Transforming information security governance in India (A SAP-LAP based case study of security, IT policy and e-governance)

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Abstract

Purpose – Digital India, the flagship programme of Government of India (GoI) originated from National e-Governance Project (NeGP) in the year 2014. The programme has important aspect of information security and implementation of IT policy which supports e-Governance in a focused approach of Mission Mode. In this context, there is a need to assess situation of the programme which covers a study of initiatives and actions taken by various actor involved and processes which are responsible for overall e-Governance. Therefore, the purpose of this case study is to develop a Situation-Actor-Process (SAP), Learning-Action-Performance (LAP) based inquiry model to synthesize situation of information security governance, IT policy and overall e-Governance.

Design/methodology/approach – In this case study both systematic inquiry and matrices based SAP-LAP models are developed. Actors are classified who are found responsible and engaged in IT policy framing, infrastructure development and also in e-Governance implementation. Based on a synthesis of SAP components, various LAP elements were then synthesized then which further led to learning from the case study. Suitable actions and performance have also been highlighted, followed by a statement of the impact of the efficacy i.e. transformation of information security, policy and e-Governance on the Digital India programme.

Findings – On developing the SAP-LAP framework, it was found that actors like the Ministry of Electronics and Information Technology of the Govt. of India secures a higher rank in implementing various initiatives and central sector schemes to accelerate the agenda of e-Governance. Actions of other preferred actors include more investments in IT infrastructure, policy development and a mechanism to address cyber security threats for effective implementation of e-Governance. It was found that actors should be pro-active on enhancing technical skills, capacity building and imparting education related to ICT applications and e-Governance. Decision making should be based on the sustainable management practices of e-Governance projects implementation to manage change, policy making and the governmental process of the Indian administration and also to achieve Sustainable Development Goals by the Indian economy.

Research limitations/implications – The SAP-LAP synthesis is used to develop the case study. However, few other qualitative and quantitative multi criteria decision making approaches could also be explored for the development of IT security based e-Governance framework in the Indian context.

Practical implications – The synthesis of SAP leads to LAP components which can bridge the gaps between information security, IT policy governance and e-Governance process. Based on the learning from the Situation, it is said that the case study can provide decision making support and has impact on the e-Governance process i.e. may enhance awareness about e-services available to the general public. Such work is required to assess the transparency and accountability on the Government.

Social implications – Learning based on the SAP-LAP framework could provide decision making support to the administrators, policy makers and IT sector stakeholders. Thus, the case study would further help in addressing the research gaps, accelerating e-Governance initiatives and in capturing cyber threats.

Originality/value – The SAP-LAP model is found as an intuitive approach to analyze the present status of information security governance, IT policy and e-Governance in India in a single unitary model.

Keywords Sap-Lap, Information security, IT policy, e-Governance, Digital India, ICT Applications

Paper type Case study

1. Introduction
Nowadays, e-governance in the Indian economy is seen as a complementary subject of information security, where e-service delivery ensuring the information technology (IT) policy development is the main focus. Apart from important instructions, the policies in the segment of e-governance framework are important for implementing procedures and security controls in various organizations and sectors. To frame security IT policy and support the process of e-services delivery to citizen, the area of information security governance is more challenging in the context of meeting the Indian objectives of sustainable development. Various implementing frameworks and routes have been developed as processes to fill the present gaps of the governmental development, where many actors are involved in the process of e-governance process implementation. Leading actors, i.e., the Ministry of Electronics and Information Technology (MeitY), the Government of India (GoI), has taken a number of policy measures in the recent years of e-governance. Those measures are crucial for achieving the vision and objectives of a recently launched programme on *Digital India*. The programme is seen as one of the keys to sustainable development. In the area of information security and e-governance, IT policies are envisaged to provide the necessary support to all central ministries and various departments for running the central sector initiatives up to the state level. In this reference, all the States and Union Territories are being transformed by leveraging emerging technologies, making use of newer business models and revamping existing projects. The aim of such project-based services is to implement the vision and deliver the services electronically to citizens in an efficient, transparent and affordable manner. These policies also draw their strengths from national and international best practices in their respective domains as well as inputs from subject matter experts from Government departments, industry and academia. In addition to this, information security policy (the so-called IT policy) initiatives are endeavouring to

chart out the roadmap for implementation of e-governance projects and to extrapolate best practices and key reform principles that can help the government implement a new paradigm of governance in the country (Government of India, 2008, 2016, Second Administrative Reforms Commission, Eleventh ARC Report, and e-Government Survey, United Nations Public Administration Network). The projects cover a number of important areas like open source software (OSS), open application programming interfaces (APIs), e-mail policy, use of IT resources, collaborative application development, application development and re-engineering for cloud-ready applications.

In view of the above background, the information security framework establishes secured policy guidelines and IT practices to manage e-governance (Goel and Chengalur-Smith, 2010), whereas practices document compliance activities which are seen as an appropriate measure of e-governance to ensure that policy objectives to overcome cyber threats are being met. It is observed that due to administrative reforms in the past few decades, there have been many changes related to development and e-governance in the Indian economy. The economy is emerging as that of a digital nation and is achieving its targets towards digital transformation. This move supports change in policy development for transformation for overall governance. In this reference, because of the need to manage the change in the Indian economy, e-governance provides general and overarching guidance on matters affecting various aspects of security. Therefore, it becomes important to study the Indian situation on the topic of information security and governance in the area of e-service delivery. Simultaneously, it is also felt that the presentation of the situation related to e-governance processes and IT policies is an important area to study.

In addition to the above issues, the security policy applies to all hardware, software, data, information, networks, personal computing devices, support personnel and users within the various sectors and implementing agencies in the country. Thus, keeping the aforesaid background in mind, the objective of this case study is set to present the situation with regard to IT policy initiative transformation and e-governance, both of which are directly or indirectly affected by cyber threats present in the IT infrastructure, hardware, software and IT policy initiatives. Methodologically, the case is developed based on the intuitive approach of situation–actor–process (SAP) and learning–action–performance (LAP) methods, widely used in the literature in the management discipline and to support decision-making for policy framing. The approach also helps in achieving the objectives of sustainable development (Kumar and Managi, 2009). The case study mainly focuses on the involvement of various governmental and non-governmental players as actors, (the decision-making actors) responsible for the information of security governance, IT policy implementation and the e-governance processes. Learning from the case study, actions required and further performance areas over the actions are also highlighted as the LAP component.

1.1 Objective of the case study

Based on the introduction, the objective of the case study is to present the situation with regard to information security governance and IT policy implementation to support e-governance projects in the Indian context. The case objective covers presentation of the situation related to securing information, minimizing cyber threats in the sectors, promoting information and communication technology (ICT) applications, implementing the National e-Governance Plan (NeGP) and the Digital India programme.

For a quick overview of the case study, the organization of this study is as follows. Section 2 provides an overview of the case and its background. The section also presents the literature review, research gaps and the issues related to information security governance, IT policy and e-governance in the Indian context. Section 3 illustrates qualitative- and

quantitative-based methodological applications of the SAP-LAP enquiry model to rank various actors and actions. Ranking of actors, their actions and performance areas and a discussion of the issues are presented, based on the methodological approach of the SAP-LAP methodology used in Section 4. In the later part of the study, Section 5 highlights selected challenges in the context of the Indian case on information security, IT policy and e-governance. The concluding remarks, scope of future work and recommendations are provided in Section 6. Finally, the implications of the research on theory, management and policy are presented in Section 7.

2. Case overview based on situation–actor–process and learning–action–performance framework

The growth of e-governance first began in India with the establishment of National Informatics Centre in 1977. This was a first major step towards e-governance and, subsequently, there were policy developments in the IT sector and many initiatives that were launched to support the growth of e-governance in the country. Consequently, upon these initiatives, the launch of National Informatics Centre Network in 1987 was one of the driving forces and other significant initiatives include the creation of a Union Ministry of Communication and Information in 1999 and identification of a 12-point minimum agenda for e-governance to implement in all other Union Government Ministries and Departments by 2000. Later, administrative reforms established the NeGP in 2006 and started the Digital India programme, which set out an impressive agenda for developing e-government services. Despite all the cyber security risks, the movement towards the Digital India programme is inevitable and the challenge is that presently, the majority of government departments and e-governance projects are being conducted in silos, specifically those working for rural area development. As noted, this cannot be the case with the flagship programme to support recent developments in the areas of smart cities, where security needs to be considered as an integral part rather than an afterthought. Due to many challenges in the area of information security and governance, it is important to model and present a wide range of issues covering the subjects of information security, cyber security breaches, IT sector development, policy, penetration testing of ICT applications and making e-services available to support e-governance, in one architecture for research.

To study the above mentioned wide range of issues, particularly in this form of case study, first a literature review was carried out to understand the various issues and the development of the SAP-LAP model. The model has been widely used for learning assessment in various situational environments, specifically in many sectors of the Indian economy (Soni *et al.*, 2016). Sometimes, the model is explored on the basis of flexible manufacturing systems management (Sushil, 1997), and sometimes, the model is also seen as a holistic framework of systems, presenting a systems overview which can be used to develop basic entities in any management context (Sushil, 2000). This study covered the developments based on information security, IT policy implementation and e-governance in a systematic manner. Using this model, the SAP-LAP methodology considers, on one side, the synthesis of the selected situation, individual government departments and other players as the actors involved in the process, where various processes related to information security governance as a system environment are highlighted in the SAP components. While on the other side, based on critical questioning, the LAP components are synthesized to support decision-making to ensure that the various stakeholders of the county are well prepared to tackle the change and future developments in the IT sector, policy development and also to

improve the overall the Indian economic situation and ensure that it is aligned for sustainable development (Kotter, 1996).

In the past, studies have focused on the Indian context, where various authors have worked on multiple aspects of the situation including the situation of the Indian telecom industry using the SAP-LAP model (Pramod and Banwet, 2010). But very few studies relating to an integrated situational framework of information security governance, IT policy and e-governance exist, and to fulfil the literature gaps, it was found that the situation of the e-governance process highlighting transformation of IT policy initiatives needed to be studied in depth and modelled. As the e-governance process implementation governs through a project mode, it also needs ethical decision-making and training of executives at various levels of the administration. Many actors need to be considered and the ranking of their actions has to quantified and well assessed using the SAP-LAP model of matrices. Thus, this case study is an attempt to inquire and evaluate the situational environment of e-governance related to security, governance aspect of IT policy in Indian context where human resource, physical and environmental security aspects are also presented.

As already noted, to fill the research gaps and also to present a wide range of issues, the SAP and LAP models of system inquiry are felt best suited. On developing the model, the SAP components are qualitatively analysed based on IT security and policy implementation in an e-governance environment which creates further linkages among other parts of the model, i.e., the LAP components. The initial part of the case study examines the SAP context, which covers the complete situation, i.e., the involvement of various actors and processes, i.e., SAP synthesis on the subject matter of information security, IT policy and e-governance implementation. The same analysis is carried out through the development of critical questioning.

Of many studies found in the literature review on the application of SAP-LAP model development, a few are listed here. However, some relevant literatures are also covered in the section on the subject matter of the case study. Tables I and II presents the selected list of research papers on information security, IT policy, threats, e-governance and the methodology of SAP-LAP model. The next section describes the SAP-LAP model of information security, policy and management concerns related to the e-governance processes.

3. Situation–actor–process and learning–action–performance model of information security transformation, information technology policy and e-governance

The case study identifies SAP-LAP components and the following sub-section presents elements of the SAP components only. Based on these SAP components, LAP components have been synthesized at the later stage of the case. For the same purpose, detailed studies about the initiatives taken by the GoI and implementation of MMPs. It is observed that the objectives of MMPs are set to the transformation of e-governance to meet the present challenges which exist in sustainable development goals (SDGs) and also to support the e-governance process. The description of MMPs is also presented here. The case study approach illustrates various interpretive matrices (Sushil, 1997, 2000, 2001, 2009), where matrices can help in developing programme planning (Warfield, 1974). Later, such a matrices-based model is used as a guiding framework to develop linkages between the SAP-LAP components. The later part of the study highlights the LAP components which discusses the various challenges of the Indian economy (*Refer to* Appendix 1 and 2 *for Future Plan for e-Governance and Status of MMPs*).

Sr. No.	Focus of the research	References
1.	Human factors in information security	Colwill (2009)
2.	Violation of safeguards	Dhillon (2001)
3.	Computer crimes	Dhillon and Moores (2001)
4.	Insider cyber-threats	Hamin (2000)
5.	Trend of the security research	Hong *et al.* (2010)
6.	Threat prediction tool	Kaspersky and Furnell (2014)
7.	Addressing bad actors and their actions	Pfleeger *et al.* (2010)
8.	Common sense to insider threats	Silowash *et al.* (2012)
9.	Threat management	Steele and Wargo (2007)
10.	Analysing the past to prepare for the future	Webster and Watson (2002)
11.	An online social network for emergency management	White *et al.* (2009)
12.	IT policy and cyberterrorism	Khoumbati and Themistocleous (2007), Harries and Yellowlees (2012), Dahiya and Mathew (2016)
13.	Economics and investment in information security	Gordon and Loeb (2002)
14.	E-Government projects and implementing projects in urban areas	Merewitz (1973), Attal (2002), Grimsley *et al.* (2007), Karin *et al.* (2010), Kundu (2001), Graham (2013), Hansen and Kraemmergaard (2013), Rotchanakitumnuai (2013), Corrêa *et al.* (2014), Alenezi *et al.* (2015), Kalsi and Kiran (2015), Gupta and Suri (2017)
15.	E-service delivery in public administration	Bekkers and Zouridis (1999)
16.	Public administration and public affairs	Henry (1989), Singh and Karn (2012)
17.	E-Government and project management	Marche and McNiven (2003), Bertot *et al.* (2012), Hansen and Kræmmergaard (2013), Khan *et al.* (2014), Rahim and Athmay (2015)
18.	Information for public administration	Peristeras and Tarabanis (2000)
19.	E-Government: social security and information society	Wescott (2001), Inkinen (2012), Zahir and Muhammad (2014), Constantinos and Skouras (2015).
20.	Sustainable fishing development	Chiou*et al.* (2005)

Table I.
Widely listed
literature on
information security,
IT policy and
e-governance

3.1 The situation–actor–process context

In the recent years of development, information and security concerns have been perceived as sensitive elements to support comprehensive IT policy framing and e-governance. More specifically, this fits with more relevance to the Indian context for the system architecture of the IT sector, both in the conventional and non-conventional aspects of development. On one side, information security is affected by technical and managerial barriers that exist in the sectors, while on the other side, it ensures the smooth implementation of e-governance processes. Thus, the complete situation is presented in this case study, which includes secured information, effective policy implementation and processes related to e-governance. Figure 1 shows the process of the development of e-governance over the period, while elements of information security and e-governance are shown in Figure 2. In the given context of the situation and considering the recently launched digital India programme, the Government's threat management centric focus is to frame and implement inclusive IT policies using MMPs. Thus, the focused approach needs critical analysis in the study and

Sr. No.	Context of SAP–LAP	References
1.	E-Business strategy of car industry: a case study	Majumdar and Gupta (2001)
2.	Supply chain coordination issues: a SAP–LAP frame work of SMEs in United Kingdom	Arshinder and Deshmukh (2007a), Arshinder and Deshmukh (2007b)
3.	Implementing e-governance applications	Suri and Sushil (2008)
4.	Engineering support issues for flexibility in maintenance	Garg and Deshmukh (2010)
5.	Organizational analysis of retention of managerial employees and framework of power sector	Ghosh and Sahney (2010a), (2010b), (2010c), (2010d)
6.	System modelling of telecom service sector supply chain	Pramod and Banwet (2010)
7.	Study of select issues related to supply chain coordination	Shukla *et al.* (2011), Siddiqui *et al.* (2012)
8	Strategic technology management in the auto component industry in India	Sahoo *et al.* (2011)
9.	SAP–LAP model of Indian SMEs	Kumar *et al.* (2012)
10.	Humanitarian supply chain management in India	John and Ramesh (2012)
12.	Supply chain performance issues in an automobile company	Parikshit (2012)
13.	Building information systems flexibility	Palanisamy (2012)
14.	Frozen corn manufacturing and its supply chain	Mahajan *et al.* (2013)
15.	A framework for building risk mitigation strategies	Mangla *et al.* (2014)
16.	Reverse logistics operations in automobile industry	Ravi (2014)
17.	ICT issues in humanitarian supply chain management	Kabra and Ramesh (2015)
18.	Systematic inquiry model for energy security and sustainability	Soni *et al.* (2016)

Table II.
Select list of literature on SAP–LAP framework

Figure 1.
Process development of e-governance in India
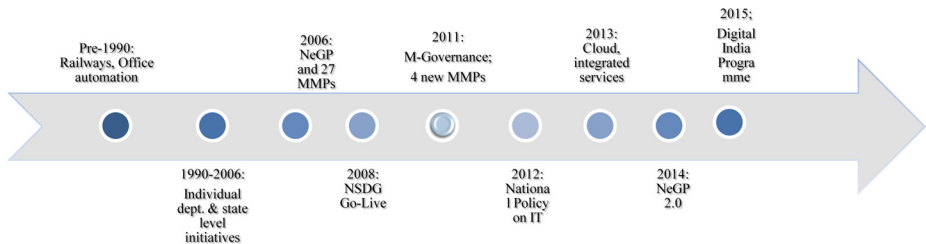
qualitative analysis for the same purpose is used in the case study where critical questions are framed for each of the SAP and LAP components separately, as presented in Tables III and IV, respectively. Based on the critical questioning, the situation, various actors and processes involved in the case study are defined below.

3.1.1 Situation

3.1.1.1 Information security: transformation and e-governance context. Information security governance is the well-known system that is based on an IT policy by which an organization or nation directs and controls not only its IT security but also the national security as well. Sometimes, it refers to the adaption of guidelines from the International Standard Organization. Governance specifies the accountability framework and provides oversight to ensure that risks are adequately mitigated. IT security governance also ensures
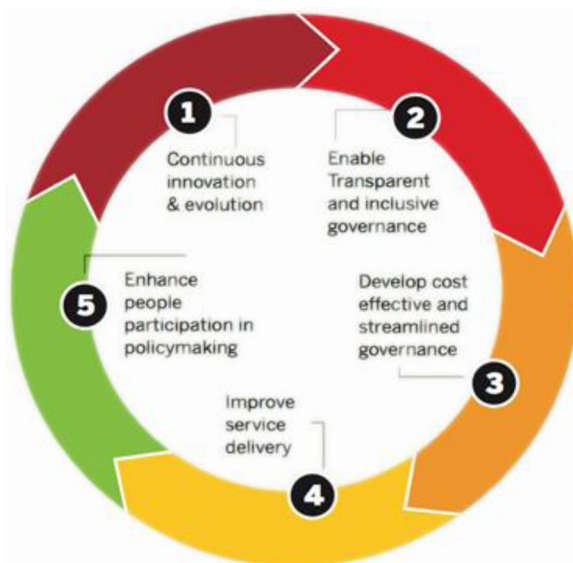
that security strategies are aligned with the business objectives of sectors and are consistent with regulations as well as with the obligations of Indian society in the broader perspective of development. The brief issues related to information security and policy, both of which affect e-governance in many of the organizations and sectors in India, are briefly detailed below:

- *Information security*. Confidentiality, integrity and availability;
- *Information Security Threats*. Packet sniffer, probes, malware, internet infrastructure attacks, denial of services attack, remote to local attack, user to root attack;
- *Improving Security in e-governance*. Security Policy, Practices and Procedures; and
- *Security technology*. One-time password, cryptography, firewalls, analysis tools and monitoring tools.

3.1.1.2 IT policy as instrument to e-governance. Egovernance is the use of ICT applications in the transformation of government, primarily aiming at the improvement of accessibility, effectiveness and responsibility of a government. Policies specifically aimed at securing sustained economic growth, a healthy environment or an inclusive social development are an important set of instructions in their own right for sustainable development. In the Indian context, over the past two decades, IT-enabled services (ITeS)-based industry has emerged as a strategic sector to support e-governance. In these sectors, there is enough competitiveness found in national as well as in global markets on indicators of growth such as employment and economic value creation. To manage competitiveness, the Central Cabinet has approved the National Policy on Information Technology, 2012 (the Policy).

As observed, a good policy as an instrument of e-governance should have a framework and structure that can addresses the states, compliance with laws and statutes, controls and practices as well as audit considerations. Therefore, the objective of the policy should be to leverage ICT applications for addressing the country's economic and developmental

Stage	Issues
Situation How we reached the present condition? What is present position? What is expected to be happening?	Booming Indian economy in IT services Administration needed support for IT policy implementation Previous decades forced to implement NeGP (started in 2005) Digital India Programme (started in 2014) with aims of power to empower all citizens Fostering economic activities and support for information and service delivery County shall be able to manage problem using e-governance projects implementation
Actor What are the concern of Ministry, R&D and technical institutions engaged? Country view on Asian region view. What roles and capabilities are exhibit? In what domain freedom of choice available	Meity, GoI. making effort for e-governance empowering citizens, promoting the inclusive and sustainable growth of the electronics, IT and ITeS industries, enhancing India's role in internet governance, adopting a multipronged approach that includes development of human resources, promoting R&D and innovation, enhancing efficiency through digital services and ensuring a secure cyber space. Ministry of Telecommunication, GoI: to provide secure, reliable, affordable and high-quality converged telecommunication services anytime, anywhere for an accelerated inclusive socio-economic development. IT sector regulator: responsible for meeting and overcoming challenges of information security, IT policy and e-governance NeGD: facilitating implementation of NeGP by various Ministries and State Governments, providing technical assistance to Central Ministries and State Line Departments, undertaking technical appraisal of all NeGP projects to examine issues such as overall technology architecture, framework, standards, security policy, service delivery mechanism and sharing of common infrastructure. DoPT and NITI Aayog: apex body responsible for closed monitoring of budget estimate, approvals for capacity building for e-governance and ensuring implementation of e-governance projects and training needs
Process What is being done? What can be changed? What else required?	e-Government: providing e-infrastructure for delivery of e-services e-Industry: promotion of electronics hardware manufacturing and IT-ITeS industry e-Innovation/R&D: implementation of R&D Framework – Enabling creation of Innovation/R&D Infrastructure in emerging areas of ICT&E/Establishment of mechanism for R&D translation e-Learning: providing support for development of e-skills and knowledge network, capacity building, e-governance cell e-Security: securing India's cyber space e-Inclusion: promoting the use of ICT for more inclusive growth Internet Governance: enhancing India's role in global platforms of internet governance

Table III.
Framing critical questions: SAP components

Learning	
What are the key issues related to situation?	High level of digital literacy
What are the key issues related to actors?	Connectivity to remote areas
What are the key issues related to process?	Compatibility to Centre-State database
	Cyber crimes
	Inter-departmental coordination
	Finance and costing issues
	Net neutrality
	Changing civil mindsets
	Exchange of information
Action	
What should to be done to improve situation?	Booting up IT infrastructure
What can be done to improve actors?	Monitoring IT policy implementation
What ought to be done to improve process?	Synergizing minds to adopt ICT applications and digital literacy rate
	Strategic alliances to implement e-governance projects
	e-learning from capacity building
	Separate e-governance cell
	Allocation of IT resources for effective and relevant use
	Though there are resources with India, but there is a huge capital cost which is to be invested and the fruits of the investment will be received after a few years
Performance	
What will be its impact on situation?	Government functions shall improved
How will the actors be affected?	Complexities in the Indian economy across the sectors can be handled
How will the performance of the processes be affected?	Effective utilization of funds
	With high digital literacy and more ICT applications, environment protection can be ensured
	Economic impact on country's growth will enhance

Table IV.
Framing critical
questions: LAP
components
(synthesis)

challenges. The policy is rooted in the confidence that ICT applications have the power to transform the lives of people and assist the Government in implementing e-governance. ICT-based applications and the electronics sector are contributing significantly to the Indian economy, society and also to the overall governance. Not limited to the contribution of these sectors, the framework further supports the federal nature of functions and operations across the gross domestic product (GDP)-dependent sectors of the economy. All these facets of IT security policies related to e-governance can help in facing the challenges of SDGs. The thrust areas that contribute towards e-governance of the IT policy are highlighted as follows:

- To increase revenues of the IT and ITeS industry;

- To gain significant global market share in emerging technologies and services;

- To promote innovation and R&D in cutting-edge technologies and development of applications and solutions in areas like localization, location-based services, mobile value-added services, cloud computing, social media and utility models;

- To encourage adoption of ICTs in key economic and strategic sectors to improve their competitiveness and productivity;
- To provide fiscal benefits to small and medium-sized enterprises and startups for adoption of IT in value creation;
- To create a pool of skilled manpower in ICT and to make at least one individual in every household e-literate;
- To provide for mandatory delivery of, and affordable access to, all public services in electronic mode and also to enhance transparency, accountability, efficiency, reliability and decentralization in the Government, and in particular, delivery of public services; and
- To leverage ICT for key social sector initiatives like education, health, rural development and financial services to promote equity and quality.

3.1.1.3 Recent e-governance initiatives. E-governance is an innovative phenomenon for redeveloping administration. This is mainly due to its objectives, which are to enhance the quality of government services to citizens and accelerate communications through the use of technology. The objective also addresses reduction in government expenditure, provides more transparency, reduces corruption and subjectivity, reduces costs in infrastructural project implementation for citizens and makes government more accessible and accountable (Gaspar and Leite, 1989). At the present time, many nations and government departments have started using ICT to automate their functions because of the ease of access to computer technology. The GoI has taken various initiatives where e-governance supports the functioning of government services because of computerization of services like ration cards, income certificates, building licenses, passport/visas, pensions, road transport, property registration, railway services, land records and income tax payments which has made life convenient for the citizens.

The situation of information security governance and IT policy, both of which support e-governance in the country, are considered in four dimensions. The dimensional situation considered and represented in the case is as (S1), (S2), (S3) and (S4). The complete situation is represented by the symbol (S), where, $S \subseteq (S1, S2, S3, S4)$. The subset parts of the complete situation (S) are described as follows:

- *Situation Subset (S1)*. This relates to issues comprising information security in organizations and GDP-dependent sectors which support the smooth functioning of e-governance;
- *Situation Subset (S2)*. This pertains to threats and cyber risks present in various organizations of various sectors (Warfield, 1974, 2005);
- *Situation Subset (S3)*. IT policy implementation; and
- *Situation Subset (S4)*. This is related to issues of e-governance which are dependent on information security and need their management for development of India. Also, this part of the situation is related to the overall best practices being run and focused on future development to support the e-governance and operations in the Indian economy.

All four dimensions of the situation are considered as one single situation, and the situation can be represented in mathematical notation, i.e., represented by the equation $S \subseteq (S1, S2, S3, \text{ and } S4)$. The complete situation (S), the set of the all the sub-sets of the situation are considered in the case study. Within the complete situation selected, various actors are

responsible for ensuring informational risk management, policy framing and e-governance. Actor identification and their role, processes related to the development of IT policy, best practices implementation, service delivery aiming at e-governance and ICT infrastructure development are discussed below.

3.1.2 Actor. With reference to the situation considered for the synthesis, it has been observed that various actors are playing important roles in the development of IT policy and the implementation of e-governance. In this context, various Central Ministries and State Governments play a part in the implementation of the Digital India programme. It has already been noted that Digital India is the flagship programme to support e-governance, which emphasizes citizen-centric services. Thus, the programme project also focuses on the digital infrastructure as a core utility for providing governance and services to empower the citizens. Therefore, it becomes important to assess the role of an actor to drive the e-governance process. A few key actors in the case study were selected based on their role, responsibility and authority to support IT policy framing and e-governance process implementation. The case study identifies the MeitY, GoI, as one of the important actors and the plan entails enhanced responsibilities for the same to engage competent resources from the open market as well as from within the Government. The National e-governance Division (NeGD) was also chosen as one of the actors which is involved as an independent division to NeGP. Various other internal and external actors are shown in Table III and briefly classified as follows:

(1) Internal actors:
- *(A1)* MeitY, GoI;
- *(A2)* Department of Telecommunication, GoI;
- *(A3)* NeGD, as part of NeGP approval, the Union Cabinet assigned some key tasks associated with Programme Management of NeGP including arrangements for monitoring and coordinating implementation of NeGP, evolving standards and policy guidelines, providing technical and handholding support, undertaking capacity building and R&D; and
- *(A4)* Centre for e-governance, conducting training to impart knowledge dissemination for best practices in e-governance, the Centre is part of the national administrative society, an autonomous body of the GoI, currently responsible for implementation of the NeGP and Digital India programmes.

(2) External actors:
- *(A5)* Information Technology Sector Regulators;
- *(A6)* NITI Aayog, GoI (*Apex body of policy framing*); and
- *(A7)* Department of Personnel and Training (DoPT), GoI, which provides holistic frameworks for e-governance. This actor is selected as the process development is affected by actions of actors and decision-making at Central–Cabinet level, which needs support for various other process developments across the sectors.

Overall, the entity fulfils the future requirement of trained, skilled manpower, IT professionals and allocation of suitable Central-services according to the competency for the purpose.

Engagements of various actors in an e-governance environment are shown in Figure 3. If the continuum of information security governance, IT policy implementation and e-governance are to be chosen and to be mapped in the Indian context of the selected Situation, then it should fall within the range from 6.0 to 7.0 on a 10.0 scale, as shown in
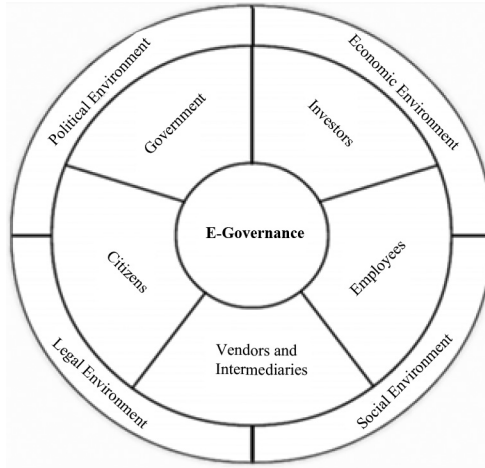
Figure 4 (based on the authors assessment during feedback received from training of senior-level officers under the Digital India programme at the National Administrative Society of India).

3.1.3 Process. Referring to the previous sub-section where an overview of the situation and actors engaged were discussed, it was observed that the Digital India programme provides immense scope to change the entire landscape of the development process. The programme also empowers Indian citizens by prudently applying ICT to the processes of e-governance. Recently, concerns regarding crises in resources, the effective utilization of resources, management and climate change caused changes in other parts of the development and processes; thus, change has emerged as a new challenge to the Indian administrators and policy makers. Therefore, actors should be proactive in their decision-making in conflicting situations to deal with changes required in the development process. It is advisable that there should be adequate skill development and that the government executive must be trained and well equipped to adopt and deploy these modern tools to gain the advantage for the benefit of the citizens (Kotter, 1996). In this connection, the capacity-building scheme under the programme focuses on the development of an institutional framework for state-level administration to provide adequately trained manpower. The process also includes the e-governance project implementation, where efficacious usage of ICT applications in the sectors entails proper understanding and structured implementation of the domain across the sectors. Such a process should not only be supported by training needs and future manpower development but should also be professionally equipped with sector regulators and an efficient regime to deal with the new challenges that these technologies usher in. The details of process related to e-governance can be seen from the
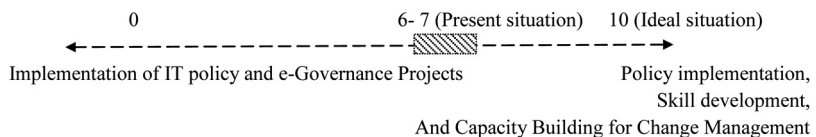
official websites of the GoI on Digital India Programme, e-Taal, and relevant data available there.

3.1.3.1 Ensuring information technology policy implementation for e-governance. The process of e-governance development is important where an effective IT policy can promote an inclusive and equitable society. Many studies support the basic ideology of implementing IT policy which attempts to optimally leverage India's global edge in ICT applications to advance national competitiveness in other sectors. The other important sectors that are particularly affected are those of the strategic and economic aspects. To develop on this edge on ICTs, the various IT policy initiatives in the country that are to ensure e-governance implementation will help to develop a healthy cyber and physical infrastructure are highlighted here:

- The policy on adoption of OSS encourages the formal adoption and use of OSS in Government organizations;
- The policy on open APIs sets out the approach on the use of open APIs to promote software interoperability for all e-governance applications and systems. It also provides access to data and services for promoting participation of all stakeholders including citizens;
- The e-mail policy lays down the guidelines with respect to use of e-mail services by the Government departments and organizations. The policy initiative aims to ensure secure access and usage e-mail services by its users. The policy document is applicable to all employees of Government; and
- The policy on the use of IT resources focuses the guidelines to ensure proper access and usage of the Government's IT resources. It also prevents their misuse by the users. The policy initiative covers all IT resources including desktop devices, portable and mobile devices, networks including wireless networks, internet connectivity, external storage devices and peripherals like printers, scanners and the software associated.

3.1.3.2 e-governance: towards transformation. Over the years, a large number of initiatives have been undertaken by various State Governments and Central Ministries to support the transformational process of e-government. Considering the critical need of mobile Governance and to support the basic idea of good Governance, the approach and key components supports the vision with the motto "Transforming e-Governance for Transforming Governance". As one of the initiative of the GoI, e-Kranti is an essential pillar under the Digital India programme. In the vision, all new and ongoing e-governance projects, which are being revamped, should now follow the key principles of e-Kranti, namely, Transformation and not Translation and Integrated Services and not Individual Services. Government Process Reengineering is to be mandatory in every MMPs. These projects should include ICT Infrastructure on Demand, Cloud by Default, Mobile First, Fast Tracking Approvals, Mandating Standards and Protocols, Language Localization, National GIS (Geo-Spatial Information System) and Security and Electronic Data Preservation.

3.1.3.3 MMPs as process to e-governance. In 2006, the Indian Government approved the NeGP comprising 31 MMPs and 8 components. Various components of MMPs include the followings:

- Capacity-building scheme – The scheme envisions:
  - Establishment of an institutional framework for state-level strategic decision-making including setting-up of state e-governance mission teams (SeMT);

- Imparting of specialized training, orientation program for SeMTs and decision-makers; and
- Setting up of a central capacity-building management cell for co-ordination and implementation of the scheme.
- Awareness and communication – The main objectives of the scheme are:
  - Build NeGP as an umbrella brand;
  - Create awareness about e-governance services and service delivery points; and
  - Build ownership and stake of implementers in NeGP.
- Standards and policies – Standards in e-governance are a high priority activity, which will help ensure sharing of information and seamless interoperability of data across e-governance applications.

The Government has also given approval to the vision, approach, strategy, key components and management structure for NeGP. However, the approval of NeGP did not constitute financial approval(s) for all MMPs and components under them. The existing or ongoing projects in the MMP category, which are being implemented by various Central Ministries, States and State Departments, will now be suitably augmented and enhanced to align with the objectives of NeGP.

To support the process, the application development and re-engineering guidelines for cloud-ready applications aims to address one of the major concerns in the project mode of the e-governance implementation. The guidelines are intended to ensure development of common application software which can be configured as per the requirements of different States and departments without the need to modify the core code of the application, for a faster deployment. The intent is to minimize the time, effort and cost in developing applications and to avoid duplication of efforts. In this context, various internal and external processes were identified which support the smooth implementation of IT policies and the project implementation of e-governance are being shortlisted briefly below:

(1) Internal processes (within the organizations and sectors):
   - *(P1)*: Implementing policies (OSS, e-mail, API, policy on use of IT resources to ensure security of organizations and sectors at large);
   - *(P2)*: MMPs implementation under e-Kranti;
   - *(P3)*: Capacity-building programme to meet the challenges of all the sectors; and
   - *(P4)*: Minimizing risks in various sectors.

(2) External processes (outside the organizations and sectors):
   - (*P5*): R&D support to enhance decision-making for smooth functioning of organizations and sectors;
   - *(P6)*: Strategic alliances for ICT management to strengthen (P1), (P2), (P3) and (P4);
   - *(P7)*: Risk management alignment support for effective decision-making for policy inclusion at Central-level departments of DoPT and the Cabinet; and
   - *(P8)*: Localizing fund requirements to support e-governance.

3.1.4 Learning. Based on the synthesis of SAP components, the following points are summarized as learning from the case study:

- *(L1*)*: Issue related to information security management can be overcome by framing a comprehensive policy document which may cover feedback from government-to-government, government-to-business and government-to-citizen channels;
- *(L2*)*: Sector infrastructures are prone to risks and cyber threats and need to be addressed in mission mode implementation for e-governance;
- *(L3*)*: Land acquisition processes for capacity addition need to be structured properly to minimize uncertainty;
- *(L4*)*: The ICT applications need infrastructural and investment support for growth of the sectors;
- *(L5*)*: Sustainability, capacity building and sector-specific training on e-governance should be promoted;
- *(L6*)*: Innovation in the IT sector to enable the growth in delivery in services should be considered and validated through public participation; and
- *(L7*)*: Various sectors including the IT sector need management education to tackle the problem of skilled manpower at various levels of requirements.

3.1.5 Actions. Sustained actions have been made at multiple levels to improve the delivery of public services and simplify the process of accessing them. The action towards information security, policy implementation and e-governance has steadily evolved from computerization and digitization of Government departments to encapsulate the finer points of Governance. Such measures include citizen centricity, service orientation and transparency. Lessons learnt from previous e-governance initiatives have played an important role in shaping the progressive e-governance strategy of the country and also in deciding the actions required. Due cognizance has been taken of the notion that to speed up e-governance implementation across the various arms of the Government at national, state and local levels, certain actions needed to be taken. Therefore, a programme approach was needed and later guided by the common vision for strategic development. Based on the synthesis of SAP components, the following actions are felt to be a minimum prerequisite to support the framing of IT policy, the e-governance process and also to implement various MMPs to support decision-making:

- *(A1*)*: Funds to support increasing expenditure in the sectors, implement development and re-engineering guidelines for cloud-ready applications;
- *(A2*)*: Effective training on MMPs and e-governance;
- *(A3*)*: Assessment of risk potential and cyber threats to various sectors that are specifically GDP dependent;
- *(A4*)*: Plan for skill development and creation of a human resource base for future;
- *(A5*)*: Creating strategic alliances to support e-governance in the context of country-specific objectives for SDGs;
- *(A6*)*: Plan for the development of physical IT infrastructure, specifically for the education sector to adopt the online mode of education in all disciplines including the management discipline (Gupta *et al.* 2004); and
- *(A7*)*: To implement IT policies: Targeting sluggish office procedures, implementation of standards specifically in those sectors which are relatively highly prone to corruption, have less IT infrastructure and have inadequate skilled or trained manpower.

3.1.6 Performance. The performance of information security governance or efficacy of ICT applications, policy implementation and e-governance are affected by threats, inadequate adoption of policy instructions and physical threats to the IT infrastructure available to the sectors and also to the respective states. Recently, the Government focus has been to support new IT-based applications and implement secured instructions in the form of a robust and sustainable IT policy. Such objectives can only be developed to encourage creativity both inside and outside the Government by encouraging collaborative development between Government departments, agencies, private organizations, citizens and developers to create innovative e-governance applications and solutions. In this reference, the performance areas are highlighted below:

- The e-governance process required investments to support growth and the challenges of the sectors;
- GDP may be increased as a result of governance performance;
- Challenges of education access to all and enhancing Indians on the digital divide;
- Initiatives related to e-Tendering and e-Procurement as well as reforming government through technology and change management; and
- International cooperation in the ICT field for establishing a bridge for the digital divide.

Moreover, improving performance related to the selected situation includes the followings areas:

- *(P1*)*: Service delivery;
- *(P2*)*: Preparedness for changes in the overall governance in advance;
- *(P3*)*: e-governance projects monitoring; and
- *(P4*)*: Implement informational risk mitigation strategies and inclusion of social capitalization performance.

The complete framework of research as a SAP-LAP model development in the case is shown in Figure 5, where the various challenges for information security, IT policy implementation and also the issues related to e-governance are also shown.

It is to be noted in this case study that the self-interaction matrix (SIM) and cross-interaction matrix (CIM) structures are framed and only one situation is taken into consideration. However, SIM is not established here and only the CIM of the SAP and LAP components are selected to demonstrate the case. To carry out the SAP-LAP synthesis, the five-point scale for quantitative assessment using the influence levels of Very Low as 1, Low as 2, Medium as 3, High as 4 and Very High as 5 is considered. Later, the information used in the CIM is converted into a binary matrix, assigning "0" to low and very low influences and "1" to all other higher influences. Based on the severity of influences, interpretive matrices are formed and shown in Table V. The interpretive logic of dominance of actors over their counterparts in several pairs was obtained and is shown. This is formed by identifying and recording the process in a square matrix of various actors showing their dominance and being dominated. Dominance over each other is also estimated and shown in Table VI. Similarly, the dominance and binary matrices for actions versus performance showing ranking of actions are tabulated in Tables VII and VIII. The interpretive logic knowledge base for ranking of actors with respect to process and actions over performance are based on the
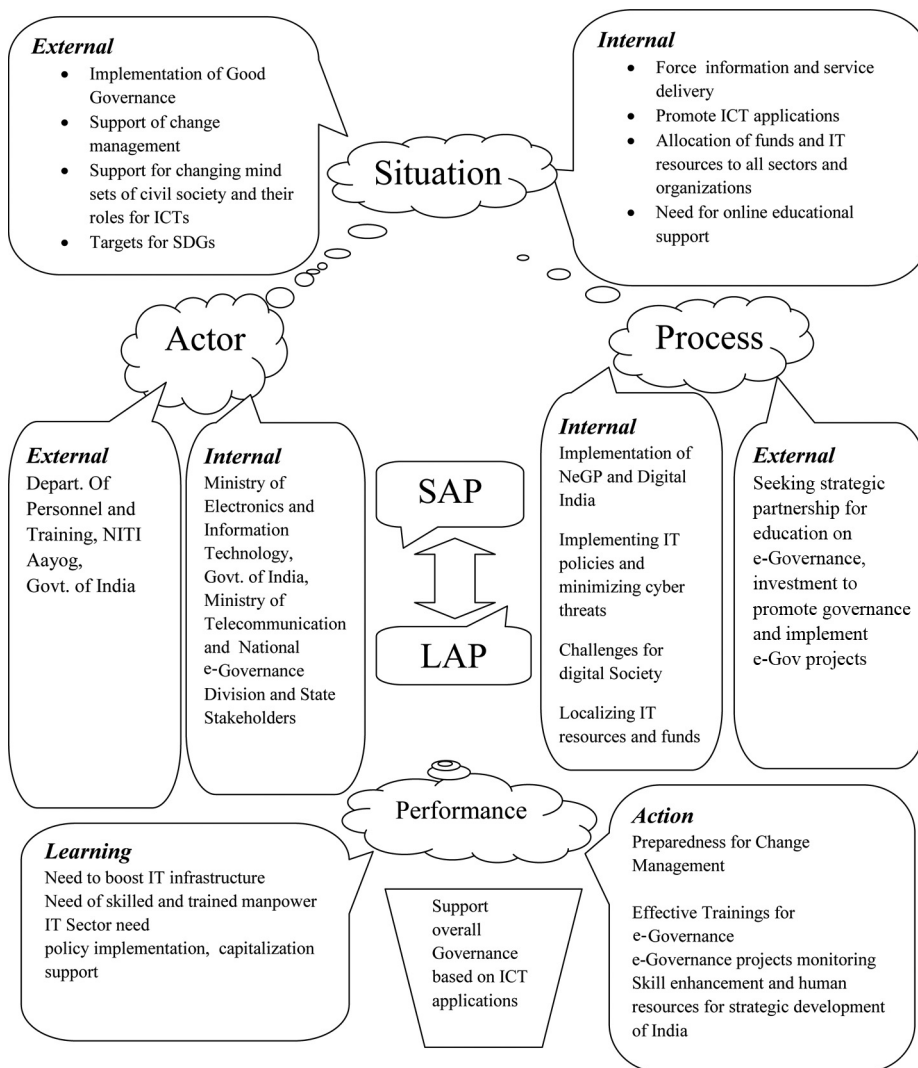
External
- Implementation of Good Governance
- Support of change management
- Support for changing mind sets of civil society and their roles for ICTs
- Targets for SDGs

Situation

Internal
- Force information and service delivery
- Promote ICT applications
- Allocation of funds and IT resources to all sectors and organizations
- Need for online educational support

Actor

Process

External
Depart. Of Personnel and Training, NITI Aayog, Govt. of India

Internal
Ministry of Electronics and Information Technology, Govt. of India, Ministry of Telecommunication and National e-Governance Division and State Stakeholders

SAP

LAP

Internal
Implementation of NeGP and Digital India

Implementing IT policies and minimizing cyber threats

Challenges for digital Society

Localizing IT resources and funds

External
Seeking strategic partnership for education on e-Governance, investment to promote governance and implement e-Gov projects

Performance

Learning
Need to boost IT infrastructure
Need of skilled and trained manpower
IT Sector need
policy implementation, capitalization support

Support overall Governance based on ICT applications

Action
Preparedness for Change Management

Effective Trainings for e-Governance
e-Governance projects monitoring
Skill enhancement and human resources for strategic development of India

Figure 5.
SAP–LAP framework e-governance in the context of information security, IT policy

feedback gained under the capacity-building training mandates under the Digital India programme at the administrative society of India to train senior-level government officials.

4. Discussion
In the previous section, various issues related to information security and IT policy initiatives for driving the e-governance process are presented. Overall, the case is presented through the selection of the situation and assessed based on the SAP-LAP model used in this case study. Based on the steps of the SAP-LAP model

Actor vs Process	P1 Implementing policies	P2 MMPs implementation under NeGP	P3 Capacity building programme	P4 Minimizing risks in various sectors	P5 R&D support to enhance decision making	P6 Strategic alliances for ICT management	P7 Risk management alignment support	P8 Localizing fund requirements
A1	M(1)	VH(1)	L(0)	H(1)	VH(1)	VH(1)	M(1)	H(1)
A2	M(1)	H(1)	M(1)	H(1)	H(1)	VH(1)	H(1)	H(1)
A3	L(0)	M(1)	VH(1)	L(0)	VH(1)	VH(1)	L(0)	L(0)
A4	L(0)	L(0)	VH(1)	L(0)	H(1)	H(1)	L(0)	L(0)
A5	H(1)	L(0)	H(1)	M(1)	M(1)	L(0)	H(1)	L(0)
A6	VH(1)	L(0)	VH(1)	L(0)	L(0)	H(1)	L(0)	H(1)
A7	VH(1)	L(0)	L(0)	M(1)	M(1)	L(0)	L(0)	H(1)

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A-A			Dominating					Count of Dominating (D)	Net Dominance (D-B)	Actor Rank
	A1	A2	A3	A4	A5	A6	A7			
Being Dominated										
A1	–	P2, P5	P1, P2, P4, P7, P8	P1, P2, P4, P5, P6, P7, P8	P2, P4, P5, P6, P8	P2, P4, P5, P6, P7	P2, P5, P6, P7	28	22	II
A2	P3, P7	–	P1, P2, P4, P7, P8	P1, P2, P4, P6, P7, P8	P2, P4, P5, P6, P8	P2, P4, P5, P6, P7	P2, P3, P4, P5, P6, P7	29	23	I
A3	–	P5	–	P2, P5	P2, P5	P2, P5	P2, P5	9	−8	IV(b)
A4	–	–	–	–	P5, P6	P5	P6	4	−18	VI
A5	P1, P7	P1	P1, P5	P1, P5	–	P5, P7	P7	10	−9	V
A6	P1	P1	P1, P8	P1, P8	P1, P6, P8	–	P6	10	−8	IV (a)
A7	P1	P1	P1, P5, P8	P1, P5, P8	P1, P8	P1, P5, P5	–	13	−2	III
Count of Dominated (B)	6	6	17	22	19	18	15	Total Interactions (103)		

Note: Rank of *A3* = Rank of *A6*

Table VI.
Dominating
interaction matrix
and ranking
representation
(actors over process)

Actions vs Performance	Actions mapped to process/knowledge areas	P1* Service delivery performance	P2* Preparedness for governance in advance	P3* e-Governance projects monitoring	P4* Risk mitigation strategies and inclusion of social capitalization
A1*	Fund Support and re-engineering guidelines	VH (1)	L (1)	L (1)	H (1)
A2*	Training on MMPs and e-governance	H (1)	L (1)	VH (1)	L (0)
A3*	Assessment of risk potential and cyber threats	H (1)	VH (1)	L (0)	VH (1)
A4*	Plan for skill development	H (1)	M (1)	L (0)	L (0)
A5*	Creating strategic alliances to meet SDGs	L (0)	L (0)	L (0)	H (1)
A6*	Development of physical infrastructure	H (1)	VH (1)	H (1)	L (0)
A7*	To implement policies	H (1)	H (1)	L (0)	M (1)

Table VII.
CIM and its binary representation (action versus performance)

implementation, both qualitative and quantitative synthesis of SAP and LAP components is carried out. Qualitative analysis is based on critical questioning, while quantitative analysis is based on assessment through CIM, interpretive matrices of actors versus process and actions versus performance. For the same purpose, SIM and CIM structures are developed. Based on the five-point scale for quantitative assessment, information and on the severity of influences, interpretive matrices are formed. Similarly, the dominance and binary matrices for actions versus performance, indicating ranking of actions, are also presented. After analysing the interpretive process of SAP-LAP, it is found that the actor for IT policy implementation includes MeitY (A1) and Department of Telecommunication, GoI, (A2) which attains a high rank in their actions to support e-governance. As IT policy framing and implementation is also seen as the backbone of e-governance to control various processes, threats and risks, it is found from the dominance matrix of Table VI that the rank of Actor (A3) is equally important to Actor (A6). The same ranking of actors is obtained and it may be due to the direct relationship between policy implementation with the governing body of the Digital India programme, which also imparts training to government officials (Refer Tables V and VI).

Finally, based on the steps of LAP synthesis, a dominance matrix is formed to estimate the rank of actions over the actor's performance(s). The summary and results from this synthesis of the LAP components supports the notion that capacity building should be a high priority to support various project implementation processes and implement the adoption of IT policy for the e-governance.

5. Challenging areas
From the above case study discussion, it is seen that the implementation of e-governance does have certain constraints. The area of literacy, i.e. the users' ability to use the computer and their ability to read and write, should be more focused areas for

Table VIII.
Dominating interaction matrix and ranking (action over performance)

A-A	Dominating							Count of Dominating (D)	Net Dominance (D-B)	Actor Rank
	A1*	A2*	A3*	A4	A5*	A6*	A7*			
Being Dominated										
A1*	–	P1*, P4*	P1*	P1*, P4*	P1*	P1*, P4*	P1*, P4*	10	3	III
A2*	P3*	–	P3*	P3*	P1*, P3*	P3*	P3*	7	−2	IV
A3*	P2*, P4*	P2*, P4*	–	P2*, P4*	P1*, P2*, P4*	P4*	P2*, P4*	12	9	I
A4*	P2*	P2*		–	P1*, P2*			4	−6	V
A5*		P4*	P3*	P4*	–	P4*	P4*	4	−8	VI (a)
A6*	P2*, P3*	P2*	P3*	P2*, P3*	P1*, P2*, P3*	–	P2*, P3*	11	4	II
A7*	P2*	P2*, P4*		P2*, P4*	P2*	P1*, P4*	–	8	−8	VI (b)
Count of Being Dominated (B)	7	9	3	10	12	7	8	Total Interactions (56)		

Notes: Rank of A1* = Rank of A2* = Rank of A7* and Rank of A4* = A5*

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e-governance implementation. There are large numbers of potential barriers to the implementation of e-governance and one significant challenge is to remove hindrances in the path of implementation, like security, unequal access to computer technology by the citizen, the high initial cost for setting up the e-government solutions and resistance to change. A few of the main challenges identified are trust, resistance to change, the digital divide, cost and privacy and security concerns. At the outset, a few challenges are identified as follows:

- to make India the global hub for development of language technologies, to encourage, facilitate development of content accessible in all Indian languages, thereby helping bridge the digital divide;
- to enable access of content and ICT applications by differently abled people to foster inclusive development;
- to leverage ICT for expanding the workforce and enabling lifelong learning;
- to strengthen the Regulatory and Security framework for ensuring a secure and legally compliant cyberspace ecosystem; and
- to adopt open standards and promote open source and open technologies.

To address the challenges set out in the case study and also to enable the various stakeholders to do more structured implementations and incorporate ethics in the governance process, attitudes will need to change. It is also strongly suggested that e-governance projects need specific training, skilled manpower and investment. Therefore, the present focus of e-governance should be ethics in overall governance, which should include moral values to implement good governance and address the problems of misfeasance and corruption. Such initiatives can not only minimize cyber threats but can also strengthen the ethical framework of e-governance, specifically the dimensions of IT policy framing and public service delivery in the changing needs of the Indian administration and society of the twenty-first century.

6. Concluding remarks and recommendations
The case study has analysed and presented various issues related to information security governance and IT policy for e-governance using the SAP-LAP model framework. The case has been presented considering the selected issues of information security, cyber breaches, IT policy and its management to support e-governance in the country. For the same purpose, a qualitative and quantitative model of SAP-LAP was used. The systematic inquiry-based questions developed or analysing the SAP component were based on the framing of critical questioning, and synthesis of both SAP and LAP components were carried out. The components were specifically classified in the areas of information security, IT policy issues and e-governance. The LAP synthesis is concluded separately using both types of qualitative and quantitative assessment of e-governance in the context of information security and IT policy implementation. The proposed framework addresses various issues related to information security and management. On development of the SAP-LAP and synthesis of various components, learning from the case study shows that the SAP-LAP framework is very useful for analysing sensitive matters of the Indian situation of e-governance, which needs information security and IT management as the challenging tasks to be dealt with in the focused approach of MMP implementation. However, based on the interpretative mode of inquiry approach of SAP-LAP, the development of matrices, capacity building, segment-like change management to support civil attitudes to resist the

changes required are significant areas to manage country's information security, develop good IT policy and also to support the overall e-governance process for the national security.

On the methodological aspect, the application of SAP-LAP has certain advantages over traditional methods such as SWOT and Political, Economic, Social and Technological (PEST) analysis. Traditional model deal only with the internal and external environment, whereas the flexible model of SAP-LAP considers the impact of a dynamic environment or inter-organizational systems of the nation, which in this case are the impact of threats and IT policy on e-governance and national security. The SAP-LAP methodology has flexibility that can consider three dynamic elements of any case or environment as compared to other methodologies such as PEST, which presents only factors in the related scenario. Therefore, the SAP-LAP methodology bridges the gaps between the theory and practice, as issues considered in this case study are also dynamic in nature and it gives base to assess the overall governance in the Indian economy.

Moreover, the case is based on feedback received from the Digital India training programme for district-level executives responsible for e-governance and also on the secondary data available in the forms of national and international reports, literature, survey and data collected from the web-portals of government websites. The case study can also be developed and analysed based on the more quantitative techniques where performance and actions can be measured and ranked using the Preference Ranking Organization Method for Enrichment of Evaluations and Grey System Based Complex Proportional Assessment methods to develop strategic contours. This kind of case development on relevant issues related to transforming the Indian government process may lead to good research areas in the time of digital divide transformation. Additionally, research based on other interpretive techniques such as interpretive structural modelling, Fuzzy-Total Interpretive Structural Modeling, Decision Making Trial and Evaluation Laboratory method and quantitative advanced methods based on the grey system theory and fuzzy system theory can also be explored and modelled in the context of important subject of e-governance.

7. Implications on theory, management and policy
This case study presented and shared research ideas to readers from academia, Government and the IT industry that have addressed some of the concerns related to various sector developments based on the needs of policy making and effective e-governance implementation. The section concludes the implication on theory, management and policy for the respective categories of readers. The implication of research is presented as follows.

7.1 Implication on theory
Theoretically, the SAP-LAP method is the best-suited intuitive approach to analyse the system boundary and IT policy transformation to support e-governance in this case. The model development is built on the synthesis of two components and critical questioning to address barriers related to ICT applications. The SAP-LAP mode also provides learning from the synthesis to support decision-making on the selected situation. The study was found to be very helpful in assessing the Indian situation, where analysis carried out, raised critical questions, regarding the situation. Thus, the SAP-LAP model application can effectively assess the situation in the conflicting issues of IT policy transformation and e-governance in the country. Moreover, as compared to another methodological tool, namely, PEST, which analyses the internal environment to assess the market for a business or organizational unit, the SAP-LAP methodology analyses the wide spectrum of the selected situation, including the external and dynamic factors. The central core of the analysis

covered in the research, evolved from critical questioning and develops using a matrices approach to rank various actors and their actions. Briefly, this study on the SAP-LAP method framework paves the way to identify the grey areas of those sectors, which were found to be less well penetrated by ICT applications. It is believed that the theory application will support the decision-making and help in identifying the prioritized sectors to enhance the e-services, delivery of central sector schemes and various initiatives taken by the GoI.

7.2 Implication to management and administration

It was observed from the literature review that there are many challenges to identify the needs of e-governance for enabling IT policy implementation. Overall, the synthesis minimizes conflicts and provides more clarity and robust decision-making for the IT sector policy framing and its re-orientation for strategic development of the country. Therefore, such a management-oriented intuitive approach can support the identification of not only the right strategic directions for the various sub-sector developments but also for national security. On these lines, this study becomes more important for the management perspective where the study can fill the research gaps in academia, in the Indian IT sector and also to support higher administration. Therefore, this study may be useful for managing the many sectors of the Indian economy where there is an exchange of views between relevant authorities of India and other neighbouring countries seeking international cooperation. The study may be useful to the Indian administration in analysing the IT sector from the points of view of policy, security and e-governance implementation, specifically to assist the Digital India programme. Hoping that this study may also synergize the minds of the various actors engaged in e-governance process of Indian initiatives for making the country as a digital economy.

Apart from the scope of this study, the paper builds on the SAP-LAP model and abstract ideas of IT policy transformation and e-governance, where understanding the involvement and interaction between international actors of the government departments and its citizens through effective use of IT policy instructions support ICTs in various sector developments, seen as crucial when discussing across the developed world particularly, Europe and the USA. This study has observed that Europe continued to lead in e-governance, followed by the Americas, Oceania and Africa, where this research study may further influence other economies and help in reshaping these geographical territories, particularly the Asian economies and their extended thinking to support Indian economy and gain mutual benefits to progress on sustainable development accordingly.

7.3 Implication to policymakers

The study builds on an assessment of IT policy and e-governance in the Indian context. As seen from the study that in a developing country like India, many routes of e-governance implementation have higher difficulty and few have added very little value due to policy inclusion and ICT applications that do not address the barriers that exists in many sectors. Most of the reasons are related to improper utilization of funds on IT infrastructure and barriers to effective policy development. ICT applications need IT infrastructure-based tools to manage the various challenges of sustainable goals. Thus, synthesis for measuring the ranking of government actions is being seen as an important grey area to addressing sector barriers and challenges by the policy makers. Hence, the research paper may be useful to policy makers and the higher administration of India for the design, management and implementation of a portfolio of policy initiatives, innovative e-governance projects and partnerships related to the thematic area of governance and public service delivery and also to support India as an emerging digitalized nation.

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Appendix-1. Future plans under e-governance

- *Technology for Education*: e-Education: All Schools will be connected with broadband. Free Wi-Fi will be provided in all secondary and higher secondary schools (coverage would be around 250,000 schools). A programme on digital literacy would be taken up at the national level. Massive Online Open Courses shall be developed and leveraged for e-education.

- *Technology for Health*: e-Healthcare: e-Healthcare would cover online medical consultation, online medical records, online medicine supply, pan-India exchange for patient information, etc. Pilots shall be undertaken in 2015 and full coverage would be provided in three years.

- *Technology for Farmers*: This would facilitate farmers to get real-time price information, online ordering of inputs and online cash, loan and relief payment with mobile banking.

- *Technology for Security*: Mobile-based emergency services and disaster-related services would be provided to citizens on a real time basis so as to take precautionary measures well in time and minimize loss of lives and properties.

- *Technology for Justice*: Interoperable Criminal Justice System shall be strengthened by leveraging several related applications, i.e. e-courts, e-police, e-jails and e-prosecution.

- *Technology for Financial Inclusion*: Financial inclusion shall be strengthened using mobile banking, micro-ATM programme and Computer Service Centres and post offices.

- *Technology for Cyber Security*: National Cyber Security Co-ordination Centre would be set up to ensure safe and secure cyber-space within the country.

- *e-Courts Mission Mode Project*: The e-Courts Mission Mode Project is a national e-governance project for ICT enablement of district/subordinate courts of the country. The objective of the project is to provide designated services to litigants, lawyers and the judiciary through ICT enablement of courts.

Remarks: The Phase I covered the basic infrastructure for ICT enablement which consisted of various modules, primarily, such as computer hardware, Local Area Network (LAN), internet connectivity and installation of standard application software at each court complex and upgradation of ICT Infrastructure of Supreme Court and all High Courts and Benches. It also included provision of laptops, laser printers and broadband connectivity at home offices of judicial officers and imparting ICT training to them. Power backup was also provided at these court complexes for the ICT infrastructure through Diesel Generator Sets and Uninterrupted Power Supply.

Central MMPs	State MMPs	Integrated MMPs
Banking	Agriculture	CSC
Central Excise & Customs	Commercial taxes	e-Biz
Income Tax (IT)	e-District	e-Courts
Insurance	Employment Exchange	e-Procurement
MCA21	Land Records (NLRMP)	EDI for e-Trade
Passport	Municipalities	National e-Governance
Immigration, Visa and	e-Panchayat	Service Delivery
Foreigners Registration &	Police (CCTNS)	Gateway
Tracking	Road Transport	India Portal
Pension	Treasuries Computerization	Financial Inclusion
e-Office	PDS	Roads and Highways
Posts	Education	Information System
UID	Health	Social benefit
Common IT Roadmap for	e-Vidhaan	National GIS
Para Military Forces	Agriculture 2.0	National Mission on
e-Sansad	Rural Development	Education through
	Women and Child development	ICT
		Urban Governance
		e-Bhasha

Table A1.
The core projects (MMPs)

Notes: PDS = Public Distribution System; EDI = Electronic Data Interchange; UID = Unique Identification Number

Appendix-2. Status of mission mode projects

NeGP comprises 44 MMPs encompassing 13 Central MMPs, 17 State MMPs and 14 integrated MMPs. MMPs are owned and spearheaded by various line ministries. State Governments are responsible for implementing State MMPs, under the overall guidance of respective Line Ministries in cases where Central Assistance is also required. DeitY acts as the facilitator and catalyst for the implementation of NeGP and provides technical assistance to various Ministries and Departments and State Governments.

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