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INTEGRATING E-BUSINESS MODELS FOR GOVERNMENT SOLUTIONS

Citizen-Centric Service Oriented Methodologies and Processes



Susheel Chhabra & Muneesh Kumar

Integrating E-Business Models for Government Solutions: Citizen-Centric Service Oriented Methodologies and Processes

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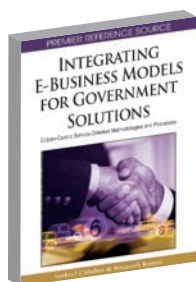
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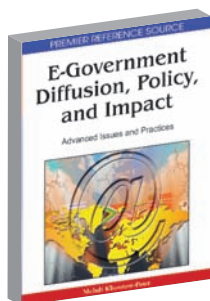


Integrating E-Business Models for Government Solutions: Citizen-Centric Service Oriented Methodologies and Processes

Susheel Chhabra, Lal Bahadur Shastri Institute of Management, India
Muneesh Kumar, University of Delhi, India

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The expectations of citizens in delivery of services by government institutions have increased over the last decade. Although, governments all over the world are involved in transforming methodologies and processes to satisfy their stakeholders, still there are problems which are causing distress and waste of valuable resources. Integrating E-Business Models for Government Solutions: Citizen-Centric Service Oriented Methodologies and Processes provides a unique collection of essential tools and alternative e-business strategies that can be incorporated into e-government solutions. The goal is to help in evolving effective methodologies and processes and consequently provide cost effective and citizen-centric services. Useful to scholars, researchers, and academic institutions, this book will enable readers to examine current issues and promote research initiatives to improve service delivery in e-government.



E-Government Diffusion, Policy, and Impact: Advanced Issues and Practices

Mehdi Khosrow-Pour, Information Resources Management Association, USA

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As governmental entities face accelerating public demand for electronic services and the internal need to utilize technology to achieve superior outcomes and operational efficiency, traditional techniques and tools are radically reshaping and evolving into innovative electronic methods of conducting governmental activities. E-Government Diffusion, Policy, and Impact: Advanced Issues and Practices sheds light on how e-government technologies are shaping today's knowledge society from the ground roots of the citizen experience to the supreme level of policy and decision making. With chapters providing insights into such critical topics as public service delivery, technological diffusion, and e-readiness, this publication offers researchers, students, policy makers, and practitioners a quality depiction of worldwide social practice and how advancements within the realm of technology will affect all corners of the globe.



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Donald Norris; University of Maryland Baltimore County, USA

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In today's dynamic society, the transformation of government operations is considered to be the first step to realize value from e-government initiatives. Using an extensive literature review of existing citizen-centric approaches, the authors have felt the need to use an additional approach to integrate e-business models into e-government solutions. Using a value chain analysis approach, an "E-Serve Value Chain Model" is suggested in this chapter. The model conveys that the government transformation, in which commercialization and specialization are essential parts, is the first step to integrate e-business models into e-government applications.

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There is a need to create synchronization between efforts of communities of developers, and users' requirements to participate in open-ended ventures in order to allow creation of collaborative networks for e-government. The authors, in the context of European IST Project, Semantic-Gov have proposed a unique tool "Mirinda" a solution for leveraging both types of benefits of the interactive elements between the communities of developers on the one hand, and the communities of the users on the other.

The suggested e-business model facilitates government functionaries to mobilize citizens to participate in value creation, and to bring a subjective richness to decision-making problems often faced by the public administrators.

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Treasury Computerization in India: A Case Study..... 34

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Using stage models to predict growth of e-government initiatives are used to be beneficial for agencies to implement e-government projects successfully. The authors, using a case study have examined stages of growth of e-government in the financial treasuries of Faridabad “District Treasury” in Haryana State of India. The scholars, using two models, Nolan’s Model and the Laynee & Lee model, have concluded that these models converge at various points in the context of a “District Treasury”. The technology life-cycle is identified as an important determinant in predicting the growth of e-government initiatives.

Chapter IV

Interoperability in E-Government: Stages of Growth..... 50

Petter Gottschalk, Norwegian School of Management, Norway

Hans Solli-Sæther, Norwegian School of Management, Norway

Keeping in view, diverse technologies and processes, interoperability in e-government has become an immediate requirement for e-government solutions. There is a need to guide e-government projects professionally to achieve better performances in interoperability, especially by tuning them to the demands of stakeholders. In this chapter, the authors, as a part of the “Semicolon Project” supported by the Norwegian Research Council, have suggested a stage model for e-government interoperability. The benefits of this approach can be expected by systematically developing interoperability in terms of work processes, knowledge sharing, value creation, and ultimately strategy alignment. The practitioners, using this approach can diagnose the current situation and plan for future improvements in interoperability.

Chapter V

Towards an Organizationally Enabled E-Government Enterprise Architecture 67

Tagelsir Mohamed Gasmelseid, Sudan University of Science and Technology, Sudan

The organization is the root of e-government activities and derives the public service administration processes. The proper orientation of organizational dimensions is required to successfully design e-government solutions. By the use of e-government in Sudan as a case study, the author has suggested organizationally-enabled enterprise architecture. The architecture spells out a requirement of thorough understanding of organizational ecosystem of the entire e-government projects as well as its components to improve the organizational dimensions, and for addressing the determinants of citizen service accesses.

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<i>Tuyen Thanh Nguyen, Ministry of Information and Communications, Vietnam</i>	
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The base of a responsive government is the readiness of its citizens in using e-government services. The authors, using in-depth interviews of citizens in various regions of Vietnam, have examined the capacity of citizens to become effective users of e-government services. The research study indicates that the Internet users and non-users are not identical in their needs and capacities, e-government approaches should not be the same for everyone but rather be customized to take account of the special needs of groups of citizens.

Chapter VII

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<i>Kalpna Chauhan, University of Delhi, India</i>	
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The Customer Relationship Management (CRM) approach for providing effective services to customers has been used in the private sector successfully over a last decade. In this Internet savvy environment, there is a need to use this approach in e-government sector as well. In this chapter, using an extensive literature review, the authors have identified critical aspects of relationship management with citizens and suggested a conceptual framework for CRM in e-government. Using this framework, the governments can configure their services that reflect the needs and preferences of clearly identifiable groups of citizens.

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<i>Susana Berenice Vidrio Barón, Universidad de Colima, México & Iowa State University, USA</i>	

The Web site has become a strategic window for the success of e-government in this global environment. There is a need to give proper emphasis to “culture” in the Web site design process that plays a key role when it comes to user acceptance of e-government services. The author, using Human Computer Interaction (HCI) methodology, reviewing the major aspects of Web site design, and assessing various Web sites, has developed a correlation matrix of national dimensions and the Web site features. The best approach for designing a Web site is to incorporate a model of “pervasive usability” or user-centered into the design and production processes.

Chapter IX

E-Government: Good Deliverance through Effective Performance Management..... 138

Shefali Nandan, Motilal Nehru National Institute of Technology, Allahabad, India

The availability and effective delivery of e-government services is required to satisfy the demands of citizens. Without a suitable performance management mechanism in the public sector, effective delivery of e-government services cannot be ensured. The author, after identifying key issues involved, and literature support has suggested a performance management framework for achieving good deliverance in e-government. The model helps policy makers to design a comprehensive program for planning, implementing, and sustaining e-government.

Chapter X

The Governance of Integrated Service Delivery in Canada: An Examination of Service
Canada's New Business Model..... 165

Jeffrey Roy, Dalhousie University, Canada

Integrated e-government service delivery system helps citizens to complete all service related transactions at one place. Using a case study of Service Canada's New Business Model, the author provides a critical assessment of both the Canadian federal government's experience to date, and the prospects of success for service Canada, an entity for citizen-centered service delivery in a multi-channel environment. Using the experiences of Canada's new business model, the governments can engage their stakeholders to create awareness, dialogue, and incorporate innovation in terms of how decisions are made, how authority and responsibilities are chalked out and shared. The model helps to achieve more effective policy outcomes and in return efficient e-government services.

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Breaking Mind Inertia for Humane Business through E-Governance..... 179

Sangeeta Sharma, University of Rajasthan, India

E-government provides various means of reaching people using diverse technological tools. These tools can be used to penetrate the individual's psyche, to set the right direction to facilitate shift of focus from excessive materialism to humane business for designing effective service oriented methodologies and processes. The author, using her own experience, and through an extensive literature review has suggested a "Neo-Ethical Business Framework". The framework helps to understand three important issues for e-government development at three different levels viz., at cognition level, at activity level, and at business level.

Chapter XII

E-Participation in Local Government Decision Making: Swedish and Australian Case Studies.....	195
<i>Peter Demediuk, Victoria University, Australia</i>	
<i>Rolf Solli, Goteborg University, Sweden</i>	

Understanding the requirement of citizens is the base of designing and developing effective e-government services. E-participation, as a service-oriented methodology facilitates citizens to use their knowledge and capabilities to better shape their lives and communities. The authors, using Swedish and Australian case studies, have sketched the nature and effect of e-participation activities that occur as a part of local government initiative to involve citizens in a council decision making. The governments, using new ways of listening to the voice of people, can fill the gap in the knowledge about what works, what does not work and why. The closer study of this approach helps to inform future policy and action in e-government.

Chapter XIII

The Role of Knowledge Management Security Requirements for E-Government	211
<i>Pauline Ratnasingam, University of Central Missouri, USA</i>	

The management of a vast knowledge as a comprehensive storage as well as its security requirements are growing rapidly with the expansion and integration of e-government services. The author, using theory of knowledge management, and security requirements, has suggested an integrated e-government framework. The framework assists the government functionaries in having a common shared understanding of all e-government stakeholders for knowledge management and security expectations. The framework provides the availability of technical support from e-government security officers and managing public records efficiently.

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With the integration of e-government services, the e-government projects are moving towards enterprise-level development initiatives. There is a need to suggest service-oriented processes in a larger setup to provide a context for the development of e-government systems. The authors in this chapter have developed a framework for identification of suitable processes for the development of information systems in a e-larger government set-up. The development of e-government system is illustrated using Konkan Railways enterprise systems, which led to learning for the development and implementation of large information systems in the railroads. The learning from this chapter can be of substantial value in developing a sound theoretical framework for information technology management practices in the government services sector in developing countries.

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David Donnan, Thales Services – Theresis, France

Joseph Latanicki, Thales Services – Theresis, France

A robust methodology brings trust and confidence among citizens for using e-government services fearlessly in this Internet-enabled environment. The authors in this chapter have suggested IMPRESS, a tool which supports integrated framework for security-aware software engineering. The tool is further supported by automated transformations and validations. The base of this system is semantic descriptions and formal methods resulted from the research in the SERENITY Project. It centers on the precise description of reusable security and dependability solutions (S&D solutions) stored in the form of S&D patterns. The tool is illustrated in an e-government scenario in which it is possible to access e-government services in a secure and trusted way, and through multiple channels.

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Foreword

E-government has got into the political agenda of several countries, with its promise of bringing-in efficiency, effectiveness, transparency, and convenience in the functioning of the governments. E-government makes a unique appeal to the leaders, administrators, and citizens alike. The essence of e-government is to enhance the value of governance to the citizens through transforming the basic relationships between the government and the citizens. While the concept of e-government is about a decade old, we have yet to see an example of the realization of its full potential in any country. The theory and practice of e-government is still evolving, though at a fast pace in the recent years. This publication on e-government which is a compilation of the works of eminent researchers across the globe, has come at an opportune time when several countries are enhancing their e-government budgets significantly.

It is now well recognized and accepted that e-government is not about technology but about the transformation it can bring about in the quality of public services. The principles of e-government can be applied with benefit in all the sectors and geographies, where governance is relevant. To create the desired impact, e-government has to be conceptualized, designed, developed, and implemented in a holistic manner that has at least four dimensions, namely – people, process, technology, and resources, which are like the four pillars of the e-government. Interestingly, this compilation provides useful and thought-provoking ideas in all these four areas.

Process transformation, which is critical to success in the e-government space, has to do with enhancing or creating value for the citizens. The most important step in valuecreation is identifying and defining what the value is to the citizen. Most often, e-government initiatives that have ignored defining “what” precisely has failed. Next in the sequence are the questions relating to “how” and “who”. It is necessary for the e-government policy makers and planners to be clear on how to convert their vision and objectives into tangible outcomes through a step-by-step procedure which could be tedious, time consuming, and hence, avoided at times. “Value creation, Consultation, Voice of customer, and Participative development” are the concepts which have been treated in this book.

Deployment of technology, as an essential component of e-government brings with it, a host of concerns like technology management, information security, privacy, confidentiality and strategic control of the government and over critical and sensitive information assets. In the rapidly expanding world of e-government where multiple agencies are adopting rapid implementation methodologies to contract the “time-to-benefit”, lack of focus on interoperability, will definitely lead to creation of islands in the medium and long run. While adoption of standards is the generic solution, the issue of interoperability in Chapter IV of the compilation addresses is deeper. In the technology dimension, concepts such as knowledge management, security-aware software engineering, and usability, are extremely relevant in developing the e-government projects.

The sustainability of an e-government initiative is directly linked to the business model or implementation model adopted. Some of the chapters in the book touch upon the need to adopt the models

prevalent in the corporate world for achieving cost effectiveness and customer centricity. The need for looking at Public Private Partnerships as a viable option for delivering the public services has been widely recognized widely recently. We have examples of the PPP model being deployed enterprise wide for delivery of public services online.

I am sure that this compilation of research works of researchers, consultants, administrators, developers, and eminent academicians will be an extremely valuable addition to the library of knowledge on e-government and would be useful to practitioners, consultants, and academicians alike.

J. Satyanarayana

National Institute for Smart Government (NISG), India

Preface

Citizens' expectations in getting effective e-government services have been amplified with the increased awareness and use of Web-based applications. Although, governments all over the world are putting their best to satisfy citizens, still, there are problems, which are the basis of distress and waste of valuable resources.

The major reasons responsible for causing distress among e-government initiatives include adoption of non-integrated and technology-oriented approaches for the design and development of e-government models, obsolete processes, insufficient infrastructure, mismanagement, non-participative style, knowledge management chaos, and security related issues. Therefore, there is a need to reorient e-government initiatives professionally to achieve superior performances.

The governments can achieve best results by being unique in their offer and delivery of e-government services. They should do something that no other institution does, using ways that no other institution can duplicate. When a business model is oriented for providing services to citizens, and is difficult to replicate, such a model offers unique advantages for the governments and the society.

In the present dynamic environment, the use of e-business models can help in orienting e-government initiatives towards customers and generate greater value for them. Incorporating experiences of effective e-business models into government applications can be an ideal strategy in providing citizen-centric services.

The objective of this book is to examine issues and promote research initiatives in the area of effectiveness in e-government by suggesting integrated e-business models for government solutions, through citizen-centric service-oriented methodologies and processes.

The book is useful for policy makers, consultants, software vendors, researchers, scholars, and academicians all over the world. The policy makers will get unique e-business models to provide citizen-centric e-government services and the consultants and software vendors can visualize innovative solutions to design and implement e-government solutions. The researchers, scholars, and academicians will be able to examine current issues and promote research initiatives pertaining to bringing effectiveness in e-government services.

The call for chapters was sent to 700 research institutions, consultants, academicians, and industry experts all the over world, that attracted enormous interest in addressing various e-government issues. After a stringent blind refereeing process and coupled with well-focused persuasive, qualitative IGI Global's book editing style, 15 contributions were selected for publication in this book.

The book is logically sequenced into three sections to examine major e-government themes: Section I proposes E-Business Models for Government Solutions, Section II suggests methods of Delivering Citizen-Centric Services, and Section III makes a journey toward E-Government: Methodologies and Processes.

SECTION I. INTEGRATED E-BUSINESS MODELS FOR GOVERNMENT SOLUTIONS

Society is gearing-up to meet the changing requirements of people. Therefore, the governments can no longer remain mute spectators towards providing services to citizens in this dynamic and challenging environment. There is a need of integrated e-business models for government solutions in order to provide citizen-centric services. Hai Thi Thanh Nguyen, and Toshio Obi, Japan, starts off in “Government Transformation: The First Step to Integrate E-Business into E-Government” with a dialogue on incorporate e-business models into e-government applications in order to bring transformation in government and building an integrated citizen-centric strategy. Nguyen and Obi have used a value chain analysis model to prove that this approach can overcome the weaknesses of the current approaches such as the one-stop service centers and customer relationship management. They have suggested the E-Serve Value Chain Model for citizen-centric services, a model that helps to find effective e-government solutions to bring specialization into a single or group of related e-government services. The authors have felt the need to bring commercialization in e-government initiatives to allow for the participation of the private sector in order to create the sufficient pre-conditions for integration of e-business models.

The communities of developers and users of e-government services remain estranged due to governments’ bureaucratic procedures. There is a strong need to bring synchronization and integration between citizens’ requirements and efforts of developers in generating value of e-government initiatives. Vasiliki Moumtzi, Marios Chatzidimitriou, and Adamantios Koumpis, Greece, in their contribution on “Collaborative E-Gov networks: The Case of the Semantic-Gov Project,” have proposed a unique tool called “Miranda” as a possible solution for leveraging both types of the interactive elements between the communities of developers on the one hand, and the communities of the users on the other hand, in the context of the European IST Project SemanticGov (www.semantic-gov.org). They have suggested a unique e-business model, which mobilizes citizens to participate in value creation, and empowers them to synthesize composite products. According to authors, the framework is expected to bring a subjective richness to decision-making problems often faced by the public administrators.

The prediction of future stages of growth helps policy makers to design effective e-business models for government solutions. S. Siddharth, Rajat K. Baisya, and M. P. Gupta, India, in “Treasury Computerization in India: A Case Study” have examined stages of growth in e-government in the financial treasuries of Faridabad District Treasury in Haryana State of India. The basic objective of this research study was to identify points of convergence among various stages of growth in a Treasury. The growth has been mapped onto two models, namely the Nolan’s Model and the Laynee & Lee model. The study highlights that these models of growth converge at various points. Another important point brought into light by this research is that technology life cycle as an important factor in predicting this growth. The chapter also throws up other issues for research as to what factors other than the technology could be the factors of growth.

Interoperability of e-government systems and services has become an imperative research agenda for the conceptualization of effective e-government initiatives. Interoperability helps to integrate government information resources and processes to enable interoperability of government institutions. Petter Gottschalk & Hans Solli-Sæther, Norway, in “Interoperability in E-Government: Stages of Growth,” have suggested a stage model for e-government interoperability. According to authors, the success of interoperability projects depends on meeting the needs of stakeholders. These projects need to be guided by a direction to achieve better performances. The desired benefits can be expected by systematically developing interoperability in terms of work process, knowledge sharing, value creation, and ultimately strategy alignment.

There is an urgent requirement of managing e-government projects professionally to design integrated e-business models for government solutions. Especially, in developing countries, many e-government projects are being approached differently in accordance with the organizational and managerial dimensions that derive the entire public service administration. Tagelsir Mohamed Gasmelseid, Sudan, in “Towards an Organizationally Enabled E-Government Enterprise Architecture,” has emphasized the need for thorough understanding of organizational ecosystem of the entire e-government projects as well as its components, to improve the organization structure, and for addressing the determinants of citizen service accesses. Gasmelseid has suggested organizationally-enabled enterprise architecture through a case study of Sudan. The author has also felt the importance of enriching the entire e-government architecture with organizational dimensions in pursuit of improving the potential of success of e-government initiatives.

SECTION II. TOWARDS CITIZEN-CENTRIC SERVICES FOR GOVERNMENT

The existing approach of providing citizen-centric services for government, needs re-examination in order to provide real value for citizens. This task can become easy, if governments can first understand citizens’ e-readiness for building responsive government. Tuyen Thanh Nguyen, Vietnam, and Don Elkin Schauder, Australia, in “Understanding Citizens’ E-Readiness as a Precondition to Building a Responsive E-Government: A Case Study of Vietnam” have expressed the need to “careful thinking” as a precondition for successful development of e-government in a country, particularly the e-readiness of the population. Nguyen & Schauder, in their thought provoking contribution, have highlighted the results of in-depth interviews of citizens in various regions of Vietnam to examine the capacity of citizens to become effective users of e-government services. The study indicates that Internet users and non-users are not identical in their needs and capacities; e-government approaches should not be the same for everyone but rather be customized to take account of the special needs of groups of citizens.

To be sensitive towards the needs of citizens, use of Customer Relationship Management (CRM) in e-government has become the order of the day. CRM helps in understanding customer needs by customizing e-government services on a one-to-one basis. Kalpana Chauhan and K. B. C. Saxena, India, in “CRM in E-Government: Issues and Challenges” have identified critical aspects of relationship management with citizens and suggested a conceptual framework for CRM in e-government. According to the authors, CRM has become strategically significant in promoting e-government acceptance in which citizens can better express their requirements. Further, there is a need to assemble user-related information to develop insights about the characteristics, needs, and preferences of services in order to achieve these objectives. Using these insights, governments can configure their services that reflect the needs and preferences of clearly identifiable groups of citizens.

It has become strategically important to search for innovative ways to enhance the user’s experience when it comes to navigation, exploration, and finding information on the Internet. The Web site is considered to be the preferred resource to seek e-government services by the citizens. Susana Berenice Vidrio Barón, México, in “Human-Computer Interaction: National Culture and Electronic Government Web site Usability” has expressed the need to consider the value of “culture” that plays a key role when it comes to user acceptance of e-government services. The user interface development process in the Web site should focus on understanding users, and their individual differences. According to the author, users’ profile and perspectives should be considered throughout the process of Web site design. The best approach suggested in this chapter is to incorporate a model of “pervasive usability” into the Web site design and production processes.

Effective management of Human Resource, especially performance management in the public sector, has become critical to improve e-delivery service mechanisms. Shefali Nandan, India, in “E-Government: Good Deliverance through Effective Performance Management” has suggested a model of achieving good deliverance in e-government through performance management. According to the author, the current challenge of governments is to create a system of good governance that promotes, supports, and sustains human development, especially for the poor and the marginalized. Thus, effective performance management leads to good deliverance which in turn leads to citizen-centric services. Good governance is participatory, transparent, and accountable. Nandan has expressed the need to design a comprehensive program for planning, implementing, and sustaining e-government, of which performance management can be considered as a key component for success.

Web-enabled service delivery system for government requires close coordination with vertical & horizontal integration of internal as well as external stakeholders. Jeffrey Roy, Canada, in “The Governance of Integrated Service Delivery in Canada: An Examination of Service Canada’s New Business Model”, has given a critical assessment of both the Canadian federal government’s experience to date, and the prospects of success for Service Canada in a multi-channel environment. The citizen-centered business model suggested is based on the premise that in order to optimally create service value and better outcomes for the public, government organizations must adapt accordingly. According to Roy, Service Canada is engaging all stakeholders, both internally and externally, in order to foster greater awareness, dialogue, and innovation in terms of how decisions are made, how authority and responsibilities are parceled out and shared, and thus how best to achieve more effective policy outcomes and efficient services.

SECTION III. SERVICE ORIENTED METHODOLOGIES AND PROCESSES

The technological proliferations have facilitated the penetration into individuals’ psyche; if utilized properly can set the right direction to build a balanced society. The mind inertia refers to the lethargic state of minds of commercial people where they do not think beyond the context of materialism. This inertia needs to be broken before molding the mindsets of people in e-government for developing successful service-oriented methodologies and processes. Sangeeta Sharma, India, in her chapter on “Breaking Mind Inertia for Humane Business Through E-Governance” has highlighted three important issues to understand the mechanics of breaking mind inertia at three different levels viz., at cognition level; at activity level, and at business level. The author has examined the possibilities of penetrating the mind of individual’s psyche to facilitate shift of his focus from excessive materialism to humane business by suggesting a “Neo-Ethical Business Framework”.

E-participation in decision-making reflects the actual desire of citizens to expect value-added services from government. E-participation as a service-oriented methodology has a great potential in e-government in which citizens individually and collectively are able to use their knowledge and capabilities to shape their lives and communities. Peter Demediuk, Australia, and Rolf Solli, Sweden, in “E-Participation in Local Government Decision Making: Swedish and Australian Case Studies,” have outlined the nature and effect of e-participation activities that occur as a part of local government initiatives to involve citizens in council decision making. The research presents a contextual analysis of e-participation within an Australian and a Swedish local government reform initiative. According to the authors, governments must find new ways of listening to the voice of people, as there is a gap in the knowledge about what works, what does not work, and why, so closer study of practices is required in order to inform future policy and action.

The knowledge management and security requirements in e-government have gained wider implication in today's information-based society. Hence, the requirement of a framework to manage these processes becomes imperative in order to design citizen-centric services. Pauline Ratnasingam, USA, in "The Role of Knowledge Management Security Requirements for E-Government," drawing upon the theory of knowledge management, and security requirements, has suggested an integrated framework. The author has expressed the need to have a common shared understanding of all e-government stakeholders as to the knowledge management and security expectations. This will provide the availability of technical support from e-government security officers and managing up to date public records.

Efforts to develop enterprise level e-government systems spanning large number of transactions have met with limited success. Therefore, there is a need to suggest a service-oriented methodology in a larger setup to provide a context for the development of e-government systems. Sanjay Nayyar, Vinayshil Gautam, and M. P. Gupta in "A Study of Information Systems in Indian Railways with Specific Reference to Konkan Railway Application Package," have developed a framework for identification of suitable methodologies and processes for the development of information systems in a larger e-government set-up. Further, specific reference is given to the Konkan Railways enterprise systems which led to learning for development and implementation of large information systems in the railroads. According to the authors, the learning could be of substantial value in developing a sound theoretical framework for information technology management practices in the government services sector in the developing countries.

In the final contribution on "Security Aware Development of E-Government Systems", Daniel Serrano and Antonio Maña, Spain, and Gimena Pujol, David Donnan, and Joseph Latanicki, France, have suggested IMPRESS, a tool which supports integrated framework for security-aware software engineering, further supported by automated transformations and validations. According to authors, IMPRESS is based on semantic description mechanisms and formal methods resulted from the research in the SERENITY Project, and it centers on the precise description of reusable security and dependability solutions (S&D solutions) stored in the form of S&D patterns. The authors have also explained an e-government scenario and how its development could be done using the proposed development process. Using this tool, it is possible to access e-government services in a secure and trusted way, and through multiple channels.

The need for making e-government initiatives more effective and efficient cannot be over-emphasized. Unfortunately, there is a dearth of standard e-business models and techniques that can be suggested for such initiatives and there is hardly any experience to fall back upon while planning for such initiatives. Integrating e-business models with the conception, design, and implementation of e-government solutions can go a long way in discovering alternative strategies for achieving the objectives of such initiatives.

The book has made a modest attempt to suggest e-business models that can be used in various e-government applications for citizen-centric service-oriented methodologies and processes. Some of the important e-government issues addressed in this book include breaking mind inertia, e-participation, citizen's e-readiness, government transformation, interoperability, collaborative networks, integrated service delivery mechanisms, use of CRM in e-government, human-computer interaction, effective performance management, role of knowledge management security requirements for e-government, and organizationally enabled architecture.

While the craze of e-government continues among governments, one needs to have a critical view of alternative e-business models that can be integrated into e-government solutions and evolve methodologies and processes that can help in making these projects more citizen centric, transparent, and improve accountability of government.

We hope the readers will find this book informative, thought provoking, theoretically challenging, and practically useful. We welcome any comments, feedback, suggestions, and constructive criticisms.

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Section I

Integrated E–Business Models for Government Solutions

Chapter I

Government Transformation: The First Step to Integrate E-Business into E-Government

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ABSTRACT

The incorporation of e-business models into e-government applications is an additional approach in building the citizen-centric strategy. The value chain analysis is used to prove that the additional approach can overcome the weaknesses of the main current approaches such as the one-stop service centers and customer management relationship. However, this incorporation is challenged due to the differences between governments and businesses. The value chain analysis assists to find out solutions, which are specialization into a single or group of related services and commercialization allowing the participation of the private sector in carrying e-government initiatives, in order to create the sufficient pre-conditions for integration of e-business models. In other words, government transformation in which commercialization and specialization are the essential parts is the first step to integrate e-business models into e-government applications.

INTRODUCTION

Recently, an increasing number of countries around the world apply Information Communication Technology (ICT) into their administration in order to improve their efficiency and provide better public services via Internet. For instance, in 2001, one of the President's Management

Agenda initiatives in the Bush Administration is *Expanding Electronic Government*, which focuses on “modernizing Information Technology (IT) investments within agencies using the principles of e-business (and) integrating IT investments across agencies centered around groups of citizens” (Executive Office of the President of the United States, 2003, p. 2). However, results

of the e-government initiatives are mostly not as good as the expectation. The number of online public service users is very low compared to the huge amount of capital invested on e-government projects. Particularly, Heeks (2002 & 2003) found that more than 60% of e-government initiatives in developing countries was partly or completely failure. Hence, the contemporary e-government research is nowadays concentrating on exploring the critical success factors which are defined as those few key areas where things must go right for programs to proper (Dubelaar et, al., 2005). Among other factors, the need of a citizen-centric view when providing e-services is currently taking attention of not only researchers but also policy-makers. For example, the e-Japan initiative has been evaluated as its operation was mostly from the supply-side point of view, and thus, it could not be always in sync with the needs and requirements of citizens. Moreover, the private sector with the customer-centric strategy has reaped success as proved by the growth and global expansion of eBay and Amazon. Therefore, within this chapter, we will discuss how incorporate the customer-centric e-business into citizen-centric e-government to make the targets of e-government feasible.

RESEARCH METHODOLOGY AND MODEL

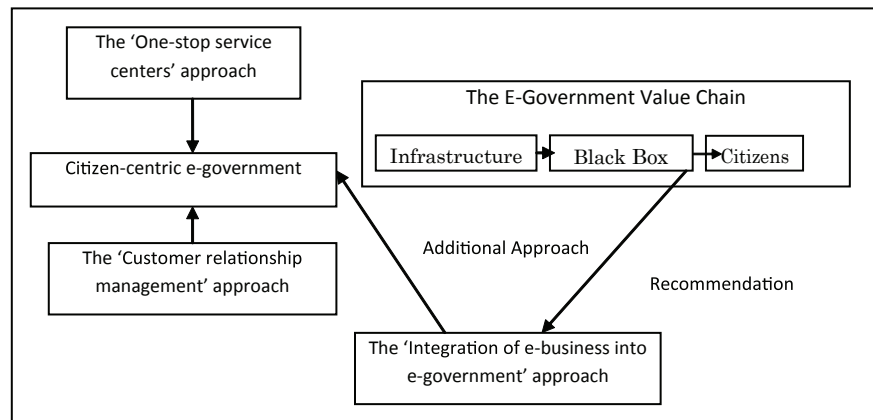
While the citizen-centric strategy can be traced farther back in public administration reform (PAR), the ICT potentials for PAR have recently given new attention (Kubicek & Hagen, 2004). Therefore, the first step in this chapter is reviewing the citizen-centric e-government literature to understand the insufficient of the current approaches. The summary of literature review and comparison is displayed in the following table.

The findings from the comparison point that we need an additional approach to fill in the gaps which current methods leave since these gaps are the cause of partly failure in citizen-centric e-government projects. In fact, both e-government and e-business are currently orienting to the strategies which focus on meeting the demand of online-users and the growth and global expansion of many companies such as eBay, Google, Amazon and Tesco (Timmers, 1998) has proved the relevancy of the customer-centric model in the private sector. Hence, the idea of bringing the citizen-centric e-business model into government operation is a new and creative approach. However, the differences between businesses and governments challenge the ability of realizing this idea. To overcome these obstacles, the value

Table 1. Citizen-centric e-government approach comparison

Requirements	Customer Relationship Management	One-stop service centers	An additional Approach
Focus on citizen needs	Yes	Yes	No change
Focus on both front system and back end	No (i.e only front systems)	Yes	Yes (Need Integration)
Required realistic level of government capacity	Yes	No (i.e required huge amount of time and effort)	Yes

Figure 1. Research model



chain analysis will be used to identify and evaluates weaknesses in process of providing services in the e-business and e-government. The value chain model also assists to have the comparative study of the phenomena of e-business and e-government that would most likely be instrumental in fostering cross-fertilization between the two evolutionary trajectories (Hazlett & Hill, 2003; Nahon & Scholl, 2007). Finally, findings from the value chain analysis will suggest solutions to incorporate e-business models into e-government applications. The research methodology is presented in the Figure 1 below.

CITIZEN-CENTRIC E-GOVERNMENT APPROACHES

The citizen-centric strategy is usually expressed by how government toward citizens. Following describes two popular approaches to implement the citizen-centric e-government strategy.

The 'Customer Relationship Management' Approach

The citizen-centric e-government is concerned with providing quality public services and value-

added information to meet the demand of citizens. To meet the citizen's demand we firstly need to understand their needs and preferences. This understanding has been the core element of the customer relationship management (CRM) in the business world. CRM also becomes strategically significant in promoting e-government acceptance by proving tools such as forums or marketing surveys for both public agencies and their citizens to meet each other's precise requirements (IBM Business Consulting Services, 2002; Pan et al., 2006). However, managing the customer/citizen relationship in order to increase the e-service adoption is different between business and government. For instance, in e-business context, websites are often designed to be really attractive to keep a customer's loyalty as long as possible, and encourage customers to return to buy products. In contrast, the citizens probably use the public service only one, even less than one per year when they have to fulfill their duties such as tax payment, birth or license registration. Therefore, the target of citizen relationship management in e-government should not be the number times of uses but the change from the off-line into on-line use (Davison et al., 2005). Then, improving the ease of use and friendly website design is one of the solutions for e-government services (ACT/IAC,

2005). However, notably, the absence of market incentives, the need for higher levels of accountability, the existence of multiple conflicting goals as well as the restrictive boundaries put in place by a greater set of legislation have constrained the viability of pursuing CRM within the public domain (Pan et al., 2006). In addition, based on the value chain model designed in this chapter, the citizen's relationship management which can be assisted by the front office systems is only front-activity in the value chain. *In other words, the back office systems or support activities has not been included for consideration in this approach. Hence, some scholars have suggested another approach for the citizen-centric strategy which influences the entire value chain (from supporting to primary activities) as discussed in the 'one stop service centers' approach.*

The 'One Stop Service Centers' Approach

The philosophy of transforming public service delivery to center around the needs of citizens with the assistance of ICTs rather than the structure of "government" rejuvenated the idea of "one-stop service center" in the past. From 1980s agencies involved in social services had already experimented with this alternative organization model as a way of integrating government services and operations (Kubicek & Hagen, 2004; Stauffacher, 2002). Even currently in some developing countries, the Public Administration Reform Program has the target of setting up the 'one-stop service centers', which is the only physical place citizens have to go to when they need all different government services. From this a single-contact, the request will be delivered to the related departments which have responsibility to process. The same as the comparison of the "value chain" (Porter & Millar, 1985) and "virtual value chain" (Rayport & Sviokla, 1995), the difference between 'one-stop ser-

vice centers' of 1980s decade and nowadays is the traditional, physical "one-stop" versus the modern, on-line "one-stop". In the traditional 'One-Stop-Government', services are face to face and often over the counter while with the modern 'One-Stop-Government' is the use of information and communication technologies (ICTs) to support the provision of client-centered public services (Dias & Rafael, 2006). For instance, in USA, *First-Gov.gov* provides access to 186 million web pages from federal and state governments. Similar approaches to multiple services and information portals are also found at the state level (e.g. *AccessIndiana*) or at the local level (e.g. *Bremen Online*) (Center for Technology in Government, 2003).

In order to created 'one stop service centers', the integration of public services from a citizen's point of view is necessary while it is very difficult to integrate in practice. This process goes beyond a technical issue concerned with linking up computer networks to the administrative re-organization for the seamless delivery of online services. However, such efforts often faced bureaucratic resistance and slack resource constraints. Even though some scholars (e.g. Ho, 2002; Kubicek & Hagen, 2004) stated that a massive reorganization and consolidation of personnel is not required because of the assistance of ICTs, the bureaucratic systems which are still based on functional operations persist in many public services nowadays. In deed, public administration has a general reputation for functional insularity and the tendency not integrates service provisioning across government departments when responding to citizen' needs. It is suggested that the cause of this functional insularity is intrinsically associated with inherent difficulties associated with integrating operational procedures and information systems, which may not be computer-based, among individual government

agencies, departments and bureau (Davison et al., 2005). *The 'One stop service centers' approach obviously expresses the idea of providing many services attached diversified targets in one place i.e. one website whereas the challenges in co-operation and collaboration are rather difficult to solve only by assistance of ICTs in the public sector.*

The Incorporation of E-Business into E-Government approach

The above literature review point that the current approaches have the limitation and the need of the additional approach which overcomes their weaknesses. The success experience of the private sector in applying ICTs is useful for the citizen-centric e-government since understanding and learning from the experiences of the private sector can be a useful way to progress (e.g. Hazlett & Hill, 2003; Nahon & Scholl, 2007). However, public agencies, unlike their private counterparts, are heavily influenced by politics (Ni & Bretschneider, 2007). Therefore, the rest of this chapter will focus on proving how the additional approach is more effective than other approaches in building the citizen centric e-government and bridging the gap between the customer-centric e-business and citizen-centric e-government.

E-GOVERNMENT AND E-BUSINESS DEFINITIONS

E-Government

There are many different definitions of e-government and e-business (e.g. Schubert & Häusler, 2001; Siau & Long, 2005; United Nation, 2005; World Bank, 2007; Yong, 2005). In fact, e-government means different things for different people. Some simply define it as the creation of a website where information about political and governmental issues is presented or the engage-

ment in digital transactions with citizens. Box 1 provides a synthesis of the principal definitions of e-government used in the existing literature.

Box 1: Definitions of E-Government

- **Schubert & Häusler, 2001:** E-government includes the governmental task of setting a valid legal framework for the effective use of the electronic media in a society as well as the application of these media for public procurement, services to companies and citizens and the management of the internal organization (p. 3, E-Government meets E-Business: A Portal Site for Startup Companies in Switzerland Proceedings of the 34th Hawaii International Conference on System Sciences, 2001)
- **Siau & Long, 2005:** E-government can be regarded as a sophisticated and integrated portal to connect internal governing and external users (p. 444, Synthesizing e-government stage models-a meta-synthesis based on meta-ethnography approach, Industrial Management & Data Systems, 2005, 105, 3/4, ABI/INFORM Global)
- **United Nation, 2005:** E-Government [...] encompasses the capacity and the willingness of the public sector to deploy ICT for improving knowledge and information in the service of the citizens. Capacity espouses financial, infrastructural, human capital, regulatory, administrative and systemic capability of the state. The willingness, on part of the government, to provide information and knowledge for the empowerment of the citizen is a testament to the government's commitment (p.13, UN Global E-Government Readiness Report, 2005).
- **World Bank, 2007:** "E-Government" refers to the use by government agencies of information technologies (such as

Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government... (Retrieved 1st April, 2008 from <http://go.worldbank.org/M1JHE0Z280>)

- **Yong, 2005**, The use of technology by government to enhance access to and delivery of public services to benefit citizens, business partners and employees has been labeled “Electronic Government” or e-Government for short. (p.11, Enabling Public Sector Reform, e-government in Asia, 2005)

Although there are different views on the concept of e-government, the crucial element of all definitions is the use of ICT tools by government agents to be able to provide the public services effectively and efficiently.

E-Business

Regarding e-business, the definitions also are many and varied. When the term e-business was first introduced, it was understood as simple as transactions over the Internet. However, as e-business evolves, the horizon of e-business expands as the conduct of selling, buying, logistics, or other organization-management activities via the Web (Sung, 2006). A principal synthesis of e-business definitions is gathered in the Box 2 following.

Box 2: Definitions of E-Business

- **Amit & Zott, 2001**: E-business is referred to business conducted over the Internet, with its dynamic, rapidly growing, and highly competitive characteristics, promises new avenues for the creation of wealth (p.493, Value creation in e-business, Strategic Management Journal, 2001)
- **Clarke, 2003**: e-business is the conduct of business generally, with the assistance of telecommunications and telecommuni-

cations-based tools (p.6, *If e-business is different, then so is research in e-business in Seeking Success in E-business*, Kluwer Academic Publishers, Boston, Massachusetts, 2003)

- **Schubert & Häusler, 2001**: E-business is a business model and focuses on the support of processes and relationships between business partners, employees and customers by means of electronic media (p.1, E-Government meets E-Business: A Portal Site for Startup Companies in Switzerland Proceedings of the 34th Hawaii International Conference on System Sciences, 2001)
- **Sharma, 2000**: described e-business as: “utilization of networks and near-time interactions to accomplish some combination of six core business goals: empowerment of customers, enhancement of trade, increased business agility, extension of enterprises in a virtual manner, evolution and invention of products and services, and the development of new markets and audiences” (p. 27, Strategy & Leadership, p. 27 - 31, 2000).
- **Weill & Vitale, 2001**: E-business means doing business electronically by completing business processes over open networks, thereby substituting information for physical business process (p. 5, *We have moved Place to Space: Migrating to e-business model*, Harvard Business School Press, 2001).

In summary, despite the variety of definitions, e-business can be relatively broad defined as the application of ICT tools by firms in conducting business or and providing services to customers profitably. *Based on these views, there will have three main elements in e-government and e-business models, which are the ICT infrastructure, businesses or governments, and customers or citizens.*

E-GOVERNMENT AND E-BUSINESS STAGE MODELS

In literature, many e-government and e-business stage models have been proposed (e.g Koh & Prybutok, 2003; Layne & Lee, 2001). Basically, these models have outline stages of service maturity as government and businesses embrace more of the capabilities of the Internet (Shackleton et al., 2004). Siau & Long (2005) conducted the research on five models to reveals their similarities and differences. They found that these models are similar in the field of development trends and some of the stages found in one model can share similar meanings but different names when compared to the other model. On the other side, the five models differ based on various perspectives. For example, Layne & Lee's (2001) model, of which four stages are category, transaction, vertical and horizontal integration, is "based on a general and integrated perspective that combines technical, organizational, and managerial feasibility" (Siau & Long, 2005, p. 450). Based on this view of maturity, one can therefore associate higher levels of e-government maturity with an increasing level of e-government integration (Lam, 2005). In other words, governments have to do the integrating activity to provide the e-services regardless to the maturity of the services. From the very simple services such as providing information in the website to the transaction services such as license applications, the integrating activity will move from the simple form such as the overall coordination for designing and maintaining the state web site to the complex one such as cooperation and collaboration to resolve conflicting system requirements across different organizations. *Therefore, even though the e-government stage models identify the existing linear of the maturity of government electronic service delivery, it has been described only one activity, which is the integration, in the process of e-service generation. We need an additional model which can reflect the completed chain of citizen-centric e-government.*

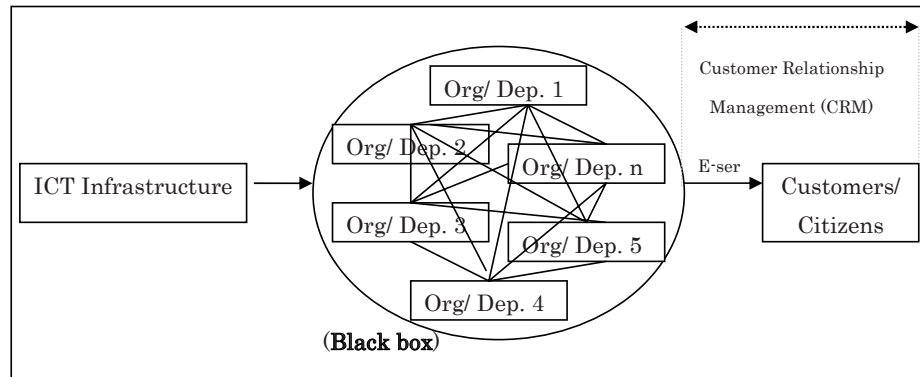
E-GOVERNMENT AND E-BUSINESS VALUE CHAIN MODEL

The value chain notion is firstly introduced by Porter and Millar nearly two decades ago. It is a powerful concept for organizations, primarily businesses to describe and identify the activities that create values for firms (Porter & Millar, 1985). Later, with the incredible growth of Internet usage for the business operation, many other scholars (e.g Amit & Zott, 1996; Barnes, 2002; Rayport & Sviokla, 1995) conducted research on the value-creation potential of e-business in a virtual environment. While the business and e-business literature discusses value chain analysis quite widely, a few scholars in both the public administration (e.g Heintzman & Marson, 2005) and E-government (e.g. Holden & Fletcher, 2005; Wassenaar, 2000) document its application to the public service delivery. In this chapter, the value chain analysis is used to unravel the complexity of e-service creation. Firstly, the e-government value chain model is built based on the combination of the above definition of e-government and e-business and the citizen-centric strategy, within which the need of citizens and customers will be the centre of focus in designing the process of delivering services.

Hence, generally, the basic model consists of 3 main components which are the infrastructure, black box and customers or citizens as illustrated in the figure 2. Compared to some other models such as Porter and Millar, 1985 or Barnes, 2002, this model integrate multiple steps of the value chain to be able to generalize for both e-business and e-government.

In the three-step process of exploiting the virtual value chain, the government and business firstly establish the ICT infrastructure as the raw material or input of producing e-services. The next concern is how different organizations can work together in supporting activities to provide e-services. Government structure is usually too complex to be easily perceived by a common user

Figure 2. The e-service value chain in citizen-centric e-government



who is probably much more interested in solving his problems in a quick and efficient way than to understand the administration's peculiarities (Dia & Aberto 2006). From the citizens' perspective, they do not want to know how complicated the procedure is for resolving any given problem. Citizens only want to have their requested demand served. Therefore, we named the space where all the necessary cooperation and collaboration are integrated both vertically and horizontally as the "Black Box". After processing in the 'Black box', the requested services will be delivered to the citizens/customers.

Infrastructures

Building infrastructure is always the first step in order to implement the e-services for both governments and businesses. They all have to consider the number of computers which their citizens/customers can afford since there is a link between the numbers of computers with the actual number of people who can use the online services. In theory, we can argue that governments are in a more powerful position to grow their market share for online services than commercial organizations since enterprisers have financial limitation in increasing the proportion

of the online users while governments can use a policy tools to disseminate ICT knowledge across society that will increase the potential market for public e-services. However, there is a reverse situation. While the private sector realizes successful cases, online services provided in e-government programs are undergoing the unstable number of users. For example, in Japan, where the infrastructure is very well-built, e-business activities recently increase both in volume and quality with some remarkable cases such as Kakuka and Asakura online companies. In contrast, results of many e-government services are less than expected. Particularly, the resident ID card which every local government started to issue resident ID card from 25th, August 2003, is completely voluntary and enables the cardholder to receive e-government services in the cyberspace. Despite its advanced characteristics, the number of issued card was only around 450,000 cards in 2005, much less than expected (Ohayama, 2005). *One of the reasons found out from the government surveys is that government policy makers have too much concentrated on the supply-side by investing heavily on infrastructure and others. Therefore, governments should redirect to the citizen-centric strategy by designing more the*

e-government promotion programs (Accenture, 2006; Okui, 2007)

Black Box

The efficiency of integrating activities in the 'black box' depends on its working environment and the level of diversity in the targets as analyzed in the followings.

Competition versus Monopoly

The competitive environment which is familiar with the private firms does not exist in many areas of the public service provision (Donnell et al., 2003). If the government operates as a monopoly, the employees' wages and bonuses do not depend on the government's performance. As a result, whereas businesses seem more dynamic and response quickly to the change or innovation, governments are bureaucracy and slow in applying the new technology to generate the competitive advantages. Furthermore, the public administration domain is characterized by a legal frame of growing density of regulations and a complex tissue of internal and external cooperation of acting entities (Davison et al., 2005). Therefore, the conditions for the re-engineering business process in the public sector seem to be rather different than the private sector as before mentioned. In fact, new societal challenges in the 90's like the globalization and new public management programs are leading the trend of more competition in the public sector as Davison et al., (2005) stated that "in the globalization environment, at a higher level, a government can also be considered to be in competition (e.g. for investment or human resources) with neighboring governments, whether in nearby cities, regions or countries" (p. 280). Many scholars and governments start considering the quality and extent of the e-government services as one of the tools for governments to compete in this new environment.

Specificity versus Diversity

Unlike e-business where firms apply information system to gear at increasing economic efficiency and profitability, the targets of e-government initiatives are simultaneously provide both economic and political efficiencies and also serve a policy mission (Nahon & Scholl, 2007). For example, a company can set a desirable marketing goal to reach only customers, who are able to afford the certain or latest technical equipments while this policies are unacceptable for a government since it is imperative to serve all citizens fairly and bridge the digital divide. Besides, the government often provides many different types of services from legal, financial to social services than the single one of commercial businesses, and frequently without payment. For example, the one-stop websites of governments provide federal or statewide information on a variety of subjects while the websites of Google or E-Bay are famous for searching engine and online auction. Obviously, achieving the diversified targets requires a significant inter-department cooperation on many issues from technology, culture to management. This obstacle is accumulated with the monopolistic environment under which the public sector works whereas the private sector pursues the single target under the competitive environment. *It is, therefore, inappropriate to extrapolate successfully e-business to the government sector without any adjustment in the operation method of the public sector.*

Citizens and Customers

Stiffer challenges in the competitive environment such as globalization and higher customer expectations forces business firms to shift from cost-efficiency strategy to meeting the demand of customers which is named the customer-centric strategy. Similarly, the theme of the citizen-centric strategy applied in e-government projects, is to transform the process of providing public service

from the agency-centric to be centered on the needs of citizens. However, the customers of government services are never ‘just’ customers, as they might be in the private sector since citizens, that is, bearers of rights and duties as subject: to pay taxes, to be drafted in armies and to respect laws or suffer the consequences. Thus, civic and public interests and rights go far beyond their service needs and rights of customers (Mintzberg, 1996). Besides, they may even be ‘involuntary clients’, whose service relationship with government derives not from choice but rather from their obligations as citizens (Heintzman & Marson, 2005). *Clearly, the nomenclature of the citizen-centric e-business cannot be paralleled completely with that of e-government without making ‘citizens’ are closer to ‘customers’.*

RECOMMENDATIONS

Specialization in a Single or Group of Public Services

From the value chain analysis, the activities in the ‘black box’ play the very important role in the citizen-centric strategy. In the one-stop service centers, the link all different front system to the one portal or one website requires the collaboration of all supporting activities from many different departments. Then, some of the ICT projects aim at facilitating the required collaboration, enhancing internal management and sharing of information to improve administration of service delivery. For example, the *New York State (NYS) GIS Coordination Program* focuses on sharing of spatial data and analytical expertise throughout state and local government agencies (Center for Technology in Government, 2003). However, the quality of services provided in the one-stop service centers cannot be guaranteed since among other reasons, staffs are not willing to cooperation and the complex public administration systems

are difficult to integrate both horizontally and vertically.

To appropriately manage the complexity in the ‘black-box’ activities, like the e-business enterpriser does by specializing in a certain sector of the economy, we recommend that e-government projects should focus on providing a single service or a group of related services to be able to be successful. Different services demand different attention on information technology aspects because of its natural services (Ni & Bretschneider, 2007). A set of criteria including the economic intendency, stability of demand, technology requirements and legal constraints can be used as guidelines for governments to categorize their services. This understanding of services must then be mapped directly with a thorough marketing of user segments in the customer relationship management (CRM). For instance, we can have a group of financial services such as tax, insurance and pension. This group, which is a similar to business characteristics, is suitable to follow the customer-centric e-business models since e-business is mainly driven by economic factors such as profits and cost saving.

Incorporation of e-business models can also be carried in other group of welfare services such as education or healthcare. This group, which contains social characteristics, has the high and stable demand, which is an important factor for the sustainable development of providing online services in e-business models. These services usually require the great amount of investment while the government’s resource is limited. Therefore, it is better to collaboration with the private sector since the service delivery such as job trainings may not be different from the similar private sector and the huge amount of capital can be shared between the private and public sector. This solution will be discussed in detail in the ‘commercialization’ part below. Finally, some e-government services involve citizen rights and security issues. For example, the group of legal services such as licenses, army and police. This

group of services is difficult to apply e-business model since they involve more to regulation and political issues and require the support of critical government operations. It should be noted that which services belonging which category depends on the circumstance of each country

Commercialization

One part in the value chain is the end-users which are customers and citizens. Thus, to integrate the success of customer-centric e-business models into e-government applications, it is necessary to move 'citizens' closer to 'customers'. This can be done if the 'black box' of e-government is less bureaucratic by the commercialization of public service delivery. The commercialization will allow the involvement of the private sector in the e-government initiative implementation. In fact, the collaboration between public and private sectors in the implementation of E-Government are increasing (Harper et al., 2004) since the public and private collaboration can have possible benefits, which included: combining accountability with efficiency; the complexity and size of e-government; the pace of implementation; resources and weathering the storm during the implementation of e-government (Raman et. al., 2007).

Sub-contracting and outsourcing are the most common collaboration methods between the public and private sectors. In these cases, the government remains accountable for a service which is totally or partially operated by the private sector. The possibility and type of private-public collaborations are influenced by the nature of public services. The public services with more competitive characteristics are more likely contracted out in order to reap economic benefits. For example, with the advent of new e-commerce business models, the Internal Revenue Service (IRS) used the Request for Agreements (RFA) to establish whether it was possible to add products to the *e-file* program through private-sector initiatives at little or no cost to the IRS (Holden, 2006). Moreover, some

services require large infrastructure investments and the collaboration with the private sector is more likely if a contractor has superior resources and the capability to deliver these services. Some services, however, are considered "inherently governmental" and thus less likely to be contracted out (Guttman, 2000). For example, the services involved in the public resource allocation such as planning, programming and budgeting usually require the public-public collaboration. This integration includes both horizontal agreements between two agencies or departments at the same level of government, and vertical agreements or intergovernmental alliances between or among federal, state, and local levels in Layne and Lee's (2001) four-stage model.

GOVERNMENT TRANSFORMATION

The need for a client-centered approach in government was originally asserted in the context of the New Public Management programs and has had a decisive influence in the e-government arena (Dia & Rafael, 2006). Through an integrated web-portal, it will be possible for citizens and businesses to complete a transaction with government agencies without having to visit several separate ministries/departments in separate physical locations (Ebrahim & Irani, 2005). However, many scholar stated that citizen-centric model is not just on how businesses or governments are using technology, but also on the needed fundamental business and policy changes within business and government's operation. For example, the Internal Revenue Service (IRS) Restructuring and Reform Act of 1998 directs the IRS to reorganize from its current structure into one that is more customer-focused; serving groups of taxpayers with similar needs (Holden & Fletcher, 2005). Therefore, the re-engineering business processes are necessary in both the private and public sector. From the preliminary assessment, Scholl (2004) found that the private-

sector-based literature appeared highly relevant to E-Government Business Process Change practice and might be utilized in a more systematic fashion in both academia and practice. However, due to its mostly consensual nature and also due to numerous legal, statutory, and regulatory requirements, e-government Business Process Change projects are intrinsically more complex and take longer to complete than similar projects in the private sector. As a result, in order to apply the private sector based literature into the citizen-centric e-government practices, we recommend the specialization and commercialization in public services. If specialization and commercialization are not new concepts in the private sector, these have not been familiar to the public officers even though in the last decades these activities have been reinforced by the outsourcing of some of the traditional functions of government as influenced by the New Public Management (NPM) programs. Obviously, carrying commercialization and specialization is transforming a government from the monopoly to competition and the complex to simple service procedures. The government transformation is a long-term and complicated process. Hence, it is advised to start with 'easy wins' services which cost feasible. In turn, these successes will build commitment and confidence to take further changes.

FUTURE TRENDS

There is the competition trend among governments in globalization environment. E-government services are considered as the new weapon in this battle since e-government programs are promising to offer a more efficient way of governmental operation and less expensive services despite decreasing budgets. In addition, improving customer services in businesses has led citizens to expect better services from the public sector. Learning from the private sector, the current strategy of electronic service development is

guided by the citizen-centric view versus the previous agency-centric one. Some e-government initiatives start primarily basing on the market research to identify obstacles preventing citizens from accessing ICT applications and factors influencing on the adoption of online services. Indeed, "it is well established within public administration literature that public and private institutions are not homogenous in character with critical differences rooted in environmental factors, organization-customer transactions as well as internal structure and processes" (Pan et al., 2006, p. 240). For example, if private enterprises attempt to satisfy customers for higher profits, government agencies rarely try to manage the good relationship with citizens since they may perceive that it is unnecessary to spend extra effort to meet the demand of citizens. For these reasons, Fu et al., (2006) describe that the implementation of cross-agency cooperation in the Taiwanese public sector was a challenge. Furthermore, although "accessibility and userfriendliness can be targeted together by the creation of one-stop online portals this is not a magic bullet" (Jakob, 2002, p. 2). Obviously, the security issue can be more serious in a single point of online service contact. Lastly, most of the respective authorities are not willing to participate and cooperate in "one-stop government" when these program seem to endanger their own autonomy and power. Therefore, the citizen-centric e-government stemming from the customer-centric e-business will be dominated the e-government research and practice. Then, there will be a growing trend towards the finding of additional answers to the question of "how to apply the experience and lessons learned from the private sector into government operations successfully".

CONCLUSION

E-government and e-business have the mutual benefits. Governments can facilitate and nurture

e-business initiatives within the economy by providing the relevant infrastructure and favorable policies (e.g., taxation, rules and regulations). Governments can also become active participants of an e-business initiative as they can use electronic procurement solutions, when dealing with its suppliers in an e-procurement project of Malaysia (Raman et. al., 2007). In the other side, businesses are one of the big customers for e-government services. Moreover, the success and management experience of the private sector can be useful for governments in their public administration reform programs. This is proved by the fact that currently the new public management programs borrow business management skills of the private sector. In addition, analysis of the value chain model can lead to the fact that the customer-centric e-business can be integrated into the citizen-centric e-government model with the necessary adjustments i.e specialization and commercialization in the production and delivery of public services. The incorporation e-business into e-government approach in pursuing the citizen-centric strategy can overcome the weaknesses of the one-stop center services and customer relationship management approaches. Particularly, one-stop service centers, which provide a one-stop access point to many different government services, would be prevented by the complex public interest and experimentation in the public administration system while one-single service centers, which provide a one-stop access point to complete a single or a group of related services that previously required visiting several government offices, would simplify the government administration process without requirements of complicated cooperation. The customer relationship management approach cannot create the fundamental changes when it concentrates only on the front activities while recommended commercialization of public services is to transform the whole value chain and adjust the citizen-centric to be closer to customer-centric strategy. Therefore, government transformation is a necessary step to create the

suitable condition for integration of e-business into e-government models.

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Chapter II

Collaborative E-Gov Networks: The Case of the Semantic-Gov Project

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ABSTRACT

Work reported in this chapter relates with work carried out in the context of the European IST Project SemanticGov (www.semantic-gov.org). The project aims at implementing a set of advanced Semantic Web technologies for adoption in the European public sector to advance the level and expand the volume of e-government solutions in EU. In this chapter we elaborate on the need to (re)position the idea of providing an advanced solution for an ideally functioning e-gov island within a sea of non-interoperable e-gov process frameworks, to become parts of open-ended ventures to allow the creation of collaborative networks for Electronic Governance.

INTRODUCTION

What has become obvious to us as result of our exposure to several e-Gov adoption pitfalls is that we are not facing a lack on enabling technologies but on paradigms to successfully deploy them.

In this context, the main aim of our work is to provide a new open development paradigm on how user and development communities can coexist and co-work for the definition of new

e-Gov mission-oriented application concepts. At a second level, what is important is to help the organization of the requirements elicitation processes, the compliance validation and quality checking processes in a synergetic way with both users from the European public sector and developers' communities forming essential part of the intellectual service and software engineering processes.

Our vision is to understand how to capitalise on the interactions between e-Gov users and developers as part of a value chain that creates new intellectual capital for new e-Gov application types by exploring problem-solving principles in computer science and other disciplines.

This necessitates the existence and fostering of closer links between the sides of the users and the developers, both of which need to share a space for expressing as well as exploring their own modes of thought and help improve their problem-solving paradigm.

Better understanding and communication with the future users of the systems requires the software creation to be placed at the level of abstraction the users can understand. Better communication between IT- and application field-specialists will lead to avoidance of misunderstanding, loss of time and resources and in the effect to systems that better address the needs of the end users. This refers to the creation of *policies*, *processes* and *practices* that will enrich the *people* in both communities of users and developers to coexist smoothly and gain from their interactions.

BACKGROUND

The purpose of any government enterprise is to create value. Codagnone and Wimmer (2007) recognise that ‘New opportunities offered by the advent of the Information Society force not only the business sector, but also governments all over the world to improve their operations and become more efficient and effective’.

The traditional thinking about value creation is based on the industrial organisation theory and the concept of the value chain: the government enterprise belongs and operates in some part of the public sector; strategy is primarily pre-occupied with positioning the government enterprise in the right place on the value chain, so that it performs the right value-adding activities that promise to offer the biggest profit. The

competitive advantage derives by disaggregating the value creation process of the enterprise into discrete activities, which create a basis for differentiation. In the marketplace, a commercial enterprise would select the products that fit better to its value-adding activities and places them in the right market segments, that correspond to large enough customer bases. Government enterprises afford – though on a heavily reduced basis now, to follow value-creating paths that don’t necessarily imply lower costs. Today, however, a variety of trends, such as globalisation, the development of the digital economy and the increased importance of information technology, services and knowledge, change dramatically the context and open up new ways of value creation. The term “new economy” launched about the end of the previous century to denote the radical change that was taking place in the business world, the economy and -more broadly- the modern society. The key point of this term is that the economy as we knew it has changed and now it operates in a new, different way (OECD, 2000).

In this modern environment, the fundamental logic of e-government strategy and value creation is changing and new models are emerging. Network structures and concepts of collaboration have been developed as effective means to cope with the needs and challenges of 21st century. The development of collaborative networks, alliances and virtual organisations question the traditional organisational and strategic business models. Value creation is not considered anymore a linear (mostly business) function, but a collaborative and co-evolutionary process. The focus of the strategic analysis is not on the government organisation itself or even on an entire segment of the public sector, but on the whole value-creating system, within which collaboration partners, allies, suppliers and customers work together to co-produce value.

According to Normann and Ramirez (1993), the key strategic task in the new business environment is the reconfiguration of roles and rela-

tionships among this constellation of economic actors in order to mobilize the creation of value in new forms and by new players. The underlying strategic goal is to create an ever-improving fit between government competencies and citizen needs. Core research fields of the SemanticGov project build on service-oriented architectures, ontologies, Semantic Web Services, Pan-European government services and e-government interoperability, all of which contribute the necessary knowledge and technology infrastructure for implementing the SemanticGov system and all of which currently attract the growing interest of academic and industrial communities as well as governments. SemanticGov aims to use these technologies to provide Public Administration the necessary technology means in the form of Semantic Web Services to overcome institutional communication shortcomings and solve in this way serious collaboration problems both at the national and the pan-European levels.

Public Administration is a huge, diverged and distributed environment layered in clearly-defined organizational levels (e.g. local, regional, state and national). Additionally, currently there are severe malfunctioning problems causing a lot of distress, embarrassment and waste of valuable resources and thus a great potential for improvement exists. All these characteristics make the PA domain suitable and a challenging candidate for testing and applying semantic technologies and solutions on a large scale.

Furthermore, Public Administration is hierarchically organized, which means that there is a rather clear line of command, a central coordination and a rigidly defined corpus of rules (e.g. laws) that explicitly define the system's behaviour. These characteristics describe a domain that is relatively easy to be standardized when compared with the totally-decentralised and competitive environments in the private sector.

As Public Administration is currently considered the heaviest service industry, with a service production distributed in thousands of partially in-

dependent agencies, this means that architectural paradigms like Service-Oriented Architecture and technologies putting the "service" notion at the core of development are particularly suitable and fit well with these structural characteristics of the domain. Through the implementation of European Union-level policies, there is an increasing need for collaboration and interoperation among the Member States Administrations (MSA). Each separate national Public Administration system can be perceived as a separate legacy system with complexity and severe malfunctioning problems in its interior but even less capable of effective communication with other legacy systems (other MSAs). Semantic interoperability is perceived as a key aspect to be adequately addressed in this environment in order to make feasible direct interoperation and communication between MSAs.

At an international level, we should mention the case of NICTA, an Australian company limited by guarantee whose members comprise the Australian National University (ANU), the University of New South Wales (UNSW), the NSW Government and the ACT (: Australian Capital Territory) Government, that also includes as alliance partners are 6 other universities and the Queensland Government, and which in January 2007 launched a new three-year research initiative in e-government to bring together government agencies, industry, researchers and educators to provide holistic solutions to the challenges that e-government presents.

The NICTA e-government vision was to provide research leadership and coordination through a major research initiative of national benefit. This initiative brings together ICT expertise from key discipline areas including software engineering, information systems and enabling technologies within NICTA, ANU and other universities, the Australian and State Governments, and private companies to serve the needs of the Australian and State Governments in e-government.

The vision for this collaborative e-government initiative is to deliver increased efficiency and

effectiveness through the creation of an e-government Network to provide information flow and collaborative outcomes between key stakeholders in e-government including academic, government and industry.

The SemanticGov Project

SemanticGov aims at building the infrastructure (software, models, services, etc) necessary for enabling the offering of intelligent services by public administration (PA) through the use of the semantic web (Peristeras & Tarabanis, 2006). Through this cutting edge infrastructure, SemanticGov will address longstanding challenges faced by public administrations such as streamlining cooperation (e.g. through achieving interoperability) amongst PA agencies both within a country as well as amongst countries, easing the discovery of PA services by its customers, facilitating the execution of complex services often involving multiple PA agencies in interworkflows. More importantly, this infrastructure will exploit SemanticGov as an enabler for total reengineering of PA service provision and propose a paradigm shift from today's *modus operandi*.

To achieve this, the SemanticGov project aims at capitalizing on the Service Oriented Architectures paradigm (Peristeras & Tarabanis, 2004), implemented through state-of-the-art Semantic Web Services technology and supported by rigorous and reusable public administration domain analysis and modelling, while being in line with all major European programmes and initiatives in the field such as the European Interoperability Framework and the recent work conducted by the EU IDABC Programme (CapGemini & IDA, 2004), the forthcoming i2010 group of Member States representatives and the Competitiveness & Innovation (CIP) Programme.

As a wider impact, SemanticGov is expected to enhance the administrative capacity of national public administration systems by providing a new paradigm for service provi-

sion, and pave the way to the administrative dimension of European seamless collaboration (aka "Common European Administrative Space") (Olsen, 2003) by facilitating the cooperation amongst EU national public administration systems.

The Miranda Modeller

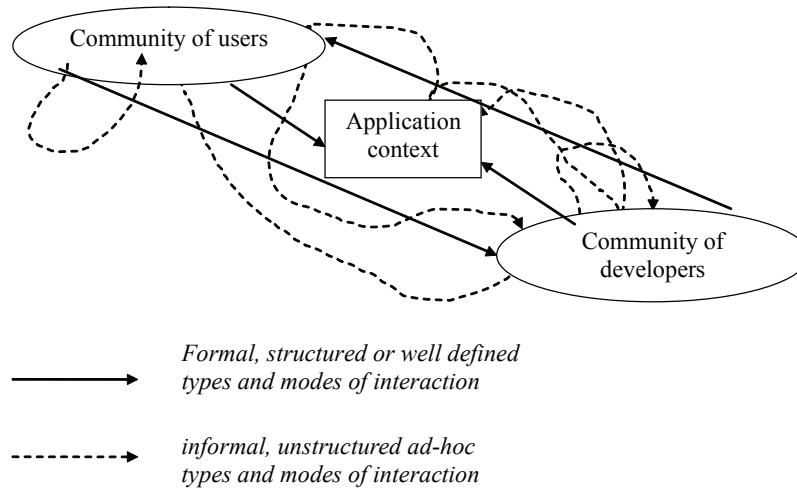
Miranda is the acronym for what we call an e-government "mission-oriented application modeller empowering user and development communities involvement". The basic goals for such a facility are twofold:

- On the one hand to provide a new open development paradigm on how user and development communities can coexist and co-work for the definition of new e-government mission-oriented application concepts,
- While on the other hand help the public sector organizations on the requirements elicitation processes, the compliance validation and quality checking processes in a synergetic way with both users and developers communities forming essential part of the intellectual service and software engineering processes.

Our vision in Miranda is to understand how to capitalise on the interactions between users and developers as part of a value chain that creates new intellectual capital for new application types by exploring problem-solving principles in computer science and other disciplines.

We support an interactive approach in modelling new forms of jointly defined and lead processes. As shown in Figure 1, except from the formal and structured interactions (in many cases of transactional nature) between members of the two communities or within each of the two communities, there is a great number of informal and unstructured (or better: ill-structured) interactions which we tend to leave outside of our thinking.

Figure 1. Besides the formal and structured interactions, there are much more important and densely organised informal and unstructured ones



We therefore propose the Miranda tool as a possible solution for leveraging both types of the interactive elements between the communities of developers on the one hand and the communities of the users on the other. The French philosopher Luis Althusser (1918 – 1990) defined a practice as any process of transformation of a determinate product, affected by a determinate human labour, using determinate means (of production) (Althusser, 1970). Nowadays that we talk a lot about practices on the Net, in services or e-services, it is tragically timely how much we lack on intellectuals that will be able to transform and process technology problems into societal or political ones and vice versa.

Miranda must take into account emerging approaches from the software engineering discipline, adopt a cross- and inter-disciplinary research agenda and adhere to best research results internationally, best practices and standards to avoid any rework and to assure future adoption. Furthermore, better understanding and communication with the future users of the systems requires the software creation to

be placed at the level of abstraction the users can understand. Better communication between IT- and application field-specialists will lead to avoidance of misunderstanding, loss of time and resources and in the effect to systems that better address the needs of the end users. This refers to the creation of *policies*, *processes* and *practices* that will enrich the *people* in both communities of users and developers to coexist smoothly and gain from their interactions.

THE CONTEXT OF OUR RESEARCH

Due to its open architecture, e-government provides new research areas for Semantic Web, such as inter-portal search and building on top of distributed querying or discovery across distributed and heterogeneous resources. In addition, e-government has some specific features as opposed to traditional e-business scenarios which are of interest to Semantic Web research and on which Semantic Web research could be properly demonstrated. These include a high degree of

Figure 2. Impact and influence patterns amongst people – processes – practices and policies



formality of key areas such as law, high demands in security, trust and privacy, typical and sometimes extremely-long-running processes (e.g. urban planning) and many different stakeholders in the same process (e.g. citizen vs. municipality, county council, federal government).

Joint research efforts of e-government and Semantic Web communities are mainly apparent on a number of events with an international level visibility and coverage.

The research work and contributions of the SemanticGov project on e-government with application of Semantic Web and Semantic Web Services can be divided into the following areas:

- services and processes,
- models and ontologies and
- applications and portals.

Services and Processes for Interoperable E-Government

Research in e-government related to services and processes based on semantically enabled technologies mainly lies in building a service-level view on e-government systems and the integration of services and different processes across heterogeneous E-government sites. For this purpose,

the underlying infrastructure of ontologies and semantically-annotated services is the key aspect of the seamless and (semi) automated integration process. Apart from interoperability issues at the technical, data and process levels, service creation as well as service discovery, selection, invocation, composition and monitoring of e-government processes is considered to be of extremely high benefit to e-government systems.

As the European Union (EU) continues to enlarge, the diversities among the Member States are increasing as well. These diversities, usually combined with bureaucracy, complicate the communication between Public Administrations agencies from one country and clients (citizens or businesses) from another country or between Public Administrations agencies from different countries. As a result the need for seamless and easy-to-use public services across borders in order to increase clients' opportunities for mobility and for business in Europe becomes even more intense. This need is in line with the principle of free flow of goods, persons, capital and services within the EU and thus is one of the EU's priorities as stated in i2010 E-Government Action Plan.

This emerging need for trans-national cooperation between Public Administrations within the EU addresses important issues:

- which Public Administration Services have to be provided at a pan-European level. Here, the term cross-border services is introduced to characterize these services;
- how can the Public Administrations Agencies that provide cross-border services interoperate. Thus, the issue of interoperability among Public Administration Agencies of different Member States is raised;

These issues are of great importance, especially if we take into consideration the significant role that cross-border services and interoperability play in establishing a single market within the EU.

Models and Ontologies

Building the infrastructure for E-government systems by creating semantically-rich information models is the key aspect of building integrated E-government systems in both, national and cross-border settings. Information models captured using highly-expressive ontology languages should be consistent within the particular E-government domain as well it being possible to integrate several information models and achieve semantic interoperability across several domains. Apart from building formal ontologies for information models, building ontologies for services and processes is also an important aspect of the Semantic Web research applied to E-government. Highly-expressive information, service and process ontologies will provide space for automated reasoning over the models and will increase automation in E-government processes. This work is directly related and overlaps with the research done in the area of services and processes when the ontological infrastructure is the underlying aspect of applied reasoning to semi-automated discovery, selection, composition, mediation and invocation of services and processes. Ontologies for E-government providing the underlying infra-

structure for integrated E-government systems are at the core of the SemanticGov project.

Ontology research is a fast-evolving field, which provides the necessary basis for further development of Semantic Web and Semantic Web Service technologies. Moreover, ontologies are also considered as the critical knowledge infrastructure to address semantic interoperability problems. Ontologies represent the formalization of a conceptualization, namely semantic schemata which provide definitions of concepts relevant to some domains, system or applications. In an open, distributed and diverged environment like e-government, ontologies can also provide a common language and domain interpretation. This is particularly true for Public E-Government Services, where adequate communication interfaces should be developed amongst administrative systems with important differences without losing their autonomy. To this end, there are a growing number of initiatives trying to model the Public Administration (PA) domain and provide descriptions, models and ontologies as a knowledge base and infrastructure for applying semantic technologies in e-government.

Despite these efforts, currently the PA domain still lacks commonly-agreed content standards, definitions, vocabularies and models, not only at the global level among administrative systems worldwide (or at the European level) but even within each country. The need for reusable content standards has recently become apparent. Due to the fast development of Semantic Web and Semantic Web Service technologies, we expect to see in the next few years a substantial growth on demand for reusable and scalable Public Administration domain models and ontologies.

Applications and Portals

E-government portals can be understood as e-government front-end applications providing entry points for citizens, businesses and civil servants.

They create an integrated view on e-government systems from the clients' point of view. Advanced e-government applications should provide intelligent features to clients in order to guide them through complex e-government processes and help them to interact with Public Administrations. Such interaction should reflect requirements for one stop government, tracking e-government requests or in cross-border e-government setting requirements for interoperability of multiple sites as well as requirements for multilingualism. With respect to services and processes as well as models and ontologies for e-government, applications and portals can be understood as a client view on E-government systems with underlying infrastructure of ontologies and integrated services and processes.

SemanticGov aims to use these technologies to provide Public Administration Semantic Web Services and solve in this way serious semantic interoperability problems both at the national and the pan-European levels. More generally, applying these technologies in the e-government domain is challenging for at least the following reasons:

- Public Administration is a huge, diverged and distributed environment layered in clearly-defined organizational levels (e.g. local, regional, state and national). Additionally, currently there are severe malfunctioning problems causing a lot of distress, embarrassment and waste of valuable resources and thus a great potential for improvement exists. All these characteristics make the PA domain suitable and a challenging candidate for testing and applying semantic technologies and solutions on a large scale.
- Public Administration is hierarchically organized, which means that there is a rather clear line of command, a central coordination and a rigidly defined corpus of rules (e.g. laws) that explicitly define the system's behaviour. These characteristics describe a domain that is relatively easy to be standardized when

compared with the totally-decentralised and competitive environments in the private sector.

- Public Administration is currently considered the heaviest service industry, with a service production distributed in hundreds (even thousands) of partially independent agencies, which means that architectural paradigms like Service-Oriented Architectures (SOA) and technologies putting the "service" notion at the core of development (e.g. Semantic Web Services) are particularly suitable and fit well with these structural characteristics of the domain.

Through the implementation of EU policies, there is an increasing need for collaboration and interoperation among the Member States Administrations. Each separate national Public Administration system can be perceived as a separate legacy system with complexity and severe malfunctioning problems in its interior but even less capable of effective communication with other legacy systems from other Member States Administrations. Semantic interoperability is perceived as a key aspect to be adequately addressed in this environment in order to make feasible direct interoperation and communication between Member States Administrations.

Aspects of the Organizational Structure

Having several first and second hand experiences in the success or failures faced from the more demanding and relatively complicated projects or tasks, to less complex and simple ones, the story has to do usually with the same ingredients:

- *People*, and
- *How these interact to each other* or with each other, and
- *How they perceive and analyse the world they live in*, the events that are taking place

and to which they have or need to respond at, and

- *How they document their knowledge*, their wants, their goals, their history of what they did or they aimed to do, and,
- *How they access and make use of the documented knowledge* – be it theirs or someone else's, and finally,
- *How they manage to improve their behaviour* either at the individual level or at the collective one, or – sometimes – at both through learning processes or other optimization processes.

However, to manage a coordinated behaviour of individuals is a difficult – if not unachievable task at all. Even if people are working together for the same goal, and have all unanimously agreed to the same objective and target, it is in the human nature that they shall develop differentiations in regard to the means that each individual shall employ for meeting any specified end. Or, even in the case that there is agreement regarding the means, there will be different opinions on the instrumentations of these very specific means, the orchestration of all individuals around them, etc. This helps us come to the conclusion that the main difficulty concerns the synthesis of all these different 'resources'.

Though the starting point for us has been problems that appear in the corporate world, any type of 'problem' that involves most of the above components can be regarded as subject to the same need for being approached with a preferably simple and consistent method for modelling the problem and, secondly, trying to 'tackle' or 'solve' this in the most easy or straightforward and - if possible - unique way.

In interactive environments such as the workplace, to date we have two main types of management models (this goes back to 1960 and the path making work of Douglas McGregor reported in (McGregor, 1985)). McGregor there made his

mark on the history of organizational management when he proposed the two motivational theories by which managers perceive employee motivation. He referred to these opposing motivational theories as Theory X and Theory Y. Each theory assumes that management's role is to organize resources, including people, to best benefit the company. However, beyond this commonality, they're quite dissimilar. Quite recently, Heil (2000) revisited in a contemporary manner the area and provide information and evidence that is reflecting the networked economy era:

- Theory X, which refers to the authoritarian management style characteristic of scientific management; and
- Theory Y, which supports a participatory style of management.

Theory X was based on the premise that the average user was basically lazy and was only motivated by money and neither wants or is capable of self-directed work.

This kind of model led to the specialization and division of jobs into simple tasks, with the aim of increasing user production and consequently, increased pay. Meanwhile, Jaggi (1988) defined participatory management as "a cooperative process in which management and users work together to accomplish a common goal."

This second model was different from the first in that instead of top-down, directive control over users who were perceived to be unproductive without close supervision, the new model stressed that giving the user decision-making powers provided valuable input and enhanced employee satisfaction and morale. This second model came as a result of alternative theories that found users not to be intrinsically lazy, but who were instead adaptive to their environment. Where a workplace lacks challenge, professional

growth and other motivators, users became lazy. When the situation was reversed, the proponents of this theory found users to be creative and motivated.

The Case of Living Labs

Recently, the appearance of Living Labs on the horizon of European innovation has opened up a new perspective to future e-government developments, by securing the users' participation in design, prototyping, development, testing, deployment, and evaluation of solutions and tools. In this way, it can be expected from a public administration to produce more useful, desirable, and affordable policies, systems, and services that deliver substantial and sustainable public value to citizens. However, it should be remembered that these idealised "citizens", as addressees of the public value created, and more generally, as members of the open Living Lab, do have much in common with the profile of "customers", but – as it has been noted – more with their own rights, duties and obligations. As long as the idea of citizenship encapsulates the reference to an underlying constitutional setup and to a rule of law that enforces it, we are no more talking about "plain" customers, but a specific and (to some extent) idiosyncratic typology of users. People that can easily and seamlessly switch from a position of consumers of services to that of advisors to public administration and co-creators of e-government service ("you should do that and that"), financial supporters ("it's my money that you are spending after all"), or radical critics ("I won't give you my vote any more").

On November 20th, 2006, the Finnish EU Presidency has launched a European Network of Living Labs for the "co-creation of innovation in public, private and civic partnership". This is the first step towards a new European Innovation System, entailing a major paradigm shift for the whole innovation process.

A European Network of Living Labs is a collaboration of Public Private Partnerships where firms, public authorities and people work together in creating, prototyping, validating and testing new services, businesses, markets and technologies in real-life contexts, such as cities, city regions, rural areas and collaborative virtual networks between public and private players. The real-life and everyday contexts both stimulate and challenge research and development, as do public authorities and citizens not only participate in, but also contribute to the whole innovation process.

The Living Lab concept is about moving out of laboratories into real-life contexts. In the past years, a number of national experiences can be mentioned across Western Europe, and more recently, an integration effort has been set out in a trans-European perspective. From a market and industrial perspective, Living Labs offer a research and innovation platform over different social and cultural systems, cross-regionally and cross-nationally. This is a natural move for ICT, life sciences and any innovation domain that deals with human and social problem solving and people's every day lives. However, this new approach to research for innovation is a huge challenge for research methodologies, innovation process management, public-private partnership models, IPRs, open source practices, development of new leadership, governance and financial instruments. This complexity increases remarkably with the international nature of a European Network of Living Labs, implying a set of large-scale experimentation platforms for new services, business and technology, market and industry creation within ICT environment.

A Living Lab refers to a setting that is created with specific targets and has a clear structure, but in the same time it is dealing with the uncontrollable dynamics of daily life. Therefore, its configuration holds an open character according to which technology is shaped out of specific social contexts and needs, and which users are seen as

co-producers. Researchers within Living Labs are restricted to monitoring what is going on “from the inside”; on the other hand, they are part of a Living Lab themselves, and are able to intervene in order to contribute to a better implementation of technological innovations in social practices, and deal with the unpredictable processes by reflecting upon and consequently adjusting their initial methodology.

The problem faced by current Living Labs is that, although similar services and products are usually developed, a coherent framework for cooperation inside a Living Lab is missing. Thus every new Living Lab has to start (almost) from scratch in configuring itself for the selected beneficiaries. Within our research, we build and populate our targeted experiential environment according to the following steps of a Living Lab configuration process as summarised in Pierson & Lievens (2005).

- contextualisation, referring to the prior exploration of the technological and social challenges implied by the technology or service under investigation;
- selection, referring to the identification of potential users or user groups, by means of non-probabilistic or purposeful sampling;
- concretisation, referring to a thorough description of the current characteristics, everyday behaviour and perceptions of the selected test users regarding the research focus;
- implementation is actually the behavioural validation and operationally running test phase of the LL, from a user-oriented and ethnographic viewpoint; and
- feedback, consisting of two research steps:
 - an ex post measurement based on the same techniques of the initial measurement, to check if there is any evolution in the users perception and attitude towards the introduced technology or

service, to assess changes over time in everyday life in relation to technology use and to detect transitions of usage over time; and

- a set of technological recommendations from the analysis of data, gathered during the previous implementation phase; this outcome of the feedback phase is used as the starting point for a new research cycle within the LL; in this way the iterative feature of research can be made operational.

Relation of the Research with the Organizational Zeitgeist

The conducted analysis and the business application scenarios for application of a community-based approach that puts increased significance in the interactions between the two communities of developers and users indicate that ‘prototyping’ of a Miranda-like environment within a public sector organizational setting can contribute to the increase of the intellectual capital creation in at least three key ways:

- By helping to develop understanding about the essence or essential factors of a decision-making experience, as it simulates important aspects of the whole or parts of the relationships between people, events and contexts, as they unfold over time.
- In exploration, shaping and evaluation of ideas and attitudes: such a community-based approach can provide inspiration, confirmation or rejection of ideas based upon the quality of experience they engender. It produces answers and feedback to decision-makers’ questions about proposed solutions in terms of ‘what would it feel like if...?’
- In communication of issues and ideas: by enabling others to engage directly in a proposed new situation, it provides common ground for establishing a shared point of

view. Such a point is to be regarded as a collective asset – not property of an individual but of the team that has contributed to its creation.

In this respect, a possible criticism might read like “such a community-based approach is not a new phenomenon within the e-government sector; decision-makers have always been ready to adopt and adapt methodology and technology and processes of many kinds to create early representations of their ideas and understandings”. But the concept of our approach specifically, we believe, deserves a conscious focus. It should become a recognized and well-supported tradition within e-government networks decision-making practice(s). This belief is founded upon observation of our own practices which indicate that we can be more sensitive, can design better experiences for the users, and can be more convincing about the value of the decision-making patterns, by *intentionally* adopting such an approach. From this perspective, it follows that the conducted analysis is not about the creation of a formalized toolkit or set of techniques, but is about developing an attitude and corporate culture to solve problems.

As we move into a more conscious frame of mind about collaborative **e-Gov** networks, we are aware of much we do not yet understand about how to best utilize the principles for the most innovative and successful results.

What is the appropriate representation for different audiences? E-Gov networks might be designed primarily for Public Administration users, or other members of the PA organizational value chain teams, stakeholders, and *internal or external clients*. The audience influences both the type of *e-Gov network instance* we create and the degree of context and explanation we provide to frame the experience for them. For the middle management it may be difficult to provide an early, low-fidelity improvisation prototype of sufficiently robust nature that they can have

an experience in a naturalistic context without supervision. Higher levels of fidelity have their problems, too. As faced in one of the conducted experimental sessions, e-Gov network members may become unshakably attached to early ideas when they experience a single convincing manifestation of many different possibilities and perceive it as the final solution.

Clearly it is important for designers of e-Gov networks to share their understanding of the intent behind a particular e-Gov network as an immaterial (intangible) infrastructural asset, but perhaps there are also lessons to learn about communicating these intentions more effectively by carefully choosing the implementation or prototyping technique. Hence it is important to investigate the value of role-playing and improvisational theatre (Laurel, 1993), rather than of watching someone else’s experience. Is there any danger that active involvement, especially when an audience is present, tends to direct energy away from understanding the experience?

Perhaps sometimes there is at least additional learning to be gained by observation and reflection of someone else having an experience as opposed to being fully immersed in it yourself and then transferring or generalizing your own personal and subjective experience without cross-checking with real users.

Our analysis focuses primarily on participatory, multi-party and team learning in relation to the precondition for organisational learning and on applying the theory from experiential learning as described by Kolb (1984) and reflective learning as described by Schön (1983, 1987). Important is to discuss the circumstances under which we can expect that problem-based, project-organised training / learning methods will be effective in relation to changes in corporate attitudes, values and behaviour. To be effective here means that the aim of the learning process encompasses more than participants / employees gaining new knowledge on the cognitive and affective levels: opportunities for subsequent organisational learn-

ing should also be ensured. Our opinion is that it is important for the facilitator of a collaborative situation to have a clear approach in order to establish learning activities to support a consistent style of decision-making.

It is easy to recognize that when trying to establish a theoretical approach to learning, the first focus is to introduce reflection in the activities with which we worked in different learning situations in the past. The next focus point is the facilitators' role in the learning process; at this point, we were very much aware of the necessity of focusing on more structured experimentation, as it is in the cross field between reflection and experimentation that innovative processes take place (Schön, 1983).

The need for customer participation is genuine and well documented in the literature. For Sawhney, Balasubramanian and Krishnan (2003) participants of a collaborative network seek particular outcomes and engage in activities to achieve them; these activities can be mapped along a customer-activity chain, which represents end-to-end sequences of related activities that often crosses inter-government and national boundaries.

The recent success of Web 2.0 is another example that supports the prospect of participation in business processes (Fragidis G., Tarabanis K. and Koumpis A, 2007b). The message of the Web 2.0 with regard to government strategy seems to be clear: "give people the opportunity to participate". The most well-known success stories of the Web 2.0 (e.g. Wikipedia, MySpace, YouTube, etc.) are based on the concept of user participation. In all these cases, instead of business-generated content we see user-generated content; the users contribute directly or indirectly and collectively co-create content or experiences. The users are not only consumers, but also co-developers; they do not expect passively the fulfillment of their needs and wants by the business firms, but actively participate in the development of the products and services that meet their needs. Their motives for participation

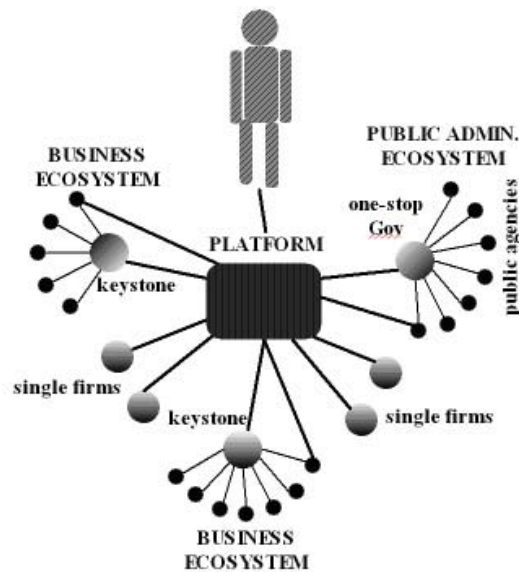
are related with their needs to be heard by business firms, to configure products, services and places that fulfill their needs, to tailor offers according to their preferences, to experiment, learn and gain experiences, to contribute to the community, to offer to their peers and communicate and share with the others.

In previous work we (Fragidis G., Tarabanis K. and Koumpis A, 2006, 2007a) proposed a conceptual and a business model for the development of "customer- centric business ecosystems", that is business ecosystems that are developed having in mind customer participation in configuration and production process. The conceptual model analyses customer participation in business ecosystems, while the business model illustrates the operation of customer-centric business ecosystems.

The business model is depicted in figure 3. It is based on an information platform that mobilizes customers to participate in value creation and empowers them to synthesize composite products. Customer needs can sometimes be so much heterogeneous that a single business firm or even a single business ecosystem cannot address them. Customer needs can, therefore, be satisfied only by the dynamic constellation of business firms, business ecosystems and other organisations, such as public agencies, in new formations we call "customer-centric business ecosystems".

For instance, viewing the business ecosystem of the automobile firms mentioned in section 2 from the customer's perspective, we perceive it is shaped by the customer's need (suppose) to buy a new car. Certain needs and action that derive from this are related with the recycling of the old car (which may involve transportation to recycler's establishment, multiple transactions with various public administration agencies, etc.), the issue of driving licence, the issue of car insurance, etc. As a result, the customer-centric automobile ecosystem can involve the car producer's business ecosystem (notice that Moore (1996) restricts his interest in it), the recycler's business ecosystem, the insurance company (which can be part of an

Figure 3. The business model for customer-centric ecosystems



insurance/financial services business ecosystem) and the public administration business ecosystem, which regulates or supports the whole process. Connections among business entities are flexible and temporary and dissolve after the fulfilment of the customer needs. If the car buyer is to drive the new car soon, all these ecosystems have to collaborate closely.

It is essential to think of a collaborative e-Gov network as complementary to other decision-making methods. First, no matter how good a collaborative network is at promoting empathy, we cannot actually *be* other people or dis(as)sociate ourselves from the emotional aspects of a situation we are part of. There will always be a place for other design and research methods to help us understand other people's points of view. Second, as in all forms of implementation, we inevitably make choices about what elements of the ultimate e-Gov network to represent and what to omit. This means recognizing that a single prototype is never enough. Multiple prototypes and other methods such as contextual observation, participants test-

ing and participatory design all bring important perspectives to complete the picture.

These other methods help us in identifying the relevant factors of a collaborative e-Gov network that we plan to implement. To create an appropriate prototype we need to determine, for example, whether we are interested primarily in the temporal/dynamic aspects of an experience, the physical/spatial and social aspects, or the cognitive and temporal/dynamic aspects. And, since we are developing only partially integrated prototypes, "setting the stage" for a particular collaborative e-Gov service session becomes crucial. We need to be explicit about what needs to be ignored (e.g., because it "does not look like" or "would not be tethered") and about what context surrounds the participants' experience ("a high pressure emergency situation" or "a very insightful and personal moment").

Finally, we come back to the point that people's experiences with information products and systems are a complex integration of both personal and circumstantial factors. People will

have experiences with the things we design, whether we intend them or not, and in ways that we cannot hope to predict entirely. Nevertheless, understanding, exploring and communicating the experiential aspects of adoption ideas are central activities in the implementation of collaborative e-Gov networks in the real world.

Collaborative e-Gov networks, while they create only approximate and partial simulations of the real experiences others will have, bring a subjective richness to bear on decision-making problems faced by Public Administrations. It is an approach that, we believe, will benefit from more conscious attention and deliberate experimentation and adoption in the real world.

CONCLUSION

E-government, like other areas such as inter- and intra-enterprise integration, e-business and e-learning, has been recently facing existing problems in systems and information integration, information extraction and representation across heterogeneous organizations.

E-Government in particular faces a big challenge to achieve interoperability and integration taking into account differences in law, regulations, services, administrative process and different languages across regions and countries.

Such differences are related to a great variety of computer-based solutions at various levels to be integrated through standardization or mediation while at the same time taking into account all integration levels, namely technical, semantic and process levels. In particular, integration of services and processes is the key aspect of integrating processes that involve a variety of objects with specific semantics.

On the other hand, Semantic Web and Semantic Web Services have been of interest to the research community for the last five years and as any other research domain, they require a large, dynamic, heterogeneous and shared information

space to be effectively evaluated. Therefore, the combination of these two domains seems to be quite natural.

The e-government domain can provide an ideal test bed for the Semantic Web research and Semantic Web technologies can be an ideal platform to achieve the vision of a knowledge-based, citizen-centric and citizen-empowering, distributed and integrated e-government.

Our experiences show that the concept of collaborative e-Gov networks can be an extremely beneficial development tool in developing successful corporate identity for e-government projects and increasing their intangible assets value, provided that certain problems are resolved and provided that both communities of developers and users demonstrate that they have the will to remove the obstacles that currently stand in the way of widespread business process and decision-making connectivity.

While it is all very well to call indiscriminately for adoption of collaborative practices such as the proposed Miranda environment as a tool for development, the reality on the ground in the majority of the corporate world is that there are a number of problems, hindrances and issues which have to be squarely faced and resolved before the Miranda concept can be used successfully as a development tool. These problems, hindrances and issues have been described at some length in the research and relate mainly to the kind of soft skills infrastructure and processes that are absolutely essential in any company before a collaborative e-Gov network can function with maximum efficiency.

Any sustainable adoption and usage of collaborative e-Gov networks would require a careful case-by-case needs analysis to determine the form and extent of each organisation's needs for adoption and specialisation. Finally, the research recommends specific, situation- and context-based provision of access to a collaborative e-Gov network rather than indiscriminate whole scale provision.

With this in mind, the research emphasises that analysis and market research need to precede any kind of collaborative e-Gov network provision. Providers, suppliers and designers of collaborative e-Gov network tools and methods should examine every aspect of each company's needs – as well as each organization's readiness to use the network before facilitating access for that organization.

If it is used in this way, the collaborative e-Gov network will serve a specific function in a specific situation and therefore provide maximum benefit to particular group of users and developers (rather than random benefits to diffuse and undefined stakeholders).

The authors' experience and evidence that results from the study has led to believe that situation-specific collaborative decision-making would be far more beneficial for organizations than any kind of ill-prepared attempt to provide universal access to information resources.

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Chapter III

Treasury Computerization in India: A Case Study

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ABSTRACT

This case study examines the growth of e-governance in financial treasuries in India and examines the growth of computerization among treasuries using various models and tries to identify points of convergence among them. The Faridabad District Treasury in Haryana State of India, was studied to identify these stages. The two models that were considered were the Nolan model that relates to growth of Information Technology and the Laynee & Lee model that relates to growth of e-governance. The study brings out the fact that these models of growth converge at various points. The study brings into light, technology life cycle as an important factor in predicting growth. The study also throws up issues for research on what factors other than technology could be factors of growth.

INTRODUCTION

Treasuries were the agencies for managing this financial resource which differed from one country to another. To begin with the currencies were also maintained in the Government Treasuries at the

district headquarter in India. The currencies were disbursed to various banks by these treasuries. The currency operations finally got separated from the treasuries. State Bank of India being the treasury bank now handles the currency operations and the treasuries continue to handle security docu-

ments and stamp papers. Treasuries are still the basic unit of financial management of the government. All the funds of the government are either received or disbursed through these treasuries. E-Governance among these treasuries has been a challenging task because of the fact that these treasuries have been using a paper based process since inception and to convert these processes into computer based process was an extremely challenging task.

THE TREASURY OPERATION

The receipts and payments of funds in India are maintained in two separate classes of accounts. One of the accounts relates to the funds of Government of India and the other relates to the individual State Governments. The funds of the Government of India are maintained in the Consolidated Funds of the Union and those

of the State Government are maintained in the Consolidated Funds of the State. All the receipts and payments into the Consolidated Funds of the Union and the State are made by the treasury. The treasury operations of the State Government are carried out through different steps. These steps define how the revenue collected by the state is to be spent in the various programmes of the government. A block diagram of the process is as shown in Figure 1.

These respective consolidated funds consists of taxes and duties collected by the respective government, contribution of taxes and duties collected by the other governments, interest, unspent balances of the previous years and any loan raised by the government by issue of treasury bills or money received as a repayment of loans.

The funds available with the government in the consolidated fund of the State or the Union can only be spent if they have been approved as part of the Budget. The sanction orders are issued

Figure 1. Financial management system of the government

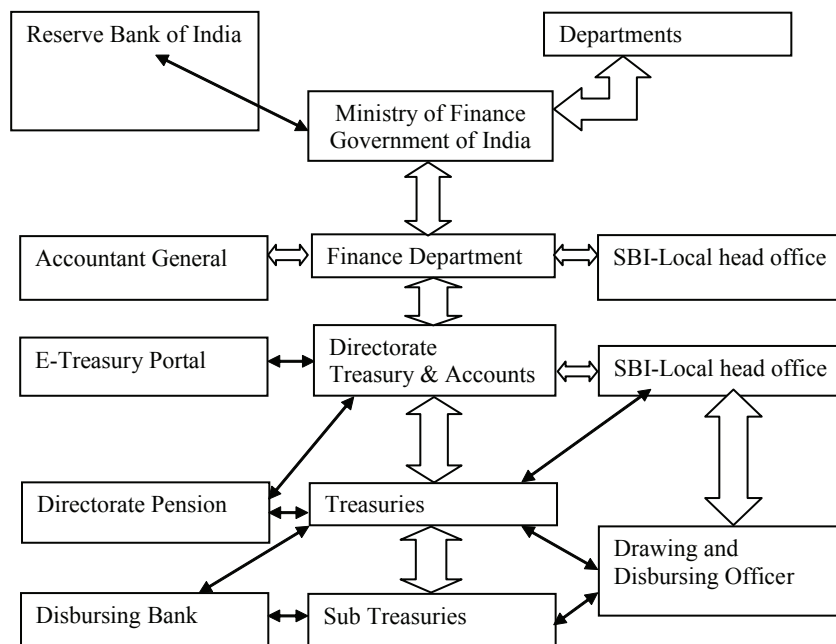
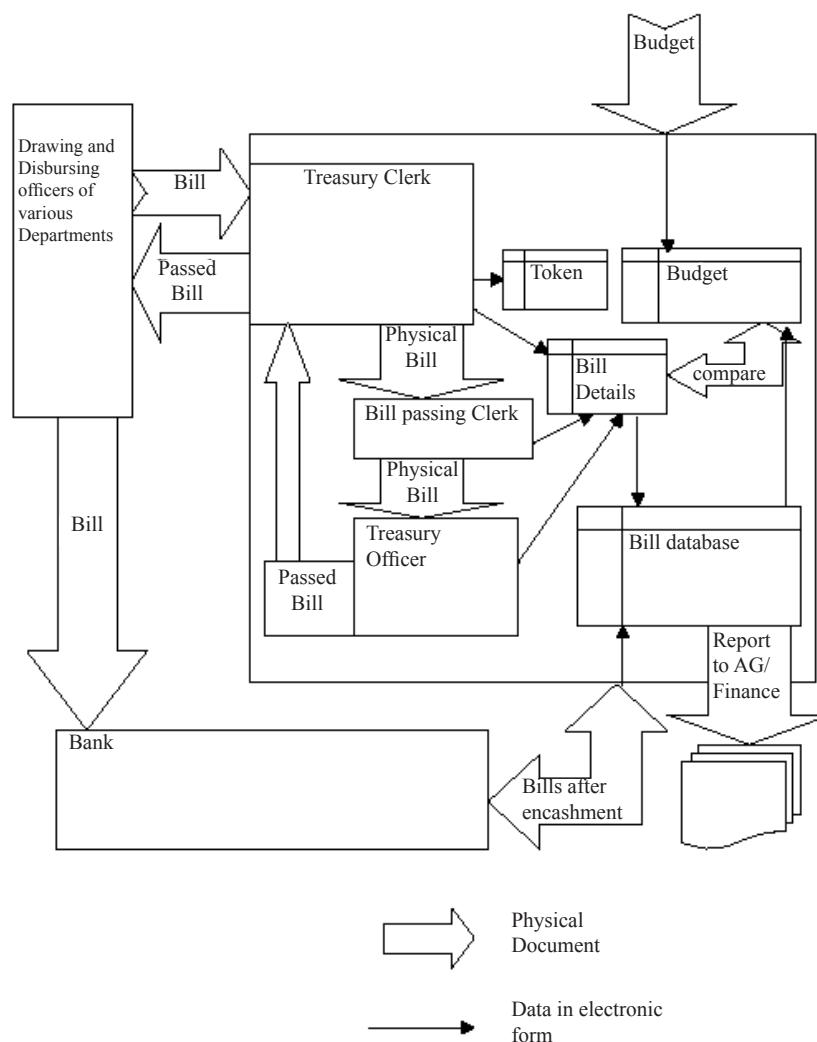


Figure 2. Block diagram of a treasury



by the various departments on the basis of which the Drawing and Disbursing Officers (DDO) of various departments are authorized to withdraw funds from the treasuries. These DDOs are based in the various districts and the state headquarters in the State Government. The DDOs are the only officers authorized by the government to draw funds from the consolidated funds of the State as per the sanction order of the government. A

block diagram of the operations that occur in the treasuries is in figure 2.

The function of the treasury could be summarized into the following broad categories :

- **Payment of bills:** Receiving claims from Drawing and Disbursing Officers, scrutiny of claims as per State Treasury Code, Financial code and relevant rules, on-line generation / issuance of cheques

- **Receipts:** Entry of credit scroll received from banks against challans, deposited refund of revenue as per advice issued by competent authority.
- **Accounts Preparation:** Preparation of Receipt and Payment Accounts with the details of Head of Accounts, Incorporation of Sub-Treasury accounts in Treasury accounts, Submission of accounts to AG, providing a monthly list of receipts and payments to all Drawing Officers of the concerned department.
- **Pension Generation/Pension Payment:** Preparation of pension, gratuity and commutation payment order, payment of pension, revision of pension cases, cash/cheque payment of pension from Treasury.
- **Deposits:** Maintenance of personal deposits, civil deposits, education deposit and revenue deposits, issue of Treasury cheque against cheque received from deposit holders, maintaining strong room, issue of stamps, safe custody of valuables and duplicate keys, packets deposited by civil courts and different offices in the district, maintenance of bill, Token books & Cheque books.

WORKLOADS ON TREASURY

The work load on treasury has been constantly on the increase. Karnataka state handles an over all transaction volume of Rs 2,30,000 million receipts through 80 million Challan and Rs 2,70,000 million of payments through 1,350 million vouchers. An estimated 70 million employees

are paid salaries through the treasury. Around 45 million government employees receive pensions and another 135 million ex employees of other organization receive their pension through the treasuries. In addition to the task of disbursement of funds Karnataka Treasury disburses Rs 7,500 million of stamp papers and stamps. A statement showing the increase in workload across years in Faridabad treasury is shown in Table 1.

The workloads on treasuries is seasonal in nature. The financial year ends in the month of march which account for the highest number of transaction. On an average 25 to 30 thousand tokens are generated every year in a treasury. The monthly transactions range around 2000 achieving a peak of around 4000 transactions in the month of march. A graph showing the month wise generation of tokens is shown in figure 3 and a comparison with the workload in Figure 4.

Treasury Operations in Haryana

Haryana is one of the 29 states in India with 21 districts and 80 sub-divisional level treasuries, located in different parts of the state. Prior to the process of computerization, the funds were managed through a completely paper based system, leading to inefficiencies in the process. The involvement of numerous banks and the lack of a computerized workflow made the data collection process long, tedious and cumbersome. The biggest problem though, was the time lag between when the funds were deposited in the bank, and when the state treasury actually found out about the transaction. The treasury was totally depen-

Table 1. The increase in work load of treasuries across year (Source: Faridabad Treasury)

Year	2001	2002	2003	2004	2005	2006
No of tokens generated	17,900	18,600	21,600	32,400	31,200	40,000

Figure 3. Month wise issue of tokens at Faridabad Treasury Haryana

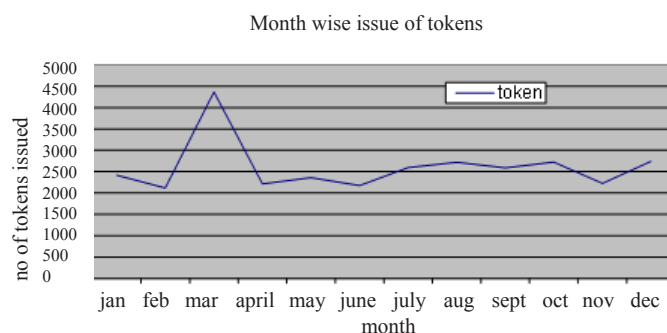
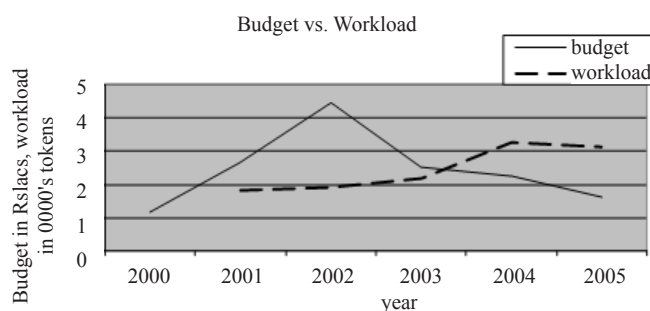


Figure 4. Workload vs. budget allocation (year wise) of Faridabad Treasury



dent on the internal processes of the banks - which were often marred by inefficiencies

Inspite of the sensitive nature of work and the large number of transactions that the treasuries had to handle, the operations of the treasuries were being done through a purely paper based system before they started using computers. There are six departments that these treasuries have to coordinate namely Finance Department, Accountant General's Office, Haryana, Treasuries Department, Accounts officers of the different Departments, Banks and Drawing and Disbursing Officers, who are ultimately responsible for the disbursement of payments against the various bills. This lead to a situation wherein irregularities takes place in treasuries. Many departments managed to withdraw allotment from the treasuries more than the allotment sanctioned to them. Some of the problems being faced by the treasuries were the following:

- The volume of financial transactions and scope of operation of the department has increased manifolds over the years, which in turn had over stretched the system in place and led to the information gaps.
- Due to a manual system of tracking funds inflow and outflow, it was difficult to access information accurately and regularly, which had an impact on the decision-making of effective utilization of the funds.
- Banks are responsible for collecting all receipts and making payments and then reporting to the treasury. The biggest problem was the time lag between when bank actually receives the revenue receipts and the date when it actually credits the amount in state accounts. The treasuries were totally dependent on the internal processes of the banks.
- Information about one single transaction is being maintained by all the six offices

interacting with the treasury, in their own format, which led to inconsistency of the information and was difficult to reconcile.

- Since many offices are involved it was not possible to get a clear picture of state finances.
- The employees used to face a lot of problems as on many occasions the credits and debits were not properly accounted for in the book of accounts.
- The businessmen were unhappy, as the tax revenue deposited by them in the banks was not properly accounted for.
- The system failed to detect the fraudulent payments.

COMPUTERIZATION OF TREASURIES

Treasury computerisation being the most sensitive operation of the state, the computerisation process also involved a lot of risk and care. Computerization of Treasuries in India started in the late 1980's. The local district administration in various states tried to find ways to computerize their treasuries. The districts tried to introduce e-governance in these treasuries depending upon the resources that were available to them, since there was no formal budget sanctioned for this purpose, districts diverted funds from other projects to set up computers in the treasuries. The growth of information technology hence did not follow the path of growth that happened in other areas of e-governance. The increase in the workload and the extremely sensitive nature of work with increased pressures to perform lead to the introduction of computers in these treasuries. The Indian Government in its 9th (1990-1995) and 10th Finance Commission Plan (1995-2000) finally sanctioned a formal budget of Rs 592.08 million and Rs 230.10 million respectively with a provision of Rs 10,00,000 per treasury. The Government of Haryana received a grant of Rs

160.89 million as per the recommendations of the 9th Finance Commission for the purpose of treasury computerization. Subsequently the National Plan of E Governance of the Government of India also identified treasury computerization as one of them most important activities to be implemented. The complexities and the sensitive nature of operations lead to delays in the implementation of computerization of treasuries.

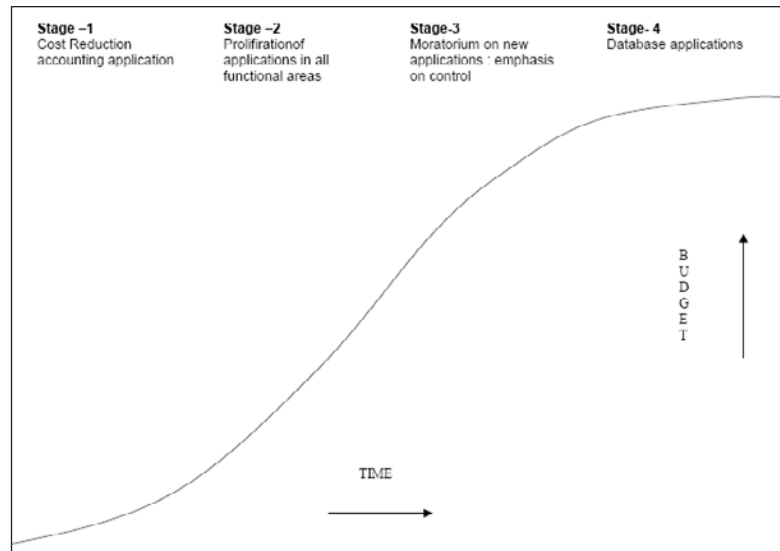
The treasuries in different States had their own path of growth. The present study examines the implementation process of computerization in Faridabad District of the State of Haryana, India and maps their progress on the various e-governance growth models. The following paragraphs examine the various growth models.

GROWTH MODELS OF E-GOVERNANCE

Growth of Information Technology gained importance for research only after the 1970s when Richard Nolan (1973) wrote about the four-stage model of Information System Management. The other who followed included Cyrus Gibson and Nolan (Gibson & Nolan, 1974). Nolan (1973) in his four stage model identified four distinct stages in the growth of information technology. It was found that EDP budget for a number of companies, when plotted over time from initial investment to mature operation, follow an S-Shaped curve. The turning of this curve corresponds to the main events – often crises – in the life of the EDP function that signal important shifts in the way the computer resource is used and managed. In the S-curve there were three such turnings and four such stages. (Figure-5) The four stages defined by Nolan were Initiation, Expansion, Formalization, and Maturity

These stages are associated with a distinctive informal organization process. In order for an EDP system to move from one stage to another, many of the issues related to the stages need to

Figure 5. Four stages of application growth (Source: Nolan & Gibson 2000)



be resolved. The Nolan model identified the underlying forces at work at these stages (Nolan & Gibson, 1974). At the end of the S-curve there would be more S-curves as new EDP technologies emerge and there is more sophistication in system analysis.

A year after documenting this four-stage model Nolan, in concert with Gibson (2000), offered an updated version (Gibson & Nolan, 1974). The major modification was that consideration was given to three factors that seemingly affected information systems management, these being the information systems applications portfolio, the level of specialization of the computer professionals, and the management methods applied at each stage. A secondary modification was that the stage names had been renamed as Initiation, Expansion, Formalization, and Maturity. For the first time, there was a hint that if an organization was able to establish its position within the model, future systems management problems could be anticipated and to a certain extent miti-

gated. The management techniques appropriate to each stage is clearly delineated in this work, with the expectation that progression to the next stage would eventuate if these techniques are properly executed. The assumption of predictability inferred within the model is reinforced by the interpretation of other authors (Dearden & Nolan, 1973; McFarlan, 1973).

Nolan (1979) revisited his original work and modified it into a six-stage model. Nolan stated that his original four-stage model was still valid, but that further research had enriched his understanding so the new model was to be seen as superseding the old one. The six stages are named as Initiation, Contagion, Control, Integration, Data Administration and Maturity. Characteristics of each stage that alter their attributes include the applications portfolio, data processing departmental organization, data processing planning and control and user awareness. Subsequently John Rockart's Critical Success Factor Model (Rockart 1979),

Warren McFarlan , James McKenny and Philip Pyburn's Strategic Grid (McFarlan, McKenny & Pyburn 1983), Gibson and Mike Hammer's Benefit/Beneficiary Matrix (Gibson and Hammer, 1985), a model later revised by Gibson and Barbara Jackson (Gibson and Jackson, 1987) were some of the models that evolved after the Nolan Model.

The stages of growth information systems management model could be an appropriate means for managing e-government initiatives and that such models had been considered appropriate for previous technological interventions, such as when end-user computing arrived (Huff, Munro et al. 1988), and again, when enterprise resource planning systems became available (Holland & Light, 2001). There has been some research in the area of developing new models of growth specifically for e-government (Layne & Lee, 2001; Moon, 2002). Stages of growth model for information systems management was originally

described by Churchill and colleagues (1969), who identified four stages for their model. Later, Nolan made the stages of growth model popular, mainly because of the intuitive appeal of his model. The original Nolan model (1973) was the progenitor of just about every subsequent model. In his preamble, Nolan said his client organizations demonstrated incapacity to migrate from operational use of computers to higher tactical and strategic levels.

The growth of e-governance goes much beyond the growth of EDP systems or Information Technology Systems. Laynee and Lee (2001) proposed a four stage model for e-governance growth. The stages of development outline the structural transformations of governments as they progress toward electronically enabled government and how the Internet-based government models become amalgamated with traditional public administration, implying fundamental changes in the form of government. A four-stage model

Figure 6. Laynee & Lee four stage growth model (Source Laynee & Lee 2001)

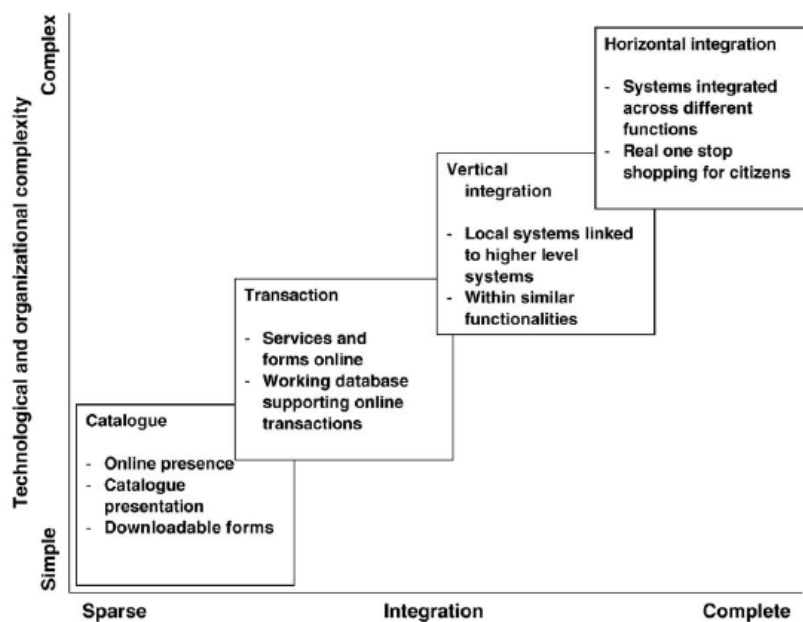


Table 2. Various models of growth of information technology and e-governance

Sno	Name of the Stage Model	No of stages	Area of Application	Stages
1	Nolan (1973)	4	General	Initiation, Expansion, Formalization, Maturity
2	Nolan (1979)	6	General	Initiation, Contagion, Control, Integration, Data Administration and Maturity
3	Gibson & Hammer (1985)	3 X 3 (matrix)	General	Task Mechanization, Process automation, Boundary Extension, Work Improvement, Functional Enhancement, Service Enhancement, Role Expansion, Functional Redefinition, Product Innovation
4	Hiller & Belanger (2001)	5	Government	Information, Two way communication, Transaction, Integration, Political Participation
5	Laynee & Lee (2001)	4	Government	Catalogue, Transaction, Vertical Integration, Horizontal Integration
6	Moon (2002)	5	Government	Information dissemination / cataloguing, two way communication, services and financial transaction, vertical and horizontal integration, political participation
7	Adapted Moon	6	Government	Informational, Transactional, Process redesign, Full integration, E-Democracy, and Maturity
8	United Nations(2002)	5	Government	Emerging, Enhanced, Interactive, Transactional, Seamless
9	World Bank	4	Government	Publishing, Interactivity, Completing transactions, delivery
10	Reddick (2004)	2	Government	Cataloguing, Transactions
11	Anderson PPR Model 2006	4	Public Sector	Cultivation, Extension, Maturity, Revolution

was suggested. The four stages of e-government were (1) cataloguing, (2) transaction, (3) vertical integration, and (4) horizontal integration. These four stages are explained in terms of complexity involved and different levels of integration as shown in Fig. 6.

Many models have tried to map the growth of Information Technology, the difference being the perspective in which these models were developed. The growth of e-governance systems has been quite different from the way Information Technology has grown in the private sector. The factors that guided business operations being quite

different from the factors that guide e-governance systems. E-governance has elements of bureaucracy, politics, citizen and a non-profit motive, which makes it different from the private sector. A comparison of the various growth models is at table 2.

The information technology implementation started late in the treasuries. The case study of the Faridabad District treasury reveals that the first computer entered its premises in the year 1997. What followed was a period wherein there were changes in technology and changes in the implementing agencies. The phases of computerisation

of Faridabad District Treasury, Haryana has been mapped across six stages in figure 4.

The present study examines the growth of Information Technology using the two models of Nolan (1979) and Laynee & Lee (2001), to map the growth of e-governance in Faridabad Treasury.

STAGES OF GROWTH AND TREASURIES

The history of computerisation of Treasury in Faridabad was traced from the year 1996 to 2006. The implementation started with a stand alone system in the year 1996 and reached an online transaction stage in the year 2006. The stages have been indicated in figure 7.

The Faridabad Treasury has gone through a six stage growth as in figure 7. According to Nolan (1973), Budget and Skill levels of implementation when mapped across time frames yields an S-Curve. The expenditure on Information Technology during the period 1991 to 2006 is as in Table 3, when plotted across time frames yields the curve as shown in figure 8.

The transition points on the curve in Figure 8 indicates various stages of development of Information Technology. Two S curves can be clearly identified in Figure 8, one for the period 1991 to 2000 and another for the period 2000 onwards. The two curves have been plotted separately in figure 8 and figure 9. The two time periods correspond to the time when the computer system was single user and subsequently a multi user system. The complete history of computerisation has been traced in the following paragraphs.

The introduction of computers in the year 1996-97 saw an extremely low level of expenditure on hardware and extremely low levels of skill. It was a stage when the treasury staff were being first introduced to computers. It was a period of resistance and a period when the technology acceptance levels were low. The computers op-

erators mentioned that there was a sense of fear and hence the computer usage remained limited to printing of reports using computers, something that they had been doing manually.

Thus stage of implementation of information technology corresponds to the initiation stage of the Nolan Model. It was a gradual progress from a stage of getting familiar to compiling reports using computers. The data used to be typed into the computer to generate reports. (figure 7) This stage also corresponds to the first stage of Layne and Lee model i.e Catalogue Stage, a stage where data is fed into the computer only for the purpose of retrieval at a later stage. The skill level of the employees improved from the year 1998 to 2000. The implementation of this stage continued for some time till it was abandoned in the year 2000. The usage stopped as soon as the supporting personnel for the project deputed by the vendor was recalled. The use of computer in the treasury did not go beyond compilation of reports and printing reports for submission to Directorate of Treasury and Comptroller and Auditor General.

The system was soon replaced by a multiuser online system. The online system consisted of a multiuser system wherein the Treasury operators could enter and update financial data online.

The software was developed by National Informatics Center (NIC) a national level agency. The hardware vendor however continued to be Haryana State Electronics Development Corporation (HARTRON), a state level agency. It was a case of change of technology both w.r.t the hardware and the software. According to Nolan (1979) the growth model would follow a new S curve whenever there is a change in technology (figure 6). This stage also corresponded to the second stage of Laynee and Lee Model i.e. transaction. The initiation phase of the new S curve corresponds to the second stage of Laynee and Lee model. This brings to light an interesting behaviour of the two models. In the case of Nolan (1979) the growth shifts from one S curve

Figure 7. Stages of development of computerization in Faridabad Treasury

Stage	Stage-1	Stage-2	Stage-3
Year	1996-97	1998-99	99-2000
Hardware	Intel 386 /Pentium	No change in Hardware	No change in hardware
Skill level	One operator by the vendor	The staff were trained by the State Agency which developed the Software (HARTRON)	4 out of eight staff got trained in data entry and compilation of reports
Application	Application developed by State Agency(HARTRON),Compilation of report	Compliation of Budget statements .	No Change
Uitllisation	No uitllisation	Was only used to compile the budget statements and take printouts.	The use stopped for about 6-8 months.

Stage	Stage-4	Stage-5	Stage-6
Year	2000-2001	2001-2005	2005 and beyond
Hardware	Multiuser Environment and Server Based machines	No change in hardware	No change
Skill level	Training of staff took place. One staff from the hardware vendor also posted	All the 8 staff of the treasury got trained	No change
Application	Application was developed by NIC a national agency	No change. The application still had a draw back that it was not online with the other departments with which it transacted. Only internal operations were online.	Application for making operations with finance, budget, AG, Sub Treasuries being made onlie through Web based modules through e-Finance-Net a software
Uitllisation	Use stabilised within the first 8 months	Fully utilised.	Still under development

to another whereas in case of Lee & Laynee it follows the same growth pattern instead of starting from the first stage whenever there is a change in technology . It possibly appears that the change in technology enables e-governance systems in the Layne & Lee model to progress

from one stage to another.

The State Government has taken up a project of integrating treasury systems through a Web based software called *e-Finance-Net*. This web based system will integrate all the six agencies namely, the Finance Department, Ac-

Treasury Computerization in India

Table 3. Expenditure on e-governance at Faridabad Treasury, Haryana

Year	1991	1992	1993	1994	1995	1996	1997	1998
Expenditure (in million Rs)	.50	.50	.43	.57	.47	.85	.60	1.198
Year	1999	2000	2001	2002	2003	2004	2005	2006
Expenditure (in million Rs)	1.264	1.15	2.65	4.43	2.49	2.25	1.60	1.61

Figure 8. Expenditure occurring on treasury computerisation across years

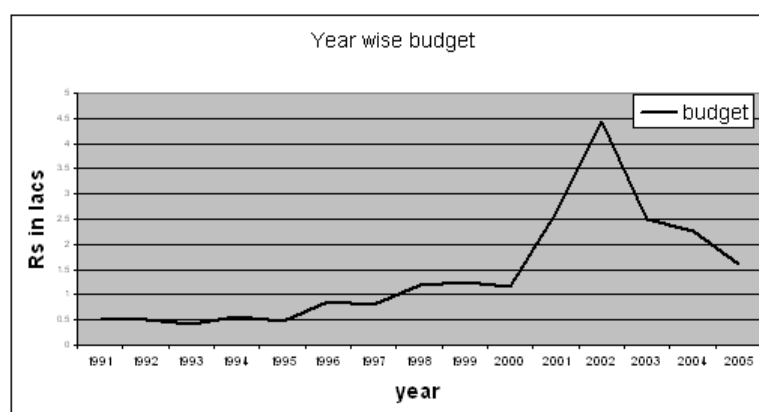


Figure 9. Trends of expenditure on computerisation during the single user phase

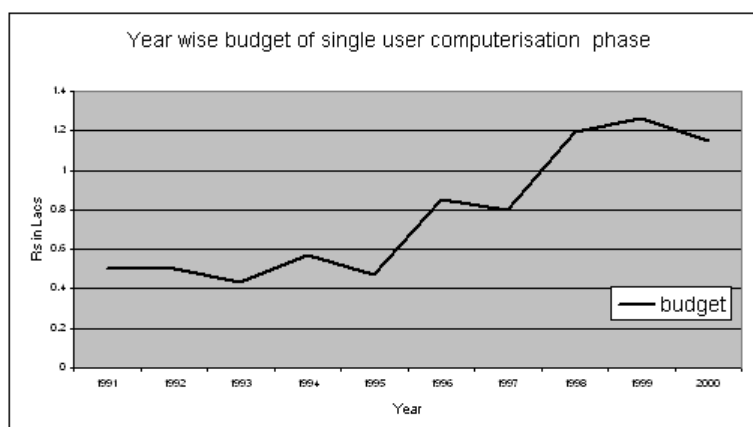
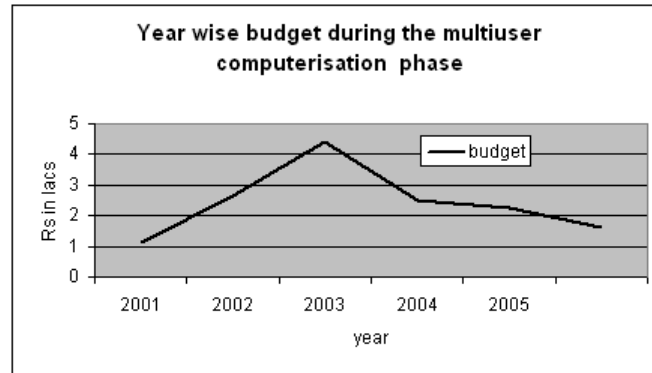


Figure 10. Trends of expenditure on computerisation during the multi user phase



countant General's Office, Haryana, Treasuries Department, Accounts officers of the different departments, banks and Drawing and Disbursing Officers. The implementation is still in process. There is a change of technology from a multiuser environment to a Web based system. There is an effort to vertically integrate the various departments so the treasury data could be effectively updated and online. The Nolan (1979) model predicts that the implementation would follow a new S curve which would taper giving way to a maturity stage. The two models discussed above can be mapped onto the stages of growth of computers as in figure 5.

The two reference models do not have any explanation for a situation wherein there is a change in technology. Both the models assume that the technology would remain same and that all projects will progress from one stage to another.

The technology related to the e-governance system of the treasury has undergone change thrice. While the S Curve in case of Nolan (1979) model changed, the Laynee and Lee Model continued to follow the various stages of the model. It brings into light an important issue that e governance system may not complete all the stages

of growth starting from the stage of initiation to maturity. Technology changes may be enough to change the pace of growth of e-governance and also move e- governance to a higher stage.

The growth of Information Technology among the treasuries has not been voluntary process. The computerisation efforts have been more forced and implemented through strict orders. Many of the transition or changes in technology has been due to forced compulsory orders and hence many not follow a natural path of growth as predicted by Nolan (1979).

FUTURE TRENDS

Faridabad Treasury computerisation has now grown from a standalone Treasury system to being a part of a Financial Management System of the State Government. This involves issues of Financial Planning, Financial Forecast and Financial expenditure monitoring. This process involves extensive Vertical Integration with the Finance department and Horizontal Integration with the other department leading to a situation wherein all the departments would know online the amount withdrawn from the treasury

Figure 11. Integrating Laynee & Lee four stage model and Nolan model with growth of e-governance in treasuries

Stage	Stage-1	Stage-2	Stage-3
Year	1996-97	1998-99	99-2000
Application	Application developed by State Agency(HAR TRON),Compilation of report	Compliation of Budget statements .	No Change
Nolan	Initiation	Contagion	Transition to new S Curve
Laynee & lee	Catalogue	Catalogue	

Stage	Stage-4	Stage-5	Stage-6
Year	2000-2001	2001-2005	2005 and beyond
Application	Application was developed by NIC a national agency	No change. The application still had a draw back that it was not online with the other departments with which it trasacted. Only internal operations were online.	Application for making operations with finance, budget, AG, Sub Treasuries being made onlie through Web based modules through e-Finance-Net a software
Nolan	Initiaition	Contagion	Control
Laynee & Lee	Transaction	Transaction	Verticle Integration

and difference between the sanctions and the actual withdrawal. Andreson (2006) proposed the proposed Public Sector Process Rebuilding (PPR) model which emphasizes the digitalization of the core activities not from the perspective of what is technologically feasible but from what is beneficial for the end-users regardless of the possible internal changes caused by the digitalization. This would involve data mobility across organizations, application mobility across vendors and ownership of data transferred to customers. Systems need to be standardized and open to public access. Government of India has passed

the Right to Information Act. This has resulted in making the information with the government open to the public. Hence e-governance systems now look at making data available in the system open to the common citizens.

LEARNINGS AND IMPLICATIONS

The case study of the treasury system at Faridabad brings into light some very important issues of convergence of growth models. One of the growth model relates to IT growth in general and the other

model relates to e-governance growth. The growth models converge at various stages. How do these growth models converge and at what stages is a matter that requires further research.

Technology is an important factor for growth of e-governance. Information Technology has been known for a very short life cycle. When Technology Life Cycles are short, organisation may like to abandon old technologies for newer technologies. What is the extent of effect of technology on growth is an issue that requires to be studied. What are the other factors that enable e-governance systems to grow also needs further examination. Technology acceptance at various stages of growth might be one of the factors that needs a deeper examination.

The case study bring into light fact that technologies may not grow to their full life time. They may be replaced by a new S curve even before they reach the second or the third stage. The S curve has shown a fall towards the end of the technology life cycle. Whenever there is a tendency of an S curve to be replaced by another S curve there is a fall in the budget allocations at the end of the S curve.

For organisation this would mean that they need to explore technology options if they want to move from one stage of growth to another. Changing over to a newer technology would cost them less and also enable them to move into a higher stage since they would be at the beginning of a new S curve.

Limitation of the Study

The case study was carried out in treasury system of Faridabad, Haryana, India where in transitions in technology were very evident. This may not hold good in areas where the Technology levels have saturated. Governments in general are technology followers and tend to adopt technology which the private sector uses for its operations. Hence there may be organization which may like

to keep the technology and not change it till the end of the life cycle.

Scope for Further Research

The study throws up issues of research in an area where technology transformations triggers system growth. The relationship between technology life cycle and system growth needs to be studied in details to establish the fact that, whether changes in technology can trigger e-governance growth. How do the organizations adapt to changes in technology which may also have an effect on technology acceptance. One of the issues that need to be further studied is whether an attempt by an e-government to growth triggers change in technology or vice-versa.

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Chapter IV

Interoperability in E-Government: Stages of Growth

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ABSTRACT

Improved interoperability between public organizations as well as between public and private organizations is of critical importance to make electronic government more successful. In this chapter, stages of e-government interoperability are identified and discussed. Four stages are presented: work process stage, knowledge sharing stage, value creation stage, and strategy alignment stage.

INTRODUCTION

The mobilization of electronic information across organizations has the potential of modernizing and transforming information exchanges. The current information exchange is, however, often inefficient and error-prone (Eckman et al., 2007). Exchanges of information and services are often fragmented and complex, dominated by technical as well as organizational problems.

High-ranking issues among the defining purposes of e-government are highly agile, citi-

zen-centric, accountable, transparent, effective, and efficient government operations and services (Scholl and Klischewski, 2007). For reaching such goals, the integration of government information resources and processes, and thus the interoperation of independent information systems are essential. Yet, most integration and interoperation efforts meet serious challenges and limitations.

The purpose of this chapter is to present stages of development for e-government interoperability. By identifying development stages, scholars and practitioners have a framework within which they

can diagnose the current situation and plan for future improvements in interoperability.

INTEROPERABILITY

Interoperability is referring to a property of diverse systems and organizations enabling them to work together. When systems and organizations are able to inter-operate then information and services are provided and accepted between them. In a narrow sense, the term interoperability is often used to describe technical systems. In a broad sense, social, political, and organizational factors influencing systems and systems performance are also taken into account.

For example, new technologies are being introduced in hospitals and labs at an ever-increasing rate, and many of these innovations have the potential to interact synergistically if they can be integrated effectively. However, as pointed out by Eckman et al. (2007), the current health-care information exchange is inefficient and error-prone; it is largely paper-based in most countries, fragmented, and therefore overly complex, often relying on antiquated information technology.

At the same time, health care costs are rising dramatically. Errors in medical delivery are associated with an alarming number of preventable, often fatal adverse events. A promising strategy for reversing such a trend is to modernize and transform the health-care information exchange, that is, the mobilization of health-care information electronically across organizations within a region or community (Eckman et al., 2007).

However, in the case of hospitals, there are limitations to free flow of information. Information systems often handle sensitive information about individuals and other organizations. Collection and sharing of such information is affected by privacy concerns (Otjacques et al., 2007).

As electronic government refers to the delivery of government services (information, interaction and transaction) through the use of information

technology, a distinction can be made between the front and back offices of public service delivery organizations. The interaction between citizens and civil servants occurs in the front office, while registration and other activities take place in the back office. Bekkers (2007) found that back-office co-operation is a serious bottleneck in e-government due to different interoperability problems.

One important action to improve information sharing is standardization in information systems. It is necessary to define the compatibility standards to be adopted among systems (Santos and Reinhard, 2007). Some organizations will have to change their technical and organizational processes and make accommodations in response to standardization initiatives (Gogan et al., 2007).

Interoperability of systems enables interoperability of organizations. Systems interoperability is concerned with the ability of two or more systems or components to exchange information and to use the information that has been exchanged. Organizational interoperability is concerned with the ability of two or more units to provide services to and accept services from other units, and to use the services so exchanged to enable them to operate effectively together (Legner and Lebreton, 2007).

STAGE MODELS

Stages of growth models have been used widely in both organizational research and management research. According to King and Teo (1997), these models describe a wide variety of phenomena – the organizational life cycle, product life cycle, biological growth, etc. These models assume that predictable patterns (conceptualized in terms of stages) exist in the growth of organizations, the sales levels of products, and the growth of living organisms. These stages are (i) sequential in nature, (2) occur as a hierarchical progression that is not easily reversed, and (3) evolve a broad range of organizational activities and structures.

Benchmark variables are often used to indicate characteristics in each stage of growth. A one-dimensional continuum is established for each benchmark variable. The measurement of benchmark variables can be carried out using Guttman scales (Frankfort-Nachmias and Nachmias, 2002). Guttman scaling is a cumulative scaling technique based on ordering theory that suggests a linear relationship between the elements of a domain and the items on a test.

Various multistage models have been proposed for organizational evolution over time. For example, Nolan (1979) introduced a model with six stages for information technology maturity in organizations, which later was expanded to nine stages. Earl (2000) suggested a stages of growth model for evolving the e-business, consisting of the following six stages: external communication, internal communication, e-commerce, e-business, e-enterprise, and transformation, while Rao and Metts (2003) describe a stage model for electronic commerce development in small and medium sized enterprises. In the area of knowledge management, Housel and Bell (2001) developed a five level model. In the area of knowledge management systems, Gottschalk (2007) developed a four-stage model applied to knowledge management in law enforcement. Gottschalk and Tolloczko (2007) developed a maturity model for mapping crime in law enforcement, while Gottschalk and Solli-Sæther (2006) developed a maturity model for IT outsourcing relationships. Each of these models identifies certain characteristics that typify firms in different stages of growth. Among these multistage models, models with four stages seem to have been proposed and tested most frequently (King and Teo, 1997).

The concept of stages of growth has been widely employed for many years. Already two decades ago, Kazanjian and Drazin (1989) found that a number of multistage models have been proposed, which assume that predictable patterns exist in the growth of organizations, and that these patterns unfold as discrete time periods

best thought of as stages. These models have different distinguishing characteristics. Stages can be driven by the search for new growth opportunities or as a response to internal crises. Some models suggest that organizations progress through stages while others argue that there may be multiple paths through the stages.

Kazanjian (1988) applied dominant problems to stages of growth. Dominant problems imply that there is a pattern of primary concerns that firms face for each theorized stage. In criminal organizations, for example, dominant problems can shift from lack of skills to lack of resources to lack of strategy associated with different stages of growth.

Kazanjian and Drazin (1989) argue that either implicitly or explicitly, stages of growth models share a common underlying logic. Organizations undergo transformations in their design characteristics, which enable them to face the new tasks or problems that growth elicits. The problems, tasks or environments may differ from model to model, but almost all suggest that stages emerge in a well-defined sequence, so that the solution of one set of problems or tasks leads to the emergence of a new set of problems and tasks, that the organization must address.

SEMANTIC INTEROPERABILITY

Semantic interoperability is defined as the extent to which information systems using different terminology are able to communicate. Semantic interoperability is part of the interoperability challenge for networked organizations. Inter-organizational information systems can only work if they are able to communicate and work with other such systems and interact with people. This requirement is called interoperability, and it can only be met if communication standards are applied. A standards-based technology platform allows partners to execute a traditional business function in a digitally enhanced way. A common

information systems platform, then, basically is a set of standards that allows network participants to communicate and conduct business processes electronically (Papazoglou and Ribbers, 2006).

As semantic interoperability is broader than the technology, syntax and practice levels, and encompasses elements of them, it deserves to be discussed further (Papazoglou and Ribbers, 2006).

Semantic issues at the data level is concerned with the actual meaning of data found in one system, and how it relates to data found in each and every one of the other partners' systems. Addressing these semantic concerns involves discovering how information is used differently by each the cooperating organizations, and how that information maps to the normative alliance view (Papazoglou and Ribbers, 2006).

Semantic issues at the business process level is concerned with mutual agreement about how business processes are defined and managed. A need for process re-engineering, corresponding implementation efforts and organizational changes are often needed. These efforts are often more about redesigning business processes than about making them easy to change and combine with those of cooperating organizations (Papazoglou and Ribbers, 2006).

A semantic network is a directed graph in which concepts are represented as nodes, and relations between concepts are represented as links. It is a map of the cognitive terrain that surrounds and gives meaning to a concept and through which each concept is ultimately understood. A concept is a unit of information that can be represented by a word or phrase, and the meaning of which is embodied in its relations to other concepts. On the other hand, relations are a special category of concepts that depict the linkages between and among concepts. An instance, or sometimes termed a proposition, is a unit composed of two concepts and their relationship. As each concept can be linked to many other concepts, semantic

networks can be complex and multidimensional (Khalifa and Liu, 2008).

Khalifa and Liu (2008) studied a semantic network applied in computer-mediated discussions. The semantic network was the discussion representation for computer-mediated discussions. Computer-mediated discussions have become an integral component of many knowledge management systems used to support knowledge management activities. In communities of practice, for example, computer-mediated discussions support the externalization, communication and internalization processes of knowledge sharing among members.

ORGANIZATIONAL INTEROPERABILITY

Organizational interoperability is defined as the extent to which organizations using different work practices are able to communicate. Interoperability represents a dynamic capability for transacting organizations. Teece et al. (1997) define dynamic capabilities as the organization's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Dynamic capabilities thus reflect an organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions.

Dynamic capabilities are identifiable, specific processes. Some dynamic capabilities integrate resources. For example, product development routines by which managers combine their varied skills and functional backgrounds to create revenue-producing products and services are such dynamic capability (Eisenhardt and Martin, 2000).

Inter-organizational business processes are dependent on knowledge sharing and knowledge creation. There is a need for know-what, know-how, as well as know-why in cooperating

organizations to be able to explore and exploit information exchanges.

According to Kutvonen (2007), the main challenge for the interoperability knowledge management is to provide an extensible discipline to capture detailed enough ontology of business network models, service types, and service offers for automated use in the interoperability checking both at establishment and operational time. This discipline provides the inter-enterprise collaborations a kind of interoperability safety.

By ontology is meant a conception of reality. It seeks to describe or posit the basic categories and relationships of being or existence to define entities and types of entities within its framework. In an interoperability context, ontology is concerned with knowledge creation and sharing to the extent that it can make information exchanges safe, correct and efficient.

STAGES OF INTEROPERABILITY

Based on the reviewed literature on systems interoperability and stages of growth models, we are now ready to present a potential stage model for e-government interoperability, as illustrated in Figure 1.

Stage 1. In *work process*, each employee does his or her tasks in a way that is adopted to both organization and person. By aligning work processes in inter-operating organizations, e-government interoperability increases. Alignment is possible in sub-processes as well as complete processes and sets of processes. As argued by Fahey et al. (2001), there is a need to capture, analyze, and project the transformational impact of electronic government on organizational work processes in intra- as well as inter-organizational relationships. At this stage, integration and efficiency in work processes from interoperability is important.

Geographic Information Systems (GIS) are applied in a variety of electronic government

situations, from tracing the origins and spread of foot and mouth disease on farms to locating crime hot spots for law enforcement. GIS have become indispensable to effective knowledge transfer within both the public and private sector.

However, as pointed out by Gottschalk and Tolloczko (2007) the level of sophistication varies among agencies applying GIS. Furthermore, the extent to which GIS interoperate with each other are subject to substantial variation. A survey on interoperability for GIS in the UK was conducted by the e-government unit of the Cabinet Office (2005).

According to this survey, 49% of the surveyed government organizations participated in data sharing projects for GIS, indicating that half of the organizations were working on Stage 1 of the stage model for e-government interoperability. The fractions at higher levels were not identifiable from the survey.

Many different application packages were in use, such as ESRI, Mapinfo, Intergraph, GGP, CadCorp, INNogistic and Autodesk.

Stage 2. In *knowledge sharing*, a flow strategy is focused on collecting and storing knowledge in interoperating organizations (Hansen et al., 1999). While electronic work processes handle information, knowledge work is handled by employees in collaborating organizations (Bock et al., 2005; Wickramasinghe, 2006). At this stage, effectiveness and learning in inter-organizational relationships from interoperability is important.

To improve interoperability of such systems for GIS and other e-government systems, the UK Cabinet Office (2005) developed an e-government interoperability framework. The framework is mostly technical in nature, stressing alignment with the Internet and adoption of the browser as the key interface. The framework intends to stimulate government agencies to work more easily together electronically, make systems, knowledge and experience reusable from one agency to another, and reduce the effort needed to deal with

government online by encouraging consistency of approach. In terms of our suggested stage model for e-government interoperability, the framework seems only to cover Stages 1 and 2.

Stage 3. In *value creation*, inter-operating organization may have different value configurations. A distinction is often made between value chains, value shops, and value networks (Stabell and Fjeldstad, 1998). The best-known value configuration is the value chain. In the value chain, value is created through efficient production of goods and services based on a variety of resources. Primary activities in the value chain include inbound logistics, production, outbound logistics, marketing and sales, and service. In the value shop, value is created through creative problem solving for clients based on knowledge resources. Primary activities include problem identification, solutions, decisions, implementation, and evaluation (Sheehan, 2005). In the value network, value is created through efficient connections of subscribers to the network. Primary activities include services, contacts, and infrastructure. Interoperability at this stage of value creation is concerned with interactions between primary activities in different value configurations present in electronic government. While a public hospital is a problem-solving organization for patients, having value shop as the dominant value configuration, a public transportation authority is a production organization, having value chain as the dominant value configuration. At this stage, added value from interoperability is important.

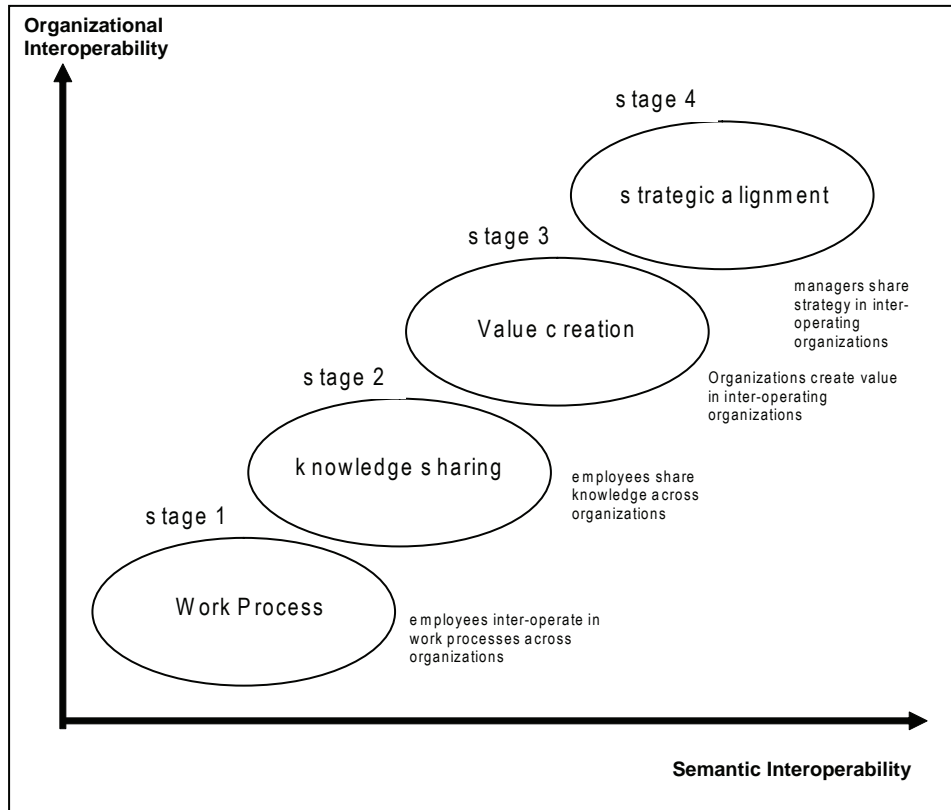
Stage 4. In *strategic alignment*, interoperating organizations apply two-way linked planning with reciprocal integration in strategy work. The purpose of integration is to support and influence organizational strategy (King and Teo, 1997). The role of information technology functions is to be a resource supporting and influencing organizational strategy. At this stage, synergies among interoperating organizations is important.

At this stage, there are no conflicting goals as often found at lower stages. For example, when a lorry loaded with family boats from Latvia passed the border of Norway, police had instructed customs to let the lorry pass. The reason was that Norwegian police knew there were narcotics in terms of amphetamin hidden in one of the boats. Since the lorry was part of organized crime, the police wanted to follow it to its destination. Customs, however, were desperately in need of success and stopped the lorry, invited the press and told how much narcotics they had been able to capture. Criminal police was upset. In our perspective this situation occurred because the two federal organizations have conflicting goals. While customs authority is concerned with confiscating smuggled goods, police authority is concerned with fighting organized crime (Dean et al., 2006). At this final stage 4, there should be no such conflicting goals among interoperating organizations anymore.

The cumulative effect of higher stages of interoperability might be measured in terms of transaction cost reduction. Legner and Lebreton (2007) argue that transaction cost theory seems to be an appropriate approach to quantify interoperability as interoperability issues are the result of the division of work and occur in the context of exchanges between organizational actors. Transaction cost theory concurs that the transaction between interoperating organizations is the basic unit of analysis and regards governance as the means by which order is accomplished in a relation in which potential conflict threatens to undo or upset opportunities to realize mutual gains.

Five attributes of information exchange are positively associated with transaction costs: (1) necessity of investments in durable, specific assets; (2) infrequency of transacting; (3) task complexity and uncertainty; (4) difficulty in measuring task performance; and (5) interdependencies with other transactions. Overall, higher stages of interoperability will reduce impacts of these attributes on transaction costs. First, investments

Figure 1. Stage model for e-government interoperability



in hardware and software have to be carried out at Stage 1 to allow inter-organizational work processes. Second, task complexity and uncertainty is reduced by knowledge sharing at Stage 2. Third, measuring task performance is possible in value creation at Stage 3. Finally, interdependencies are strategically aligned at Stage 4. Only the attribute of infrequency of transaction is not necessarily impacted by higher interoperability stages.

The starting point for the stage model is standardization. According to Papazoglou and Ribbers (2006), interoperability requires standardization in four dimensions: technology, syntax, semantics, and pragmatics. Technology standards concern middleware, network protocols, and security

protocols. Syntax standardization means that the network e-government organization has to agree on how to integrate heterogeneous applications based on the structure or language of the messages exchanged. Normally, commonly acceptable data structures are chosen to represent well-known constructs, e.g. object descriptions. Semantic standards constitute agreements in extension to syntactic agreements on the meanings of the terms used for an organization's information systems. Pragmatic standards, finally, are agreements on practices and protocols triggered by specific messages, such as orders and delivery notifications.

MEASURING TRANSACTION COSTS

The extent of interoperability can be measured in terms of transaction costs. Higher levels of interoperability are assumed to be associated with lower levels of transaction costs. This assumption is based on the argument that transactions between collaborating agencies are performed more cost-effective when work processes are aligned, knowledge is shared, value creation is joined, and strategies are aligned.

This assumption is valid given the same characteristics of transaction volume and form. Typically, however, higher levels of interoperability will be associated with higher transaction intensity, as transactions have become easier to carry out between cooperating agencies.

Five attributes are associated with transaction costs:

1. **The necessity of investment in durable, speci. c assets:** If transacting organizations need investments in assets to carry out their inter-organizational transactions, then investment costs are part of transaction costs.
2. **Infrequency of transaction:** Cost estimate for each transaction has to be higher and included as part of transaction costs.
3. **Task complexity and uncertainty:** Cost estimate is dependent on complexity judgment and risk assessment.
4. **Difficulty in measuring task performance:** Transaction cost has to take into account the hidden costs associated with invisible inefficiency in task performance.
5. **Interdependencies with other transactions:** Transaction cost has to include changes in other transactions as a consequence of inter-organizational transactions.

These five attributes determine transaction costs for all participating agencies (Williamson,

2000). In addition some agencies may suffer from additional transaction costs because of opportunistic behavior by other agencies. Opportunism is self-interest seeking with guile and includes overt behaviors such as lying, cheating and stealing, as well as subtle behaviors such as dishonoring an implicit contract, shirking, failing to fulfill promises, and obligations.

To measure transaction costs, then, is a matter of estimating certain cost elements and changing the size of these elements according to certain factors.

According to Anderson et al. (2000), empirical research indirectly tests transaction cost theory by relating observed information sourcing decisions to transaction attributes that proxy for transaction costs. Evidence on the relation between transaction-specific investments, contract duration, and technological uncertainty generally supports the theory. The consistency of the empirical results seems startling in light of two problems with the hypothesis that organizations take sourcing decisions to minimize the sum of production and transaction costs. First, production and transaction costs are rarely neatly separable. For example, the choice of production technology (and subsequent production costs) is often inextricably linked with production volume, which in turn depends on whether the organization produces some or all products internally. Second, decision-makers are likely to be affected by wealth effects associated with sourcing, and thus are unlikely to take decisions that strictly maximize organization profit.

Anderson et al. (2000) argue that because production costs are objectively calculated by the accounting system, while transaction costs are assessed subjectively through indirect indicators, functional managers are likely to differ in the importance that they assign to reducing transaction costs. Consequently, the effect transaction costs have on a make-or-buy choice can partly reflect the influence exerted by the purchasing manager. Production cost differences seems more influential in sourcing decisions than transaction

cost differences, and experience of the decision-maker is related to assessments of technological uncertainty. Profit center managers engage in influence activities that increase the costs of price renegotiations above the level that is observed in comparable external market transactions. Managers sometimes seem more reluctant to outsource when investments in specific assets are necessary; and contrary to theory, managers sometimes consider previous internal investments in specific assets a reason to insource. In certain circumstances decision-makers systematically misestimate (or fail to consider) transaction costs.

SERVICE-ORIENTED ARCHITECTURE

An approach to support interoperability is service-oriented architecture (SOA). SOA is an architectural style that attempts to guide all aspects of creating and using business processes, packaged as services, throughout their lifecycle. It is a style defining and provisioning the IT infrastructure that allows different applications to exchange data and participate in business processes loosely coupled from the operating systems and programming languages underlying those applications (www.wikipedia.org).

SOA is an architectural style whose goal is to achieve loose coupling among interacting software agents. A service is a unit of work done by a service provider to achieve desired end results for a service consumer. Both provider and consumer are roles played by software agents on behalf of their owners (webservices.xml.com).

Implementing a service-oriented architecture means to deal with heterogeneity and interoperability concerns. A flexible, standardized architecture is required to better support the connection of various applications and the inter-organizational sharing of information. SOA is one such architecture. It unifies business processes by structuring large applications as an ad-hoc col-

lection of smaller modules called services. These applications can be used by different groups of people both inside and outside the company, and new applications built from a mix of services from the global pool exhibit greater flexibility and uniformity. Building all applications from the same pool of services makes achieving interoperability much easier and more deployable to affiliate organizations (www.wikipedia.org).

SOAs build applications out of software services. Services are intrinsically unassociated units of functionality, which have no calls to each other embedded in them. They typically implement functionalities most humans would recognize as a service, such as filling out an online application for a building permit, viewing tax statements, or submitting a school priority request. Instead of services embedding calls to each other in their source code, protocols are defined which describe how one or more services can talk to each other. The architecture then relies on a business process expert link and sequence services, in a process known as orchestration, to meet a new or existing business system requirement (www.wikipedia.org).

Interoperability is an important guiding principle for service-oriented architectures. SOAs are commonly built using web services standards that have gained broad industry acceptance. These standards (also referred to as web service specifications) are expected to provide greater interoperability and some protection from lock-in to proprietary vendor software. Furthermore, basic profiles and basic security profiles are developed to enforce compatibility (www.wikipedia.org).

With the increasing use of software applications for the conduct of business, the need to link software applications of co-operating organizations with minimal effort and in short timeframes is becoming ever more evident. This need for interoperability has stimulated not only SOA but also a similar approach labeled service-oriented computing (SOC). SOC is emerging as a promising paradigm for enabling the flexible interconnection

of autonomously developed and operated applications within and across organizational boundaries (Dijkman & Dumas, 2004).

SOC is a distributed application integration paradigm in which the functionality of existing applications (the services that they provide) is described in a way that facilitates its use in the development of applications, which integrate this functionality. The resulting integrated applications can themselves be exposed as services, leading to networks of interacting services known as service compositions or composite services (Dijkman & Dumas, 2004).

SOC brings along a number of specific requirements over previous paradigms (such as object-oriented or component-oriented) that should be taken into account by service-oriented design (Dijkman & Dumas, 2004, p. 338):

- **Autonomy:** As services are expected to be developed by autonomous teams, service-oriented design is an inherently collaborative process involving multiple stakeholders from different organizational units. This raises the issue that certain organizational units may opt not to reveal the internal business logic of their services to others, making it difficult (yet indispensable) to ensure global consistency.
- **Coarse granularity:** Services are highly coarse-grained, at least more so than objects and components. Often, a service maps directly to a business object or activity (e.g. a purchase order or a flight booking service). It follows that the design of services (and in particular composite ones) is a complex activity. It involves reconciling disparate aspects such as the involved providers and consumers, their interfaces, interactions, and collaboration agreements, their internal business processes, data, and legacy applications.
- **Process awareness:** As services often correspond to business functionality exported

by an organizational unit, they are likely to be part of long-running interactions driven by explicit process models. Hence, service-oriented design should take into account the business processes as part of which services operate and interact, and in particular, the integration (or retrofitting) of services into business processes. This effectively places service-oriented design at the crossroads between software and enterprise design.

At IBM, a top-down approach to service-oriented architecture was implemented. The IBM enterprise architecture is designed to ensure effective linkages between enterprise business and IT deliverables. It is a means to integrate business strategy, process, data, applications, and infrastructure. Enterprise architecture governance attempts to unify design approaches with a set of published principles, architecture criteria, standards, and guidelines (Walker, 2007).

INTEROPERABILITY BENCHMARK VARIABLES

Benchmark variables are often used to indicate characteristics in each stage of growth. A one-dimensional continuum is established for each benchmark variable. The measurement of benchmark variables can be carried out using Guttman scales (Frankfort-Nachmias & Nachmias, 2002). Guttman scaling is a cumulative scaling technique based on ordering theory that suggests a linear relationship between the elements of a domain and the items on a test.

In the table, some potential benchmark variables for the interoperability levels are suggested. This table might be applied in several ways. First, for one specific government agency, the level for each benchmark variable can be determined. While the result will not be consistent for one level, the average level might nevertheless be

Exhibit A. Benchmark variables at levels of interoperability in digital government

Benchmark Variables	Level 1 Business Process interoperability	Level 2 Knowledge management interoperability	Level 3 Value Configuration interoperability	Level 4 Strategy Position interoperability
Purpose of integration	administrative efficiency when doing the things right	administrative effectiveness when doing the right things	Functional effectiveness when adding value to the work	Organizational effectiveness when adding business value
Role of information systems	support for inter-organizational workflow	mobilization of information resources	integrating primary and secondary activities	enabling mutual organizational benefits
Primary task for the CIO	Transformation of business process design into IT solutions	establishing electronic knowledge exchanges	Transformation of value logic into IT solutions	Translation of strategic vision into implications for information systems
Primary role of the CIO	monitor learning from the environment	resource allocator prioritizing initiatives	entrepreneur understanding inter-organizational business needs	architect linking IT to business value of cooperating organizations
main governance challenge	standardization of work processes	standardization of information systems	integration of value creation activities	common architecture and infrastructure
Design focus	information exchange	knowledge exchange	service exchange	Benefits exchange
Top management role	Decisions on solutions	stimulation of knowledge exchange	communicating business value	clear strategic direction

computed, thereby identifying the average level at which the organization is currently.

Second, when two cooperating agencies do this exercise for themselves, results might be compared. Typically, one agency will be at a higher level than the other. This insight is useful, as cooperation might be easier when becoming aware of differences.

Finally, a wide distribution of answers (some at level 1, others at level 4) might indicate that the organization has a very unclear understanding of what and why in terms of integration efforts currently underway.

This way of measuring organizational interoperability by applying benchmark variables

to levels represent a new approach in need of more research. Future research might look at conceptualization of benchmark variables as well as empirical testing. See Exhibit A.

Each of the eight benchmark variables can be explained more in detail as follows:

- *Purpose of integration.* At Level 1, integration focuses primarily on solving administrative problems and irritation related to re-entering of data and misunderstandings of information content. Avoiding mistakes and doing things right the first time is important at this stage. This gradually changes as information systems begin to support new

ways of doing the work based on knowledge and learning (Level 2) or influence value creation (Level 3). At Level 4, there is joint strategy development for collaborating organizations – at which business and IS truly acting as one with strategic influences going both directions.

- *Role of information systems.* While each system will only do what it is supposed to do, it will nevertheless change its role in an inter-organizational setting. At Level 2 for example, an environment of knowledge sharing is created around the information system, enabling knowledge workers in different organizations to learn from each other.
- *Primary task for the CIO.* This is the most critical success factor for the IT manager. At Level 1, the most critical success factor is to establish inter-organizational workflow in an efficient and secure way. At Level 4, a very different success factor can be found. It is concerned with the CIO's ability to translate strategy into action. While a mutual strategy might be concerned with overall goals, the strategy does not always tell how those goals might be reached and how information systems might support the effort. Therefore, the CIO must be capable of translating general statements into detailed specifications of future systems.
- *Primary role of the CIO.* The CIO must initially get used to the idea of not having his or her 'kingdom' of systems anymore. Now systems become part of relationships with other 'kingdoms'. Thus, the CIO need to develop relationships and cooperative arrangements with collaborating organizations to work for interoperability. At Level 4, all CIOs involved become members of a group of architecture, who work together to create the joint architecture.
- *Main governance challenge.* IT governance is concerned with decision rights related to

key IT management areas. Initially, decisions should be made concerning standardization. At higher levels, architectural decisions are more important.

- *Design focus.* When information systems are designed, focus will change from standardization at lower levels to exchanges at higher levels.
- *Top management role.* The chief executive might find it difficult to 'let others into' his or her organization, as strengths and weaknesses become visible to outsiders. Especially at Level 2, where openness concerning operations and problems is a prerequisite for inter-organizational knowledge management.

THEORY-BASED BENCHMARK VARIABLES

One of the theories introduced in this chapter is *transaction cost theory*. When applying this theory to levels of organizational interoperability, we find different costs at different levels, as described in the table.

Another theory is *agency theory*, where the agency problem occurs when cooperating parties have different goals and division of labor. The cooperating parties are engaged in an agency relationship defined as a contract under which one or more organizations (the principal(s)) engage another organization (agent) to perform some electronic information service on their behalf, which involves delegating some decision making authority to the agent (Jensen & Meckling, 1976). According to Eisenhardt (1985), agency theory is concerned with resolving two problems that can occur in agency relationships. The first is the agency problem that arises when the desires or goals of the principal and agent conflict and it is difficult or expensive for the principal to verify what the agent is actually doing. The second is the problem of risk sharing that arises when the

principal and agent have different risk preferences. The first agency problem arises when the two parties do not share productivity gains. The risk-sharing problem might be the result of different attitudes towards the use of new technologies. As illustrated in the table, agency problems can be defined as conflicts in the interoperability stage model.

Alliance theory is concerned with partnership, often referred to as alliance. Das and Teng (2002) discussed partner analysis and alliance performance. An important stream of research in the alliance literature is about partner selection. It emphasizes the desirability of a match between the partners, mainly in terms of their resource profiles. The approach is consistent with the resource-based theory of the firm, which suggests

that organizations are defined by their resources profiles. See Exhibit B.

Relational exchange theory is based on relational norms. Norms of importance to interoperability include:

- Flexibility, which defines a bilateral expectation of the willingness to make adaptations as circumstances change
- Solidarity, which defines a bilateral expectation of a high value placed on the relationship.
- Trust, which defines an expectation of a predictable and desirable behavior in the future.

More theories could be added to this table, such as network theory, contractual theory, theory of

Exhibit B. Theory-based variables at levels of interoperability in digital government

Benchmark Variables	Level 1 Business Process interoperability	Level 2 Knowledge management interoperability	Level 3 Value Configuration interoperability	Level 4 Strategy Position interoperability
Transaction cost theory	information interpretation costs as well as business process understanding costs	communication costs as well as disagreement costs	management costs associated different and conflicting value creation logic	executive costs associated with conflicting ambitions, visions and goals
agency theory	Conflict between risk-seeking and risk-averse government organizations when applying new technologies	Conflict between open and closed government organizations when sharing knowledge	Conflict between efficiency oriented value chains and problem solution oriented value shops	Conflict between collaborating government organizations about sharing productivity gains and results
alliance theory	Partner organizations approach each other to establish information exchanges	Partner organizations implement all agreements of the alliance and the alliance grows rapidly	alliance performance produces benefits for partner organizations	Partner organizations join forces by establishing joint goals for mutual benefits
relational exchange theory	Flexibility by adapting to collaborating organizations' work processes	solidarity by helping collaborating organizations	Profitability by aligning value creation to collaborating organizations	Positioning by joining forces with collaborating organizations

core competencies, stakeholder theory, theory of organizational boundaries, production cost theory, and social exchange theory.

DISCUSSION

The integration of back offices implies the integration of information domains. An information domain is a unique sphere of influence, ownership and control over information in terms of specification, format, exploitation and interpretation. However, domain integration evokes interoperability problems, such as (Bekkers, 2007, p. 379):

- Conflicting, exclusive or overlapping jurisdictions and accountability
- Different legal regimes with conflicting rights and obligations, e.g. in relation to privacy and safety regulations
- Different working process and information processing process, routines and procedures
- Incompatibility of specific ‘legacy’ information and communication technology infrastructure
- Conflicting information specifications and lack of common data definitions
- Conflicting organizational norms and values, communication patterns, and growth practices

Integration models are being introduced and applied to overcome these problems. The governance of back-office integration is critical to e-government interoperability, and its criticality rises at higher stages in the development model suggested in this chapter. Understanding intrapreneurship by means of state-of-the-art integration technologies as well as organizational learning (Drejer et al., 2004) is required for success.

In an exploratory study of the European Union, Otjacques et al. (2007) found considerable cross-country differences in legal and administrative

provisions and technical standards. These differences cause particular challenges for information systems in digital government, as there is a growing mobility of goods, persons, and related data within the European Union.

In a research agenda for e-government integration and interoperability, Scholl and Klischewski (2007) suggest future research projects to study the foci and purposes, limitations and constraints, as well as processes and outcomes of integration and interoperation in electronic government. In such future research projects, the stages of growth model presented in this chapter might prove helpful in organizing findings.

The optimal level of interoperability is not necessarily the highest Stage 4. As pointed out by transaction cost theory, infrequency of transactions might cause transaction costs to remain high, not justifying comprehensive extensive strategic alignment between interoperating organizations. Stating that organizations suffer under lack of interoperability in electronic government means that interoperability research efforts should be spent in finding out which level of interoperability an organization should strive for (Legner and Lebreton, 2007).

Scholl and Klischewski (2007) list a number of constraints that influence government integration and interoperability. These constraints have to be considered at different stages in our model. First Scholl and Klischewski (2007) mention constitutional and legal constraints, where integration and interoperation may be outright unconstitutional because the democratic constitution requires powers to be divided into separate levels and branches of government. The US constitution, for example, separates government into federal, state, and local government levels and into legislative, judicial, and executive branches. Total interoperability between levels and branches might offset that constitutional imperative of checks and balances.

FUTURE TRENDS

However, the idea of total interoperability might be explored in future research, since it is not at all sure that it is possible when including issues such as parameter checking and authorization. Furthermore, the term 'total interoperability' might imply that transaction costs are zero, which is a hypothesis with no empirical evidence so far.

Scholl and Klischewski (2007) list eight more constraints: jurisdictional constraints, collaborative constraints, organizational constraints, informational constraints, managerial constraints, cost constraints, technological constraints, and performance constraints. While several of these constraints can be handled and solved, others should be considered when identifying the optimal stage of interoperability.

Among the basic constraints that have to be handled early in the stage model is the challenge of semantics. Semantic interoperability is part of the interoperability challenge for networked e-government organizations. Inter-organizational information systems can only work if they are able to communicate and work with other such systems and interact with people. This requirement can only be met if communication standards are applied. A standards-based technology platform allows partners to execute a traditional business function in a digitally enhanced way. A necessary common information systems platform is a set of standards that allows network participants to communicate and conduct business processes electronically (Papazoglou and Ribbers, 2006).

CONCLUSION

The roles of an interoperability solution represent the stakeholders or potential users. To be successful, integration and interoperability projects have to satisfy stakeholder needs. Furthermore, such projects need to be guided by a direction. One

directional approach is suggested in this chapter in terms of stages of growth for e-government interoperability. By systematically developing interoperability in terms of work process, knowledge sharing, value creation, and ultimately strategy alignment, long-wanted benefits from e-government might be expected.

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Chapter V

Towards an Organizationally Enabled E-Government Enterprise Architecture

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ABSTRACT

The adoption of e-government projects is growing both in scale and context across the world. While the implementation of such projects is increasing in terms of the number of e-government initiatives as well as the type of applications deployed. However, the success of different e-government initiatives continued to be challenged by a wide range of organizational, technological, cultural, and economic variables, among others. The increasing emphasis on the development of technological infrastructures and build-ups and underestimation of organizational dimensions has rendered many e-governments to be outright failures. The main focus of this chapter is made on the importance of enriching the entire e-government architecture with organizational dimensions in pursuit of improving the potentials of success of e-government initiatives.

INTRODUCTION

The information and telecommunication revolution witnessed over the 21st century is affecting people as individuals, groups and organizations. While the life style of people around the world is changing, governments are reshaping their processes and interactions with their stakehold-

ers (citizens, businesses, government agencies, employees, and other stakeholders). Many governments are adopting e-government initiatives in pursuit of reducing operating costs for both businesses and citizens; providing citizens and businesses with more convenient access to online government services; improving the quality of government services delivery; and increasing

effectiveness and efficiency in the public sector organisations (Fang, 2002; Nodou, 2004; Yousef Elsheikh, et al 2007). “The move and transformation to e-government phenomenon would help public employees become more productive, accountable, transparent, and helps in reducing duplication and manage data better” (UNDP, 2001). Different countries are using technology, particularly the Internet, to implement e-government initiatives with the aim of enhancing the access to and delivery of government information and services to citizens, businesses, government employees, and other agencies (Hernon, Reylea, Dugan & Cheverie, 2002; Jaeger & Thompson, 2004). In addition to the internet, other technologies such as electronic document interchange (EDI) and mobile technologies are gaining more popularity in e-government applications.

The implementation of many e-government projects continued to be challenges by infrastructural, managerial (sustaining committed executive leadership and building effective e-government business cases), participative (maintaining a citizen focus and ensuring uniform service to the public), technical (protecting personal privacy, implementing appropriate security controls, maintaining electronic records, maintaining a robust technical infrastructure, and addressing IT human capital concerns) considerations (General Accounting Office, 2001). Other significant issues, such as the parameters of e-government (Aldrich, Bertot, & McClure, 2002), e-government’s ultimate impact on the electoral process (Nugent, 2001), the impact of constitutional principles on the development of the e-government (Jaeger, 2002), the architectural dimensions of e-government development have received little attention from policymakers at the federal government level.

Because the concept of e-government represents a rich pool of organizational and technological issues (Traunmüller & Lenk, 2002), the implementation of e-government projects continued to be challenged by different organizational, institutional, technical, technological

and societal considerations. The applications of e-government in different domains are characterized by their client orientation (focusing on the needs of clients), technology intensive and paperless environment, real-time processing, and emphasis on front office – back office integration, e-channels and automated processes (Algemene Rekenkamer, 2004).

Technologically, experience revealed that many developing countries continued to face serious problems with regards to the acquisition, infusion and diffusion of e-government technologies. The problems range from lack of know-how to lack of financial resources. Technically, developing countries tend to be unable to associate their initiatives’ tasks, programs, structures and objectives with the functionalities of the concerned e-government modules dedicated for their implementation. The failure to improve the learning curve of e-government related organizations and to fine-tune data applications are explicit technical limitations that characterize the implementation of e-government initiatives in developing countries.

Organizationally, many of them are characterized by their low capacity to manage technology intensive acquisitions develop and manage inter-organizational structures and networks of information, tasks and resources, maintain sustained committed executive leadership and build effective e-government business cases. In addition to the growing complexity of incorporating socio-economic dimensions in e-government applications, institutionally there is a considerable failure of government officials to develop and use appropriate decision making models to associate national priorities with e-government development stages on the one hand and to prepare contingency and recovery plans to address downside risks on the other hand. As a result of inappropriate planning, resources mis-utilization (mainly manpower and financial), ignorance of citizen interests, and “politicization” of organizational connections among service providing governmental units continued to escalate.

The basic aim of this chapter is to address the context of enterprise architectures of e-government with emphasis on the importance of organizational dimensions.

METHODOLOGICAL FRAMEWORK

Methodologically, the chapter is centered on the following research orientations:

1. The use of the e-government in Sudan as a case study on the basis of which different dimensions of applicability can be investigated. The use of case study research aims at gaining insights about the interplay of different research variables, the capacity of key determinants to show an inclusive robust domain for investigation and the potential of bridging gaps, building appropriate synergies and promoting alternative intervention mechanisms. However, the use of case studies to address e-government initiatives provides additional added values. Because the elements of the entire e-government initiative are directly and inexorably related (and need to be orchestrated) across a complicated landscape, emphasis on an entire country's experience as a case study improves the potential of obtaining a comprehensive understanding. Therefore, the development and use of an intervention mechanism can be oriented towards specific issues such as coordination, project management, architecture, security etc. While such practice may facilitate the emphasis on research variables and key change agents, it also helps in understanding the dynamics of change itself and its consequences as well.
2. The initiative-specific data used in this chapter is based on previous research projects mainly Gasmelseid (2007) in which a comprehensive review was made on the entire context of the e-government initiative in Sudan is being addressed from a multiagent service oriented architecture perspective. The inputs for this project were compiled from the review of initiative-specific directives, interviews with key personnel and ideas presented in awareness workshops. Use is also made of the information provided on the web site of the National Information Center which acts as a focal point for the e-government project in Sudan. The work done by partner organizations such as Sudatel (the Sudanese Telecommunications Company) including the work of Abdorabo (2004) which summarized the steps and phases of the e-government initiative in Sudan and the way the entire project is being approached. The ideas mentioned in these documents are then being mirrored against the widely used approaches of e-government modeling and planning advocated by different scholars.
3. While the use of case studies tend to be supplemented by the adoption of indices as a means for comparing the dynamics and context of the entire case studies against other locations and/or implementation domains, the use of such indices within the context of e-government initiatives tend to be questionable if not controversial. Especially in developing countries, many e-government projects are facing being approached differently in accordance with the organizational and managerial concepts that derive the entire public service administration. Because such concepts are directly related to the action which shows how organizations are connected with each other as well as with citizens, what creates success in a specific country may not necessarily be a critical success factor in another. Indices that tend to view e-government initiatives in different countries using a preparedness matrix adopt an abstract rather than initiative-specific approach for analyzing the domain of imple-

mentation based on international standards which may not be (even methodologically) in some countries especially developing ones. Because of the emphasis on the preparedness race and scoring high marks on its matrix, countries failed to look thoroughly at their e-government internal processes and capitalized on technological build ups. Rethinking the use of indices as complementary benchmarking tools allows for innovative situation-specific and out-of-the-black box thinking and investigation which is looking very big. Moreover, the use of such indices is challenged by the lack of continuous data sets of different countries.

E-GOVERNMENT APPLICATIONS

In addition to being technologically-intensive, an e-government is regarded, among others, as a strategy for delivering more effective and efficient services, a manner by which to increase access to government information, and a forum for dialogue between policymakers and stakeholders (Davies, 2002; Paul & Thompson, 2004). According to Kim and Henriksen (2006), e-government applications and strategies are cultivating a better-safe-than-sorry strategy escorted by horizontal and vertical integration of back-office and front-end systems at the expense of exploring new areas and dimensions of interaction with the end-users. As such, e-government might be more a symbol of crisis of previous generations IT quests in government than an indicator of change in government.

E-government applications are expanding both in business domains and community services. Business enterprises and citizens can get access for government information (web based access for citizens and businesses including remote access to archives and databases, news service, legal information, white chapters and policy dossiers). Electronic offices offer citizens and businesses possibilities for submitting or updating personal

data, for applying for permits, subsidies, or vacancies. E-procurement allows for the establishment of a meeting point for public procurers and their suppliers within the context of an integrated value chain process. It also allows an easier access and processing of offers, agreements, procurement and sales statistics et cetera. Accordingly, the concerned supply chain management parties can integrate and streamline the entire procurement, sales and payment data with their financial systems. One-stop shops enable access for joined-up services provided by multiple organizations. Electronic tax filing e-government applications enable tax departments to redesign its logistic procedures as regards the tax declarations and offer the possibility of sending in tax declarations via diskette, via a modem-to-modem connection or via the Internet. E-government applications allow for a streamlined exchange of information within public management organizational and institutional differentials among organizations. Such process allows for an effective involvement and participation in policy making. E-government enabled personalised care provision facilitates the use of smart card technology to provide personalised care to clients, medical care. It provides access for patient data distributed over a whole network of organisations mainly general practitioners, hospitals, medical specialists, and pharmacies. Accessible patient information includes medical history, blood type, allergies, medications symptoms, diagnoses, tests, prescriptions, emergency contacts, and insurance policy conditions. (Algemene Rekenkamer, 2004).

E-GOVERNMENT INITIATIVE IN SUDAN

Context of Initiative

The e-government project in Sudan is initiated by the ministerial decree number 22 issued by the Council of Ministers on August 2004. Ac-

cordingly, a steering committee was formed and updated in November 2005 to reflect the shifts dictated by the signature of the Comprehensive Peace Agreement with the mandate of (NIC website):

1. Formulating the eGovernment strategic plan.
2. Recommending the most suitable implementation approach.
3. Orchestrating the environment scanning activities to assess current capabilities.
4. Establishing the organization structure for the management team.

The e-government initiative consists of a portfolio of projects mainly: infrastructure, process reform, capacity building programs and legislations revision and update with special emphasis being given to states' connectivity and databases.

Modeling Approach

The e-government initiative in Sudan aims at providing as much government services as possible through an accessible electronic network in pursuit of increasing the "easiness" of transactions and rationalizing procedure through transparent governmental transactions and relationships, improved information dissemination and impartiality, and enhanced participation in decision making (Gasmelseid, 2007). The growth of e-government applications follows a water-fall alike conventional modeling perspective closely related to Layne and Lee model which includes four phases of e-government growth: cataloguing of information on a Web site, transactions on a Web site, vertical and horizontal integration (Layne & Lee, 2001).

Following the same pattern of analysis, the e-government strategy in Sudan is divided into four phases (Abdorabo, 2004):

- (a) Obtaining information about the service, documentary requirements, fees, and steps to be followed by service requestors (citizens and businesses) such as obtaining forms and applying for service provision.
- (b) Federal interaction through which service requestors can only download forms from the website of the entire "service providing" agency, print, fill and submit them.
- (c) Bilateral interaction to enable "service requestors" to "electronically" submit their requests for the provision to "service providers", fill and submit forms, get response and (in the future) make payment.
- (d) Complete interaction through which service providers follow up applications for service provision placed by service requestors, obtain additional information from other related governmental agencies and inform service requestors about service provision status.

The road map of the e-government project is approached using the following road map (NIC Website):

1. Environment scanning and information gathering.
2. E-government strategy formation.
3. E-government projects identification and definition.
4. E-government project planning and implementation.
5. Review and monitoring.

The implementation of the initiative follows the following phases (Abd Alaziz, 2007):

(1) Studies and pilot projects phase (6–12 months):

This phase represents the preparatory and introductory phase in which feasibility studies are planned to be done and general plans and guide-

lines for the e-government initiative be developed. The phase also includes the implementation of pilot small projects. The detailed components of this phase are as follows:

- (i) Preparation of the detailed comprehensive studies and a general plan for the overall program.
- (ii) Development of unit-specific plans for each and every governmental unit and the articulation of its associated projects.
- (iii) Review and re-engineering of all unit-specific standard operating procedures.
- (iv) Selecting and implementing pilot fast revenue-generating projects such as the electronic mail.

(2) Basic preparation phase (6 months):

This phase is dedicated for the development of project management methodologies, the articulation of technological standards and frameworks, and the specification of necessary resources. The phase includes the following activities:

- (i) Definition of project management elements and change management requirements.
- (ii) Designing the organizational structure of the project.
- (iii) Establishing technical plans and standards.
- (iv) Safeguarding necessary resources.
- (v) Implementing preparatory projects in accordance with the outcome of the studies conducted in the first phase.
- (vi) Continuing the implementation of pilot projects.

(3) Basic infrastructure phase (12–36 months):

The phase is dedicated to the implementation of the basic e-government projects including business process engineering, the national communication

network, civil records, electronic authentication, and the national database. This phase also includes electronic payment systems, national finance and accounting systems, electronic signatures, development of digital content, and automation of back offices in governmental units.

(4) E-government projects phase (18–36 months):

This phase is dedicated for the establishment of the unified e-government portal and service applications by focusing on:

- (i) The establishment of the portal to unify users' identification and the content and appearance of websites.
- (ii) Development of workflow, archiving systems and service provision systems.
- (iii) Strengthening security of the governmental network.
- (iv) Development of message exchange systems.
- (v) Development of e-government access points.
- (vi) Adopting service level agreements approaches.

(5) E-government project sustainability (continuous):

The main focus of this phase will be quality assurance, development of work continuity plans, implementation of network administration systems, data and information flow systems, sustaining learning plans and continuing the development of administrative procedures.

The implementation of the initiative is supported by the establishment of information centres in federal ministries, specialized data bases, linkages between local and national networks, training programs, governmental services website and communication centres, in cooperation with the private sector in the urban towns and the rural

areas. The potential types of electronic services to be provided by the e-government project include (a) registration services (certificates of birth & death, marriage and divorce statements, real estate, ownership of vehicles, business names, national ID cards, and Passports); (b) Licensing services (local business Licenses and registration procedures for educational institutions); and (c) payment-based Services (taxes, fines, profits and dividends) (NIC website).

The structure and implementation architecture follows a centralized pattern in which the National Information Center assumes a coordinating and information processing focal point as shown in figure (1).

The entire e-government architecture is driven by the following information lifecycle and classification matrix shown in figure (2).

CHALLENGES OF E-GOVERNEMNT IN SUDAN

The successful implementation of e-government programs differs from country to another depending on the context within which they are developed and implemented and the challenges being faced.

However, the widely cited challenges include low level of internet penetration, telecommunications infrastructure constraints, lack of institutional framework support, inadequate funding, digital divide, privacy and security concerns, limited IT skills and training, lack of e-government enabling frameworks, cultural and social challenges and lack of citizen awareness and participation (Yousef Elsheikh, Andrea Cullen & Dave Hobbs, 2007).

Algemene Rekenkamer (2004) viewed the challenges of e-government based on three levels. The challenges at the project level include organizational (services to be provided, information quality, levels of information reliability and usability) and technical (electronic records management, integration of front office and back office, improving access etc) challenges. Program level challenges include the management of inter-organisational connections and the co-ordination of a number of connected projects, among others. Government level challenges include the necessity of co-ordinating and integrating a plethora of initiatives taken by various ministries, decentralised government levels (provinces, districts, municipalities et cetera), and public bodies. The complexity originates from the difference of vision, objectives, authority and competence.

Figure 1. E-government architectural framework, Source: (Gasmelseid, 2007)

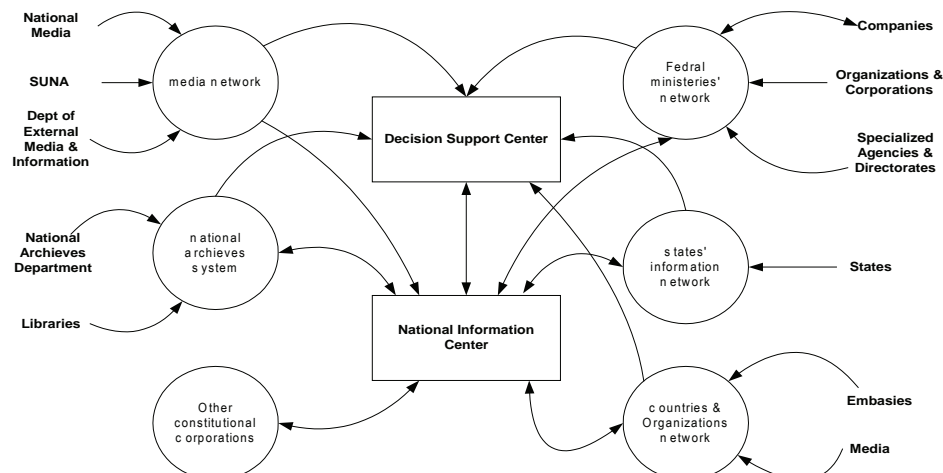
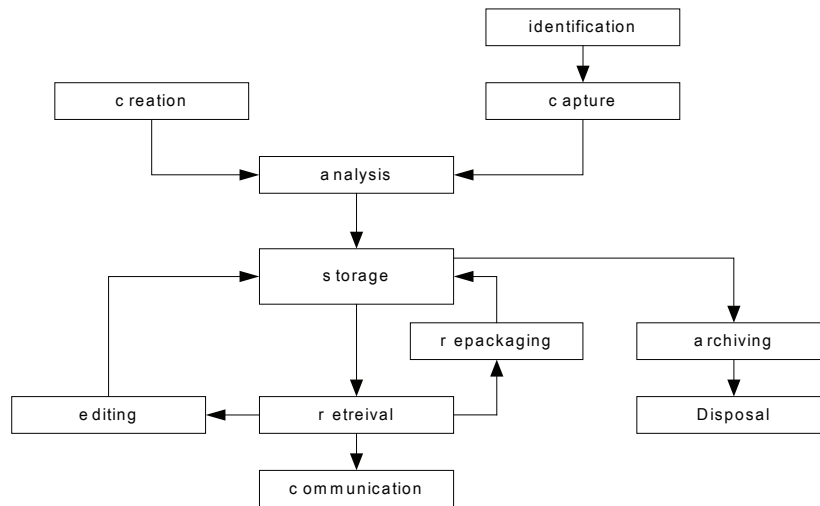


Figure 2. Information lifecycle and classification matrix, Source: NIC website



The challenges that face the implementation of e-government applications in Sudan range from organizational to technological (and infrastructure oriented) challenges as shown below:

(a) Organizational challenges: They represent the challenges originating from organizational considerations pertaining to organizational structure, project management competency, environmental scanning, awareness and capacity building and effective decision making. The main organizational challenges are:

- (i) The initiative is challenged by the fact that it has not yet been citizen-owned to accept its orientations and feel both its benefits and implications. While such a challenge is of paramount importance to the implementation of e-government initiatives, it used to be the outcome of in-appropriate e-government modelling and phase design. The resulting culture of resistance towards the implementation of the e-government project reflects also significant project management inconsistencies.

- (ii) The growing importance and imperativeness of undergoing fundamental restructuring of management systems, standard operating procedures, regulations, and rules. The extent of complexity and severity of implementation hiccups originate from the fragmentation and weak networking, coordination and cross-functioning of government enterprises as a result of many differentials (resource, political, competence etc).
- (iii) The implementation of the initiative requires the development and implementation of a comprehensive training for civil service workers and a considerable proportion of citizens and other stakeholders.
- (iv) The complexities originating from the large and growing funding requirements due to the initial and potential investments. Sustaining necessary components for the e-government process such as financial sustainability and continuity of capacity building of human resources, among others, is looming very big.

- (v) Encouraging private sector enterprises to improve its technological infrastructure to play a key role in the implementation of the e-government process.
- (vi) The digital gap challenge in a vast country with diversified cultures and languages.
- (vii) Effective telecommunication management by focusing on good practices and efficiency. Emphasis need to be made on the identification of costs of providing electronic services and the examination of expected benefits including lower transactions costs and increased productivity.
- (b) **Technological infrastructure-based challenges**
 - (i) The challenges stemming from the importance of orchestrating electronic services and the integration of applications in an enhanced and streamlined form.
 - (ii) The importance of implementing computer network and telecommunications infrastructures and technical architectures to provide the capacity and connectivity within the context of complex organizational environments. Maintaining such an environment is associated with many limitations including the management of network capacity, maintaining system reliability, and greater interoperability and accessibility.
 - (iii) Maintaining acceptable levels of security and privacy to reduce the downside risks associated with electronic transactions that affect all stakeholders.
 - (iv) Developing adequate methods and techniques for file organization and management to facilitate the storage and retrieval of electronic records.

E-GOVERNMENT ENTERPRISE ARCHITECTURE: RELATED WORK

Enterprise Architecture (EA) is an infrastructure and a set of machines constructed in order to manage a chaotic, dynamic, unpredictable, complex, organic, prone to error, frustrating, enterprise IT, which has to support an ever increasing, dynamic portfolio of products and services, through constant modifications of business processes (Muli Koppel, 2006). The question of enterprise architectures (EA) in e-governments is looming very big because it addresses issues related to resources (people, processes, and technology) and implementation (business strategies, synergies; stakeholders, infrastructure, budgets, and information). It defines the structure and operations of the entire e-government initiative, shapes its relationships with the external environment and determines how objectives can be achieved effectively and efficiently.

E-government EAs adopt multidisciplinary perspectives to conceptualize processes and their functionalities. Business perspectives address organizational and managerial considerations through the articulation of strategy maps, goals, corporate policies, operating model, functional decompositions, and Business processes. Application oriented perspectives address infrastructure and design considerations by focusing on application software inventories and diagram, interfaces and networks. Information and technology perspectives focus on infrastructure and the development of metadata and database models in order to manage complexity and communication processes. Based on these perspectives sub classifications of EA tend to emerge such as: business/functional architecture; data/information architecture; applications/systems architecture; infrastructure/technology architecture; operations and execution architecture (Schmidt & Lyle, 2005). An intermediate outcome of implementing an enterprise architecture process is a comprehensive inventory of business strategy, business

processes, organizational charts, technical inventories, system and interface diagrams, and network topologies, and the explicit relationships between them.

Within this context, different EA frameworks are advocated such as Zachman, DoDAF, Open Group Architecture Framework (TOGAF), and the ANSI/IEEE Standard 1471-2000 frameworks, among others. Zachman Framework addresses EA by using a two dimensional classification model based around the 6 basic communication interrogatives (What, How, Where, Who, When, and Why) intersecting 6 distinct model types which relate to stakeholder groups (Visionary, Owner, Designer, Builder, Implementer and Worker) to give an holistic view of the enterprise which is being modeled with the aim of showing a comprehensive coverage. However, in addition to the difficulty of associating “questions” with “ingredients” in practice, it requires overwhelming processing activities as well as its questionable utility.

DoDAF is the standard framework organized around a shared repository defined by the Core Architecture Data Model 2.0 (database schema) and the DoD Architecture Repository System (DARS). A key feature of DoDAF is interoperability, which is organized as a series of levels, called Levels of Information System Interoperability (LISI). The developing system must not only meet its internal data needs but also those of the operational framework into which it is set (Wikipedia website).

The Open Group Architecture Framework (TOGAF) aims at providing a comprehensive approach to the design, planning, implementation, and governance of enterprise information architecture. The architecture is typically modeled at four levels or domains:

- (a) Business level which defines the business strategy, governance, organization, and key business processes of the organization.
- (b) Application level which provides a blueprint

for the individual application systems to be deployed, the interactions between the application systems, and their relationships to the core business processes of the organization.

- (c) Data level which describes the structure of an organization’s logical and physical data assets and the associated data management resources
- (d) Technology level which describes the software infrastructure intended to support the deployment of core, mission-critical applications.

TOGAF views the architecture at two domains:

- (a) The entire system level that focuses on the formal description of a system, or a detailed plan of the system at component level to guide its implementation.
- (b) The components’ level that focuses on the structure of components, their interrelationships, and the principles and guidelines governing their design and evolution over time.

The ANSI/IEEE Standard 1471-2000 specification of architecture (of software-intensive systems) focuses on conceptualizing the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution.

Because the majority of current EA frameworks are based on a standard Meta model which defines the critical architectural elements and the dependencies between them, applications based on these models can then query the underlying architectural information. However, due to the nature of e-government applications the use of such frameworks tends to be of limited applicability.

Over years, various architectures for e-gov-

ernment are being proposed including, among others, the OSCI platform (Steimke & Hagen, 2003), the SeCo container (Greunz, Schopp & Haes, 2001), the AIPA reference architecture (Arcieri et al., 2002), the eGOV project (Wimmer, 2002), the eMayor project (Kaliontzoglou et al., 2005), the multiagent SOA model (Gasmelseid, 2007) and the WebDG architecture (Medjahed et al., 2003). A comprehensive review of these architectures is provided in Gasmelseid (2007). The basic emphasis of e-government architectures is to develop a service creation environment that allows the public sector to provide citizens and other stakeholders with access to information as well as national and local service repositories. To maintain accessibility, interconnectivity and citizen “centricity, service repositories tend to be centered on life events, business situations and portals in a customer oriented form.

When considered individually, current e-government architectures fail to address the implementation requirements of e-government initiatives in many countries. They fail to provide the full support of a client-centered approach; the integration of both traditional and on-line delivery channels; the support for concurrent access points; versatility; and security (Gasmelseid, 2007; Goncalo & Rafael, 2006). Systems supporting electronic government should expose a high degree of adaptability to change in terms of transparency ease of accommodation and tailorability (Stamoulis et al, 2003; Eardley et al, 2003). According to Gasmelseid (2007), the majority of these architectures “structurally” view e-government applications in terms of “entities”, transferable objects, service repositories, services, requests, reports, service providers and requesters. The lack of appropriate architecture threatens the way services are composed, discovered and executed. Emphasis on traditional approaches results into a number of drawbacks with regards to service availability, concurrent (and multiple)

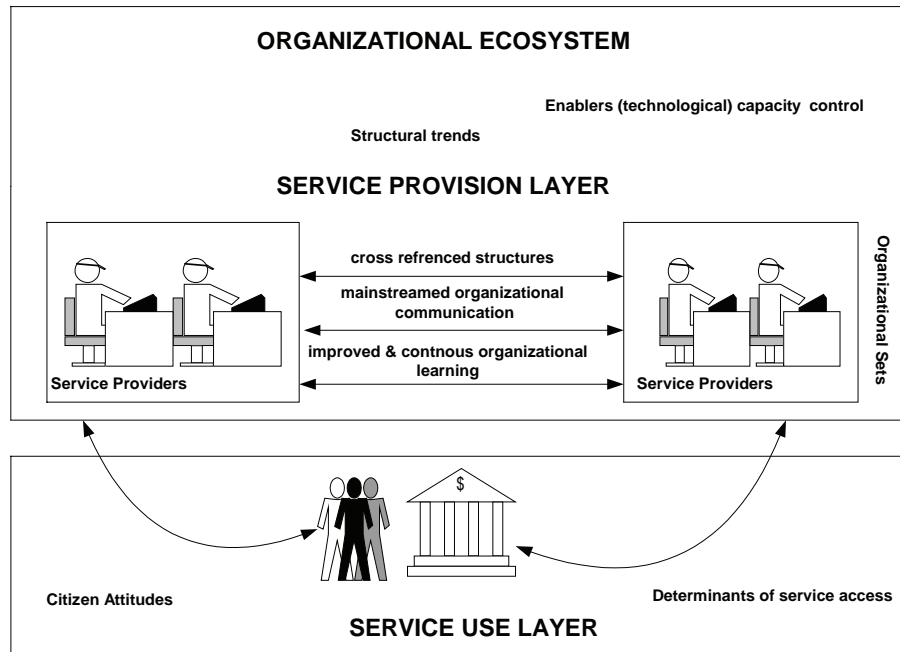
execution and invocation of service and the a priori knowledge of one or more discrete number of possible compositions that can take place in order to provide a composite service (Vassilakis et al, 2005).

TOWARDS AN ORGANIZATIONALLY ENABLED EA FOR E-GOVERNMENT INITIATIVE IN SUDAN

Organizational dimensions play significant role in the success or failure of e-government initiatives because such dimensions are directly and inexorably related to architectures, information processing and exchange and e-government adoption by citizens and other stakeholders. Enabling e-government architectures with organizational dimensions relaxes implementation challenges, improves project management practices and streamlines processing. While analysis of e-government projects tends to follow “technology-oriented” paths, little has been done to “investigate” the dimensions, parameters and impacts, and couple the overall context by developing and deploying alternative architectures (Gasmelseid, 2007). The prioritization of technical and technological orientation over organizational dimensions of many e-government initiatives has been a major reason for the failure of these initiatives. Figure (3) below shows a context for organizationally enabled e-government architecture.

The emphasis on organizational dimensions originates from the fact that the service provision layer of the architecture is characterized by joint collaboration between service providing units. While the use of front line and back offices may allow for some coordination, many challenges are associated with the lack of effective inter-organizational transactions. On the other hand, because of the emphasis on technological dimensions little effort and attention tend to be given to

Figure 3. Organizationally enabled e-government architecture



understanding and monitoring the organizational environment of the initiative as general and its organizational units. Because e-government projects aim at allowing interactions with governments and access of government-related services, the inappropriate orientation towards the service use layer and undermining the importance of understanding service access determinants remain a main reason for failure. As shown in figure (3) above, three organizational architecture-oriented critical factors that need to be incorporated in all stages of the e-government growth process can be identified:

1. **Regular scanning of the organizational ecosystem of the e-government project**

The processing environment of the entire e-government project is not limited to large scale network-based interactions and improved functionality of technological infrastructure. But instead, it includes a wide range of socio-

economic, political, cultural and even ethnic variables, among others. While the emergence of advanced technologies tends to be accompanied with changes in social interactions, the decision criteria of stakeholders to use the e-government platform tend to be driven by economic factors. As a result, companies are concerned with the impact of e-government platforms on labor relations, staff turnover and productivity-related motivational aspects. The cost-benefit matrix of e-government applications is a key determinant for both citizens and business enterprises. Because the entire e-government project is managed and coordinated by governments, the greater the political support provided the wider will be the span of success. Moreover, because the use of e-government applications exposes citizens to new models of business and modified domain of interaction, the emerging shifts of business behaviors of citizens and enterprises tend to incorporate complex cultural shifts. The failure to incorporate these factors at any single e-government activ-

ity and processing moves the whole process into disarray. The incorporation of such dimensions can't be done without a thorough and updated scanning of the organizational ecosystem of all government units (as individual and collective service providers) and stakeholders to maintain institutional fitness and mainstreamed relationships. Emphasis on empowering the architecture of the e-government project with these dimensions demand the adoption of an organizationally-oriented architectural domain in which the entire architecture is regarded as a vehicle for ensuring the flow of decision making information across the "consolidated" organizational structure of the whole e-government project.

The importance of an organizationally-oriented architectural domain stems from its impacts on the capacity of the architecture to:

- (a) Fairly represent interactions between the front and back offices on the one hand, as well as its robustness in maintaining linkages between the entire e-government platform (and applications) and other objects (and networks) in its surrounding operating environment. Within this context, the front office needs to operate as a brief case in the eyes of stakeholders with internal procedures being ubiquitously and pervasively practiced. Such interactions and connections are driven by large scale organizational dimensions that need to be reflected into the architectural context of the entire e-government project. The failure to crystallize and/or appreciate such dimensions accelerates the steps towards inappropriate e-government growth and deployment and the adoption of the widely used reversed approach that capitalizes on "technological build ups" at the expense of "organizational concepts".
- (b) Improve the information processing capacity of the back office, enrich feedback to stakeholders (through the front office) about the progress of transactions, status of services

requested, leftovers and missing or required documentation. The information processing is contingent upon the organizational structure adopted and the information system developed to support it. Therefore, the failure to envision the organizational determinants of information processing necessary for the design of appropriate e-government architectures challenges service provision efficiency and stakeholders' satisfaction.

2. Keeping an eye on the determinants of service access

The determinants of service access are not technological as seen by many e-government planners and regulators. While the ease-of-use and technology friendliness play a significant role in the encouragement of stakeholders and partners to involve themselves and their organizations into electronic transactions, service access is contingent upon a set of determinants. Citizens and business organizations may not be prepared to widely use e-government connections if they feel that the e-government project gives them the impression that they are left with no other option for interaction. The emphasis on technological issues (mainly security) and the use of intelligence-oriented project managers limit the capacity of the entire e-government project to make its stakeholders aware. The adoption of organizational approaches to address the determinants of access has the potential to encourage organizations to turn into learning ones, activate their information systems and widen their reach.

3. Fostering and mainstreaming inter-organizational communication

The majority of the failures of e-government initiatives are attributed to the fact that project planners introduce the concept of organizational integration and business process reengineering at a later stage of the e-government model.

Focusing on technological frameworks has left e-government cruising in vacuum due to the inappropriateness of organizational frameworks that augment technological enablers. Early in the e-government development process the creation of organizational sets should be used as a base for the creation of relevant service repositories. An organizational set constitute the building block of innovative learning organizations whose activities are synchronized on cross-referenced systematic basis. The use of organizational sets to understand the context of implementation is contingent upon the capacity of the e-government initiative's team to:

- (a) Develop cross referenced structures.
The organizational structure of the entire e-government initiative should be viewed as a cross referenced organization structure capable of absorbing organizational differentials and maintaining operational integrity. When organizational sets are carefully articulated and analyzed the organizational functionality of the overall e-government initiative can be fine-tuned.
- (b) Mainstream organizational communication.
Without a totally mainstreamed inter-organizational and intra-organizational communication it is impossible for any e-government initiative to benefit from the organizational sets and their associated service repositories. Mainstreaming organizational communication is important because it can be interrupted by (a) organizational considerations (rigid organization structure and tight chains of command), (b) informational issues pertaining to corporate organizational knowledge, and (c) communication methods. The capacity of the entire e-government initiative to mainstream its communication in an organizational set fashion affects the ability and willingness of organizations to acquire and share resources. This will reduce

organizational conflicts, power struggles and sub optimization.

As shown in figure (3), the capacity of the articulated and designed organizational sets to augment the dysfunctional consequences of organizational interactions demands more emphasis on improving organizational learning to enable organizations (as individual or as members of organizational sets) to respond to changes that take place in their ecosystems. Changes may range from shift of citizens' attitudes towards e-government applications and their utilization rates to fundamental technological and structural transformations.

The process of improving organizational learning is directly and inexorably linked to the ability of the overall e-government initiative to implement effective process re-engineering activities. Although the majority of e-government initiatives are devoted to the provision of government services to citizens, little has been done to investigate the potential of these initiatives in "re-engineering" government agencies and improving their operational efficiency. While such re-engineering allows organizations and their units the opportunity to assess their operational capacity to manage electronic processes it also improves operational efficiency through training and enhanced information sharing among different and remote trajectories using different types of data and interfaces. It can also be used as a vehicle for testing interconnections between the effectiveness of e-government initiatives and the dynamics of the social, political, and economic environment. Special emphasis can be made on the effect of resource availability on e-government growth and implementation at different levels of governance. The extent to which the migration to democracy and institutional or political reforms affects the effectiveness of e-government applications is another variable to consider.

CONCLUSION

The adoption of e-government initiatives can bring benefits to the concerned stakeholders. While governments may gain savings in terms of cost and effort, citizens and organizations aim at gaining access to quality services and convenience. To allow for these benefits to be realized, e-government projects and programmes should be properly designed and managed. The adoption of technology oriented approaches for the design and implementation of e-government initiatives has been accompanied with dramatic and catastrophic results that lead to the failure of these initiatives. The emphasis on developing and deploying e-government architectures without incorporating them into an organizational domain has led to lack of citizen confidence, inappropriate project management and implementation, inter-organizational conflicts and sub-optimization, among others. The adoption of organizationally oriented e-government architectures has the potential to relax some of these drawbacks. What is needed is a thorough understanding of the organizational ecosystem of the entire e-government projects as well as its components, improving the organization structure, and addressing the determinants of service access. Adopting such orientation, e-government projects can undergo drastic transformation of their structures and processes, manage organizational resistance to change, modify the mindsets of policy makers and staff, maintaining a legal status of the project and its constituencies, aligning IT with the e-government strategy, technological infrastructures and legacy systems. Moreover, they have the chance to improve their project management capabilities and financial budgeting.

Because the outcomes and consequences of adopting organizationally-enriched e-government architecture are reflected cross a wider landscape of an integrated analytical framework, its implementation calls for:

1. The development and use of the appropriate mix of analytical tools and organizationally-oriented techniques. Because many of the organizational dimensions associated with e-government applications and initiatives tend to be qualitative in nature, the usefulness of conventional methodologies and analytical frameworks tend to be questionable.
2. Building synergies that balance the enabling features of technological platforms and the limitations that originate from their use in the operating environment of the e-government initiative.
3. Increasing the preparedness of the e-government project management personnel to crystallize potential awareness improvement hiccups and improving their prompt response mechanisms and strategies to deal with downside risks.

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Section II

Towards Citizen–Centric Services for Government

Chapter VI

Understanding Citizens' E-Readiness as a Precondition to Building a Responsive E-Government: A Case Study of Vietnam¹

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ABSTRACT

This chapter explores preconditions for the successful development of e-government in Vietnam, particularly the readiness of the population to access and use ICTs. It reports the results of in-depth interviews in 2006 with 38 citizens in various regions of the country, which focused on patterns of non-use and use of ICTs and particularly the Internet. The chapter explores obstacles to effective use of Internet based services amongst both ICT nonusers and users, and implications are drawn for the development and uptake of e-government services. In the light of the interview data and relevant literature, suggestions are offered as to how the Government of Vietnam might better use ICTs to improve communication between citizens and government, with a view to building a more informed and empowered society.

INTRODUCTION AND AIMS

Vietnam is transforming into a networked society where more people are becoming connected, and more advanced applications, such as e-government, are becoming available. From 2000, the Government of Vietnam determined that, with Vietnam integrating more comprehensively into the global economy, the building of an effective e-government would help to facilitate its capacity to manage resources, implement sound policies and better satisfy the needs of citizens (Nguyen, 2001).

Statistical data suggested that in May 2007 there were about 16 million Internet users, and 70 million others were living and working without the use of computers in Vietnam (Vietnam Internet Center, 2007a). There was no data about who are users and nonusers of computers and the Internet, why people use the Internet, to what extent they use e-government services, or what changes, benefits and difficulties people were experiencing when using such services. Nor was there data about non-ICT users and how they interacted with government-related services, how and whether their needs could be better served through e-government services, and what barriers needed to be overcome to enable current nonusers to enjoy the benefits of e-government.

The chapter concerns preconditions for the successful development of e-government in Vietnam, and in particular the readiness of the population to access and use networked ICTs, the prime communication medium of e-government. The chapter reports the results of in-depth interviews conducted in 2006 with 38 citizens in various regions of the country. Its primary purpose is to examine the readiness of citizens, at the time of the study, to become effective users of e-government services in terms of their access to, and capacity to use, ICTs. Its subsidiary purpose, in the light of these user-centric considerations, is to offer some thoughts on how government in Vietnam might position itself better to provide

effective e-government services. In essence the chapter attempts to shed light on the following questions: How ready is the population to make use of e-government services if these were provided? How ready is government to provide a full range of e-government services to this population?

The assumption was made in this study that the aim of e-government is to improve the responsiveness of government to the needs of people, or in other words (to borrow from Abraham Lincoln) to contribute to the reality of *government of, by and for* the Vietnamese people, and that e-government can play a role in this by improving communication between government and people (Nguyen, 2001). In 2007 only 18.8 percent of Vietnam's more than 85 million people were Internet users (Vietnam Internet Center, 2007a). If e-government service delivery is to be effective, clearly a much greater proportion of the population needs to become Internet users. This chapter looks at case studies of users and nonusers in order to frame initial suggestions about how barriers to wider Internet use can be overcome, and how services to current and future users could be made more effective.

THE CONCEPT OF E-GOVERNMENT AND FACTORS CONTRIBUTING TO ITS SUCCESS

The term "electronic government" or "e-government" appeared about a decade ago and there is no commonly accepted definition (Bhatnagar, 2004). Oliver and Sanders saw e-government as "the migration of government information and services to an on-line delivery mode" (Oliver & Sanders, 2004, p. viii). As with the concept of "e-commerce", the scope of e-government covers the interaction between government and citizens (G2C), government and business enterprises (G2B), and inter-agency dealing (G2G).

In this chapter the authors apply the broad definition of e-government provided by Marche and McNiven:

the provision of routine government information and transactions using electronic means, most notably those using Internet technology, whether delivery at home, at work, or through public kiosks (Marche & McNiven, 2003).

It is an underlying assumption in this chapter that Internet technologies and specifically e-government should have as their main purpose the improvement of the ways in which government serves its citizens and the ways in which citizens interact with public institutions.

Martin and Byrne stated their philosophy of e-government in even stronger terms:

It seems clear that for e-government to be anything more than automated service provision it needs to reach far beyond the conduct of routine government business to embrace social, economic and political change (Martin & Byrne, 2003).

Marche and McNiven (2003) stressed that successful e-government programs should not only be based on the perceived efficiency gains for government itself, but rather on the satisfaction of consumers. Kolsaker and Lee-Kelley (2006) criticised the UK's "techno-centric model" which they argued "fails to engage citizens as anticipated, underplays the importance of Knowledge Management (KM) and clashes with the traditional values of public service".

Dada (2006) mentioned factors which would be important from the perspective of the suppliers of e-government: the capacity for significant organizational change, the development of leadership skills, a grasp of the distinction between "hard" (technological factors) versus "soft" (human factors), and understanding of the differences in catering for the private and public sectors and for citizens in developed and developing nations.

From the perspective of citizens' needs (the "demand side" in economic terms), Margetts and Dunleavy (2002) stressed the vital role of factors such as the impact on citizens of transaction

costs, an understanding of cultural barriers, for example social exclusion caused by the problem of unequal access to the Internet, citizens' expectations of government services and their degrees of acceptance of technological innovations, and possible mismatches between governmental and social uses of the Internet.

Intel joined with the Government for the Third Millennium Foundation (Gov3) to publish a white paper on global best practice in delivering public services. This paper expressed similar ideas in stressing the need for a "citizen-centric" service model, which

treats citizens and businesses like customers. Citizen-centricity is about turning the focus of government around—looking at the world through the other end of the telescope, so that the needs of the citizen and businesses come first, rather than operational or other imperatives inside the government (Intel & Gov3, 2006).

THE CONTEXT OF ICT IN VIETNAM

According to the CIA World Factbook (2007) the area of Vietnam is 329,560 sq km. The total population is 85.26 million (July 2007 est.) with a median age of 26.4 years, comprising 26.3% of 0-14 years, 67.9% of 15-64 years, and only 5.8% of 65 years and over (Central Intelligence Agency, 2007). Approximately 60 million live in a rural setting with farming as the main occupation (General Statistics Office of Vietnam, 2006a).

At the national level, government in Vietnam consists of 22 ministries and national agencies. The country is organized at local administrative level into 64 provinces. The provinces are divided into 588 districts, which are further subdivided into 9069 communes (General Statistics Office of Vietnam, 2006b).

Vietnam has undertaken a far-reaching process of economic reform known as "Doimoi" since 1986. The Government of Vietnam com-

mitted to increased economic liberalization and enacted structural reforms needed to modernize the economy and to produce more competitive, export-driven industries. Achievements of Doimoi have been spectacular. According to a report from the World Bank (2003), the progress made in Vietnam in alleviating poverty has been one of the greatest success stories in world economic development in recent decades. Poverty rates measured at international levels have halved from 58% in 1992 to 37% in 1997 and 29% in 2002 (World Bank, 2003), and further down to 24.1% in 2004 (ADB, 2005). Together with poverty reduction, the country had very successful economic growth since 1990 with around 8% annual GDP growth from 1990 to 1997, 5.5% from 1998 to 2000, over 7% from 2002 to 2005 and 8.4% in 2006, making it the world's second-fastest growing economy. The country also achieved a high rate of increase in exports, from US\$9.1 billion in 2001 to US\$16.5 billion in 2002 or over 12% a year (Dapice & Fellow, 2003). In 2007, nominal GDP and per capita GDP were estimated at US\$71.4 billion and US\$830, respectively, 8.5% higher than the previous year (Song Linh, 2007).

In June 2007, about sixteen million people were users of the Internet, while just under 70 million others conduct their lives without the use of computers (Vietnam Internet Center, 2007a). The growth of telecommunications and Internet usage in Vietnam over the 5 year period to 2006

is shown in Table 1. The leap from 1.3 million Internet users in 2002 to 13.4 million in 2006 underlines a trend of rapid growth.

Further insight regarding ICT/Internet usage is provided by the statistics assembled in Table 1. This table shows that despite the vigorous growth in the absolute number of users, the percentage of ICT usership – including telephony – in the population as a whole is still low.

Amongst small enterprises in Vietnam the diffusion of ICTs and the Internet in particular has been slow. In a case study in 2005 of nine traditional villages focusing on small enterprises and e-commerce, Tran Ngoc Ca identified the following difficulties: unreliable technological infrastructure, lack of legal infrastructure, blocking of Internet access due to security concerns, and high cost of Internet connectivity (Tran, 2005). However, despite the infrastructural constraints and difficult conditions, a number of small enterprises are engaging in e-business.

E-government cannot be achieved without the availability of telecommunications infrastructure. With the increase in use shown in Table 1 has come an “explosion” in the development of the Vietnamese ICT sector since the turn of the millennium. According to statistics presented by the World Bank (World Bank & WITSA, 2004), Vietnam's investment in ICT infrastructure as a percentage of GDP was of a similar order to that of larger economies in the region: Vietnam spent

Table 1. Telecommunication and Internet in Vietnam

Indicator	2002	2003	2004	2005	2006
Main telephone lines (thousand)	3,929.1	4,402	10,124.9	15,780	20,120 (*)
Subscribers per 100 people (*)	4.48	5.41	12.28	18.73	24.15
Mobile cellular (thousand)	1,902.4	2,742.0	4,960.0	9,000.0	22,000 (**)
Subscribers per 100 people (*)	2.34	3.37	6.01	10.68	26.19
Internet subscribers (thousand)		450	1,123.8	1,899	3,688.6
Internet users (thousand)	1,300	1,709.5	4,311.3	7,185	13,418.7
Users per 100 inhabitants (**)	0.01	2.14	5.29	8.71	16.14

Source: synthesized from data of (*) ITU (2006), (**) Vietnam Internet Center (2007a), (+) Do (2006), and (++) estimated by Ministry of Posts and Telematics (Hồng Anh, 2006)

7.3% of GDP, while South Korea spent 6.7%; Japan 7.4%; and Hong Kong 8.4%. Clearly the absolute figure spent in Vietnam was much lower than that of these countries, given the differentials in GDP terms. The 2006 estimated per capita GDP (PPP – purchasing power parity, per capita) comparison expressed in U.S. dollars is Vietnam: 3,100; South Korea: 24,500; Japan: 33,100; Hong Kong: 37,300 (Central Intelligence Agency, 2007). Nevertheless the level of commitment being made in percentage terms set a good base for long term development.

Chowdbury et al. (2002) reported that the Vietnamese government was enthusiastic in encouraging e-commerce and e-government projects, introducing ICT strategies and ICT parks to attract foreign companies. Policy makers have also been keen to foster B2B e-commerce to promote export industries, however both B2B and B2C e-commerce have been described as negligible. These authors identified some challenges to ICT expansion in Vietnam, namely: lack of sufficient competition in the ICT sector; high piracy rates; and a shortage of ICT skilled labor.

From 2000 to 2005, the Vietnamese Government undertook the Computerization in State Administrative Management project (SAMCom), locally often referred to as “Project 112”², to build the first foundations of e-government in Vietnam. The project was initially budgeted at USD 250 million. The World Bank agreed to a USD 94 million loan and the rest of the amount came from the Asian Development Bank and the Government. Hardware procurement and the training of staff were major components of the project (Vu & Jones, 2006, p. 19).

In parallel with Project 112 which focused more on internal administration, almost all ministries and national departments and all 64 provincial governments developed their websites which were linked to the government portal www.chinhphu.vn/portal to provide information and limited services to businesses and individuals. A number of online applications was initiated through

over 40 pilot projects (Vu & Jones, 2006) which were to be fully implemented across government departments and agencies. Almost all of the staff at national government agencies now have e-mail, and there have been significant developments in the Vietnamese government’s online presence, from 306 websites in 2005 to 502 in April 2007 (Vietnam Internet Center, 2007b).

Furthermore, several initiatives were underway to improve the national environment for “e-facilitated” trade and to provide support and encouragement to businesses taking advantage of this, for instance, the e-commerce project run by the Ministry of Trade, now, Ministry of Industry and Trade (I16, Feb 16, 2006³).

Kaufmann, Kraay and Mastruzzi (2006) summarized and interpreted the findings of a World Bank report “Governance Matters V: Governance Indicators for 1996–2005” which covered 213 countries and territories. The report assessed six dimensions of governance: voice and accountability; political stability and absence of violence; government effectiveness; regulatory quality; rule of law; and control of corruption in the political regime. In this report, the political regime in Vietnam was seen as stable, but the other five elements received very low scores compared with other countries. Moreover little improvement was discerned in the ten year period. The analysis suggested that improvement was needed in the capacity of government to manage its resources effectively and to formulate and implement sound policies.

Such improvements are required for greater responsiveness to the needs of citizens, both in the community and business sectors, especially at a time when Vietnam is integrating into the global economy and joining the World Trade Organisation (WTO) in January 2007.

The benefits of Vietnamese online services were still very limited. According to Pham, less than 50% of the provincial websites provided information relating to investment, licensing, land permits, customers and taxation. Only two out of

49 websites provided on-line services about these matters (Pham, 2005). For instance, NBIN, an automation of the business registration process, did not allow the process to be carried out online. The static "notice board" style of website simply provided information and application forms, and people still had to meet government staff to register their businesses (Vu & Jones, 2006). Furthermore, little attention had been given to identifying needs and obstacles of the people in relation to e-government. E-government projects basically focused on internal administration - G2G affairs rather than G2C and G2B relationships. Vu and Jones (2006) argued that:

E-Government initiatives have been far too focused on modernization and the purchase of hardware for government agencies... All initiatives (Project 112 and PAR [Public Administration Reform Program]) are supply side focused with little thought to the actual needs of users, business and citizens, and how these needs can best be met...

They thus recommended that

the service needs of citizens and businesses be addressed and e-government initiatives and PAR meet these needs rather than taking a supply side approach to projects (Vu & Jones, 2006).

Understanding the needs of customers, and both technological and social obstacles, in relation to online acceptance could help to reduce failures, wastage of investment, and damage to credibility and reputation for future e-government projects. As Project 112 was not regarded as cost effective, it was discontinued in 2007 and legal action was taken against a number of project officials suspected of procurement malpractices. The role of e-government was transferred from the Government Office to the Ministry of Information and Communications (Anh Thu, 2007).

METHODOLOGY

The style of the research reported in this chapter was mainly ethnographic and qualitative. In-depth insight, rather than statistical generalization, was the key outcome envisaged. The methodology sought to triangulate case data with large data sets (where available) in order to establish strong inputs to policy development.

As mentioned previously, the first author conducted 38 interviews in the Vietnamese language from January to December 2006. The interviewees were both ICT users (people who currently use computers) and ICT nonusers, in order to identify and explore factors associated with adoption and non-adoption of ICTs.

The sampling technique used for selecting the cases was *purposive sampling*, a non-probability sampling approach:

used when the investigator is interested only in obtaining a sufficient number of elements to satisfy research objectives. The resulting sample is ... 'balanced' on a range of variables, for example sex, age, education, income, location (or place of abode) ... (Williamson, 2002).

In other words, the sample is representative. However, representativeness is not achieved through random selection as in a probability sample, but through criteria-based selection of the individuals to be included in the sample. Representativeness means that the subset under study should manifest, in an unbiased way, selected characteristics of the superset that are seen to be important to the research. The practical success of such an approach to sampling is daily demonstrated in the business world, for example in focus group work undertaken by marketing professionals for product and service development.

Knowledgeable local guides were mobilized to help identify 16 nonusers to interview. Agriculture still accounts for 20% of GDP (despite its recent decline in proportion to the national economy).

Rural villages and hamlets house 74.1% of the whole population (Khong, 2002). Therefore care was taken to include rural, farm based interviewees who were interviewed at their homes.

For the users, 22 interviewees were chosen in Internet cafes or in their working places from North to South of Vietnam. In Internet cafes, the interviewer and his assistant walked in and selected one or two persons at each site. In addition, they also selected interviewees from a private shop, a university, a research unit and two governmental agencies.

About 10% of people who were approached refused to be interviewed either because they were busy, or were anxious about disclosure. These were replaced with similar cases from the same categories.

For the nonusers, the following open-ended issues (among others) were investigated. What were major problems they encountered? What were major channels of information through which they acquired new information and knowledge to solve problems? What were barriers that might have prevented them from using ICTs?

For the users, the key open-ended questions were as follows. For what purposes did they use ICTs? What difficulties were they experiencing in their use of ICTs, and how did they deal with these? How did the use of ICTs help them in their work and life?

An explanatory statement and a letter of consent were provided, to inform the interviewees about both the purpose and method of the interview, and also its compliance with ethical protocols; and to elicit their agreement to participate. If they agreed, the conversation started and was recorded. If any interviewee requested to be anonymous a code was used on their interview documentation. Otherwise, their names with the date of interview and a brief description were recorded. In this chapter interviewees are referenced by their code number and the date of interview, for example, I22, interview, Feb 20, 2006.

As the Vietnamese language was used in the study to facilitate smooth conversation, it was difficult to use automated qualitative analysis tools such as NVivo on the transcripts. Instead manual organization of content was undertaken, and Excel spreadsheets was used to summarize data and discern patterns.

CHARACTERISTICS OF THE SAMPLE

As already mentioned, the cases included in the sample were 22 users and 16 nonusers. For nonusers an equal number of males and females were selected, but for users males predominated, reflecting the macro picture presented in the large statistical reports available. Among the users, 17 lived in cities and five in communes. Of the 16 nonusers, five were in suburbs, four in agricultural villages, four in villages that were changing into towns and three were in the process of moving from the countryside to cities. By region, 28 lived in the north, one in the center and seven in the south of Vietnam. The composition of the sample is summarized in Table 2.

Age

Although no large scale statistical survey evidence was available regarding the relative ages of users and nonusers, the purposive sample for users included more younger people than older to reflect both the overall youthful demographic of Vietnam and an assumption that usage is higher in the younger age groups. For nonusers the interviewees were spread more or less evenly across age groups. It should be noted, however, that no nonusers below the age of 20 were included, and it would be desirable to undertake follow-up study of nonusers in this age bracket.

Income

Monthly income of nonusers in the sample varied widely from 100,000 to 4,000,000 Vietnamese currency *dong* (VND). The average income of a northern/central farmer and a student was much lower than that of other jobs (VND 400,000 and 1,237,500, respectively). Other nonusers had an income comparable to that of a user. It would be necessary to note that 1) farmers were more economically self-reliant and their incomes, such as rice or maize, were often not accounted in monetary terms; 2) in 2006, USD 1 was VND 15,983 at the official exchange rate, yet was about VND 2,826 in purchasing power parity (Central Intelligence Agency, 2007). Thus, a farmer's actual income, if exchanged into money, would be higher. For the reader's reference, VND 5,000 could buy 1kg of rice or a student's lunch at that time.

Users in the sample, excluding students, had a monthly income varying from VND 600,000 to 3,000,000 with a mean of VND 1,216,000. A

student got a monthly allowance, normally from their parents, of about VND 544,000 on average. Rural users spent much less in total, but a relatively high proportion of their income for ICT use. For instance, I22, a rural high school student, paid VND 100,000 monthly, one third of his allowance, for the Internet - a considerable amount equivalent to his monthly rice budget (Feb 20, 2006).

Education

Categories commonly used to describe formal educational levels in Vietnam are primary, secondary, high school, vocational and higher training and "other" – and these categories were used in the study. Among the nonuser group in the sample, farmers had lower education (from primary to secondary levels) than the other occupations (from vocational training to higher education). Six users were university students and seven hold bachelor's degrees or above.

There were nonusers who attained only primary education, but there were also ICT illiterates among the highly educated. Several nonusers had attained high school graduation or bachelor degrees, or were university students.

Occupation

Among nonusers, villagers were the biggest group consisting of three in the North and three in the South. Their main jobs were cultivating rice, corn, vegetables or fishing. Other nonusers were three folk-artists in Bac Ninh province, one owner of a large seafood restaurant in Ho Chi Minh city, one director of a *Quan Ho* culture business center in Bac Ninh province and one student in Ho Chi Minh city who came from the poor province of Quang Tri in the Center.

Users' professions were more diversified, including the roles of student, government officer, university staff, researcher, public relations officer, medical doctor, guard keeper, hairdresser and a sales manager of Dong Ho folk printing.

Table 2. Composition of purposive sample

	ICT/Internet Users	ICT/Internet Nonusers	Totals
Gender			
Male	14	8	22
Female	8	8	16
Location			
Rural	5	8	13
Urban	17	8	25
Age group of nonusers			
20-29		3	
30-39		3	
40-49		3	
50-59		4	
60+		3	
Age group of users			
10-14	1		
15-19	6		
20-24	7		
25-29	6		
30-34	2		
35+	0		
Totals	22	16	38

FINDINGS RELATING TO THE NONUSER SAMPLE

The Ways in which ICT/Internet Nonusers Obtained Information

In a study some years ago, the loudspeaker was identified as the major channel of information for farmers (Smith, Toulmin, & Qiang, 2003; World Bank, 2002). However this study suggests that the loudspeaker might be losing its leading position. As depicted in Figure 1, the major information channels for nonusers were as follows:

Television and Peers (People who Lived, Worked or Studied Nearby)

Nine of the 16 interviewees regarded TV and peers as the main sources of information. While TV provided various kinds of general information, peers supplied specific knowledge, such as job availability, working know-how or learning-related information. TV and peers overtook loudspeakers as the top sources of information.

Loudspeaker Systems

These were a channel through which the local authority announced local guidelines or government regulations to the people e.g. hygienic cleaning, farming schedules, health or vaccination timetables. Three interviewees recognized the existence of loudspeakers in communes but revealed that they were not important to them. Information from loudspeakers was often deemed to be less attractive and very narrow (I28, Feb 25, 2006). Furthermore, the transmission time was very limited and often conflicted with the availability of villagers who were usually too busy, often working at a second job (I37, Mar 7, 2006).

Newspapers and Books

These were not read by rural nonusers in contrast to nonuser residents in urban areas (I27, Feb 25, 2006; I26, Feb 24, 2006; I53 Apr 7, 2006).

Telephone

Thanks to the expansion of the public telecommunications infrastructure recently, more households possessed telephone sets, mainly fixed phones. Seven interviewees reported that they could use the telephone to exchange information about the market or jobs with their peers.

Radio

Four interviewees claimed that the radio was a source of information but two of them (I27, Feb 25, 2006 and I37, Mar 7, 2006) added that they spent very little time listening to the radio.

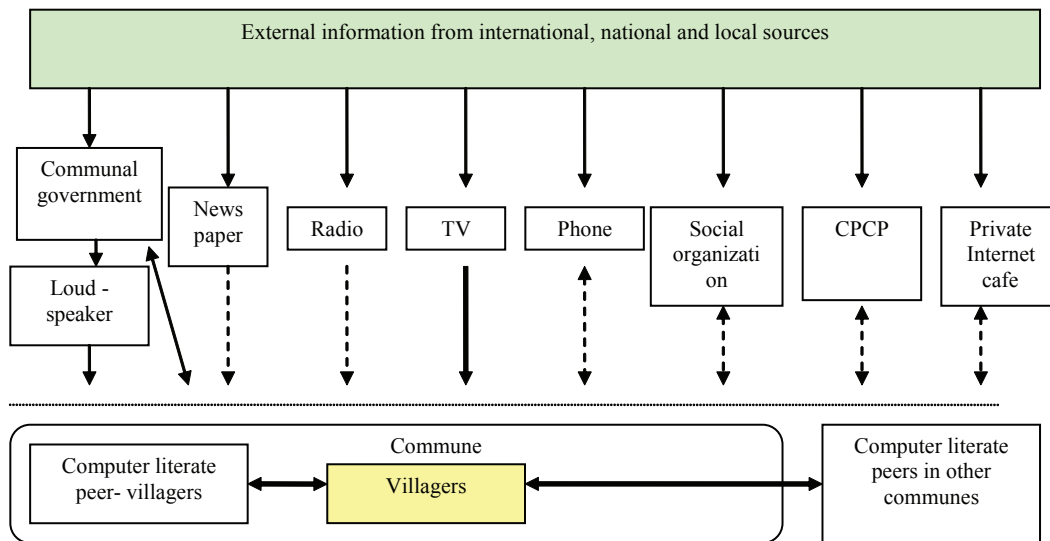
Communal Government and Social Organizations (For example, Farmer's Associations, Women's Associations or Veterans' Associations)

Social organizations sometimes organized meetings to provide villagers with information, such as know-how to raise cows or goats, or to obtain loans. Only three out of the 16 interviewees viewed communal government or social organization meetings as sources of information, but said they nevertheless did not attend because either they did not have time (I37, Mar 7, 2006 and I51, Apr 7, 2006) or that the information provided was not relevant or beneficial (I51, Apr 7, 2006).

Computers and the Internet

To all nonusers those technologies were something far away. One interviewee did not have any idea of what benefit the new technologies might offer (I37, Mar 7, 2006).

Figure 1. Main sources of external information for ICT/Internet nonusers



Communal Post and Cultural Points (CPCPs)

According to Vietnam Posts (Vienampost, 2006), as a joint initiative between the Ministry of Posts and Telematics and the Ministry of Culture and Information, about 8,000 CPCPs with Internet and telephone connection were set up by Vietnam Posts and Telecommunication Group in a total of 9,069 communes. That initiative was an effort to enable villagers in poor and remote areas to have access to ICTs. Data from this present study did not show CPCPs to be a major source of information for local people. In the two districts that the first author visited (one in Ha Tay province and the other in Hai Phong), although the presence of CPCPs was ubiquitous in almost all communes there, the actual frequency of use was very low and none of the CPCPs had Internet or computer access. The first author spent one hour in one CPCP in each district to observe and conduct in-depth interviews with CPCP operators (I61, Dec 12, 2006; I62, Dec 18, 2006). The two observed CPCPs were almost deserted, only

10 to 15 customers per day, in comparison with crowded private Internet cafes (located about one kilometer from these sites) where teenagers often had to wait for their turn. Only one client came to send postal mail in I61's CPCP in Ha Tay, and no clients visited I62's CPCP in Hai Phong during the author's one hour visit. Once a quarter, I62's CPCP arranged a talk to encourage local people and children to read books and newspapers, and get comments from them. It also exchanged books with the communal library. Further evaluation of the CPCP program appears to be needed.

An insight gained in the nonuser interviews was that computer literate and trusted peers and neighbors played an important role for nonusers in providing new knowledge, with geographic proximity and relevance of content of the information sources as key factors. It could be argued that some years ago, general information from TV or loudspeakers might have been adequate, but that in recent times villagers need more specific, practical knowledge for working or living, and traditional one-way media such as loudspeaker systems or even broadcast television cannot keep pace.

Obstacles to ICT/Internet Use Among Nonusers

Among the cases included in the sample, only three rural residents had access to the Internet, the major channel of e-government services. Many nonusers who lived very close to cable networks for the Internet, TV and telephone in Bac Ninh or Hai Phong did not use these services. Major obstacles for nonusers were not identical for everyone, but varied by profession, residential locality, age and economic status.

Firstly, the cost of ICTs was a forbidding barrier to farmers. In the North, the income from farming was too low, about VND 100,000 a month (~USD 6.0) when considering an Internet installation fee of VND 80,000 to 470,000 (I27 and I28, Feb 25, 2006, I35, Mar 7, 2006) or cable TV subscription fee of VND 55,000 a month (I37, Mar 7, 2006). In the South, I51 (Apr 7, 2006) said that “only a rich family can afford to buy a computer at 3.5-5 million VND... Many households are very poor or live in slums”.

Secondly, the gap in infrastructure availability between urban and rural areas has become larger. Telecommunication infrastructure, including the Internet, telephone, cable TV, quickly developed and became more available in urban areas. However in communes like Dong Ho in Bac Ninh province or Nhan Binh in Long An province, Internet services were not available. The nearest cybercafe to Nhan Binh, for example, was 7km away. Students at secondary or high schools were not taught IT because there was no computer lab there (I51 Apr 7, 2006).

In regard to perceived difficulties, time constraints were often mentioned, some farmers saying they were very busy doing a second job to get more income (I26, Feb 24, 2006; I35, Mar 7, 2006). They also stated that their educational limitations, in areas such as English and business skills, precluded them from using the Internet (I24, Feb 24, 2006). Consequently, villagers were reluctant to try using the Internet because

they believed they lacked necessary skills and knowledge (I51, Apr 7, 2006). Also, farmers, like I35, did not see potential benefits from the new technology:

Work at communes is often simple – it does not require technology. The Internet is something far away. We do not know what benefits ICTs can bring about for us (Mar 7, 2006).

While most of the older nonusers would say no to ICTs, the younger people appeared more enthusiastic in approaching the Internet. Numerous children were observed surfing the web in Internet cafes in communes. While being more enthusiastic about the new technology than their elders, psychological reluctance was apparently an issue for juniors to overcome. Shyness and timidity stopped many interviewees from trying out the new technology of the Internet, as I26 revealed:

The feeling of a person who never uses the Internet is very shy... Although I already know the Internet is a new channel rich with diversified information and there is an Internet cafe next door, I dare not try (I26, Feb 24, 2006).

Surprisingly, if asked to try the Internet by a peer, people could overcome those adverse feelings, as I53 recalled: “I used a computer for the first time thanks to some friends who often went to Internet cafes [who] asked me to go with them” (I53, Apr 6, 2006).

While almost all farm interviewees had no intention to use the Internet or a computer, some revealed that they might encourage their children to use ICTs in the expectation that their children could learn the emerging technology. For example, I27 (Feb 25, 2006) bought a computer set for his son who studied in Ha Noi. Similarly, the old artisan I21 asked his children to have a computer at home and to hire a company to set up a website to market his *Dong Ho* prints via the Internet.

In summary, nonusers (and especially farmers in the countryside) were visibly more disadvantaged than users in receiving e-government services. Main obstacles to them were limited education, low awareness and literacy in relation to ICTs, low income, old age and timidity, in addition to lower levels of availability of e-government services and telecommunication network access.

FINDINGS RELATING TO THE USER SAMPLE

A Picture of ICT/Internet Usage Patterns

This section presents major features of Internet and computer use reported during the interviews with users.

Online Time

Users in cities had longer experience with computers and the Internet than their counterparts in the countryside (8.9 years and 5.7 years versus 2.0 years and 2.0 years, respectively). In terms of usage time, the former also used at least three time more than the latter (23.6 hours vs. 6.8 hours per week, respectively). Some users were computer game players who spent much more time on the Internet than general users, with a mean of 47.4 hours per week (about 7 hours per day). I08, a player in grade 12, even claimed that sometimes he played 20-22 hours a day (Jan 24, 2006). Youth may be exposed to computers and the Internet from an early age. For example, the 12-year-old I33 (Mar 6, 2006) disclosed that he had experienced computer equipment for some three years up to the date of interview. Some even played with computers before going to primary school, as revealed by I07, a gamer in Ha Noi (Jan 24, 2006). Data about the sample's Internet experience and usage time is summarized in Table 3.

Locations of Use

The five main locations of Internet access identified in descending order of usage frequency were: Internet cafes, home, office, school and peer's homes. Internet cafes (other names in Vietnamese language are Internet shop, Internet dealer or Internet service center) were the most popular places where users could come to play games, chat, surf the Internet or make international VoIP calls at the low rate of about VND 2-3,000 per hour. These Internet cafes were usually full of students from nearby schools. Ninety percent of the ICT/Internet users interviewed said that they used computers in such places.

More than half of the user interviewees (55%) accessed the Internet from home computers. This was a new phenomenon, given that computers had been a luxury to Vietnamese families just a few years before. A quarter of the user group (25%) used office computers. Two teenagers (10%) claimed that they accessed the Internet from their friend's houses. Teachers and schools reportedly played only a small role in delivery of computer and Internet access (10%). Some schools even prohibited students from coming to Internet cafes. I22, a high school student in Ho town revealed:

Many students dare not go to Internet cafes because either they don't know about IT or their teachers forbid it. My school also prohibits students from the use of the Internet because using the Internet means playing games or accessing

Table 3. Computer experience and usage time

Indicator	Urban user	Rural user
Average years of using a computer	8.9	2.0
Average years of using the Internet	5.7	2.0
Average weekly usage hours	23.6	6.8
Maximum weekly usage hours	56	8

Note: N=22 interviewees

bad websites. My school expelled several students who went to Internet cafes (Feb 20, 2006).

No-one said that they had accessed the Internet from CPCPs.

Usage Purposes

To answer the question “*What are the primary purposes for which you use the Internet/ ICTs?*” ten top activities were identified. None of these was related to e-government services (see Table 4). Ninety percent of the users had at least a Yahoo email account, though they did not spend much time emailing. The uses of ICTs listed in order from most to least often mentioned were: chatting, online multiplayer games, news or information,

online music, downloading educational materials, solo games, work, other entertainments, creating online content, making friends and relaxing.

Usage and Education

The usage purposes were different between those who had higher education and those who had not. University students were the most diversified online users, exploiting many functions of computers and the Internet such as email, chat, and multiplayer games, as well as study, online music and high rates of searching for news and information. One university student acted as a super-moderator of an online forum. High school students used less sophisticated applications such as emailing and chat, followed by multiplayer

Table 4. Top ten most popular ICT activities and education level

RANK	ACTIVITY	NO. OF INTERVIEWEES CLAIMING EACH ACTIV-ITY	NO. AND % OF INTERVIEW-EES	EDUCATIONAL LEVEL OF INTERVIEWEES			
	<i>Multiple responses invited from each interviewee</i>			Secondary school	High school	University student	Bachelor or higher
			<i>N=22 (100%)</i>	<i>n=2 (9.1%)</i>	<i>n=7 (32%)</i>	<i>n=6 (27%)</i>	<i>n=7 (32%)</i>
1	Email	20	91%	1	6	6	7
2	Chat	14	22%	1	6	5	2
2	News	14	64%	1	3	3	7
4	Online/ interactive games	11	50%	1	3	4	3
4	Music	11	50%	2	2	4	3
4	Study	11	50%	2	1	4	4
7	Offline/ solitary game	5	23%	0	3	0	2
7	Work	5	23%	0	3	0	2
9	Other entertainments	3	14%	0	0	0	3
10	Create online content	2	9%	0	1	1	0

or solo games, news and information and other activities. Many male high school students played truant from school to play games at Internet cafes. Bachelor's degree holders spent more time using computers and the Internet for work, study, news and information, and less time on chat and computer games. The data for secondary school students was sparse as only two students (I33 and I65) were interviewed. They appeared to use computers for both entertainment and study at a less advanced level.

Usage in Relation to Other Factors

Besides education, the online activities of the users were affected by other factors such as gender, experience, hobbies and living location (Table 5).

Gender: Types of use made by female and male interviewees were somewhat different. Male users reported spending more time on chat and

multiplayer games. Females reported spending a relatively higher proportion of online time searching for news and information, playing solitary games, entertainment, study and work. In searching for news or information, male interviewees looked for politics, sport (I45, interview, Apr, 5, 2006) or lottery information (I15, interview, Feb 15, 2006), while female interviewees spent more time on social, business and IT information (I06, Jan 24, 2006) or on topics relating to women or children (I10, Jan 24, 2006). However there was no difference between male and female interviewees in relation to time spent on emailing and listening to online music. These findings were reasonably similar to usage patterns of American online male and female users reported in 2001 (Howard, Rainie, & Hones, 2001).

Length of experience of computer use:

This factor appeared to be associated with the purposes for which interviewees used ICTs. The very experienced (>5 years) Internet interviewees

Table 5. Top ten most popular activities cross tabulated with other factors

ACTIVITY	NO. OF INTERVIEWEES CLAIMING EACH ACTIVITY (Multiple responses from each)	Male	Female	User	Player	Rural	Urban
Email	20	11	9	14	6	5	15
Chat	14	9	5	8	6	3	11
News	14	7	7	11	3	2	12
Online/ interactive games	11	10	1	4	7	0	11
Music	11	6	5	7	4	2	9
Study	11	6	5	7	4	3	8
Offline/ solitary game	5	2	3	5	0	2	3
Work	5	2	3	5	0	1	5
Other entertainments	3	0	3	3	0	0	3
Create online content	2	2	0	2	0	1	1

in Vietnam spent the largest proportion of time dealing with email and instant messages, playing multiplayer games, undertaking specific searches for news and information, and performing professional work, while new users (>2 years) spent most time on email and chat, followed by information surfing, offline or solo games, and music.

Age: Interviewees of different ages made different uses of the computer. Older users spent less time on chat than younger users. Besides education, other factors associated with age, for example, marital status or family duties may limit the time that people can spend online. In his interview I34, a medical doctor, explained why he seldom chatted online: "Before, I chatted a lot, but since I have got married, I never enter a chat room except when I sometimes chat with my sister overseas" (interview, Mar, 2006).

Living location: The online activities of the two rural interviewees were restricted to email and chat. They also spent considerable time playing offline games because of the low quality of connectivity available to them (I22, interview, Feb 22, 2006). In terms of creating online content I23, a rural businessman, hired an IT company to create a website for his micro-business (interview, Feb 22, 2006), in contrast to an urban student I45 who himself, as super-moderator, created the site for an online forum of Vietnamese fans of the Italian AC Milan football Club (I45, interview, Apr 5, 2006).

Obstacles to ICT/Internet Use Among Users

Obstacles identified in the interviews of users included the following main categories:

The English Language

English, the dominant Internet language, was found to be a barrier to the majority of the users. For example, an academic said "I do not know much English, especially technical terms" (I05,

Jan 24, 2006). A medical doctor gave his reason for only reading Vietnamese websites: "It is essential to know English to read professional documents on the Net. [Without English proficiency,] I can only enter Vietnamese websites." (I34, Mar 3, 2006)

With the Internet, literacy takes on greater importance, as it is mostly text based (Tigre & O'Connor, 2002). Language is a big factor in Internet usage (De Boer & Walbeek, 1999; Palmer, 2000). Salman (2004) viewed language as a key Internet content issue. Cullen (2001) noted that China and Russia only experienced significant growth in Internet usership once content was provided in Chinese and Cyrillic.

Technological Skills

Most users had difficulty in searching for information because they did not have technical skills - especially searching techniques. One user complained: "It takes much time to find necessary information if the connection is not speedy and we don't know appropriate keywords." Four users expressed concerns about Internet security, such as viruses and spam (I12, Jan 25, 2006; I05, Jan 24, 2006; I34, Mar 3, 2006; and I06, Jan 24, 2006) and one user was worried about being hacked (I48, Apr 5, 2006).

Unhealthy Content

Three users showed concern about possible bad effects of unhealthy Internet content on adolescents, the major users of the Internet in Vietnam. As one user explained, unhealthy content of the net, such as erotic websites or the like, may badly spoil the personality of adolescents, who:

often have limited social knowledge and experience and become bewildered accessing the enormous information in the Internet, and may not have the maturity to deal with bad information. That can have negative impacts on their personality development (I48, Apr 5, 2006).

Affordability

Unlike the situation for rural users, economic affordability was not seen to be a major obstacle for urban users. The appearance of many private Internet cafes in cities and large towns in recent years has made the Internet both accessible and affordable to almost all urban users. As one interviewee put it, (I03, Jan 20, 2006) “the cost of using the Internet at cyber cafes is not a problem”. However, if used too long for gaming, the cost was not inconsiderable. With the availability and affordability of Internet cafes, these venues appear to be ideal points from which to deliver e-government services.

Rural Disadvantage

As was expected, rural users were disadvantaged compared to their urban counterparts in many aspects of ICT usage. Rural students have more difficulty accessing the Internet than their counterparts in the city. As I22 explained:

In the Internet cafe, many [rural] students only use applications like chat or email which have already been installed by the Internet cafe manager. They don't know how to access a website or how to search for information (Feb 20, 2006).

Rural villagers, especially farmers, lacked IT literacy simply because there was no IT training available in their region. I23 in Ho town, 30 km from Ha Noi, summed up some of the main issues:

Our IT literacy is limited. In the countryside, even if we want to learn IT, we do not have much chance. There is no IT training center in my district but only in Ha Noi and Bac Ninh. How can I arrange my time to study there and to work here, as well as to look after my children? (I23, Feb 20, 2006).

Other Concerns Among Users

In addition to the specific obstacle mentioned above, users raised other concerns which have a bearing on the development of e-government services, as follows:

Vietnamese Content

Despite the increase in numbers of local e-newspapers and e-publications in Vietnam dissatisfaction was expressed with the quality of the Vietnamese content. One interviewee remarked: “the Internet does not change much of my working practice because if I need a professional document, I have to search in foreign websites” (I34, Mar 3, 2006). Another (I07, Jan 24, 2006) pointed out: “Information in Vietnamese websites is poor and not always up to date”.

ICT Infrastructure

In relation to infrastructure, many users (other than those in Ha Noi and Ho Chi Minh cities) complained about the poor telecommunications infrastructure. Even in a big city like Hai Phong, a major harbor 100 km east to Ha Noi, users were dissatisfied with the service. “The connection is often disrupted”, said I34 (Mar 3, 2006). In rural areas, the infrastructure was even worse, both in coverage and quality. A user of a rural Internet cafe in Bac Ninh province, 30 km north east to Ha Noi, said: “the connection in rural Internet cafes is very slow. Many times I wanted to send a message but I had to stop while sending, since it took so long” (I22, Feb 20, 2006).

Regulation

The tight regulation of the Internet was a topic of criticism by many interviewees. One person (I07, Jan 24, 2006), for example, explained: “The requirement of the government for security purposes, such as showing an identification card when

entering an Internet shop, is neither relevant nor manageable". An owner of an Internet cafe in Hai Phong made the same point (I32, Mar 6, 2006). An article in Vietnamnet, a popular Vietnamese online newspaper, made the point that no Internet café could avoid violating a 2005 regulation on management of Internet dealerships, stating that "such a regulation was not only cumbersome and unrealistic, but also restricted children under 14 from using Internet cafes" (Vietnamnet 19/07/2006).

DISCUSSION AND FUTURE TRENDS

Serving a Diverse Population

E-government strategy should take account of both the growing number of frequent online users who are mostly young, well-educated, and technically agile and the majority of the population who are digitally marginalized. By providing for each group appropriately the Government can help citizens overcome obstacles to using e-government services. E-government websites should provide a graduated set of paths for different levels of information literacy, allowing the skilled and adept to by-pass step by step tutorials that might be provided for beginners.

Nonusers face many more difficulties than users in the possibility of receiving electronic services from the government. As identified above, social exclusion, low income, limited education, unfamiliarity and timidity, low expectations of government services, unavailability of technology, telecommunication costs, and time constraints are serious obstacles to the adoption of e-government.

Special measures should be taken to make nonusers, bit by bit, familiar with electronic transactions and administration. Nonusers could be indirectly assisted from e-government services

through intermediary channels additional to the Internet. As shown in Figure 1, nonusers can benefit indirectly from public services and information through help from their peers, relatives or communal authorities who may have more opportunity and capacity to access e-government websites.

Inducting New Users

As a prerequisite to being a direct beneficiary of e-government services, a nonuser must first become an ICT user. They need to be informed of the possible advantages of the Internet in offering them more effective and convenient government services. In the interviews for the study, TV was identified as the most accessible and effective channel of information. Television can therefore become a prime medium for government to raise awareness about the Internet and e-government among nonusers.

Timidity about the first experience of using ICTs is a psychological barrier that should be taken into account in any e-government implementation. Special attention is needed for young nonusers who are more likely to want access to new technology. Young people should be encouraged to become familiar with the Internet and online public services. An example of this approach was a project that Vietnam Data Company (VDC) piloted using WiMax technology in Van Hoa Secondary School in Lao Cai province in October 2006 under which ethnic minority students in the mountainous region had their first exposure to computers and the Internet (Hung, 2006). Similar activities that help youngsters to overcome anxiety in their first attempts to use ICTs should be encouraged in other places. On a national scale, opportunities to gain ICT literacy could be offered in schools, ICT training centers and via TV programs so that students and as many other people as possible can gain familiarity with the technology.

Relevance of Content

E-government information, services and functions need to be highly relevant to the needs of nonusers. In the view of the authors, these services should be tailored to satisfy the very concrete and practical requirements of people in each locality. One way of doing so is to ensure that government at the commune level and other local organizations are continuously involved in providing content for e-government sites.

General issues which might be facilitated via e-government are those capture which attract much attention by the Vietnamese public in relation to the authorities, such as land/house registration and disputes, and reporting of governmental corruption.

In the worldwide context, e-government projects such as Online Dispute Resolution (an emerging set of tools and techniques for resolving disputes online, have the potential to successfully resolve half a million disputes per year (Tyler & Bretherton, 2004). This is but one example of an area where e-government facilitation could materially assist Vietnamese participation in global business. Unless e-government continuously addresses new developments such as this, it could easily lose relevance and interest of the public in much the same way as the loudspeaker system discussed earlier.

Practical High-Impact Changes

Internet users are the direct potential customers of e-government projects. Given that the majority of them are young and well-educated, initiatives of e-government should be highly targeted towards their interests and benefits. Looking back to the patterns of online usage discerned through the interviews, the main purposes of the online activities can be regrouped into four categories: communication, entertainment, education and jobs/work related themes. Potential e-government projects should take these factors into consider-

ation, and seek to integrate services with existing and emerging use patterns.

For instance, the government could legalize the validity of electronic application forms and allow young people to download them from government websites rather than buying paper forms from authorities. This could save much logistical workload for government agencies as well as relieve the frustrations of red tape that such organizations impose upon people. Vu and Jones (2006) suggested that:

Before investing resources and time in new online services or initiatives, provinces should ensure they have done all they can do with their current infrastructure, such as ensuring forms are available for download.

At the time of writing this chapter, two governmental portals on education and labor are examples that illustrate this argument.

The website of the Ministry of Education and Training, <http://moet.gov.vn>, provides information to students, from news and legal documents to examination plans and students' scores. However it does not provide the training and education-related documents that are needed by all of the 20 million Vietnamese students, for example application forms for enrolment, resume pro formas for university exam applications, and text books from grades 1 to 12. If the website could provide these documents for instance, it would save much time, money and paper for all parties.

The website of the Ministry of Labor, Invalids and Social Affairs, <http://www.molisa.gov.vn/>, presently provides no online job-related application forms or online forums about job opportunities and required skills. At the provincial level, departments of education and training, and departments of labor, injured war veterans and social affairs could establish or upgrade websites to provide more customized content on education, training and jobs to meet the specific demands of each locality. If these kinds of relevant, specific

services were provided, the benefit – and thus the attractiveness – of sites to users would be much higher than sites providing merely general introductions or mass media news releases. E-government can start from this simple one-way provision of information before contemplating more interactive, but higher cost projects.

Publicity, Promotion, Education, Support

To the extent that government informational or transactional sites exist, the interviews showed that awareness of them is very low. Much more needs to be done about communicating their availability and usefulness. Unless the sites are marketed, usage will be low and the services will be prematurely deemed a failure. Such awareness-raising programs could be delivered to citizens through popular channels such as television. It is important also to equip users with ICT skills such as searching e-government services on the Internet. Jaeger and Thomson (2003) claimed that an e-government system would fail if the government did not take an active role in educating citizens about the value of e-government.

To provide e-government services to users in rural and poor areas especially, much more work is needed. The government may need to consider the social exclusion barrier to e-government imposed by a shortage or absence of Internet availability in rural areas – a classic manifestation of the digital divide. Farmers, especially those in the north, center, highland and mountainous areas have very low incomes. As telecommunication and Internet connection fees are still expensive to most rural residents, policies to reduce or subsidize telecom tariffs as well as other relevant measures to encourage rural people to use the Internet are recommended. Margetts and Dunleavy (2002) suggested that incentives to encourage citizen uptake of electronic services, such as lowering the cost of online transactions to a feasible level for farmers, are important to increase the adoptability

of e-government. The importance of two-way channels of information, including telephony, professional associations and especially peers are extremely important to villagers and should be consistently encouraged. Local governments play a critical role in promoting those channels as well as potential Internet access points, such as CPCPs and private internet cafes. Cecchini and Raina asserted that e-government projects need the collaboration of the local staff in reducing the gap between technology and the reality of social context, and creating a sense of local ownership. “The local administrative and political actors need to be involved in the implementation of the project. Otherwise, the likelihood of failure increases dramatically” (Cecchini & Raina, 2004).

CONCLUSION

The availability of Internet access points is essential to promote citizen information literacy and to make information accessible to the people. For that purpose, private Internet cafes with their widespread presence and cheap pricing could be regarded as delivery points for e-government services. In areas where Internet cafes are absent, public CPCPs can undertake that function. Thus, multi-stakeholder partnerships of e-government programs with private Internet cafes and public CPCPs could be a potential strategy in providing e-government services to citizens. People could be given a better chance to use the Internet by clustering private Internet cafes and public CPCPs as access nodes where government websites with relevant content and e-government services (that hopefully will become increasing interactive) can be accessed.

The authors suggest that further research should be undertaken to systematically assess the needs of citizens and to design collaborative public-private business models for the delivery of e-government services. It is important that an evaluative component should be integrated from

the outset in all e-government programs that are undertaken to ensure continuous improvement in the light of experience. Pilot programs, whether successful or not, can often reveal valuable lessons.

Inevitably the aspiration to deliver excellent, responsive e-government services to the great majority of citizens has extensive antecedent implications for the workings of government as a whole. Citizen-centered e-government services, if they are to succeed, cannot simply be “wallpapered” on to systems and structures of public administration that are inefficient, slow and inward looking. The drive towards effective e-government service delivery would often need to be accompanied by a re-examination of government processes, especially in terms of their responsiveness to citizens’ needs. A key factor is the capacity of each government officer to deal creatively with the new electronic administration environment. The transformation towards a citizen-centric, ICT-enabled, government service regime is a complex challenge, requiring extensive practical action, as well as ongoing research and evaluation. However the potential economic and cultural payoffs for individuals and the nation could be immense as improved communication between citizens and government helps build a more informed and empowered society.

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ENDNOTES

- ¹ The content of this chapter was derived from part of the first author's larger PhD study at Monash University which explores the role of knowledge and ICTs in the sustainable creation of wealth for the nation of Vietnam. Initial compilation of the chapter content was for a presentation to the 'Vietnam E-Government Symposium 2006 – The Bridge for Government, Business and Citizens'. It was then developed as an article "Grounding E-Government in Vietnam: from Antecedents to Responsive Government Services" published online in the *Journal of Business Systems, Governance and Ethics (JBSGE)* – Special Issue: ICTs for Developing Countries ..., Volume 2, Number 3, October 2007, <http://www.jbsge.vu.edu.au/>. This chapter further develops the material in response to feedback and new data. It contributes to the following broad topics of this book: how government can provide responsive services to citizens via the Internet and non-Internet channels; the degree of acceptance and trust of ICT nonusers in e-government solutions; horizontal, vertical and multi-directional integration of e-government solutions; and citizen-oriented e-business models for government.
- ² Named by the number of the Prime Minister's Decision approving the project, 112/2001/QD-TTg
- ³ Interview coding explained towards the end of the section entitled "Methodology" below.

Chapter VII

CRM in E-Government: Issues and Challenges

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ABSTRACT

Customer Relationship Management (CRM), primarily a concept of the private sector for its multi-benefit approach, is catching up fast in public sector, with constituents worldwide demanding better and more customized services built around their needs and to be treated as customers. This has compelled public sector to act like the private in certain ways and to embrace CRM to ensure better planning and resource allocation leading towards constituents' satisfaction and better quality of life. This chapter identifies the critical aspect of relationship management and provides a conceptual framework for CRM in e-government.

INTRODUCTION

The term 'Customer Relationship Management' (CRM) has gained widespread recognition in business because of the emphasis that it can give mutual benefit to both the customer and the firm. Business firms (private sector) around the globe are spending millions of dollars for managing customer relationships for their benefit. Governments, worldwide are biggest service providers and citi-

zens are also demanding more and better services from governments. With multifaceted benefits of CRM, pressing demands from citizens and web enabled technology; governments are also forced to implement the CRM concept to gain its benefits. This chapter provides a conceptual framework for implementation of CRM concept and e-government and is organized as follows: Section one discusses the concept of CRM in general and also the meaning of e-government. Section two

describes CRM in e-government, followed by section 3 providing for a conceptual framework for implementation of CRM in e-government and section 4 explaining the major impediments in CRM adoption in e-government.

CRM AND E-GOVERNMENT

Customer Relationship Management is defined as the strategies, processes, people and technologies used by companies to successfully attract and retain customers for maximum corporate growth and profit (ATA). It is about identifying, establishing, maintaining and enhancing relationships with the customers so that the objectives of both parties are met (Rashid 2003). The notion of forging intimate connections with consumers to understand the needs, references and potential of distinct market segments has also been a crucial driving force behind organizations' mounting emphasis on customer relationship management (CRM). Corporations look upon CRM as the means to identify profitable patrons, convert prospective clients and establish lasting strategic partnerships with beneficial business partners (Dyche 2001, Rust et al 2004, Zeithaml et al 2001). For the firm it is said that customer retention can enhance profitability through benefits of lowered sales costs and increased revenue (Evans & Laskin, 1994). In-fact CRM has been identified as a critical carrier of revenue growth.

There is considerable interest in how customer relationships can be managed more effectively since they are now regarded as one of the firm's primary assets (Gupta, Lehman, & Stuart, 2004; Hunt, 1997; Kutner & Cripps, 1997; Srivastava, Shervani, & Fahey, 1998). However, there is no generally agreed approach to CRM; different scholars have recommended different approaches to CRM. For example, according to Payne and Frow (2005), CRM unites the potential of new technologies and new marketing thinking to deliver profitable long-term relationships. Hamilton

(2001) defines CRM as the process of storing and analyzing the vast amounts of data produced by sales calls, customer-service centers and actual purchases, supposedly yielding greater insight into customer behavior. The essence of customer relationship management is to understand the customer needs and leveraging that knowledge to improve company's long term profitability by customizing its offering on one-to-one basis. According to Swift (2001), CRM is an enterprise approach to understanding and influencing customer behavior through meaningful communications, in order to improve customer acquisition, retention, loyalty, and customer profitability. Therefore, from all these definitions, it is evident that the objective of CRM is to acquire and retain the customers by leveraging customer knowledge to offer better services and through influencing their behavior in meaningful manner.

The public sector is one of the most primitive and predominant service domains in any community, with a wide array of governmental services catering to all aspects of society and economy (Ho 2002). Advancements in information and communication technology (ICT) have touched government agencies also and governments worldwide are embracing this technology to reach their constituents (citizens and businesses) and this initiative is known as e-government. e-government has been defined in a number of ways, mainly falling in two categories- techno-centric and government-centric with the former focusing more on technological or 'e' aspect and the latter on 'governance' (Saxena 2005).

Techno centric view: "Electronic or e-government means providing public access via the Internet to information about all the services offered by central government departments and their agencies; and enabling the public to conduct and conclude transactions for all those services...." -Comptroller and Auditor General, U.K. (2002)

Governance Centric view: Away from techno-centricity, the other view of e-governance is governance-centric (or citizen-centric). Such a view of e-governance focuses more on the outcome or impact of e-governance, rather than merely on its outputs. Or, in other words, the governance-centric view of e-governance focuses more on its effectiveness rather than its efficiency alone. It also assumes that quality for government services is different because either they are universal (e.g. payment of tax) or provided to specific eligible groups (e.g. the unemployed). Therefore, this view has to focus on the capacity of government to serve the needs of diverse groups, including the aged, those with disabilities, those with few or inadequate resources (such as technology access, knowledge of a language such as English, etc.), and those in rural and remote areas (Teicher, et al 2002). Scholl (2003) has also differentiated between these two views in his definition of e-government, though he has called both of them as 'e-government'. These definitions are:

“Definition 1: Electronic government is any process that the citizenry, in pursuit of its governance, conducts over a computer-mediated network.”

“Definition 2: Electronic government is the use of information technology to support government operations, engage citizens, and provide government services.”

e-Government, a program which is rooted in the modernization agenda, is unambiguously presented as a process involving transformational change at the organizational level; “e-government is more than technology, more than the Internet, more than service delivery; it is about putting citizens and customers at the heart of everything we do and building service access, delivery and democratic accountability around them” (DTLR 2002, Pg2).

The concept of e-governance has its origins in India during the seventies with a focus on de-

velopment of in-house government applications in the areas of defense, economic monitoring, planning and the deployment of ICT to manage data intensive functions related to elections, census, tax administration etc. The efforts of the National Informatics Center (NIC) to connect all the district headquarters during the eighties, was a very significant development (SPEG). This study addresses the issue of CRM in e-government

CRM IN E-GOVERNMENT

CRM originated as commercial sector concept. However now citizens and businesses (together referred as constituents) are demanding more and more that their governments treat them as 'customers', and that services be provisioned to them more and more interactively, timely and customized. E-government (Stratford and Stratford 2000) has complicated matters by inducing a sense of urgency in stepping up to rising public expectations of improved interactivity and enhanced sensitivity (Humphreys et al 2001, Wimmer and Traun muller 2000).

Constituents interact with government in 3 ways- as Consumer of information from government, as Customer of government services and Citizens participating in government decision making and policy making (Abramson, Breul and Kamensky 2006).

In this light, CRM becomes strategically significant in promoting e-government acceptance by providing a forum for public agencies and their customers to fine-tune services to meet each other's precise requirements (Chan et al 2003). There is an extensive amount of studies conducted on CRM initiatives (Dibb 2001, Rigby et al 2002, Woodcock and Starkey 2001)) and with the apparent dominion of information technology (IT) in the future; the growth of CRM in electronic commerce (EC) is also rapidly gaining momentum (Romano 2000). Nevertheless, despite the overwhelming number of articles presented on the advancement

of CRM across various service industries (Ahola et al 2000, Anckar, and Walden 2000, Menon et al 1999), few, if any, have explored the management of constituent relations within governmental agencies. Whereas in the past governments paid no attention to building constituent relationships, of late, government, the largest service provider in the world has increasingly become aware of the need to become more responsive to its customers-citizens, businesses and organizations and is ready to adopt new ways to do so. Therefore, CRM or constituent relationship management in the context of e-government is gaining more and more attention in e-government (Accenture, 2001; 2003). constituent relationship management could be defined as various activities performed by government agencies and departments to build better relationship with people of a country in order to provide them efficient services and to utilize the resources in most beneficial manner. If government starts treating its people (citizens and businesses) as customers, then it may reap many potential benefits of CRM in e-government also, for e.g. better relationships help in better planning and resource allocation which in turn would result into constituent satisfaction and better quality of life for civil society.

However an important point of departure from traditional CRM is that the 'customer-government' relationship is not voluntary but mandatory; citizens (and their businesses) have to deal with government; terminating a relationship is not either an issue or even possible (Saxena et al 2003, Rocheleau 2002). Therefore public institutions should consider the use of CRM to strategize the value of each customer relation while retaining merits of service modernization. (Pan et al 2006) Government has much to learn from the private sector and from other governments about the benefits and risks of CRM. Government is often wary of risk and change, so instructive case examples and best practices are important in planning for and implementing CRM (Gartner 2001).

The results of recent UK electronic government CRM programs show that the focus for many local authorities has so far been systems integration, CRM-enabling call centers and the provision of routine transactions online. More advanced authorities are planning to use CRM to help them understand their citizens better. (King 2007) Therefore e-government promotion must start with redesigning administrative processes from a customer's point of view to provide better customer service and thereby add value to their services (Liu and Lai 2004).

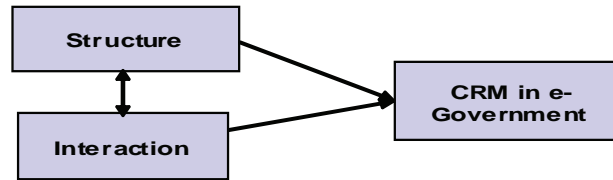
CRM IN E-GOVERNMENT: A CONCEPTUAL FRAMEWORK

In view of the above reasons, this chapter argues for the significance of CRM study in e-governments and suggests a framework, which Government should work at to build better relations with its constituents.

Structure

Structure defines roles and responsibilities. According to Gold et al(2001)- Structure is defined as the rules, policies, procedures, processes, hierarchy of reporting relationships, incentive systems, and departmental boundaries that organize tasks within the firm. 'Structure is defined as the actual static or dynamic components plus the actual relations that take place between them' (Maturana and Varela: 1980 In a complex business environment where change and uncertainty are the only constants, organizations have to discard outdated practices in exchange for highly flexible structures that are adaptable to the ever-changing environmental conditions (Smithson et al., 1994). The greatest CRM benefits come from creating a pervasive new culture focused around constituent service and delivering increasing value to constituents. It is true for e-government also. Such transformation ultimately requires major organi-

Figure 1. Framework for CRM in e-government



zational structure changes redefining roles and responsibilities, rethinking services and access, eliminating redundant functions, re-skilling staff, redesigning processes, working collaboratively with other stakeholders to deliver services that cross existing organizational boundaries, and transferring non-core processes to third parties such as outsourcers. (Gartner 2001)

However Unlike the private sector, which typically focuses on the most efficient organizational structure, in the public sector, authority and responsibility is intentionally diffused under the constitutional principles of “separation of powers” and “checks and balances.” This system is designed to ensure that governments act deliberately, not quickly and without thorough review (NICCC 2000). However it has its own limitations. In a research by Accenture (2003), bureaucracy topped as the most prominent challenge for building better relationships. E-government requires customer-oriented approaches to, management practices and organization structure.

There is a need of top-level commitment. There must be a clear vision and a clear funding model for CRM. There is need to establish, sustainable structures that facilitate and integrate the co-operative design of citizenship, services, service provision, and technical infrastructure (Business Day May 23, 2002). Structure should be such

that cross-departmental data sharing is possible. Technology enables the public service employees to have access to citizen and business’ profiles while they are in contact with the constituents or build other databases. In this way, they can offer more personalized information and services and also identify possible emerging problems (O’Looney, 2002). Therefore there is a need to train employees’ technical skills. There is also a need of business knowledge in CRM team along with technical skills. Employees must be constituent focused and there should be proper alignment of front-end and back-end. Successful implementation of e-governance projects requires lots of administrative restructuring processes, redefining of administrative procedures and formats, which find the resistance in almost all the departments at all the levels. (Kanungo 2004) There is a need of transformation with the redesign of non-innovative bureaucratic governmental structures (Moon & Bretschneider, 2002) to accommodate an emerging generation of modernized public services or e-governments (Stratford & Stratford, 2000; Devadoss et al., 2002). Organizations should move from bureaucratic structure to Anticipative & Responsive Organization. (Tan and Pan 2003) Processes should be redesigned to align the organization and its constituent facing activities with constituent requirements.

Governments traditionally have delivered online services based on their own organizational structures. Services that were delivered offline under the domain of a particular agency remained housed on that agency's website during the early stages of e-government. To access a service, a customer needed to know which agency provided it—a fact that was not always intuitive. (Accenture 2003) So if I have to make online tax payment or if I want to apply online for PAN card, I must know the individual website, which is again a difficult task for people who are still in learning phase of using online services. Since there is no physical presence limitation, that could have resulted into impeded integration or reorganization, e-government services can be organized according to a citizen centric point of view far more easily than can be done in the offline world.

Also, at broader level there is a need as well as scope to create and maintain structure to facilitate CRM. Various government agencies collect and utilize constituent data for providing services, but there is no integration of all the data and due to this, there is many a times replication in data collection, which is not only a costly affair but also is quite cumbersome for the constituents. Therefore there is need of creation of one department exclusively for constituent affairs or constituent relations, namely constituents' affair department which could act as complete database for constituent information, with constituents having responsibility of information updation. For example, figure 2 gives the proposed diagrammatic presentation of proposed constituent affair department and information flows with a suggestive list of ministries and government departments. This would help all public agencies to get timely and accurate information to serve their customer-citizens and businesses. It would also make easier for constituents to get services without hassle. For example it may help them get ration card or driving license while moving to different locations.

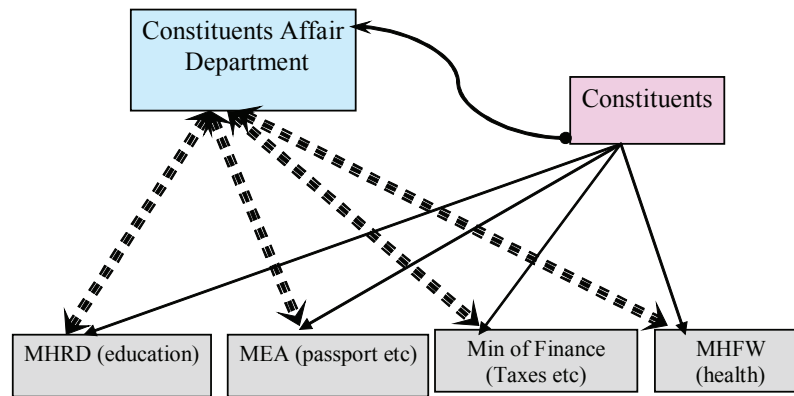
Interaction

Interaction is at the heart of CRM. An interaction refers to any instance in which two active parties, which have the ability to exert influence upon each other, engage in the exchange of values (Cunningham, 1980; Ford, 1980; Kotler, 1972; Turnbull et al., 1996). Broadly speaking, an interaction can focus on the exchange of core benefits (i.e., products and services for money), information exchange, social exchange (i.e., interpersonal exchange), and/or any combination of the three (Cunningham, 1980; Kalafatis, 2002; Metcalf et al., 1992). Relevant elements of interaction include the transactional (core benefit exchange) interactions, Managerial (Planning and Control) interactions, informational interactions and Social interactions. (Chauhan et al 2008) Capturing two way interactions with constituents is necessary to gather information and is the key to gain constituent knowledge, which is critical to understand the constituents' needs wants and preferences Opening new government channels for constituent interaction is critical to enhance constituent service. Since not all the constituents are equal tech-savvy, therefore more are the channels, more and easier is the interaction. Apart from web based services and telephony, other channels could be tapped for interacting with citizens and capturing the valuable information like information kiosks in rural villages. This will not only help eliminate the costs of traveling to the nearest municipality to receive government's services, but also increase access to information and facilitate interactions among dispersed organizations and individuals. (Navarra 2003)

A CRM initiative in e-government must focus on the following: (Saxena et al 2004)

- All available customer-related information to develop insights about the characteristics, needs and preferences of customers. The user study for designing e-Government systems should include aspects like- human factors

Figure 2. Proposed structure and information flows (MHRD-Ministry of HRD, MEA-Ministry of external affairs, MHFW-Ministry of health and family welfare)



(cognitive and physical); age and gender based preferences; economic, historical, linguistic, social, cultural and political background; illiteracy (script and computer both), physical disabilities, environmental conditions, electricity and internet connectivity limitations, etc.(Katre 2007)

- Using these insights to configure government services that reflect the needs and preferences of clearly identifiable groups of customers.
- Designing an integrated suite of channels that provide easy access and effective processes for customer interaction.
- Organizing processes and technology to maintain a comprehensive history of customer interactions.
- Creating links with other organizations, if necessary, for sharing relevant customer data as well as aggregate or align services mutually with each other.

Different government agencies can interact through various channels and in the light of history of these interactions may understand the

constituent behavior and their needs. This rich information would help meet the objectives of service improvement, cost reduction and above all constituent satisfaction. e-initiative makes it easy to capture interactions. However not only there is need to capture all the interactions, the government agencies also need to integrate information from all points of constituent interaction, be it transaction related interaction, or any other information (complaints, grievances, opinions and feedback etc.) sharing interaction. This may help understand each constituent better and accordingly they could be served in efficient manner. Also it will help reduction in same data collection every time a constituent interacts with government. There is also a need for making customers part of the policy-making processes or service provisioning. This will help build services around their needs and will enhance their satisfaction. In a recent move, Delhi state government has brought a note for cabinet approval namely 'community participation law', which would make it mandatory for government and its agencies to take communities view before deciding upon any project. (Times of India February 26, 2008 pg1)

IMPEDIMENTS TO ADOPTING CRM IN E-GOVERNMENT

Taking a cue from private sector and adopting similar practice is not that easy for e-government, especially in a developing country like India. There are quite a few challenges before any government to implement CRM successfully.

Cultural: One of the biggest and most important impediments in implementing CRM in e-government is the cultural block. CRM requires constituents to be treated as customers and government in service provider's mode. However, from eternity governments are in the role of administration where they make rules and through administration rules are enforced on citizens. This is a need to overcome this attitudinal block and treat citizens as customers, which requires acceptance of this fact at decision-making level and counseling and training to the government officials.

Budgetary: Another issue is related to infrastructure and budget allocation. To implement CRM, there is a need of robust infrastructure and support structure, which requires huge investments. Unlike private sector, the benefits are not so evident from initiation; therefore governments are not keen on spending money on those projects where benefits appear in long term, especially in a democratic setup where governments prefer spending money on populist schemes to get the support and votes from public.

Applicability: Applicability of CRM concept in e-government as it is applied in private sector is another issue to be tackled judiciously. Governments, worldwide are responsible for welfare of the citizens and unlike private sector, they don't provide services with sole objective of profit making, therefore they need to adopt CRM concept with objective of better planning and resource utilization.

FUTURE TRENDS

The future of CRM in e-government in all over world as well as in India seems quite positive, because worldwide governments understand the benefits CRM can provide and e-government already has a technology platform which makes it possible also. Leading governments are recognizing that e-government cannot just be a duplicate channel for the same service, but that it must add a service dimension—such as convenience, accessibility, rapid response, or control. For this, they are allocating budget to create more and better services for their constituents. India also has multiplied its e-government budget over the years (Katre D 2007).

CONCLUSION

Even within private sector building and maintaining relationship with customers is not an easy task and studies have shown that more than 75% CRM projects fail (Kotorov 2003), therefore the organizational challenges inherent in any CRM initiative and the diversity of people involved pose threat before e-government also. According to World Bank approximately 85% of e-governance projects in developing countries are failures; and only 15% can be seen as fully successes (Katre 2007). Many projects fail because of the lack of coordination between strategy and processes. Public Administrations have to understand all processes in great detail, which might not be possible due to lack of human resource. There is need to re-organize the structure and its alignment with processes. Also there is a need to imbibe right relational value among the staff of government agencies. It also calls for the utilization of the technological infrastructure in full to interact with constituents and integrate those interactions around individual constituent's needs. An ongoing two-way interaction supported with well designed processes and a right structure to

enable these processes could be the key to build better relations with the constituents and serve the society at large.

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Chapter VIII

Human–Computer Interaction: National Culture and Electronic Government Website Usability

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ABSTRACT

Human Computer Interaction is a relatively new field. It has borrowed theories, techniques, and tools from such diverse disciplines such as computer science, management of information systems, sociology, anthropology, psychology, and design. The Web design process needs to evolve in order to include the constructs and tools provided by multidisciplinary research. Culture has been proven to have a direct influence in the way a Web site can be both evaluated and designed. In order to attract and retain users, electronic government Web site designers must acknowledge that culture plays a key role when it comes to user acceptance. The best way to approach the users, who in the case of an electronic government are the citizens, is a citizen-centered approach that must be incorporated into the Website design process.

INTRODUCTION

Human Computer Interaction (HCI) is a relatively new field. It has borrowed theories, techniques and tools from such diverse disciplines, such as computer science, management of information systems, sociology, anthropology, psychology and design. Thus, HCI development has been a derivation of interdisciplinary and collective efforts from different research perspectives in order to provide a better understanding of the way the user interacts, adopts, and efficiently performs specific tasks by using technology.

Usability evaluation has been broadly used as a means to assess the effectiveness and efficiency of Websites. It also has consistently adapted tools from sociology and psychology by implementing focus groups, ethnographic studies, and interviews in order to have a better understanding of the way users perceive Websites and how familiar and friendly they are for the users. Thus, usability evaluation aims to make predictions about how people will use a Website; make predictions about interactive elements that may be problematic and predict consequences of not fixing usability problems; and the resulting product may be an interface that will deliver information in the most efficient way (Patton, 2002).

Since the World Wide Web was conceived, its main objective has been to deliver information in the most appropriate and efficient fashion to users. As a result, the Internet has proven to be the most interactive and global means of communication and has reached more international audiences than any other massive communication technology.

Because of this global reach and the crescent acceptance among users all over the world, private and public institutions have developed efforts in order to address information to the targeted audiences. Among these institutions, governments have played an important role in the way

services and communications are delivered to their citizens.

Even though commerce was the main use originally given to the Internet, electronic government Websites have appeared, and there is a fierce competition among the main electronic government leaders to become the model and to set the standards, when it comes to adopting and adapting electronic government applications, services, and innovative solutions. An electronic government is the result of governmental efforts to achieve efficiency and to reduce transaction costs. It also reflects the interest that citizens may have a method to interact and become not only participants, but protagonists, in the way these services and transactions are performed.

Web design is a topic being considered and explored with a more scientific scope. With the development of the Internet, the number of Websites has grown considerably, and Web design has become a profitable part of this new massive communication means.

One way to identify innovative solutions to enhance the user's experience when it comes to navigation, exploration, and finding information, services, or applications the user is seeking is by providing a usable Website. A Website is usable when it enables the best possible human performance. To ensure the best possible outcome, designers should consider a full range of user interface issues (Kojani, Bailey, & Nall, 2004).

To attract and retain citizens, electronic government Website designers should acknowledge that culture plays a key role when it comes to user acceptance. The user interface development process focuses on understanding users and their individual differences. These differences result from *inter alia*—differences in cultures.

Until recently, the phenomenon of culture has been the subject mainly of sociology and management theory, as well as language teaching methodology. Much less work has been dedicated

so far to intercultural research in other fields of the social sciences; notably, in information and knowledge theory (Steinwachs, 1999). Unfortunately, the impact that culture and cultural dimensions have on the developmental and post-developmental procedures of Web design have been vaguely analyzed (Inseong, Boreum, Jinwoo, & Se-Joon, 2007).

The purpose for this chapter is to provide a theoretical background that will help integrate culture and cultural dimensions to research models for technology acceptance and usability evaluation. Also, it aims to present the more recognized and widely used theories, such as Geert Hofstede's (2005) cultural dimensions, Aaron Marcus' and Emilie Gould's (2001) cultural dimensions and Global Web user interface design, as well as Jacob Nielsen's (1990) research for designing user interfaces for international use.

The scope will be on the integration of these theories in the evaluation of electronic government Websites and the assessment of the way communication is directed towards the citizens. Thus, the main concern is on identifying the way culture influences adoption and use of electronic government Websites among its citizens, being citizens from a particular nation, and/or international citizens. Another objective is to examine cultural barriers and enablers, which have impeded or facilitated the implementation of electronic government initiatives from selected nations.

BACKGROUND

Defining Human-Computer Interaction (HCI)

There is currently no agreed upon definition of the range of topics which form the area of human-computer interaction. Yet, there is a need for a characterization of the field. Therefore, the ACM

(Association for Computing Machinery) offers a working definition:

"Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of a major phenomenon surrounding them." (Hewett et al., 2007)

HCI is basically an interdisciplinary area. It is emerging as a specialty concern with several disciplines, each with different emphases—computer science (application design and engineering of human interfaces), psychology (the application of theories of cognitive processes and the empirical analysis of user behavior), sociology and anthropology (interactions between technology, work, and organization) (ACM SIGCHI, 2008).

To provide a further rough characterization of human-computer interaction as a field, the ACM provides also a list some of its special concerns. Human-Computer Interaction is concerned with the joint performance of tasks by humans and machines; the structure of communication between human and machine; human capabilities to use machines (including the learnability of interfaces); algorithms and programming of the interface itself; engineering concerns that arise in designing and building interfaces; the process of specification, design, and implementation of interfaces; and design trade-offs. Human-Computer Interaction thus has science, engineering, and design aspects (Hewett et al., 2007).

Defining Usability

There are different definitions of usability. We will use the one from ISO 9241-11 (ISO/IEC, 1998e): *"The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."* This definition is used also in the standard ISO 13407 (ISO/IEC,

1999e) and represents a wide scope of usability, emphasizing how the usability of a product relates to its context of use. Jakob Nielsen (1993), gives a narrower definition for usability: “*learnability, efficiency, errors, remembering, satisfaction.*” ISO 9126 (ISO/IEC, 2000b) defines usability as consisting of understandability, learnability, operability, and attractiveness.

Barber and Badre (2001) refer to the merging of culture and usability as “culturability” when cultural elements are considered in Website design and are expected to directly affect the way a user interacts with the site.

Usability can be measured; regularly, these metrics are expressed as a percentage. Nevertheless, usability cannot be directly measured, but must be quantified by means of indirect measures or attributes such as, for example, the number of reported problems with ease-of-use of a system or the user satisfaction metrics.

Defining Culture

In an attempt to present a basic framework from the different disciplines that have contributed to the enrichment of Human Computer Interaction literacy, definitions of culture will be provided from the following areas.

Anthropology

One of the most widely used definitions in anthropology is the one that claims that culture should be understood as socially shared information coded in symbols and, according to Toomela (2003), culture can be studied as the epidemiology of representations or symbols. National culture is another form of culture that refers to the members of one group or category of people. Typically, national culture represents a group of individuals who constitute a state or nation that has physical borders. Hofstede’s operating definition is “*The collective programming of the mind that distinguishes one group or category of people from another*” (Hofstede & McCrae, 2004, p. 58). This stresses that national culture is a collective, not individual, attribute; not directly visible, but manifested in behaviors; and common to some, but not all, people. Culture as such is difficult to capture. It becomes visible by the way in which people judge certain behaviors and acts in certain situations. In Hofstede’s (1994) broader view, culture is seen as patterns of thinking, feeling, and acting. He visualized the position of culture in Figure 1.

In Hofstede’s conceptualization, culture straddles the gap between the universal commonalities

Figure 1. Three levels of uniqueness in human mental programming. ©1991 Geert Hofstede BV. Used with permission.

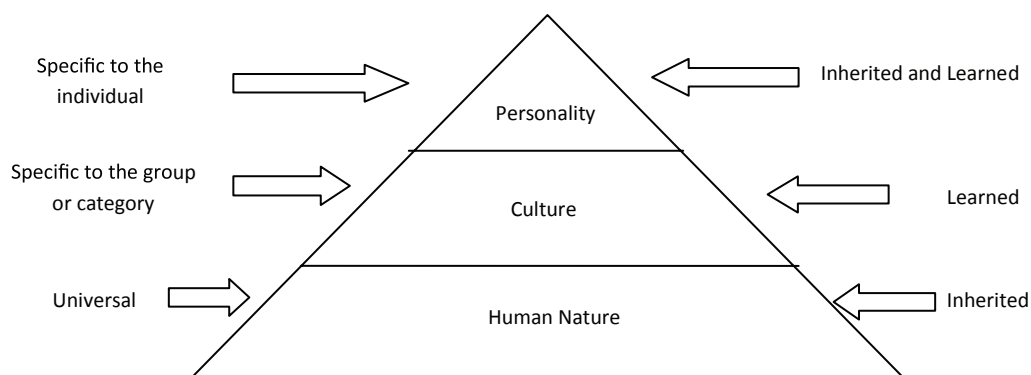
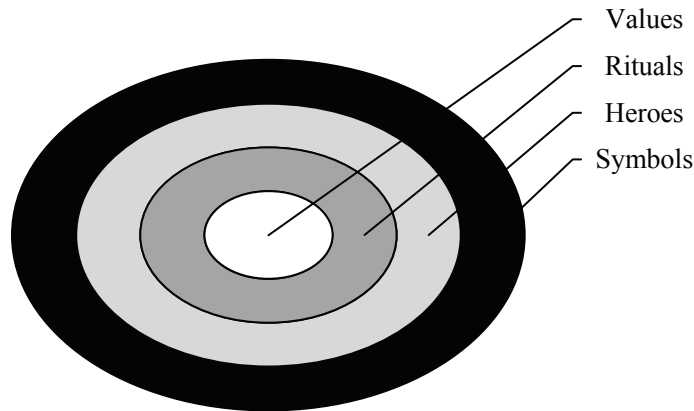


Figure 2. Hofstede's Onion Diagram. ©1991 Geert Hofstede BV. Used with permission.



among all humans and the specific idiosyncrasies that people display in their personalities.

Hofstede used an onion diagram to illustrate his view of culture as a many-layered concept. At the heart of everything he places Values. Values are defined as broad tendencies to prefer certain states to others among dichotomies such as ugly-beautiful, dirty-clean, unnatural-natural, abnormal-normal, paradoxical-logical, irrational-rational, etc. The next layer is labeled Rituals, which stand for collective activities such as greetings, paying respect, social/religious ceremonies, etc. Beyond Rituals is the layer labeled Heroes, which refers to persons alive or dead, real or imaginary, who possesses characteristics prized in the respective culture. According to Hofstede (1991), the cultural purpose of heroes is to provide models for behavior. The final and outermost layer is labeled Symbols. It is in this layer that Hofstede places words (language), gestures, pictures, objects, clothing, hairstyles or other superficial (in his estimation) expressions of culture.

National Cultural Dimensions

In order to provide a broader understanding about the national cultural dimensions provided by Hofstede (1994), we will present an explanation of the dimensions and some insights about how they are identified.

Power. Hofstede named this *Power Distance (PD or PDI)*. It is the extent to which less powerful members expect and accept unequal power distribution. High PD cultures usually have centralized, top-down control. Low power distance implies greater equality and empowerment. “The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally” (p. 28).

Self. Hofstede named this *Individualism versus Collectivism (ID or IDV)*. In an individual environment, the individual person and his/her rights are more important than the groups, who they

may belong. In a collective environment, people are born into a strong extended family or tribal communities, and these loyalties are paramount. *Individualism versus collectivism*: ranges from “societies in which the ties between individuals are loose” to “societies in which people from birth onwards are integrated into strong, cohesive in-groups” (p. 51).

Predictability. Hofstede named this *Uncertainty Avoidance (UA or UAI)*. It defines the extent to which a culture values predictability. UA cultures have strong traditions and rituals, and tend toward formal, bureaucratic structures and rules. *Uncertainty avoidance*: “the extent to which the members of a culture feel threatened by uncertain or unknown situations” (p. 113)

Gender. Hofstede named this *Masculinity versus Femininity (MAS)*. It focuses on the degree to which “traditional” gender roles are assigned in a culture; i.e., men are considered aggressive and competitive, while women are expected to be gentler and be concerned with home and family. *Masculinity versus femininity*: ranges from “societies in which social gender roles are clearly distinct” to “societies in which social gender roles overlap” (p. 82).

Time. Hofstede named this *Long-versus Short-term Orientation (LTO)*. It is the cultural trait that focuses on the extent the group invests for the future, is persevering, and is patient in waiting for results. *Confucian dynamism*: ranges from long-term orientation to short-term orientation (p. 166).

Sociology

Culture is understood in a sociologist’s view to be a shared set of beliefs that influence what is considered meaningful and valuable (Weber, 1947). Culture consists of shared behaviors, practices,

values, and beliefs of a collective people and the collective’s shared symbolic representations (Triandis, 1996). As such, values are important symbolic elements that define a culture and distinguish one culture from other cultures (Kroeber & Parsons, 1958; Triandis, 1995).

Psychology

Kroeber and Kluckhohn (1963) defined culture as patterns of and for behavior acquired and transmitted by symbols, constituting the distinct achievements of human groups, including their embodiments in artifacts. Geertz (1975) defined culture as shared symbol systems transcending individuals.

Hutchins (1995) argues that cognition is a cultural process. The purpose of this process is adaptative problem-solving or the processing and manipulation of symbolic structures within a context of frequently occurring problems. The resulting deliverables of this process are products, those artifacts often referred to as cultural objects. These products may be words or grammar, texts, pictures, or images. Their importance lies not in themselves, but as evidence of the cultural cognition process that produced them. In other words, they are signposts indicating areas of socio-cultural cognitive activity. (Hutchins, 1995, p. 49)

As presented above, a common element of the definition for culture is the identification and use of symbols and symbolic representations within the cultures. An in-depth discussion about the role of symbols—and its different representations within graphic manifestations of culture—will be held in the Website design section.

Interaction between Culture and Technology

Culture has been conceptualized, depending upon the use given from each specific discipline. Broad definitions have been developed, based precisely

upon the context and rationalization behind the scope of the research intention. Among the terms related to the influence, use or relationship among culture and technology include the following.

Scientific or Technological Culture

The term “scientific culture” has been viewed as an asset for economic development. In the United States and the United Kingdom, the usual term is *public understanding of science*, but the term *scientific literacy* is often used, also. In Canada, government documents prefer the term *public awareness*. In documents printed by the governments of the European Union, France, and Quebec, the notion has been extended to firms and innovation, such that the term has become *culture scientifique, technologique, et industrielle*. And finally, the definition of scientific and technological culture is “*The expression of all the modes through which individuals and society appropriate science and technology.*” (Godin & Gingras, 2000, pp. 43-44)

The internet can also be described as culture. In *Cultures of Internet*, Shields (1996) describes its main features as: The Internet is supposed to be *the* ultimate democratic, egalitarian, freedom of speech culture. Therefore, the Internet provides the perfect frame for governments from all over the world and also citizens from all over the world to converge into a unique, global, versatile, and convenient interface that is a Web page.

Information Systems

Over the past decade there has been increasing interest in Information Systems (IS) research literature in the impact of cultural differences on the development and use of information and communication technologies. Since many companies are now doing business beyond the national boundaries—and these global activities are facilitated and supported to a large extent by current

communications and information technologies—it is important to understand the impact of cultural differences on these activities (Ives & Jarvenpaa, 1991; Shore & Venkatachalam, 1995).

Raman and Watson (1994) state that information systems should be sensitive to culture. Also, as online information dissemination and electronic commerce transactions become globally popular, understanding the cultural aspects of Website documents will gain critical importance. Hidden cultural dimensions could facilitate or inhibit the usability and communication effectiveness of Websites. However, few studies have investigated the existence of cultural dimensions in Websites (Zahedi, Van Pelt, & Srite, 2006).

To the members of a culture, the symbols, heroes, and rituals of another culture can be incomprehensible or understood in different ways. For the scope of design, there must be a concentration on human interaction; in other words, an individual’s interpretation of written or spoken communication or a given situation, influenced by the cultural experience of the individual. Content is at the heart of the Information System; it is existing knowledge or data which become information in the information process. Culture can be expected to have an influence on the production of knowledge in many respects, as stated by Katarina Steinwachs (1999).

Website Design

Effective Web design engages and attracts users. A Web interface is very different from a conventional one. The Web is a domain that must be instantly usable and support many communication modalities.

As the Web became an increasingly essential interface, usability research began to focus more specifically on extending the basic usability principles into the Web environment. Nielsen (2000) extended these design principles for Web design to include: (1) navigation, (2) response, (3) cred-

ibility, and (4) content. After identifying some of the common features or sections (conventions) that appear on Websites, they are defined as:

- **Navigation:** The graphic structure that allows users to go back and forth within the web page. Also, a guideline that prevents the user from getting lost or to lose track of the paths he or she followed to get through certain information on the web page. Once designers have an idea of the architecture and organization, they will be ready to think about the overall design of the navigation.
- **Design:** This dimension is related to the general appearance and look of the Website. Colors, images, fonts, and typography are usually considered within this category.
- **Content:** The tone and information contained in the Website. The organization, structure, and type are important elements to consider.
- **Layout:** The common structure of a Website. It includes orientation, width, density, and the general architecture the Website displays on a browser.

It is critical that the accomplishment of the users' goals be the primary objective of a usability evaluation of Website interface design. Users will not be able to access correct pages unless the constructed site reflects their needs and contains a navigation scheme that allows easy access to the desired information (Nielsen, 2000). In Web interface designs, the properties of color, sound, navigation, and placement must be considered from a different perspective than those used with conventional interfaces. This acquires special meaning when the designers phase the task of developing Websites that aim to reach international users. Jakob Nielsen defines international user interfaces as *"those which are intended for use in more than one country. De-*

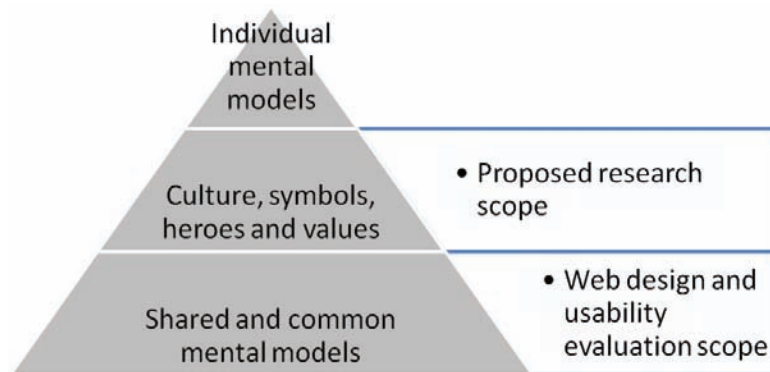
signing international user interfaces may or may not involve translation, but it should certainly involve consideration of the special needs of other countries and cultures" (1990, p.v).

Another important consideration is the need for Website designers to have a deeper understanding and insight about the cultural signifiers of Website contents in order to design effective Websites. Like Zahedi, Van Pelt and Srite (2006) claim semiology must be used to identify cultural signifiers of Website documents. In semiology, signs have different components: signifier, signified, and signification (Ducrot & Todorov, 1979). Signifier constitutes observable aspects, signified is the hidden aspect, and signification is the recurrent observed relationship between a signifier and a signified. To accomplish this, semiology will play an important role by providing an interpretive approach to identify cultural signifiers, signifieds, and significations in Website images.

ISSUES, CONTROVERSIES, PROBLEMS

Among the most challenging situations for the web designer, as well as the researcher interested in evaluate user interfaces by considering national cultural dimensions, would be to integrate and compare those dimensions with the established Website usability evaluation tools. This is how users recognize and analyze cultural symbols, heroes and values embedded within the Websites that reflect national identity and dimensions. Also, there is the need to understand how cultural symbols, heroes, rituals, values, and the symbolic order of cultures are related to symbols used in graphic design. And, as defined before, there is the role of cognition and culture, and how they are related to the graphic part of web page design.

Figure 3. Scope and limitations from Web design and usability evaluation



Also important is to understand the main similarities and differences between the electronic government Websites from different countries, since this will provide a framework to start identifying those differences and the extent to which those differences are related to national cultural dimensions.

For this analysis, one of the main assumptions is that some common, conventional, or universal attributes can be identified, and, most of the time, should be included in every Website. Taking into consideration the proposed diagram of culture from Hofstede (1991), the proposed diagram shows the limitations and scope from Web design and usability evaluation. These conventions are clearly identified and have been used throughout time. Therefore, the identification of culture, symbols, heroes, and values shared that reflect the countries' specific characteristics and attributes should be addressed in further usability analyses.

SOLUTIONS AND RECOMMENDATIONS

In order to provide an introductory and exploratory explanation about how to address some of the issues identified, we will start by describing

and comparing the classification obtained from Robins and Stylianou (2003), who developed a conceptual model that differentiates Website content from design. Next, we will proceed to identify which content features are related to the electronic government Websites to provide a framework for what is proposed in this chapter to be the similarities between Websites, or what Nielsen (date) defined as "conventions."

For the purposes of their analysis, Robins and Stylianou (2003) revise several corporate Websites. They claim that companies wanting a multinational Internet presence must design sites effective in a diverse and multi-cultural environment. Corporate Websites represent an organization's window into the Internet. If the Internet is having a homogenizing effect, this should be evidenced in corporate Web pages when examining content and design features.

After careful consideration and some discussion among scholars from the MIS (Management and Information) discipline, Electronic Government Websites will be described and operationalized as corporate Websites, with only some very specific differences. In order to address this issue, an analysis of the first 20 countries' Websites that have been ranked by the United Nations Electronic Government Readiness year 2008 has been

Exhibit A.

1. Sweden	8. Australia	15. Finland
2. Denmark	9. France	16. Austria
3. Norway	10. United Kingdom	17. Israel
4. United States	11. Japan	18. New Zealand
5. Netherlands	12. Switzerland	19. Ireland
6. Republic of Korea	13. Estonia	20. Spain
7. Canada	14. Luxembourg	

Table 1. Electronic government Websites conventions. Source: The author

Conventions	Type of information	Sections
Content	Government information	Biographical information about: The regulations The authorities The president The political parties
	History	Country's history Parties history
	Communication	Message from the president National Development Plan Project (Mission/Vision) Citizen support Directory Contact us Frequently Asked Questions Most visited and consulted sections and services Forums and chats Communication in other languages
Design	Presentation	Consistency Animations Frames Graphics Colors Figures Symbols Heroes
Navigation	Traffic	Hyperlinks Protected contents Search engines Site map/index
Layout	Overall structure	Consistency Structure Menus Alignment

conducted in order to identify the conventions, commonalities, or universal features that every Electronic Government Website should include. These countries are in Exhibit A.

After conducting the revision, and taking in account that the most representative sections of Websites are content, design, and navigation, the analysis was conducted. Also, the layout section was included, since some differences were identified across the sample. Table 1 describes the conventions, type of information, and sections that have been identified as more common, conventional, or universal across Electronic Government Websites.

So, as can be observed from the table, aside some very specific content differences, when it comes to analyzing the structure and design of a Website, one can look at some of the standardized conventions that exist. The differences are then related to the significance and meanings that some of the structural as well as the content features of a Website have between cultural dimensions.

The user-interface development process focuses attention on understanding users and acknowledging demographic diversity. But, in a global economy, these differences may reflect world-wide cultures. Companies that want to achieve international business on the web should consider the impact of culture on the understanding and use of Web-based communication, content, and tools.

Therefore, in order to address the need for a better understanding about the influence that culture has on Web design, the work by Aaron Marcus and Emilie Gould (2001) will be presented. They are the most notable researchers who have addressed the issue of how national cultural dimensions affect Web design. Using previous research by Geert Hofstede (1991), they completed an exploratory analysis of the main design aspects that could be affected by these dimensions. Marcus and Gould analyzed a different set of Websites that included:

1. The Universiti Utara Malaysia (www.uum.edu.my)
2. *The Ichthus Hogeschool* (www.ichthus-rdam.nl)
3. *The Technische Universiteit Eindhoven* (www.tue.nl) are located in the Netherlands
4. The Glacier Bay National Park Website (www.nps.gov/glba/evc.htm) located in the USA
5. The Website from the National Parks of Costa Rica (www.tourismcostarica.com/)
6. The Woman.Excite Website (woman.excite.co.jp) located in Japan
7. The Excite Website (www.excite.com.se) from Sweden
8. The Sabena Airlines Website (www.sabena.com) located in Belgium
9. The British Airways Website (www.britis-hairways.com) from the United Kingdom
10. The Siemens Website (www.siemens.co.de) from Germany

For our analysis, the propositions from Marcus and Gould will be classified within the context of Web design and usability evaluation.

Marcus and Gould (2001) believed power distance may influence the following aspects of user-interface and Web design. The aspects are as follows.

After reviewing these proposed aspects of Web design and the Websites that have been assessed, it is notable the lack of inclusion of any governmental Website. There are two national parks Websites assessed and revised, but no specific federal or governmental Websites that have been assessed. Also, by reviewing some literature related to the use of culture when analyzing Electronic Government Websites, the need to conduct more in depth analysis was identified. Therefore, in order to provide a preliminary framework, a matrix of possible correlations among the national dimensions and the Website features is shown in Table 2.

Table 2. Correlation matrix. Source: The author.

Website elements	National Cultural Dimensions	PDI	UAI	I/C	F/M
Layout	Website Structure	*	*		
	Alignment		*		
	Consistency		*		
	Flexibility	*	*		
	Density				
	Hierarchies	*	*		
Navigation	You are here indicator		*		
	List of contents	*	*		
	Consistency		*		
	Clarity of function		*		
	Use of site maps		*		
	Use of glossaries		*		
Design	Human Images	*		*	*
	Non-human images	*		*	*
	Colors	*	*	*	*
	Graphics and tables		*		*
	Familiarity		*		
Content	Information organization and structure	*	*	*	*
	Information clarity		*		
	Hierarchy of information	*	*		
	Use of headings	*	*		
	Grouping of elements	*	*	*	
	Amount of displayed information	*	*		
	Consistency of important information		*		
	Audiences reached	*	*	*	
	Tone and voice of content	*	*	*	*

Also, a set of propositions were identified after developing the matrix. The propositions include the following.

- Structure of the Website/layout
 - a. The structure of the Website can be directly associated with the identification of the country's power distance index.
 - b. The more structured the Website, the bigger power distance among the government and its citizens.
 - c. The less structured the Website, the smaller power distance among the government and its citizens.
 - d. The structure of the Website can be directly associated with the identification of the country's uncertainty avoidance index.
 - e. The more structured the Website, the bigger uncertainty avoidance of the country.
 - f. The less structured the Website, the smaller uncertainty avoidance of the country.
 - g. The structure of the Website can be directly associated with the identification of the country's femininity or masculinity.
 - h. The more structured the Website, the more masculine the country is perceived.
 - i. The less structured the Website, the more feminine the country is perceived.
- Design of the Website
 - a. The color on the web page can be directly associated with the identification of the country's masculinity or femininity.
 - b. Black and solid colors are directly related to masculinity (blue, red, gray, etc.).
 - c. Pink and bright (pastel) degraded colors are directly related to femininity.
 - d. The color on the web page can be directly associated with the identification of the country's individualist or collectivist character.
 - e. The color on the web page can be directly associated with the identification of the country's UAI.
 - f. The color on the web page can be directly associated with the identification of the country's PDI.
 - g. Black and solid colors are directly related to a higher PDI (blue, red, yellow, gold).
 - h. Pink and bright (pastel) degraded colors are directly related to a lower PDI.
- a. (Hofstede, 2005)The images on the web page can be directly associated with the identification of the country's masculinity or femininity.
- b. Big and tall solid non human images are related to the higher masculine cultures.
- c. The more images of people in formal attires, formal attitudes and men, the more masculine the culture.
- d. Cartoons, natural environments and landscapes are more related to feminine cultures.
- e. The more images of babies, communities, and women, the more feminine the culture.
- f. The images on the web page can be directly associated with the identification of the country's PDI.
- g. The bigger and taller the non human images, the bigger the PDI.
- h. The more figures of authorities, national identifications and flags, the more PDI.

- i. The images on the web page can be directly associated with the identification of the country's collectivity or individuality.
- j. The more groups of people sharing activities, aiming at the same purpose, or walking together, the more collectivist the culture.
- Content
 - a. The information organization and structure can be directly related to PDI, UAI, F/M.
 - b. The more structured and organized the information, the more PDI and UAI.
 - c. The more structured and organized the information, the more masculine.
 - d. The information clarity and consistency of the information can be related to UAI.
 - e. The more clear and consistent the information, the more UA.
 - f. The hierarchy and use of headings can be directly related to PDI and UAI.
 - g. The more hierarchies and use of headings in the content, the more PDI and UA.
 - h. The grouping of information elements can be directly related to PDI, UAI, I/C.
 - i. The more grouped and condensed the information, the more PDI and UA.
 - j. The more grouped and condensed the information, the more collectivism.
 - k. The amount of displayed information can be directly related to PDI, UAI.
 - l. The less information displayed, the higher the PDI and UA.
 - m. The information structure can be directly related to UAI and PDI.
 - n. More information provided on the Website, more uncertainty avoidance.
 - o. Less information provided, less uncertainty avoidance.
 - p. The more the information provided, the less the power distance.
 - q. The more the white areas, the more the power distance.
- Navigation
 - a. The more hierarchies on the Website, the more power distance.
 - b. The more levels on the Website, the more power distance.
 - c. The more hierarchies on the Website, the more uncertainty avoidance.
 - d. The more levels on the Website, the more uncertainty avoidance.

FUTURE TRENDS

In the future, what will be necessary is to fill the void that exists in the current empirical research agenda to address the cultural influence on Websites design. It is specifically important for the evaluation of electronic government Websites, since given that an organization's Website is the actual medium used by a government to communicate externally with the general public, Website appearance is included as a dimension of the organization's culture. The information found in Websites enables one to unmask important differences and similarities in corporate culture across industries and geopolitical boundaries (Overbeeke & Snizek, 2005).

It will become more important as well, since the World Wide Web is a creation of technology developed primarily in the U.S. and Europe and tends to exemplify the values and norms of these advanced industrial countries. Website design has been primarily influenced by Western culture because this is where the majority of the sites are developed and users are clustered. These conventions are changing as the Internet penetrates regions—particularly in Europe, Asia, and Latin America—and there are already been some reactions from new users in these areas

to the current Western based Websites yet to be determined (Steven, 2001). Therefore, it will become necessary for future designers and web developers to take into consideration these cultural differences in the way Websites are constructed and the targets are selected.

According to International Data Corporation, currently 60 percent of the Web population resides outside the USA and is expected to generate about half of the global e-commerce spending. Internet users surpassed 1 billion in 2005 across the world—up from 45 million in 1995 and 420 million in 2000. By 2011 it is expected there will be 2 billion Internet users. Internet user penetration is now in the 65% to 75% range for the leading developed countries with a predicted slowdown in growth. Developing countries have penetration rate in the 10 to 20% range, which is expected to grow rapidly in the future (Computer Industries Almanac, 2006).

It is predicted that only one-third of the Web users speak English as their first language. Hence, website designers need to have deeper understanding and insight about cultural signifiers of website contents in order to design effective websites that will be successfully used by web visitors.

CONCLUSION

Users should be considered throughout the website design process. Usability should not be an afterthought. Testing and fixing a website after it has been built is inefficient and unlikely to produce good results. The best approach to take is to incorporate a model of “pervasive usability” or user-centered into the design and production processes.

For the purpose of this project, several papers were revised and analyzed. Most of the bibliography consulted revealed that the scope of Web design and usability evaluation has been primarily focused on the assessment of Electronic Com-

merce and Corporative/Organizational Websites. Only a few articles directly focused their scope on the particular characteristics of Electronic Government Websites. Among the more noticeable documents, the one by Zlatko J Kovačić (2005) was revised. In his article, the author stated implications between Electronic Government readiness levels and cultural variables exist. He conducted a statistical analysis by using the 2003 E-Readiness Rankings published by the United Nations and compared these rankings with the ones proposed by Hofstede in 2004. Kovačić conducted regression analysis to determine if there were any correlations among the two different sets of values, and he found some interesting relationships. He was able to identify that among four cultural dimensions *Individualism* and *Power Distance* are the only statistically significant variables that could be used to explain differences in the level of E-Government readiness. These results, of course, could give directions towards future analysis that can be achieved when conducting examinations of cultural dimensions and Electronic Government. Kovačić's study has implications both for practice and theory. It shows that cultural variables are relevant to the worldwide E-Government readiness.

The aim of this project is to provide a framework that will help assess the relationship between actual Website features and National Dimensions. Stress has been given to Websites and specifically Governmental Websites, since the main proposition for this analysis is that a Website is a means of communication, has a global scope, and can reach audiences from all over the world, and that federal governments have spent considerable amounts of resources in an attempt to send a message through this medium. This message is directed to a varied and diverse set of users, but the message conveyed should reflect the country or nation's set of values, heroes, symbols, and rituals that are part of its culture.

As stated before, in order to determine these

proposals, either the positivist or interpretive approach was considered. Unfortunately, a lack of more scientific treatment to the claims proposed by Aaron Marcus and Emilie Gould (2001) was also identified.

In addition to the more positivistic approach, there is a need to evaluate governmental Websites by using cultural dimensions, especially since these Websites would be the ideal unit of analysis. They should function as a display for these particular cultural differences or similarities among countries or clusters of countries.

Finally, it is also important to understand there will be bias that comes from Web designers; their own nationalities, values, symbols, and culture will have an influence on the way the Website is constructed. It is of particular interest to understand the process behind the governmental Website development, and the strategic planning and thinking behind each effort that a government makes. Also, it is necessary to understand if the user (citizen) was considered as part of the construction of the Electronic Government agenda.

In conclusion, there is evidence that states that a good design process must always include the user, in the case of electronic government Websites, the citizen.

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Chapter IX

E–Government: Good Deliverance through Effective Performance Management

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ABSTRACT

Successful implementation of e-government programs, policies, and effective service delivery to citizens is faced with many obstacles related to operations, technology, and human resource management, amongst others. The changes brought about due to introduction of Information and Communication Technology require changed work patterns, work styles, and overall management of performance. In this context, five key issues have been identified. These are identification of new performance measures, creating an environment for innovation, teamwork, fostering employee empowerment, and developing new competencies. A theoretical framework for performance management in e-government departments and agencies is proposed. A model for delivering improved service to citizens has also been developed.

INTRODUCTION

E-governance is a form of e-business in governance and refers to the processes and structures pertinent to the delivery of electronic services to the citizens and businesses, collaborating with business partners and conducting electronic transactions within an organizational entity (Backus 2001) by e-government. E-governance promises full service available 24 hours a day, seven days a week; greater accessibility; capability to obtain government services without visiting government

offices; and reduced service cost. The services include those related to taxation, infrastructure, regulatory services (licenses etc.), social security, health care, defense, foreign trade and so on.

Use of Information and Communication Technology (ICT) requires new styles of leadership, inclusion of new dimensions in deciding policies and investment, new ways of accessing tasks, new ways of interacting with public and new ways of organizing and delivering information and services.

In this context Good Deliverance may be understood as delivery of services by e-government that are satisfactory to users in respect of quality, quantity and timeliness, efficiency, effectiveness, ease of access and cost (of providing and using the service). This also means that e-governance needs to be citizen-centric. Appropriate skills and competencies need to be developed in employees to make good deliverance a reality.

In spite of world-wide diffusion of e-government initiatives, getting the claimed benefits of e-governance has not been easy for various technological as well as organizational reasons in both developed and developing countries (Pacific Council on International Policy, 2002; Strejeek & Theil, 2002; Holliday, 2002; Wescott, 2001).

E-governance is an ambitious plan and huge resources have been allocated towards it. The concept is still in nascent stage and hence a lot remains to be done in (1) designing effective policies (2) successful implementation of policies. Government of India allocated US \$ 4.92 billion in the tenth five year plan (2002-07) for implementation of e-government (www.egovonline.net). Every government department is expected to invest 2% of its budget on e-government (www.mit.gov.in). National e-Governance Plan (NeGP) was commenced in May, 2006 in order to expand e-government initiatives in India with the objective of making all government services accessible through integrated service delivery mechanism ensuring effectiveness, efficiency, cost reduction and transparency. The whole work has been split up into various Mission Mode Projects.

The objective of efficient public service delivery has not yet been successfully met by e-government (Misra, 2006), in spite of all the efforts. This is due to various reasons. There is a lack of coordination among the various departments of the Union government with each other and with the states (Sebastian, 2008). Capacity building is an integral component of NeGP, which requires State Governments to build capacity in terms of

human resources, tools and processes. Certain gaps have been identified in building capacity (Narayanamurthy, n.d.). These include

- Lack of personnel with appropriate background and aptitude
- Inadequate skill sets of personnel already deployed
- Inadequate expertise and skills within the state training institutions to lead training programme for policy makers

Resolution of the employee related issues are the key to successful e-delivery. Cultural change can result from innovative approaches to all Human Resource Management (HRM) functions in an integrated and strategic programme. Thus strategic HRM has a major role to play in ensuring that a corporate culture conducive to the achievement of overall strategic objectives is developed and maintained (Schuler and Jackson, 1999).

This chapter deals with one of the important aspects of HRM, i.e., performance management. Effective performance management is essential for good deliverance of services by e-government employees. The objectives of this chapter are to

- identify the reasons for non-achievement of efficient service delivery
- identify the key issues that need to be addressed for effectiveness in e-governance (and hence effectiveness in service delivery)
- identify the need for a new framework of performance management in e-government
- propose a theoretical framework of performance management in e-government
- evolve a model for effective service delivery in e-governance

BACKGROUND

Emphasis upon service quality or responsiveness to clients in government organizations increased with the beginning of 'New Public Management' (NPM) in many developed nations in 1990s (Hughes, 2003; Saxena, 1996). NPM emphasizes professional management practices including service quality, performance management and risk management (Leeuw, 1996).

It has been found that the overall progress of NeGP has been less than anticipated rate. Geetika and Pandey (2007) identify some of the obstacles as (1) requirement for ground changes in legal, procedural, institutional etc (2) lack of deadlines for various projects of NeGP (3) lack of coordination between government agencies for capacity building. If efforts are not made to change the situation, effective deliverance may merely remain a dream for e-government. Many areas of concerns need to be addressed that are affecting the performance of e-governance in the service delivery. Among others, prominent areas are inadequacy of functional capabilities, lack of citizen centric approach, inadequate capacity of delivery system to deliver and so on. These problems may be due to entire focus being on computerization and automation using Information Technology (IT) (Gupta, 2006). The studies reflect that for successful e-governance project implementation, government process change and organizational development (cultural and behavioural change) are very important (ISS, 2006). It has been observed that most implementation projects focus on concerns of service delivery (Scholl, 2005) and efficiency (Andersen & Henriksen, 2005). There is still little emphasis on real transformation on the services themselves or the processes associated with the service delivery (Anderson, 2004).

The issues mentioned above seem to be symptoms of problem, rather than problem itself. In view of these deficiencies in operations and processes of e-government, the first logical step

would be to identify the root cause of the problem, which seems to be poor performance management. A government agency may not find it easy to change its old culture, structure and mode of operations. In this regard private sector may set a lead for government sector. The emphasis on top-level involvement, strategic focus, delivery, communication and performance management can empower governments to achieve transformations similar to those in high-performance businesses (McPherson & Ehrig, 2006).

Performance management systems in government organizations suffer from many drawbacks. Following are some of the findings of a study (Baburajan, 2008):

- Mechanical and numbers-focused implementation styles of performance management prevent performance improvement.
- Non-utilization or under-utilization of data collected on performance in providing insight and taking prompt actionable decisions, resulting into skill gap.
- The absence of an organized strategy creates confusion among the employees.
- The performance data of many organizations are fabricated. The study found that approximately 68 percent of organizations have fabricated their performance reports, so they failed to provide valuable inputs into the decision-making process and resulted in the failure of the system to gain public accountability and trust.

It is essential to inculcate institution-wide performance management efforts in order to change the orientation of all those who are involved in this gigantic project of implementation of e-governance. The way that people had been performing or were expected to perform requires to be changed. One of the probable reasons for the problems may be the failure to establish, understand accept new performance norms. According to Labig & Chye (1996) one major problem with

current appraisal systems is an inability to translate organizational goals into appropriate goals for jobs and individuals and solutions to these appraisal problems include: 1) modification of the appraisal format either by adding or deleting performance categories, quantifying performance standards (2) training of appraisers

Emphasis may be laid upon the following (E-governance Strategy, n.d.):

- the identification of ICT competencies that would facilitate effective functioning of employees in IT enabled working environment;
- the implementation of training and development programmes to enable employees to deliver e-services effectively and efficiently;
- monitoring and review of personal development processes and implementation of personal development plans;

The Performance Management Practices Survey Report of 'Development Dimensions International (DDI)' indicated that performance management systems directly influenced key outcomes. When these performance management systems were flexible and linked to strategic goals, organizations were more likely to see improvements in critical areas of organizations. This analysis also showed that team objectives, non-manager training, appraiser accountability, and links to total quality management were the specific practices most strongly associated with positive outcomes.

Recent research (TMP Hudson Global Resources 2003), together with other industry evidence, suggests that many organizations and their senior managers still regard performance management merely as a ritual with no practical implications in overall functioning of the organization. Overall, there has been minimal recognition and understanding of the power of performance management practice. There is widespread agreement that success or failure in

performance management depends on at least four criteria (Compton, 2005):

- organizational philosophies,
- the attitudes and skills of those responsible for its implementation,
- acceptance, commitment and ownership of appraisers and appraisees (Lawler, 1967; Hedge & Teachout, 2000), and
- the endorsement of the notions of 'procedural fairness' (employees' perception of the program's overall process equity) and 'distributive justice' (perceptions of the fairness of associated rewards and recognition outcomes) (Gabris & Ihrke, 2000).

This suggests that effectiveness of a performance management system in bringing about desired changes and delivering positive outcomes depends upon the attitude of all the levels of management- top level (policy making), middle level (implementing), lower level (endorsing) towards it.

Change in Work Environment for E-Governance

Introduction of ICT in government organizations that were till now working in a bureaucratic set-up, characterized by highly routine operating tasks achieved through specialization, very formalized rule and regulations, centralized authority and decision making that follows the chain of command, amongst other features (Robbins 1999), mandates a major change in various aspects of organizational processes. Investment in technology will be wasted if employees do not radically change the way they approach the design of their work, business and delivery processes. This means that traditional styles of working and service delivery will have to cross boundaries. This implies that performance measures and indicators for e-governance would also be further different than those that existed in older structure. New knowledge-

based enterprises are characterized by flat structures and multi-skilled workforce, team work, generalist workforce rather than specialist and an emphasis on Total Quality Management. The main thrust of the performance of these workers is upon creation and/or application of knowledge. Such organizations need to continually update their knowledge base and may be categorized as learning organizations. Table 1 presents the aspects in which learning organizations need a change. Independent entrepreneurship and initiative is valued at all levels in such organizations. The role of managers expands to accommodate more leadership and coaching tasks. People related issues are one of the important aspects which need to be taken of. Government organizations need to take a proactive approach rather than a reactive approach in preparing their employees for e-governance. For example, Oil and Natural Gas Commission, a public sector unit, has started its efforts in leveraging IT and Telecom and the top management is already working on preparing a 10-year blue-print to have IT-ready people, besides other plans (India's 20 Most Wired, 2008).

For effective e-service delivery managers need to focus on operational and technological aspects. Other aspects that need to be addressed include:

- understand the full potential of the technologies available;
- understand what is required to be done and simplify processes;
- find new ways of presenting information to meet customer needs;
- design feedback mechanisms (from customers)
- get continuous feedback from superiors with the aim of improvement
- eliminate barriers to team work
- empower and enable employees to take decisions about his tasks
- achieving good coordination, not only inter-departmental, but also intra-departmental
- take responsibility for developing the e-skills and other desired competencies of employees
- learn to create demand for newly introduced system
- arrange resources for effective task performance

KEY ISSUES TO BE ADDRESSED

Organizational culture should be consistent with the revised e-business strategy and implementation plan (Shankar, 2001). It is the way in which people, within and outside business, understand the technology and transform their workplaces accordingly shall make a big difference in success or failure of business (Delargy, 2001). Customers (citizens) are also much more aware and demanding. Table 1 emphasizes that e-organizations (read e-government agencies) need to adopt new concepts in order to be successful in the changed work environment. They need to focus upon empowerment, teamwork, customer satisfaction and performance management, among other aspects. A survey of knowledge workers (Thakar, 2007) found that the performance appraisals and the training/skill development programmes need to be different for the knowledge workers. Training needs have to be more specific and need to be accompanied with empowerment. There is a shift from one time performance appraisal to a more holistic and continuous performance management system. Flow of information among employees, especially knowledge pertaining to the latest developments in their field was considered to be crucial. Control needs be replaced by empowerment; fear for technology must be replaced with desire to apply technology; fixed procedures need to be replaced by innovation and focus on individual may be replaced by teamwork. People with whom they would be interacting for official purposes would include IT consultants, vendors, suppliers, customers with new set of needs and

Table 1. Dimensions of change in a learning organization

From	To
Continual Change	Transformation
Quality Improvement	Process Engineering
Matrix	Network
Performance Appraisal	Performance Management
Fear of Technology	Application of Technology
Functions	Process
Control	Empowerment
Procedure centric	Customer centric
Focus on individual	Focus on team
Periodic feedback	Continuous feedback

(Adapted from Marquardt, MJ (2003): Building the Learning Organization: Mastering the 5 elements of Corporate Learning. Jaico Publishing House)

problems, and so on. Employees might now be exposed to Public Private Partnership for achieving accessibility, and efficiency. Employees need to be prepared as to how to deal with these requirements. These changes point to yet another aspect of performance, i.e., identification of new standards and measures of performance and a whole new set of competencies that go along with these changes in the internal and external work environment.

Burns and Stalker (1961) have pointed out that in situations of rapid change the organic organizational form is preferred, whereas in stable environments, a mechanistic organizational form is more appropriate. This transformation also requires considerable change in organizational culture and hence the mindset of people. Innovative capabilities of employees need to be developed and nurtured. This must be accompanied by employee empowerment, which can sustain itself only if supported with employee enablement. Emphasis upon teamwork also increases in e-organization which functions as a networked entity.

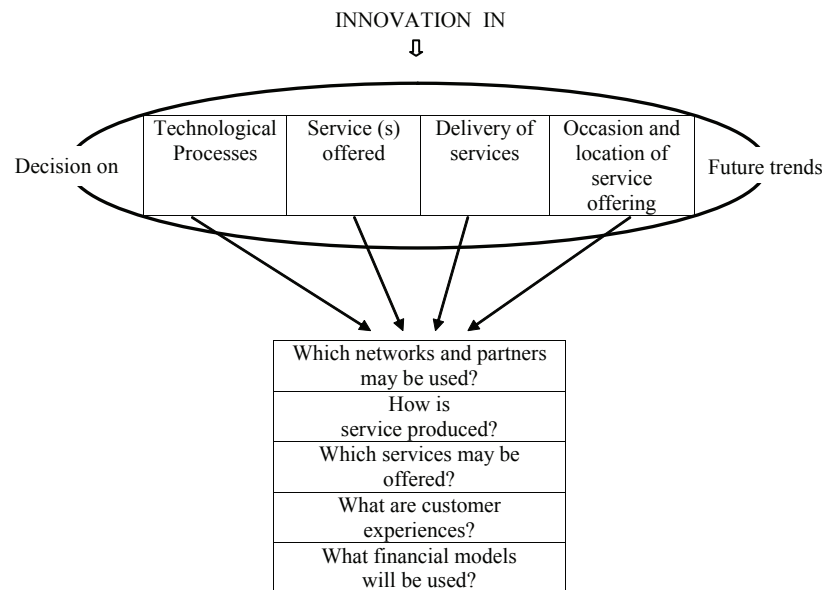
Thus, the key issues that emerge out are the need for innovation, teamwork, employee empowerment, identification of new competencies and identification of new performance metrics.

Innovation

Modern technologies bring in their wake changes in terms of services and business process design, new ways of working, the requirement and hence development of new skills, flexible approach to working patterns and practices and organizational structure.

As mentioned earlier, e-government agencies may be called learning organizations as they would be required to continually update their expertise and technologies and the workers would be knowledge workers. Therefore, just like knowledge-based organizations, e-government would also require innovation in almost every aspect of functioning, even performing routine tasks. Innovation is a process that includes the generation, development and implementation of new ideas

Figure 1. Pathways for innovation for service organisations (Based on: *The State of Innovation* (2008, April 20). *Business Today*, p.60)



or behaviours (Daft, 1978; Damanpour & Evan 1984). It is conceived as a means of changing an organization, either as a response to changes the external environment or as a pre-emptive action to influence the environment (Damanpour, 1996).

Innovation is a key driver of efficiency (Davenport, 1993). Through process innovations, companies have been able to drive down costs, reduce cycle time, and create tighter links to their customers and other business partners.

A model of pathways for innovation in service organization as presented in Figure 1 shows that there is a possibility for innovation in almost every process of service organization, ranging from choice of service, offerings and delivery to customer experience.

Employee Empowerment

Making a government agency a learning organization also makes it mandatory to decentralize

decision making process and replace control (a typical feature of a bureaucracy) by employee empowerment, where people are given freedom to practice what they have learnt to find solutions to problems in a novel way.

Nykodym, Simonetti, Nielsen & Welling (1994) define employee empowerment as 'a study of employee participation (empowerment) in promotion, evaluation, job content, technological change, work standards, financial policies, cost control, organization structure, workforce size, safety programs, work methods, and pricing'.

Wei, Wang & Lu (n.d.) have attempted to prove that standardized knowledge-intensive business services (KIBS) innovation organization with good performance is an innovative cooperation system with a high degree of self-management and a low degree of interdependence. Members are responsible for their own tasks and make decisions on their working styles and work flow themselves.

This implies that empowerment is an integral aspect of such knowledge organizations. Employee empowerment is one necessary prerequisite for sustaining the changed organizational culture. Empowerment is not just about delegating job authority to the job-holders. It means the authority to take decision about one's work in organization. Instead of the traditional bureaucracy, with its emphasis on control, standardization and obedience, empowerment can only thrive in the liberated surround of innovation, flexibility, commitment, zero defects and continuous improvement.

For empowerment it is essential that open and free communication takes place regarding important goals of the group. People must have access to information for decision making, Authority must be delegated and opportunities must be given to utilize their potential.

Microsoft Chief Executive Officer Bill Gates (1999) has emphasized the need to empower knowledge workers. He says "our goal is to help create an opportunity for companies to explore best practices and innovative ways of empowering these knowledge workers so they can be more productive and better serve their customers. When knowledge workers have no limits, entire organizations can stay one step ahead of the competition and provide benefit to their customers".

A study found that empowered teams tended to be more productive and render better customer service than less empowered teams. Empowered team members also tended to be more satisfied with their job, team and employer (Kirkman & Rosen, 1999). Policy makers in e-governance will have to search innovative ways of empowering employees that fit into e-government structure and functioning.

Simple empowerment is not sufficient. To get benefit of empowerment, employees need to be enabled and facilitated through proper training. Empowerment without enablement may create chaotic situation. The role of manager here must be that of a facilitator, not a fault-finder.

Teamwork

One of the basic tenets of e-governance is the way transactions, process and citizens are distributed allowing for the formation of teams that span along departments and regions. (Olson & Olson, 2000). This suggests that teams may play an important role in e-governance. Most government agencies operate as a network of various departments that are inextricably interconnected. Decisions made in one part of the network necessarily affect the activities and outcomes in other network areas (Whittaker, n.d.). Properly coordinated teams helps in effective decision making even at the lowest level. Employee-centric teams also promote empowerment.

In old bureaucratic style of functioning, due to lesser need and chances of involvement and working on a common project, people did not get the opportunity to work as a team. In ICT enabled organization, there is a need that people work as a team, with different persons playing specialized roles. Advantages of teamwork include improved quality, productivity and service, greater flexibility, faster response to technological changes and a better reaction to workers' values and increased employee commitment to the organization. Teamwork and collaboration have been viewed as key to making E-Government a reality (Clerk, 2001).

Prasad and Tata (2006) have proposed that team structures and team processes impact upon e-governance efficiencies and effectiveness. As service delivery e-governance system involves multidepartmental multi-level interaction, therefore each member should be encouraged to work in a team for effective problem solving (Gupta, 2006). Claims have been made that teams improve quality, customer service, productivity, and the bottom line (Sheridan, 1990), besides improved performance, increased creativity and commitment, higher quality of products, less absenteeism and reduced turnover (Donellon, 1993;

Harris, 1992). All these factors seem to contribute in better service delivery.

Identifying and Establishing New Performance Metrics

E-governance does not merely involve application of ICT in various processes and operations of government. It also involves bringing about a fundamental change as to how government operates and this implies a new set of responsibilities for the executives (Sharma & Palvia, 2004). This suggests that establishing new performance metrics (from which individual goals would be derived) is essential. The process of modernizing government sets new performance objectives for organizations, from the delivery of high quality services that meet the needs of their customers and stakeholders, to doing more within the constraints of available resources, through to continuous improvement in how the organization itself operates, where targets need to be flexible and reactive to change (Performance Management, n.d.).

These objectives must be made specific as specific goals increase performance (Latham & Yukl, 1975). According to Arora (2006) major reason for non-achievement of desired efficiency and service levels by e-governance efforts in India is the lack of rigorous performance measures for the initial projects of e-governance. Identification of right metrics is very essential as it forms the basis for goal setting and performance planning, which ultimately would determine the achievement or non-achievement of organizational goals.

According to Tiwana (2000) some of the pitfalls in the choice of Knowledge-based performance metrics include 1) using too many metrics 2) choosing metrics hard to control 3) choosing metrics that neglect the intangible outcomes. Skryme (2001) has discussed the practical considerations for developing new metrics for knowledge management based activities which may be relevant for e-governance. These include:

1. Categories of performance measures should originate from organization's strategic objectives, business priorities and critical success factors.
2. Develop enough but not too many indicators in each category (typically 2-4, giving 12-15 key indicators in total).
3. Develop casual loop model to help understand interdependencies
4. Develop indicators as team process, so that people are sharing knowledge and coming to a common understanding of organization.
5. Allow a degree of customization across organizational units, but have common ones to aid comparisons.

Identifying New Competencies

The challenge of HRM is to develop competencies in people so that they deliver best services for achieving competitive advantage (Varkkey, 2001). Job competency is "a series of behaviors or actions that make up a portion of a job" and "traits may underlie competencies" (Building a Job Competency Database, n.d.). Researches have supported personality-performance relations across various occupational groups and criterion measures. For example, conscientiousness or dependability is found to be a valid predictor of *overall* job performance (e.g., Barrick & Mount, 1991; Mount & Barrick, 1995; Salgado, 1997). Competencies required in knowledge workers are different. "The majority of characteristics possessed by leaders of traditional bricks and mortar organizations are found to be equally valued in the digital economy. There are, however, a certain number of characteristics that are emphasized within e-businesses. These include a propensity for risk taking, entrepreneurialism, networking ability as well as the requisite technical skills" (Horner-Long and Schoenberg, 2002). Other competencies may be knowledge (technical and professional skills and combinations thereof), communication skills (ability to share

that knowledge) and interpersonal skills (ability to motivate in a group leadership and teamwork environment).

Knowledge workers may be required to work with changed work patterns and work schedule. They must have the ability to adopt these changes.

E-governance has a customer-centric approach. This would enable it to achieve essential efficiency gains and improve service delivery levels, improve citizen satisfaction with government services and improve quality of life (Mehra, 2004). Employees must be able to understand this thoroughly and incorporate this approach in their day-to-day working.

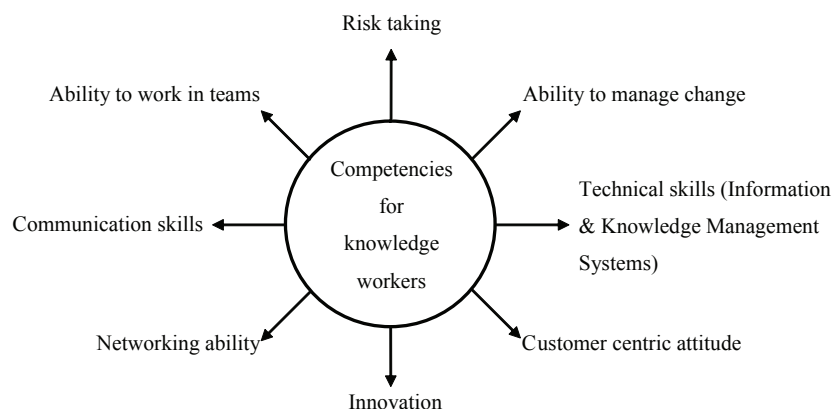
In addition, people must develop an orientation towards continuous innovation. Here innovation does not mean inventing anything new, rather it means handling tasks with a new approach so as to achieve efficiency in terms of cost, time, quality and so on. Ability to work in team, empowering subordinates, concern for subordinate development etc. may be other competencies. The list is indicative; these competencies are not exhaustive.

Based on above studies some important competencies for knowledge workers are shown in Figure 2. The particular competencies required by people in different countries will vary. They will have to be identified by training needs analysis, with training provided to meet those needs (Heeks (2001). Training need analysis may be a component of performance management system.

Employees need to be motivated to give better output. The changed work patterns demand that appropriate environment must be provided to employees that promotes institutionalization of above mentioned concepts. Here, Performance management process may be utilized as an effective tool to introduce sustain the above mentioned concepts in e-government, which in turn may ensure effectiveness in deliverance to external as well as internal customers. The following sections present a theoretical framework for overcoming employee-related problems in effective delivery of services by e-government through the process of performance management.

A well crafted performance management system for e-government employees can tackle all the above mentioned issues. The following

Figure 2. Competencies for knowledge workers



section discusses the concept of performance management. An attempt has been made to explain as to how this process can assimilate the identified key issues.

PERFORMANCE MANAGEMENT AS A MEANS FOR GOOD DELIVERANCE

The Concept of Performance Management

Attempts have been made to classify the performance appraisal systems by various researchers. Rock and Lewis(1970) have classified the appraisal systems into two categories including the narrow interpretation—as a rating devise only, and the broad interpretation—as an overall management concept. Performance management concept belongs to the latter category.

Performance management is a pervasive term that encompasses planning, reviewing, monitoring, measuring, performance and identifying the need for taking corrective actions for effective performance with the objective of improving overall organizational effectiveness and efficiency so as to satisfy all the stakeholders (employee, employer, customer (read citizen), suppliers and shareholders) in organization.

According to Armstrong (1995) performance management is, “A process for establishing shared understanding about what is to be achieved, and an approach to managing and developing people in a way which increases the probability that it will be achieved in the short-and long term.”

Performance management is a continuous on-going process that begins from the time when a job is defined. It involves the following:

- **Developing job descriptions.** Job descriptions provide information for selecting the right person for the job. Job descriptions provide a framework so the applicants and new employees understand the expectations for the position. It also provides a basis for setting annual targets for employee.
- **Selecting appropriate people for the job** People have different skills and interests. Different jobs have different requirements. Selection is the process of choosing the person with most appropriate skills and interests for a job. Finding a good job-personality -fit is exceptionally important.
- **Communicating goals, standards, outcomes, and measures.** People sometimes fail to achieve because they are not aware as to what are they supposed to do. Therefore it is essential that they must be made to clearly understand their goals and acceptable standards. To make goals understandable and achievable large targets may be broken down into several smaller ones.
- **Identifying the resources for achieving goals:** A blueprint for goal achievement may be prepared in the beginning itself. Resources required for target achievement must be identified and made available to employees.
- **Providing on-going coaching and feedback.** People need ongoing, consistent feedback that addresses both strong and the weaker areas of their performance. Effective feedback focuses more intensely on helping people build on their strengths. Feedback is a two-way process that encourages the employee to seek help.
- **Periodic performance reviews:** Giving employees frequent feedback and coaching, and conducting frequent reviews help supervisors in tracking the progress and identifying the obstacles faced in target achievement, in terms of personal or institutional deficiency. Employees know how they are performing and as to what are their next goals and challenges.
- **Identifying gap between actual and desired performance level:** At the end of

the appraisal period, the gap between the actual and desired performance level may be identified so as to address training and development needs.

- **Providing orientation, education, and training.** Before a person can do the best job, he or she must have the information necessary to perform. This includes job-related, performance-related, and organization-related information; thorough understanding of product and process use and requirements; and complete knowledge about customer (public) needs and requirements.
- **Linking performance with recognition reward.** The contribution made by the employees should be aptly rewarded. This will ensure repetition of good performance. The reward could be monetary or simply the recognition of efforts made by employee. It should be made known to employees.
- **Linking performance with career development opportunities for staff.** The supervisor plays a key role in identifying potential of staff for career growth. Employees may be given such assignments, tasks and projects to handle as may help them develop their potential. Growth goals, changing and challenging job assignments and responsibilities, and cross-training contribute to the development of a more effective staff member. Promotions may be linked to performance.

The major drawbacks found in the performance appraisal processes being followed at the government organizations include the following (Performance Appraisal, n.d.):

- Performance indicators not being quantifiable making it difficult to measure the performance.
- Objectives being unchallenging, unrealistic and not timely reviewed and updated.

- In government organizations, team appraisal is often not possible.
- Other HR decisions like rewards, training or promotions are not directly linked to the results of the performance appraisal process.

According to Federal Public Employee Survey (1999), less than half the public servants feel that they are encouraged to be innovative or take initiative, have a say in decisions and actions that impact their work, get help from immediate supervisors or departments in determining learning needs or career development support or have had a promotion or believe that they have a fair chance of getting one. Only 37% think senior management will try to resolve these concerns (Utterback, 1994). A closer look at these issues reveals that all these problems can be addressed through an effective performance management system.

The performance management approach has been successfully employed by some of the developing countries as one element of a broader, long-term effort to focus budget processes, policy deliberations, and overall public administration on setting and achieving agreed policy objectives. Performance management can be an important element of a broader strategy to focus policymakers and those responsible for implementation on better defining specific policy objectives and on continuously improving their capacity to meet those objectives. However, experience indicates that these efforts must address both technical and implementation challenges to yield sustainable impacts. (Reid 1999; Hatry 1999).

Purposes of Performance Management

In a broader perspective, performance management looks into the following aspects:

- “What”: What caused the changes that are being monitored?
- “How”: How can the identified gaps and lacunae be filled?
- “Compliance/accountability”: Who will be held accountable for success or failure of a particular action?
- “Whether”: Whether strategies, operation, and learning processes are right?
- Timing: Were the targets achieved within pre-decided period?
- Critical factors for success – What are the critical factors for success in a particular job?

Findings from the performance evaluation exercise provide important insights for performance improvement. Such information is useful to make resource decisions, to re-think about the causes of a problem, support reform/innovation in government agencies, and to help build consensus among stakeholders on how to respond to a problem. The key areas in which performance information is used include:

- Resource allocation decisions - There are important linkages among resource allocation, strategic planning, and performance measurement. Strategic planning of a department would decide the measures of performance, which in turn determine the resources requirement.
- Driving Business Process reengineering – In response to the identification of gaps between objectives and achievement, some of the processes could be reengineered such as cycle time, organisational structure, outsourcing, information technology, programmes and benefits.

A Framework for Performance Management in E-Governance

Objectives

The strategic objectives of a performance management system as identified by Mohanty and Naveen (2004) seem to be applicable to e-government as well. These are to:

- Create a performance culture and ethos across public service in terms of “shared” values, “outcome” orientation and “best” practices.
- Promote accountability of employees and organizations in using resources and ensuring that implementation objectives are met.
- Guide capacity building development.
- Contribute to overall development agenda
- Produces meaningful measurements which are useful in benchmarking, or setting standards for comparison with best practices in other organizations. They provide consistent basis for comparison during internal change efforts. (McNamara)

Other objectives may be to:

- Develop and enhance competencies that are required for effective and efficient performance in the changed work environment
- Shift focus from individuals to teams

Developing Performance Management System

Performance Management approach for e-governance must be flexible and decentralized so that it would be able to fit in context of both work technology and organization culture. Introducing a performance management system in organiza-

tions that have been strictly following bureaucratic style of working, characterized by tight compartmentalization of various functional departments, so much so that sometimes functional unit goals may override organizational goals and obsession for rules and procedures (Robbins, 1999) may demand tremendous efforts right from the inception stage.

Preliminary Exercise

Since the job contents and tasks change after introduction of ICT, the jobs may be re-classified as follows (Thakar, 2007):

1. **Expertise:** Those who design new products and develop new innovative methods and practices, example Researchers, Software Designers etc.
2. **Collaborative work:** This is the type of work where people work in constant collaboration with other departments. Their expertise and high proficiency are the main input in work. Example, general managers, team leaders.
3. **Business related routine work:** This comprises routine tasks, which require skill application. The tasks are predominantly process driven with minimum scope for change. For example, supervisors in operations.

This classification can enable designing more accurate and effective appraisal systems. The new system cannot replace the existing one overnight. Some groundwork is required to be done. Following activities have been identified for such an effort:

- *Redefine Vision & Mission*

The objectives for individual performance are derived from broad organizational objectives which in turn are derived from the vision and mission of organization. To streamline individual objectives, there could be a need to review the

vision and mission statements of the government departments due the transformational change that is being brought about by ICT.

- *Identify and delegate responsibilities:*

The current system of managing performance in govt. departments needs to be revamped. This might be a tough and complicated exercise. Various tasks involved in the process need to be identified and responsibilities must be delegated to appropriate persons to plan and implement. A force field analysis needs to be done in which it may be identified what is the current position and what is ultimately desired. The driving and restraining forces in reaching the desired position must be identified.

- *Create/align internal organizational mechanisms*

Three step model of change proposed by Kurt Lewin (1951), as shown in Figure 3, involves unfreezing the status quo, movement to a new stage and refreezing the new change to make it permanent. This means that (1) the existing systems and processes must be prepared to accept the change which has been planned (2) the change is introduced gradually (3) In the final step this change is institutionalized.

This implies that to introduce or modify the performance management system, first the internal mechanisms must be geared up to adopt and facilitate this change. The following steps may be followed:

1. *Preparing the organization:* The employees must be oriented through various programmes to identify and understand the need for performance management.
2. *Facilitating system development:* All the processes must facilitate the development of such a system as can foster the culture of continuous learning
3. *Support for implementation:* The support must be arranged for successfully imple-

Figure 3. Lewin's Model of Change



menting the system. Support is required from the top level (policy makers). Financial support is required for taking help from external experts, for organizing training sessions etc. and support from employees for accepting and help in implementing it successfully so that it can achieve its objectives.

- **Developing the system**

Developing the system would involve identifying and establishing performance indices, performance measures, developmental aspects, and in-built system for continuous performance improvement of employee, developing performance monitoring and evaluation system. The system should be developed such that all the stakeholders must have some involvement/participation in it.

- **Preparing the employees at all levels to use and adopt the system**

Introduction of a new system makes it mandatory for the organization to train the employees regarding its use and make them aware of the potential benefits. They must be informed about the need to introduce the system. All the doubts and fears must be allayed. Today, 51 percent of organizations frequently train managers in applying performance management systems, and 22 percent frequently train non-managers. Training for both managers and non-managers in performance management has *doubled* in the past four years (Bertha, Sumlin, Davis & Rogers, n.d.).

- **Implement the system**

Such an environment needs to be created where such a system can sustain itself. Various processes

involved in the performance management system should flow freely and must be in good coordination with other systems (recruitment and selection, promotion, compensation etc.) and processes (strategic planning, decision making etc.). All the systems and processes must support each other so as to produce a synergistic effect. Resource persons may be appointed within the departments who can take care of proper implementation of performance management system. Aligning performance management with organizational goals and integrating with other systems may be a determinant of system effectiveness.

When all the functioning of e-government is IT-enabled, performance appraisal system too should be on-line which would have all the advantages of the use of IT, i.e., being quick, providing easy access and ease in documentation, amongst others.

Establishing Performance Measures and Performance Indicators

Key Performance Indicators align all levels of an organization (business units, departments and individuals) with clearly defined and cascaded targets and benchmarks to create accountability and track progress (Bauer, 2004).

First, the purpose of measuring may be determined and then, the exact measures and indicators may be determined. These measures should be able to answer the questions raised by the purposes of evaluation. Thus the purposes can be taken as bases of establishing performance measures. Table 2 provides a gist of purposes for measuring performance in e-government.

Table 2. Purposes for measuring performance for e-government

The Purpose	Question that the performance measure can help answer
Evaluate	How well is service delivery from my department
Control	How can I ensure that my subordinates are doing the right thing?
Budget	On what programmes, people, or projects should my agency spend the public's money?
Motivate	How can I motivate line staff, middle managers, non-profit and for-profit collaborators, stakeholders, and citizens to do the things necessary to improve performance?
Promote	How can I convince political superiors, legislators, stakeholders, journalists, and citizens that my department is doing a good job?
Celebrate	What accomplishments are worthy of the important organizational ritual of celebrating success?
Learn	Why is something working or not working? What and where are the gaps?
Improve	What exactly should one do differently to improve performance? In what areas do my subordinates require improvement?

(Adapted from: Robert D. Behn (2003). *Why Measure Performance? Different Purposes Require Different Measures*, *Public Administration Review*, 63(5), 586-685)

Performance measurement systems determine whether a department/government agency is fulfilling its vision and meeting its strategic goals. Performance measures, must therefore,

- (1) *Ensure a critical, strategic focus* - The departmental strategy developed senior management, provides a framework within which departmental units, teams, and individuals can implement a performance measurement system. The measures and goals a department sets should be narrowed down to a few important ones. In addition, mature performance measurement systems are linked to strategic and operational planning. They know where they are by measuring performance against organizational goals and objectives. For example, while evaluating NeGP projects, a performance measure may be target achievement, in terms of quantity, quality, time and cost.

- (2) *Measure the right parameters* - Before deciding on specific measures, a department should identify and thoroughly understand the processes to be measured. Then, for each key process, certain key result areas, which are contingent upon the success of the process, should be identified.

According to McNamara (n.d.), performance management identifies organizational goals, results needed to achieve those goals, outcomes and drivers for goals. For e-government, performance must be judged against the goals of the programmes of various departments and agencies and whether the desired results and outcomes have been achieved. The parameters for success of a particular programme may be different for different stakeholders such as policy makers, regulators, administrators, other governmental bodies, vendors and suppliers, customers, and citizens. Therefore, it is extremely important that the measures of performance be created with input

and insights from these parties as feasible, so as to reach as much consensus as is possible regarding what is expected of the organization. Since the ultimate aim of any government agency would be to carry out the operations effectively so as to be able to deliver services efficiently to public at large, therefore the parameter of 'customer satisfaction' may be placed above all else.

Selecting Method of Appraisal

There are numerous methods of performance appraisal available. The objective should be to choose such a method or a combination of methods as can enable fair appraisal with least scope for bias and subjectivity. Singh, Maggu and Warriar (1981) studied the level of satisfaction of managers with existing performance appraisal system in public and private sector. They found that the public sector employees are lesser satisfied than the private sector employees. They noticed that one of the major reasons for ineffective functioning of performance appraisal had to do with technique relate aspect. Various researches have found that Management by Objectives (MBO) and graphic rating methods are amongst most popular methods that are in use today (Shirmeyer, 1996; Berntal etal).

Relevance of 360 Degree Appraisal: Participants in e-governance are vendors, general public, politicians, private organizations, and IT consultants amongst other. Employees may be required to interact with all of them in the process of delivering services. Therefore 360 degree appraisal, which involves appraisal from all the parties that frequently interact with employees, besides superior, subordinates and peers, may be useful in such a work setting.

Review and Feedback

Frequent reviews and feedback are particularly important in e-governance, as the concept is still relatively new. For an appraiser Performance ap-

praisal can be the excellent way of discovering the support people need but don't ask for. Performance appraisal should not be seen as a difficult task. It should be seen as a consultative approach, where one has the opportunity to share his thoughts and feelings with his team members. The review session is not a win-lose game. The aim should be to manage the meeting without controlling it and be powerful without disempowering the other person. Frequent reviews and feedback is essential for recognition as well as improvement in knowledge and skills.

Identification of Training Needs

Periodic reviews and continuous monitoring enables managers to identify gaps and deficiencies that hinder effective performance. This may be done for employees at all the levels, right from lower level supervisor to highest level officers. These gaps could be in technical skills (related to job and use of ICT) and managerial skills (like planning, decision making, communication etc.). Emphasis may be different at different levels, for example at lower level, where employees are involved in process drive routine tasks, there may be greater requirement for technical skills while at higher level, conceptual skills may be more important. This should not merely end here, rather it should emphasize upon recommendation of appropriate training programmes. Training need identification need to be done at all levels, even for trainers.

Potential Identification

E-governance may involve creation of new jobs, redesigning of new jobs and possibly the creation of a new career ladder. It, therefore, becomes essential that employee potential must be identified for shouldering new responsibilities and charting out a career plan for the person. Since superiors are the ones who are regularly in contact with the employee, they must be entrusted with this responsibility.

Self Appraisal

Employee may be given opportunity for self appraisal of various aspects of performance, like extent of target achievement and self-development. This practice is supportive of empowerment process. Moreover, taking part in self-ratings and upward appraisals of team leaders was associated with greater levels of appraisal satisfaction than was participating in peer evaluations (Miller, 2001).

Linkage with Reward

Linking performance with reward may prove to be motivating for employees. The rewards could be in form of promotions, recognition or monetary gains. In certain countries governments are considering even to link pay to performance. Two-thirds of OECD (Organization of Economic Cooperation and Development) member countries have implemented performance related pay or are in the process of doing so (Performance-Related Pay, n.d.). Most of the leading-edge organisations link pay or rewards to their performance measurement systems. Managers ensure that performance goals are met by rating individual contributions to performance goals in individual appraisals. In addition to rewarding achievement, many organisations also recognise a pattern of chronic substandard performance.

Fostering New Competencies

Appropriate competencies required for new work patterns must be carefully identified.

In older work patterns, it seems not much care was taken in choosing competencies. In a study entitled “performance appraisal in the police”, done by the bureau of police research and development in 1977 in India, the traits figuring in the ACR forms of inspectors and sub-inspectors were analyzed. The study revealed that out of 79 traits which were being evaluated, only 11 could

be regarded as directly related to the police work. Out of 24 ACR forms analyzed in the study, as many as eight did not contain even a single trait which had any direct relevance to police work (Joshi, 1983).

Therefore care needs to be taken while choosing the traits, behaviours and competencies. These can be developed and fostered through PM. Training managers in understanding and using competencies significantly improves satisfaction with ‘relevance of competency framework’ (Strebler, Robinson & Heron, 1997).

These competencies may comprise one of the criteria for appraisal. Many organizations use it as criteria of appraisal. The purpose of assessing it may be developmental or may even have a weightage in final rating. Failure to appraise competencies reduces the effectiveness of competencies and the managerial performance appraisal programs (Abraham, Karns, Shaw & Mena, 2001). It may be possible to foster certain desired competencies in employees by rewarding them for showing behaviours that are consistent with these competencies. As tendency to repeat behaviour is influenced by reinforcement or lack of reinforcement brought about by the consequences of behaviour (Skinner, 1971). This would serve dual purpose. It would not only motivate employee to repeat the behaviour, but also give the impression to employee that top management values these competencies. For example, rewarding the best suggestion received from employees might motivate them to think and come up with new suggestions, which may foster participation, empowerment and innovation. Identification of training needs and recommending appropriate training programs also help in identification and development of desired competencies in employees.

Promoting Innovation

To promote innovation culture, organizations need to measure and reward employees for in-

novation related activities. Large private sector organizations, which are growing fast, have made innovation central to their strategy. For example, Proctor & Gamble, a multinational company, has integrated innovation into its personal goal setting and reward system. 'Innovativeness' has been made a part of employees' annual reviews and provides such incentives as faster promotions, non-monetary benefits and innovation fellowships and innovation fellowships in order to promote innovation (The State of Innovation in India, 2008). The findings of a survey of 'best managed companies' conducted by Ernst & Young it was seen that all the 'best managed' organizations have a formal process for accepting employee suggestion or innovation (Chawla, Gulia & Chawla, 2008).

Fostering Teamwork

Performance management process may be used to strengthen the teams. Establishing specific, challenging and accepted team goals, and monitoring, evaluating, and providing feedback on both overall team performance and individual team-member performance has been considered as important skill/ability for teamwork.

Performance appraisal systems in organizations with teams should be modified to reflect teamwork KSAs (Knowledge, Skills, and Abilities) requirements for teamwork (Stevens, 1994).

In the past, poor team players were often tolerated because teamwork contributions were not explicitly included in the appraisal. Modifying the appraisal will prevent teamwork being considered as an extra-role behavior (Organ, 1988).

The human resources self-directed team at the Department of Energy's Savannah River Operations Office, USA, has designed its own appraisal process that supports teamwork and is a tool for improving customer service and team performance. The appraisal process measures performance at both the individual and the team

level. Elements and standards are directly linked to customer needs and satisfaction (One Team Approach, 1997).

Empowering Employees

According to the definitions of employee empowerment as discussed in the previous section, it can be seen that involvement of employee in various stages of performance management can empower him/her sufficiently. Various processes involved in performance management including, appraisal of target achievement and competencies assessment and participation in feedback session (Nandan, 2007) can empower employees. A major advantage in participation in goal setting may be in increasing acceptance of goal as a desirable one (Erez; Early & Hulin, 1985), which may improve performance.

Process of self appraisal is also attuned to empowerment (Waiguch, 1999). Training may also lead to employee empowerment. Identification of potential and subsequent assignment of appropriate responsibilities may also be seen as employee empowerment. According to Bell (1994) giving back the appraisal process to staff which involves upward feedback from internal customers and teams also empowers employees and emphasized the need to create a more empowering appraisal process is better aligned with the needs of all stakeholders.

On the basis of literature survey, as presented in Table 3 and Table 4, a model for good deliverance through performance appraisal is proposed (Figure 4).

Establishing Accountability for Performance

Successful deployment is strongly connected to developing a successful system of accountability: Managers must learn to assume responsibility for some part of the process. Some of the successful strategies that could be considered for establish-

Figure 4. A model of achieving good deliverance in e-government through performance management

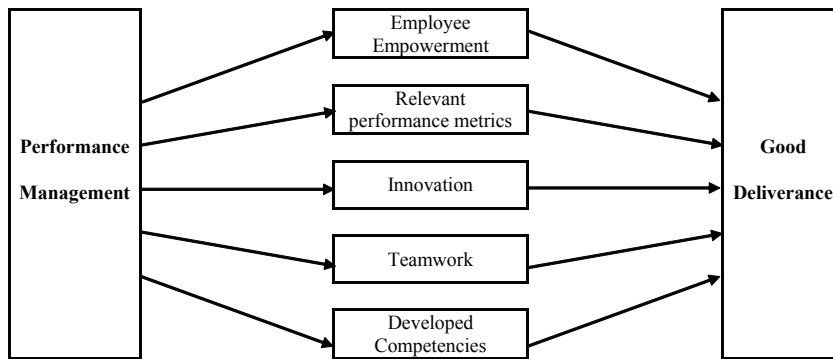


Table 3. Literature support for key issues identified for good governance / deliverance

Issue	Literature
Innovation	Damanpour, 1996; Davenport, 1993; The State of Innovation, 2008
Employee Empowerment	Wei, Wang, Lu (n.d.); Bill Gates 1999); Kirkman, BL & Rosen, B (1999); Bell (1994); Erez, Early & Hulin (1985)
Teamwork	Olson& Olson (2000); Whittaker (n.d.); Clark (2001); Prasad and Tata (2006); Sheridan (1990); Donellon (1993); Harris (1992); Gupta (2006)
Competencies	Horner-Long and Schoenberg (2002); Mehra (2004); Varkkey (2001); Barrick & Mount (1991); Mount & Barrick, (1995); Salgado (1997); e-governance Strategy (n.d.)
Performance Metrics	Sharma & Palvia (2004); Arora (2006); Tiwana (2000); Skryme (2001); Performance Management (n.d.); Latham & Yuki (1975)

ing employee and management accountability for the success of the department's performance measurement system include employee empowerment, proper identification of owner and rewards and incentives. These are discussed below:

- Empowerment – When employees have an involvement in goal setting and are empowered with the authority to make decisions and solve problems related to the outcomes for which they are supposed to show, they become accountable for

the results. Here, the superior provides a supportive environment and the employee provides results. Achieving performance goals of a department or government agency is a shared responsibility of its employees each of whom has a stake in the department's success. A critical challenge is ensuring that this shared responsibility does not become an unfulfilled responsibility. Accountability helps organisations meet this challenge. Nandan (2008) has argued that the performance management can be used

Table 4. Literature support for linkages between the key issues identified and performance management

Issue	Literature
Innovation	The State of Innovation, 2008; Chawla, et al (2008)
Employee Empowerment	Nandan(2008); Erez, Early & Hulin (1985); Waiguchu (1999)
Teamwork	Organ, 1988; Stevens & Campion?(1994); One Team Approach, (1997)
Competencies development	Skinner (1971), Heeks (2001), Heron (1997), Abraham etal. (2001)
Performance metrics	Armstrong (1995); Behn, 2003; McNamara (N.D.); Bauer (2004)

- as a tool for employee empowerment.
- Owner Identification – Just empowering employees is not sufficient. Most managers from best-in-class organisations hold an appropriate individual accountable for each performance measure. Most organisations therefore identify a measurement owner - an assigned individual who is accountable and responsible for a particular measure.
- Rewards and Incentives – If an employee can be rewarded for achieving a particular result, he can equally be held responsible for non-achievement and under-achievement. Thus, rewards and incentives
- Support from top management is essential. Senior government officials and managers must actively be involved in designing and deploying stages.
- Outcomes of Performance measurement systems must provide data for decision-making
- Performance measurement systems should be positive, not punitive. These must be so designed that they do not seem to be punitive systems, but learning systems that help the department identify successful practices
- Transparency in the system is desirable. Results and progress toward goal achievement should be openly shared with employees and stakeholders While protecting the sensitive information
- Performance management system needs to be constantly rejuvenated, howsoever good the process is. This is important for every organisation, more so an organisation that integrates the use of ICT in its processes. The technologies keep changing and consequently the job descriptions, competencies and Key Result Areas of managers. Therefore, there is a need to continuously update the system, in the absence of which the system may become obsolete and irrelevant.

Figure 4 broadly summarizes the role of performance management in good deliverance in e-government.

Key Parameters for Successful Performance Management in E-Governance

A review of literature pertaining to successful performance management systems indicate that the following key parameters may be considered for successful performance management in e-governance:

In this context two examples may be presented from India. Bharat Heavy Electricals Limited, a Public Sector Unit, has designed and implemented a new development and performance oriented performance management system (Nandan, 2007) to suit the need of the organization. Resource persons have been appointed within the organization to facilitate managers with the use of this new system.

Government of Andhra Pradesh has taken initiative to install a Performance Management System (PMS) based on performance indicators to track, measure, and review and improve the performance of Government Departments. The PMS model is designed to link development goals, policies, priorities, plans, programmes, projects, budgets and action plans with performance towards achieving the desired objectives. It involves performance indicators, performance targets, performance monitoring, performance measurement, performance-based evaluation, performance-based review and evidence-based policy-making.

FUTURE TRENDS

The concept of e-governance is still in growth phase. Different studies have identified issues from various perspectives and have proposed methods for achieving good deliverance. Ultimately, majority of the problems can be traced back to employees. The ultimate test of success of a process or system lies in the fact that whether it is delivering effectively what it is designed for. This holds true for e-government also. E-government services are meant for citizens; therefore a citizen centric approach must be adopted for the processes involved. Through the use of proposed model of performance management, performance level of employees may be enhanced and employees at all levels may be oriented to focus on customer and deliver services so as to satisfy customers. Performance Management, if implemented

carefully, seems to offer solutions for establishing a culture of performance in bureaucratic organizations. It seems that once the system is institutionalised it will become self-sustaining. The model of performance management proposed above attempts to address almost every aspect of employee performance that may be significant from the perspective of e-governance. Attempt has been made to explore and establish linkages of performance management with five key issues. The nature and extent of these linkages may be established through further research.

The proposed framework may be used to develop training programs for equipping top managers with the required skills in e-governance. The framework can also form the basis for a more detailed analysis, and for empirical studies.

Though performance management is in practice and has been a topic of discussion for quite sometime now, this study proposes how can this system be evolved and developed to fit the structure of e-government and hence e-governance. Feasibility studies may be conducted to test the suitability of the proposed system. Surveys may be conducted to find the openness for acceptability of such a performance oriented system in bureaucratic government organizations where job security could be a reason for complacency.

CONCLUSION

Researchers have shown that that even the best business companies in the world have given priority to having a good work culture, focus on developing employee capabilities and competencies, and understand the importance of redesigning processes and systems to improve efficiency. The process of performance management does not only have the potential to initiate this change in bureaucratic government agencies, but also to sustain it. The framework proposed in this chapter includes not just measurement of performance, but also identifies and links various other aspects

like competency development, empowerment, innovation, career-planning, identification of gaps and so on, which may be linked positively with employee motivation. In a best-in-class organisation, employees and managers understand and work toward the desired outcomes that are at the core of their organisation's vision. They focus on achieving organisational goals, by using performance measures to gauge goal achievement, but do not focus on the measures per se. Performance measurement is thus seen as a means, not an end.

Performance management is a tool and a means. A progressive transformation is required from a good performance monitoring and measurement system towards good governance. The bigger challenge of governments is to create a system of good governance that promotes, supports and sustains human development – especially for the poor and the marginalised. Good deliverance is a means for Good governance. Thus effective performance management leads to good deliverance which in turn leads to good governance. Good governance is participatory, transparent and accountable, among other things. It is also effective and equitable. There is need to design a comprehensive program for planning, implementing and sustaining e-governance, of which performance management may be considered as a key component.

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Chapter X

The Governance of Integrated Service Delivery in Canada: An Examination of Service Canada's New Business Model

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ABSTRACT

The emergence of the Internet has given rise to internal connectivity and external, online delivery as centrepieces of both the public and private sector service strategies alike. The purpose of this chapter is to provide a critical assessment of both the Canadian federal government's experience to date and the prospects of success for Service Canada – the new lead entity for citizen-centred service delivery in a multi-channel environment. Our primary interest lies in better understanding the organizational (managerially and politically) dimensions to this transformation and the extent to which these dimensions are well aligned in a suitable governance framework that encompasses shifting patterns of service delivery at both the federal level, and for the Canadian public sector as a whole. The Service Canada experience to date illustrates the governance complexities surrounding the introduction and pursuit of e-services and more integrated service delivery. More than a technological challenge, the realization of a new business model is the primary challenge in succeeding.

INTRODUCTION

The emergence of the Internet as a mainstream venue for communications and commerce over the past decade has given rise to online delivery mechanisms as a centrepiece of both the public and private sector service strategies alike. With

regards to the public sector, the e-government agenda has come to denote the broad application of new information and communication technologies (ICTs) to the public sector as a whole. In most countries, however, e-service delivery denotes the chronological starting point and the

main strategic impetus for operationalizing the Internet for public sector usage.

An early empirical review of integrated service delivery strategies in Canada puts forth the following three challenges and three success factors (Institute for Citizen-Centred Service [ICCS], 2003). In terms of challenges, differences in organizational culture, partnerships, and resources are identified; for critical success factors, leadership, governance and accountability and partnerships are underlined as most important. Given the level of inter-organizational and intra-organizational linkages at play in achieving service transformations, it is appropriate that partnerships be identified in both sets.

It is within such a context that the Government of Canada (GOC) provides unique insight into the challenges of online and multi-channel service delivery. Recognized by organizations such as the United Nations, the OECD and Accenture Consulting as a leading jurisdiction in online service capacities, Canada began its second major phase of service delivery transformation in 2005 with the creation of Service Canada. Building on the foundation of its predecessor, Government Online (GOL), Canada's flagship e-government initiative launched in 1999, Service Canada's mission is to expand integrated service delivery capacities (in terms of both service offerings and delivery channels) across government in order to realize more citizen-centric outcomes.

The purpose of this chapter is to provide a critical assessment of both the Canadian federal government's experience to date and the prospects for Service Canada to succeed. In doing so, our primary interest lies in better understanding the organizational (managerially and politically) dimensions to this transformation and the extent to which these dimensions are both addressed and well aligned within the federal government apparatus. Accordingly, the notion of a business model is adopted as a framing concept and examined within the context of Service Canada's own efforts.

The chapter is organized as follows. Section two contextualizes the case study by reviewing the main contours of new service models in this emergent e-government era. Section three sketches the Canadian context by describing the evolution of electronic service delivery over the past decade. Section four then examines the concept of a business model and Service Canada's formulation of a business model for integrated service delivery. Section five considers three quandaries that have emerged from efforts to realize this new business model and section six provides some concluding thoughts as to lessons learned.

ELECTRONIC SERVICE DELIVERY AND THE NEW GOVERNANCE IMPERATIVE¹

A useful point of departure is to conceptually define e-government as - *the continuous innovation in the delivery of services, citizen participation, and governance through the transformation of external and internal relationships by the use of information technology, especially the Internet.*² Within this wide lens three images of e-government – in terms of the underlying objectives, have been well summarized by Remmen (2004) in the following manner: i) efficiency - cost reductions; ii) public service - better quality, easier access (i.e. 24/7), new services; and iii) democracy - participation and interactive dialogue. Since for most public sector leaders the initial impetus for thinking about online dimensions to government operations came from the 'service' dimension, this chapter situates the nature of e-government's evolution primarily within and between the first two of these images – efficiency and public service reform. Nonetheless, the relevance of democracy remains as key contextual dimension of any public sector restructuring.

The private sector is also an important reference point. The widening scope of digital technologies means that few, if any, industries

are exempt from some degree of transformation (Andal-Ancion et al., 2003) and electronic commerce levels, though a modest proportion of overall economic activity, continue to grow in a manner that would have been unthinkable only a decade ago. For example, in terms of the Canadian online marketplace, Canadians spent more than \$3 Billion shopping online in 2003 – an amount that reflects participation by 3.2 million Canadian households, up from 2.8 million in 2002 (a still tiny but growing fraction of the nearly \$700 Billion in total personal expenditures).³ Moreover, not only are such amounts expected to rise in the future but they exclude the significance of commercial transactions, communication flows and new governance relations across companies and industries.⁴

For governments, such Internet-induced trends are relevant and both corporations and governments share many challenges in seeking to deploy new governance capacities (Cairncross, 2002). At the same time differences are evident: efficiency, for example, is often a more politically contested principle in government as stakeholders such as unions and political parties may oppose worker mobility and job cuts, moves generally applauded in the market sector. Equally important, whereas private corporations may aggressively cater to select client groups, governments carry broader public interest responsibilities involving all citizens that, in turn, shape both the feasibility and the perceived appropriateness of e-government as a service strategy. Moreover, the public sector's traditional reliance on hierarchy and bureaucracy makes resistance to change more systemic and harder to overcome. The modest and uneven results of online service delivery in the public sector, even in those countries leading in Internet use are indicative of this complexity (Eggers, 2005; Hart-Teeter, 2003; Roy, 2003).

One difficult transition for government lies in achieving the sorts of internal mechanisms for integration and coordination required across the

public sector in order to enable a more integrative approach to web-enabled service delivery. These necessary changes are primarily about fostering more horizontal governance to cut across traditionally separate vertical entities, perhaps the single most crucial organizational challenge to realizing citizen-centric portals and service delivery mechanisms (Allen et al., 2005; Fountain, 2001). These pressures for more horizontal ties stem directly from the sort of alternative, more citizen-centric forms of organizing represented by a portal no longer organized around government department, but rather purpose of service stream.

Achieving this horizontal collaboration therefore requires political will and a set of organizational mechanisms to facilitate information sharing and joint action (Batini et al., 2002; Bellamy et al., 2005). There are both structural and cultural impediments to such mechanisms, reflecting traditional resource allocation processes and separate accountability systems based on vertical hierarchy and, in the case of Parliamentary models, Ministerial accountability. Typically, Ministers are rewarded and/or punished on the basis of performance within their fiefdom of jurisdiction which normally involves a single department or set of agencies thus accountable in a hierarchical fashion to that Minister. In such a world, budgets are allocated on the basis of inter-Ministerial competitions for resources, with central agencies expected to sort out disagreements and, when required, impose a degree of coordination on initiatives that require an inter-departmental set of actions (Lindquist, 2005).

The danger is that in the absence of strong action to overcome the boundaries engrained within traditional organizational structures, predicated for the most part of separate, vertical silo like functions, then the rhetoric of portals as a basis for integrative services, one stop encounters and more seamless governance remains just rhetoric (Allen et al., 2005). In an online world, integrative mechanisms become reduced to a mere set of

web-links that direct citizens and organizations from one branch of government to another.

The resulting challenge of horizontal coordination is closely intertwined with the principle of interoperability, a central characteristic of governance reforms tied to the enabling of government-wide systems for information sharing and collective action across organizational boundaries. Although at one time viewed predominantly as a technical challenge, where the absence of interoperability would be reflected in the disconnect between various hardware components and software programs in separate departments not being able to work with one another (often due to the fact that each department designed their information systems to work for their own unique purpose with little incentive to be concerned about cross-governmental approaches), this principle can no be viewed as an important element of organizational design in the digital age.

The contentious nature of achieving is rooted in the following decision that denotes an important organizational design quandary of e-government: whether interoperability can be facilitated by collaboration between government units; or rather whether it is necessary to ordain it via more centralized mechanisms mandated with the task of ensuring government-wide capacities are in place (Culbertson, 2005).

The Swedish example is instructive, for example, where a level of managerial autonomy is complemented by flexibilities that are the basis of a 'contractual' and 'networked' approach for pursuing aims both vertically and horizontally – as circumstances dictate:

Owing to the increased need for cooperation between different administrative units, networked administration represents an appropriate organizational paradigm for modern administration. The term refers to administration composed of independently managed units that rely on functions and resources provided by other such units

or private companies, and form part of permanent and temporary cooperative structures.

Forms of collaboration among administrative units vary according to country and administrative tradition. The Swedish model of cooperation may be summarized as a contractual model. Accordingly, an administrative unit decides for itself whether external services and functions are sufficiently attractive for the unit to use them or pay for this use (Swedish Agency for Public Management, 2004, p. 2).

The Swedish government has wrestled with whether such an approach can co-exist with e-government's emphasis on government-wide architectures and interoperability: a study of the Spanish state of Catalonia's e-government approach (viewed as highly centralist) led to a rejection its approach deemed unsuited to the Swedish context. Accordingly, while various mechanisms have been introduced to facilitate better cooperative linkages and knowledge-sharing across the Swedish public sector, the networked, contractual model is viewed as the foundation on which future reforms will be based.

The resulting need for a 'federated architecture' is thus central to both integrating and coordinating service delivery capacities (Batini, 2002). The fundamental question and challenge that lies at the heart of governance reform – and new, more integrated and multi-channel service delivery capacities in particular, is whether this federated architecture will be sought through centralized mechanisms to impose interoperability through vertical hierarchy (i.e. traditional public sector authority from central agencies and individual Ministers empowered to ordain organizational change) or rather via more novel and networked governance mechanisms that are more collaborative and diffused in terms of their accountability relationships (Kamarck, 2004). Thus while the term, 'federated or enterprise architecture' has typically been denoted the chal-

allenges of technological alignment and interoperability, for the duration of this chapter its usage will denote the organizational and institutional processes and design work that must accompany technological innovation if new service capacities are to result.

BACKGROUND: FROM GOL (1999) TO SERVICE CANADA (2005)

The impetus for the major components of the federal e-government strategy arose from a broader effort, *Connecting Canadians* that was crafted in the late 1990s, leading to the 1999 pledge to achieve comprehensive online service delivery by 2004:

The Government On-Line Initiative (GOL) was launched to meet this commitment. The goal of GOL is to provide Canadians with electronic access to key federal programs and services. The initiative focuses on grouping or “clustering” online services around citizen’s needs and priorities, rather than by government structures (Coe, 2004, p.6).

The Government showcases citizen satisfaction surveys with online delivery channels⁵ and the results of various surveys such as Accenture’s annual rankings as evidence of progress: much of this recognition is owed to the Government’s main portal (www.gc.ca) that, in the spirit of integrated service delivery is grouped according to clusters of services and specific client groups.⁶ A key objective of GOL has been ensuring that the 130 most common federal services are online by 2005 (when the GOL program formally ends, giving way to a broader service transformation effort—the details of which are reviewed below). By 2004, some 122 of these services were ‘identifiable’ online (meaning access to some information about them was featured on government web-pages: the remaining services are internal to government and therefore not conveyed publicly online). Most offerings,

however, are informational – rather than transactional and the ability to fully complete services and make payment remains more limited. Some current examples include: integrated change of address features, online tax return filing, business registrations, submission of select statements of employment, applying for government employment, and a variety of purchases for government publications.⁷

One challenge facing e-service strategists in going forward is uncertainty in terms of service offerings across different delivery channels and both the evolution and management of demand levels and supply capacities. Many early online services models floundered on overly optimistic projections for take-up levels, and the Government of Canada has been criticized by the federal Auditor General for lacking a rigorous business plan to guide GOL: “With only high-level expected outcomes, there is no clearly defined end state for GOL. The government will have difficulty measuring progress and performance...” (Auditor General of Canada, 2003, p.10). At the same time, however, more recent experiences with user-fees and self-financing delivery models (largely predicated on outsourcing portal-based solutions and their maintenance to the private sector) have begun to demonstrate more sophistication and success, particularly in high-volume transaction areas (Peterson, 2005).

Indeed, it is reasonable to argue that like many early e-government efforts in the 1990s, GOL was predicated more on enthusiasm and hype surrounding the Internet’s spectacular growth than a well thought on strategy for multi-channel management and opportunities and constraints in manipulating these channel offerings over time. Despite this shaky start, the importance of multi-channels and online delivery mechanisms in particular is underscored by the clear migration of Canadians to Internet-based interactions with their public sector. At the federal level, the Government of Canada (2005) potential for online delivery is illustrated by the following trends:

Once again, it is important to bear in mind the informational nature of many of these ‘transactions’ but the growing prominence of online activity both within the public sector and across society generally bodes well for a strategy of expanding and deepening the integration and functionality of online service offerings. Security and privacy issues have been recognized as both foundational and fundamental to the online service delivery agenda. Accordingly a GOL centrepiece is the ‘secure channel’:

Secure Channel is a portfolio of services that forms the foundation of the Government of Canada’s (GoC) Government On-line (GOL) initiative. Secure Channel’s primary goals are to provide citizens and businesses with secure, private and high-speed access to all federal government’s on-line services, and to provide an environment that enables and encourages departments to integrate with federated common services. Without the common infrastructure...it provides with respect to security and privacy, Government On-Line’s Service Vision of client-centric, cross-government service anytime, anywhere cannot be realized.⁸

By 2004, the secure channel had been deployed across all federal departments and agencies as the basis of a new government-wide network infrastructure – and it also allowed for the small but growing base of online service offerings summarized above (among other initiatives planned, the secure channel is expected to allow for the first-ever availability of the national census online in 2006). Despite efforts to create such a common platform, leveraging it across traditionally separate entities in order to integrate service offerings is a more complex undertaking. The main barrier in getting departments to work together in sharing information and combining authority in order to realize more ‘citizen-centric’ processes. The vertical structures of separate departments serving individual Ministers largely translate into

autonomy over interoperability: “silos continue to reign” (Coe, 2004, p. 18).

Such findings are indicative of the growing need for more rigorous collaborative mechanisms and performance frameworks to both facilitate shared action and gauge progress, particularly in service delivery agendas that transcend traditional reporting relationships (Public Policy Forum, 2003; Stowers, 2004). They also underscore both the breadth of organizational and cultural change required if the Government of Canada is to move beyond its modest GOL achievements to date (Marche & McNiven, 2003). In recognition of the need for deeper reforms, during the course of GOL the government developed a parallel though closely related initiative, known as Modernizing Services for Canadians (MSC). In essence, MSC acknowledges not only the challenges confronting GOL but it also recognizes that online service delivery must co-exist and align effectively with other service delivery channels, such as telephone and in-person facilities.

Beginning with what was the largest department providing domestic programs and services to Canadians, Human Resources Development Canada (HRDC), MSC represented a three-year business transformation initiative (2002-2004) in order to review policies, programs, services and delivery capabilities. By building a new citizen-centred foundation, MSC aimed to change the focus of HRDC from the business of conducting transactions to a new emphasis on building relationships with citizens: “it is transforming the current complex delivery network into a single integrated service delivery network that provides seamless, multi-channel service to Canadians.”⁹

In May 2002, Treasury Board (the central agency or ‘management board’ responsible for overseeing spending plans and operations) approved MSC’s first year plan that focused on global research and internal preparation and planning and ultimately led to the development of a blueprint for citizen-centred services to Canadians. Central

to this blueprint is the MSC vision: *To transform service to Canadians by focusing on what citizens need in a way that supports their full participation in the workplace and community.* The vision has four fundamental objectives: i) insure the integrity of social programs; ii) move from the delivery of separate government programs in silos to seamless citizen-centred service; iii) work together as a collaborative networked government; and demonstrate accountable and responsible government. Whereas the first objective is specific to the mandate of HRDC (a department subsequently divided into two, HRSDC and SDC¹⁰) within which MSC was hatched, the latter three objectives are pertinent not only for efforts to achieve citizen-centric service capacities within and across these two founding departments but also across the government as a whole (the vision of Service Canada, examined more fully below).

MSC thus became a vehicle to transform a set of services and programs amounting to over \$70 Billion annually (via an HRDC network of call centres, processing centres, kiosks, web-sites and portals, government offices and third party delivery agents) within a department that counted more than 25,000 employees. Indeed, prior to MSC, HRDC had 170 separate and distinct Internet sites, each of which was managed independently. In MSC's second year, the management of the Internet channel was brought under one roof and the 170 web sites were consolidated into one single web site: the Government estimated that these reforms will generate efficiencies of about 15% of annual Internet infrastructure costs (Dutil et al., 2005).

By 2004, MSC was essentially complete as series of planning and capacity-building measures: GOL was coming to an end and questions were growing about the future of electronic service delivery efforts. These two streams would converge in 2005 with the next phase of the Government's service transformation effort, namely the creation of Service Canada.¹¹

A NEW BUSINESS MODEL

Many organizations assume that success is determined primarily by their product and service offerings, how well they meet customer needs, and on the efficiency and effectiveness of their operations. But in today's rapidly changing and complex environment, the business model is becoming equally important and arguably inseparable from the product and operational strategies of an organization in determining how it achieves success.

A business model defines how a business creates value for their clients, stakeholders and shareholders (Belanger et al., 2007). It defines the core functions that an organization will excel in, the structures and competencies that they need to execute on their mandate and the relationships and strategies it will establish with its partners. A successful business model also defines the competitive advantage that will set it apart from others and make it 'best in class' (Belanger et al., 2007).

Getting the business model right is often the difference between surviving or not, between being truly transformational or simply incremental. Many business models in the private sector demonstrate a simplicity, precision, and focus that can be communicated in just a few words, such as:

- Procter & Gamble Co.'s transformation of its former in-house research and development process with a new '*connect and develop*' model to leverage external networks of inventors and scientists for new product development;
- Dell's '*direct model*' based on the premise that the most efficient path to the consumer is through a direct relationship, with no intermediaries to add complexity and cost; and
- eBay's '*automated online auctioning*' business model pioneered in order to innovatively

and instantaneously match buyers and sellers (Belanger et al., 2007).

Business models are as relevant to the public sector as they are to the private sector. For many years, governments world-wide have delivered service to their citizens through a traditional programmatic business model. This model is characterized by multiple policy departments each with their own set of programs and service delivery channels: it is evidently complex and frustrating for citizens to navigate, expensive and duplicative, and focused on transactions not outcomes. In Canada, the situation has been much the same. As user surveys have shown in this country, they want personalized, high quality service (Heintzman & Marson, 2005). They expect government to provide service that is comparable or better than in the private sector. The successful deployment of the new citizen-centered business model is central to the value proposition of twenty-first century government, in terms of service relevance, innovative design and delivery, and overall performance (Belanger et al., 2007).

The business model that supports Service Canada's mandate is the 'citizen-centered' business model that focuses on people not programs, and puts the citizen at the centre of how government delivers service. There are four defining concepts underpinning this new business model:

1. *Focus on the Citizen.* A citizen-centred organization connects people to the programs, services and information they need, regardless of who delivers them.
2. *Deliver One-stop Government Service.* One-stop service ensures that government is easy to find, easy to deal with and easy to access.
3. *Integrate Citizen Information.* Instead of asking for the same information every time a person accesses government, a citizen-centered organization asks for the information

once and remembers it in the future while strengthening privacy and security.

4. *Collaborate and Partner.* Bringing services together in a way that is easy and integrated requires extensive collaboration and partnering, as organizations work together to leverage their collective potential to create new value for citizens (Belanger et al., 2007).

Service Canada's mission is to apply these concepts in order to improve service, lower costs, and, above all, achieve better outcomes for citizens. The implications of a new government citizen-centered business model are significant and challenging. While much progress has been achieved¹², there is much that remains to be done – as realizing service transformation necessitates systemic change both within Service Canada and across the public sector as a whole.

WRESTLING WITH THREE GOVERNANCE QUANDARIES

In transformation, resistance to change is both unavoidable and natural. Indeed, such resistance can even be healthy in encouraging thoughtful discussion as to the prospective risks and benefits in devising a new approach to doing business. Stemming from these discussions, three governance quandaries have arisen concerning the suitability and potential of Service Canada's citizen-centered business model. They are: first, the dangers of separating policy and service; secondly, a conception of Service Canada as merely a front office window; and thirdly, the perils of weakened accountability through an integrated government-wide service provider.

In terms of the first quandary, tensions have arisen from efforts to separate service from policy, creating the risk in the eyes of some that the necessary linkages between the two functions will be weakened. For proponents of Service Canada and its new business model, however, the creation

of Service Canada signifies a strengthened focus on both the policy and service delivery functions within the Government of Canada. The new service delivery model recognizes the importance of both functions in achieving outcomes for Canadians and provides clear accountability for each. The creation of Service Canada is presented by its proponents as a clearer point of accountability for service in the federal government that will strengthen the government's ability to serve Canadians and meet their needs. At the heart of Service Canada's business model is the recognition of the importance of gathering information about the needs of Canadians through service delivery and sharing that information across government to better inform the policy and program development process.

Furthermore, a well performing delivery network integrated and aligned with policy departments can infuse a cross-pollination of feedback and ideas by better incorporating the views and experiences of frontline staff and citizens into policy-making systems. Moreover, as policy agendas become more complex and more horizontal across departments, an integrated delivery network can help here as well. In today's networked world, the specialized competencies of a service provider can be shared across government to not only better respond to the needs of citizens but also to empower policy units to better focus on their own core missions.

Nonetheless, the realization of such positive outcomes rests on the ability to forge new and much more horizontal and collaborative governance mechanisms between policy departments and Service Canada. These partnering arrangements are central enablers of integrative service delivery (Roy, 2006). They also run counter to the traditional culture of vertical hierarchy and individual lines of resourcing accountability for separate Ministerial portfolios (that often comprise both policy and service functions).

The second quandary stems from tensions between those viewing Service Canada as ide-

ally an initial point of contact with Canadians (providing some service but more often than not redirecting them elsewhere) and those aiming for more genuine integration. In this latter scenario, Service Canada would move beyond a 'front end' single window toward more integrated 'back office' functions. For critics, this would invariably mean a massive agglomeration of departmental operations that will be inflexible, inefficient and unwieldy. Yet the notion of a citizen-centered business model that separates front end client service from back-end processing is out of step with global trends and best practices. Leading service organizations are moving very rapidly and deliberately to integrate their front end and back end business processes in order to better serve their clients at the point of contact (Eggers, 2005). For its defenders, the citizen-centric business model is about achieving better service at reduced cost via a more integrated and responsive service architecture – predicated on improving the user experience.

With regards to the third quandary that is inter-related to the first and second, there is a contention by some critics of Service Canada that the risk of an integrated service provider is a loss of control and thus accountability for individual Ministries. Such concern arguably reflects a deep-seeded bureaucratic culture of silos rather than one of collective performance.

It bears noting, however, that there is a collective logic to Cabinet decision-making in our Parliamentary system, much as it is a more shared and integrative view of outcomes that drive citizen-centric service. Accordingly, this third concern is, in fact, helpful in underscoring the importance of political leadership and innovation in making this new business model work. A government-wide citizen-centered delivery model requires not only strong political leadership but also new accountability mechanisms designed to transcend the traditional departmental-based service delivery models. These mechanisms must provide incentives that enable Service Canada

to forge mutually rewarding partnerships with departments and agencies across government.

For example, with strong support from the Premier, the Canadian Province of New Brunswick established a standalone crown corporation, Service New Brunswick (SNB), to work horizontally across all provincial departments and municipal governments in order to achieve integrative outcomes (Langford & Roy, 2005). At the heart of the SNB business model is a contractual and collaborative framework for establishing mechanisms between policy departments and SNB in a mutually beneficial manner (Pardo & Dadayan, 2006). Despite considerable progress, no doubt in part benefiting from the flexibility accorded by a smaller jurisdiction and thus a more nimble administrative apparatus than at the national level, SNB admittedly continues to struggle with finding this new governance balance and expanding it to new service arrangements.¹³ Similar sentiments have been expressed by officials from other provinces such as British Columbia and Nova Scotia.¹⁴

In the United Kingdom, building on the findings of the 2006 Varney report (Sir David Varney appointed by Gordon Brown as his advisor on service transformation), the British Government has established several high-level coordinating mechanisms to both nurture and oversee service improvement efforts from a government-wide perspective. Importantly, there is a new Cabinet Committee on Public Engagement and the Delivery of Services, as well as a Civil Service Steering Board chaired by the Cabinet Secretary that comprises both permanent secretaries and non-executive members. Additionally, a Delivery Council of senior officials has been tasked with formulating and implementing plans to realize the objectives of the formally adopted Service Transformation Agreement.¹⁵ It is precisely these sorts of high level political and administrative mechanisms that are lacking in the case of Service Canada, limiting its abilities to be a genuine catalyst for cross-governmental service integration.

CONCLUSION

The citizen-centered business model is based on the premise that in order to optimally create service value and better outcomes for the public, government organizations must adapt accordingly. This transformation is not one for Service Canada alone: recognizing interdependence is essential. Service Canada is therefore engaging with all stakeholders, both internally and externally, in order to foster greater awareness, dialogue, and innovation in terms of how decisions are made, how authority and responsibilities are parceled out - and shared, and thus how best to achieve more effective policy outcomes and efficient service.

Although the Government of Canada has often been lauded by external observers for its vision of service excellence, the realization of better outcomes requires that this new business model be underpinned by new governance arrangements of the sort being demonstrated in other jurisdictions. In particular, a culture of collaboration between Service Canada and its potential partners across the federal government (i.e. the policy departments with service delivery responsibilities to accord to a specialized service entity) must be encouraged through both the direct commitment and engagement of political leaders and senior officials and organizational innovation.

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ENDNOTES

¹ This section draws freely from the following article:

Roy, J. (2006). E-Service Delivery and New Governance Capacities: 'Service Canada' as a Case Study. *International Journal of Services Technology and Management* 7, (3), 257-271.

² Among others this definition was deployed by the Government of Mexico in recent years, though its' precise origins are unknown. The author adopted it as the basis for a recent article that developed the framework of the four dimensions discussed in this section (Roy 2005).

³ Source – Statistics Canada (<http://www.statcan.ca/Daily/English/040923/d040923a.htm>).

⁴ An April 2005 cover of Business Week Magazine, for instance, forewarns readers that 'IBM wants to run your business'. The article discusses IBM's plans to rely less on sales of computer products and systems (increasingly viewed as a commodity industry of lower margins and intense competition both in the US and around the world) and more on strategy consulting and partnering relationships that would see IBM take on the management of increasingly core responsibilities from its clients in order to better align technological and organizational infrastructures with performance outcomes.

⁵ The results of such surveys are summarized and made available in a very general form in the annual reports for the GOL exercise (http://www.tbs-sct.gc.ca/organisation/ciob-ddpi_e.asp).

- ⁶ There are three main sub-selections from the main portal: Canadians, non-Canadians and businesses, the logic being that the sorts of information and services required by online visitors generally falls into one of these three camps. Accordingly, with just a few clicks users are more likely able to find the information they seek (www.canada.gc.ca).
- ⁷ In its 2005 GOL Annual Report, the Government of Canada reports that over 40% of individual tax returns were filed online in 2003 (a level expected to increase to nearly 50% by 2004) and more than 90% of federal job applications are now received online. The report, detailing and profiling all service offerings is available at: www.gol-ged.gc.ca.
- ⁸ http://www.pwgsc.gc.ca/text/factsheets/secure_channel-e.html
- ⁹ These quoted captions are from internal MSC planning documents made available to the other by MSC managers. They have also been used as a basis for a case study focusing on the private sector's role in collaborating with the federal government's lead MSC department (then HRDC) responsible for MSC (Dutil, Langford and Roy 2005).
- ¹⁰ In 2004 a new Prime Minister would spur a recomposed Government with a separation of HRDC into new departments each with their own Minister and unique mandate (nonetheless closely aligned and enjoined by subsequent Service Canada plans examined more fully below): Human Resource and Skills Development Canada (HRSDC) and Social Development Canada (SDC).
- ¹¹ The formal announcement of Service Canada was included in the 2005 federal budgetary package (as part of an allotment for service improvement initiatives). Cabinet approval for the concept was given in 2005 – although a number of machinery and governance issues remained unresolved at that time, most notably whether the entity is to have separate departmental status and its relative powers to work in concert with other departments and agencies: in whatever form it eventually takes it will likely begin as an evolution of MSC, working primarily as a regrouping of service functions from both HRSDC and SDC. An initial notification of Service Canada was sent to employees of both departments in late May 2005, and more formal public announcements re mandates and restructuring are expected in the fall of this same year.
- ¹² The 2006 annual report providing a summary of progress and results is available at: http://www.servicecanada.gc.ca/en/about/reports/ar_0506/pdf/highlights.pdf
- ¹³ From an interview with a senior SNB manager in January 2008.
- ¹⁴ From presentations made at a November 2007 conference on service transformation: www.transformingservice.ca
- ¹⁵ For details the agreement is available at: http://www.hm-treasury.gov.uk/media/B/9/pbr_csr07_service.pdf

Section III

Service Oriented Methodologies and Processes

Chapter XI

Breaking Mind Inertia for Humane Business through E-Governance

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ABSTRACT

The changing economic scenario is redefining the socio-cultural dynamics. The notional domains of conventional concepts are changing and therefore humanitarian commerce is emerging as the new thrust area. This chapter examines the possibilities of penetrating the mind of individual entrepreneur to facilitate shift of focus from excessive materialism to humane business. The main structure of this chapter consists of basics of mind inertia, of humane business, and of restructuring the business values. The inter-relationship is vital and visible. The mind inertia cannot be broken without shifting the focus of business from materialism to humane which is possible by evolving a neo-ethical framework. This conceptual construct is based on the premiss that individuals in consonance with their desires define function of money. This is coherent with fact that to redefine the function of money the “desire” management is inevitable. The inter-mobility within these three basics can be increased with the intervention of e-governance.

INTRODUCTION

All social structures are composite of various functional units, which pave ways for in-roads of development. The parameters of development though vary from polity to polity and so vary the

strategies but the core index of development must be constructed by having the measurable quanta for economic as well as for human activities. The commercial functions are important for generating capital but misappropriation of capital may lead to imbalance in the society thereby leading to the social disintegration. The reversal of this

process should be the most urgent area of concern, for this, the activity needs to be undertaken at the mind level, which in turn would mean changing the whole perspective to look at the life objectives from an entirely renewed focus. The mind inertia refers to the lethargic state of minds of commercial people where they do not think beyond the context of materialism. This inertia needs to be broken before molding the mindsets of people in business for developing the inclination for humane activities by drawing philosophical content from the historical rooting to understand the focal construct of contentment. The technological proliferations have facilitated the penetration into individual's psyche, which if utilized properly can set the right direction to build a balanced society. The importance of this analysis can be substantiated with the logic that earning money unfeelingly for satisfying materialistic desires is making people richer but at the cost of losing right vision. The excessive indulgence in to moneymaking activity is disturbing the pace of peaceful coexistence. This is a normative analysis aiming at the preparation of a road map to take on the road that is so far less traveled by our business tycoons. This will require the perpetuation of eternal values and taking an attitudinal u-turn from excessive materialism. It is divided into three sub sections viz., Basics of Mind Inertia; Basics of Humane Business and Basics of Restructuring Business Values vis-à-vis the role of e-governance. The amalgamation of commercial functioning with humane thrust will entail full conviction and open mindedness due to its transcendental nature. To have a better insight it would be pertinent to analyze these basics with more elaborations.

BACKGROUND

This work focuses on the normative dimension of building ethics by advocating for configuring the business values through e-governance. Issues of e- governance and business ethics have

been given importance in recent times specially when alternative business model need to be built. This interface between Ethics and Information Technology though is in nascent stage but few recent studies and efforts can be quoted as the referral works within this realm. The E-Government Strategic Plan issued by the Department of Labor, in USA is transforming the way it serves its customers as part of business activity. This framework categorically uses the integrated approach to identify the customers who are served by various agencies and also to improvise the services within the framework of this strategic plan. Further in E-Government Partnership the component of Business focus and organizational capability are emphasized. The Information Technology focus identifies enterprise architecture and security as the important areas of functional jurisdiction including the improvisation in customer values. To relate people, government and business the initiatives by the Government of Korea regarding the project, Business Process Reorganization and Information Strategy Planning were carried out for three months from June to September 2004 to establish an action plan for phased implementation of Online Citizen Participation Service is important to support the constructive interface. In continuation to this The Korean Government has introduced a Government Work Process Management System called On-Nara Business Process System (On-Nara BPS, 2007). It has also developed the Business Reference Model, which is changing the conventional system with new notions of attaining humanity with technological inputs. The Ethics Recourse Center since 1994 is conducting regular surveys to create inputs for various organizations. For instance National Business Ethics Report Survey in 2005 reported that in response to the ethics program designed by this Center those Companies which had this program only 29% of employees failed to report the cases of misconduct whereas 61% cases went unreported where this program was not introduced. In New Zealand the Ministry for State Services formally

launched Enabling Transformation: A Strategy for E-Government reflecting the changes in the Information and Communication Technology and its impact on the people who have particularly grown in the era of Online World. This has also identified the goal for 2020 as the futuristic strategy discussed in the Forum Building Information and Communication Technology Professionalism in New Zealand (Doug Martin, 2008). In this direction the reference of Discussion Panel led by UNDESA & UNECA on Promoting Public Administration Innovation through E-Government held in Addis Ababa, Ethiopia from 11-13 December, 2006 is important for it examined the changing face of society in the light of e-government through internalization of values of integrity to keep pace with the changing scenario. The contribution of IGI Global's reference works is enormous in exploring the various aspects of Information Technology and its multifarious usage. The human side of technology has been surfaced by the efforts of this major reference group, which has been compiling research works world over to find out the solutions for maintaining the quality of life. The socio-economic aspects of Digital economy have been explored comprehensively to visualize their impacts on business transactions, technology, culture and education. (Harbhajan & Singh, 2006). The Information Technology Ethics Cultural Perspectives as a single reference source has brought about the diverse ethical issues evoked by information and communication technologies with possible resolutions at the forefront to work out the global strategy and have proper integration. (Hongladarom, 2006).

The concept of Data Integrity closely linked to the ethics explores it from the perspective of Wholeness, Entirety and Soundness in relation to adherence to a code of especially moral values and emphasizing why each enterprise must first choose an acceptable working definition for Data Integrity to assure the moralistic bases. (Barquin, 2007). The National Business Ethics survey done in 2007 on more than 2000 employees from private

sectors reveals that strength of ethical culture is declining and only 10% of US companies have strong ethical culture. The EthicsWorld.org is a Development Gateway Foundation's site committed to deliberate upon the issues related to digital governance, digital commerce, e-learning, and digital economy connecting various sectors to discuss different aspects of governance including ethics. For instance the EthicsWorld.org 2008 is a website linked with the dissemination of information on issues like institutional governance, business ethics, and anti-corruption by compiling read database of *online news*. This website is bringing out discussions on the issues like ethics and employees focusing on how the Managers of Corporations demonstrate respect for their employees and promote high ethical standard in the organizations. Many studies have examined the difficulties in developing Corporate Social Responsibility program by proposing a prudent policy framework of analysis. Further issues of ethical inculcation into this concept have also been incorporated that will help in identifying and clarifying the fundamentals of evolving a realistic action plan, (Etang, 1995). The works mentioned above reflect seriousness and inquisitiveness of scholars from various fields to come together and open productive dialogue on how deconstruction of conventional precept is possible. In an effort to understand the socio-psychological dynamics it will be pertinent to explore yet another less talked about but important aspect of business activity.

ISSUES

There are three important issues, which have been highlighted to understand the mechanics of breaking mind inertia at three different levels viz., at cognition level; at activity level and at business level. It will be pertinent to elaborate each issue at each level discretely.

Basics of Mind Inertia: The cognition is the function of mind and rationalization is the basic activity that affects the behavior of the individual. The mind inertia as referred earlier is the state of mind, which develops the fixity towards certain ideas thus blocking the mobilization of thought process. In this context it will be interesting to understand as to how does sedimentation of ideas, opinions and philosophies become the major directing force of controlling the different aspects of individual personalities as an offshoot of relationship between cognition and behavior. The outlook to view any phenomena and build-up finer contours of perspectives thereby is determined by these regimented and collected versions that lead to the captivity of visions. These captive visions may be detrimental for the healthy structuring of society because this might lead to the indulgence of those practices, which may pull apart the universal bond that binds the world together. Thus it will be pertinent to analyze the causes of mind-inertia that probably constitute the formation of basics of this process,

- the surroundings that orient the mind sets
- the perceptions that build up the attitudes
- the notional contents attached to the concepts
- the limited opportunities available for productive and sensible life patterns
- the effects of practices percolating down and affecting the societal echelons

The mind inertia hence explains the lethargic state of minds of commercial people where they do not think beyond materialism. When seen from these perspectives business activities become the areas of serious concerns as their repercussions have magnifying effects at the societal levels. So immense is the effect that socio-ethical frames of performing various activities also get directed towards materialism. Moreover the perceptions of general public are adjusted to the acceptance of converting every act into money making rather

than looking it from philanthropic perspective. At this juncture it will be pertinent to comprehend how the perceptions of general public also gets reoriented by often recycled attitudes regarding approach to understand the life objectives and adapt to the patterns thereafter.

The business activities are no exception to this proclivity. Often these activities are linked with money generation. The core of content exchanged between different role players mostly centers round discussing the ways of moneymaking and younger generation is also being personified with this function. The role of print media, telecast material, Internet etc. in spreading this message is crucial. The impact of this is enormous as competition is crisscrossing various lanes of social structures hence molding the primary concepts.

Basics of Humane Business: The Gandhian philosophy of social trusteeship which perpetuates the principle of relating process of generation of money with it's utilization for the welfare of marginalized groups can be considered as the first step towards defining what we mean by Humaneness. This bridging alliance between the commercial functioning and humane functioning can form the basis of evolving a model with fresh perspective. Finding out can ensconce the mechanics as to why there is need to have humane content in business. The need precisely arises because,

- the excessive lust for money is disturbing the ambience of social formation.
- the divisive forces are getting strengthened and thereby contributing to the creation of unequal and unjust society.
- the desires are mushrooming and getting whimsical due to power of money and more so the effects are transmitted at all levels.
- the emerging threats are sending signals of the human extinction.

The basics of humane business demand the reversal of the trend of making excessive money by

focusing sharply on evolving modes and ways of productive coexistence. This in turn would mean deriving the business core with humane content. The consistent efforts have been made to enrich the literary dimensions through dialogues and writings for instance Friedman (1992) has presented through case studies the misuse of money and also has discussed about the role of money in future. The humane dynamics of business world has focused on issues related to human values in technological society. The notions of liberty, justice, efficiency and progress that have been introduced in the business world are providing a new impetus to undertake commercial activity keeping in view the human focus, (Green, 1971; Bushman, 1980). Recently on June 21, 2007 nineteen people gathered in the Utopia Theater at Interband to have Human Business Dialogue to evolve a constructive interface between technology, money and humanity. In exploring the relationship between corporate and humanity Pradip Khandwalla (2007) has focused on management of corporate greatness by examining the concept of corporate goodness, which means desire on the part of corporate management to operate according to an idealistic motive. According to him it can take many forms like corporate charity; business ethics; corporate social responsibility. In all these forms the urge is to go beyond the mundane to something that is exalted. The concept of corporate goodness needs to be inculcated as the part of corporate management and this reflects the direction in which the business activity is moving. The social responsibility of corporate houses is now the vibrant area, which is perpetuating the idea of upholding the human values.

It will be insightful here to evolve the basics of humaneness in business by,

- inculcating the virtuous values by the business houses within their working and non-working jurisdiction
 - nurturing the service based alliance between various partners of the business activity i.e. producers, consumers, society etc.
 - identifying the obsolete sets of functional values which are detrimental for the individual institution. These are also inhibiting the process of social transformation.
 - developing the productive linkage between formative institutions which are responsible for value formation and commercial institutions, and
 - improving the accessibility of Information Technology to bring out buoyancy in business and its usage to propagate the message of humaneness.
- Basics of Restructuring Business Values:**
- The most important and resisted task is the inoculation of humaneness in business activity. This involves a marathon exercise right from re-orientation of the minds to the internalization of new business value molds. This requires workable strategic interventions at cognitive, behavioral and extensional levels so that reversal of mechanized business can be made possible. At the cognition level a thought of perceiving human dimension has to be internalized. Through e-learning it is possible to sensitize people in business by frequently sharing the literary collections and discourses on this aspect. There are many groups working for articulation of different views on the subjects like integrity, morality and spirituality with the help of computer networking and such exchanges are self-elevating for the participants. The initial sedimentation of ideas can only be redirected by continuous and open participation, which can be facilitated through electronic connectivity. The business partners can be motivated to think in terms of building up these values so that their decisions and actions become more comprehensive and driven by humaneness. This will need,
- inclusion of integrity and morality in thought process through e-education

- to reverberate at the mind level the role of money in eradicating the misery which can be activated through e- governance
- recycling the need of setting the optimal limit of the desires at certain level so that enough resources are left for the people to meet out their needs respectfully, and
- preparing the mind-sets for using various digital devices in building up values by transmitting messages with moral laden subjects.

The behavioral dimension reflects the conversion of cognitive capability of commercial functioning based on benignity leading to the pellucidity of action at the behavioral level. The inhibition of materialistic desires may lead to masking, resulting in the duality of thought thereby affecting the behavior. The power of money which otherwise is divisive can be utilized for nurturing the needs of marginalized sections of the society through world social networks on governmental or non-governmental websites. The economic justice is the prime responsibility, which can be attained easily through e- governance and once socio-economic dynamics reaches at the sustainable level a neo-ethical framework can be enforced. This in turn will require,

- more transparency in the system through e-governance to bring mind and action in unison
- self-vigilance in behavior to impose discipline in resource utilization so that humane oriented business then may become prevalent activity
- a moderation of behavior to change the concept of money power by not emphasizing the physical growth as the sole indicator of development
- preparing the business houses to adapt to simpler life patterns by defining the money functions as enshrined in Vedic literary

discourses and similar collection of eternal works.

At the extensional level, penetration is the key to break the mind inertia. The man-machine combination has enormous capacity to deconstruct deeply rooted opinions and reconstruct the vision of symbiotic existence. The Information Technology has facilitated the connectivity and this opportunity needs to be utilized in the appropriate manner without apprehensions and dilemmas. The dualism can be dealt by percolating the sensibility of conducting business with human thrust. The justifications and compulsions emerging due to changing scenario must be discussed with open mindedness. The newer equations that are emerging due to shrinkage of world spaces are increasing the level of inquisitiveness amongst the common person. The enhanced level of awareness is constructing a general perception regarding the role of excessive moneymaking in disturbing the pace of natural as well as sociological phenomena, therefore people are most likely to put pressures on the business houses in response to the nature's call before world enters into irreversible situation. A recent phenomenon, which is well perceived by younger generation, is involving themselves into the process of creating a just society and also their intentions to work for managing the human concinnity is understandable. This will further need,

- to know that resources are indispensable and scars of their being over-utilized can be seen on nature
- to know that synthetic replacements are adding to miseries of mankind because mostly these are converging into health hazards
- to know that excessive pumping of money is causing a peculiar phenomenon of getting into virtual disharmony which mean to have real loss in terms of erosion of ethics ,and
- to know that final itinerary of business is through self-realization.

The immediacy of listening to the rhythmic sound of consciousness can be activated by the use of digital devices as these have immense capacity of reaching out to people and furthering the process of soul transformation.

The logistics of restructuring the business values is scientific and rational. It follows the sequential logic as,

- setting out the coherent strategies for controlling the unproductive and destructive desires of making money by the people in business.
- controlling such desires will lead to the rationalization of demands from common people.
- rationalizing such demands will lead to the regularization of needs in such a way that a desirable level of contention is fixed.
- regularizing needs will lead to the imposition of the self-discipline which in turn will redefine the notion of business.
- redefining the business periphery will lead to the construction of neo-ethical frame of carrying out activity with the eventual objective of bringing peace.

Thus the attainment of peace through business can be put in to practice with the help of e-connectivity at the initiation of e-governance right from the local level of governance up to the international level. This will also change the power hierarchy of different nations, which have been labeled with different categories on account of concentration of wealth.

SOLUTIONS

Redefining Business Alternative Ideals

The ideals are accentuation of values to their optimal state. The maintenance and sustainability

of such a state is not possible without integrating the structural and functional aspects of public institutions. This integration can be facilitated by intercession of e-governance especially in propagation of moralistic ideals. The mind inertia can be broken by continuously infiltrating into individual's domain of cognition by implanting the changed versions of money and its utilization for fighting miseries of lives of others. The conversion of Self-centeredness into Selfless-ness is possible by circulating well-framed business ideals through e-connectivity. The mobility can only be ascertained through governmental initiations by establishing a system of connectivity amongst people that will empower them with right frame of mind by using e-learning modules. Hence there is a need to define the business alternatives other than moneymaking, especially in the sphere of social responsibility as well to sensitize businesspersons regarding their reverential paybacks to the society. There has to be a proper mix of inherent value patterns and adapted value patterns, which can be collected and disseminated, with the help of digital devices. While looking for the alternative business ideals in the era of technological proliferations it would be pertinent to take a historical journey to understand how over the times the human values have been reshaped. Philosophers like Hobbes, Locke, and Rousseau who have propounded the notion of 'free will', further accepting that individuals are 'free moral agents' who are capable of making decisions, controlling their destinies and engaging in social contract (Macpherson, 1962 & Cohen, 1995). Another important philosophical insights that guided the business theory and practice is 'rationality' believing that people are fundamentally rational beings are provided by philosophers such as Descartes (Stephen, 1997) Spinoza (Steven, 1999) The focus on this aspect and the assumption of 'Homo economicus' remained unchallenged for almost three centuries until Herbert Simon challenged the idea of rationality by proposing the alternative concept of 'bounded rationality' (Simon, 1972).

Another stream of philosophical beliefs included 'atomism' influencing the business ethical foundations. For instance Locke's analysis of society as the aggregation of independent, autonomous individuals pushed forward the idea of evolving individualistic oriented activities. Another philosophical parallel reflected in Rousseau's discourses viewed society as an organic collective that would become the integral part of business philosophy thus the key ethical unit is individual. Friedman (1969 & 1996) has made this assumption as the basis of his interpretation when he argues that corporations have no moral responsibility he contends that only the individuals within the business entities have the moral responsibility. However coming to other modern business trends reflects the mechanistic orientations. Smith (1759&90), borrowing terminologies from Physics explains economic phenomena. For instance look at his usage of the terms like 'equilibrium' 'labor force', 'elasticity', 'income accelerator' etc. Another important key concept of 'psychological egoism', which says that all actions are motivated out of self-interest, has been propagated by 'enlightened self-interest school' consisting of Shaftesbury, Mandeville, Hutcheson and Smith as the core concept of modern business, (Bracken, 1965). For instance Hutcheson has accepted the confluence of public and private interest but he attributed the mechanism not to rational self-interest but to what he called 'moral sense' (Kivy, 2003). Adam Smith goes further by saying that one has to act according to the dictates of one's moral faculties and ultimate pursuance has to be for the happiness of 'mankind'. (Rawls, 1971).

Theorists like Walras (1874) who has developed four-equation general equilibrium model epitomizes by saying that individual self-interest operating in a competitive market places produce the unique conditions under which a society's total utility is maximized (William & Walker, 1983). A similar exposition is of Vilfred Pareto who uses 'edge worth box' to explain the principle of 'social optimality'. (Pareto, 1906). The economists

have used this theory of 'utility' to construct the model of 'human action.' Jeremy Bentham (1781) assumes that people are 'hedonists' i.e. they prefer more satisfaction to less satisfaction, (Philips, 2006). The humane business is more nearer to the social welfare functions of economics; to this the contribution of John Stuart Mill (1848) is of prime importance whose discourse on utilitarian calculation of obtaining greatest good for the greatest number holds valid in modern times, (Brink, 1992). Peter Drucker refers to business as enterprise, which shifts the focus of how to carry out the business to define purpose of business as creating a satisfied customer, (Drucker, 1954; 69; 85; & 97). On this line Paul Lawrence has explored the relationship between the structural characteristics of complex organization and technical, market and other condition of their immediate environment (Lawrence, 1967). At this point in time reference of Klemptner is also important who states that theories of ethics and business are often at odds and that one might even have to suspend the normal ethical consideration that would apply outside of business in order for a business to be possible. (Klemptner 2005). In similar elucidation Francis Bator also highlights the need of welfare maximization. (Bator, 1957). Seen from Indian panorama Vedic literature provides an in-depth insight about the accumulation of wealth without loosening the ethical fabric that configures the society. The Vedic dictums have shown the path of accumulating wealth by righteous means to be used for spiritual benefits. A passage from Veda categorically states that without wealth a man does not have an honorable position in the society (etav An Khalu vai Parusha: Yavadasya Vittham). For the clarity here honorable position does not indicate the ostentatious-status rather illustrates the respectful livelihood through ethical means. Regarding circulation of wealth and money it says that it should be as wide as possible within the framework of morality and ethical values. It condemns the miserly hoarding and mindless spending for self-gratification. Contrary to this

it strongly recommends that the wealth accumulated through dharmic (righteous) means must be shared for the welfare of fellow beings. It specifies the four goals of human life as, 1. wealth/arthA 2. desires/kammA 3. righteousness/dharmA 4. liberation/ mokshA. The value frame attached to this is economic value; psychological value; moral value and spiritual value respectively to be integrated by individuals in their personal value schemes. In Sanskrit it says, “artham anartham bhavaya nithyam naasthi tatha: sukh eva satyam,” which means there will not be a particle of happiness at the end from the both. This is eternal truth (Radhakrishnan & Moore, 1957; Majumdar, 1974).

These pearls from archives of knowledge make the purpose of money making very clear. For constructing the neo-ethical business frame in modern era, the mechanisms spelt out in humane literature need to be reintroduced in such a way that the generation of enormous wealth by few can provide respectful essence of life to those who are being marginalized due to their deprivations. The management of various kinds of induced divides within and outside the nations is the right key to have purposeful growth.

The economic justice is based on the construct that the differences between developed and developing nations on account of money-value have to become non-existent. If we are able to reduce these differences to zero level it will subsequently configure the social structures on the basis of confederacy rather than on the basis of non-productive competitiveness. If we accept the principle of union, then world can be visualized as a unitary whole consisting of different nations as the potential partners in the process of development. The index of development needs to be evolved on the basis of having equal accessibility to various natural resources and the social justice attained thereafter. The role of polity in evolving consensus on devising universal parameters for ensuring the responsibility of business houses regarding sharing of natural resources

proportionately along with sustaining the biodiversity through e-mapping is important. The role of e-governance in preparing precise details of available resources with all markers about the abundance of resources within the geographical boundaries needs to be highlighted in the larger interest of the mankind.

The Business Alternative Ideals are not based on the negation of money rather refocus on limiting the desires to earn. This requires constructing the neo-ethical framework for trade and commerce based on the concept of using money as the means to achieve higher values.

As also mentioned earlier emerging concepts like corporate greatness are helpful in reorienting the objectives of business. Scott (2000) argues that it is possible for the Corporation to inspire and harness comparable, committed, and coordinated energy. He refers to this process as ‘Reinspiration’ an important dimension of Corporate Greatness. In addressing to the connection between ‘goodness’ and ‘financial performance’ he presents his viewpoint by saying that if Corporate Social Responsibility is associated with higher financial performance and lower risk, the goodwill would rise with increasing Corporate Social Responsibility. He further points out that a profit maximization and goodness restrict investment, strategic and operating options. When it is pursuing the one of the goodness paths it filters out inappropriate options. To have an empirical overview for instance Malaysian Airline has been trying to inculcate some values like unsullied character, gratefulness, trustworthiness, sincerity and discipline amongst its employees. The Microsoft founder Bill Gates while addressing in Davos, (January 24, 2008) advocated for a new form of capitalism, which would help the neglected sections with better services. He observed that global economic conditions have been improving but not everyone was sharing in the benefits. The focus has been on highlighting the limitations of the conventional concept of capitalism, which do not take in to account the other key driver of human

behavior i.e. the desire to help others. Calling this new form as Creative Capitalism which refers to the approach where governments, business and NGOs work together to stretch the reach of market forces so that more people can make profit or gain recognition doing work that eases the world's inequalities. In modern era when concept of capitalism is changing it is necessary to intertwine the volumes of values as clear by above analysis in to the business world. The strategic modifications are important which are not possible without governmental interventions. These interventions can be introduced through e-governance, which can facilitate formation of values at the formative years by propagating compiled material in the form of e-learning packages. Thus the role of e-governance is not redundant in restructuring the basics of business values. The inevitability of including human perspective in business is redrafting the core content of entrepreneurial activity hence the prognostic analysis would be needed to highlight the basics of constructing the neo-ethical framework.

FUTURE TRENDS: NEO-ETHICAL BUSINESS FRAME

The future trends are clearly visible indicating the creation of knowledge-based society with the help of e-connectivity. In the era of technological transformation where e-business is responding to the emerging forces, the onus of integrating the divergent activities lies on the government. This also involves the formation and perpetuation of neo-ethical framework to incorporate business fundamentals such as inclusiveness, humane drives, conscientious action, simplified life patterns, and such simpler aspects of human life into the practicing configure. The modern governmental system has adopted e-governance as the mechanism to reach to the people hence the role of e- governance in defining the business

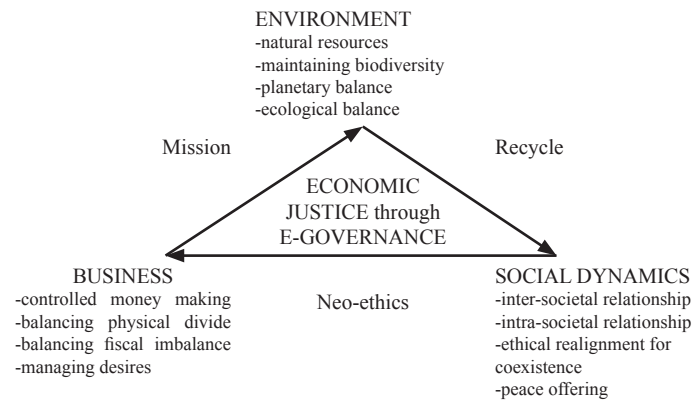
alternative ideals can be seen from the perspectives of,

- compilation of literary works on virtuous values available by using electronic connectivity
- preparing the consolidated document regarding values which can guide any professional activity irrespective of its nature
- perpetuation of values enshrined in the testaments world over through e- connectivity
- introducing the system of cyber vigilance to check erosion of the transcendental values identified earlier, and
- inoculating these values in the business arena.

While compiling, preparing, perpetuating, introducing and inoculating are processes that can be facilitated by e- governance, the institutional support needed to carry out pragmatic policies in each functional unit is possible through e- government networking.

It will be interesting to evolve a slightly modified business matrix enough to generate and circulate money in order to deal with the penurious conditions which is widening the gap between nations and enforcing a new power divide. Two simultaneous processes one of globalization and another of polarization are shaping the business activity in a very peculiar manner. Through globalization common plateau to design the basic activities is building up while through polarization individual identity defined by cultural specific traits for business is shaping up. Seen from this perspective it will be pertinent to view the identification of universal sets of values as highlighted earlier by taking into account their relationship with environment, after impacts of newer technologies and social dynamics. The cyclic schema can explain the triangular relationship by focusing on how one activity component will induce desirable outcome in the other activity component and the result will be creation of eco-

Figure 1. Intra-societal dynamics (Source: author, 2008)



nomically justifiable world. The three vertices of the triangular schema reinforce the input-output conversions in any extreme. The resultant output can be inharmonious or it can be harmonious depending upon the pulling up of string i.e. if excessive money is the aim then it will lead to ecological imbalance which might subsequently converge into social discordant. The process will reverse if the humanity is at center stage.

Though it is self-explanatory but a brief elaboration will be necessary at this point of reference. The three most important activities that are undertaken by different organizations at mega level include Business, Social Dynamics and Environment protection. The nature of these activities ranges from economical to socio-ethical. To add further the ultimate mission of the business must be to maintain the ecological balance without disturbing the biodiversity, but this has to have the social compliance, which in turn will require the harmony of relationships at various levels through ethical realignments. The realignment with the purpose of offering alternative of peace to the world of conflict will lead to the construction of sub-goals of business entities, which will eventually lead to the confluence of divergent economies at the same platform of equality. The role of e-governance is very definitive in policy documentation and implementation

and therefore must be strengthened to evolve a responsive system, which is sensitive towards the human needs.

The fundamental conditions that are essential to make neo-ethical framework for business to be operationally viable include elimination of business activity that aims at mass destruction and providing business impetus for upholding socio-economic harmony around the globe. The Digital devices are the important tools for identifying which activity needs to be included or excluded, as it will be easier for the institutions to compile the precise information at a faster pace. The values of business need to be measured in terms of humane enrichment and the contribution such values make for the internalization of virtuous elements so that mind inertia can be broken. In the process of social dynamism the human element is an essential ingredient but with the changing economic scenario and more money pumped into society the human matrix is also reshaping itself. A proper convergence of money and human forces into business by adopting the neo-business ethics probably holds the key of future society. Therefore the future social configuration will need to develop a proper synergy between money and human functions especially in the business arena. The strategic trajectory will involve the following stages.

- a. Consensus Building
- b. Conceptual Inclusiveness
- c. Converging Process

Consensus Building

This is the most difficult stage because it involves the penetration into psyche of others. As mentioned earlier the fundamental cause of mind inertia is self-created captivities, which are difficult to perforate. But human mind is receptive to learn innovations provided these are systematically structured. The e- networking is important tool for tuning the individual mind to assimilate other's viewpoints as well, on various aspects of economics. The economical deviations from extremes are also visible because polarized concepts are unable to provide the workable solutions to manage deprivations. The consensus is needed to re-vision the business mission on the basis of values enshrined in older testament and emerging values, which can be amalgamated, to draw conscientious based business actions. The consensus has to be drawn in identifying transactional areas which serve the larger human interests; marking the prohibited business areas which are harmful; transparent strategic interventions with no concealments; and universal approach to maneuver humanity.

Conceptual Inclusiveness

The aspects on which the consensus is drawn need to be converted in to conceptual propositions with either redefined notions of existent concepts or newer theoretical constructs to explain the emerging phenomena. In this regards some are referred earlier such as 'creative capitalism', a very recent proposition that can be worked out at the conceptual level. Even many more can be thrashed out like 'legitimate socialism' focusing on how to control the formation of harmonic social structures; 'human motive of money' finding out the ways money is not linked exclusively

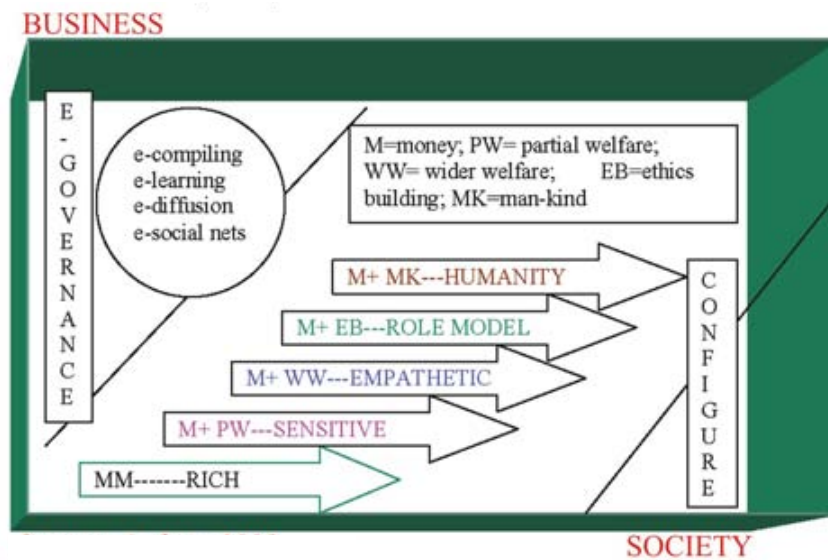
with profit making etc. Construction of formats with pure theoretical orientation would be necessary to put forward the idea of changing mind sets of people to accept in principle the service content for carrying out business. The theory building with scientific precision in the newly identified conceptual arena will hold the key of furtherance of knowledge. Thus identification of variable parameters to carry out the research and sharing the results with the larger community across the countries has to be facilitated through e- governance.

Converging Process

In addition to the philosophical content, realistic analysis with appropriate adaptations to apply these concepts will be needed to complete the model. Thus two simultaneous processes one of identifying the supportive mechanisms and another of eliminating the impedimental factors have to be designed as the part of major policy of e- governance. A detailed package containing information regarding the contents of concepts, the application mode and the intensity of humaneness has to be made accessible to the various partners. An on-line facility to register reactions of partners regarding the operational deficiency will make effective conversion of the formats possible. The impedimental factors like unhealthy, undesired and unplanned competitions in the race of making profit need to be eliminated from the definition of development.

The business and society interface can be represented with the help of hierarchy of business purposes as depicted in the fig.2. The lowest tread of the arrangement shows moneymaking, as the sole purpose of undertaking business activity and the respective societal role of the person will be accumulator of exuberant wealth. The second ladder demonstrates that money is also slightly diversified into some welfare activities thus modifying the role as the welfare-activist ready to invest money for social works as well.

Figure 2. Business society interface (Source: Author, 2008)



The third rung illustrates expansion of the earlier role with wider perspective added to the welfare activism. The fourth however is more intensive as money from the business activity has to be utilized for the perpetuation of ethics. This is the role of a change agent which when imbibed by the business people can create a better society. The last ladder signifies the reincarnated role of a business man by relinquishing self-driven goals to the higher humane goals and making money for the mankind hence the transformative role taken up by the business people can bring out the real changes in the societies. Thus at every step there is a need to work out the strategy to break mind inertia to get oneself freed from the captivities.

This schema is multi-dimensional proposing the role of e-governance in compiling, learning and diffusion through social networking to help the business people to move higher on the ladder and transferring the results at the societal levels by reconfiguring the business structures as per the desired transformations. Bringing out changes in

the formative years of personality development can break the mind inertia and renewed vision can be internalized in the later period of man's life.

CONCLUSION

Epitomizing the analysis following synthesis can be presented in nutshell. The concern by intelligentsia and people working in various spheres to develop workable theoretical constructs is genuine for the prognosis of society. The technicality of social development involves both technological and non-technological aspects interwoven in such a way that resultant impact can be created in the desirable manner. With the help of e-tools or more appropriately of digital tools, the governmental and non-governmental functionaries are projecting precise images of world scenario. The virtual images for future world by computing the exact value in terms of quantitative as well as qualitative attributes of inputs required to configure the

business structures can be converted into reality with the help of e-devices. The interdependency of various components recycles the resultant impacts in the multifold manner therefore a scientific approach is needed to plan the 'strategic basics' of evolving the integrated model of carrying out business activities by incorporating the neo-ethics frames. This frame, which centers on the enhancement of inner strength is necessary for ethical concinnity and refocuses on soul journey. The relationship between money as economic resource and money as the instrument for social transformation is very distinct. The purpose of money generation must be to manage the deprivations and dehumanization rather than increasing the index of richness. The role of e-governance is crystal clear, as the responsibility of introducing rational policies within the legal frames is that of the government. The groundwork for collecting information, to incorporate the information into policy document in an evenhanded way and to make common man aware requires the usage of e- tools. In the modern era speed, strategy and stimulation are the essential components of having business with humane thrust and technology is the potential tool of integrating them all into a unified mode of functioning. A change is rhythm of our existence and so is the quest for higher humane goals. It is therefore essential to create the world of peaceful coexistence by working out for more humanitarian approach. The focus has to be unambiguous, the policy has to be prudent, purpose has to be sanctimonious and means have to be scientific and technologically apt for extrapolating the impacts at various levels. To get freedom from the captivities is not impossible only formative learning needs to be made more effective. The impact of formative years of learning on personality development is decisive. Seen from this standpoint if rightly framed mindsets within moralistic framework are introduced at early stage of socialization then people with right focus and larger perspective of humankind will subsequently transform the concept of commercial business into humane business.

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Chapter XII

E-Participation in Local Government Decision Making: Swedish and Australian Case Studies

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ABSTRACT

Modern society will only reach its potential when citizens individually and collectively are able to use their knowledge and capabilities to shape their lives and communities. Citizen participation in government decision making that uses online technologies is one way of leveraging this capacity, and has been termed e-participation. Case studies of a Swedish and an Australian local government examine how e-participation fits into initiatives to increase community involvement in decision making. Interactive chat sessions between stakeholders can facilitate debate. Information portals can provide supporting information in interesting and accessible ways. E-voting can enable greater input and influence by a wider number of citizens. But ultimately the technology choice and e-participation implementation must be driven by the objectives of the engagement exercise, and these can range from better decisions to community capacity building and issues of trust and legitimacy.

INTRODUCTION

Modern society will only reach its potential when citizens individually and collectively are able to use their knowledge and capacity to shape their lives and communities, and consequently citizen participation in decision making by governments

has become a dominant theme in public sector management and governance (Box 1998; Thomas 1995), along with the question of how internet channels of communication might facilitate these initiatives (Coleman & Gotze, 2001; Macintosh, 2007a, 2007b; Tolbert & Mossberger, 2006). Citizen participation in government decision

making through online and other electronic technologies has been termed e-participation (Macintosh, 2007a).

The objective of this chapter is to outline the nature and effect of e-participation activities that occur as part of local government initiatives to involve citizens in council decision making. The research presents a contextual analysis of e-participation within an Australian and a Swedish local government reform initiative. Firstly the background to citizen participation in government decision making and the role of the internet in such initiatives is examined. Secondly, case studies are presented for community engagement initiatives in a Swedish and an Australian local government that have gained reputations for robust and innovative e-participation practice in their community engagement initiatives. Finally, future trends and areas for further research are examined and conclusions from the cases are drawn in order to inform practice at other councils.

BACKGROUND

E-participation is an increasingly vital part of world-wide initiatives by governments to achieve a genuine, vibrant and effective democracy through greater public involvement in the work of governments and improved accountabilities (see for example Audit Commission, 2003; Department of Justice Canada, 2001; Solli, Demediuk, & Sims, 2005). The concept of e-participation intersects with the e-government, e-democracy, e-voting and e-governance debates (Demediuk, 2007; Macintosh, 2007a, 2007b). E-government refers to government's use of information technology to exchange information and services with citizens, businesses, and other stakeholders. E-democracy is about using technologies to reinforce the connection between public officials and communities thereby leading to a stronger, more accountable and inclusive democracy. E-voting encompasses electronically enabled voting technologies that

are designed to increase participation as well as providing a quicker and more cost effective means of organising public consultations. E-governance involves the use of information technology to improve relations and interaction between the public authorities and civil society to raise the quality of the services that governments deliver to citizens and businesses (Council of Europe, 2008). Consequently the issues in this chapter concerning e-participation are relevant to these other debates.

Where citizens become more involved as actors in the work of government outside the election cycle, a new form of governance ensues. This 'local governance' enables rational decision making by governments that is attuned to, and influenced by the community. This new localism is especially appealing at the local government level due to the closeness of the public and the services that councils provide – and so it is more practical to know communities better, make performance more visible, and ultimately give local people more power. The central argument is that increased citizen participation allows for better-informed government decision making that leads to improved policy and service delivery for the community. As well stimulating better decision processes and outcomes, citizen participation also has the potential to improve: the honouring of democratic ideals; social cohesion; community capacity; trust in government; legitimisation of authority; political stability; and skills and knowledge of the public and institutions (see for example Roberts, 2004; Thomas, 1995; Wang & Wart, 2007).

But while governments must find new ways of listening to the voice of people (Bingham, Nabachi, & O'Leary, 2005), there is a gap in the knowledge about what works, what does not work and why, so closer study of practice is required to inform future policy and action (Box, 1998; Fung, 2006; Thomas, 1995; Wang, 2001; Yang, 2005). In particular there needs to be a good understanding of the role the Internet can play in providing

these channels of engagement and examples of how e-participation works in practice (Coleman & Gotze, 2001; Demediuk, 2008; Macintosh, 2007a, 2007b; Tolbert & Mossberger, 2006). Knowledge of what works in particular contexts is vital since citizen involvement can potentially produce better decisions with efficiency and effectiveness benefits flowing to society, whereas poorly executed citizen participation can be dysfunctional to the political and administrative systems (Thomas, 1995).

Whilst there is a small but growing group of social scientists and information technologists working with government and communities to develop Internet tools and approaches to enhance community-based decision making (Scott, Johnson, & Mundell, 2000), "... there are still a lot of difficult questions to address if we want to understand if and how e-participation can support this re-engagement, be manageable, scaleable and sustainable ... and (there is) the urgent need to better understand current e-participation applications – what is working in which context and why." (Macintosh, 2007b, pp. 2-3). Socio-technical research can begin with an examination of how e-participation fits into the particular initiative as part of a "... novel combination of technical, social and political measures" (Macintosh, 2007b, p. 3).

In response to the knowledge gaps and the research agenda, this chapter reports on e-participation initiatives in two local governments - a Swedish kommun and an Australian council. These original case studies contribute towards the need for research that examines e-participation in the context of actual engagement initiatives on policy or implementation (Coleman & Gotze, 2001; Cooper, Bryer, & Meek, 2006; Fung, 2006; Roberts, 2004). Peters (2000) argues that by interviewing individuals in an organization about their work and context, one can get a valuable microscopic analysis. With this microscopic lens, one is not attempting to get neat statistical and generalisable findings, but to see the gritty

reality these individuals face (Silverman, 2000). Case studies of practice make issues discussable - for "... what cannot be discussed cannot be improved, at least not intentionally" (Jonsson, 1996, p. vii). In such exploratory studies, qualitative methodologies are appropriate as they are structured around discovering themes and variations which can improve our understanding of a phenomena and inform future research (Miles & Huberman, 1994).

The cases do not provide a detailed technical analysis of e-participation mechanisms (such as identity security), but are designed to provide a better understanding of how the parts of the engagement process fit together and the integral role of the Internet and e-participation in the overall scheme of things – or as Jonsson (1996) has it, to shine a bright light on a dark corner. To describe the objectives, activities and outcomes of the community engagement initiatives and the e-participation aspects, the Swedish case study (Sigstad) derives from extensive semi-structured 'long interviews' (McCracken, 1988) which were augmented by site visits within the municipality and the Australian case study (Bay City) utilises a participant-observer approach (Zikmund, 2000). Both institutions were recommended for exploration by the peak local government bodies in their respective countries as examples of innovative practice, and their names have been made anonymous in accordance with interview protocols. Whilst this chapter does not provide representative information about Swedish and Australian practice (in that it examines two cases of local governments in a particular context), the issues that arise can inform debate about good practice and alternative responses to e-participation in particular, and e-government in general, and provide issues for further research (Silverman, 2000).

E-PARTICIPATION IN LOCAL GOVERNMENT DECISION MAKING

1. Sigstad Kommun Case – ‘Power to the People’ (more or less)

Unlike countries like the United Kingdom and Australia where legislation requires local governments to incorporate community engagement activities into their processes, Swedish local governments engage or otherwise on a self-determined basis (Solli et al., 2005). In economic and social terms, the work of Swedish *kommuns* is hugely influential as it includes basic services that councils around the world typically offer, plus responsibility for education and health care.

Sigstad Kommun has about 40,000 inhabitants and 2,200 employees. Sigstad comprises of two main areas: twenty percent of the population live in the affluent historic area of Sigstad Stad; and seventy percent reside in the town of Merta which represents a less prosperous and more varied new society with a high immigrant population. So Sigstad has a very mixed cohort of inhabitants from different economic, cultural and educational backgrounds and this impacts on how and why engagement is practiced within the Kommun, not least of all because inhabitants in the lower socio-economic parts of Merta have less belief that they can or should influence the work of government, and less knowledge of how to go about it.

The main pressures for community engagement have come locally and not from directives of the central government, but are tied up with a national phenomena. In Sigstad, voting participation in local government elections fell from 90% in 1993 to 83% in 1994, and then to 74% in 2002. Whilst 74 % is by European standards a rather high level, it was a worrying trend for Sweden. By 2000 the declining participation in the democratic process triggered discussion in Sigstad municipal council about how to make the governance of the

Kommun a more attractive thing for people to be interested in and active about.

From 2000 to 2004 the Kommun conducted community engagement initiatives typical in local governments across Sweden like opening-up committee meetings to public scrutiny, expanding the number and representativeness of boards, and carrying out capacity building projects in less-privileged areas. In 2004 the politicians decided that these engagement measures were not enough and a more bold experiment - dubbed the ‘Radslag’ project - should be tried, and this initiative is the focus of this chapter. As the CEO explains, “There is not a good English translation for this term but we can try to use ‘deliberative referendum’ to describe this project”. Radslag rose from the political level at council as a response to continuing signals from many residents of a lessening involvement in the political process. Radslag was conceived as a way to reverse this trend and involve citizens in council decision making. Sigstad Kommun contracted a company that had been involved in some forms of deliberative referendums elsewhere in Sweden to provide some expertise in important processes such as two-way communication of information. Sigstad chose to start its Radslag project in quite a big way with eight deliberative referendums in 2005 and two in 2006.

The Internet frames two pillars of Sigstad Kommun’s Radslag initiative to increase community participation in decision making: the interactive chat sessions between stakeholders that facilitate debate; and the e-voting designed to encourage greater influence by a wider number of citizens.

Radslag does not present a blank canvas for comment or allow for the generation of a ‘wish list’ by the community. Instead, the Radslag project asks citizens from different groups, backgrounds or interests to choose between highly specified alternatives. The questions asked in each referendum require a very simple yes or no answer. For example: should this road be opened or closed?;

should this building be 12 floors or 4?; should the school be structured to include pre-school children or not? The politicians of the Kommun have committed to follow the community's decision in the referendum. The commitment stands no matter the size of the voter turn-out or the margin between the alternatives. The Deputy Mayor notes that the council "... has not had to face an issue of what to do if say only 10% turned out to vote, as the referendum with the least participation was 29% and most 64% ... and we were very satisfied with the attention".

The minimum age limit for Radslag voting is set at 16, and that is 2 years before normal election voting. The Kommun decides who is eligible to vote in a particular matter, and those people are contacted by mail and electronically. Each prospective voter receives an envelope in the mail that contains information brochures on the context of that Radslag and the choice of options, paper voting forms with a return stamped envelope, and instructions about how to vote using an individual internet code supplied. So voting allows the option of making a traditional choice via printed ballot paper and return letter or using a secure electronic submission. Where earlier Radslags ended up with a 60/40 paper to internet voting ratio, later referendums are moving towards 40/60 in favour of the electronic medium.

A lot of 'front end' informational campaigns were connected to each deliberate referendum using different kinds of media activities. Sigstad used fairly typical community meeting forums favoured by many councils in Sweden and abroad, with politicians and officials making presentations and taking questions and comments from the public. Also for the first time, internet chats with the inhabitants were used to discuss referendum issues, and the CEO believes "... it was popular, interesting and useful". These internet chats were real-time sessions that ran according to advertised times. In addition, innovative ways of describing the decision alternatives were used. For example, to indicate the two decision options for

the height of a proposed building, large balloons were tethered aloft on the proposed site to provide visual reference points for decision making, and to also stoke interest in the issue and the upcoming vote. Another innovative example concerns major changes proposed for an important road that had become a quite dangerous 'speedway'. There were 10,000 people living along or near this road and it has become a significant problem. The two alternatives available for voting were represented in two huge cakes (replete with edible depictions of road surfaces, intersection roundabouts, lights and trees) and these were displayed on-site in large tents and then consumed after inspection by community members. As an aside, the Deputy Mayor was unsure whether proponents of one solution ate the cake representing that option or consumed the 'opposition' cake to make that visually disappear.

To use the Radslag methodology, the council looked for suitable questions for referendums to solve. Some of these questions had been on the agenda for a while and some were emerging issues. One matter about whether a particular street should be opened and closed was over forty years old. So the referendums proved a good way of a good way of getting rid of some old and new questions. Each referendum is not for everyone in the municipality and there is a discussion and a political decision as to what part of the population should be included in a referendum. The number of potential voters specified by the Kommun as eligible to vote on a particular Radslag depends on the nature of the issue, and how it relates the structure of the community. The smallest Radslag engaged 2,000 inhabitants, and the largest took in 12,000 people. 12,000 people is almost the entire post-16 years old voting population, and that vote centred on where to put a new aged care facility.

The two voting choices available to voters formed the decision boundaries that the Kommun considered to be two reasonable and workable options which satisfied economic, legal, social,

environmental and other base criteria. As the CEO commented, "... the two alternatives were not one bad and one good, but two quite different but reasonable alternatives". In the Radslags where the alternative options seemed to be more different, residents tended to form groups to publicise one view or another and engaged in a lot of robust promotional activities.

Also in terms of outcomes, one main feature of these Radslag projects is, according to the CEO, "... that it is important for participants to see the results of their vote very quickly". In the competing roads case, trees etc were ordered immediately and work undertaken speedily. The result of the vote is described in the local newspaper and the internet home site as soon as possible. Quick publication of the result and rapid action is felt by the interviewees to be an incentive for participation by inhabitants in future community engagement activities.

In terms of financial costs the ten Radslags were an ambitious project. They cost at least 2.5 million kroner in direct costs, and consumed a very significant but uncalculated cost in time and other resources expended by politicians, management and employees. Each of the ten Radslags varied in cost due to their scope, but there was a learning cost on the council's behalf that got less as experience with the processes grew. This experience meant that as time went on, Radslags became easier and easier to operate – both for the Kommun and for the community. The CEO argues that the cost of running a Radslag was "Not all an expense as it built up social capital and learning - but that's hard to describe and (we) have to report it as an expense". A key cost component was consulting fees, as they had to buy-in expertise in processes, especially on secure internet voting technology and the professional evaluation of results. Putting the materials together and mailing was a significant expense, and the Deputy Mayor notes that "Swedish post and our technology consultants had done well."

Following the most recent Radslag, a statistically representative sample of the whole population found that over 80% said the deliberative democracy project was good or very good and hoped there would be further opportunities to take part. But the 'acid-test' is, according to the CEO, is the degree to which engagement in-between the election cycle drove voting on the subsequent election day. In the September 2006 election, voter participation increased 3.4 percent in the municipality overall, and 7.4 percent in one of the less affluent areas.

Two of the practical constraints that limit the number of Radslags are the danger of voter fatigue and resourcing costs and managerial issues. Radslags have extended the work of managers since the views of multiple stakeholders are to be considered before the decision boundaries are fashioned, and then these boundaries must be articulated and communicated in the way that is accessible to the community, given variations in their abode, literacy, numeracy and access to technology. Interviewees maintain that Internet communication channels have so far made the additional volume of consultation work imposed on politicians, managers and citizens manageable. But whilst managers are supportive of current levels of engagement initiatives and devolvement of decision making, their support for expansion is an open question and would very much depend on how technology can moderate expanded burdens.

The majority of politicians have voted for the current levels and forms of engagement and have committed to use Radslags in the future. Indeed, the CEO and Deputy Mayor note that some politicians who initially doubtful have become stronger advocates of the community participation in council decision making. As the Deputy Mayor notes, "... being a good representative can be to ask them in other ways like referendums and that is a good thing", and many councillors suggest that the interactive Internet chats have given them a stronger understanding of, and

connection with their constituents, and this has “refreshed” the political role, and “... now if we go to the Supermarket there is no such thing as a short visit, people recognise us now and know we are open to talk”.

Another key issue concerns how the Internet will figure in future Radslags as the ‘technologies of connection’ (White, 2001), to allow people to communicate, give feedback, ask questions, complain, exchange information, and build relationships (Coleman & Gotze, 2001). Currently Email is extensively used as a one-to-one communication between and within the key stakeholder groups: politicians, managers in debating the merits of the Radslag alternatives. Groups and individuals with particular points of view have started to more actively use mailing lists, newsgroups and forums like weblogs. However, the interviewees maintain that the interactive internet chat rooms (one-to-one; one-to-many and many-to-many communication) are now, and will continue to be the principal vehicles for debate—a view supported by the community surveys. The innovative physical displays like the cake and the balloons can be seen in-situ and also in full colour on the Kommun website sections devoted to particular Radslags, but these are merely the trigger points for fertile debate which centres on interactive chat.

Politicians and managers provide set hours for the interactive debate to occur, and these coincide with times that local libraries and community centres are rostered to open in order to allow citizens to use their substantial instructional, support and equipment resources. Citizens from more economically marginalised groups who do not have their own computers, and those with a lack of experience in technological use have made heavy use of these support services. Rather than one computer being used by each participants, there has been a tendency for a small group to cluster around one PC. Here the group chats amongst themselves in the physical environment, while chatting over the ether with other stakeholders. More often than not, one of the group has

strong keyboard skills and takes over that role, or support staff can be co-opted to take on that task. The interviewees keenly emphasise that not only has the use of the Internet in interactive chat rooms secured an effective channel of engagement for these previously marginalised groups, it is providing new technical, communication and problem solving skills, widening the participants knowledge base and motivation initiatives for future engagement, and adding to social capital with the physical and virtual networking which occurs. The online debate gives the stakeholders, and particularly previously marginalised groups, a high level of ‘voice’ and the prospects at least for a high level of ‘influence’ (Coleman & Gotze, 2001).

The interviewees stressed that the availability of e-voting in support of e-participation has been instrumental in the extremely high levels of engagement with the Radslags, and it is expected that a significant majority of voting in future referendums will be via the Internet. This means that people do not have to make the physical effort of finding, retrieving, completing and posting ballot papers – and can easily operate when they are out of the Kommun, their homes or their offices. However there are special conditions relevant this case and to Sweden which should be borne in mind here. Firstly, in order to convince people to vote using the internet, the Kommun had to mount and publicise an argument that they had an effective system of technology with unique password and a security overlay that would protect people’s anonymity. The front-end expenditure on having consultants design and implement such a system fell roughly in line with what had been budgeted for. However the costs and resources associated with publicising the possibilities and benefits of voting on the Internet, along with attestations about the excellent security, were substantial and significantly higher than anyone had imagined. Secondly, Sweden has a system of national identity numbers and an associated accurate register of peoples residential and contact details – in-

cluding internet addresses. This system enables both postal and Internet campaigns, and allows databases (physically and legally) to capture and store information that increases the penetration and intensity of consultative processes.

Four important features of Sigstad's e-participation strategy should be emphasised. Firstly, while the scope of voting participation has been carefully limited to particular interest groups (at least in terms of the ability to vote in a Radslog) anyone may enter the debate. Secondly, the mode of communication is a sophisticated combination of conventional practices like public meeting forums along with innovative practices like real-time electronic discussions and illustrative models set up in the field that both engage interest and help conceptualise the voting options that are constructed from what the Kommun believes to be viable alternatives. The construction of these alternatives has also been the subject of information from engagement initiatives – for example where paintings done by students to show what they wanted their school to look like were exhibited both in a hall and on the Internet, and formed part of the decision-making process about the competing viable alternatives proposed by the Kommun for voting. Thirdly, the extent of authority saw a two-stage process in connecting what community participants want to government policy and action, with politicians and managers constructing decision alternatives using engagement activities, and then eligible voters having the final say through voting. Finally, the clearest objectives of the exercise were to increase the interest and interaction of civil society in the democratic governance that affects them, and to strengthen the community – especially in communication and technology skills of the less well off sections of society. While to make a good decision was useful by-product, all of the decision options put out for comment and voting were seen ahead of time to be financially, politically, socially and economically responsible.

2. Bay City Case: 'The Big Day Out'

Bay City council in Australia provided an opportunity for stakeholders to be part of an exciting and dynamic day of decision making to shape the community's future. The summit was only the second of its type to be staged in Australia, and is a pilot for future planning and consultative activities in state government and other municipalities. This 'Bay City Speaks' project was an exercise to inform the ten year Community Plan, and operationalized through systems and technology sourced from America Speaks – an organisation from the US which has had experience in large scale deliberative processes in the aftermaths of the World Trade Centre and New Orleans tragedies. This Community Plan is the pivotal planning document to which all on-going council policy and implementation need to refer to. On a Saturday in April 2007 in excess of 800 participants from a variety of demographic backgrounds who were associated with Bay City (business owners, landlords, employees, residents and visitors) came together in a large auditorium to develop a community owned vision for the next ten years and produce the 2007-2017 Community Plan. Participants had varying motivations for attending the day – which was a large commitment of time. These motivations included a desire to participate and have a say, improve the city and influence the future, experience the 21st Century Town Meeting process and to meet people and feel connected to the community.

Bay City is known as a dynamic urban village of 21 square kilometres situated close to the heart of the State capital, Melbourne. It has a population of 86,000 residents live in and identify with seven quite distinct neighbourhoods which range from some of the richest and poorest in the state. The diversity of Bay City is renowned, with drug and prostitution issues meshing with pressures of migrant groups, along with skyrocketing property values and a preponderance of trendy cafes and a vibrant nightlife scene. In economic and social

terms, the work of Australian local governments is less profound than Swedish *kommuns* that cover similar populations since the former do not have responsibility for education and health care as these are provided by the State governments. Whilst Swedish local governments decide engage or otherwise voluntarily on a self-determined basis, by contrast the Victorian State Government in Australia mandates a general requirement for its 79 local governments to incorporate community engagement activities into their processes – but with little specification of their form and substance.

An important force for this engagement initiative was a realisation by politicians that the community needed a stronger voice in the work of government for the dual purposes of community strengthening and informing decision making. Indeed, a large proportion of these councillors had gained their interest in local politics come from previous engagement activities that they had been involved in as citizens. Senior management also played a key role by being proactive in researching good practice in community engagement globally, and were particularly focused on tracking down technology solutions to improve efficiency and effectiveness of citizen participation.

Bay City advertised the event extensively in various media and directly by visits to particular demographic and interest groups in an effort to get a large representation of stakeholders with reasonable symmetry to their proportions in the population. For example, the Mayor and Councillors appeared in photographs in newspapers with huge ears that proclaimed “we are all ears”, and limited visits were made to venues like schools and community centres. An ambitious target of 1000 participants was set, and on the day in excess of 750 people came.

Potential participants were sent (electronically or by post) the practical details about parking, the sequence of events, as well as a list of some of the key issues to be discussed that had come from previous council research. After arriving at the

entrance to the large auditorium, participants were dispersed randomly with ten each to a table. At these tables was a trained volunteer facilitator who acted as a table ‘captain’. Participants introduced themselves, and the facilitator guided the activities of their group. Each table had a keyboard linked to a wireless local area network, and this was to enter ideas proposed by each participant.

As an issue from the agenda was raised for discussion and comment, each participant at a table in turn had a couple of minutes to speak, and what they said was summarised and clarified by the facilitator (if necessary) and keyed into the database by the table’s typist (who was in fact a volunteer from the 10 members – and this task was generally shared). A central clearing house of experts (made up of America Speaks staff and locals who had been extensively trained for the purpose) were dubbed the ‘theme-team’, and they synthesized the ideas that came from the participants at the various tables into common themes, and these were projected onto giant screens that could easily be viewed by all.

Using personal computerized keypads akin to a television remote control, each participant was asked to rank their priorities among the themes displayed on the giant screens. These themes could be to do with objectives (what should the council be doing) or action (how should things happen). In that way, alternative possible objectives and actions for the Community Plan could be articulated and then prioritised in a transparent and democratic way. Through the large screen displays of themes and voting, everyone knew what was happening in the whole room, not just at their table.

It is critical to note that the format of the day did not provide the opportunity for ‘grandstanding’ or for any-one to ‘get on their soap box’, since the time to speak was equitably shared around each table, and there was no opportunity by any participant to address the meeting at large. Here the technology both controlled and gave power to

people and was easily handled by inexperienced, elderly and migrant participants.

There were continual snacks, drinks and food provided, but the tasks did not cease between 9 am and 3:30 pm and work was conducted whilst consuming lunch. Whilst this seamless continuity was unexpected (at least by the researcher's fellow table participants) and somewhat arduous, it meant that individuals at each table had a break when they needed one, and valuably, the momentum of work, comment and progress was not lost.

Between 3.30 and 4.30 a whole new enterprise began. People were asked to leave their deliberative groups and join discussion groups that centred around particular themes which had emerged from the meeting (for example: environmental action; creating community gardens; utilising and maintaining the small laneways; or supporting disaffected youth). The idea of this last and rather separate phase was to 'kick-off' community alliances and networking activities.

Councillors and senior Council staff took part in the event and responded at the end of the day. The participants substantially changed the Community Plan initially proposed by the public officials (which had provided the point of departure for discussions) and were given the commitment that the draft plan that ensued from the Summit would be honoured by Bay City (subject to legal and financial constraints). As participants left the auditorium at after 4.30 pm, they were handed a report setting out what people agreed to (both in terms of priorities but also next steps to ensure things happen) - which in effect was a draft copy of the new 2007-2017 Community Plan. This interim report was immediately made available on the Council website with prominent linkages.

The participants on the researcher's table were unanimous in their praise for the event, and each of the ten agreed with the statement that "the Summit added-value to you, and you added value to the Summit". There was a real sense that the energy and collective voice of the people could bring good direction and forward thinking for the next

ten years – especially since major issues of our time such as climate change require innovative, acceptable and united action. The politicians were delighted with the outcomes. The Mayor believes that the key message of this deliberative process is that the community and officials can all shape the future, take action, and work together. Two councillors noted how much more challenging the decisions made at the Summit made the future work of council. Now there were resourcing challenges of funding the priority objectives and actions and pressures from now having to meet much more focused and measurable objectives and targets set by the meeting. In addition, some recommendations had gone against prior council policy and action and there were costs in unwinding previous strategies. However these councillors noted that in some ways the summit had in fact made their jobs for the future easier. Some of the things the people had demonstrated that they wanted to happen were part of the personal beliefs of the councillors, but they had not pursued them at official meetings because they believed the options had insufficient support. Now the items in the draft plan provided a mandate of a sort that would unify and embolden decisions taken council. For example on the contentious issue of waste management, the draft Community Plan now called for systems of hard rubbish collection that previously were not previously supported by council, and the comment from two councillors was that now it will happen.

The ultimate test will be the extent to which the community takes up a shared role in meeting the challenges proposed by its own deliberation, since the scope of the objectives and actions now embedded in the draft community plan exceeds the possibility of Bay City Council as an institution alone.

Much was learned about the technology solution employed for gathering and prioritising themes. The technology allowed complex ideas and views to be collected from an extremely large number of stakeholders and to be prioritised in a

democratic, transparent, rapid and non-confrontational way. The technology provided the hard data for constructing the draft plan, it set boundaries on individual input, and it provided quantified information for rational discourse and decision making in the future. The technology artefacts are not a huge challenge to this or future smaller or larger projects. The software and hardware is reasonable conventional and accessible from other local or overseas technology-only suppliers or supply and event managers like America Speaks. What is more problematic for institutions wishing to undertake such activities is the intellectual capital required to market, orchestrate and operationalize the event. Whilst that intellectual capital can be bought from contracting organisations such as America Speaks, the costs associated with hiring international experts would be out of the range of many local governments who do not share in the wealth and scale of Bay City. This case study has highlighted some important practical innovations used by America Speaks that can be replicated by individual councils (such as the strong and innovative marketing, the maintenance of momentum by having no scheduled breaks, and the preparation and dissemination of a draft document at the end of the day). What could provide the greatest challenge to institutions who wish to use such as e-participation activity is accessing the skills and experience required to effectively discern themes from the multitude of participant responses quickly, accurately and fairly – because this lies at the heart of the whole exercise and dictates the validity and depth of information, ideas and attitudes acquired.

Whilst the technology solution and the outcomes exceeded expectations – culminating with a printed draft of the main elements of the ten-year plan handed to participants as they left – an issue with the way technology was used in this exercise concerns younger members of a community. At the very start of the meeting, demographic categories were projected onto the big screens (age, gender, ethnicity, and status as resident or visitor

or business etc). When participants had indicated their categories via the electronic voting control, the results displayed quickly and clearly showed that participation demographics were reasonably representative of the population – but with the strong exception of teenagers to early 20's. Whilst there had been extensive marketing to the general population via radio, newspaper and internet sites, and particular efforts by Council to target schools and migrant and other interest groups, young people were conspicuously under-represented on the day. There was a strong belief amongst participants and organisers that the lack of the younger population cross-section was not a failure of marketing and communication, but due to nature of the event being bound by attendance at a physical venue and for a prolonged period of time. Put simply, it is an important and open question as to whether a younger generation can be enticed in sufficient numbers along to a physically-bound event. Participants on the researcher's table believed that consideration and experimentation is required to see whether real-time options for remote participation rather than an in-situ only option can be built-in the activity, and whether this will allow for a wider and more representative cross-section of respondents in the engagement.

Where the main objective for e-participation in the Swedish case study was to increase the interest and interaction of civil society in democratic governance and to strengthen the community, in stark contrast the Australian case was mostly about providing trust and legitimacy for government, and in making better informed decisions by tapping into the priorities and knowledge of citizens. In both cases, different e-participation solutions successfully supported the objectives.

FUTURE TRENDS

At Sigstad, the priorities are community strengthening and increased citizen interest in govern-

ment – especially in terms of increasing election voting. E-participation at Sigstad has efficiently and effectively worked to help achieve these ends. The accessibility provided by Internet-based discussion and voting has allowed the engagement initiatives to have a strong penetration across all demographic categories, and have engendered strong support for a continuation of participatory activities. At the same time in Sigstad, e-participation has provided a locus for the developing social networks of less- privileged or elderly groups and provided the impetus and resources for their up-skilling in technology skills. With these new skills, the elderly and less-privileged have benefited from a new ability to contact friends, relatives, businesses and government agencies by E-mail, search for information on the web, undertake electronic banking, and stay informed with current matters of interest and of state. So at Sigstad, the e-participation is less about providing mechanisms for uncovering good ideas and providing better accountability – as after all the options for debate and choice are already defined by the public officials as falling within the boundaries of social, legal, political and economic reason – and is more about changing skills and attitudes in the community. In contrast, the Bay City objectives are mainly about gathering and prioritising ideas, and e-participation technologies provide an immensely powerful way for a substantial cross-section of the community to find voice and representation beyond the ballot box.

It is no exaggeration to say that e-participation has changed the very face of democracy at Sigstad and Bay City, although both had varied objectives, employed different technologies and got different results, and these are summarised in Table 1. But can these successful e-participation initiatives in two extremely well resourced local governments with a reputation for innovation and change be replicated elsewhere? The answer would seem to be qualified yes – with more limited and incremental projects in less well resourced local governments.

The Sigstad experiment relies very much on the existence of a good broadband network, strong levels of computer ownership and skills, and large investments in IT equipment and staffing in community facilities such as libraries - and this is a resource rich scenario that does not typify many other local governments worldwide. In less well resourced situations compared to Sigstad, the same sort of referendums could still function but with a lower percentage of contributors using e-participation initially – and this would constrain outcomes of technology up-skilling for citizens in the shorter run. The e-participation quotient in the engagement initiatives would in some cases necessarily start off small, and be more slowly increased over time as infrastructure improves and technology penetration deepens.

For other local governments to replicate the Bay City initiative, technology cost and complexity and existing computer literacy levels may not be the main barriers. The largest impediment may well be in the ability for local governments to cost-effectively access the intellectual capital necessary to have the technology properly capture and prioritise ideas. For example, difficulties may well be encountered in accessing effective ‘table captains’ to steer tables and expert ‘theme team’ members to capture and stream information. But there are some ‘baby-step’ strategies that can be applied at Councils with less resources. For example River City in Victoria plans to take the Bay City model and apply it to some local environmental issues. In this iteration River City will use: locally sourced technology; a much smaller participant base; a narrower set of issues; a one evening commitment rather than a full day; and a self-grown ‘theme team’ that learnt by observing the Bay City operations closely. The expectation at River City is that ideas and priorities can be determined at an affordable cost without the confrontational debate of traditional open town hall meetings – and skills in discerning themes and running such events can be developed and

later applied to both larger and smaller planning projects.

Further research is needed to investigate good ways of mixing different e-participation processes and technologies to match the varied objectives for community involvement in government decision making. Research could explore the technical, social and political variables that affect the value-adding role of Internet channels of communication for particular objectives. For example, whilst user authentication is an obvious necessity for e-voting, is a requirement to officially log-on and be identified during interactive discussions about project options too much of an obstacle to participation for some if the objective is to get a wide and inclusive range of views? Or for instance, does the large expenditure on providing community computing facilities and on-site support and tuition (like in Sigstad) only make sense over a paper-based information and voting system if the agenda is to up-skill citizens as well as get their input, and what are the variables that should appear in such a cost-benefit analysis? From the Sigstad case, a priority for research is to examine how and why the Internet and other technology initiatives might increase the connection with marginalised or disinterested groups and individuals (for example the youth, elderly, poor or migrants) and at the same time provide them with skills and motivation to enhance future iterations of engagement.

While the engagement initiative with the Bay City community demonstrates that citizen participation in government decision making can be revitalized and expanded through technologies, future research could investigate if internet channels of communication or other technologies can provide an alternative or adjunct to the resource and time intensive large-scale in-situ meetings which had especially failed to attract young participants. From the Bay City case also, a priority for research is to examine what different local government contexts and project areas the deliberative technologies can be cost-effectively

applied to, and how can learning from one case best be transferred to others.

CONCLUSION

It appears to be a 'given' that modern local governments view increased community engagement activities as an important thing to actually do – or at least to talk about doing. The idea of increasing the interest and involvement of the community in the work of government is very hard to argue against in principle. The actual objectives for a government to engage can vary. Engagement activities can be used as a tool for legitimisation to show that a particular council is doing what good governments should try to do – and that can be good for institutional image along with re-election prospects for individual politicians. Stronger discourse between the community, politicians and management can lead to an influx of new, improved or more palatable ideas – thus providing better information for more robust rational decision making and accountability. More engagement can also foster a deeper sensitivity and understanding by individuals for the position and constraints of other parties concerned with a particular policy and its implementation and foster compromise. Engagement can also lead to community strengthening and capacity-building as stakeholder groups form networks, develop social capital, and hone communication, negotiation and associated skills, and gain experience in leveraging power and accessing information through information technologies. Engagement activities can lead to an increased interest in the work of government and a desire to be involved in the democratic processes like voting. In both the Sigstad and Bay City cases, these objectives all exist to some extent – but in very different measure and priority.

In both cases, on-line and other electronic technologies and processes provide efficient and effective communication channels to connect

Table 1. Nature and effect of e-participation

e-participation	Sigstad - Sweden	Bay City - Australia
Nature of e-participation	<p>Internet bulletin boards and information portals.</p> <p>Official chat rooms.</p> <p>E-voting technologies using private or government equipment.</p>	<p>Large scale in-situ e-voting technologies.</p> <p>Internet bulletin boards and information portals.</p>
Objectives for e-participation (priority order)	<p>Provide ongoing cost-effective communication channels that maximise interaction between all societal groups and public officials.</p> <p>Improve accessibility and support an increased interest by the community in the work of government and a desire to be involved in the democratic processes like voting.</p> <p>Facilitate community strengthening and capacity-building as stakeholder groups form networks, develop social capital, and hone communication, negotiation and associated skills, and gain experience in leveraging power and accessing information through information technologies.</p> <p>Enable discourse that leads to a deeper sensitivity and understanding by individuals for the position and constraints of other parties concerned.</p> <p>Capture and balance an influx of new, improved or more palatable ideas.</p> <p>Provide a means of accessibility and transparency that increases institutional and process legitimacy.</p>	<p>Capture and balance an influx of new, improved or more palatable ideas for one-off project.</p> <p>Enable discourse that leads to a deeper sensitivity and understanding by individuals for the position and constraints of other parties concerned.</p> <p>Provide a means of accessibility and transparency that increases institutional and process legitimacy.</p>
Results	<p>Demonstrated increase of interest in democratic governance through higher voting in elections and more discourse and a sense of involvement between public officials and citizens.</p> <p>Majority choice decisions (sometimes with very close voting) on the limited range of voting options.</p>	<p>A new 10 year community plan with a clear consensus and major revision to the document originally proposed by public officials.</p>

citizens with decision makers, but a key lesson is that for e-participation to be effective, the technology choice and implementation must be driven by the objectives of the engagement exercise and not the other way around. The Bay City in-situ e-participation solution was perfect for a one-off project with objectives that centre on gathering and balancing information and reaching a consensus. The Sigstad e-participation solution was more about developing capabilities and social capital in the community and fostering a feeling of inclusiveness and a motivation for further engagement. Both councils matched their e-participation solution to the objectives for engagement, and in each case developed or accessed technologies that were new and experimental for them. But whilst risks were taken in adopting technology and processes that were out of their 'comfort zone', each council believed this to be less hazardous than either forsaking e-participation or relying on the familiarity of past practices.

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Chapter XIII

The Role of Knowledge Management Security Requirements for E-Government

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ABSTRACT

E-government has gained a lot of attention and public interests of government, technology providers, and researchers. Despite the growing awareness among policy makers about the prospects of the new technology for the government, past research suggests that the quality, security, and the timeliness of the services provided by e-government could be described as poor, and in many ways is still in its infancy. Further, IT security has gained tremendous importance in recent years with tragic events such as 9/11 and natural disasters caused by hurricane Katrina. The purpose of this chapter is to examine the role of knowledge management security requirements for e-government. Drawing upon the theory of knowledge management, and security requirements we develop an integrated framework of knowledge management, and security requirements for e-government. This study contributes to theory of e-government as it introduces knowledge management, and the importance of security requirements for e-government. Further, it contributes to practitioners as it increases their awareness on the importance of the security requirements in the context of e-government.

INTRODUCTION

At present e-government has gained a lot of attention and public interests of government, technology providers and researchers. The use of IT and the Internet in the public sector is growing rapidly with innovations including government web sites, e-transactions such as; e-tax filing accessing e-forms and electronic kiosks. In the USA, 23% of the federal, state and local government agencies currently offer at least some services online and this figure is growing rapidly each year. E-government is defined as the use of information and communication technology in public administration to change structures and processes of government organizations (Lofsredt, 2005). It is the ability for government to provide access to services and information round the clock (i.e., twenty four hours a day, seven days a week). The definition include the interactions between government to citizens (G2C), between government and public (G2P), government to business (G2B), government to other government departments (G2G), and between government and its own employees (G2E). G2C or G2P implies that citizens are allowed to retrieve government information and complete government transactions via online forms such as; license renewal and e-filing of their taxes. G2E implies that government agencies are allowed to interact with their employees online. G2G supports online communication and interaction between government agencies and G2B allows businesses to retrieve timely information for government agencies online (Carter & Belanger, 2004). The benefits of e-government include; increasing efficiency, effectiveness, accountability and collaboration with government agencies so that government employees can spend more time on value added services.

Despite the growing awareness among policy makers about the prospects of the new technology for the government, past research suggests that the quality, security and the timeliness of

the services provided by e-government could be described as poor and in many ways is still in its infancy (Grounlund, 2004; Lofsredt, 2005). Public services traditionally are slower to embrace innovative management practice and are beginning to recognize the importance of knowledge management (Taylor & Wright, 2004). For example, Metaxiotis and Psarras (2005) suggest that e-government and knowledge management based public administration are still in a state of evolution.

Protecting e-government's I.T. security infrastructure from hackers, viruses, theft of data, denial-of-service attacks and intruders has assumed an extremely important role. Further, since e-government offers a remarkable set of opportunities to increase transparency of government operations, improving access to information and access to government services and giving public sector employees a greater role in their own governance and increasing their awareness of security requirements in knowledge management is critical.

Alternatively, IT security has gained tremendous importance in recent years with tragic events such as; the 9/11 incident and natural disasters caused by hurricane Katrina. Further, with the proliferation of electronic information systems that facilitate the exchange and storage of sensitive information it is critical for public sector employees to be aware of the security requirements involved in knowledge management. We first discuss the stages of e-government growth followed by the components of knowledge management, and security requirements that impact knowledge management in e-government. Drawing upon the theory of knowledge management, and security requirements we develop an integrated framework of knowledge management, and security requirements for each stage of the e-government growth.

KNOWLEDGE MANAGEMENT

Knowledge Management (KM) provides a formal mechanism for the identification and distribution of knowledge. It is the mental, behavioral and cultural shift to a new mindset “sharing knowledge is power.” The components of KM in e-government include; stakeholders interacting with e-government systems, knowledge dimensions, knowledge characteristics, and knowledge resources discussed below. The stakeholders of KM are the “right people” (citizens, employees, public, other government agencies, business organizations) who should possess the security requirements for knowledge transfer. Knowledge dimensions refer to the “right information” component of the knowledge management definition. These are categories of government knowledge needed by an individual user or a group of users for making effective decision. There are different ways in which government knowledge can be classified. One widely used form of classification is tacit knowledge versus explicit knowledge (McManus & Synder, 2002). Tacit knowledge is subconsciously understood and applied, difficult to articulate, developed from direct experience and action, and is usually shared through highly interactive conversations, story-telling, and shared experience. Explicit knowledge, in contrast, can be precisely formulated and articulated, easily codified, documented, and transferred or shared. Knowledge resources are knowledge stores that governments can draw from for answering questions. Knowledge resources can be internal or external. Therefore, maintaining the security of knowledge and information is crucial since the government interacts with citizens and other stakeholders at a larger scale. However, in the context of e-government, data is first collected from public citizens, customers, business partners and other stakeholders via e-tax forms, license bureaus and immigration offices. These data are then categorized into meaningful information so that accurate and effective decisions about the

stakeholders and other businesses that interact with e-government can be made. Finally, the information is then reflected as knowledge for e-government when they transform it as explicit knowledge in the form of standard operating procedures, security policies, and standards for best business practices.

Previous studies have popularly indicated three main security principles objectives: information confidentiality, integrity, and availability. Confidentiality is the protection mechanism that keeps information from being read by unauthorized people. Integrity refers to a state of completeness, wholeness, and soundness, including mechanisms such as checking sequence numbers, check-sums, and hash totals to assure that information stored in the computer is not changed in a way that is not appropriate. Availability is ensuring that data can be accessed by all authorized people. We include a fourth element called non-repudiation which means to ensure that a transferred message has been sent and received by the parties claiming to have sent and received the message. It is a way to guarantee that the sender of a message cannot later deny having sent the message and that the recipient cannot deny having received the message (EarthWeb 2003). Other objective elements include authentication, authorization, and identification (Boykin 2003; Host 2001; Parker 2002).

This chapter aims to focus on the impact of knowledge management and security concerns in the context of e-government. We develop an integrated framework of knowledge management, and security requirements for e-government. The research question designed for this study is how and why knowledge management and security concerns impact e-government?

The rest of the chapter is organized as follows. In the next section we define e-government followed by the stages of e-government growth or evolution. Then we discuss the components of knowledge management and the security requirements leading to the development of the integrated

framework. This study contributes to theory of e-government as it introduces knowledge management, and the importance of security requirements for e-government. Further, it contributes to practitioners as it increases their awareness on the importance of the security requirements in the context of e-government.

BACKGROUND INFORMATION OF E-GOVERNMENT

E-government is the term that reflects the use of information and communication technologies (ICT) in public administration to change structures and processes of government organizations (Lofsredt, 2005). E-government implies fundamental knowledge redistribution and requires a careful rethinking of the management of information resources and knowledge bases (Metaxiotis & Psarras 2005). E-government strategies include; information dissemination on searchable databases, customer satisfaction, online translations, implementing the use of e-checks and be able to measure government systems (Eyob, 2005). It aims to offer accessibility to government information and services for citizens, businesses and government agencies thereby improving the quality of e-services and providing greater opportunities for participation in democratic institutions and process (Lambrinoudakis et al., 2003). Eyob (2005) also identified top ten e-government services namely; communication with officials, request for services (e.g., repairs), request for local government records, delivery of local government records, registration for services use, completion and submission of application, business license application, payment of utility bills, payment of fines or fees, property registration and form downloads for manual completions. Current academic research in e-government prevails in many fields such as; public administration, organizational behavior, information science and technology innovation. Further, e-government services have

to be made secure with regards to all aspects so that users trust the system.

STAGES IN THE GROWTH OF E-GOVERNMENT

Layne & Lee (2001) suggests that there are four stages of e-government growth – cataloging or broadcasting, transaction, vertical integration and horizontal integration. Despite what stage the e-government growth is, security is critical in every stage so that accurate, complete and correct information and knowledge can be transferred to all stakeholders.

According to the e-government handbook produced by the Center for Democracy and Technology, there are three phases of e-government – publish, interact and transact. However, the four popular stages of growth in e-government in the literature (Layne & Lee, 2001; Wagner et al., 2003) include; first, broadcasting or cataloging stage where the government presents the information in a static manner in web pages as a one way communication. Knowledge is required on how to present information clearly online, manage the publication and transfer of knowledge. Secondly, the interaction stage allows some resources from the databases to be obtained via portals. It enables exchange of knowledge between government agencies and other public sector employees. Knowledge is required on how to react electronically to requests from other government agencies that include; searching for information and maintaining customer information. Issues of security and privacy are also important. Third, in the transaction stage the public can carry out (financial transactions) with the government. Knowledge is required with the security and efficiency of transactions (e.g., taxes, registration fees and licenses). Issues with trust occur among the stakeholders in e-government. Finally, in the integration stage the different government departments collaborate in significant ways to avoid

Table 1. Stages in e-government growth and its relationship to knowledge management components

Stages in E-Government Growth	Activities during each Stage	Relations to Knowledge Management Components
Broadcasting (Catalog, Publishing) Stage	Presents static information on their web pages as one way communication. This allows both the public and government employees to access information easily.	Knowledge resources
Interaction Stage	Enables public and government employees in government agencies to interact and exchange information or services and obtain information. This represents the use of the Internet and other tools to communicate with each other.	Stakeholders of knowledge management
Transaction Stage	Public and government employees can engage in financial transactions with the government. Demands higher levels of processing capability and security. This represents the use of the Internet and tools to engage in financial exchanges. Example, filing tax return, renewing driver's licenses, paying fines etc	Knowledge dimensions
Integration Stage	Allows public sector employees to interact with other government agencies and when one stop contact point – where information about the procedures, policies of all departments can be obtained. This represents the integration of business functions that in turn enable the smooth flow of transactions and communications.	Knowledge characteristics

duplication of efforts, and when one stop contact point for information and knowledge occurs. In the integration stage, knowledge is required on how to integrate systems locality to regional, state and federal level so that higher authorities can take a look at the big picture and challenges include scalability and inter-operability. Table 1 presents the stages in e-government growth and the activities during each stage.

KNOWLEDGE MANAGEMENT COMPONENTS

Knowledge Management (KM) provides a formal mechanism for the identification and distribution of knowledge. It is the mental, behavioral and

cultural shift to a new mindset 'sharing knowledge is power.' Benefits of proper KM are improved e-government effectiveness, delivery of customer value and satisfaction, and added product and service innovation (Nonaka, 1998). KM is defined as capturing, organizing, sharing and retaining key corporate knowledge as an asset (McManus & Snyder, 2002). It is the generation representing storage, transfer, transformation, and application, embedding and protecting organizational knowledge (Alavi & Leidner, 2001). KM ensures that the right knowledge is available in the right representation to the right processors (humans or machines) at the right time for the right costs (Holsapple & Singh, 2005). Benefits of proper KM are improved e-governmental effectiveness, delivery of customer value and satisfaction, and

added product and service innovation. There is no reason to believe that IT security will be an exception in the context of KM for e-government. However, knowledge management in the public sector has not received much attention in the research literature (Bate & Robert, 2002). Previous research suggests that the components of KM in e-government include; stakeholders interacting with e-government systems, knowledge dimensions, knowledge characteristics, and knowledge resources discussed below (Ratnasingam and Kesh, 2007).

Stakeholders

The stakeholders of KM are the “right people” (citizens, employees, public, other government agencies, business organizations) who should possess the security requirements for knowledge transfer. Everyone legitimately interfacing with the government system should know the role they play in understanding and applying the security requirements, and the knowledge needed to execute the role. Government agencies should develop a systematic procedure for identifying and classifying legitimate users with similar knowledge needs. Stakeholders can be classified into whether they are internal or external to the government agency. External governmental entities interface mostly with system boundaries and therefore may have very different knowledge needs than internal employees. Internal employees can be classified into those who directly interface with the I.T. system and those who do not. The Chief Information Officer (CIO), Chief Information Security Officer (CISO), network and systems administrators, database administrators, and programmers are those that directly interface with I.T.

Knowledge Dimensions

Knowledge dimensions refer to the “right information” component of the knowledge management definition. These are categories of government

knowledge needed by an individual user or a group of users for making effective decision. Government agencies can develop their own dimensions with granularity that matches their own needs. Sources used for developing these dimensions include policies, procedures, regulations and standards. Some of the broad common dimensions are; information security planning, information security policy development, information security project management, security management architectures, models, and practices, risk management for IT security, protection mechanisms, personnel and security, law and ethics.

Knowledge Characteristics

There are different ways in which government knowledge can be classified. One widely used form of classification is tacit knowledge versus explicit knowledge (McManus & Synder, 2002). Tacit knowledge is subconsciously understood and applied, difficult to articulate, developed from direct experience and action, and is usually shared through highly interactive conversations, storytelling, and shared experience. Explicit knowledge, in contrast, can be precisely formulated and articulated, easily codified, documented, and transferred or shared. Knowledge will be useful to government agencies when it has formal or informal mechanisms for transforming tacit knowledge into explicit knowledge. Knowledge can also be declarative, procedural, social, conditional and relational, pragmatic, and causal (Alavi & Leidner, 2001). Further, knowledge management portals add superior knowledge representation and search a capability that provide tools to extract, analyze and categorize both structured and unstructured information and reveals the relationship among the stakeholders in e-government (Wagner et al., 2003).

Knowledge Resources

Knowledge resources are knowledge stores that governments can draw from for answering questions. Knowledge resources can be internal or external. According to Stein and Zwass (1995) knowledge resources are derived from the collective organizational memory defined as the means by which knowledge from past experience and events influence present governmental activities. Such governmental memory systems store the accumulated knowledge, experience, expertise, history, stories, strategies, and successes as documented by its employees. Knowledge resources reflecting this definition are databases storing historical data of government's significant events and decisions.

SECURITY REQUIREMENTS FOR KNOWLEDGE MANAGEMENT IN E-GOVERNMENT

E-government is still in its formative stages and remains a knowledge field in its exploratory stage (Lofredt, 2005). Knowledge sharing includes factors such as the climate of the organization, infrastructure and process and strategy implementation. Although many governmental portals are set up either for internal, inter-departmental or G2C communication with features such as; email, chat rooms, personalized news and a search engine, there are still concerns in the transfer of security knowledge in e-government. The concerns are due to the barriers that include; lack of technology staff, financial resources, web expertise, security and privacy (Eyob, 2005).

Security is critical since it can influence public sector employee's willingness to adopt the security requirements offered. Security should be the key responsibility of the IT security officer and it should include the fundamental security requirements of confidentiality, integrity, authentication,

non-repudiation, availability or access controls discussed below (Joshi et al., 2001).

Confidentiality

Privacy issues are a concern for e-government. Confidentiality mechanisms reveal data only to authorized public sector employees, who either have a legitimate need to know or have access to the system. Disclosure of transaction content may lead to the loss of confidentiality (privacy) of sensitive information whether accidentally or deliberately divulged onto the IT system (Jamieson, 1996; Marcella et al., 1998). Confidentiality of business transactions is achieved by encrypting the messages. Knowledge management enforces data mining in order to identify hidden useful relationships and patterns in existing government databases. Within e-government data mining helps to manage interactions and transfer of security knowledge between inter-governmental employees. Although, data mining helps to extract knowledge from transaction data thereby reducing the burden of dealing with large volumes of transactions and improving decision making, there are concerns about the privacy of the transaction being exposed to unauthorized parties.

Integrity

Integrity mechanisms provide assurance security knowledge and transactions transmitted in the government systems are complete, accurate, and unaltered (Bhimani, 1996; Jamieson, 1996; Parker, 1995; Marcella et al., 1998). Unauthorized access to IT systems can lead to the modification of messages or records both by internal employees or external trading partners thereby leading to fraudulent activities. Although one of the strategies of e-government is to make the web the first place to find information and not the last errors in transaction processing from the lack of web expertise can result in the transmission of

incorrect information or inaccurate reporting to management (Eyob, 2005).

Authentication

Authentication establishes that government sector employees are who they claim they are. Data origin authentication ensures that messages are received from a valid user, and confirms that the user is valid, true, genuine, and worthy of acceptance by reason of conformity. Authentication requires that 1) the sender can be sure that the message reaches the intended recipient, and only the intended recipient and 2) the recipient can be sure that the message came from the sender and not an imposter. It is important that authentication procedures are included in the e-government's security plan; the lack of these could lead to valuable, sensitive information being revealed to unauthorized parties that could affect their business continuity. Encryption mechanisms provide authentication features that provide security and audit reviews. These reviews help to ensure that e-government transactions are received only from authorized users (Marcella et al., 1998). A strong privacy is the first step to building trust. Further, there are cultural barriers to e-government (e.g., societal use of information and communication technology and organizational culture), which should not be underestimated (Margetts & Dunleavy, 2002).

Non-Repudiation

Non-repudiation mechanisms prevent the receiver or the originator of the transactions from denying that the transaction was received or sent. Non-repudiation of origin protects the message receiver against the sender denying the message was sent. Non-repudiation of receipt protects the message sender from the receiver denying that the message was received (Jamieson, 1996; Marcella et al., 1998). For example, Ba and Pavlou (2001) suggest that credibility can be quickly generated if the appropriate feedback mechanisms on the

Internet are implemented. Non-repudiation can be achieved by using the Secure Functional Acknowledgment Message (FUNACK) protocol.

Access Controls

Access control mechanisms provide legitimate access to government systems and deliver information only to authorized users, when required, without any interruptions. Content management (or workflow systems) is designed to assist public sector employees more knowledgeable as online access to many government security policies and procedures can be easily obtained. Many governments (e.g. US federal government) consider content management as an essential application and one of the core technologies of knowledge management solution, to overcome problems of information accessibility by knowledge workers. Further, service level agreements specify hours of operations, maximum down time, and response time to maintain the availability of e-government systems. Disruptions to the IT systems can come from both natural and manmade disasters. These could lead to system breakdowns and errors. Availability issues are addressed by fault tolerance, duplication of communications links, and back-up systems that prevent denial of services to authorized users (Bhimani, 1996; Marcella et al., 1998).

We define the IT security requirements and relate it to the type of knowledge management component that will be impacted by it. The correlation is based on an identification of the role of stakeholders in knowledge management components and then applying it to the knowledge management and its impact on the security requirements. Table 2 presents the relationship between the security requirements and knowledge management categories. We provide the definitions of the security risks and correlate it with the knowledge management components by identifying what it is protecting.

Table 2. Relationship between security requirements and KM components

IT Security Requirements and their Definitions	Relationship to the Components of Knowledge Management
Confidentiality <i>Protects the privacy of information and reveals data only to authorized parties who have the legitimate need to access the system</i>	Ensures that the stakeholders of e-government transmit the relevant knowledge applying encryption mechanisms so that effective and timely decisions can be made.
Integrity <i>Provides assurance that the government messages and transactions are complete, accurate and unaltered</i>	Ensures that the knowledge resources in the form of the e-government security policies and procedures stored in the e-government databases are constantly updated to include complete and correct information.
Authentication <i>Establishes that the government employees are who they claim they are</i>	Ensures that knowledge characteristics permit the different types of knowledge to be transferred by the stakeholders of e-government who claim to be who they are
Non-Repudiation <i>Prevents the receiver or originator of the transactions from denying that the transaction was received or sent</i>	Ensures that knowledge dimensions and knowledge resources provide the right knowledge to the right stakeholder.
Access Controls <i>Provide legitimate access to e-government systems and delivers information only to authorized users when required without any interruptions</i>	Ensures that knowledge dimensions and knowledge resources apply different levels of authorization mechanisms and encryption mechanisms to the different types of knowledge

FUTURE TRENDS

The Integrated Framework of Knowledge Management Components and Security Requirements for E-Government

In this section we discuss the future trends of the security requirements in knowledge management for e-government. We discuss the development of the integrated framework of knowledge management factors and security requirements for e-government. We first identify the activities in each stage of the e-government growth and evolution. Then we match the relevant knowledge components and the security requirements needed at each stage of the e-government growth as presented in Table 3 below.

During the catalog stage the stakeholders of e-government and the knowledge dimensions provide different types of electronic access to

government information and services. Further, knowledge resources provide public services online offering information and communications. The knowledge factor necessary for this stage is the source credibility as the information loaded on the government web site must be reliable. As for the security requirements e-government employees who manage the content and presentation of hierarchy of information in the government web sites should have the technical expertise. Further, assigning roles, responsibilities and complying with rules or regulations will protect the confidentiality of the sensitive information.

During the interaction stage stakeholders of e-government and knowledge resources as to who is accessing what information and interacting with who becomes important in this stage. The extent of communication competence of the e-government employees ensuring that complete, correct

and accurate information are exchanged is managed during this stage. Arduous relationship and absorptive capacity in e-government employees are considered during this stage. Further there needs to be a common shared understanding of all e-government stakeholders as to the security expectations of the information exchanged. As for the security requirements the availability of technical support from e-government security officers and managing up to date public records is important during this stage. The confidentiality of the information exchanged, integrity, and authentication as to who is releasing the information and applying authorization mechanisms is important for this stage

During the transaction stage knowledge resources and knowledge dimensions including different types of information should be kept up to date and real time in order to facilitate e-procurement including bidding, purchasing and payment. Further, knowledge resources facilitate e-transactions including electronic vendor cataloging, bid submissions and tabulations among inter-governmental employees. E-government employees should have a shared understanding of the content in their databases. The need for both the source and recipient intrinsic/extrinsic motivations of the government employees (as in good training programs) is essential during this stage for application download, digital library and email. The need for non-repudiation mechanisms, authentication encryption mechanisms, integrity of the government messages and transactions exchanged becomes important in order to facilitate inter-governmental work flow exchanges of data, policy and information. Confidentiality as to the privacy, authentication, non-repudiation, and backup recovery, of the internal systems is important so that accountability can be achieved.

During the integration stage stakeholders of e-government, knowledge dimensions, and knowledge characteristics of government information facilitate information sharing and integration of service delivery program across government

agencies. This in turn impacts the efficiency and effectiveness of both the internal and external integration of the e-government systems. Further, there is need for shared understanding among the government employees as to the functionality of the e-government systems in order to facilitate both internal and external integration of the systems. Similarly, there is a need for both source and recipient intrinsic/extrinsic motivation to facilitate the integration. As for the security requirements since the focus is on both internal and external integration on going training and support in terms of integrity, authentication of the system becomes important during this stage in order to enforce cooperation, performance and accountability of the systems. Table 3 presents the integrated framework of knowledge management factors and security requirements for e-government.

CONCLUSION

In this study we examined the role of knowledge management security requirements for e-government. The findings of the integrated framework contribute to theory as there is no evidence of KM components, and security requirements in e-government from previous research. Future researchers can now apply the framework to test for empirical study. The chapter contributes to practice as it increases the awareness of public sector stakeholders on the importance of security requirements. We believe that an integrated framework of knowledge management that incorporates security requirements for e-government agencies and departments at a local, state and federal level can be monitored to allow access only to authorized parties.

We encourage future researchers to test this framework with government agencies and businesses that do business electronically with the government. Future research should aim and examine ways on how to update and react to relevant, complete and accurate current knowledge

Table 3. Integrated framework of knowledge management factors and security requirements for e-government

Stages in E-Government Growth	Knowledge Management Components	Security Requirements
Catalog Stage	Stakeholders of e-government and the knowledge dimensions provide different types of electronic access to government information and services. Further, knowledge resources provide public services online, e-service delivery for offering information and communications.	E-government employees who manage the content and presentation of hierarchy of information in the government web sites should have the technical expertise. Further, assigning roles, responsibilities and complying with rules or regulations will protect the confidentiality of the sensitive information.
Interaction Stage	Stakeholders of e-government and knowledge resources as to who is accessing what information and interacting with who becomes important in this stage.	Availability of technical support from e-government security officers and managing up to date public records is important during this stage. The confidentiality of the information exchanged, integrity, authentication as to who is releasing the information and applying authorization mechanisms is important for this stage
Transaction Stage	Knowledge resources and knowledge dimensions including different types of information should be kept up to date and real time in order to facilitate e-procurement including bidding, purchasing and payment. Further, knowledge resources facilitate e-transactions including electronic vendor cataloging, bid submissions and tabulations among inter-governmental employees	The need for non-repudiation mechanisms, authentication encryption mechanisms, integrity of the government messages and transactions exchanged becomes important in order to facilitate inter-governmental work flow exchanges of data, policy and information. Further, confidentiality as to the privacy, authentication, non-repudiation, and backup recovery, of the internal systems is important so that accountability can be achieved.
Integration Stage	Stakeholders of e-government, knowledge dimensions, and knowledge characteristics of government information facilitate information sharing and integration of service delivery program across government agencies. This in turn impacts the efficiency and effectiveness of both the internal and external integration of the e-government systems	Since the focus is on both internal and external integration on going training and support in terms of integrity, authentication of the system becomes important during this stage in order to enforce cooperation, performance and accountability of the systems.

in e-government in order to avoid natural and man-made disasters.

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KEY TERMS

Authentication: Establishes that the government employees are who they claim they are.

Confidentiality: Protects the privacy of information and reveals data only to authorized parties who have the legitimate need to access the system.

E-Government: The use of information and communication technology in public administration to change structures and processes of government organizations. It is the ability for government to provide access to services and information round the clock (i.e., twenty four hours a day, seven days a week).

Integrity: Provides assurance that the government messages and transactions are complete, accurate and unaltered.

Knowledge Characteristics: Refer to the different ways in which government knowledge can be classified.

Knowledge Dimensions: Refer to the “right information” component of the knowledge management definition. These are categories of government knowledge needed by an individual user or a group of users for making effective decision.

Knowledge Management: The organized and systematic process of generating and disseminating information, and selecting, distilling, and deploying **explicit** and **tacit** knowledge to create unique value that can be used to achieve a competitive advantage.

Knowledge Resources: Knowledge resources are knowledge stores that governments can draw from for answering questions. Knowledge resources can be internal or external.

Security Requirements: Technology solutions and security policies that provide confidentiality, integrity, and availability mechanisms

Stakeholders of Knowledge: Are the “right people” (citizens, employees, public, other government agencies, business organizations) who should possess the security requirements for knowledge transfer.

Chapter XIV

A Study of Information Systems in Indian Railways with Specific Reference to Konkan Railway Application Package

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ABSTRACT

The railroads sector in the developing countries like the other services sectors (i.e. electricity, post, and telegraphs, health, and transport) are still administered by the government in many countries. Organizations providing these services have a large geographical spread, an assured market, and an administered price regime. The organizations function under the twin pressures. One being to function as an entity with commercial goals thereby being financially self-sufficient; a compulsion imposed on the organizations as a result of the financial squeeze faced by the governments that support these organizations through budgetary grants. The second pressure being to support a large public service obligation; a constraint imposed by a large population with low income levels. Information Technology Management in such organizations evolves in a scenario marked by such conflicting pressures. The chapter takes a look at the evolution of the information technology applications in Railroads of select countries. A particular focus is given to the Indian Railways in an attempt to cull out the issues of Information Systems for the same. Further specific reference is the Konkan Railways enterprise systems which led to some learning for development and implementation of large information systems in the railroads. The learning could be of substantial value in developing a sound theoretical framework for information technology management practices in the services sector in the developing countries.

INTRODUCTION

The public services sectors in advanced countries that are administered by the government include primarily the defense forces and the police. In the developing countries that have a large proportion of the population below the poverty line, the public services include postal services, transport services, telecommunication services and even the basic services like electricity, health care, education, water supply and sanitation facilities. There have been very few studies in the implementation of information systems in the public services sector in India specifically in the area of the transport sector and within the transport sector the railroad sector has still fewer studies. With economic structure in most parts of the world shifting from predominantly primary sector based to one that has a predominance of the tertiary sector the traditional markets for railway services is on the decline. As a result, rail systems need to explore new areas through more advanced services and technologies like information systems. Also to cope with an ageing business model, railway providers are undergoing a radical change to adapt to a more competitive model. The focus of this article is information systems development in the Indian Railroads performing in the ambit of the government sector and the concomitant pressures.

Organisations like the railways are characterized by large number of assets and a large workforce; both are dispersed across a large geographical area. Large resources are required to develop and implement information systems in such organisations. For an organization to accomplish this objective, it requires a clear focus and a sustained effort without which the resources allocated for information systems development can easily be lost in organisational inertia and spreading the resources thin over many information system development initiatives. Therefore there is a need to conserve the resources – monetary, infrastructure and manpower of the organisation

allocated for information system development and sustenance and use them efficiently. The aim of this study is to develop a framework for identification of suitable work systems for development and implementation of information systems in such large organisations.

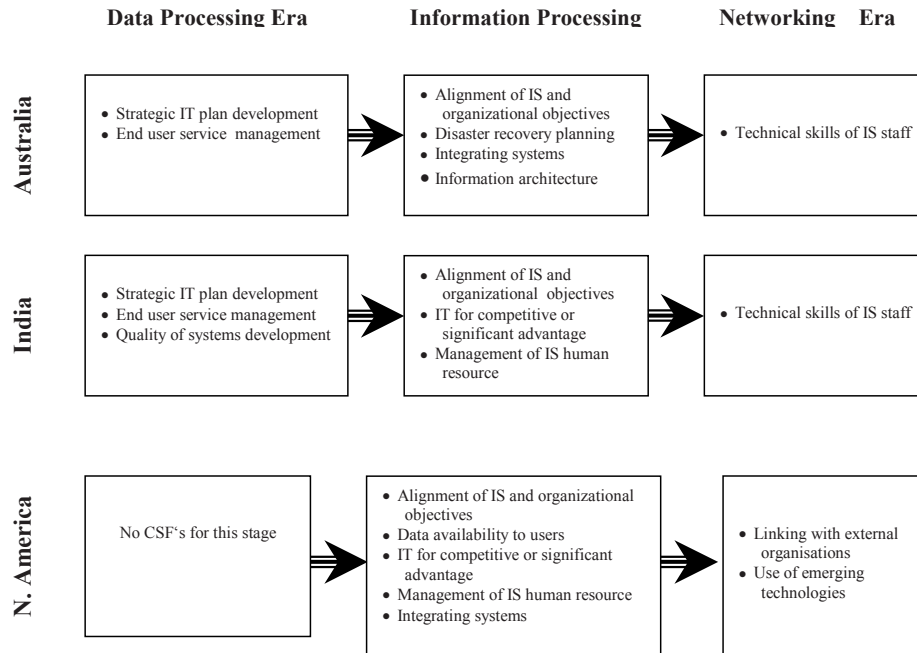
The study begins with the literature survey pertaining to the information systems developed and implemented in the railways of different countries worldwide. Then a framework is developed in which the information systems in the railways are classified based on work systems of use. Further the framework classifies the main drivers of information systems development in the organizations and tries to establish through the case studies method as to how these drivers propel the development of information systems in the organization under study.

INFORMATION SYSTEM ISSUES: A BRIEF REVIEW

Globally, irrespective of the industry, the organizations are in competition with one another to gain a foothold in the industry – the battle being played this time is using ‘Information Technology’. Information technology has been the harbinger of many changes. They have varied from modification in the operations, changes in the processes, alteration in the value chains to repositioning of the firm in different market segments. The pace of changes in the organizations in the Northern hemisphere has been in tandem with the progress in the field of information technology. In fact, there has been a positive synergy between the two.

However in the Southern hemisphere the impact of information technology started to be felt in the late eighties. The information technology in most of these organisations is still hovering around the second level of the Nolan’s model. Nolan (1979) identified six stages of growth of information systems in his research based on the growth of Electronic Data Processing (EDP) facilities in

Figure 1. Comparative maturity of IT in various geographic regions: CSF's at various stages (Khandelwal & Ferguson, 1999)



an organization. The classification was based on three dimensions (a) growth of applications (b) personnel specializations and (c) management techniques used in the EDP facilities. A few Personal Computers (PC)'s connected by leased lines and modems characterize the second stage of the Nolan's model. The information systems applications functional in these organization are of the type of cash flow, budgeting, order processing, inventory management but have yet not moved on to information systems that could perform scheduling and purchase controlling type applications. The designations of the personnel looking after the information systems that are most likely to be found at this stage are systems programmer and system analyst. The EDP management is moved up in the organization hierarchy and the system analysts are assigned to work in the various functional areas. These organizations have yet

to internalize the basic components on which the edifice of information technology is erected.

In India even though the markets are opening up, but organizations are still saddled with the old command economy model and coupled with archaic legal and paralegal bodies make the organizational climate not conducive to the development of effective information systems. Indian Railways is no exception. Khandelwal and Ferguson (1999) while evaluating the comparative maturity of IT in various geographic regions have also observed that the critical success factors for growth of IT in India are largely from the Data Processing (DP) era and Information Technology (IT) Era and a very few are from the Networking (NW) Era (Figure 1).

Considering the issues of IS relationship between IT and organizations is found to be more reflexive than reactive (Laudon & Laudon, 1994).

*Table 1. Key IS issues in private sector and public sector (Caudle, 1991 and Gottchalk, 2000 and Gupta & Sanjay, 2004; Ranganathan et. al., 2004; Joshi and Sauters, 2004) (** - Not as per ranking)*

Rank	Key Public sector IS issues (Caudle, 1991)	US Public IS issues (Gottchalk, 2000)	India IS issues (Gupta & Sanjay, 2004; Ranganathan et. al. 2004; Joshi et. al 2004)**
#1	Integration of technologies	Planning strategically for IS	Industry in automate phase
#2	Aligning IS with agency goals	Increasing understanding of the contribution of IS	Awareness of larger benefits of IS initiative
#3	IS planning	Planning and managing applications	Communication and Networking Infrastructure
#4	End-user computing	Encouraging end-user computing	CEO perceptions and software application development gaps
#5	Office automation	Making use of data as an agency resource	Role of top management
#6	Data security	Planning a communications system	CEO-CIO relationship
#7	Linking IS planning and budgeting	Training agency personnel in use of IS	IS department structure
#8	DBMS impacts	Educating agency managers about IS capability	IS strategy and planning processes
#9	Distributed data processing	Integrating processing and communications	IS implementation processes
#10	Software maintenance	Improving the quality of systems development	Informatics climate of India based on cultural setup

The mediating factors are (i) Size of the organisation, (ii) Size of user population, (iii) Nature and scale of operation of business, (iv) Level of user automation and user interaction (v) Organisation structure and culture (vi) Standard operating procedures (vii) Management decisions (viii) Politics and (ix) Chance. Information systems impact the business environment of the organizations at mul-

tiple levels, that of the industry, firm and at the strategy definition of the firm (Parsons, 1983)

The various mediating factors listed above act together with each other in complex patterns to throw up issues of concern to management and the organisation for successful implementation of information systems in the organization. Several studies have been conducted to assess the key IS

issues in development of information systems in private as well as the public sector across the world. Some of the notable studies in the area of key IS issues as documented by Caudle (1991) were by Ginzberg (1981), Ball and Harrison (1982), Dickson, etc. al. (1984), Harlog and Herbert (1986), Brancheau and Wetherbe (1987), Caudle (1991), Brancheau, Janz and Wetherbe (1996), Watson et. al. (1997) and Gottchalk (2000). Earlier the Society for Information Management based at US had set up a website <http://www.cba.uga.edu/iris/> that compiled the various issues in information system. A comparison of two important studies in the key issues in IS for both public and private sector is tabulated in Table 1.

The top key IS issues in reviewed studies as per Gottchalk (2000), which were common to both public and private organizations.

1. Improving IS Strategic Planning: To align long range IS planning with strategic business plans.
2. Making effective use of Data Resources: To develop data architecture so as to utilize the organizations data resources that is steadily growing in size.
3. Improving effectiveness of software development: Developing applications so as to reduce the backlog of application development, and improving of information systems effectiveness.

In the Indian context a few studies have been done. Delving into the information technology usage in India, Gupta and Sanjay (2004) have brought out that issues of IT usage in India are similar to those of organization worldwide however they have been moderated by low levels of penetration of IT and the slow adoption of IT in India. Indian industry despite being a software exporter has been slow in implementing IT in India. Ranganathan & Kannirban (2004) identified five parameters to assess the critical

factors that are likely to contribute to successful deployment of IS in Indian organizations specifically organization design and management of IS function so as to improve the contribution of IS to the organizations.. These are (i) Role of top managements (ii) Chief Executive Officer (CEO)-Chief Information Officer (CIO) relationships, (iii) IS department structure, (iv) IS planning process and (v) IS implementation. Earlier S Kanungo and M Chouthoy (1998) had studied IT planning in India. The factors that impact on IT planning as brought out in the study were (i) The requirement of IT strategy by organizations, (ii) Development of organizational structures inside the organization to manage organization wide information processing activities so as to reduce organizational dependence on outside agencies and (iii) Understanding the key facilitators and inhibitors of IT use in organizations.

It is observed in the case of Indian Railways that though the initiatives for development of information systems in the organization began in the early 1960's but till date Indian Railways has been able to develop only one organization wide information system which has stabilized – the Passenger Reservation System (PRS). The scope of the PRS system is limited to computerizing a single transaction – issue of reserved journey tickets to the passenger. Therefore the PRS could be classified as a transaction processing system. The reasons for this phenomenon need to be understood.

Efforts to develop enterprise level systems spanning more number of transactions have met with limited success. Therefore an attempt is made to study information systems in other railway systems across the world to provide a context for development of information systems in the Indian Railways.

INFORMATION SYSTEMS IN RAILWAYS OF SELECT COUNTRIES

As discussed earlier external environment is a significant moderating factor for the development of information systems in an organisation. Ranganathan and Sethi (2000) have also established that external IT environment impacts the development of information systems in an organization. The information systems in the railroads would typically be classified into three main categories, which would be as follows (i) information systems pertaining to the assets, their operation, maintenance, safety and energy requirements, (ii) information systems pertaining to the personnel operating the railway assets and (iii) information systems pertaining to the delivery of the services produced by the Railroads. The three broad areas can be further sub-divided into seven areas into which literature available in the field of Information Systems in the railroads can be classified. The areas are as follows; (i) Asset management includes operation research based information systems, (ii) Communication systems, (iii) Consumer interface, (iv) Energy management, (v) Operations human interface, (vi) Rail traffic control, and (vii) Safety. A brief discussion of each of the above is detailed below and the research is tabulated in Table-2.

Information systems in railroads in different countries have evolved under the pressure of the environment factors as is brought out by the following case studies from the Railways of three regions, South Africa, Japan and European Union.

South Africa Public transport and logistics is handles by Transnet: One of the largest logistics companies in the world, Transnet handles 60 percent of all freight moved within and across South Africa's borders by rail, road, sea, and air. It needed to create efficient distribution networks and help to drive down costs for South African industries, improving their competitiveness. It has a large network of railways (20,872 km) and roads

(275,971 km). Exports contribute \$41.97 billion to its GDP of \$491.4 billion i.e. almost 10% of its GDP. Logistics is a major cost for many of its largest customers, the exporters. South Africa's total expenditure on logistics is estimated to be 18 percent of the country's gross domestic product (GDP), compared with 10 percent in Europe and the United States. Transnet has radically transformed its logistics provision, to help reduce costs for local businesses and increase South African competitiveness in the global economy. To support this transformation, the company has implemented a state-of-the-art logistics information system with a thrust on intermodal information systems. This is implemented through eLogistics of B2BAfrica, the eBusiness subsidiary of Transnet.

The solution needed to enable customers, suppliers, and partners to track the movement of shipments at all times – online and in real time. It also needed to automate core processes and provide functionality such as order-entry, track-and-trace, event management, and proof-of-delivery. Transnet identified i2's transportation and distribution management platform, FreightMatrix. The application offered all of the services and features that the company required (Table 3). The company set up a series of key performance indicators to establish firm baseline for measuring business improvements. Using these indicators, it has been able to establish that it has raised its customer service levels from 15 percent to 80 percent and vastly improved the visibility in its supply chain from just 3 percent to 90 percent. In acknowledgement of its accomplishments, Spoornet was honoured with a Gold Logistics Achiever Award from the Logistics Industry in South Africa.

East Japan Railway Company (JR East) has implemented information system applications covering a large spectrum of its working. Japan has a long history of utilizing high-end technologies. In fact the monorail was implemented in Tokyo in as long back as 1964. The efforts towards information system development were

Table 2. Information systems in the railroads

Information Systems in the Railroads	Key Features	References
IS for Asset Management	<ul style="list-style-type: none"> - Manage information of the assets over the complete life cycle -Managed by the Engineering Department of the organization - Capacity utilization of assets 	<ul style="list-style-type: none"> - Levine and Pomerol, 1990 - Fuller, 1995
IS for Communication	<ul style="list-style-type: none"> - Systems specifically deal with combating the communication needs of the railway operations - Recent advances in IT in forms of mobile telephony and PDA 	<ul style="list-style-type: none"> - Skaivik and Roste, 1992
Consumer Interface Information Systems	<ul style="list-style-type: none"> - Passenger reservation systems developed in India (CONCERT) - Strategic information systems; ex. passenger's reservations for the TGV in France SOCRATES¹TM - Provide the customer with better information and facilities with web enabled IS systems like time tabling and itinerary planning 	<ul style="list-style-type: none"> - Tulp et al, 1989 - Veenendaal, 1993 - Eglizeau et al, 1995 - Lamel et al, 1998 - Mitev, 1998
IS For Operations human interface	<ul style="list-style-type: none"> - Deal with improvement of the interface of the railway operation staff; drivers, guards and train controllers by improving the interfaces of this category of railway employees with the equipment they use. - Used ergonomics and advanced software techniques 	<ul style="list-style-type: none"> - Schmid and Collis, 1999
IS for Rail Traffic Control	<ul style="list-style-type: none"> - Maximize the line capacity through various techniques like simulation studies and operation research, and other allied techniques. - Adjunct objectives of improving safety and reliability of train operations 	<ul style="list-style-type: none"> - Kwon et. al., 1995 - Missikoff, 1997 - Kitahara et. al., 1999 - Kitahara et. al., 2000 - Ishikawa et. al. 2003;
Energy Management IS	<ul style="list-style-type: none"> - Information systems for improvement of the energy efficiency of train movement through effective and efficient control of power control apparatus - Systems use varied methodologies for the above like SCADA (Supervisory control and data acquisition system) and GPS (Geographical Position Systems) 	<ul style="list-style-type: none"> - Leahy et. al. 1993 - Bajenaru et al 1998 - Einarsson et al 2001
IS for Safety	<ul style="list-style-type: none"> - Primarily aimed at ensuring safety of railway operations in the station area - Utilization of advance systems in monitoring and optimizing train operation and control systems 	<ul style="list-style-type: none"> - Groote et. al., 1995 - Myers et. al., 1998; - Demir et. al., 1998 - Lloyd, 1998

initiated in the year 1987 under the company's first president Yamashita and the first information systems were implemented in 1989-1990. JR East has developed information systems (Table 4) in all the three areas namely, train operations, customer relations and business operations as is illustrated in Table 4. Each of the application areas is supported by databases. For example

there are databases that contain data pertaining to train operations, fixed and running assets like signaling and communication facilities, electric power facilities, track facilities and customer details- like profile of tickets sold across time and different stations. JR East has a definite program for the development of its information systems. The strategy aims at reducing hardware costs and

Table 3. Challenges for development of IS and benefits derived. SPOORNET case study.

Challenges For development of IS	Benefits Derived from the IS
Improve the efficiency of logistics operations	Improved fleet utilisation for the generation of new business opportunities and new revenues
Help South African industries become more competitive in global markets	Improved competitiveness in global markets through lowered costs
Improve customer service levels	Increased customer service levels from 15% to 80%
Select Software application to create a “glass pipe” across all of Transnet’s group companies	Increased supply chain visibility from 3% to 90%

Table 4. Information systems development in Japan: Present and future

Type Of Information systems	Functional Applications	Future Applications
Train operation related systems	Computerized Safety, Maintenance and operation system of Shinkansen (COSMOS), Facilities management System	Improving quality of software applications, reducing hardware and system costs
Customer related system	MARS (Multi-access reservation system), Point of Sales systems (POS), View Card system	Customer related information database
Business operation related systems	Executive data management system, e-mail services, bulletin boards,	New office computer system using groupware

restructuring of the systems function with a focus on horizontal integration as against the present vertical structure.

In Europe, Information systems are being developed by a consortium formed by various countries to cater to the needs of the different European Railways, which form a part of the European Union. The project aims at providing an information system, which shall ensure interoperability of the various signaling and train control equipment functioning on different Railways across the European Union. (Table 5) The European Train Control System (ETCS) is essentially an information system in the domain of train operation systems. Two learning points emerge from the ETCS case, the first being

that with spread of the railway systems across national boundaries, there are changes in both, the technologies used for delivering the services as also the culture of the manpower involved in delivering the services. The initiative of implementing such information systems acquires a high degree of complexity as multiple agencies are involved in conceptualization through to the implementation stage. This mandates continuity of the effort through time and spatial coordinates through a dedicated agency. The development of the Technical Specifications on Interoperability, (TSI) takes over three years from the approval to the publication stage.

Like India, China has also achieved considerable economic growth in recent years. It is

Table 5. Challenges for development of IS in The European Union

- | |
|--|
| <ul style="list-style-type: none"> ▪ Innovative business and operational processes from service origin through to destination ▪ Continuity of service, notably across borders ▪ Coherent management of information across the commercial, logistic and operational chains of the railways ▪ More reliable and flexible management of infrastructure and mobile assets notably under degraded operating conditions ▪ Enhanced demand/supply management |
|--|

undergoing a technological change with huge IT investments in both public and private sectors. China Railway organizational structure has moved away from the command economy model towards a market led economy. The Chinese Railway has been corporatized, so that it can be more responsive to market requirements with passenger fare and freight tariff consistent with market forces. Non-core businesses like hospitals, educational institutions, design institutes and railway communication companies have been hived off. A restructuring plan is being pursued at the Chinese Railway with a central objective to let the enterprises set commercial goals and allow them to be run as commercial entities. Thus Indian Railways can emulate the Chinese Railways experience by developing large sophisticated infrastructure projects through the joint participation of private sector and foreign entrepreneurs. These large infrastructure projects can in turn exert the 'pull effect' for absorption of latest information technology and concomitant information systems.

INDIAN RAILWAYS: THE LEGACY AND DIVERSITY

Railroads in India have a rich legacy from the one and a half century of its long organizational history. The legacy is a network of complex, archaic, well-established socio-technical and

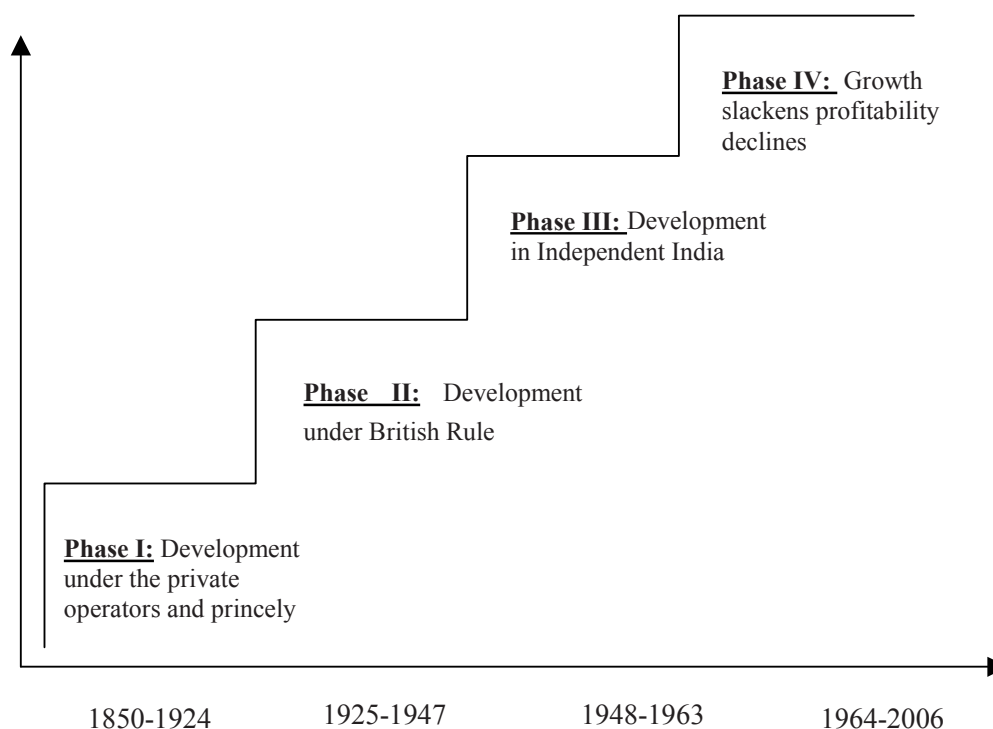
socio-cultural systems. The legacy derives from the one and a half century of British rule over India. The first commercial railroad in India started in 1853.

On the eve of independence of India (15 August 1947), the British left behind a network of 54,000-route km of railway lines (including those belonging to the former princely States). Even as of 1948, there were 42 railway systems consisting of 13 Class I Railways, 10 Class II Railways and 19 Class III Railways. Among these were included 32 lines owned by ex-Indian States varying from, under 10 kilometers of the Sangli State to 2275 kilometers of the Nizam's State. The history of Indian Railways spans a century of its organizational life under the British Rule and further half a century in independent India.

The British had developed the Railways as a means of commercial exploitation of colonial India. After independence, the channel of colonial exploitation metamorphosed into the lifeline of the nation. It welded the parts of the country together and was a driver of development. It transports its armed forces, provides postal services, and carries the raw materials like coal, fertilizers, food grains, steel and cement. The Indian Railways history can be divided into four phases (Figure-2). Two phases are from the pre- independence and two phases are from the post-independence era.

Indian Railways has been a much-acclaimed organisation for its contribution to the national development, for its size and for its diversity. Its

Figure 2. The four phases of Indian Railways development



Railway Minister presents the budget of the Indian Railways to the Parliament of India separately. By one estimate, one out of every ten Indians depends directly or indirectly on Indian Railways. Indian Railways is truly a vast, integrated and multifaceted organisation. It has multiple business lines as depicted in Table-8.

Further the Indian Railways has significant technical achievements to its credit. The Himsagar Express (between Kanyakumari and Jammu Tawi, Train No. 6318) has the longest run in terms of distance (and time, see above) on Indian Railways -- it covers a distance of about 3745km in 74 hours and 55 minutes. The bridge on the river Godavari near Rajahmundry (Road-rail mixed traffic bridge) is a little over 5 kilometers long. Indian Railways runs trains on three gauges, Broad Gauge (BG-1676 mm), Meter Gauge (MG-1000 mm), and Narrow Gauge (NG-762/610 mm). New Jalpaiguri is a special station on North Frontier (Indian) Railway as it has all the three gauges

- BG, MG, and NG (2'0") present at the same place. Currently it is the only such station on Indian Railways network.

EVOLUTION OF INFORMATION SYSTEMS IN INDIAN RAILWAYS

Indian Railways were amongst the first organization to use computers in the country. (Table-7). As long back as in 1963-64 IBM unit record equipments were installed on all Zonal Railways across India. The Accounts Department and the Statistical Departments were the first users of computers on Indian Railways. The Accounts Department used the IBM Unit Record Equipments for audit and account of revenue earnings and the Statistics Department for compilation of revenue statistics. Railways used computers at both the Zonal offices and at the Main Head Office. At the time of induction of the computers,

Table 6. Diverse of business lines of Indian Railways












	Railway Fixed Assets	Design, laying, track maintenance, track electrification and signaling, bridge design, bridge construction - Design, manufacture, operate & maintain steam, diesel and. electric locomotives
	Railway Rolling Stock	Design, manufacture, operation & maintenance of ordinary and luxury coaches including Electric Multiple Units (EMU)
	Railway Stations	Design, construction, operation and maintenance
	Signaling and Telecommunications	Design, installation, operation & maintenance of VSAT, Optical Fiber, Microwave, Wire & Wireless communication, telephone exchanges
	Operation of trains	Runs around 11,000 trains everyday, of which 7,000 are passenger trains
	Catering and Rest Houses	Services For passengers
	Railway Crossings	Operating thousands of Railway Crossings across the country
	Real Estate	Developing and managing the real estate
	Hospitals	Medical services for its employees
	Factories	For manufacturing electrical, diesel locomotives, passenger and freight coaches
	Workshops	For maintenance and overhauling of its assets

Table 7. First computers on Indian Railways (EDP systems on Indian Railways, 1977)

Location	Year Of Installation	CPU	Memory	Tape Drives	Disk Drives
Zonal Railways (Eight zones)	1967-1970	IBM-1401	12 KBs	729-II, 4 Nos.
Railway Board, Head Quarters Delhi	1968	IBM-1401	12 KBs	7330, 4 Nos.	1331, 1 Nos.

Table 8. Major areas for inductions of computers in Indian Railways (EDP systems on Indian Railways, 1977)

Transportation Management	Workshop Management
Commercial Management	Project Management
Inventory Management	Financial Management
Fuel Management	Fixed Assets maintenance Management
Rolling Stock Assets Maintenance Management	Manpower Planning and Personnel Management
Planning	

the Indian Railways was aware of the far-reaching impacts the computers would make on the operation and management of the organization. A list of applications were used in the late seventies is quite impressive. It included applications in areas of commercial management, transport management, material management, personnel management and financial management.

The computer utilisation in terms of monthly meter time of these second generation computers was well above the all India average for computers at that time. As early as 1973 the official report of the study team on Automation appointed by the Maharashtra state (of India) had observed, “On an all India level the most impressive use of computers in public and private sectors is to be found in the integrated operations of the 14 computers controlled by the Railway Board in New Delhi.” Further a key committee identified eleven major areas for inductions of computers (Table 8).

The Passenger Reservation system is also the first of its kind in the world keeping in view the number of trains, class of passenger travel and the spatial spread of the system. Kanungo (1999) has studied the Indian Railways passenger reservation system, IMPRESS and freight management system, FOIS. The study mapped the Indian Railways IS setup to a modified Nolan’s model, comprising of five stages. According to this study, the IS growth in the Indian Railways context has been arrested at stage two of the model, that is ‘Extension’. Kanungo notes that there is no perspective in IS development in Indian Railways covering the infrastructure and the user. Only basic applications like payroll, inventory have been implemented and that only applications that Indian Railways has been successful in implementing are the IMPRESS and FOIS that too partially. The present development of information systems in Indian Railways mapped to the Nolan’ model is described in Table 9 and Figure-3.

The four organizations that have spun out of Indian Railways and the characteristics of the Information systems developed in them are discussed next. All the four organizations, Container Corporation of India Ltd. (CONCOR), Rail India Technical & Economic Services (RITES), Center For Railway Information Systems (CRIS), Konkan Railway Corporation Limited (KRC), have been instrumental in developing and implementing excellent information systems. CONCOR an off-shoot of Indian Railways has already provided its customers an online consignment tracking system, for both international and domestic containers. The consignment tracking system is available on the company's Internet site. Likewise, RITES has been providing state of the art consultancy in information systems in the international arena. Some of the notable projects undertaken by RITES are, Automatic Simulation System for operations and running of trains, in Malaysia, Inventory Control and Maintenance System in Mexico and, the Online Wagon Control System, in Mozambique. CRIS has developed a world-

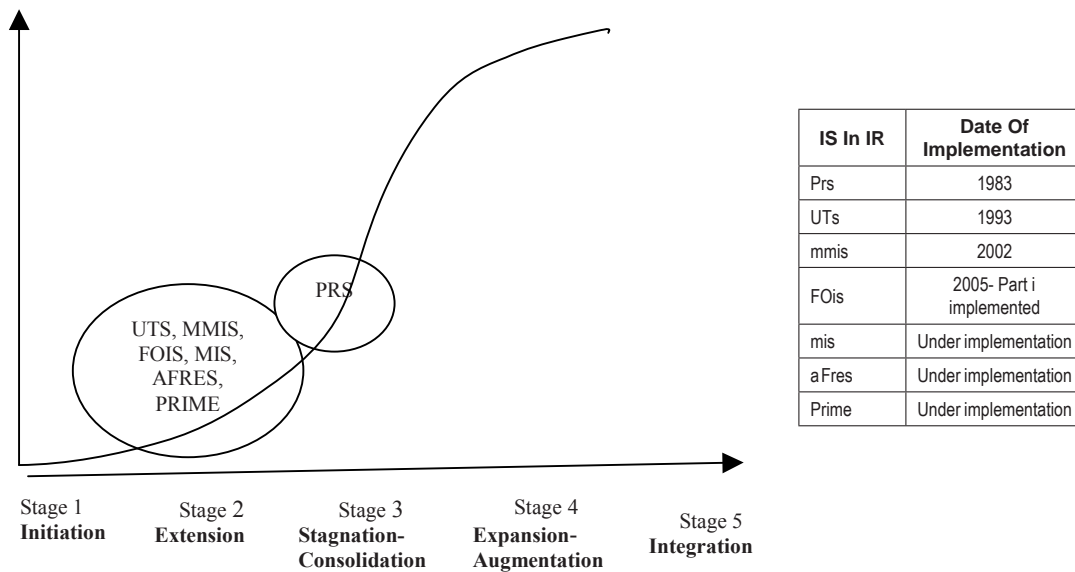
class passenger reservation system, which handles around 0.75 million-passenger transactions per day during peak season across the length and breadth of India. CRIS is also in advance stages of implementing the Freight Operation Information System (FOIS) for the management of freight traffic over the entire Indian Railways.

For some organisations IT activities form an area of great strategic importance in the present. For other organisations the IT function may not have any strategic importance today but may be of significant strategic importance in the future. Based on the current and future impact of IT, McFarlan and McKenny (1983) developed four scenarios of IT applications depending on the impact of the IT applications, in the present and in the future. The Konkan Railway Corporation has indigenously developed an end-to-end Railway Applications Package (RAP) resembling an ERP, solution that it has implemented across the organisation including all the stations and offices. The Information System has been running successfully since start of operations of Konkan

Table 9. Information systems on Indian Railways: A snapshot

Areas	Remarks	Examples
Applications	<ul style="list-style-type: none"> Legacy applications Applications in the area of transaction processing. Limited networking across geographical locations Developed and maintained with support from outside agencies 	<ul style="list-style-type: none"> Advanced Finance and Railway Earnings And Expenditure System (AFRES) Freight Operation Information System (FOIS) Passenger Reservation System (PRS) Unreserved Ticketing System (UTS) National Train Enquiry System (NTES) Material Management Information System (MMIS) Management Information system (MIS) (Under Development)
Personnel Specialization	Most of the applications are maintained by CRIS through third party service providers for hardware and software maintenance	<ul style="list-style-type: none"> Operators System Analyst Console operators
Management Techniques & Funding	IS functioning in the EDP scenario under department with first justification. Funds earmarked for IS are around half percent of the capital expenditure of Indian Railway since last three decades	Please refer Table 16 for computerization spending of Indian Railways.

Figure 3. IS in Indian Railways mapped on to Nolan's Model



Railways in 1998. However, it is noteworthy that information systems developed in Indian Railways have been developed only on the 'Support' quadrant of the Strategic Grid Framework.

The IT applications prevalent in Indian Railways are word processing, spreadsheets, payroll, inventory tracking, budgeting, and publishing of tenders, timetables, fares and journey particulars on the web. These IT applications would belong to the 'Support' quadrant. Other IT applications like the Passenger Reservation System (PRS), Unreserved Ticketing System (UTS) and Freight Operation Information System (FOIS) would also be classified in the Support quadrant as functioning of these systems is not critical to the operation of the Indian Railways. The applications, like PRS, UTS, and FOIS that have been implemented across the entire Indian Railways were developed by an organisation – CRIS, a separate entity spun out from Indian Railways. In contrast Container Corporation of India Limited (CONCOR) has been able to develop the container tracking system for both national and international containers that can be classified in the Strategic quadrant. This

is indicative of a number of underpinning factors like the sheer size of Indian Railways along with the diversity of the cargo carried by the Railways precluding the possibility of development of an information system across the entire organization. However having limited the options to developing an Information System for containers only, it was found to be technically possible to develop an information system. The competitive pressures of the market segment to which the organization, CONCOR was catering to, also acted as a driver in the development of the information system for tracking the containers. This is also indicative of organizational constraints of agreeing to a common application leave aside an information system to develop across the entire organisation in view of the sheer size of the organisation that is functioning across multiple cultural zones, each zone having differing priorities. The role of top management becomes all the more important for it has to chalk out a path for development for information systems with vision and firmness which can be adhered to over the long term.

Table 10 provides at a glance the status of Information Systems developed and implemented by these organizations. All of these organizations have been conceived and promoted by personnel from Indian Railways, are staffed essentially with manpower drawn from the parent organisation, but have one notable exception. The regulatory framework under which they function, is that of the Indian Companies Act (1956). The single most advantage that it brings is that the company has to cast its accounts in format prescribed by the Company's Act. It brings into the psychological vocabulary of the company, a profit and loss account. The financial community at large can understand this accounts format and various indices of the company can be benchmarked across the industry, both at the national and the international levels. This goes a long way in making the company responsive to its environment.

The single most important consequence of the above is that the company starts to consider it a business entity, which is subject to the forces of competition in the market. It also makes it amenable to the introduction of new technologies that have the possibility of improving its bottom line even though the technologies strike at the root of the web of socio-technical and socio-cultural systems. And as a corollary to the above it helps in the development of information systems. After the discussion, dealing with the affect of human factors of a company on the development and implementation of information systems, the technical factors that affect the development and implementation of information systems in a company -the case under discussion –Konkan Railway are studied. However before the study of Konkan Railway some observations of development and implementation of information system on the Indian Railways are delineated.

As is seen from the Table-11 and Figure-4 the expenses incurred on computerization on Indian Railways are very low. As per the figures available in the table, they form only 0.56 % of the capital expenses of the Indian railways and

0.17% of the total expenses of the Indian Railways. Though the expenditure on computerization (different projects) on Indian Railways in absolute terms is on the increase, in percentage terms the expenditure is on the decrease. Over the period from 1986 to 2003 the expenditure on computerization in percent terms has decreased from 1.57 % to 0.56% of capital expenditure and 0.52% to 0.17% of total expenditure of Indian Railways. For an organisation like Indian Railways this is not appropriate. Further from the data it is seen that the actual expenditure as a part of estimated expenditure on computerization during the same period has decreased from an average of 95% to 57%. This is an indicator to the fact that delivery mechanisms of IS development and implementation are not well established in the organisation.

Another trend which is discernible from the field studies indicates that the order of activities of implementation of IS projects is hardware procurement, software delivery and personnel training for IS. Further all software applications developed are from third party vendors. In fact most of the software applications have been developed in independent administrative units that have felt the need of development of the IS applications. More so, the diffusion of the software applications across administrative boundaries has been minimal. This trend is also brought out for applications like AFRES and PRIME which though developed under the aegis of the Railway Board have been implemented completely only in the Zones in which they have been developed. This is a pointer to the fact that either other units of the Railways do not perceive the need or the driving force behind the development and implementation is not existent.

Konkan Railway Application Package: A Review

As already mentioned, Konkan Railway Corporation Limited (KRCL) was set up as a Public Sector Company under the Ministry of Railways

Table 10. IS status in Railroads of India and reasons for success of IS

Name Of Company	Status Of Information Systems	Reasons For Success Of IS
CONCOR	<ul style="list-style-type: none"> • ‘Mission-critical’ information system for tracking both international and domestic consignments • ERP for HRD and payroll under implementation 	<ul style="list-style-type: none"> • Young company. Incorporated as Public Limited Company 1988 • Deals with only freight transport using containers resulting in focused market segment
KRCL	<ul style="list-style-type: none"> • End to end indigenous Railway Application Package (RAP) in place covering all aspects of railways functioning, an enterprise resource planning like information system 	<ul style="list-style-type: none"> • Young company. Incorporated as Public Limited Company in 1990 began operations in 1998 • IS developed from the inception of the organisation • Small size – approximately 2% of geographical spread of IR
MITES	<ul style="list-style-type: none"> • Provider Of Consultancy for ISO-9000 quality assurance for software development • Network designing • MIS –design, development & implementation 	<ul style="list-style-type: none"> • Incorporated as Public Limited Company (under the Company Act in 1974) • Niche market. Provides only consultancy services
CRIS	<ul style="list-style-type: none"> • Provider of passenger reservation and freight operation systems to Indian Railways • Provider of other integrated information systems like National Train Enquiry System (NTES), Unreserved Ticketing System (UTS) to Indian Railways 	<ul style="list-style-type: none"> • Registered as an autonomous Society/ in 1986 • Niche segments, like consumer services and traffic facilities. Provides computer services to Indian Railways- hardware, software including manpower support through third party vendors

in July 1990 to bridge the 738 km Konkan Gap by providing railway connection between Roha (150 km south of Mumbai) and Thokur (about 22 km north of Mangalore). KRCL was structured as a build-operate-transfer (BOT) project, with a concession period of 10 years from start of operations.

Conceptualization of the Konkan Railway Application Package (KRAP)

When the creation of Konkan Railway was going on it was envisaged that after it becomes operational it would work as a truly information driven organisation with a flat structure. (Please refer

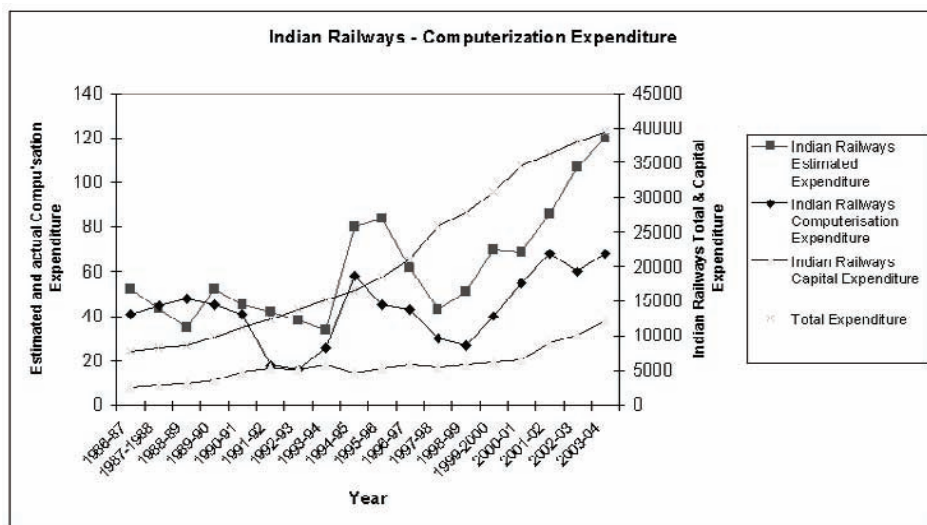
Box 1). An ambitious IT project was conceived to achieve this objective. The project envisaged the computerization of all the business processes essential for running of a railway system irrespective of the departments concerned. Konkan Railway wanted to empower its train controllers with precise decision-making abilities to perform “what-if analysis” for seamless movement of trains.

Railway functioning was envisioned as a series of functions that are performed in sequence as well as in parallel by different departments. The successful collective effort of each of these functions is critical to the delivery of the output –the operation of the train services. The Information System that was to be developed had to

Table 11. Estimated and actual expenditure on computerisation & capital and total expenditure of IR

Indian Railways Computerisation Expenditure							
Year	(In Crores Of Rupees)				(In Percentage)		
	Estimated Expen'ture (1)	Comp'isation Expenditure (2)	Capital Expen'ture (3)	Total Expen'ture (4)	Actual Expenditure/ Estimated Expenditure (5) = (2)/(1) *100	Actual Expenditure/ Capital Expenditure (6) = (2)/(3) *100	Actual Expenditure/ Total Expenditure (7) = (2)/(4) *100
1986-87	52	41	2612	7845	79	1.57	0.52
1987-88	43.5	44.5	2870.5	8239	102	1.55	0.54
1988-89	35	48	3129	8633	137	1.53	0.56
1989-90	52	45	3562	9888	87	1.26	0.46
1990-91	45	41	4892	11153	91	0.84	0.37
1991-92	42	18	5393	12389	43	0.33	0.15
1992-93	38	16	5136	13890	42	0.31	0.12
1993-94	34	26	5860	15134	76	0.44	0.17
1994-95	80	58	4727	16590	73	1.23	0.35
1995-96	84	45	5350	18525	54	0.84	0.24
1996-97	62	43	5926	21000	69	0.73	0.20
1997-98	43	30	5443	25876	70	0.55	0.12
1998-99	51	27	5790.5	27834	53	0.47	0.10
1999-00	70	40	6138	30843	57	0.65	0.13
2000-01	69	55	6498	34667	80	0.85	0.16
2001-02	86	68	9002	36293	79	0.76	0.19
2002-03	107	60	10241	38026	56	0.59	0.16
2003-04	120	68	12157	39482	57	0.56	0.17

Figure 4. Estimated and actual expenditure on computerisation & capital and total expenditure of IR



keep in consideration the efficient utilization of the system so developed at all levels, vertical as well as horizontal. Keeping all these requirements in focus, the best match was found in an ERP like system.

There are instances of use of enterprise systems in Railways (Table-12). The railroads have implemented packaged solutions replacing the fragmented legacy solutions. However implementation of the enterprise systems is being done in stages. The organisations are selectively implementing those modules of these software's, which are useful to them. Various reasons for implementing the enterprise systems modules by the railroads are process improvement, cost savings, efficiency enhancement, integrated view of information, information based decision-making, online connectivity, security of data and governmental stipulations as in the case of Canadian National Railways and Italian Railways.

Generally, ERP systems are known to take a long time for customization of the system as per

the requirements of the organization where they are being implemented. The time of customization could extend from a year, to as much as three years, before the systems begin to deliver. Moreover, the organizations in which the ERP systems have been integrated had business processes, which were markedly different from that of Railways. Also of consideration is the fact that an ERP package implementation is done after a round of Business Process Reengineering (BPR). It was considered that many Railway processes would not be amenable to change to suit standard ERP systems. Bearing in mind these requirements Konkan Railway decided to go in for indigenously developing an enterprise system called Railway Applications Package with the following benefits:

- Minimum learning curve involved, resulting into better adoption of the system.
- Seamless integration of MIS with those produced by manual systems on Indian

Table 12. Enterprise systems (ERP) in world railroads

Railway	Recently Implemented Enterprise Systems	Earlier Implementations
Canadian National Railway (Canada)	The SAP® Environment, Health & Safety (SAP EH&S) application Plant Maintenance, HR & FI	SAP R/3 4.6c: components for financials, materials management, human resources, and plant maintenance
Eurotunnel (Europe)	SAP R/3® (for materials management; purchasing; and sales and distribution) mySAP Product Lifecycle Management SAP Business Intelligence, a component in SAP NetWeaver	More than 50 proprietary applications
Indian Railway Catering And Tourism Corporation (India)	Oracle Business Suite. Modules implemented are Inventory, Procurement, Contracts, Financials and Human Resources.	Newly formed organisation
Pakistan Railways (Pakistan)	Oracle database, Oracle Developer Suite, Oracle Application Server, Oracle Collaboration Suite	Paper based systems
Canadian Pacific Railways (Canada)	Oracle's, People Soft, Customer Relationship Management	Disparate proprietary IS

Box 1: A Vision of the Konkan Railways Information System – Touching all aspects of Railway Functioning (Shivdasani. and Kane: Konkan Railway - A Dream Come True, 1998)

The 900 km long optic fiber information highway supports all aspects of Railways functioning. The vision

- **Ticketing** - Passengers in a remote Konkan village should be able to book tickets without coming to the station. This would be implemented with the help of dial up connection.
- **Freight:** Customers would be able to obtain immediate information availability of space on specific trains through freight agents who would have dial up connections.
- **Train Control:** Instant online monitoring of train location and relevant data on computer screen.
- **Passenger Information:** Passenger information available on computers directly through the computer network.
- **Crew Management:** Monitoring of arrival and departure of crew through magnetic card readers.
- **Safety:** . A modern control centre would monitor smoke, temperature and visibility in the tunnels and use s this data to run giant ventilation fans.

- Railways.
- Possibility of sale of the system to Indian Railways and other Railways out side India
- Easy integration of Konkan Railway and Indian Railway as and when it happens.

The next stage was the enumeration of a detailed set of functional specifications that the system should satisfy.

Development and Implementation of RAP

Drawing up the specifications: The process of development started with senior officers of Indian Railways writing down the business processes very explicitly and deriving Systems Requirement Specifications (SRS) out of that. Tata InfoTech Limited (TIL), the software developer was involved in this activity from the very beginning. Based on the SRS, Conceptual Designed Documents (CDD) were prepared by TIL. The process of writing SRS and CDD involved multi disciplinary teams so that the linkages between the various modules could be taken care of. The

synergy between KRCL & TIL in terms of domain knowledge and IT expertise respectively helped in laying a strong foundation for the system. This is also in the true spirit of ERP where all the functional packages are tightly integrated and share information. The package in its entirety was named as Railway Applications Package (RAP)

Some of the features of RAP are as follows

- The data is captured as the action takes place.
- The system takes all the rule-based decisions on its own.
- Provides MIS for better management and improved utilisation of assets.
- Provides data for long terms analysis and data mining

The software contract was planned in a very innovative way. Instead of up front payment of the development of the software it was decided that TIL would have exclusive marketing rights. This ensured continued partnership even after the development was over and long term association with the product. With the same arrangement KRCL and TIL are doing a project for South

Eastern Railway. Next we take a look at the Information System developed.

RAP system consists of tightly integrated 17 modules for all the departments in a Railway System. RAP is an application that is all pervasive, starting from operations and extending down to ticketing, business intelligence, stores, inventory, HR and financial accounting. Every detail down to the last paisa is recorded in its database. The modules cater to all the basic functions performed by the personnel of each department. This enables not only the automation of the basic activities but also capturing of the data at the action points. The modules are tightly integrated with each other. Relevant information is passed on to from one module to another as the different departments do in the manual working. This has a number of advantages like; no reconciliation required management of the information since maintained only at one place. Each module performs following functions:

- Enables the discharge of the basic functional responsibility of the departments,
- Interact with the related modules of others departments as required,
- Creates and maintains the information support needed for the organisation.

The list of modules incorporated in the ERP system is enumerated in Table 13. A snapshot of the functionality and the benefits accrued from the ERP system is shown in Box 2 and Box 3.

Tackling Implementation Blues: - The problems faced during testing and implementation phases were numerous. To name a few, gathering the data for making the masters, defining access rights and assignment to end users, representatives of the user departments unable to find sufficient time for the testing of the modules etc. Lack of confidence on the automated systems was another major issue. Many users, especially those in charge of the critical functions were of the view that the time-tested systems of the Indian Railway couldn't

be automated like this. Extensive parallel runs slowly eliminated such skepticism.

Since the set of officers who wrote the SRS was different than those who were in charge of implementation there was a lack of ownership with the modules. Many new incumbents wanted the SRS's to be revised as per the requirements they thought was the right way of doing a process. The Managing Director, effectively checked this, by issuing a dictum that any changes would require his personal approval and the officer requiring changes would have to convince him that the changes are absolutely essential.


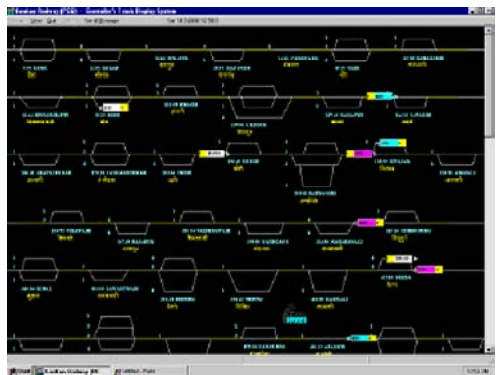
Training: For training, the users cascading approach was followed. Before launching a new sub module or a new functionality, the core group in the IT department used to make a small user manual. The initial training was imparted to the core group of the users and the computer operator in the field in charge of the modules. They would in turn impart the training to the end users at the stations. IT awareness programs were also conducted in the beginning to excite the users about the technology.

Commitment of the top Management: CEO of the organization was very committed to the implementation of the modules. He used to review the progress of the modules on a weekly basis with all the heads of the departments. This really provided lot of impetus to the implementation process and many inter-module problems were sorted out during these meetings. Weekly meetings were also held with the development team for thrashing out their issues. The users too, used to participate in these meetings. The commitment of the CEO sent a clear message to one and all about the importance of the whole affair. One very important principle which comes out is that the top management has to be convinced that IT systems are not just functions to be managed but enablers for accomplishing business objectives and only then they will be able to

Table 13. Different modules comprising the IS at Konkan Railway (RAP – Railway Applications Package Of Konkan Railway – Web Site www.konkanrailway.com)

<ul style="list-style-type: none"> • Financial Accounting Module • Annual Accounts Module • Traffic Accounts Module • Expenditure Authorization Module • Commercial Coaching Module. • Claims & Compensation Module • Operations & Train Control • Commercial Freight Module: • Personnel Management Module • Electrical Maintenance Module 	<ul style="list-style-type: none"> • Track & Structure Maintenance and Control Module • Rolling Stock Motive Power Module • Rolling Stock Carriage & Wagons Module • Health Management Module • Stores & Inventory Control Module • Security & Administration Module • Signal & Telecommunication Maintenance Module
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Box 2. Some snapshots of the IS functionality (RAP – Railway Applications Package of Konkan Railway – Web Site www.konkanrailway.com)

	<p>Konkan Railway's Train Control Office: Controller on the job (No manual charting).</p>
	<p>'Live' Display of the train movement on Track diagrams in the section. The trains move automatically on the display as the stationmasters feed the train details. All the details about the train can be obtained by clicking over it. Station layouts can be also be zoomed.</p>

Box 3. Benefits of a computer system at the Konkan Railway (Shivdasani and Kane: Konkan Railway - A Dream Come True, 1998 and Trivedi G – On the Right Track, 2003)

As per CEO Konkan Railway the organization has spent approximately 75 million for hardware procurement in comparison to the total cost of the project which was Rs.3,500 billion. KRCL works effectively with barely 3,000 people where a staff of 14,000 to 20,000 would otherwise have been required. All employees have access to computers, and have a email address.

Even though initially the employees were apprehensive about working with computers but gradually the employees unlearned the old attitudes. The ERP solution extends to the Human Resources (HR) department as well and caters to various aspects of the HR department, such as attendance, leave, issue of passes, seniority and promotions, transfers disciplinary action cases. Employees are able to check their personal records and information on line, using Personal Management module. According to top HR executives this gives a lot of empowerment to people, and roots out the potential for corruption.

be influence successful implementation

Issues After Implementation of Information Systems

Structure of the IT Setup in KRCL: A separate IT department has been made in Konkan Railway, which has programmers and executives recruited either directly from the market or from construction surpluses. This department works as a software service provider for the organization. Some of the important functions of the department are, catering to the changing needs of the software requirement, maintenance of RAP, training of the end users and support of other departments in their IT based project initiatives. Chief Manager (IT) who heads the department and directly reports to the Managing Director participates in all meeting in which the other departmental heads are there. A separate department for the IT services and the personnel in that department having a road map available to them to progress right up to the top is that what differentiate Konkan Railway from Indian Railway. Because of this reason, the IT personnel have the ownership of the system and take care of it accordingly

Setting Up Of Quality Systems: To effectively manage the entire IT infrastructure it is

imperative that principles of IT governance be adhered to. In this direction, Control Objectives for Information and related Technology (COBIT) has been adopted as the framework. Thirty-four base processes are under implementation at various stages especially in the delivery and support area. For software development internationally recognized standards and processes are followed. Capability Maturity Model (CMM) level II has been adopted as a framework and its processes are being implemented. This has only been possible because of IT being treated as a major business process enabler.

IT Score Card: There is a well-defined measurement system for various departments on a Railway system. IT being a new set up there are no such standards performance measurement available in Konkan Railway as well. Work is under way to develop a Balanced Score Card for IT department.

Learning and Conclusion

The choice as to which information systems to develop in an organization is to a large degree affected by the external environmental factors as against the internal organizational factors. This is brought out by the various case studies

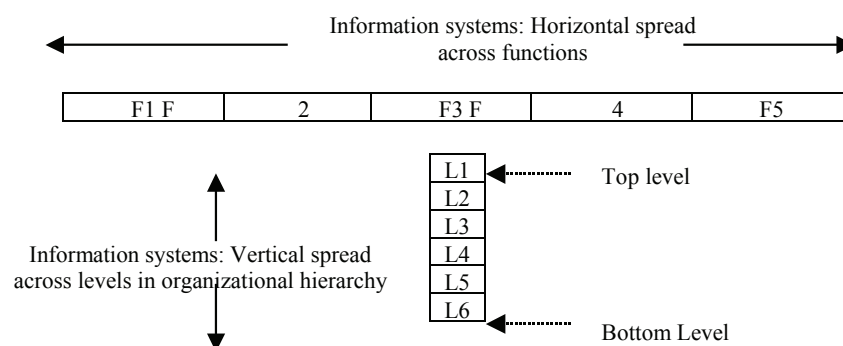
discussed earlier pertaining to the development of information systems in different countries across the world as also in India. Further to this it is observed that the greater part of information systems developed in an organization is in the work systems that are on the interface of the organisation with its environment. As brought out in the study the environmental drivers of development of information systems in an organization could be the push on account of the large volume of transactions in a work system. The current methods of working without information systems cannot support these high levels of transactions. These transactions would occur when large numbers of travelers look up railway timetables for planning of train journey for ascertaining the route, schedule or fare or request for journey tickets.

The other environmental drivers of development of information systems could be the increased demand of information of the status of passenger trains or freight consignments by the customers. This has become necessary as competing modes of business like the road sector are already providing this information to their customers. Thus most of the areas in which information systems would develop in an organization would be where the activities are either highly structured like reservation, timetable or those

areas where the information input content to the information system is static with time as in web pages. Such information systems are mainly used as a mechanism for input, storage or retrieval of data. The data processing capabilities are used to comparatively a lesser extent. It is also indicative of the fact that the organization is working in a scenario where the demand of services required from the organisation far exceeds the supply of the services. Thus when planning for work systems in an organization for developing information systems the planners should look for work systems that satisfy these conditions.

As has been discussed earlier and depicted in the Figure 5, organizations like the Railways have a large number of departments – the Railway Board the headquarters of the Indian Railways has 41 Directorates. It also has 17 levels in the organizational hierarchy. Further the organization is spread across the entire country with an area of 3,287,263 square kilometers and 6,974 railway stations. In such a scenario it is imperative that at the time of development of the System Requirement Specifications and Conceptual Design Documents clearly delineate the scope of the information system being developed. The scope should be restricted to a single function – horizontally and a maximum of three to four levels – vertically.

Figure 5. Information systems development in the organization



This is necessitated by the large size of the Indian Railways as otherwise the information systems become unwieldy and difficult to implement across the entire organization.

The learning that emerges from the study is that the processes in railways are unique and therefore standard ERP systems cannot be customized to adapt to railway processes. A significant learning that emerges is that the standard operating procedures in the railways have remained unchanged over the organizational life and even if these processes in the railways are computerized a substantial reduction in manpower can be obtained and substantial saving of resources can be obtained. In all the organisations under study it is observed that the information systems development is done through an external agency, as the organization does not have the requisite skill set to develop the applications in-house. Therefore partnering with a third party becomes imperative. Thus the organization needs to have a well-staffed business process-outsourcing department that would coordinate the process of development and maintenance of information systems.

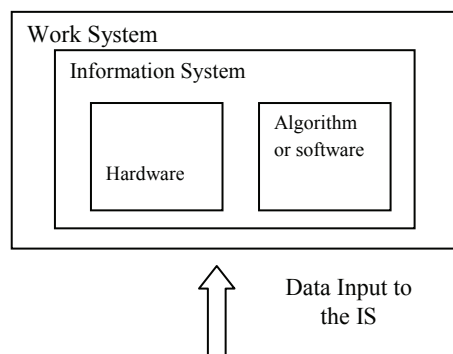
FURTHER TRENDS

This section presents a framework based on the study done. It is an accepted fact that greatest

power that the computer has provided to the manager is the power of number crunching. This is now available at minimal cost to the organization. However there is a mismatch between the processing power of the information systems and the availability of data that can be entered into the information system for processing into information and finally knowledge. The data obtainable for entry into the information systems is generally available at the interfaces of work systems with their environment. Greater the structure and modularity of the data, greater are the chances that the data can be transferred to an information system and could be processed to obtain useful information.

Another area crucial to the development of information systems is to develop an algorithm based on the domain knowledge of the work system in which the information system is being developed. The crucial element at this stage is the transfer of domain knowledge to the computer based information system in the form of System requirement specifications and process parameters. These learning's could be used as hypothesis which could be validated by further researchers.

Figure 6. Schematic of information system



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Chapter XV

Security Aware Development of E-Government Systems

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ABSTRACT

In this chapter we present IMPRESS, a tool-supported integrated framework for security-aware software engineering, supported by automated transformations and validations. IMPRESS is based on semantic description mechanisms and formal methods resulted from the research in the SERENITY Project, and it centres on the precise description of reusable security and dependability solutions (S&D solutions) stored in the form of S&D patterns. The chapter presents an e-government scenario and how its development could be done using the proposed development process. Doing this, we show that it will be possible to access these e-government services in a secure and trusted way, and through multiple channels, using the IMPRESS process to guarantee the security of the solution.

INTRODUCTION

Electronic government (e-Gov) systems facilitate the interaction between government agencies and other entities (citizens, businesses or even other government agencies) by providing means for the

delivery of information and services online via the Internet. Many governmental units across the world have embraced the digital revolution and placed a wide range of materials on the web, from publications to databases. There is a great deal of variation in the services available on national

government websites. E-Gov in the information age gives rise to new forms of relationship with government agencies. The public administration is shedding its bureaucratic character and is transforming into an efficient, service-oriented provider of services. However, the unregulated and open nature of the Internet has prompted many to question the privacy and security of government websites and e-services. Several surveys have concluded that these issues are at the top of the list of concerns about e-Gov. Having visible statements outlining what the site is doing regarding privacy and security are valuable assets for reassuring a sceptical population and encouraging citizens to make use of e-Gov services and information, but of course this is not enough. The establishment of robust methods for the development and deployment of secure e-Gov systems is essential for such systems to gain wider acceptance. Other additional characteristics that complicate the development of secure e-Gov systems are their very large scale and the intrinsic heterogeneity (which concerns users, access channels and devices, sensitivity of information and services, etc.). Regarding the IMPRESS users we can distinguish two profiles. Firstly, secure application developers; they profit by use of the improved development process presented as IMPRESS. Secondly, applications users will profit by using more secure and dependable applications; this fact improves users' trust-perception.

This chapter presents a system development process that is especially well-suited for future multi-channel e-Gov applications. As mentioned, two essential aspects of these systems are their stringent security and privacy requirements and the fact that they serve very large populations of users who use heterogeneous access channels and devices. These characteristics require solutions that are able to adapt themselves to changing environments, which complicates the development process, especially with regards to the provision of security. The development process proposed in this chapter is called IMPRESS (Integrated

Mda-based PProcess for Engineering Secure Systems) Serrano (2007). IMPRESS draws together the areas of software and systems engineering, security engineering, and formal methods for the design and analysis of secure systems. In this manner, formal methods, a cornerstone for rigorous security engineering, is made available within the software engineering process for the average system engineer. Our main goals for the development of IMPRESS was to provide support for software engineers in the specification of their security requirements, the validation of their models against such security requirements, and the integration of proven security solutions in their models. We took into account the characteristics and security requirements of highly sensitive applications such e-Gov ones. This chapter introduces the IMPRESS approach and it presents how secure e-Gov applications can be developed using it. We illustrate the application of the process using an example based on a tax declaration application. The development of e-Gov systems based on our proposal has the advantages of the independence of the work of security experts from the development of the application itself. In this way, software developers can concentrate in the specific functional requirements of their applications. The security requirements will be fulfilled by the integration of proven solutions into their models.

The Secure System Development Based on MDA presented in this chapter, builds on:

- The Serenity Project results, SerenityProject (2006)
- The MDA model transformation approach, Soley (2002)
- The Software Factory approach, Greenfield (2004)

The proposed methodology is intended to include formal methods techniques in model-driven development process, as defined by the Object Management Group MDA initiative. Our

ultimate objective is to provide methodologies and tools for the generation of systems with fully configured security infrastructures, starting from as early as the business process model. Additionally, and in order to include security requirements and solutions in development process we use the concept of security patterns. A pattern describes a recurring problem that arises in a specific context and specifies a generic scheme with well-defined properties for its solution. Security patterns have appeared in the literature where they have been used only as informal and often managerial measures of security, without any formal treatment and/or support for reasoning. In our approach, we use security patterns in a much broader sense. Security patterns are used to represent security services with specific functionalities and solutions for different environments. Each pattern is semantically described using XML-based metamodels. These semantic descriptions include, among other characteristics, abstraction level, type of solution, applicability, context conditions, pre-conditions, definition of parameters and of course, the security properties provided by the pattern.

The e-government scenario presented addresses on-line services that can be delivered by a fiscal administration. The fiscal portal from which the services are accessed notably allows:

For individuals:

- to consult, to declare and pay taxes on-line,
- to make simulations to know the amount of the income tax,
- to download and/or perform on-line the fiscal forms,
- to order tax return for a reception at home,
- to get information by the fiscal current events consultation or the practical columns, by downloading of leaflets and documents,
- to ask questions, manage remotely the contracts of monthly-payment and taking,

- to subscribe to a letter of fiscal information

And for businesses:

- to declare on-line the VAT 7,
- to pay on-line the VAT, the local tax, the property tax, the tax paid by businesses.

The purpose of the scenario is to show that it will be possible to access these services in a secure and trusted way, and through multiple channels, using the IMPRESS process to guarantee the security of the solution.

BACKGROUND

Many governments around the world have decided to use computing and communication technologies to enhance the relationship between citizens and administration.

In a first stage, e-government portals were used to disseminate “public” information which would otherwise only be available through personal contact (phonecalls and written correspondence). Examples of documentation disseminated included legal documentation, process description to obtain official documents such as id. Card, passport etc, addresses and directories of Government offices ...

For this first stage, the security requirements were not so important. There was a need for integrity for the information provided, but the availability of other means and the merely informative nature of the channel (with no official validity) made this requirement less important.

In a second phase, e-government portals evolved to provide custom services geared to the citizens themselves, accessing databases containing personnel and sensitive records. These services have led to different security requirements such as confidentiality of informa-

tion, secure identification and authentication of citizens, privacy ...

Finally, the latest e-government portals now incorporate e-participation. The main difference is that the interaction is given official validity. Citizens can now submit their income tax online, book a hospital appointment, and update personal details such as address, to name a few.

As an example, in 2006, 5.7 millions French citizens used the Finance Ministry internet portal to declare their income tax. Here the security level gets higher and the requirements are stronger:

Confidentiality information both ways: citizen-application and application-citizen, strong identification and authentication, privacy, legal aspects ...

The majority of citizens who use e-government services are connected from their private fixed computer, but there are more and more citizens who need to use these services from different computers. Therefore, mobile access is becoming an important requirement for e-government portals.

This need for supporting mobility raises new security requirements, mainly about privacy. The citizens expect seamless access to the e-government services across platforms and locations.

Several works deal with Security related issues on e-Gov applications. In Luna-Reyes (2003) authors present an essay about some technical and policy considerations of Internet security in the context of electronic government applications. A very interesting approach is Corradini (2006) where authors propose a framework in mobile business transactions, called CNS-Mobile. The aim of this proposal is to achieve an as flexible as possible interoperable system, granting high security standards, and longevity. The authors of Soon (2002) present an approach for dynamically composing workflows to delivering customized government services to citizens, this system dynamically composes the inter-agency service as well as the related information, tailored to needs of a citizen, by identifying, integrating and co-

ordinating individual components that constitute this service. Becker (2004) provides a procedure model for process oriented organizational engineering, with reference to the example of local government building permission procedures. Finally, Janssen (2007) proposes a framework that includes amongst business models. The framework presented in this proposal is closed to our approach. It emphasises on how to provide services, however one presented here focuses on development of secure services.

There is very little work concerning the full integration of security and systems engineering from the earliest phases of software development. Although several approaches have been proposed for the integration of security issues in the development process, there is currently no comprehensive methodology to assist developers of security sensitive systems. All this becomes a special concern when considering complex security requirements such as those associated to applications in e-commerce, e-government and e-health scenarios. Lack of support for security engineering in those approaches for software systems development is usually seen as a consequence of: (i) security requirements being generally difficult to analyse and model, and (ii) developers lack expertise in secure software development.

Existing approaches fail into the task of providing an integrated framework covering the overall development process. These approaches can be split between two groups. On one hand, those focused on a special stage of the development, forgetting the rest of the development cycle. On the other hand those that address a specific security aspect (such access control). In Lodderstedt (2002), and Best (2007), can be found empirical studies confirming this view. This raises the first objective addressed by the IMPRESS approach, which is covering all security related aspects over the complete development process.

Regarding security for business processes, security aspects were introduced into business process and workflow models since Herrmann

(1999) and Roehm (1999). This approach considers security requirements like inherent elements of the business transactions and dependent on the circumstances of the applications. Initially, this approach was not based on UML (Uniform Modelling Language), but Herrmann (2002) presents an extension oriented to support the development of an abstract UML-based business process specification.

UMLsec, Vaughn (2002), is proposed as an extension of UML for modelling security properties of computer systems, according to suggestions in Devanbu (2000). UMLsec uses standard extension mechanisms to introduce new semantics into UML models. Unfortunately only addresses a few specific security requirements. Anyway, being a modelling language, UMLSec only supports the representation of models, but it does not cover any engineering procedure for software development. Anyway, one of the most problems regarding the use of UML is that it lacks a formal semantics, France (1997). However, a large community of researchers is currently working on the gap between UML and formal specification languages. Most of this work is supported by the UML Precise Group (PUML) (UMLPrecise Group website), created for the research on the completeness of the UML semantics, and for developing new approaches to use UML more precisely.

An interesting approach for the use of UML, and its models, for security engineering is the use of “Use cases” in order to capture and analyse security requirements. “Abuse cases” Sindre (2005), defined as an interaction between one or more actors and a system with a harmful result, and “misuse cases” McDermott (1999), which describe functionality that the system should block. Use cases can describe requirements for special scenarios and are suitable to improve the intuitive understanding of security requirements.

Closer to engineering processes, in Castro (2001) and Giorgini (2003) it is presented a proposal for the integration of security in system engineering using of UML elements and the

Tropos methodology. MDS, or Model Driven Security (MDS), Basin (2003), integrates role-based access control policies into a UML-based model-driven software development process. MDS is a specialization of MDA (Model Driven Architecture) that proposes a modular approach to constructing modelling languages, which combines UML-based languages for system design with languages for modelling security. The PhD thesis presented in Rodriguez (2007a) and in Rodriguez (2007b) introduces a complete business process with integrated security aspects called Method for Business Process Security (M-BPSEC). This approach, based on UML models and MDA transformations, is focused on business level, so it does not support implementation phases of development processes.

Several research projects have been dedicated to issues that are relevant in the present context. The SEMPER project (Secure Electronic Marketplace for Europe), Lacoste (2000) addresses the provision of a comprehensive security framework for electronic commerce and business applications, concentrating on security architecture and services rather than secure systems development.

The COPS Project (Commercial Protocols and Services) Röhm (1999) also concentrated on security services. COPS intended to enable the design of an infrastructure for marketplaces supporting all phases of a market transaction. CORAS, Aagedal (2002), on the other hand, aimed at developing a tool-supported framework for model-based risk assessment of security sensitive systems. The methodology gives recommendations for the use of UML-oriented modelling in conjunction with risk assessment. Most recently, the CASENET project the main objectives of which are the development of methods for the design and analysis of security protocols started work on integrating security requirements specification into the process of application development.

Regarding the integration of security in engineering processes, an important reference is the

Systems Security Engineering Capability Maturity Model (SSE-CMM). The model highlights the relationship between security engineering and systems engineering, regarding the former as an integral part of the latter and not an end on itself.

The IMPRESS approach, presented in this chapter, is based on the use of security and dependability patterns. Security engineering with patterns is currently a very active area of research Schumacher (2003) and Fernandez (2007). The Open Group has published a book on the subject, in TheOpenGroup (2004). Research into defining a template for security patterns to meet the needs of secure system development has been reported in Konrad (2003), where the UML notation is used to represent structural and behavioural aspects of design, and formal constraints to the patterns are used to enable verification. However, security patterns are usually not precisely described and therefore, automated tools for classification, selection and composition are not yet available. Here, our work can improve security engineering based on security patterns, because it provides tools for processing these patterns by automated means.

INTEGRATED MDA-BASED PROCESS FOR ENGINEERING SECURE SYTEMS, IMPRESS

In order to facilitate the understanding of the IMPRESS approach and to make it self-contained, firstly three important elements are introduced. These conforms the basis to this secure system development framework. Firstly, the Model Driven Development (MDD) is presented and briefly described. We present the OMG's MDA initiative here as a realization of MDD concepts. Sometimes MDD is called Model-Driven Engineering (MDE) in the literature, in this chapter we use the MDD term. Secondly, we introduce the SERENITY approach which is the basis for our approach. The differences between SERENITY and our proposal

are that SERENITY focuses on the development of S&D Solutions by means of S&D Patterns, while IMPRESS assumes that these S&D Patterns are available. And, that SERENITY is designed to act as a provider of security and dependability solutions at runtime, while our framework is focused on the system design and development process and it does not depend on the existence of a runtime framework. Finally, we introduce the Software Factory (SF) approach. Software factories share some issues with both MDD and the SERENITY approaches. IMPRESS could be seen a realization of software factories concepts based on the SERENITY results.

Model Driven Development

The notion of object was the central idea of software development practices in the 80's and is still extensively used. Authors of the approach called 'Software Factory', Greenfield (2003) conclude that the current software development paradigm, based on object orientation, is reaching its point of exhaustion, and now its time for the industrialization of the software production. Nowadays, the focus is changing and now software development processes pay more attention to models, this is, Model-Driven Development (MDD, or Model Driven Engineering MDE). Currently it is important to define what a model is, defining models for several levels of abstraction, and deciding what elements a model may include. It is accepted that a model is a description of the elements of a system, from a specific point of view, that include the relations between them. The use of models includes the necessity of the use of meta-models. The idea of what a meta-model is, can be understood with the help of the following sentence. The relation between a model and its meta-model is similar to the relation between a program and the programming language in which it is written, defined by its grammar, or between an XML document and the defining XML schema or DTD, Bezivin, (2005). The Object Manage-

ment Group(TM) (OMG for short) defines a four-layered architecture that separates models based on their abstraction level. Using the OMG terminology, these layers are called M0, M1, M2 and M3, Fuentes-Fernandez (2004). M0 is the lowest (most specific) level one, and M3 is the most abstract one.

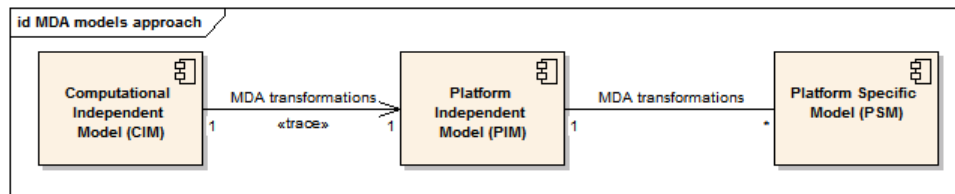
- M0, instances: The M0 layer models the running system. The elements in this model are the actual object instances that exist in the system.
- M1, the model of a system: The elements of the M1 layer are models. An example would be a UML model of a software system. There is a strong relationship between the M0 and M1 layers. The elements of the M1 layer are classifications of elements of the M0 layer. Likewise, each element at the M0 layer is always an instance of an element at the M1 layer.
- M2, The model of the model (the meta-model): The elements of layer M2 are the modelling languages. A layer M2 model defines a language for M1 layer model. There is a close relationship between M1 and M2 layers. Every element at M1 is an instance of an M2 element, and every element at M2 categorizes M1 elements. M1 models are ruled by M2 models. The models of the M2 layer are called meta-models. Meta-models define what M1 layer models are correct or not.
- Layer M3: The model of M2 (the meta-meta-model): Layer M3 defines the concepts that can be used to define modelling languages.

Summarizing, at the bottom level, a M0 layer model is the real running system. A M1 layer model represents this system using a modelling language, for instance UML. This M1 layer model conforms to its meta-model defined as a M2 layer model. The M2 layer model conforms to a M3

layer model, called meta-meta-model. Finally the meta-meta-model conforms to itself. As UML is currently used to define M0, M1 and M2 models, Meta-Object Facility (MOF) (Object Management Group) is used to create M3 layer models. MOF is a language to describe meta-models. In order to define a new language to model a special kind of system, a new meta-model has to be developing using MOF. In Fuentes-Fernandez (2004) authors propose using of UML 2.0 plus UML profiles to describe meta-model definitions, doing this it is possible to define new UML language version adapted to specific platforms or systems. The basic principle of MDD is that everything is a model.

The OMG's MDA initiative, Soley (2002) presents a new way of developing applications using MDD concepts. One of the main ideas that MDA introduces is the model transformation. MDA proposes a new development cycle starting by writing the specification of an application forgetting all platform specific details. This model, usually represented via UML, is called Platform-Independent Model (PIM). A PIM is an abstract model which contains enough information to drive one or more Platform Specific Models (PSM). PSMs are models including platforms details, a PSM combines the specifications in the PIM with the details required to specify how a system uses a particular platform. MDA allows to define transformations that map from PIMs to PSMs. Doing this it is possible develop a system in abstraction, and implement that system across a variety of target platforms. Finally, MDA defines one more model on top of the previously mentioned two, the Computation Independent Model (CIM). A CIM is a business or domain model because it uses a vocabulary that is familiar to the subject matter experts. A CIM presents exactly what the system is expected to do from the domain model expert's point of view. It hides all technical related issues. CIM models bridge the gap between domain experts and engineers in charge of the system implementation. Using

Figure 1. MDA models and their relations



a MDA approach CIM requirements must be traceable to the PIM, and as shown before, PIM requirements are traceable to PSM.

Figure 1 shows MDA models and relationships between them. This is done not only by this way, because the traceability of requirements between models can be done from a low level model to a high level (more abstract) model.

A complete MDA application consists of a PIM, plus one or more PSMs and several complete implementations, one on each platform that the application developer decides to support. A single PIM can drive multiple PSMs. Changes to the PIM can be synchronized into the PSM, by automatic ways, maintaining coherence between the PIM and PSM.

One fundamental aspect of MDA is its ability to address the complete development life cycle, covering analysis and design, programming, testing, component assembly as well as deployment and maintenance, Truyen (2006). Following this development cycle a complex system consists of several models each one defined at different level of abstraction, with mappings defined between them. These mapping allow horizontal transformations inside a single layer of abstraction or vertical transformations across different level of abstraction layers. An MDA mapping provides specifications for how to transform a PIM into a particular PSM. The target platform model determines the nature of the mapping. This is a good reason for use MDA; in Soley (2002) the author defends the use of MDA as a solution for

the current savage middleware proliferation. It is important to keep in mind that, while the intention is to automate the most of the transformation process, part of the transformation have to be done manually. In Fuentes-Fernandez (2004) presents how UML2 profiles can be used in order to represent transformation rules. This fact and the aforementioned ones, show us the power behind UML profiles. MDA can be summary with the following equation:

$$\text{Source Model} + \text{Transformation Rules} = \text{Target Model}$$

Today, there are UML design tools that include MDA development functionalities. On the Open Source side we can mention StarUML (starUML website) for instance. On the commercial side, one of the most complete tools analysed is Enterprise Architect (EArchitect website), which provides a free manual of how use MDA facilities included in the tool (MDA OMG overview).

Regarding to the use of MDA methodology it is easy to find documentation at OMG's website, they provide presentations, manuals and tutorials such as the one presented in (OMG, 2003), which is a complete guide of MDA. Of course, there are open research issues in MDD. Jean Bézivin (2005) makes a good review of them.

The SERENITY Approach

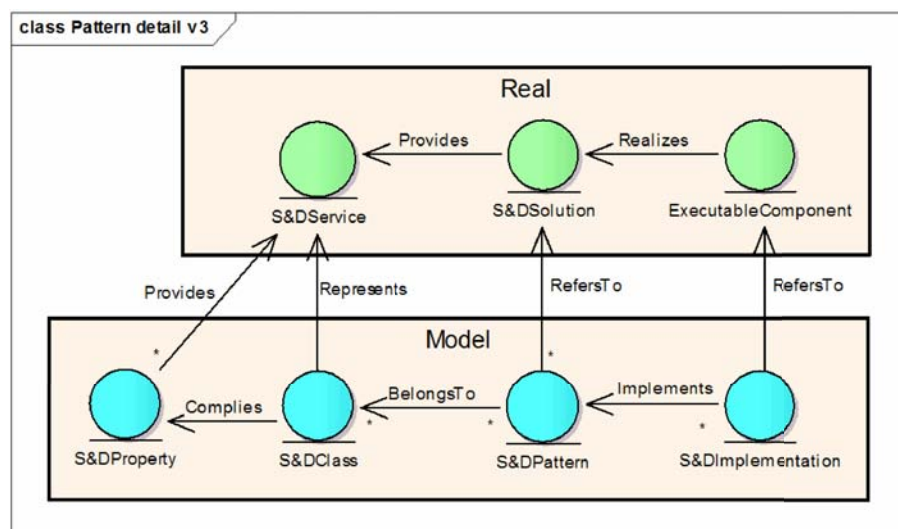
SERENITY is an ambitious research project founded by the European Commission, in its Sixth Framework Programme (SerenityProject, 2006) and Maña (2006a). The objective of SERENITY is to provide a framework for the automated treatment of security and dependability issues in Ambient Intelligence Scenarios. To achieve this goal the members of the SERENITY consortium have identified two key aspects: Capturing the specific expertise of the security engineers in order to make it available for automated processing; and providing means to perform run-time monitoring of the functioning of the security and dependability mechanisms.

Due to the inherent dynamic nature of Aml environments, a flexible and runtime adaptable solution is required to provide security in such scenarios. SERENITY proposes to include S&D requirements in the beginning of engineering process, these S&D requirements will be translate into S&D solutions that can be applied at run-time. SERENITY may provide a way adapt,

compose and change S&D solutions at run-time. This is especially interesting because SERENITY will deal with applications running in Ambient Intelligence environments. The framework is divided into two frameworks, firstly SERENITY Development Framework, which include tools for two kinds of developments. Development of all level S&D Solutions and development of SERENITY aware applications, which are the applications designed taking into account the support/existence of SERENITY S&D Solutions. Secondly, the SERENITY Run-Time Framework (SRF), which is in charge of dealing with S&D solutions at run-time.

One of main SERENITY results is the set of modelling artefacts used in order to capture security expertise. These artefacts represent S&D Solutions using semantic descriptions at different levels of abstraction. The main key of using different artefacts, each one for covering an abstraction level, is that doing this it is possible to cover completely both development and life cycles of secure applications. The main artefacts are

Figure 2. Simplified conceptual model showing relations between Serenity artefacts



shown in the conceptual UML model presented in Figure 2.

- An S&D Property is a definition of a Security or Dependability quality. A reference of the S&D Property provided must include in the specification of each S&D Solution. The definition referenced by the S&D Solution aims to express S&D Properties in a way that is appropriate for Security Administrators and System Developers. In order to select S&D Solutions for their requirements, they do not need to use the complete details about the properties. In general they will be only interested in fulfilling their requirements and therefore they will only care about the relations between properties. For this purpose they only need to know the relations between the different properties. Of course, these relations can be deduced from the formal definitions of the properties, Maña (2008).
- S&D Solutions are well defined mechanisms that provide one or more S&D Properties such as confidentiality, integrity, availability, etc.
- S&D Classes represent abstractions of a security service that can be provided by different S&D Solutions. S&D Classes are characterized by providing the same S&D Properties and complying with a common interface. The main purposes of introducing this artefact are to facilitate the dynamic substitution of the S&D Solutions at run-time and to support the development process. All S&D Patterns (and their respective S&D Implementations, see below) belonging to this S&D Class will be selectable by the framework at run-time.
- S&D Patterns are detailed descriptions of abstract but specific S&D Solutions. These descriptions contain all the information necessary for the selection, instantiation, adaptation, and dynamic application of the

security solution represented in the S&D Pattern. In particular, they include two main elements: the representation of the specific aspects of the solution corresponding to the service and behavioural description and the pattern semantics, which is related to the semantics of the security properties provided and the restrictions imposed by the solution.

- S&D Implementations represent the components that realize the S&D Solutions. These components are made accessible to applications throughout the SRF. An S&D Pattern may have more than one S&D Implementation. All these S&D Implementations must conform to the S&D Pattern but have differences (such as the Operating System they run on).
- Finally an ExecutableComponent is the actual implementation of an S&D Implementation. These elements are not used during the development phase. Instead, they are the functional realization of S&D Solutions that are used at run-time. An ExecutableComponent works as a stand alone executable S&D Solution ready to provide functionalities to applications.

Another important cornerstone of SERENITY is the SRF. The SRF runs in each device that we want to support and it is in charge of supporting applications at runtime when they need to perform an action that needs to be protected. The SRF is implemented as a service running in a device and listening to application requests. Applications send requests in order to fulfil their security requirements. These requests, once processed by the SRF, result in the selection of the S&D Solutions that may be used by the application by selecting an appropriate pattern from a library. In order to produce accurate results when supporting applications at run-time, the SRF uses a set of mechanisms for context evaluation. In this way, the SRF knows the current and the past device

context conditions. The provision of security solutions by the SRF is explained in more detail in Maña (2006b)

Software Factories

Despite of the expertise that has been accumulated throughout the years, software development remains non industrialized. Current applications continue to be developed under the pressure of cost and time reduction and under the pressure of the increase in quality needed to play in the current market. These aspects play a critical role, especially in a scenario where the applications complexity has been increased to high levels. Nowadays development methodologies centre its main efforts in standardize part of the process. The object oriented methodology leaves too much part of the implementation phase to skilled programmers that hand-craft this part.

A Software factory, as defined in Greenfield (2004), is *“a software product line that configures extensible tools, processes and content [...] to automate the development and maintenance of variants of an archetypical product by adapting, assembling and configuring framework-based components. Therefore, Software Factories focus on the development of similar systems encouraging the reuse of architectures, components and know-how”* In the Software factory development model, application families have predefined architectures, which can be instantiated in order to obtain different applications that have similar behaviour. These predefined architectures contain components that can be configured separately. Doing this, we count on an “open architecture” that has to be fulfilled at design time.

Software factories represent an evolution of the current software development process. This approach tries to apply traditional industrial development methods to software development. Microsoft is paying special attention to software factory concepts. They are using software factories paradigm in association with the .NET

Framework. Greenfield (2003) gives a view of Software Factories from Microsoft point of view. Although, there is too much information at Microsoft website, where the reader can find updated data. The development cycle proposed by Software Factories emphasizes organizational aspects. This leads to systematizing the production of software. Software Factories open new career opportunities to both technician and production level professionals. At the same time, it opens new horizons to new business models.

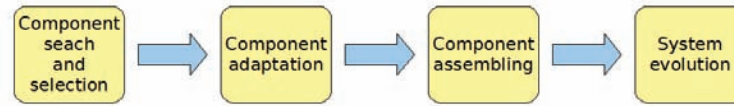
The Software Factories approach is based on the concepts of Component-Based Software Development (CBSD), Model Driven Development (MDD) and Software Product Lines (SPL).

Software factories represent a step towards standardize software development based on the concepts used in standard industrial processes. Like in a real factory, software factories require clearly defined product creation and management processes. In order to be effective and efficient a “Software Factory” requires considerable organizational, process and project discipline. These disciplines typically involve the following aspects:

- High quality requirements gathering, derivation, management, and packaging.
- Rigorous program management.
- Effective resource management and allocation.
- Proven/reusable components.
- Excellent project scheduling and control.

As aforementioned the Software Factory approach comes from the relationship between the Model Driven Development, the Component-Based Software Development and the Software Product Lines. The rest of this section introduces these new two concepts.

Figure 3. Phases of component-based software development



Component-Based Software Development

Component-based software development (CBSD, or component-based software engineering, CBSE) consists in a development model based on the existence of software components that can be used to compose a complete software application. Such software components provide functions common to many different systems. Some authors find analogies between hardware and software components (CBSD website). Following these ideas one of the features of CBSD is that it is possible to replace parts (components) of a software system by newer, functionally equivalent, components.

The CBSD approach is not new. “Componentizing” software was suggested by McIlroy in 1969, in McIlroy (1968). Nowadays, there is an increasing marketplace for ‘Commercial Off-The-Shelf’ (COTS) components. It is an approach to software development that suggests do not develop components but search and buy them, Frederick (1987). The promise of CBSD is a reduction in development costs: component systems are flexible and easy to maintain due to the intended plug-and-play nature of components.

The CBSD distinguishes two processes. Firstly assembling software systems from software components and secondly, developing reusable components. Developing systems using the CBSD approach involves several activities, figure 3 depicts them.

The CBSD model presents an evolution from traditional software development. Although, there are problems common to both CBSD and

traditional methods. Mainly, those ones related to managing change and maintenance.

Software Product Lines

In a Software Product Line (SPL) software applications are identified as members of an application family. These application families can be specialized or instantiated to obtain applications. All applications belonging to the same family of software applications are developed from the same core components in a prescriptive way Clements (2001). Each application is developed by configuring and assembling these core components within a featured model Kang (1990). Once we identify an application as part of an application family we count on a featured model of the application, this model specifies what components includes the application. In this way, the development of a new application is shorter than in the traditional way, thanks to the existence of a featured model that make us save time and efforts.

IMPRESS Overview

IMPRESS proposes a development process that draws together areas of software and systems engineering, security engineering, and formal methods for the design and analysis of secure systems. In this manner, formal methods, a cornerstone for rigorous security engineering, is available for use within software engineering processes. Our vision of the process is that it must provide support to software engineers in the specification of their security requirements, the validation of their models against the security requirements,

and the integration of proven security solutions in their models. We believe that this approach can be generalized to other fields, such as real time systems, because it is based on defining a general collaborative framework that separates the work of experts in a specific field (security in our case) allowing software developers to take advantage of the work of the experts and to integrate proven solutions into their models. The ultimate objective is to provide methodologies and tools for the generation of systems with fully configured security infrastructures, starting from as early as the business process model.

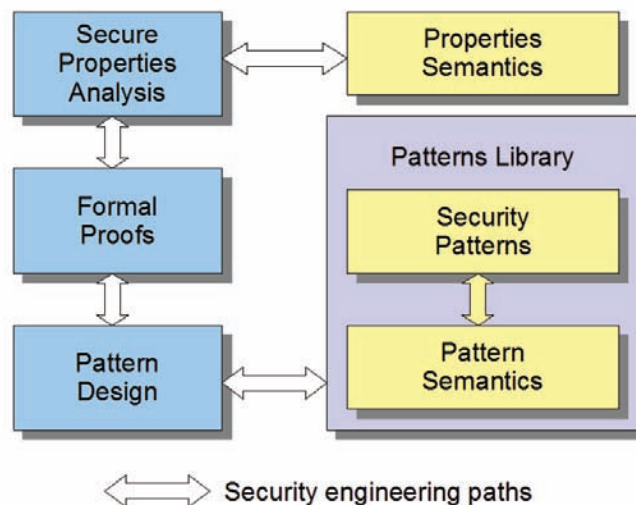
Following the SERENITY project approach, as shown in figure 4, security engineers will analyse and define security properties. They will also use pattern design, formal modelling and validation tools to create new specialized security solutions. They will formally prove that these solutions indeed provide the desired security services, and finally they will integrate them into a library of security patterns. The Secure System Development Based on MDA approach proposes the use of this library by system developers to fulfil security requirements in their models. Reusability

is supported through the use of this library or repository of security services with the help of security patterns.

The IMPRESS development process proposed follows the approach of Iterative and Incremental Development (IID, proposed by Barry Boehm (1988) and integrates security engineering techniques based on the use of libraries of security solutions. This model forms the basis of most modern software engineering processes. In this model, software is developed in several iterations, each one divided into different phases. Usually, a full cycle does not represent one release of the software, but just one step in the evolution from an abstract to a more detailed model. Usually, each development cycle is composed by the following activities: requirements collection, planning, design, development, deployment and tests. IMPRESS addresses all phases of the development process.

In order to include security requirements and solutions in the development process, we propose the use of patterns. A pattern describes a recurring problem that arises in a specific context and specifies a generic scheme with well-defined

Figure 4. Security engineers interface to generic software development process



properties for its solution. Security patterns have appeared in the literature where they have been used only as informal and often managerial measures of security, without any formal treatment and/or support for reasoning. In our approach, we use security patterns in a much broader sense. Security patterns are used to represent security services with specific functionalities and solutions for different environments. Each pattern is semantically described using XML-based meta-models. These semantic descriptions include, among other characteristics, abstraction level, type of solution, applicability, context conditions, pre and post-conditions, definition of parameters and of course, the security properties provided by the pattern.

The characterization of security solutions as series of semantic properties provides a semantic background, which enables us to move to more abstract levels and to incorporate semantics about the context of application of that solution. Additionally, it enables the implementation of the same security property through different S&D patterns, that is, different instantiations of the same S&D class solutions. As we have yet mentioned, our approach uses the concept of security pattern to represent existing security solutions. The semantic description of both, security properties and patterns enables:

- The semantic categorization of patterns in a security solutions library, based on different parameters.
- To consider the context of application of the pattern within the model, to locate the most appropriate pattern fulfilling the security requirements of the software model based on semantic information.
- To check if interaction of the security properties implemented in different patterns in the model does not cause cancellation or deterioration of some of them.

- To validate the correctness of new security patterns incorporated by a security engineer.

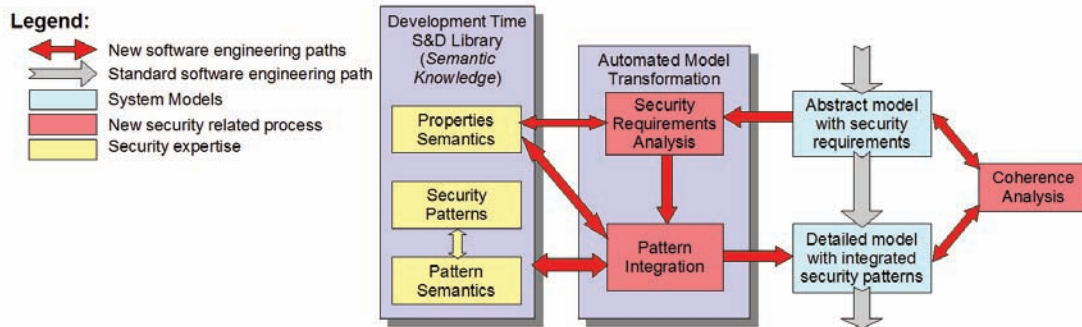
Patterns are used mainly at two levels. Firstly, at business model (abstraction level) level, where designers use properties in order to represent the security requirements they want to apply to the software system they are working on. Secondly, at implementation model level, where patterns are applied in order to fulfil the security properties expressed at business models.

Figure 5 shows the integration of the results of the security engineering work as shown in figure 4 into the engineering/development phase of the generic software engineering process. It shows how the treatment of security aspects is integrated into the treatment of other aspects (functional, performance, etc.) within the full software development cycle. It is at this point that our tools/methods are used to support developers of secure software. For instance, automated tools support the developers in the selection of a particular security solution, the adaptation of the solution to the context where it will be finally applied, the analysis of the consequences of changes and the coherence between models at different levels of abstraction, etc.

The main differences between the traditional IID model and the proposed development process are in the design, development, and deployment activities. They are redefined as follows.

Currently, design phases are used in order to create abstract models of the system under development. These abstract models are called business model, domain models, and sometimes conceptual models. They represent the application components from a high level of abstraction. At this level of abstraction we usually find entities, processes, activities ... that are not detailed. UML is extensively used for these models, due to its good expressive capabilities. The secure system development framework proposes the inclusion of the security and dependability requirements at this

Figure 5. Generic software development process with integrated security engineering



level by means of S&D Properties. The extension of UML in order to support the inclusion of S&D Properties can be implemented by means of UML profiles, see Fuentes-Fernandez (2004).

Next, during the development phase, one deals with more specific and low level models. These models include implementation and target specific details (the use of UML modelling language is widely used here too). Models at this phase are derived from the corresponding ones generated during the design phase. IMPRESS proposes the following additions to this phase:

- The use of an extension of UML that allows the inclusion of S&D Patterns into the models. Taking into account that these models can be more or less detailed it is possible to use S&D Patterns at different level of abstraction. For instance, in an implementation model we could use an S&D Implementation component. But in a medium level of abstraction model we may use S&D Pattern components, since with them, the programmer could be flexible in the selection of the S&D Implementation.
- The introduction of MDD transformations between models. Model transformation provides a framework for the derivation of development models from design models.

Based on the security requirements specification at design phase, in terms of S&D Properties, we propose the use of methods developed for automatic identification and retrieval of the appropriate S&D Patterns that fulfil the security requirements specified in the specific user model environment. Doing this, it is possible the analysis of the coherence and the validation of models at both design and development levels. These automated methods are based on the relations between S&D artefacts and on the traceability of these relations between models.

The deployment phase can be defined as the processes used for installing and activating the system under development. Following the IMPRESS development process, during this phase all S&D solutions, which support the system under deployment, must be installer and must be made accessible. Usually, these S&D solutions are installed together, by means of different S&D artefacts, with the rest of the system components. Maña (2006b) presents a run-time framework that is able to provide S&D solutions at run-time. In this case the deployment is split into two steps: firstly, there is a “pre-deployment” of all supported S&D solutions. Secondly, at run-time, the framework selects one of the “pre-deployed”

S&D solutions for its instantiation by means of the corresponding ExecutableComponent.

Summarising, IMPRESS proposes the following main activities as part of each development cycle. “Identification of system’s security requirements”, firstly, the development team has to highlight which are the security requirements of the system. Security requirements are considered during the development phase by including them into UML models by means of S&D Properties. Automated tools support this phase, by helping into the identification of S&D properties fulfilling security requirements. In particular, part of the work is devoted to the development of methods that support the analysis of security requirements specified in the system models in order to find inconsistencies in the model (e.g. publishing confidential information on a public repository) with the aid of semantic descriptions of the security properties. Next, based on the security requirements specification, methods will be developed for automatic identification and retrieval of the appropriate security patterns that fulfil the security requirements specified in the specific user model environment. During the development phase, abstract models are transformed into low level models. Development phase models include S&D Classes, S&D Patterns and S&D Implementations fulfilling the S&D Properties. The lower level the model is the lower level S&D artefact uses. It is possible the automated processing of specifications in order to find appropriate solutions in formally proven “security knowledge bases”. Finally, selected patterns will be adapted, instantiated and integrated in the system model. Here, interdependencies between the newly integrated patterns, previously introduced security patterns and the functional behaviour of the system have to be considered. Resulting from this process, development team counts on a hierarchy of models, where the security requirements can be traced from S&D Properties to S&D Implementations. So, changes at any model can be automatically translated to the rest. Once that system is ready

for its deployment, all related S&D Solutions have to be deployed, too.

Regarding the users that profit from the use of IMPRESS, we can mention two. On the one hand, secure application developers; they profit by use of the improved development process presented as IMPRESS. Particularly, IMPRESS includes advantages that address all the phases of software development, so these users include analysts, designers and programmers. On the other hand, applications users will profit by using more secure and dependable applications, especially, taking into account that security mechanisms used by secure applications are certified. This fact improves users’ trust-perception.

Concluding, the results of our work enable the use of a library of security patterns in order to include security related aspects in the software development process. This library is not a simple set of “best practice” or recommendations (mostly at the operational level), like those proposed in the literature as “security patterns”, but a precise, well-defined and automated-processing-enabled repository of security mechanisms. The most relevant feature is the incorporation of rich and precise semantic descriptions of the patterns. The extensive use of semantic descriptions enables the use of automated reasoning mechanisms capable of solving problems such as pattern composition and adaptation. Patterns are categorized into distinct abstraction categories, corresponding to different phases of the security engineering process, to different types of security measures (technical, organizational, etc.) and to different levels of formalism (e.g. formal patterns for security services that implement formally specified requirements and informal patterns that address security issues in the organizational environment).

E-GOVERNMENT SCENARIO

The e-government scenario mainly addresses on-line services which can be delivered by a fis-

cal administration. The fiscal portal from which the services are accessed allows the following services:

Individual Services	Companies Services
On-line consultation, declaration and payment	On-line VAT declaration
Income tax calculation estimation	On-line VAT, local tax, property tax
Download of fiscal forms	
The order tax download	
Leaflets and documentation	
The possibility to ask questions, to manage remotely the contracts of monthly-payment	
Fiscal newsletter subscription	

The purpose of the scenario is to show the possibility of accessing these services in a trusted way, and by multi-channels, with SERENITY to secure the solution.

Scenario Story

Since some years John is a boss of a small laboratory. This year he decided to use the new on-line services of the fiscal administration, at the same time as a professional and as a citizen.

Scene 1, at home

John is at home. He reads his mail. He has just received the form of tax return and a letter of the administration suggesting him to use the new on-line services. He opens his “Emac” and connects to the fiscal administration portal. The home page informs him on how to obtain the electronic certificate thereby allowing him on-line declaration.

He uses the previous year declaration (the process of filling in the tax-form is automated, the information which the administration already

knows like the fiscal number are already filled in) to type his fiscal number, his identification number, and his incomes tax amount of the year n-2. He indicates his personal e-mail address and defines a password, which will be asked for every connection.

After checking these elements, the electronic certificate is directly installed on his desktop hard disk. He may export it on his USB key.

He can begin to fill in his on-line declaration, but he soon has to break off because he has to leave home and travel to Asia. He knows that he can resume his declaration within 15 days, adding information at each session. The different steps of this process are depicted in figures.

Later, John will be able to consult his notice of assessment. If John gets child benefit, he will decide to transmit it on-line to the child benefit office. In fact, child benefits depend on the tax rate. In that case, it is necessary to raise security requirement and the notice of assessment will have to be authenticated by the fiscal administration electronic certificate because the document has to be certified (Scenario run-time aspect).

Scene 2, at the cyber café

Later on, in Asia, John, going to a cyber café, he decides to finalize his declaration, because he risks to exceed the deadline. He knows that the service of on-line declaration can securely be accessed from any computer provided that he disposes of the appropriate released certificate.

He accesses to the portal of the fiscal administration from the available laptop under Windows XP. He introduces his password, and then is authenticated by the electronic certificate he has stored in his USB key. In case if he had forgotten to take with him his certificate, he could have revoked his old certificate and requested a new one.

He can access the declaration form he had begun to fill. Once he has completed his declaration and checked it accurately, he signs it by using his

Figure 6. Fill in the declaration from home

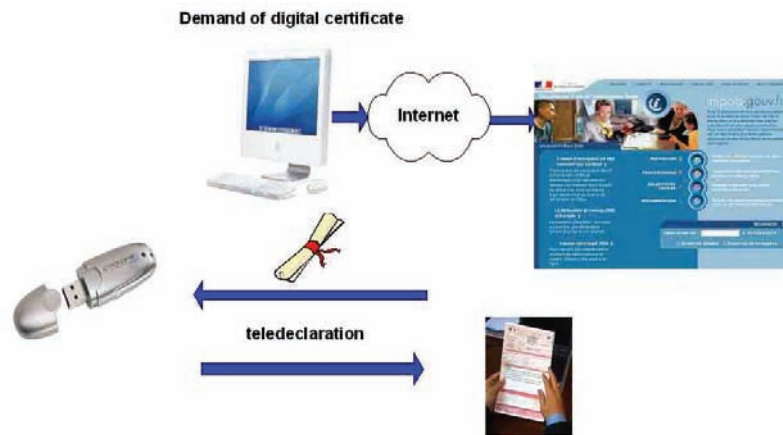
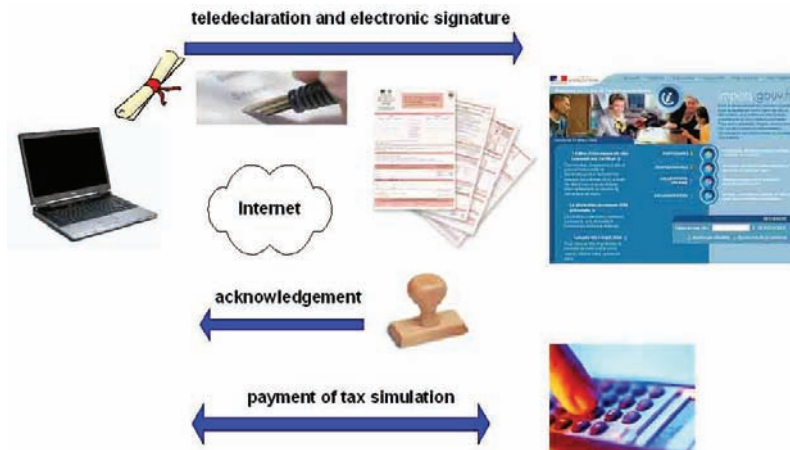


Figure 7. Fill in the declaration from the Internet cafe



private certificate. An acknowledgement is automatically sent by return with date and the hour of recording of his declaration. He takes advantage of it to run a simulation of the amount of the tax that he will have to pay.

At this step an issue raises, the application leaves a lot of information on the cyber café computer. These information are surely private data as for example, certificate (if not coming from his USB key), some tax identification numbers, tax amounts...). A security requirement is that

all these information should be erased from the computer at the end of the session, Figure 7 summarizes the different steps of this process.

Scene 3, at the airport

Flying back home, John is waiting at the airport, and his plane takes off within one hour. He is going to take advantage of this spare time to consult the procedure of demand of monthly direct debit on his account bank for paying his tax. He

uses his mobile phone to connect through WAP to on-line services of the fiscal administration.

Scene 4, at the office

John is in his laboratory. He earns time since he can consult his company on-line fiscal account, at any time and in a simple and fast way. This consultation benefits from a trusted access thanks to the acquisition of a digital certificate and to a procedure of subscription. This subscription is going to allow him to benefit from numerous services: declarations of professional results, declarations of the VAT, payments or demands of refund of the VAT, payments of the company tax, and payments relative to the business rate.

He connects to the fiscal portal, from the office workstation under Linux, to declare and pay the VAT of his company. Notice that, John uses the same user identifier every time he signs to the on-line tax service. It is easy to connect to all the information which are related to this particular ID user. Mechanisms will have to ensure that while inter-connection is facilitated (for improving efficiency of e-government), collection of large amounts of data by compromising one ID is prevented. Otherwise, the knowledge of this one ID could compromise all of a person's information at the same time. This event would act as an incentive to persons who would be able to collect large amounts of information related to one ID and would be far too dangerous.

The way to proceed is particularly adapted to the individual declaration because it allows a help to use on-line forms, with a system of pop-up, automatic calculations and information controls. Accessible by Internet, it is particularly convenient for small and medium-sized companies that send their declarations to the administration.

John takes advantage of it to consult the on-line fiscal documentation. From the fiscal administration portal, John accesses the legal texts and the practical brochures, the jurisprudence, the

international fiscal agreements and the statistics of the tax.

Special Security and Dependability Requirements of this Scenario

The requirements related to the security of transactions and data in online e-Gov systems has to meet four main restrictions:

- Minimal transfer of information. One of the most critical security restrictions, the information transferred must be the minimum necessary to use the services (data minimization principle).
- Entitlements Enforcement. While enforcing the identity of users accessing the portal is critical, it is equally important that access is controlled based on a user's rights or credentials. In most organizations, each application determines what rights a user disposes of, but in systems like e-Gov the interoperability of credentials becomes critical.
- Information Privacy. One of the greatest challenges in delivering on-line e-government services respecting privacy of citizens and companies taking into account the different national legal aspects (e.g., EU legislation). Privacy should be also understood globally even between different government bodies, on a need to know basis.
- Transaction Verification. In many e-Gov services, once a transaction is complete, it is crucial that it can be verified to ensure accountability. If there is doubt regarding the identity of the submitter or in the integrity of the actual transaction, then the transaction cannot be verified and accountability cannot be enforced. For instance, this is of utmost importance for tax declaration where the transaction can be successfully completed

but the recorded declaration might contain erroneous or false information.

Current Approaches to Develop this Application

Applications are frequently developed according to a Detailed Description of work (DDW). That should contain the security requirements, but this is not always the case. Currently, the Security community agrees that the security requirements should be elicited through a negotiation between the Business Community (owner of the information) and the Security Group, which then designs and enforces corporate security policy. Again, this is rarely the case.

There are two main strategies used by software developers: the pragmatic strategy and the Cartesian strategy.

The Pragmatic Strategy

In this case, the software developers decide themselves on the basis of their past experience, the best practices, the security requirements, the technical solutions to be applied, and designs their integration. Of course, the technical solution and its integration depend on the development infrastructure to be used.

This strategy can work well (provided that the developers have enough expertise) in static domains where the complexity of services is not high, and where services are under the control of the single authority.

The Cartesian Approach

This approach is mostly used in Europe. It is based on the necessity to treat security as exhaustively as possible. This process can be described as follows:

- Threats elicitation
- Impacts and risks measurement

- Security requirements elicitation

These two approaches provide the software developer with the security requirements in natural language. If there is a security policy which specifies what are the allowed technical solutions, then the developer can find the right technical solution and its integration.

For example:

- Security requirement: The communication between the user and the application should be confidential
- The technical solution : Encrypt communication
- Integration: The security policy says that for encrypting communication, the company PKI should be used. Then the integration scheme could be to use SSL with a strong authentication based on X509 certificates provided by a PKI.

To conclude, in the software application development process, security is taken into account on a “best practices” basis. The choice of a technical solution and its integration lie on the software developer.

DESIGNING THE APPLICATION AND IDENTIFYING THE SECURITY REQUIREMENTS

Even when, security requirements are provided by the business community before designing the application, it is necessary during the design and development process to continuously check that the different application version still comply with the security requirements. More often than one would expect security requirements get lost during the development process and never get realized in the final product.

It is widely admitted by the security community that the security requirements should be

provided by the owner of the information (usually the business community). Only this community can decide if their information is sensitive or not and its level of sensitivity. These application-specific requirements should then be related to the corporate security policy. In most large corporations, there is a Security Department with a Security Officer, who is responsible for defining the corporate security. This document provides the rules that should be applied on a physical or a logical point of view.

An example of such rule can be: “for company confidential information access, a strong authentication will be applied”. This security requirement will be added to those provided by the business analysis. Then when software developers present a technical solution for a strong authentication, like a smart card using X.509 certificates, the Security Department should check if this solution satisfies the security policy.

Even in the best cases, once the technical solutions are chosen and verified to be in compliance with the security policy and the business requirements, it is up to the to integrate them into the application.

Developing the Application

The IMPRESS development process of the proposed system begins with the identification of security requirements at business-level. These security requirements are then applied to the relevant elements of the system domain model. The domain model shows all the elements of the system from domain expert’s point of view; this is a good starting point to include the security requirements that will be fulfilled by the system components. This model shows domain entities and the relation between them. At this abstraction level, the security requirements are expressed via security properties attached to the different domain elements.

The SERENITY model for S&D Properties provides tools for the precise and formal defini-

tion for such properties and defines an open and extensible framework that allows different entities to define their own properties and to establish relations between properties.

Table 1 shows some examples of *conceptual entities*, which appear in our example scenario, and the security properties that each entity must fulfil. The process is iterative, so these models are reviewed and modified until it is considered satisfactory by all stakeholders.

During the following iterations, the design team develops different models that evolve towards an implementation model that is the basis for the actual application code. As we will see later automated tools support both the transformation between models and the verification of the coherence of manually transformed models.

In our example application the process continues by identifying S&D Properties required to fulfil the security requirements identified during the first step. At this point, the design team introduces security properties into the appropriate components of the model. SERENITY provides automated tools for the identification of S&D Properties stored in both local, and on-line S&D Properties data bases, and for reasoning about these properties.

On-line repositories are interconnected by means of the relations existing between properties. As an example, table 2 presents a possible result of S&D Properties identification.

The model showing entities and S&D Properties is the first cornerstone of our secure system development framework, since this is the first model allowing the automated processing of security requirements. In the remainder of the chapter we refer to this model as “CM” (Conceptual Model). Once, the development team has used an automated tool in order to identify S&D Properties in the CM, they continue by creating a lower level UML-based model, that includes detailed security solutions (S&D Solutions). This model is based on the CM, and we will call it DM1 (Development Model One).

Table 1. Entities and related security properties

Entities	Security properties
Fiscal Administration portal access control	Authentication (Certificate)
USBKey storage	Privacy
Child Benefit Office website access control	Authentication (Certificate)
Declaration recording	Non repudiation
Wap connection	Privacy (Encryption)
User platform	Privacy
Communications	Minimal transferred data / entitlement enforcement / privacy /transaction verification

Table 2. Entities, security properties and S&D Properties

Entities	Security properties	S&D Property
Fiscal Administration portal access control	Authentication (Certificate)	authentication.uma.es
USBKey storage	Privacy	secureStorage.uma.es
Child Benefit Office website access control	Authentication (Certificate)	authentication.uma.es
Declaration recording	Non repudiation	nonReputation.uma.es
Wap connection	Privacy (Encryption)	encryptCommunication.iso.com
User platform	Privacy	privateEnvironment.uma.es
Communications	Minimal transfered data / entitlement enforcement / privacy /transaction verification	secureCommunication.uma.es

Classes appearing in the DM1 model result from the transformation of entities appearing in the CM. Usually, an entity in the CM is transformed in a set of classes in the DM1, and S&D Properties are transformed into different artefacts used to represent S&D Solutions (S&D Classes, S&D Patterns ...). Once again, we use an automated tool in order to identify S&D Solutions providing a particular S&D Property. This automated tool is able to perform searches in both local and on-line repositories of S&D Solutions called S&D Libraries. DM1 models include S&D Solution related information by means of a UML profile,

so in this case, it is possible to relate an S&D Solution for one or more classes. An S&D Solution, related to a UML class, provides a security service to the class. The abstraction level of the S&D Solution related artefact used to fulfilling a particular requirement depend on the level of abstraction that one wants to express. S&D Classes represent the higher abstraction level, since S&D Implementations represent the lower abstraction level. An S&D Pattern represents a medium abstraction level.

All DM1 S&D artefacts are related to the S&D Property in the CM model. Security requirements

Table 3. Entities, S&D properties and S&D classes

Entities	S&D Property	S&D Classes
Fiscal Administration portal access control	authentication.uma.es	WEBcertAuthen.uma.es
USBKey storage	secureStorage.uma.es	secureStorageEncrypt.uma.es
Child Benefit Office website access control	authentication.uma.es	WEBcertAuthen.uma.es
Declaration recording	nonReputation.uma.es	nonReputationACK.uma.es
Wap connection	secureComm.uma.es	encryptCommunication.uma.es
User platform	privateEnvironment.uma.es	volatileEnvironment.uma.es
Communications	secureCommunication.iso.com	encryptComm.iso.com

can be traced from the CM to the DM1 model, and viceversa. During the development phase it is possible the creation of several DM1 model like, each one at a different abstraction level. The security requirements traceability between them is guaranteed, since the inclusion of each S&D artefact in each model. Doing this, if the development team counts on several models changes in one of them is automatically translated to the rest following a cascade scheme.

Let's suppose that, our development team, after of the analysis of the CM model, has included only S&D Classes in the DM1 model. So they have produced a high/intermediate abstraction level model, since they have chosen S&D Solutions for each security requirement. Table 3 presents a possible (and imaginary) S&D Class selection for the given scenario security requirements.

The DM1 model is a good starting point, but probably engineers do not want the programmers to deal with S&D Classes, although it is possible since S&D Classes are objects with a defined interface. So they decide to produce a lower abstraction level model including more detailed information about the system under development. This third diagram (DM2) includes S&D Patterns belonging to the S&D Classes at DM1. Once again it is possible the use of the aforementioned automated

tool in order to identify S&D Patterns for each S&D Class. Table 4 present a possible S&D Pattern selection for the given scenario.

At this point there are three models of the same system, each one at different level of abstraction: CM, DM1 and DM2. The creation of these models is aided by two automated tools. On one hand, for S&D Properties identification, and on the other hand, for S&D Solution related artefacts identification. Additionally, a third tool could be used in order to maintain the consistence and the correction of the models, by managing security requirements traceability.

Finally, the last part of the development phase is the implementation. Usually, programmers develop implementation models of the application under development. These implementation models (IM, Implementation Model) are fully detailed; security services in this level are ExecutableComponents. By doing this, it is possible to maintain the link from the conceptual model level security requirements to the implementation level security solution. The IM model is implemented as a ready to run system.

After the development phase, the development cycle continues at the deployment phase. The deployment includes the installation and the setting up of the system for a given environment.

Table 4. S&D properties, S&D classes and S&D patterns

S&D Properties	S&D Classes	S&D Patterns
authentication.uma.es	WEBcertAuthen.uma.es	WAC.cert.lcc.uma.es
secureStorage.uma.es	secureStorageEncrypt.uma.es	3DES.encrypt.uma.es
authentication.uma.es	WEBcertAuthen.uma.es	WAC.cert.lcc.uma.es
nonReputation.uma.es	nonReputationACK.uma.es	PKI.nonReputation.uma.es
secureComm.uma.es	encryptCommunication.uma.es	SSL.communication.uma.es
privateEnvironment.uma.es	volatileEnvironment.uma.es	Stuple.storage.uma.es
secureCommunication.iso.com	encryptComm.iso.com	SSL.connection.iso.com

In order to perform a correct deployment both the system and the security solutions included must be deploy.

A run-time framework has been developed as part of the Serenity Project. This framework, called Serenity Runtime framework (SRF). The SRF make possible for developers to defer the selection of the actual solutions until the system is running. The advantage of doing it is that the selection can be made automatically, taking into account the specific context conditions that hold at run-time.

Each SRF maintains a local repository of the S&D Solutions available for that SRF. Therefore, given an S&D Property, the SRF is able to perform the selection of the most appropriate S&D Solution for the given requirement based on the SRF context conditions. This kind of run-time behaviour is very interesting for the provision of security in highly dynamic systems such as ambient intelligence, service oriented computing, etc. In this kind of systems we must deal with everchanging environments where security solutions need to be chosen on the fly. Summarising, the SRF is able to: (i) complete applications' architectures at run-time by providing security solutions, which meet these applications' requirements based on the concept of S&D Properties; (ii) monitor all running security solutions to guarantee that the given context conditions do not violate any preconditions of the solutions. In

case of such a violation, the SRF can substitute security solutions at run-time; and (iii) based on the reasoning mechanisms for S&D Properties, negotiate security configurations for communications among distributed applications.

THE WORK PRESENTED AND ITS ADVANTAGES

Information systems are becoming more and more complex, in terms of architecture, security, legal issues. The current trend towards offering more and more online services to access government bodies and public institutions, justified by the obvious advantages of the Internet, poses important challenges, especially with regards to the security and dependability aspects.

Furthermore, in the new applications the security-relevant aspects of the environment are continuously evolving. This makes it impossible for developers to select at design time the most appropriate solutions for their requirements because they lack the information about the actual runtime context.

Furthermore, users want to access the services offered by e-gov applications from any kind of devices (desktop, laptop, PDA, smartphone...), in any place in the world (home, airports, cars, shops ...).

The previous considerations demonstrate the need for (i) addressing the provision of security and dependability requirements throughout the whole development cycle, and (ii) providing runtime support for these systems in order for them to adapt to the high variability of their contexts (communication channels, devices, surrounding applications, etc.).

In this chapter we have presented a complete solution for the development and operation of secure and dependable e-gov systems, based on the SERENITY security model and the IMPRESS development process. Both SERENITY and the IMPRESS process are still under development and in particular, we are developing the different tools required to support the developers' activities. We have illustrated the application of the process to an example e-gov application (fiscal portal for taxes).

The results of our work enable the use of a library of security patterns in order to include security related aspects in the software development process. This library is not a simple set of "best practices" or recommendations (mostly at the operational level), like those proposed in the literature as "security patterns", but a precise, well-defined and automated processing-enabled repository of security mechanisms. The most important feature is the incorporation of rich and precise semantic descriptions for the patterns. The extensive use of semantic descriptions enable the use of automated reasoning mechanisms capable of solving problems such as pattern composition and adaptation. Patterns are categorized into distinct abstraction categories, to different types of security measures (technical, organizational, etc.) and to different levels of formalism (e.g. formal patterns for security services that implement formally specified requirements and informal patterns that address security issues in the organizational level).

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