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Executive Summary

This is a summary of the consulting report conducted by the KIPA consulting team for the preparation of e-Government in Nepal. During the first half of the consulting project, the consulting team investigated and analyzed the laws and regulations of Nepal, the present status of e-Government, education, and informatization of Nepal, and the imperative requirements for e-Government by employing state-of-the-art techniques of research methods and having interviews with diverse levels of citizens, corporate executives and civil servants. The team tried to incorporate as many cases of e-Government promotional strategies of developed countries as possible in the study, as well as to introduce many modern ICT technologies which can be utilized. During the second half of the consulting project, the consulting team created the vision and mission for the e-Government promotion of Nepal together with the Nepali TFT composed of scholars from related academia, ICT-related industry people and citizens. And the team selected some projects urgently in need in the country and prepares action plans for them.

Overview of this project is described in Chapter 1, and key findings from the interviews and material surveys are reported in Chapter 2 as requirements. Chapter 3 covers e-Government vision and mission, strategy and project identification. Chapter 4 reports the e-Government roadmap, appropriate framework, reasonable organization and budget planning. The vision and mission for e-Government as well as action plans of priority projects are described in Chapter 5. Finally, the report is finished with the recommendation for the successful e-Government implementation.

Analyzing ICT policies, laws and regulations related to e-Government, the consulting team found some implications from them. With the cooperation of the Nepali TFT, the consulting team interviewed secretaries, under secretaries and joint secretaries of various ministries, as well as conducted opinion surveys with citizen, corporate employees and civil servants. These interviews and surveys were of help in deriving the requirements for the e-Government project and picking up the priority projects. The team examined e-Government promotion steps of developed countries like South Korea and the U.S. Also the team investigated India's e-Government where the culture is similar with Nepal. The ultramodern ICT technologies were described in Annex A. Critical customer requirements were derived from the results of As-Is

Analysis for building strategy.

A couple of workshops were held in Nepal and Korea to create vision and missions for the e-Government. The result of the workshops is the vision and mission statement of the e-Government in Nepal.

E-government Vision is 'The Value Networking Nepal' through:

- Citizen-centered service
- Transparent service
- Networked government
- Knowledge based society

E-government mission statement is:

Improve the quality of people's life without any discrimination, transcending regional and racial differences, and realize socio-economic development by building a transparent government and providing value added quality services through ICT.

To realize the vision and mission, the consulting team worked out strategies and selected 33 projects in sectors comprising G2C, G2B, G2G and infrastructure. All the projects are vital for Nepal, but there is a limitation of time, budget, human resource and capability of implementing such projects. Thus, the priority was given by considering the availability of technologies, institutional readiness, emergency handling capacity as well as environmental impact.

There were 8 projects chosen as priority projects which were building groupware systems for government, government portal, national identification, e-education, communication network, enterprise architecture, PKI and integrated data center. They were detailed in four categories: 1) concept, 2) implementation strategy, 3) cost estimation for project execution, 4) and expected effects and consideration.

The priority projects were selected with the following considerations. The strategy for the Nepali e-Government starts from the computerization and informatization of the central governmental processes, which should be gradually spread to the local governments. Building infrastructure and assuring contents should lead to bridging the digital divide. e-Education facilities can be used for the eradication of computer illiteracy in rural area.

For the successful implementation of e-Government, the team made recommendations, which consists of managing factors and measuring factors, in the final chapter. Managing factors mean factors needed to successfully implement the e-government while measuring factors are those that assess the progress to verify whether the e-government plan is implemented in the purported direction, consistently and continuously.

The following are the recommendations for success:

Managing Factors

- Head of the government's strong will to enhance national competitiveness through realizing e-government, and strong standing of the implementation organization
- Organizational and institutional system that allows effective and continuous implementation of the e-government plan regardless of change of regimes, and systematic communication among government departments
- Advancing communication network based on forecast of future demand and bold introduction of cutting edge technologies
- Fostering domestic ICT workforce by expanding participation of domestic ICT companies in the e-government project and securing foundations to promote ICT companies and continue the promotion
- Introduction of a fund mechanism that can attain both large scale investment and risk diversification at the same time

Measuring Factors

- Monitoring and assessing progresses and managing performance by checking progresses regularly and by step with a view to confirming the e-government project is going in the right direction
- Establish a system that assesses usage status after the completion of the project, compares performance against the original plan, and reflects the assessment result to the future projects
- Assessment of performance against original plan for aggressive and continuous progress of the project and implementation of an accurate incentive/remuneration system based on performances
- Seeking advice based on superior levels of technologies after assessing

adequacy of technological level per implementation step

The KIPA consulting team is very grateful especially to the Nepali TFT for supporting and guiding the team in understanding the project itself and the status of Nepali IT industry, geographical, political, economic and legal environments. Specifically, the team is grateful for the help in the site surveys in Kathmandu and the meetings with other government organizations and operators. The consulting team believes that through international cooperation and the collaboration between the government, academia and industry within Nepal, Nepal will successfully implement the e-Government project and become an IT power country.

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I. Project Overview

1. Project Background

Dynamic development of the Information Communication and Technology (ICT) is changing our way of life and creating new business opportunities, bringing about diverse and rapid changes. Moreover, countries around the world are establishing the e-government to change their national administrative system for greater work efficiency. Through this, governments aim to provide administrative services in a prompt and convenient manner to their people and seek to enhance their national competitiveness. As such, the UN conducts surveys on the e-government environment and services of each country and releases the e-Government Readiness Index. Based on this report, each country compares and analyzes the status of their e-government project and makes complements for any shortcomings, and ultimately tries to enhance their global competitiveness.

To keep pace with this global trend, Nepal, a developing country, would broadly utilize the ICT to solidify economic development, strengthen democratic norms and values, improve the quality of life, and thus reduce poverty. Moreover, with the expansion of the ICT infrastructure, the Nepali government expects to overcome its geographical adversities and achieve a new round of socio-economic development. Thus, the Nepali government has introduced the IT Policy 2000, IT Policy 2004 (draft) and Telecommunication Policy 2004 to develop and expand the national ICT. With strong commitment to execute the e-government plan, the Nepali government has created a separate body to be in charge of the e-government project.

Meanwhile, Korea started the development and expansion of the ICT since 1980s and achieved breathtaking developments in the ICT sector, ranking fifth in the e-Government Readiness Index released by the UN in 2005. With such experience, Korea is committed to providing technical supports in the establishment of e-government in developing countries.

As both countries' efforts and commitment have coincided, KIPA (Korea IT Industry Promotion Agency) and Nepali HLCIT (High Level Commission for Information Technology) have signed the MOU on consulting services for the establishment of the e-government master plan.

Nepali e-government committee was formed to jointly carry out project activities with Korea IT Industry Promotion Agency (KIPA). The Nepali team provides

supports in identifying the ICT status of Nepal and takes charge of seeking cooperation from the Nepali government and the people. The Korean team analyzes the developed countries' cases and technical trends and provides technologies needed for Nepal to establish the e-government.

The e-government master plan and studies on successful and failed cases of leading countries will enable the TFC to generate the most adequate e-government model for the Nepali government and help realize a higher level of e-government.

2. Project Goal

In order to realize the e-government, there are a few things to be considered such as computerizing, services needed by people and businesses, and efficient way of delivering such services. Also, all the details such as the ICT infrastructure, legal/institutional efficacy of digitalized documents and formation of TFT should be reviewed and incorporated in the master plan.

The main goal of this project is to achieve good governance and social and economic development by establishing effective, systematic, and productive e-government. The final report will comprise of the following four points to achieve the goal.

- Establishing the vision, strategy and framework
- Selecting major projects and drawing the roadmap
- Defining direction of the execution organization
- Defining direction of restructuring legal framework

3. Project Scope

The project scope of the e-government master plan is divided by large into; subject to be pursued; time period to execute those subjects; and activities to achieve those subjects.

Subject of this project is for the government to enhance productivity in its administrative services and make improvements in its services for the people and businesses.

Activities to achieve the subject include identifying the ICT status of Nepal through bibliographic study, survey and interview. Also, benchmarking studies and analysis of the ICT trend will be conducted to create a To-Be model that fits the reality

of Nepal, which will help to build a more efficient, productive, transparent and responsible government. Other activities include, defining strategies and tasks to achieve the goal, drawing up the project roadmap, selecting the priority project, and preparing detailed action plan.

Establishing the e-government master plan is a long term project, which requires more than 10 year period. However, in order to reflect the dynamic development in the ICT sector and to establish a realistic plan, it is better to shorten the project period and to make periodic modifications to the plan to reflect new developments and trends in ICT. As such, the project period is set for five years, from 2007 to 2011.

4. Project Schedule

The project schedule is divided into four major phases. First is the “Preparation Phase,” which is about initiating the project and making preparations. Second is the “As-Is Analysis Phase” that involves collecting and analyzing data such as government law / policy / regulation, informatization status, requirement of citizens, business and civil servants, benchmarking, etc. Third is the “To-Be Model Establishment Phase,” where visions and strategies are set up based on data analyzed in the second phase and where projects are selected and their priorities are defined. The last phase is the “Action Plan Establishment Phase” where the action plan for major projects defined in the third phase is prepared.

The project took four months, from the preparation phase to the final action plan establishment phase. Kick-off report will be written at the beginning of the project. Interim report will be prepared upon completion of the “As-Is Analysis,” while executing the project. Final report will be prepared at the end of the project.

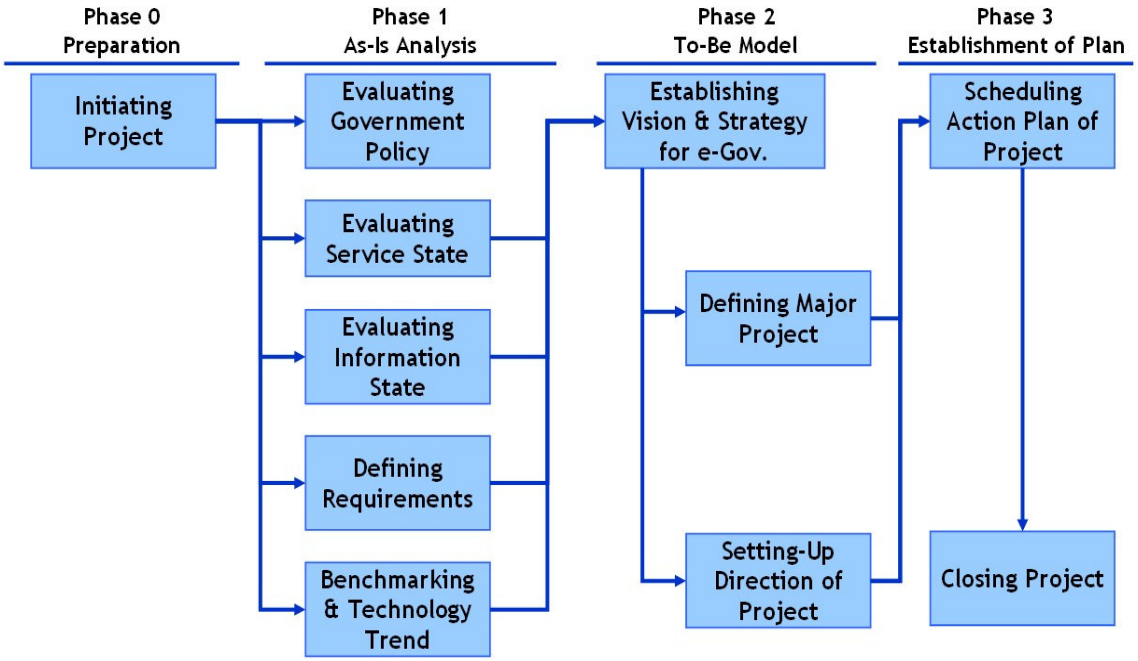
Following are steps to be taken in each phase:

- Preparation
  - Initiating project
  - Forming the project team
  - Project kick-off meeting
- As-Is Analysis
  - Evaluating government policy
  - Evaluating service status

- Evaluating informatization status
- Defining requirements
- Benchmarking
- Analyzing technology trend
- Interim reporting

- To-Be Model
  - Establishing vision and strategy for the e-government
  - Defining projects
- Establishment of Action Plan
  - Scheduling action plan of project
  - Estimating major project budget
  - Final reporting
  - Closing project

Figure 1. Executing Flow

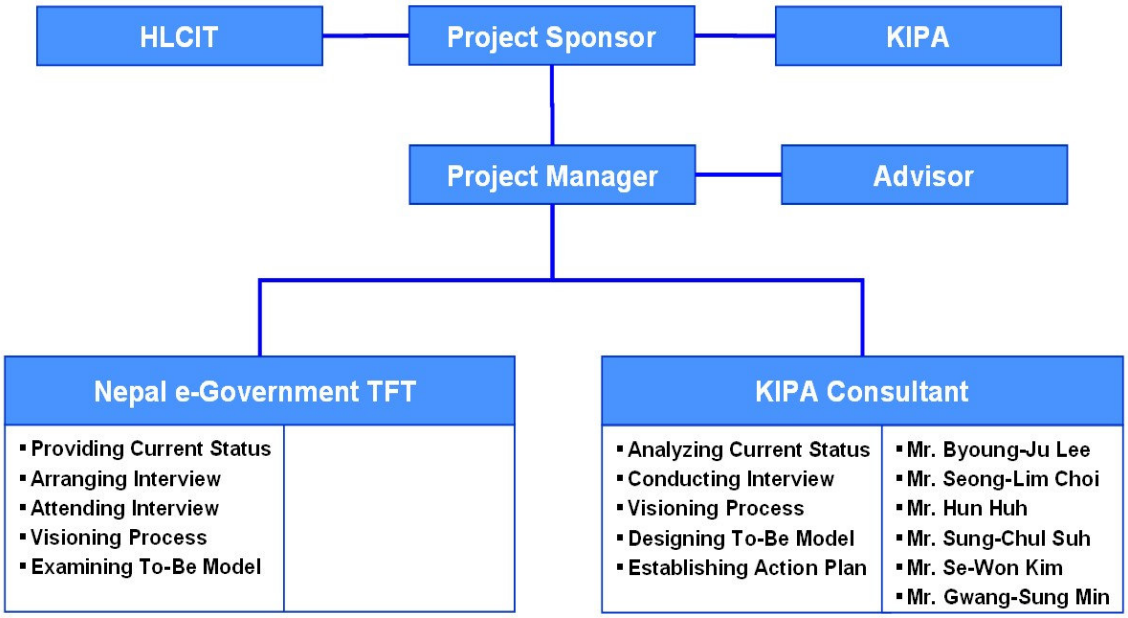


5. Project Team

The project team required for development of e-government master plan consisted of E-government Working Committee in Nepal and E-government Task Force respectively from Nepal and Korea. Communication between each TFT would be closely conducted through meetings, e-mail exchanges and telephone calls.

Nepali TFT provided current status, arrange interviews, attend interviews, vision process and examine the To-Be model for the Korean TFT. Whereas the Korea consulting team was responsible to analyze current status, conduct interviews, vision process, design the To-Be Model, establish action plan, and etc.

Figure 2. Project Team Organization



6. Definition of the e-Government

With the rapid development and expansion of ICT, and in particular, with the fast spread of the Internet, administrative services by the government is also changing from its traditional, passive service led by the government to active and consolidated service led by the people. In line with such trend in ICT, governments around the world are aiming to establish the e-government which can improve productivity in administrative services, realize a networked government, satisfy its people's demand in administrative services, and enhance the national competitiveness through proactive services.

To help understand the e-government and its trend, definitions of e-government by world-renowned institutions are prepared as following.

Table 1. Paradigm Shift[1]

Item	Traditional Government	e-Government
Customer service expectation	• Government-driven • Cumbersome, many channels • Get in, get out	• Customer-driven • Option for end-to-end self-service • Enduring relationship
Staff	• Overworked or underutilized • Distant customer contact	• Optimized effort-to-value ratio • Immediate customer service
Technology	• Silo-serving • Information center	• Enterprise-serving • Intelligent reporter
Organizational structure	• Process-based • Territorial • Outsource to meet today's need	• Competency-based • Shared services • Partner for current and future value

The following definitions come from a number of global sources, including the World Bank, United Nations, Global Business Dialogue on Electronic Commerce (GBDe) and OECD.

World Bank (www.worldbank.org)

- E-government refers to the use of information technologies by government agencies (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. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with businesses and industries, citizen empowerment through access of information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.

United Nations (www.unpan.org)

- E-government is defined as utilizing the Internet and the world-wide-web for delivering government information and services to citizens.

[1] Deloitte Research 2001

Global Business Dialogue on Electronic Commerce (GBDe) (www.dbde.org)

- Electronic government (hereafter e-government) refers to a situation in which administrative, legislative and judicial agencies (including both central and local governments) digitize their internal and external operations and utilize networked systems efficiently to realize better quality in the provision of public services.

Organization for Economic Co-operation and Development (OECD) (www.oecd.org)

e-Government:

- is more about government than about “e”
- improves efficiency
- improves services
- helps achieve specific outcomes
- can contribute to broad policy objectives
- can be a major contributor to reform
- can help build trust between governments and citizens
- can open up the policy process
- challenges existing ways of working
- seamless government services will drive agencies closer together

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II. Analysis of e-Government State

1. Overview

In this chapter, analysis was done on policies related to information communication technology (ICT), current state and requirements of e-government, benchmarking and ICT trends to establish the e-government master plan. Based on the results of analysis, the implications were drawn out for each sector. Policy analysis was conducted by studying the policies related with ICT. The current state and requirements of e-government were analyzed by studying documents, surveys and interviews. The implications presented here would be the foundation for establishing the vision, strategies, priority projects, which would be provided in Chapter 3 and 4.

Study was carried out on the three policies that the Nepali government is undertaking and how it intends to achieve economic development through ICT.

To analyze current state of the e-government, data on IT penetration rate, ICT education, government's informatization status, ICT organization, ICT related laws and regulations were collected and reviewed. Through this effort, current issues and improvement opportunities for Nepal were identified.

For the analysis of e-government requirements, interviews were conducted on civil servants and surveys were conducted on randomly selected citizens, businesses and civil servants. Furthermore, site survey was executed where Nepali Task Force Team and the Korean consultant team paid visits to sites, and by doing so, identified obstacles in executing e-government plan and opportunities for improvement.

Korea and the United States of America, which both ranked high in the UN's e-government readiness index, were selected for the benchmarking. Also, e-government status of India, which has similar conditions as Nepal, such as religion and culture etc. was investigated. Result of such study will be a valuable basis in the upcoming e-government project that the government of Nepal has to undertake.

Lastly, Critical Customer Requirement presents common major issues among all the improvement opportunities identified so far. This plays an important role in selecting major projects.

2. Analysis of Policies

2.1. Method of Information Gathering and Analysis

The first step of making the Nepali e-Government Master Plan is to analyze current status, which would include benchmarking studies and trend analysis of global information technology. In this section, the Nepali policies on e-government were analyzed based on existing documentations such as Information Technology Policy 2057 published in 2000 (IT Policy 2000), Information Technology Policy 2004 draft(IT Policy 2004 (draft) and Telecommunication Policy 2060 published in 2004 (Telecommunication Policy 2004).

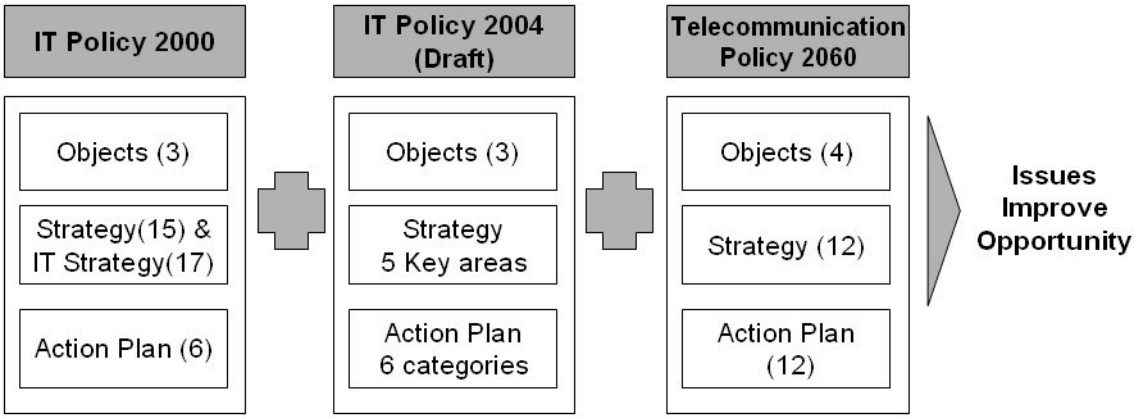
First, IT policy 2000 for the next five years was established to discover the possible development opportunities in various sectors such as education, health, agriculture, tourism and trade, using information technology.

Next is IT Policy 2004 (draft), which was designed to offer new opportunities for Nepal in achieving and sustaining economic and social development, using recent advanced information and communication technologies.

The last is Telecommunication Policy 2004, which seeks to create a favorable environment for delivering reliable and accessible telecommunication service to all people at a reasonable cost in collaboration with the private sectors. These policies will ultimately bring social and economic development to Nepal.

The following diagram shows summary analysis of each policy.

Figure 3. Summary of Policy



2.2. IT Policy 2000

2.2.1. Introduction

The government of Nepal selected IT industry as the top priority for development and established IT Policy 2000 to consolidate the foundation for national economic growth and better living-standards for the next five years starting from the year 2000. The government planned to concentrate in the IT sector to provide fast development opportunities for other industrial sectors such as education, health, agriculture, tourism, and trade. It would also complement Nepali weakness in having unevenly distributed population across its geographically long-stretched country. Therefore, the government set the vision as “To place Nepal on the global map of ICT within the next five years” and worked to attain the following.

In this section, analysis was conducted on 15 general strategies and 17 ICT policies summarized into seven categories. Also this section analyzed and summarized action plans of six groups, and 36 detailed tasks based on the strategy classification system to meet the Nepali government requirement.

2.2.1.1. Objectives

- Make information technology accessible to general public and increase employment through this means
- Build a knowledge-based society
- Establish knowledge-based industries

2.2.2. Policy Analysis

2.2.2.1. Organization

In accordance with the IT Policy 2000 strategies, the government acts as a promoter, facilitator, and regulator of the IT sector and follows a single-door system for the development of IT industry. National Information Technology Development Council, which decided on the national IT policies with the Prime Minister as the head of the council and ministers as its members were organized. Also, other organization such as the National Information Technology Coordination Committee in charge of IT research and HR development, and the National Information Technology Centre in MoST to promote informatization of the nation were established. The National

Information Technology Development Council and National Information Technology Coordination Committee are extinct now. The implications are:

- Maintain expertise and consistency by organizing permanent government bodies; one with specialists managing informatization, and another doing the practical work
- Place the organization directly under the head of country
- Dispatch IT staff to each ministry

2.2.2.2. Computerization

The policies to be promoted include enhancing administrative efficiency through digitalization, and implementing an open administration system through websites and Internet connection, and developing Nepali art culture and rural areas by developing Internet contents. Especially, a plan was set to strengthen under-developed areas by promoting e-commerce, e-education, and e-health. In line with these policies, it is necessary to lay the foundation for government officials to have access to the Internet and personal computers, as well as digitalize internal administrative processes. The implications are:

- Enhance efficiency of administrative process and promote digitalization through BPR
- Establish nationwide government standards for IT environment
- Supply PCs to all government offices and provide Internet access

2.2.2.3. Human Resource Development

Several action plans are devised to encourage and sustain IT development through the upbringing of specialists such as installation of computer education programs in middle schools, provision of computer facilities to support the education of experts and specialists with bachelors and masters degrees in universities (“Computer education to all by 2010”) and promotion and support of domestic and foreign training and education for IT sector.

It is necessary to develop appropriate and diverse education and training programs for the schools and academies, and furnish an environment where experts and specialists can remain working in Nepal for the sake of accumulating knowledge

and experience. The implications are:

- Adopt computer curricula and nurture instructors specialized in computer education
- Implement government-led IT projects to trigger demand for IT professionals
- Institute a computer license system with international standards

2.2.2.4. Infrastructure

It has not been easy to establish ICT infrastructure due to Nepali geographical disadvantages such as elongated territory from East to West, altitude difference between the South and North and uneven population distribution. Thus, only 4% of the population uses telecommunication services. Taking this into account, the development of rural areas has been set as the priority policy.

It is necessary to devise a measure to promote the usage of IT services as well as to build high-speed network in highly-populated areas. IT expansion strategies were adopted to provide Internet facilities to all Village Development Committees of the country in phases and to develop IT park in various places with the private sector. The implications are:

- Review various telecommunications methods, such as xDSL, PLC, L/L, FTTH, etc
- Expand basic facilities such as communication/electricity
- Establish basic facility catered to the demand and environment of the rural areas

2.2.2.5. Laws and Regulations

It has been set as the policy to enact laws and regulations for administrative processes of e-commerce and IT. It is necessary to create a legal environment that provides legal sanctions to the use of IT for spreading IT services and promoting e-commerce.

In addition, it is required to draft legal provisions on intellectual property rights (IPR) and IT development, as well as accounting principles on handling IT promotion funds. The implications are:

- Enact laws to secure legitimacy for the government's activities on electronic media
- Enact law for e-commerce and IPR
- Enact law for IT promotion fund and IT development

2.2.2.6. IT Fund

IT funds is managed by NITC for rural network support, technology development, HR development, and facilitation of service to enhance national competitiveness through the promotion of IT industry and the development of human resources on IT in under-developed areas. Also, native and foreign investments for the development of IT and S/W export are encouraged.

However, there is still an issue of how to secure funds and how to establish a system for managing the fund. The implications are:

- Establish specific plans for IT funding
- Provide legal regulations for IT fund management

2.2.2.7. Facilities

Nepal has established policies to foster IT industry by encouraging private participation in IT sector and creating an environment for healthy competition and promotion of export. Also, policies were established to bring Nepal into the global market through the use of IT. As part of efforts to accomplish the goal, strategies were implemented such as introducing a Tax Favor System on computer-related products for IT training institutes, using domestically developed software and computer equipment first, and allowing transfer of foreign capitals and dividends were.

Although it is important to attract private participation and foreign investments in the IT industry, it is also imperative to expand domestic IT market and nurture top class technological workforce. The implications are:

- Create an environment conducive to expansion of domestic IT market such as discovering new business opportunities and providing tax benefits
- Provide foundation for IT industry development through nurturing of technological manpower
- Prepare legal provisions for foreign investments such as repatriation of profits

2.3. IT Policy 2004 (draft)

2.3.1. Introduction

The Government of Nepal prepared a draft of IT Policy 2004 (draft) that plans for economic consolidation, and development and strengthening of democratic norms and values through IT. Especially, through efficient distribution of economic resources, the policy seeks to contribute to raising the living standards and eventually towards reducing poverty. Also, Information Technology policy announced in the year 2000 provided a broad framework for the development of the IT sector in the country.

However, considering the dynamism of the IT sector and continuous socio-economic change, a new vision was proposed along with the IT Policy 2004 (draft). The new vision is “Transform Nepal into a knowledge-based society by 2015 to become fully capable of harnessing information and communication technologies. Thereby, achieve the goals of good governance, poverty reduction and social and economic development.”

The analysis of the policy is classified into six groups covering the strategy sectioned into five parts and organizations specified in chapter 6. The action plan, which was organized into six categories, was re-categorized according to the strategy classification system. Based on this, the issue on how to achieve the government’s goal of using IT is addressed.

IT Policy 2004 (draft) is not yet out, so new and improved IT Policy will be coming soon.

2.3.2. Objectives

In pursuance of the vision stated above, government of Nepal sets out to achieve the following objectives:

- Make information technology accessible to the general public and increase employment through this means
- Build knowledge-based industries
- Build a knowledge-based society

2.3.3. Policy Analysis

2.3.3.1. Strategic Focus and Regulatory Framework

The government devised IT Policy 2004 (draft) to foster the IT sector for socio-economic development, good governance and poverty reduction. Also, it established a systematic and legal framework to enact laws for securing legitimacy of electronic media for the policy efforts, cut tax to encourage private participation in the IT sector, and promote export and IT investment.

IT sector was declared as the priority sector for nurturing and strategies were introduced to accomplish the goal such as to adopt one window system, supply and evaluate transparent and efficient administration program, implement monitoring procedures, provide equal IT access to female, handicapped, minority, and rural population, grant rights to purchase domestic products first, foster systematic tools and management abilities for sustainable IT growth (HLCIT), protect IT-related IPR, encourage domestic and foreign investment in basic facilities, and create environment for healthy competition for ISPs, etc.

Based on these strategies, action plan of IT Policy 2004 (draft) was devised such as to reform procurement laws and regulations, establish a national fund for rural development and poverty alleviation, exempt tax or customs on establishment of IT institutes or donations by INGO or civic groups, levy 1% customs tax on imported IT-related product for development of HR and establishment of IT institutes, evaluate e-readiness by region and develop a database system. However, since there are inconsistencies between classification system of strategies and action plan, strategies need to be established before preparing the action plans.

It is also necessary to establish a legal foundation to support the development of IT sector, as well as to reform laws related to digital right management (DRM) of digitalized resources. The implications are:

- Need the law to guarantee legitimacy of e-media
- Enact laws for e-commerce and IPR
- Establish IT fund and enact law for IT promotion
- Create an environment conducive to attract domestic and foreign investments
- Introduce monitoring system to guarantee sustainable implementation

2.3.3.2. Infrastructure

As stated in the analysis of IT Policy 2000, it is imperative to take appropriate measures to compensate the geographical disadvantage of Nepal, which is an obstacle in expanding ICT infrastructure and reducing the digital divide. Response measures include the implementation of broadband networks and construction of telecentres in VDC to provide an easy-to-use and readily available Internet access.

Also strategies to promote expansion of ICT infrastructure are devised such as to introduce financial support for ISP facilities and provide income tax benefits, expand IT parks through private sector participation, levy 1% customs tax to enterprises located in the parks and orchestrate ICT development through cooperation with MoIC and NT.

Furthermore, detailed action plans were drawn to execute the strategy as the integrated action plan 2004-2007 such as to cooperate with global connectivity providers for international broadband facilities, construct nationwide broadband network as “Internet for everyone”, establish regulations for VoIP, assess e-readiness for Nepal, provide email connectivity for all government agencies, establish community telecentres for expanding access to ICT and to design and develop business plan of IT park. The implications are:

- Establish basic facilities for expansion of Internet access in rural areas and provide measure to promote usage
- Establish broadband network in populated areas
- Establish organization to manage expansion of nationwide basic facilities
- Establish the foundation for networked government by connecting government offices
- Provide systematic support measure for companies that engage in expanding IT infrastructure

2.3.3.3. Content and Applications

IT Policy 2004 (draft) also contains contents applications to create an environment for information exchanges between government offices by supplying personal computers, digitalizing administrative processes, and implementing telecommunications network, promoting socio-economic development through e-commerce, e-education, telemedicine and technology transfer in rural areas, using

Nepali language for the development of contents and applications and setting national standards, automating all government offices with state-of-the art systems and resources, developing citizen-oriented web sites and applications, expanding ICT utility in the government and private organizations, installing MIS for efficient decision-making, and using open source software development, customization, as well as improving IT usability in the private sector.

Additionally, the action plan was established to encourage e-commerce which is developing B2B marketplaces that bind various portals together to provide one-stop solution, establish payment gateway and certification authority, and dispute management authority. Moreover, GIS is to be introduced to handle land registration, survey, census and other miscellaneous statistical data and to digitalize legacy documentation of key outfits and put them under computerized system.

For the successful implementation of the e-government project, it is necessary to redesign unnecessary and redundant administrative processes through business process reengineering (BPR) and to establish national standards for computerization. The implications are:

- Redesign and digitalize administrative processes through BPR
- Supply Internet and establish telecommunication network in government offices
- Establish national standards for computerization
- Implement system to promote e-commerce and create environment such as electronic signature

2.3.3.4. Private Sector Participation

In order to achieve the goal of economic growth and poverty reduction through IT development, it is essential to encourage the participation of private sectors and promote domestic IT market.

The government established a policy to encourage private sector participation by providing tax benefits and incentives to the domestic software developers and ISPs, and supporting the introduction of advanced technologies from abroad and overseas corporations, such as providing tax holiday to registered IT companies for up to 5 years starting from IT Policy 2004 (draft), treating costs incurred in software procurement as expenses for taxation purposes, implementing incentive system in all public and private organizations that export IT products and services and exempting duty on export of software products and services until 2015.

In accordance with these strategies, detailed activities were planned to support establish the private local ISP for rural connectivity, provide incentive for content providers, support export of ICT products and services, develop policies and programs to assist software companies, encourage local IT companies for ISO or CMM certification and provide incentives, work closely with international Nepali Diasporas related with IT community, and set up IT business centers in other countries.

To promote domestic IT industry, it is important to continuously discover new IT business opportunities and based on this, accumulate experience and technological knowledge. This will then help to reduce poverty and lay the foundation upon which economic growth could be achieved. It will also increase the capacity for IT export and opportunity for professional training. The implications are:

- Continuously discover new business opportunities for self-sustenance of the domestic IT companies
- Establish support system for domestic S/W and ISP companies
- Implement a national support measure for adopting advanced technology
- Create environment to encourage private and foreign investment

2.3.3.5. Human Resource Development

IT Policy 2004 (draft) speculates the introduction of IT certification system to nurture IT specialists and the provision of tax benefits to IT institutes for training IT specialists such as to waive license fees and taxes to all national universities and educational institutions that establishes their own ISP, and to encourage the participation of private sectors. It provides computer curricula at schools and improves computer literacy of teachers through training.

Also, to implement programs that foster IT specialists and to help those specialists attain more experience and greater technological knowledge, it is necessary to continuously search for new business opportunities. Action plans for human resource development are to provide IT proficiency test for testing certification and quality assurance, introduce computer education for all school teachers, develop public and private IT education industries that suit domestic and foreign demands, implement IT business incubation system for innovative IT start-ups, educate on

embedded technologies and expand HR development organizations in developing areas through private sector's participation. Thus, the implications are:

- Select school-level computer curricula and foster instructors with specialization in computers
- Implement international standard computer-related certification system
- Provide programs for bachelor/master students to foster specialists
- Implement tax benefits and financial support systems for academies that foster IT workforce

2.3.3.6. Organization

While IT policy 2000 organized the National Information Technology Development Council to decide on national IT policies, IT Policy 2004 (draft) organized High Level Commission for Information Technology (HLCIT), chaired by the Prime Minister, to enact upgraded IT policies.

Also HLCIT is granted the role to plan, execute, and evaluate the government's informatization efforts. The key mandate of HLCIT is to serve as an apex institution for formulating, implementing, monitoring and evaluating IT policy and strategy in a manner that supports rural development initiatives. That includes human resource development through quality controlled courses and development of IT industry clusters by establishing IT parks.

In addition, there needs to be an advisory body composed of IT specialists from both public and private sectors and a permanent government body to maintain consistency in policy implementation and securing specialties. HLCIT should be granted and stipulated with the right to control over egoism of governmental agencies. The implications are:

- Stipulate and place HLCIT directly under the head of the country
- Grant the right to deliberate and regulate problems that may emerge in the process of policy implementation
- Organize an advisory group of IT specialists and secure specialty
- Organize a permanent government body to maintain consistency of informatization and secure specialty

2.4. Telecommunication Policy 2060 (2004)

2.4.1. Introduction

Though many policies were implemented after the restoration of the Multi Party Democracy in Nepal, Nepal still needs much improvement in its social and economic aspects. In the midst of this, the government of Nepal has set poverty alleviation as its major development goal and introduced sustained economic growth, social development and good governance as its strategies to achieve the goal. The Government of Nepal chose the telecommunication sector as its key sector for national development and established Telecommunication Policy 2056. Also, it planned to maintain a complete competition system by opening the telecommunications market from 2004.

The government established Telecommunication Policy 2060 to replace Telecommunication Policy 2056 knowing the necessity of appropriate flexible policies to cope with the dynamism of IT industry and rapid evolution of technology. The main objective of the Telecommunication Policy is to create favorable environment for making IT service reliable and accessible to all people at reasonable cost with private sector in order to support social and economic development of the country. To achieve this goal, the policy contains 12 strategies and 12 action plans, which include issues on administrative organizational structure as well as legal and systematic approaches required to implement the policy. Analysis of Nepali IT policies has been conducted based on this policy.

2.4.2. Objectives

In order for people from rural and urban areas to have access to telecommunication service, government of Nepal sets out to achieve the following objectives:

- Make the telecommunication service available to meet the demands of urban areas
- Provide opportunity to the consumers from urban areas to choose service from various providers
- Provide access to information and communication technology for poverty alleviation and rural area development

2.4.3. Policy analysis

Nepal has a relatively low rate of IT penetration being still an agricultural society. To break through the poor ICT status of country, the government has devised Telecommunication Policy 2060, which will build appropriate IT infrastructure in the urban and rural areas. This will assure fast and smooth flow of information to enhance industrial competitiveness and improve the quality and efficiency of civil services. In order to establish this environment, following strategies were taken:

- Extend telecommunication service through shared telephone for universal access
- Provide immediate service to consumers in urban areas upon order by telecommunication service provider
- Provide leased line, data and other similar corporate services to government bodies and private business sector in the urban areas through multiple service providers
- Maintain open licensing regime system to allow all service providers to enter into the telecommunication sector
- Prepare necessary prerequisites to become information society such as extending telecommunication service and enacting Cyber Law
- Fully utilize the Internet for effective rural development and construction of infrastructure
- Commercialize the Nepal Telecommunication Corporation
- Develop organization for implementing policy
- Create an environment of healthy competition among the telecommunication service providers to build economic efficiency of the telecommunication sector

The action plans can be divided into several groups: implementation of IT infrastructure, introduction of fair competition and inducement of overseas and domestic investments. The body acting as the focal point shall give assistance to the various governmental and non-governmental agencies for the common use of ICT for development of the rural areas.

To achieve the goals of Telecommunication Policy 2060, it is desirable to prepare strategy first and then devise action plans to include detailed activities such as:

- Extend telecommunication service without subsidies by existing service providers including mobile service providers
- Levy only one percent customs duty on equipment to be imported by the telecommunication service providers to provide service to the rural areas
- Exempt license fee and annual fee to rural telecommunication providers whose annual income is less than NRs. 2,000,000/
- Set up rural telecommunication fund for rural telecommunication development
- NTA shall develop principle and procedures for operation of the rural telecommunication fund by fiscal year 2061/62
- Incumbent and dormant service provider shall be obligated to provide the service to all the consumers of the urban areas immediately
- Connect various data, broadband, PABX network, etc. with leased line and corporate data network
- Grant license authorizing provision of Internet and other data service through cable television and wireless technology
- Connect all the central bodies of government through the Internet by the end of fiscal year 2061/62 (2004/2005)
- Increase internet literacy by the end of fiscal year 2062/63 for civil servants
- Nurture expert human resource and secure other necessary resources for MoIC and NTA
- Clearly define the role of MoIC and MoST and formulate and implement policy in prompt, simple and transparent manner
- Immediately incorporate provision for competition in the Telecommunication Act until separate legal provision is enacted

However, there are some discrepancies between the strategies and action plans: some action plans lack the description of detailed activities or contain items prepared by MOIC and NTA, which may require additional negotiations between the organizations. The implications are:

- Build telecom network between governmental agencies for networked government
- Design and construct telecom network appropriate to rural area
- Raise funds for the development of rural areas

- Build telecom networks through participation of private sector
- Introduce competition in the IT market
- Nurture IT experts and specialists
- Commercialize Nepal Telecommunication Corporation

2.5. Implication Summary

The implications drawn from the analysis of the three policies can be classified into six categories: organization, computerization, budget, law, infrastructure, and human resource development.

2.5.1. Organization

- Create an organization which will put together all the issues related to national IT policies with IT experts to secure expertise and specialty
- Organize a working-level organization as a permanent governmental division to maintain expertise and consistency
- Position the organization which has responsibility for ICT development of the country directly under the head of the country
- Each ministry dispatch its IT staff to supplement the personnel for the organization
- Grant the organization with authorities to deliberate various issues emerging from implementation of the ICT policy, acts, rule and regulation as well projects

2.5.2. Computerization

- Renovate operational processes through BPR and digitalize process-related materials
- Establish national standards on ICT
- Supply personal computers, personalized e-mail and provide Internet access to all the government offices
- Discover IT business opportunities continuously to develop domestic IT industry

2.5.3. Law

- Establish laws and regulations on electronic media to secure legitimacy of government activities, such as IT promotion fund, e-Commerce, electronic certificate, IPR protection, etc.
- Create a favorable environment for IT business including tax benefits
- Provide appropriate measures to encourage overseas investments including guaranteeing of remittance of investment returns
- Devise a system to continuously monitor the progress of project implementation
- Provide proper level of support to domestic software developers and ISPs
- Provide incentives to the introduction of advanced technologies

2.5.4. Budget

- Devise detailed plans for the establishment of IT funds
- Prepare appropriate legal provisions on the scope of IT fund management
- Create an environment conducive to domestic/overseas investment

2.5.5. Infrastructure

- Implement customized IT systems that meets the demands of rural areas
- Prepare plans for the implementation of IT infrastructure and how to encourage the Internet usage
- Implement broadband telecom networks in highly populated areas
- Establish the foundation for networked government by linking governmental agencies with IT network
- Design and implement optimized telecommunications network by using various technologies, such as xDSL, PLC, L/L, FTTH, etc.
- Encourage the implementation of telecommunications network by supporting private sectors and attracting foreign investment in infrastructure development

- Introduce effective competition system to IT market
- Commercialize the Nepal Telecommunication Corporation

2.5.6. Human Resource Development

- Adopt computer-oriented curricula and nurture instructors and teachers specialized in the curricula
- Implement government-led IT projects to encourage the demand of IT experts and specialists
- Introduce computer-related certification system
- Strengthen IT infrastructure by nurturing IT technicians and engineers and retaining IT professionals
- Install IT-related courses and curricula in colleges and universities
- Provide tax benefits and financial support to IT educational institutes

3. Analysis of current e-Government

3.1. Current Status of e-Government

3.1.1. History

Since the introduction of computer for census in 1972, the country made an early start compared to the other countries, including the establishment of organizations for computerization. However, in the 1980s and 1990s, Nepal slowed down its momentum to push forward the advancement of ICT industry.

Starting from the 2000s, the government instituted its first ICT policy and in 2003 organized the HLCIT to take charge of national IT policies. In 2004, it promulgated the Electronics Transaction Act.

- 1971 Introduction of computer in the country for census (IBM1401)
- 1974 Establishment of the Electronic Data Processing Centre. Now merged with the National Computer Centre, for promoting computer usage and computer literacy.
- 1982 First Private Overseas Investment in software development by establishing company for export, Data Systems International (p) LTD.
- 1985 Distribution of Personal Computers in Nepal
- 1990 Liberalization on imports of equipment
- 1992 Establishment of Computer Association of Nepal
- 1996 Establishment of the Ministry of Science & Technology

- 2000 Announcement of the first IT policy, “IT Policy 2000”
- 2001 Establishment of the National Information Technology Center
- 2003 Establishment of the High Level Commission for Information Technology
- 2004 Enactment of the Electronics Transaction Act

3.1.2. Implications

- To successfully foster the IT industry, it is imperative to devise a systematic approach in setting up IT policies and continuously implementing such policies, which will not be affected by political changes.
- It is necessary for the government to give priority to ICT projects and to monitor the implementation and evaluation of such projects.
- IT Policy should be revised and updated frequently should be added.

3.2. Expansion of IT Services

3.2.1. Status of Telephone Penetration

- Two basic telephone service providers in Nepal and two wireless mobile service providers
- Number of telephone subscribers as of April of 2006:
  - Fixed: 478,204 (PSTN)
  - Mobile: 458,619 (GSM), 67,000(CDMA), 825(GMPCS)
- Over 1,000,000 people are subscribed to fixed and wireless telecom service, which is around 4O% of the total population. About 300,000 people are on waiting list for service subscription.[2]
- There are some network construction projects which will install up to 240,558 additional lines by 2007 to increase telephone penetration rate.
- Average line distribution per year: 87,600 lines (PSTN+GSM)

[2] 2005 NT Annual Report

- Additional lines to be distribute by GSM+CDMA: 152,958[3]

3.2.2. Penetration of Internet Access Services and PC

- 38 ISPs + 59 regional access points
  - Dial-up(56K): 34
  - Cable: 3
  - Wi-Fi: 1
- There are over 48,000 Internet subscriber mostly using dial-up service.
- Number of Internet users: 240,000
- Capacity of Internet backbone: 33.4 Mbps downlink and 13.9 Mbps uplink
- Penetration rate of PCs: 6.2 units per 1,000 populations

3.2.3. Implication

- Need to establish ICT diffusion plan which includes providing low price PC and promoting ICT education
- Need to develop domestic ICT industry by increasing penetration of basic ICT services

3.3. Current Status of Networks

3.3.1. Overview

The transmission networks in Nepal consist of backbone link, microwave radio network and optical fiber network, though most of them lack incapacity. Satellite network is preferred for linking geographically difficult terrain and very remote areas where it is difficult to establish Optical Fiber or Micro Radio network.

Most of the systems deployed for microwave radio network are asynchronous types and operate as trunk and branch networks. However, several SDH Microwave systems are in use in some nodes. Currently, there is a microwave radio link between Nepal and Bangladesh.

In the case of optical fiber network, there is a ring-shaped 2.5Gbps optical fiber network in the Katmandu Valley and a SDH Optical Link along the East-West Highway,

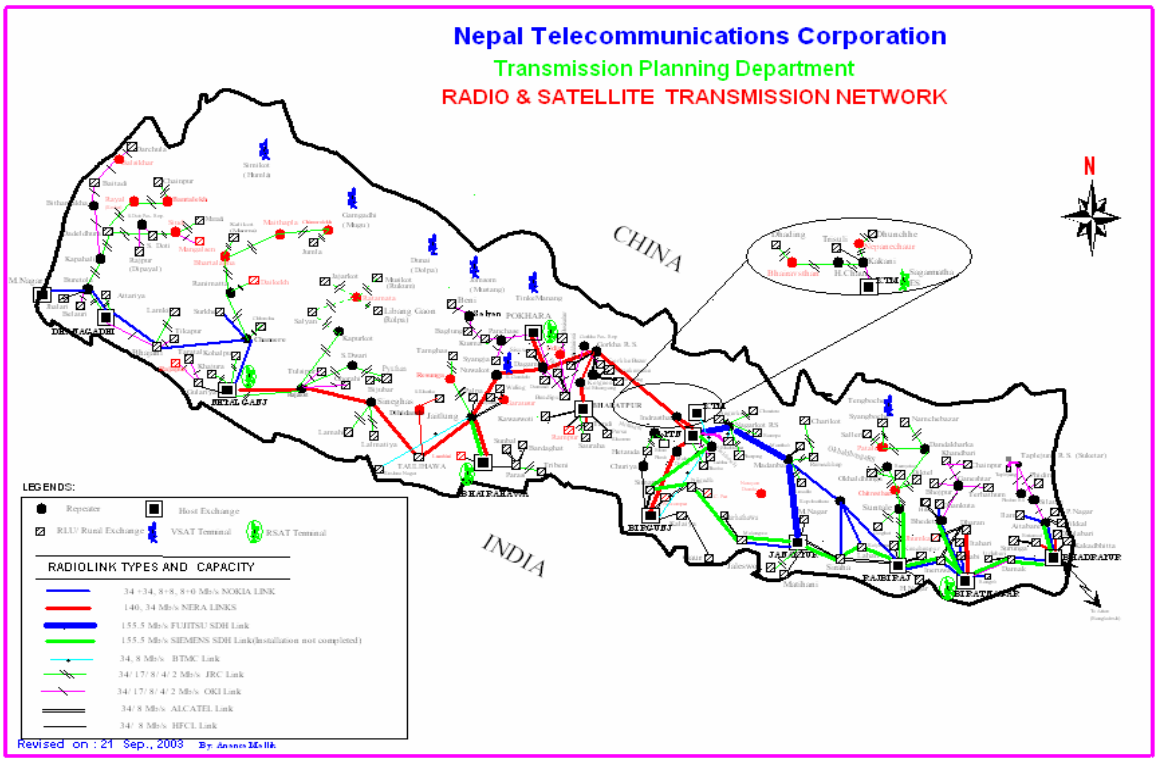
[3] MIS Report 2062/09

though west section of which is not yet completed. Also, an optical fiber network between Nepal and India is in operation. For the access links, WLL and mobile network have been used. The provision of ADSL service is in the planning stage.

For satellite network, earth stations, RSAT and VSAT are in use, and there is a plan to deploy DSAT system.

There is a plan to deploy 10Gbps next generation SDH optical fiber backbone network.

Figure 4. Telecommunication Infrastructure



3.3.2. Issues

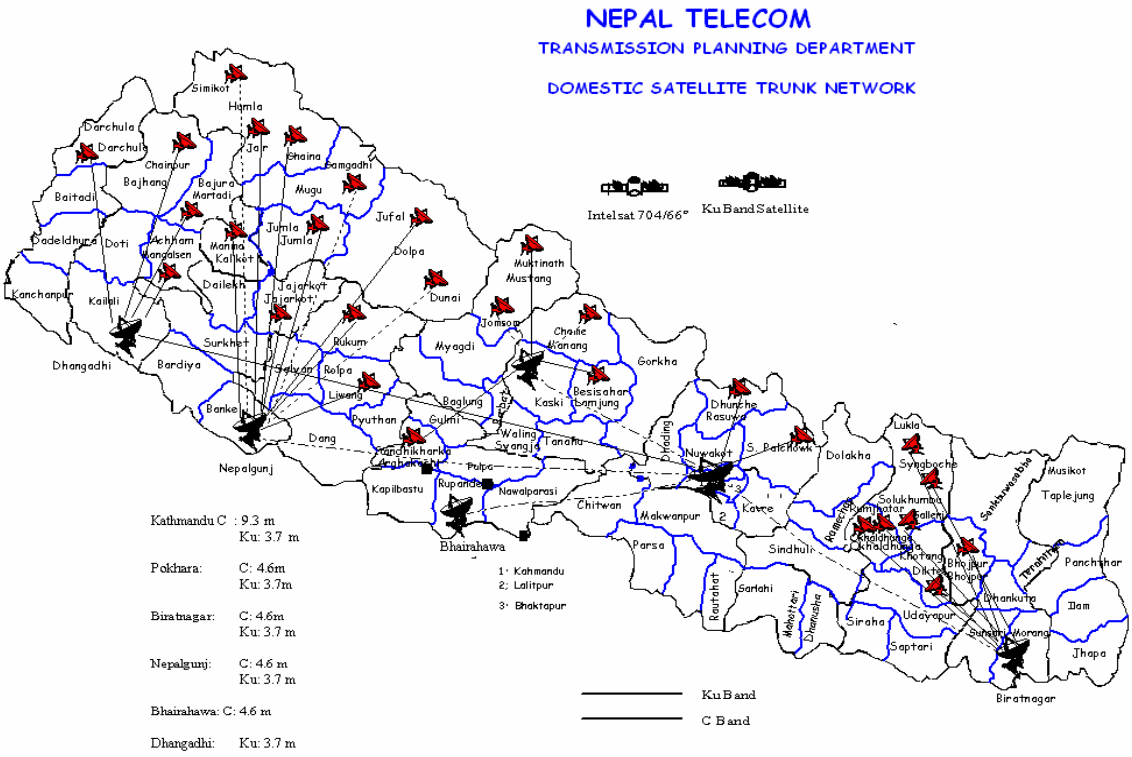
There are some issues with radio network such as low quality and availability, frequent trouble in link, possible security issues near the border areas of China and India, low capacity of links, complicated radio frequency spectrum management due to limited resources, lack of tools required for RF optimization, RF design, high resolution digital maps (GIS), link reallocation, etc. However, the cost of implementing SDH radio network is too much for the country.

In the case of the optical fiber network, the maximum capacity of backbone network is STM-16. However, this cannot properly satisfy rapidly-increasing demands

on STM-4s and STM-1s. There is also the problem of optical fiber cables breaking easily. Especially, the west section of the Nepal East-West highway SDH Optical Fiber Project is not yet completed.

For the satellite network, there is no alternative route from Balambu to ISC (international switching center), since the links are not yet dualized. There are also issues of Rural Telecommunication Fund (RTF), payment of yearly space segment fees, transportation to VSAT locations for maintenance, installation of solar power systems to sites at which no power supply are available (mostly in the Himalayan region), establishment of standalone satellite stations, etc.

Figure 5. Satellite Infrastructure



The WLL network has issues such as unavailability of transmission links in hilly regions, LAC (Local Access Coverage) problem at the boundary of a district in terms of corporate profitability, radio interference near border areas politically.

In the case of DSL network, the quality of lines is not satisfactory.

As a whole, it is necessary to renovate IP backbone network and broadband subscriber networks. The lack of opportunities to get information on newly emerging technologies is also worth mentioning, as well as discrepancies between investment/O&M cost and revenue.

3.3.3. Implication

- Re-arrange regional trunks and radio links
- Optimize East-West optical fiber links
- Build IP backbone and broadband access network
- Expand access point using WLL and wired line
- Build significant backbone lines
- Develop integrated wired and wireless platform
- Introduce the next generation SDH optical network
- Build DCME and LRE for increasing quantity of trunk lines

3.4. ICT Education

3.4.1. General

In 1992, eight private schools offered computer science course as an optional subject for School Leaving Certificate Examinations (S.L.C), and Katmandu University started offering Bachelor courses since 1994.

Four universities and affiliated colleges provided ICT education courses. Now the total number of IT personnel in country is around 4,000 and the number of IT manpower is expected to reach 7,335 within the next five years, by the end of 2010. (National IT Workforce Survey 2005, CAN)

3.4.2. Current Status

The distribution of ICT workforce has been heavily skewed in Kathmandu valley with 69% of ICT workforce[4]. 29% of total IT workforce is operator, IT lecturers including trainers and instructors comprise 28% of the total IT workforce, 63% of the workforce works at private and professional organizations, 14% at NGOs and 11% in the government.

According to the survey conducted by Computer Association of Nepal (CAN) in October 2005, females comprise 18% of the total IT workforce. Considering the nature of employment, 66 % of present IT workforce are employed as permanent staff,

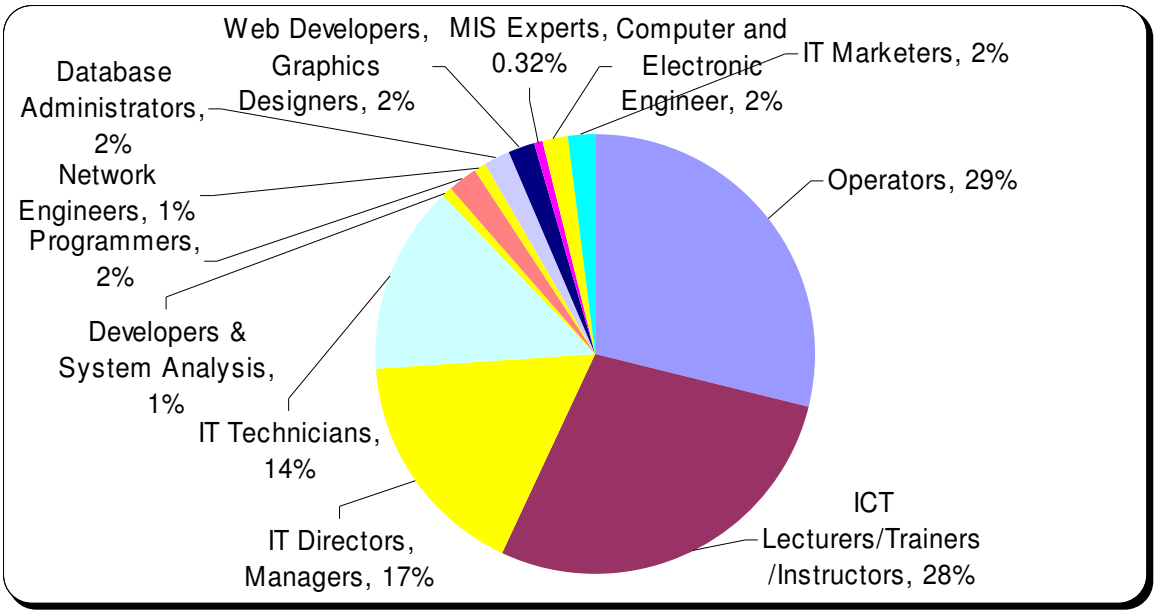
[4] P.8 of 'A fact book on Information and Communication Technology sector of Nepal', HLCIT

23 % as temporary and 11 % are hired on contract basis. Regarding qualifications, almost 44% of the workforce has qualifications in IT-related fields.

It is necessary to implement telecentre network around the country and carry out ICT education programs in rural areas for developing rural areas and eliminating digital divide. Telecentres aim to provide one or more of the following services:

- Access to telephones and faxes
- Access to e-mail
- Access to the Internet
- Documentation
- Scanning or printing
- Video conference call
- Education in “Information Age” skills
- Other information services
- Other developmental support services to meet basic needs

Figure 6. Categories of Total ICT Workforce[5]



As well as the obvious benefits of telephone, fax and e-mail, the following advantages should also be highlighted:

- Social opportunities will be expanded
- Local and distance employment might be generated
- Educational and training opportunities will be expanded

[5] A fact book on Information and Communication Technology sector of Nepal, HLCIT

- Local businesses will be able to compete with city companies
- Communication with distant regions and friends or relatives abroad will be possible
- The telecentre will be able to provide access to on-line information services for weather, market prices, news, banking, medical advice, business advice, marketing information, travel arrangements, etc.

Table 2. ICT Workforce in Nepal

Educational Level High Level Manpower	Academic Number	Trainee Number
Ph. D	10	-
Master / Higher level	400	1500
Bachelor / Middle level	3500	10,000
Intermediate / Lower level	7500	25,000
Total	11410	36,500

Table 3. Distribution IT Manpower by IT Qualification

IT qualifications	Number	Percent (%)
Computer science	432	11
Computer engineering	574	14
Information Technology	416	10
Electronics	349	9
without IT qualification General qualification with training	2,229	56
Total	4,000	100

Table 4. Distribution of IT Manpower by Type of Employment

Type of employment	Percent (%)
Permanent	66
Temporary	23
Contract-based	11
Total	100

3.4.3. Implications

- Devise a comprehensive strategy on rural development to promote balanced development of ICT industry
- Stimulate IT market to absorb most of IT workforce in the IT industry and

encourage the industry to support education/training programs

- Expand educational opportunities for ICT to females and rural residents
- Promote IT development continuously to accumulate technologies and knowledge

3.5. UN Index

3.5.1. Overview

Each year, the United Nations publishes e-Government Readiness Index, which is composed of Web Measure Index, Telecomm Infrastructure Index, and Human Capital Index.

3.5.2. Status in e-Government Readiness Index

The UN e-Government Readiness Index in 2005 ranked North America (0.8744) and Europe (0.6012) in the leadership position in e-government readiness.

The next was South and Eastern Asia (0.4922); South and Central America (0.4643), followed by Western Asia (0.4384); the Caribbean (0.4282); South and Central Asia (0.3448); Oceania (0.2888) and finally Africa (0.2462).[6] [7]

From 2003 to 2005, the e-Government Readiness Index of South and Central Asia (0.0528) has been growing rapidly compared to the other regions. Nepal moved up 6 steps in its ranking, from 132 to 126 in 2004. Especially, the Web Measure Index improved rapidly, thanks to the government efforts of operating and maintaining governmental web sites. However, e-Government Readiness Index was still low compared to the other high ranking countries.

Despite continuous efforts of the government, most telecommunication infrastructure index scored poorly such as Internet users, PCs, telephone lines, cellular subscribers, TVs, online population, etc. Especially, Internet User Index was 0.0151, which is very low compared to the high-ranking countries.

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[6] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion. Page 23.

[7] Governance is defined as the sum of the many ways individuals and institutions, public and private, manage their common affairs. (Our Global Neighborhood'. The Report of the Commission of Global Governance. UN. Chapter 1.) It is the exercise of political, economic and administrative decision-making. UNDP. Governance for Sustainable Human Development. A UNDP Policy document. January 1997. Page iv.

Table 5. Regional e-Government Readiness Rankings[8]

Region	2005	2004	2003	Difference from 2003 to 2005
North America	0.8744	0.8751	0.8670	0.0074
Europe	0.6012	0.5866	0.5580	0.0432
South & Eastern Asia	0.4922	0.4603	0.4370	0.0552
South & Central America	0.4643	0.4558	0.4420	0.0223
Western Asia	0.4384	0.4093	0.4100	0.0284
Caribbean	0.4282	0.4106	0.4010	0.0272
South & Central Asia	0.3448	0.3213	0.2920	0.0528
Oceania	0.2888	0.3006	0.3510	- 0.0622
Africa	0.2642	0.2528	0.2460	0.0182
World Average	0.4267	0.4130	0.4020	0.0247

Table 6. e-Government Readiness Rankings[9]

Country	Index	Ranking		Ranking Change
	2005	2005	2004	
US	0.9062	1	1	0
Denmark	0.9058	2	2	- 0
Sweden	0.8983	3	4	1
UK	0.8777	4	3	-1
Korea	0.8727	5	5	0
China	0.5078	57	67	10
India	0.4001	87	86	-1
Tajikistan	0.3346	117	-	-
Nepal	0.3021	126	132	6
Bhutan	0.2941	130	165	35

[8] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion. Page 30.
[9] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion. Page 58

Country	Index	Ranking		Ranking Change
	2005	2005	2004	
Pakistan	0.2836	136	122	- 14
Bangladesh	0.1762	162	159	-3
Afghanistan	0.1490	168	171	3
Average	0.3448	-	-	-

Table 7. Web Measure Index[10]

Country	Web Measure Index		
	2005	2004	2003
USA	1.0000	1.000	1.000
Republic of Korea	0.9769	0.946	0.607
India	0.5827	0.568	0.522
Sri Lanka	0.3192	0.270	0.279
Nepal	0.4000	0.336	0.319

Table 8. Infrastructure Index[11]

Country	Infrastructure Index		
	2005	2004	2003
USA	0.7486	0.770	0.801
Republic of Korea	0.6713	0.666	0.675
India	0.0277	0.026	0.027
Sri Lanka	0.0359	0.034	0.036
Nepal	0.0063	0.006	0.006

Infrastructure Index as shown in table 8, was very low at 0.006.

[10] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion, reconstruction of page 200~204, UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2004 TOWARDS ACCESS FOR OPPORTUNITY, reconstruction of page 131~135 and UN Global E-government Survey 2003, reconstruction of page 64~69

[11] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion, reconstruction of page 200~204, UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2004 TOWARDS ACCESS FOR OPPORTUNITY, reconstruction of page 131~135 and UN Global E-government Survey 2003, reconstruction of page 64~69

Table 9. Internet Users and PCs Index (per 100 persons)[12]

Country	Internet Users	Internet Users Index	PCs	PC Index
USA	55.600	0.824	66.000	0.807
Republic of Korea	61.000	0.904	55.800	0.682
India	1.800	0.027	0.700	0.009
Sri Lanka	1.300	0.019	1.700	0.021
Nepal	0.300	0.004	0.400	0.005

Table 10. Telephone and Cellular Index[13]

Country	Telephone Data	Telephone Index	Cellular Data	Cellular Index
USA	62.3800	0.5998	54.5800	0.4572
Republic of Korea	53.8300	0.5176	70.0900	0.5871
India	4.6300	0.0445	2.4700	0.0207
Sri Lanka	4.9000	0.0471	7.2700	0.0609
Nepal	1.5700	0.0151	0.2100	0.0018

Table 11. TV and Online Population Index[14]

Country	TV	TV Index	Online population Data	Online population Index
USA	84.400	0.875	59.100	0.847
Republic of Korea	36.400	0.377	53.800	0.771
India	7.500	0.078	0.670	0.010
Sri Lanka	10.200	0.106	0.630	0.009
Nepal	0.600	0.006	0.230	0.003

[12] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion reconstruction of page 210~214
[13] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion reconstruction of page 215~219
[14] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion reconstruction of page 220~224

Table 12. Human Capital Index[15]

Country	Human Capital Index		
	2005	2004	2003
USA	0.9700	0.970	0.98
Republic of Korea	0.9700	0.960	0.95
India	0.5900	0.570	0.57
Sri Lanka	0.8300	0.820	0.84
Nepal	0.5000	0.500	0.48

3.5.3. Implication

- Need to expand the basic ICT infrastructure including telephone, PC, Internet and e-mail.
- Maximize utilization of to continuously expand the basic ICT infrastructure
- Provide ICT-related education and training to civil workers and general population to increase ICT literacy
- Enhance the functions of existing governmental web sites to include provision of civil service

3.6. Government Informatization Status

3.6.1. Current Informatization Status

As shown in the following table, several government agencies have operated database systems for their administration. But from the perspective of the database size, the usability of such systems is dubious at most.

Most database systems are running on small-to-medium-sized server systems manufactured by IBM, Dell or HP, which provide 24/7 operation. As the main operating systems, UNIX, Linux, Windows 2000, and Windows XP are widely used. Various application programs have been used for the database operation: Oracle,

[15] UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2005 From E-Government to E-Inclusion, reconstruction of page 200~204, UNITED NATIONS GLOBAL E-GOVERNMENT READINESS REPORT 2004 TOWARDS ACCESS FOR OPPORTUNITY, reconstruction of page 131~135 and UN Global E-government Survey 2003, reconstruction of page 64~69

Microsoft Fox Pro, Access, Excel, etc.

MoGA's PIS (Personal Information System) is used by many governmental agencies. From the aspect of security, some agencies using server systems are well protected by hardware firewalls, but most of governmental offices which use their PCs for documentation, printing, e-mail and Internet surfing are protected only by anti-virus software.

Table 13. Current Application Programs Used in Government

Ministry	DB	Program	DB Size	Server	Server OS
CSIO[16]	IICS[17]	-	-	-	-
DoTM[18]	VRIS[19]	-	-	-	-
	DLIS[20]	-	-	-	-
EC[21]	IVRS, DVRS[22]	Visual Fox-Pro	3.6GB	IBM	Unix
FCGO[23]	DECS[24]	Oracle	125MB	PC	Win 2000
	FMIS[25]	Oracle	162MB	Dell	Win 2000
	PMIS[26]	Oracle	15MB	Dell	Win 2000
	CSDRMS	Oracle	141MB	Dell	Win 2000
HLCIT	PPP(e-Procurement)[27]	-	-	-	-
	DMS[28]	Java	100MB	-	Win 2000 Pro.
	GAS[29]	Java	-	Dell	Linux
MoES	EMS[30]	-	-	-	-

[16] Cottage and Small Industry Office
[17] Integrated Industry and Commerce System (http://www.csioktm.gov.np)
[18] Department of Transportation Management
[19] Vehicle Registration Information System
[20] Drivers License Issuance System
[21] Election Commission
[22] Integrated Voter Registration System, District Voter Registration System
[23] Financial Controller General Office
[24] District Expenditure Control System
[25] Financial Management Information System
[26] Personnel Management Information System
[27] http://www.bolpatra.gov.np
[28] Document Management System
[29] Government Accounting System
[30] Education Management System

Ministry	DB	Program	DB Size	Server	Server OS
	TMIS[31]	-	-	-	-
MoEST	OSGP[32]	-	-	-	-
MoF	BMIS[33]	Oracle	-	Dell	Win 2003 Server
MoFA	PSI[34]	-	-	-	Win XP
	CDS/WinISIS[35]	-	-	-	Win XP
MoFSC	PIS[36]	-	-	Dell	Win 2003 Server, Linux
MoGA	PIS	Oracle	350MB	HP	Linux
	PPSS[37]	-	-	-	-
MoHP	HURDIS[38]	Access	75MB	Dell	Win XP
MoLD	Arcview[39]	-	3.5MB	Intel	Windows XP
	Arc GIS	-	-	-	-
	ArcInfo	-	-	-	-
	WinISIS[40]	-	-	-	-
NPC[41]	PPIS[42]	VB	-	Dell	Linux
	MTF[43]	JSP	-	Dell	Win XP
	PIS	VB	-	Dell	Win XP
	Accounting System	VB	-	-	
Peace Secretarial	GROOV	C++	-	IBM	Win XP
PSC[44]	Examination	Excel	-	2GB	Win XP
Total	23				

[31] Teacher Management Information System
[32] One Stop Government Portal (http://nepal.gov.np)
[33] Budget Management Information System
[34] Passport Information System
[35] Library Management System
[36] Personal Information System(Human Resource Management System)
[37] Personnel Policy Support System
[38] Human Resource Development Information System
[39] Geographic Information System
[40] Library Management System
[41] National Planning Commission
[42] Project Performance Information System
[43] Medium Term Expenditure Framework
[44] Public Service Commission

As shown in table 13, relationship between the existing database systems and administrative services offered by government agencies. The computerized administrative services include voter list preparation, budget implementation, passport issuance, project management, management of civil servant application, etc.

The number of personnel engaged in ICT-related jobs including personnel in charge of data input for database systems is from 0 to 90, which show big differences between agencies. Most agencies do not have manager-level personnel responsible for ICT operation. The number of ICT engineers is also very small.

Table 14. Relation of Database and Administrative Service

Ministry	Informatized Task	Database	ICT Staff[45]
CIAA[46]	-	-	14
EC	Preparing voter list	IVRS, DVRS	90
FCGO	Budget implementation	DECS	10
		FMIS	
HLCIT	Maintaining documents	DMS	12
	Maintaining revenue	GAS	
MoAC	-	-	0
MCM[47]	-	-	-
MoCTCA	-	-	8
MoD	-	-	1
MoES	-	-	19
MoEST	-	-	?
MoF	Budget management	BMIS	2
MoFA	Issuing passport	PSI	4
MoFSC	-	-	2
MoGA	-	-	32
MoHP	Training	HURDIS	8
MoHA	-	-	29

[45] ICT member is including computer operators
[46] Commission for the Investigation of Abuse of Authority
[47] Office of the Prime Minister and Council of Ministers

Ministry	Informatized Task	Database	ICT Staff[45]
MoICS	-	-	4
MoIC	-	-	18
MoLTM	-	-	3
MoLRM	-	-	3
MoL	-	-	0
MoLD	Local development	Arcview	7
		Arc GIS	
		ArcInfo	
MoPPW	-	-	1
MoWR	-	-	4
MoWCSW	-	-	6
NPC	Project management	PPIS	13
	Expenditure management	MTF	
	Financial management	Accounting System	
NVC[48]	-	-	4
NLRC[49]	-	-	2
Peace Secretariat	-	-	2
PSC[50]	Recording applicants	Examination	8

3.6.2. Implication

- Share the computerization plan among government offices to prevent redundant execution
- Digitalize all the documents to be preserved and put into e-document management system to allow real-time inquiry, searching, viewing and printing by users
- Build single access channel to the Internet for all the government

[48] National Vigilance Center
[49] Nepal Law Reform Commission
[50] Public Service Commission

agencies for security issues

- Introduce security system and backup system for all government offices as soon as possible
- Computerize administrative services with greatest number of visits for the convenience of citizens
- Build national standard for ICT and introduce interchangeable systems for connectivity
- Provide administrative services on civil affairs through the Internet or intranet
- Provide computer training to all the civil servants
- Consider implementing developed applications or those in the process of developing in the Ministries
- Consider current application in the BPR/ISP of each project

3.7. ICT Organization

3.7.1. High Level Commission for Information Technology (HLCIT)

The government of Nepal organized High Level Commission for Information Technology (HLCIT) in 2003 to provide crucial monitoring and policy guidance for the development of ICT sector in the country.

HLCIT is in fact an apex body formed under the chairmanship of the Prime Minister of Nepal with a view to providing crucial strategic direction and helping formulate appropriate policy responses for the development of ICT sector in the country to meet key developmental challenges and catalyze and stimulate economic growth for poverty reduction.

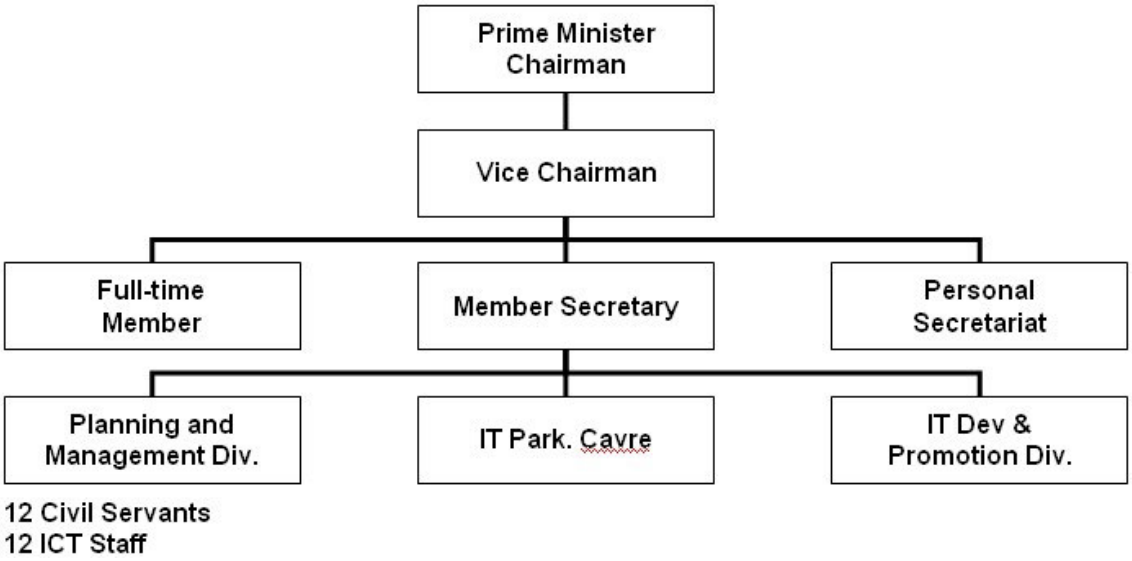
3.7.1.1. Roles and Responsibilities

- Provide policy feedback and support on a regular basis to government of Nepal by maintaining close relationship with the private sector, academia and the international development agencies
- Help promote innovation and R&D works in the IT sector enhancing overall industry competitiveness and advocate policy, regulatory and institutional initiatives aimed at enhancing quality of human resources including the standardization of textbooks and training programs
- Provide quality control support to the government by helping articulate

and enforce quality standards of ICT related educational institutions

- Establish, develop, assist and manage IT parks
- Help Nepali IT firms promote their product and services in the international markets
- Develop and promote e-commerce based implementation and advocate the creation of enabling infrastructure
- To encourage national and foreign investments to build/develop IT infrastructure.
- To help prepare requisite legal, regulatory and operational instruments in the form of acts, regulations and guidelines.

Figure 7. Organization Chart of HLCIT



3.7.2. Ministry of Environment, Science and Technology (MoEST)

Ministry of Environment, Science and Technology looks after content/ application part.

The National Science and Technology Council and the Royal Nepal Academy of Science and Technology (RoNAST) were founded in 1976 and 1982, repectively, and the Ministry of Science and Technology was instituted on 1996 to make coordination amongst all the bodies to perform the functions relating to science and technology in the process of national development and to effectively accelerate the activities relating thereto by creating a conducive environment for the proper development of science and technology. This Ministry has, after the dissolution of the

Ministry of Population and Environment on 2006 and the merge of the Environment Division of the said Ministry in this Ministry, been named as MoEST.

National Information Technology Center (NITC) under the Ministry of Environment, Science & Technology has been designated as the secretariat of HLCIT in 2003.

3.7.2.1. Roles and Responsibilities

- Implement ICT annual plans and programs approved by Board of Directors
- Prepare and submit long-term and short-term ICT plan, annual program and budget to the Board
- Prepare and submit periodic report on the plan and programs operated by the center to the Board
- Implement Board decision, supervise and regulate employees of the center
- Work as Chief administrator of the center and operate daily business of the center
- Fulfill all other necessary duties and functions under the act, rules and regulations of the center and decisions of the Board

3.7.3. Ministry of Information and Communication (MoIC)

MoIC is responsible in national-wide ICT infrastructure.

3.7.3.1. Role and Responsibilities

- Formulate policy, acts and regulations
- Manage and monitory frequency spectrum
- Program, plan and monitor ICT development projects
- Provide telecommunication, security printing, and postal service
- Provide press and information, radio and television broadcasting
- Develop film and advertising service
- Contact and coordinate with international organizations and institutions related to communications and information
- Work with 72 civil servant and 18 ICT

3.7.4. Implication

- Establish an ICT organization directly under the nation's highest authority to continuously and powerfully establish nationwide ICT policy
- Create a pool of technical advisors to resolve technological problems
- Unify HLCIT and MoEST's execution bodies for NITC, the organization in charge of Nepal Government's computerization, to enhance operation efficiency and NITC should be the strong and efficient secretariat of HLCIT

3.8. ICT Law and Regulation

3.8.1. Electronic Transaction Act 2061

March 18, 2005 Ordinance No 32

Significant provision for the proliferation of e-transaction in this Act is:

- It validates and gives legal recognition to electronic documents, electronic signature and electronic transactions.
- In case of dispute, it facilitates the validation of electronic documents, electronic transactions and electronic signatures as evidence.
- It penalizes unauthorized access to information.

An Ordinance to provide the provisions for electronic transactions.

- Provision related to legal recognition of electronic record and digital signature
- Provision related to dispatch, receipt and acknowledgement of electronic records
- Provisions related to controller and certifying authority
- Provisions related to digital signature and certificates
- Provisions related to functions, duties and rights of subscriber
- Provisions related to electronic record and government use of digital signature
- Provisions related to network service
- Provisions related to computer offence
- Provisions related to information technology tribunal
- Provisions related to information technology appellate tribunal

3.8.2. Implications

- Electronic Transaction Act is an act solely for e-commerce, therefore additional laws for ICT development are needed
- The foundation for ICT development through enactment of ICT promotion fund, ICT promotion law, e-government law, etc. is needed

4. Analysis of e-Government Requirements

4.1. Analysis of Interview

In order to gather e-government requirements among stakeholders, which are needed to establish the e-government master plan in Nepal, surveys were conducted along with interviews on 24 government officials in Secretary, Joint Secretary, or Under Secretary, who are the decision makers of each government department, by visiting those departments and interviewing them face-to-face from Mar 23 – 28, 2006. Also, interview on 18 ICT staff was conducted from Mar 27 – 28, 2006, face-to-face, at the meeting room in the Ministry of Environment, Science and Technology. The interviewee list is in Annex B. During the interview, questions on what they think about the current progress in the e-government plan, what kind of problems there are and what their requirements are were asked. When there were multiple answers to one question, all of those answers were included in the analysis.

4.1.1. Result of Interview

First, to the question of what are the obstacles to build the e-government in Nepal, 18 (69%) out of 26 government officials in the decision maker group and 15 (83%) out of 18 ICT staffs pointed out lack of ICT professionals, as illustrated in Figure 8 and 9. Thus, securing sufficient professional workforce was identified as a key factor in implementing the e-government plan.

More specifically, among 18 ICT members interviewed, only eight (44%) of them had ICT-related degrees or training. It shows that there is insufficient number of professionally trained staffs, since there is no continuous improvement/upgrade/ training, and especially, insufficient number of civil servants who can utilize computer.

As regard to HRD (expertise), both groups cited financial problem and lack of infrastructure as main obstacles. It showed that both decision makers and ICT staffs

have same opinion on what the obstacles are to build the e-government.

As to the fourth largest obstacle, the seven government officials in the decision maker group cited insufficient mindset of civil servants. It means that the fear against changes from computerization is one of obstacles to building the e-government.

Other opinions included absence of the ICT organization, the inability to execute the plan, the lack of transparency, the lack of cooperation among departments, and etc.

Figure 8. Obstacles to e-Government Cited by the Decision Maker Group

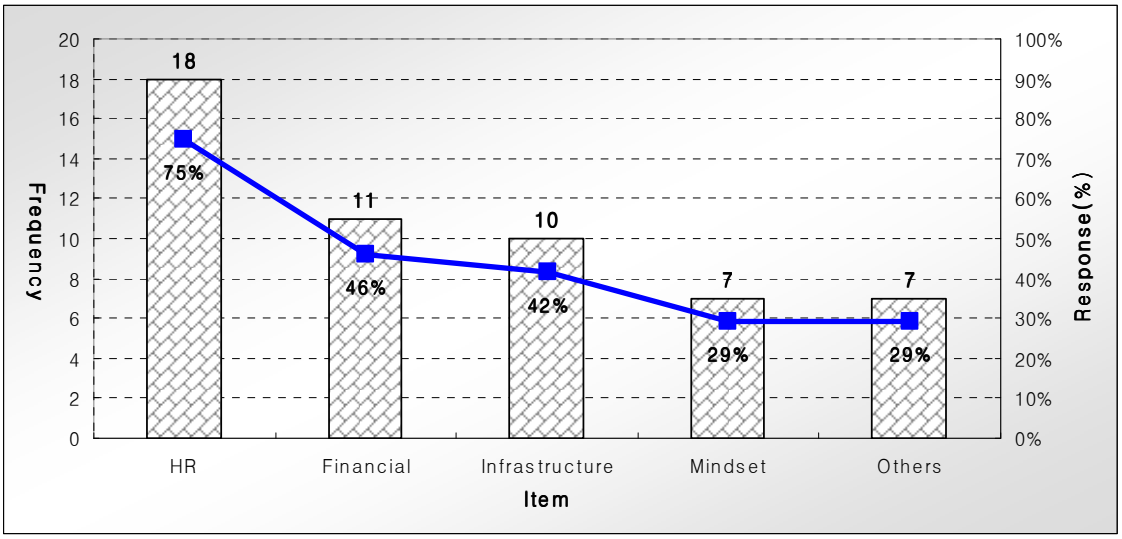
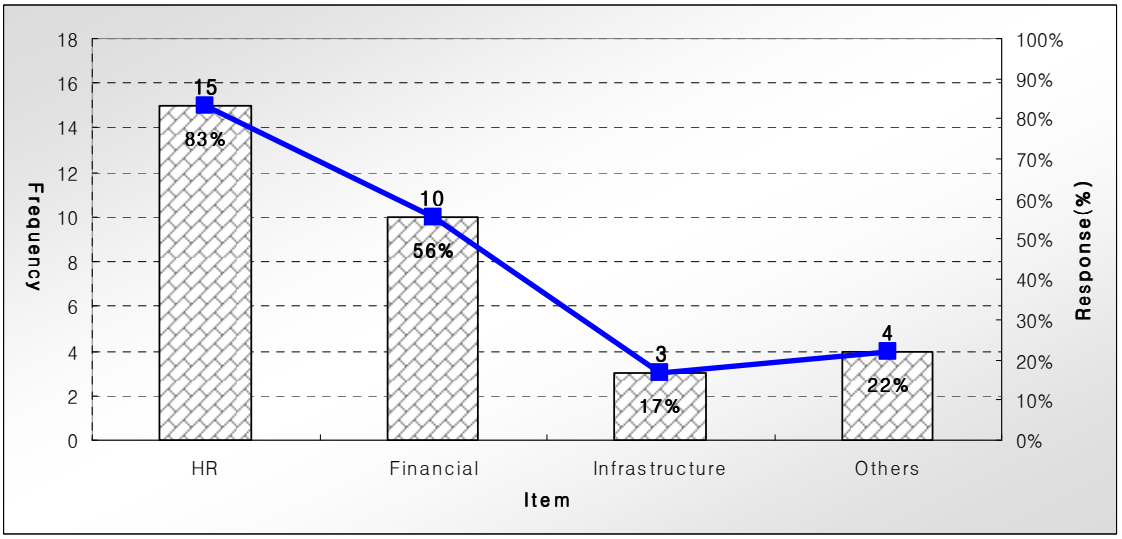


Figure 9. Obstacles to e-Government Cited by the ICT Staff Group



As key factors to successfully build e-government, the decision maker group selected HRD, leadership, execution, financial and infrastructure, whereas the ICT staff group selected HRD, financial, infrastructure and leadership.

To efficiently implement the e-government plan, it is important to establish a system where the e-government can be continuously implemented according to the top management's commitment and plan, along with good HRD. Moreover, while the civil servant's mindset was identified as one of obstacles to the e-government, it was also found that high-level officials need to have positive attitude towards changes and innovations. Also, not a one-time or show-off type plan, but a mid-to-long term plan needs to be established and be implemented consistently.

Other opinions included the need for public-private sector cooperation, introduction of policies and regulations that are similar to those of developed countries, and creation of an organization composed of experts.

Figure 10. Success Factor for e-Government Cited by the Decision Maker Group

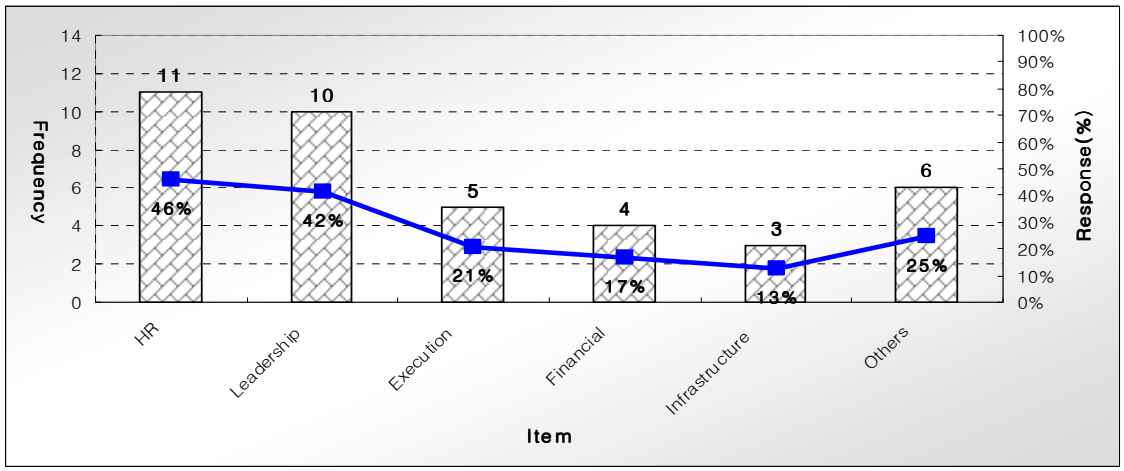
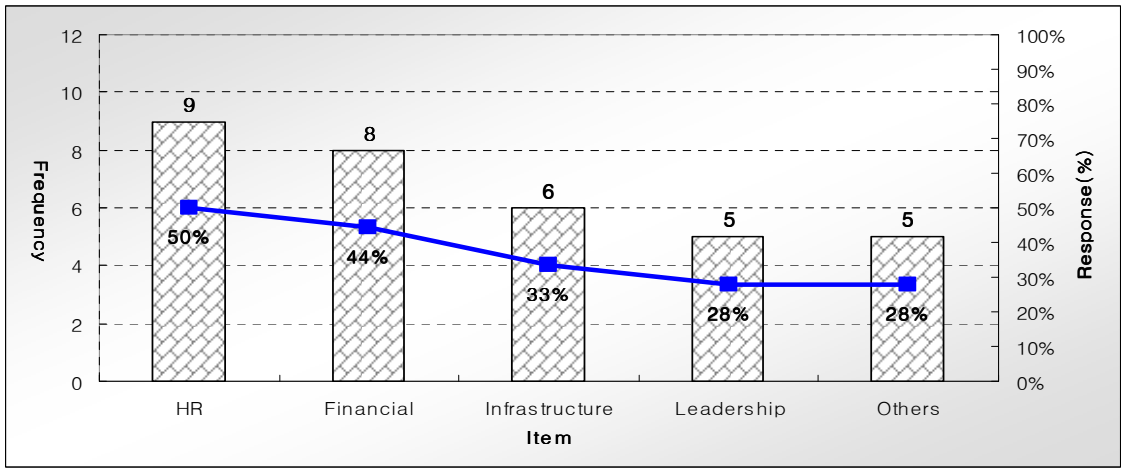


Figure 11. Success Factor for e-Government Cited by the ICT Staff Group



To the question that asked what the objectives of the e-government are, answers were as following:

- Administration service focused on citizens
- Realize an efficient, effective, transparent and innovative government
- Provide fast, effective and transparent service to the public
- Achieve cooperation among government agencies
- Realize the paperless office
- Make decision on time and provide prompt and timely government service to people
- Develop the intranet among the government agencies

4.1.2. Implication

- Recruit ICT experts for efficient implementation of the e-government plan and acquire professional workforce through ICT training
- Introduce basic ICT training for civil servants
- Install positive attitude towards change among high-level officials
- Secure funds needed to implement the e-government project
- Implement continuous and long-term plan for establishing infrastructure
- Secure top leader's commitment to the e-government and adopt system that allows continuous implementation of the plan

4.2. Analysis of Citizen Survey

In order to identify the To-Be model that is requested by the government and the people based on the current e-government status, the public citizen's requirements for the e-government were investigated. As one method to perform such investigation, surveys were conducted on 100 unspecified citizens, students, experts, people in agricultural and commercial sectors, office workers, people in services industry and etc., from March 23, 2003 to April 3, 2004. It was a face-to-face survey, mainly in the Katmandu region, such as CAN INFOTEC. Survey was largely composed of questions on current ICT environment, questions on how to improve the national administrative service and some general questions. Due to geographic and time restrictions, visits to rural areas were limited, which resulted in an urban-centered survey. This, together with the fact that women's participation was low, was taken into considerations at the final stage of analysis, which is the generation of key findings.

Out of total 100 respondents, 91 used PCs at home and only nine of them have never used a computer. The fact that most of respondents had experience of using PCs is attributable to the fact that most of interviews were conducted in the capital city, Katmandu, such as CAN INFOTEC.

4.2.1. Period Since First Started Using PCs at Home

To the question that asked how long they have been using PCs, if they have a PC at home, 31% answered 1 – 3 years and 26% answered 3 – 5 years. It shows that 57% of total respondents have used PCs for 1 – 5 years. Also, the analysis based on educational background of those surveyed shows that university/college graduates were using PCs the most, at 88%. The analysis by occupation shows that students were using PCs the most, at 34%. It is because PCs are still used for educational purposes mostly and are not highly utilized by businesses.

Figure 12. Period since First Started Using PCs at Home

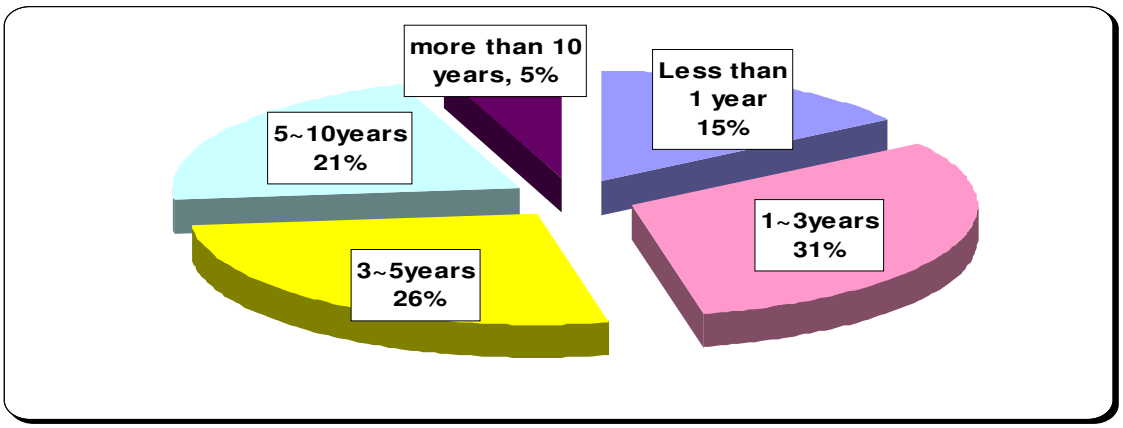


Figure 13. Period since First Started Using PCs at Home (by Occupation)

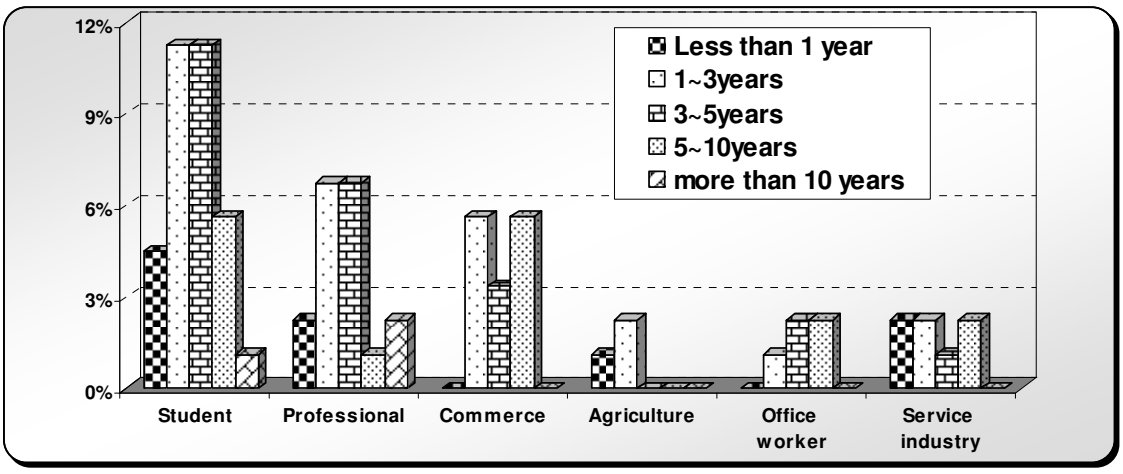
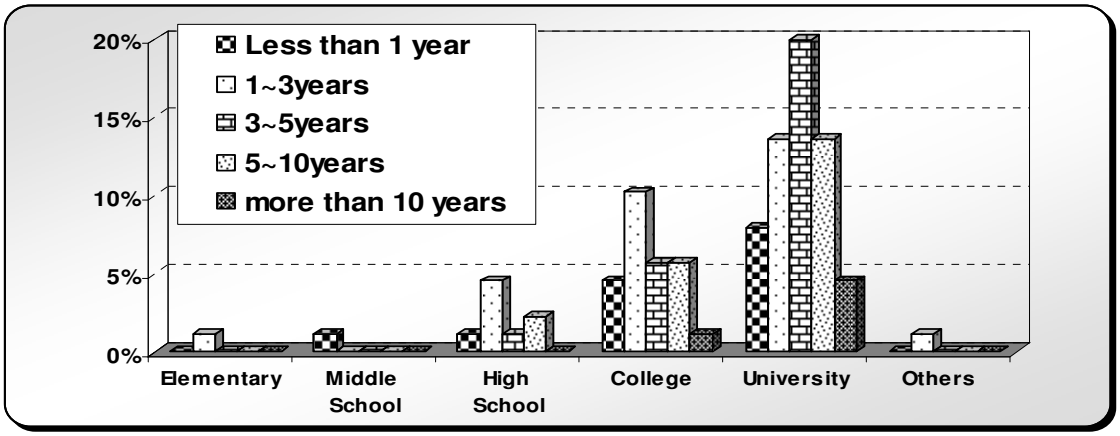


Figure 14. Period since First Started Using PCs at Home (by Educational Background)



4.2.2. Average Time Spent on PC per Day

To the question that asked the time spent using the Internet per day, 1-2 hrs accounted for most of answers at 32%, and 67% of respondents used the Internet for 30mins to 3hrs per day. By gender, 1-2hrs usage was most common among males, at 33%, and among females, 30mins to 1hr was most common at 42%. Thus, even after considering that there were not many females surveyed, it shows that women use the Internet for shorter length of time than men. Just as found in the period since first started using PC, the Internet usage rate was highest among students at 34% and it was 15% in the commercial sector and only 3% in the agricultural sector. Considering that the Nepali economy has 78% agricultural dependency, it is important to expand the Internet throughout the entire industry, including the agricultural sector in particular.

Figure 15. Average Time Spent on PC Per Day

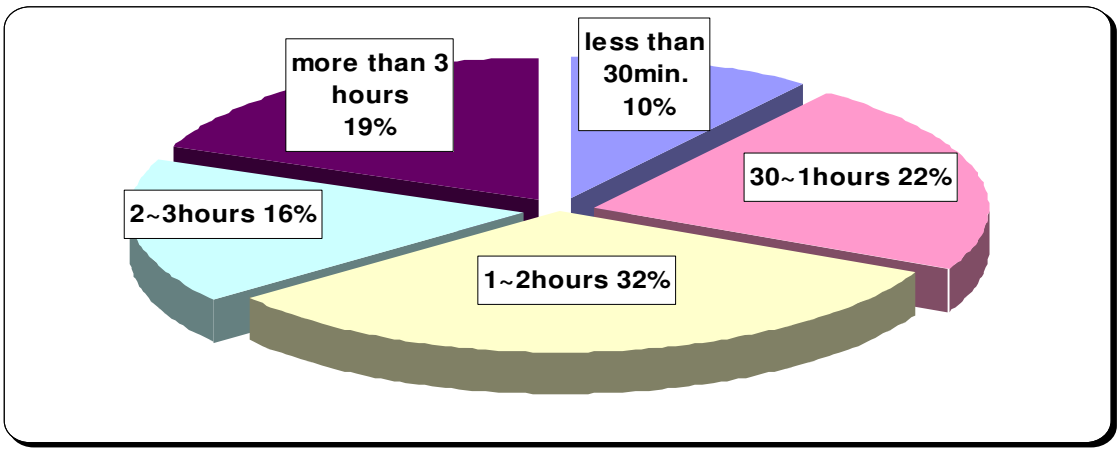


Figure 16. Average Time Spent on PC per Day (by Gender)

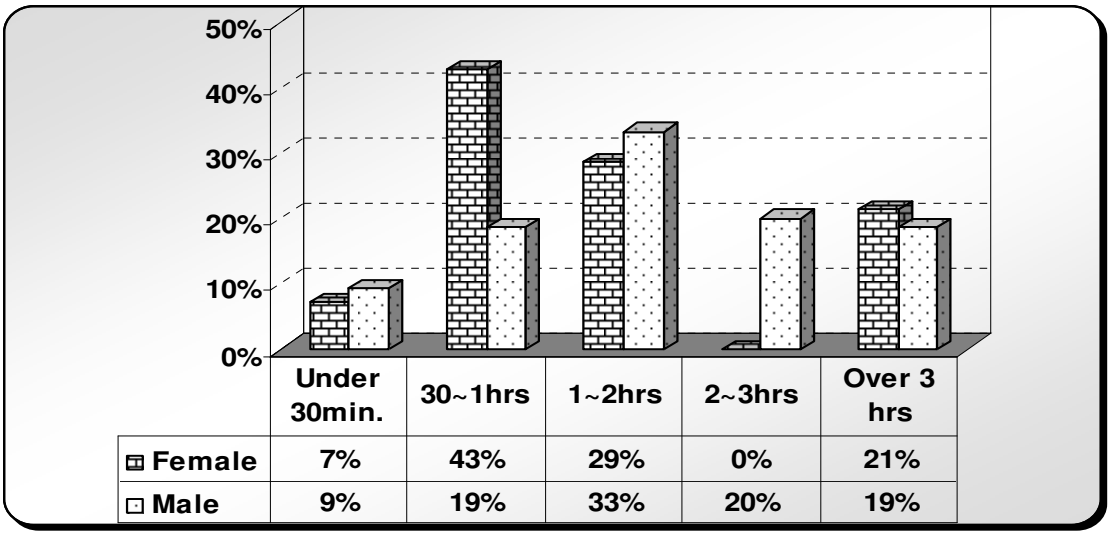
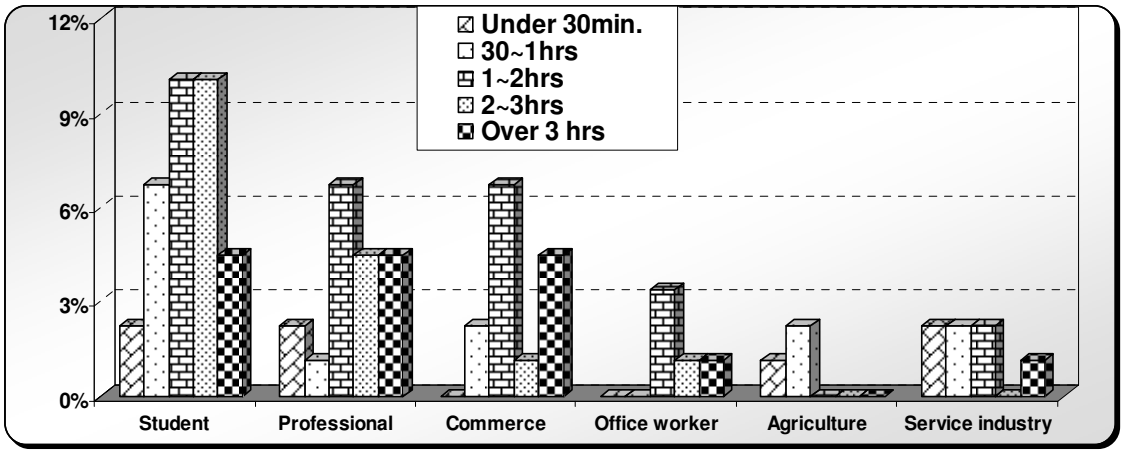


Figure 17. Average Time Spent on PC per Day (by Occupation)



4.2.3. Main Purpose of Using PC

To the question that asked what is the main purpose of using PC, 31% answered for internet browsing, 30% answered for educational purposes, 16% answered to use the e-mail, and 13% answered for work. Among students, it was in the order of education, internet surfing and game, and among businesses, it was in the order of internet surfing, work and e-mail. It shows that PC is still more commonly used for personal or educational purposes than for business purposes.

Figure 18. Main Purpose of Using PC (Total)

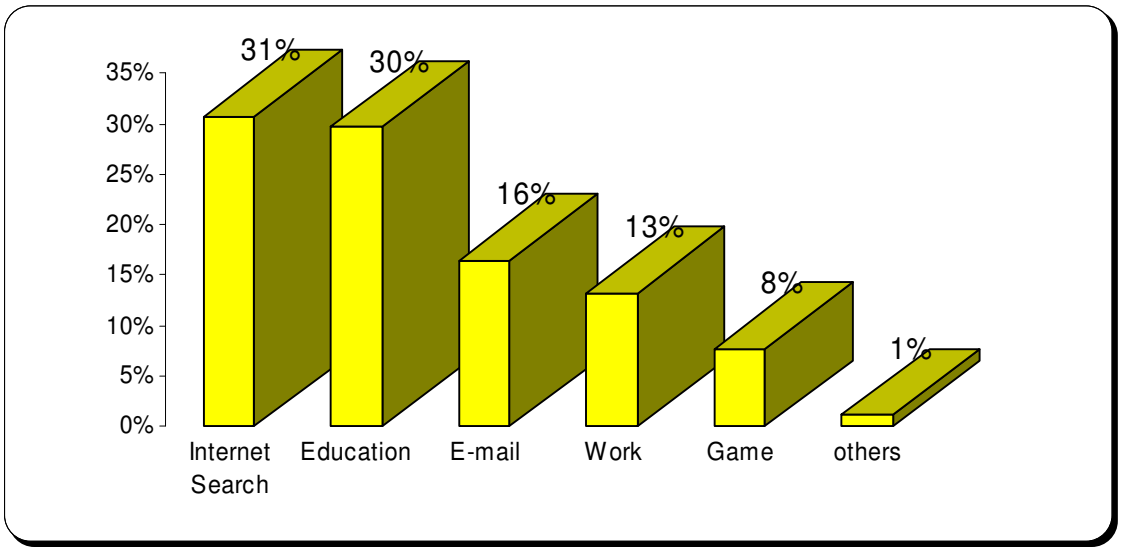
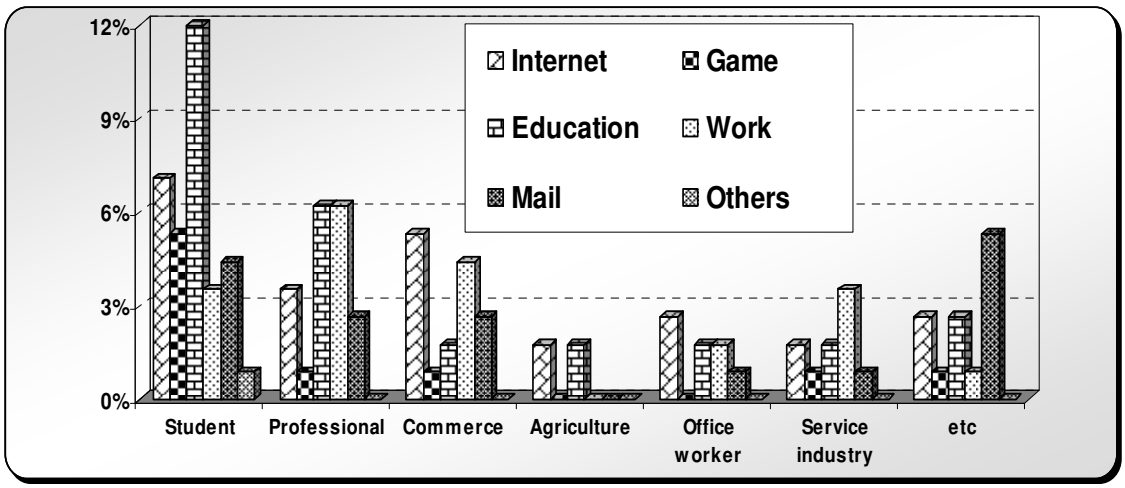


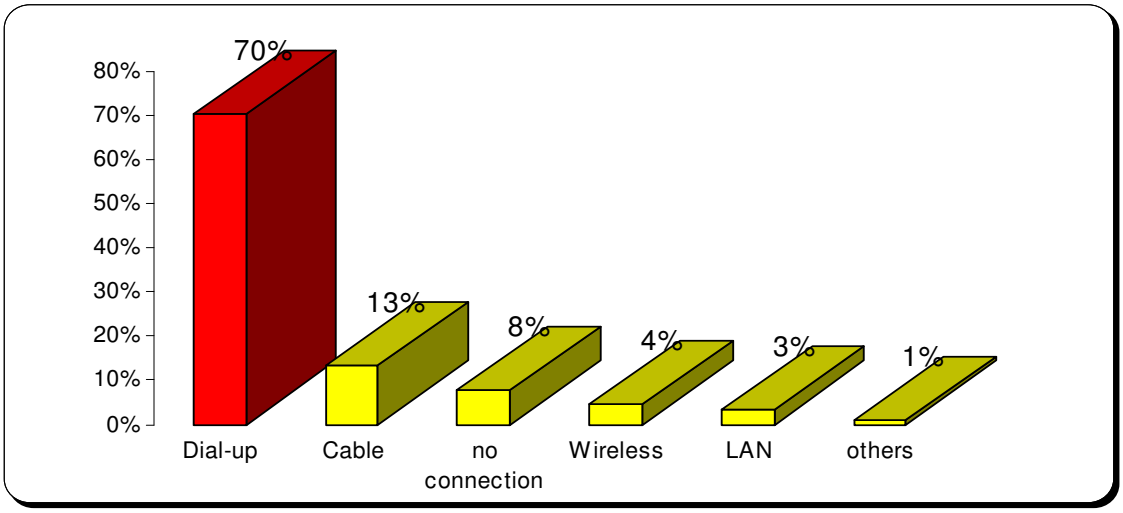
Figure 19. Main Purpose of Using PC (by Occupation)



4.2.4. Internet Access Methods

As the method to access the Internet, dial-up method accounted for 70%, and the rest in the order of cable, wireless and LAN. The dial-up method has maximum speed of 64Kbps, which is quite low to efficiently utilize the current multimedia environment. Thus, it is necessary to construct an environment where the very high speed internet, such as xDSL, HFC, can be used.

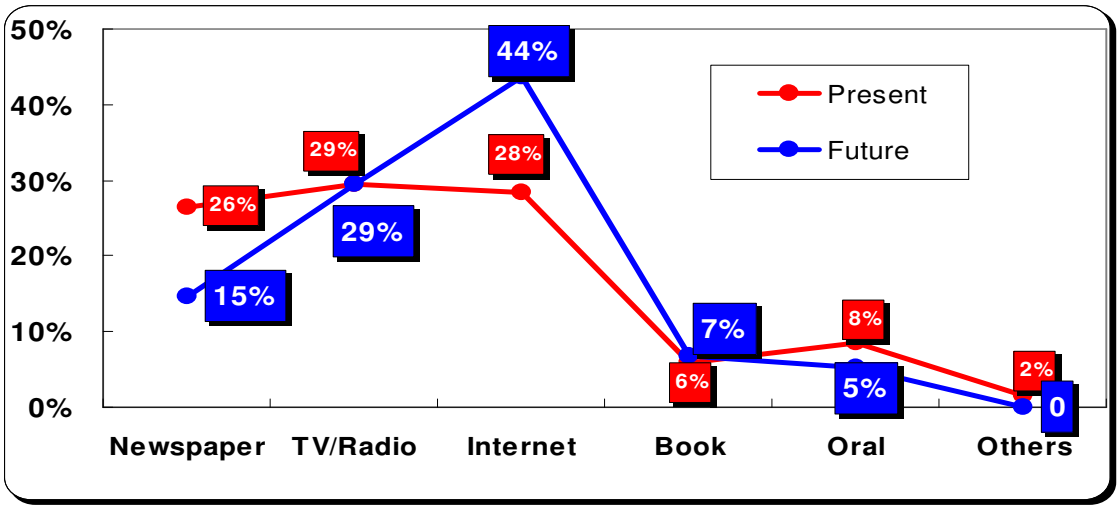
Figure 20. Internet Access Methods



4.2.5. Main Media Used To Get Information (Present & Future)

TV(29%), newspaper(26%) and the Internet(28%) were found as the present media used to get information. Here, the proportion of the Internet is high because 91% of those surveyed are using PCs. Thus, the survey result is affected by the disproportionate respondents. As the expected media for the future, the proportion of newspaper drops from 15% to 11%, whereas the proportion of the Internet increases dramatically from 28% to 44%. This is because of the expectation that the whole world would be able to get information faster and more conveniently through the Internet in the future.

Figure 21. Media Used to Get Information (Present & Future)



4.2.6. Information That the Public Needs

Information that the public needs is in the order of education (31%), technology (22%) and economy (13%) information. Those in the age group of students have high interest in education-related information, while those aged above 40 and those in the service industry have higher interest in economy. This indicates what kind of information needs to be provided through the Internet.

Figure 22. Information That the Public Needs

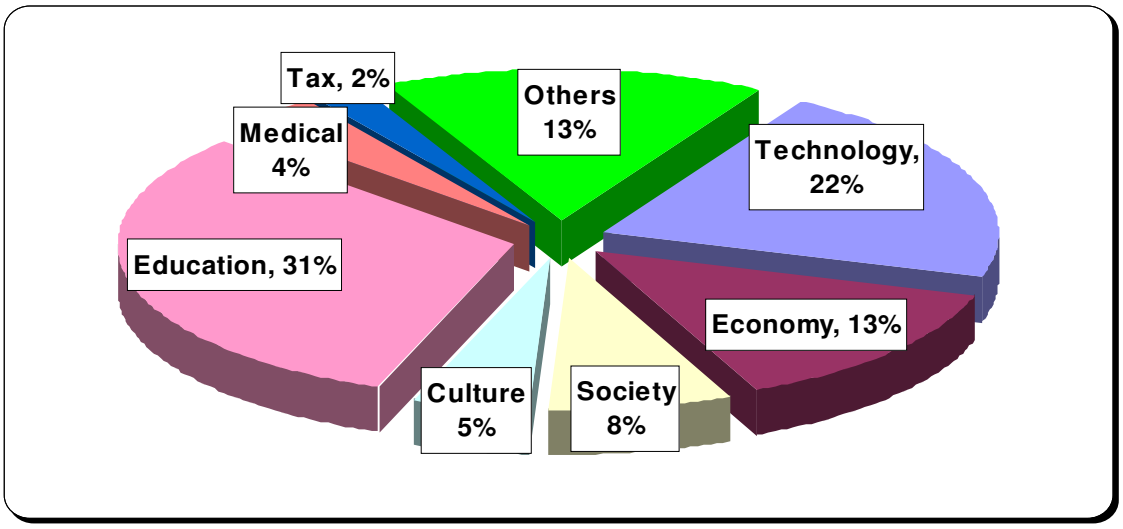
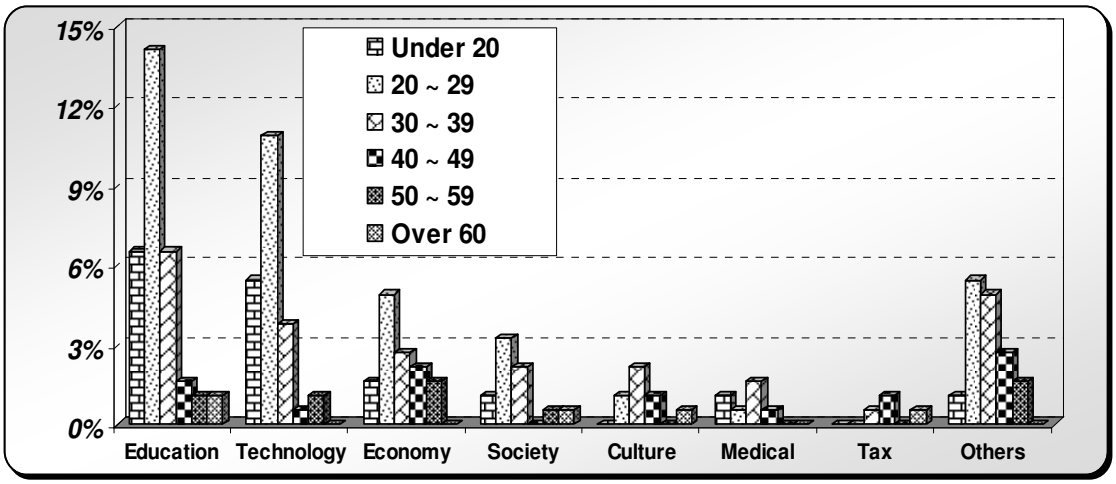


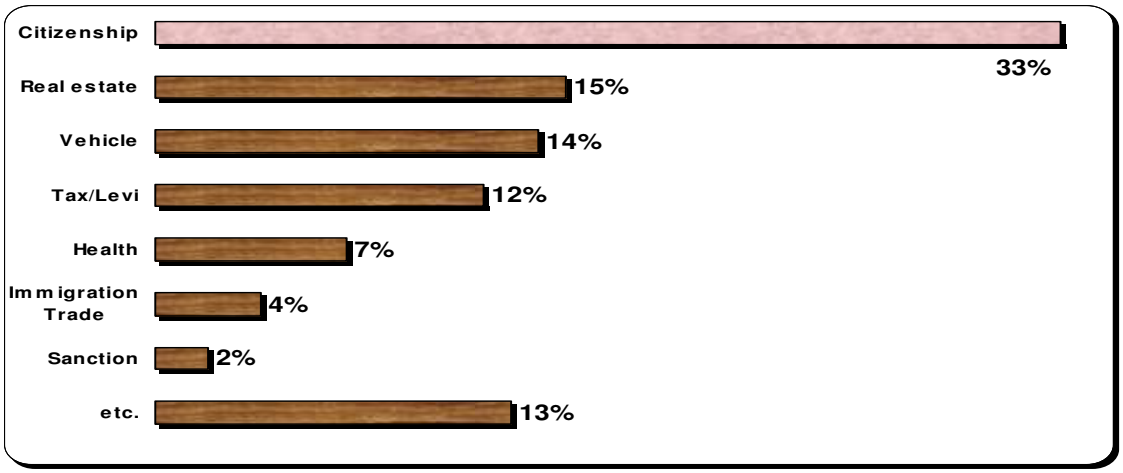
Figure 23. Information That the Public Needs (by Age)



4.2.7. Most Frequently Used Administrative Service

As the most frequently used administrative service, the resident registration topped at 33%, followed by real estate at 15%, vehicle at 14%, tax/levy at 12%, and health at 7%. This result indicates what should be the priority in the e-government project.

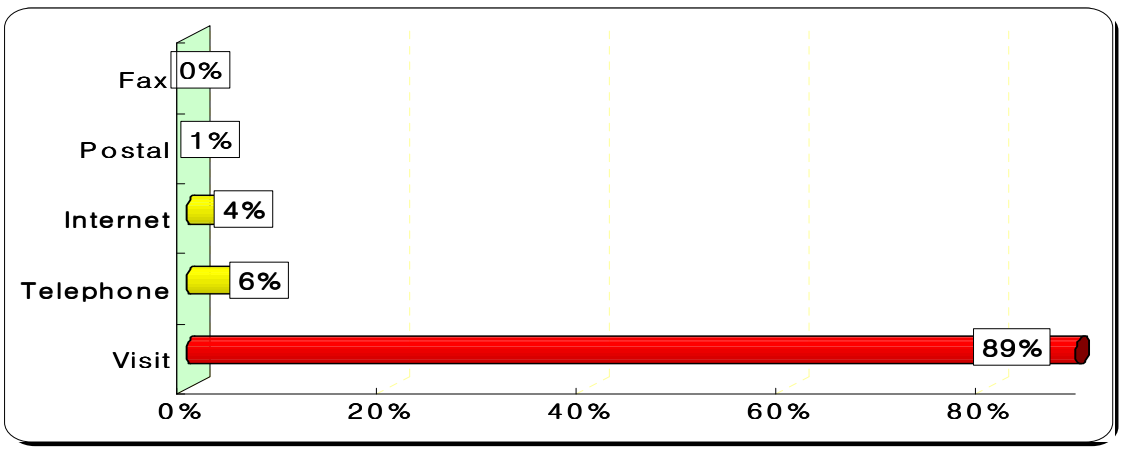
Figure 24. Most Frequently Used Administrative Service



4.2.8. Ways to Get the Administrative Service

89% of the Nepali public visit the government office in person to get administrative services, while around 6% use the phone and only 4% use the Internet. This shows that various channels need to be developed to provide administrative services more efficiently and promptly.

Figure 25. Ways to Get the Administrative Service



4.2.9. Satisfaction on Administrative Services Offered by the Government

To the question that asked about their satisfaction on the government's administrative services, 91% of respondents answered normal or below. Only 1% answered that the services are good or very good. In particular, 95% of female respondents answered that the services are normal or below, indicating the necessity to improve satisfaction of female users. Also, the analysis on satisfaction level by occupation showed that professional, office work and agricultural sectors have lower satisfaction than the commercial sector.

Figure 26. Level of Satisfaction on Administrative Services Offered by the Government

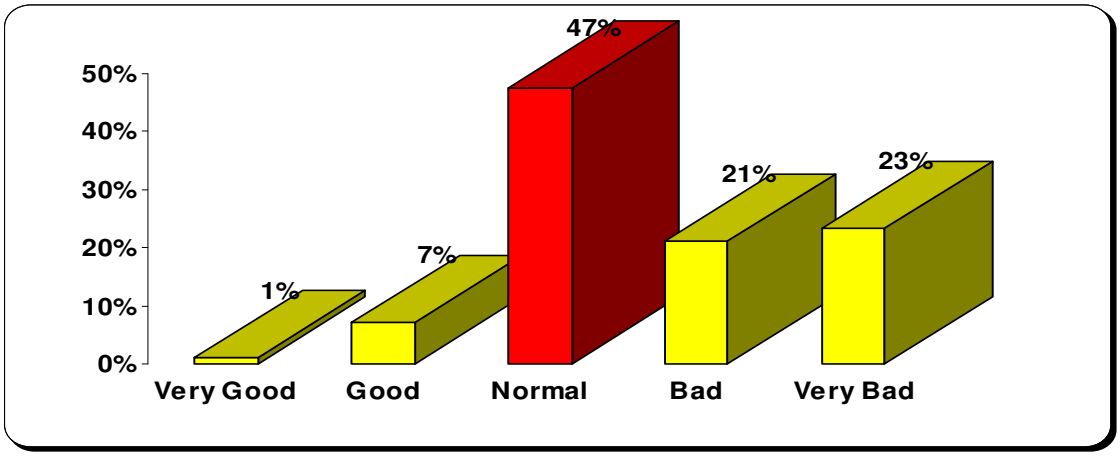
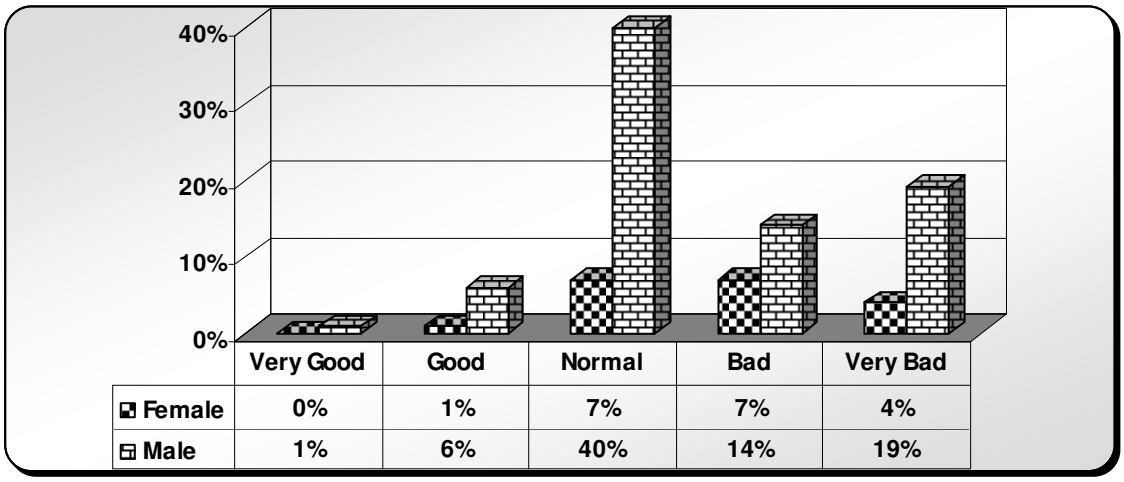
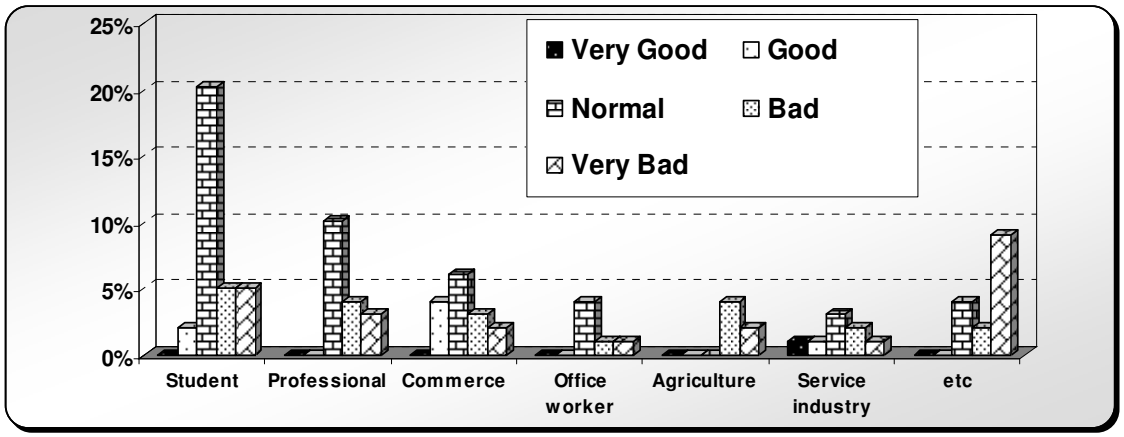


Figure 27. Level of Satisfaction on Administrative Services Offered by the Government (by Gender)



	Very Good	Good	Normal	Bad	Very Bad
Female	0%	1%	7%	7%	4%
Male	1%	6%	40%	14%	19%

Figure 28. Level of Satisfaction on Administrative Services Offered by the Government (by Occupation)



4.2.10. What Needs the Improvement the Most

To the question that asked what needs to be improved the most in order to improve the national administrative services, 41% answered slow work execution, followed by customer satisfaction deficiency at 30% and complicated work flow at 25%. By occupation, the analysis showed that students cited customer satisfaction deficiency, the commerce sector cited complicated work flow, and the agriculture and service industry cited slow work execution as what needs to be improved the most, respectively. This survey as a whole shows that there are many areas that need to be improved in the national administrative services.

Figure 29. What Needs to be Improved the Most

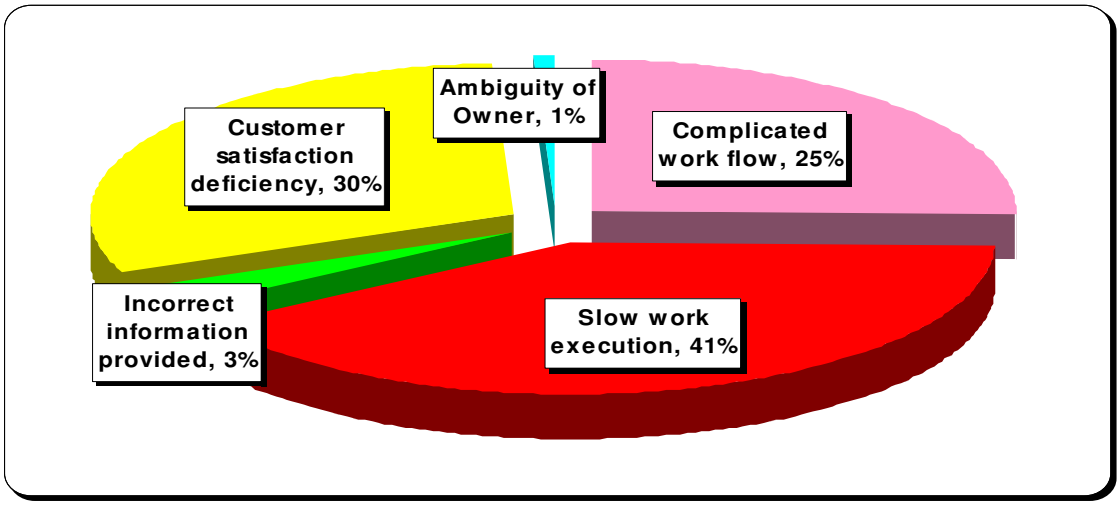
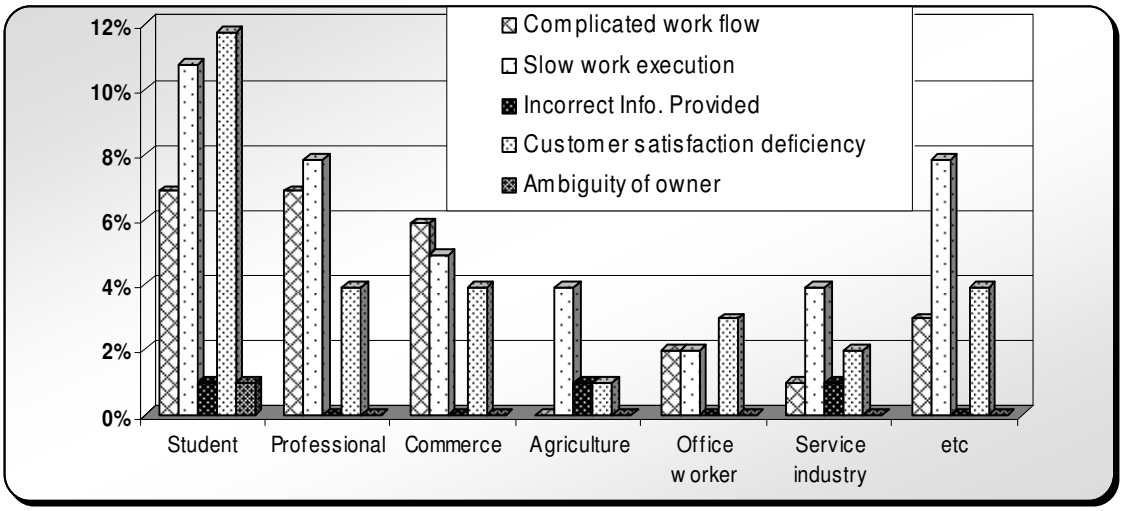


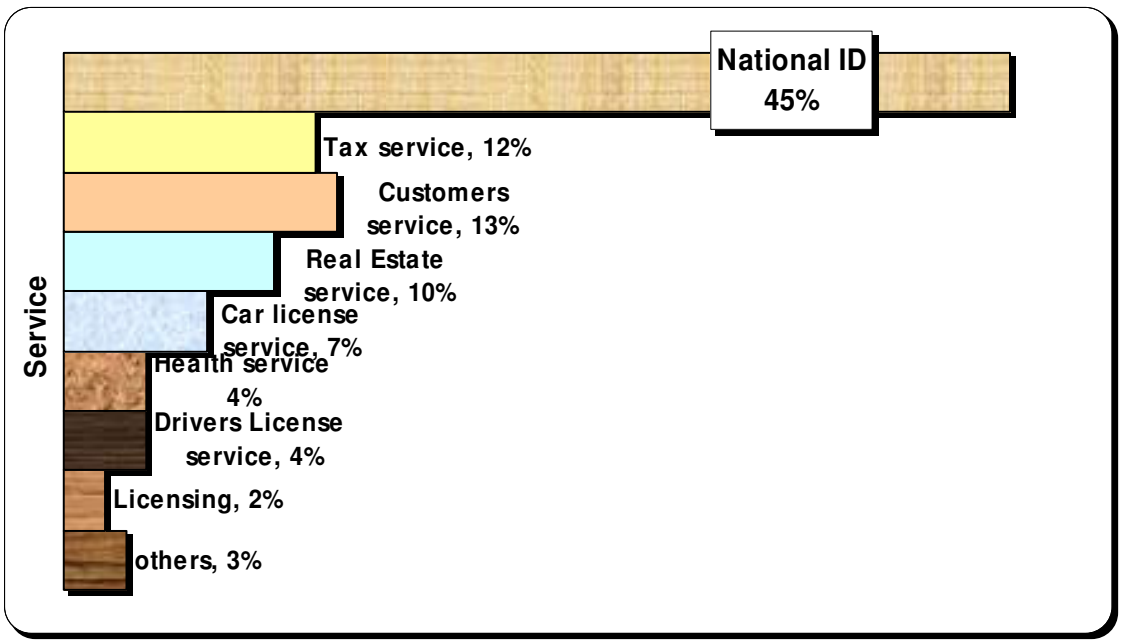
Figure 30. What Needs to be Improved the Most (by Occupation)



4.2.11. Administrative Service That Needs Computerization Most Urgently

To the question that asked which administrative service needs to be computerized first, most cited the National ID service at 45%, followed by customer service at 13%, tax service at 12%, real estate at 10%, and car license service at 7%.

Figure 31. Administrative Service that Needs Computerization most urgently



4.2.12. Level of Understanding on the ICT Project

To the question that asked their level of understanding on the Nepali government's ICT project, medium, not much and nothing accounted for majority of answers at 81%. This shows that there is lack of promotion and insufficient implementation by the government and indifference among the public on the ICT project. In particular, those in the agricultural industry had very low knowledge of the project compared to students. This indicates that the ICT project needs to be implemented more aggressively in the agricultural sector that accounts for 78% of the Nepali economy.

Figure 32. Level of Understanding on the ICT Project

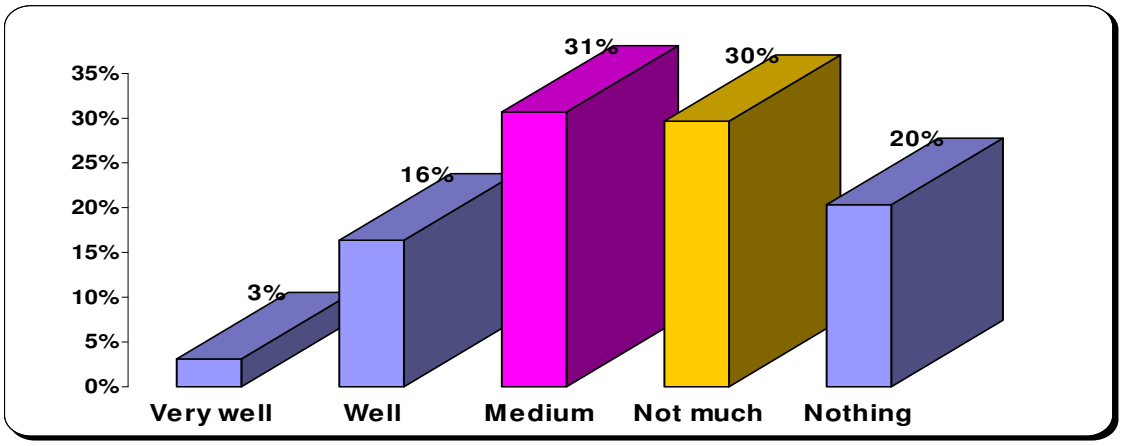
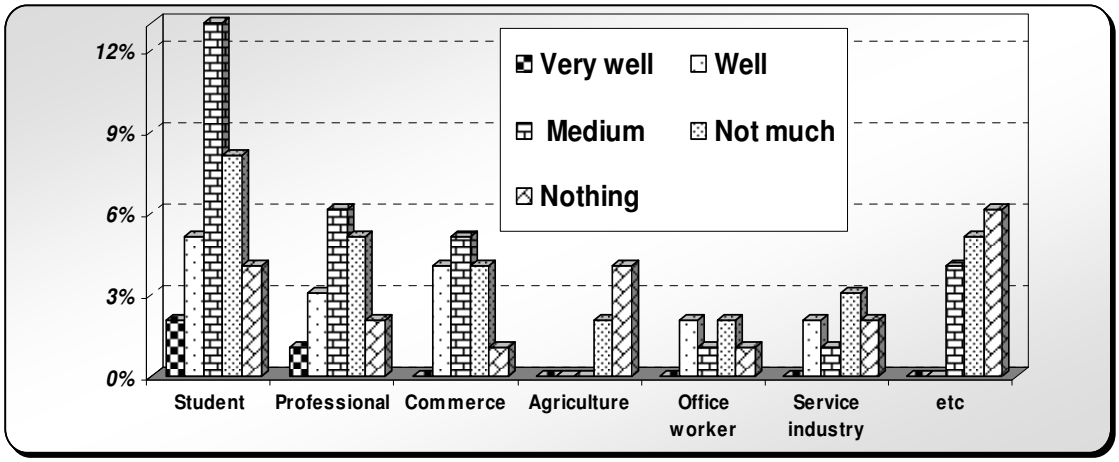


Figure 33. Level of Understanding on the ICT Project (by Occupation)



4.2.13. The Most Important Thing for Development of the Nepali Economy

To the question that asked what is the most important thing that the government needs to do to develop the Nepali economy, 26% of respondents answered easing government regulations. It was followed by computerizing administrative services, at 23%, and corruption at 16% of respondents. Yet, as the second most important thing, respondents cited in the order of guaranteeing security at 24%, efficiency in administrative services at 18%, and eradication of irregularities and corruption at 16%. This indicates that when government regulations are eased and administrative services are computerized, the public expects to achieve security and drop in crimes, as well as efficiency in administrative services. Also, those in their 20s pointed out relaxation of administrative regulations and computerization of administrative services as the most important factors, while those in their 30s pointed out the eradication of irregularities and corruption and relaxation of administrative regulations as the most important factors. It means that the economically active population regards corruption as the key issue that the government needs to solve the first.

Figure 34. The Most Important thing for Development of the Nepali Economy

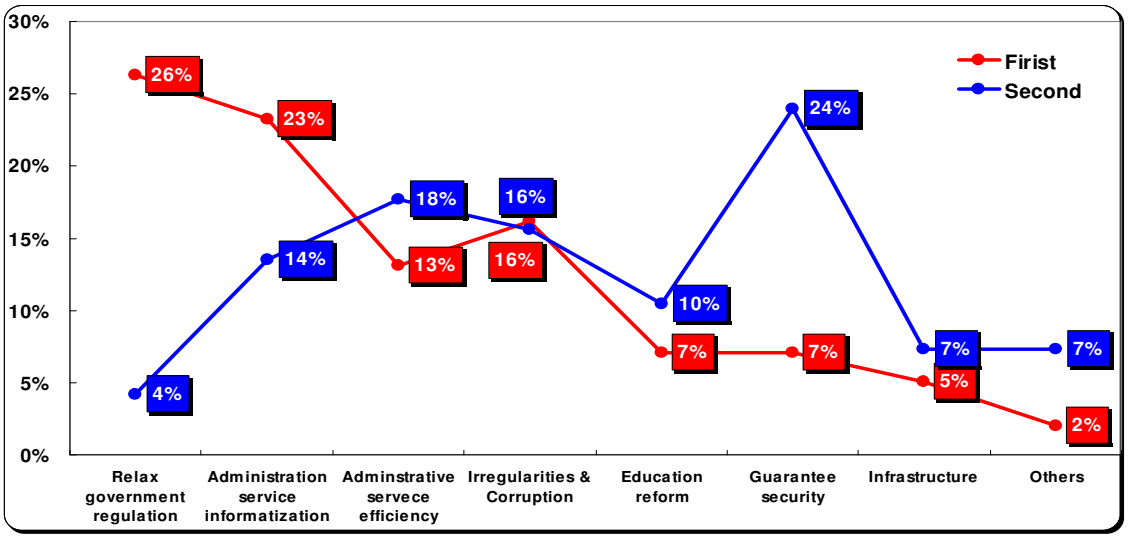
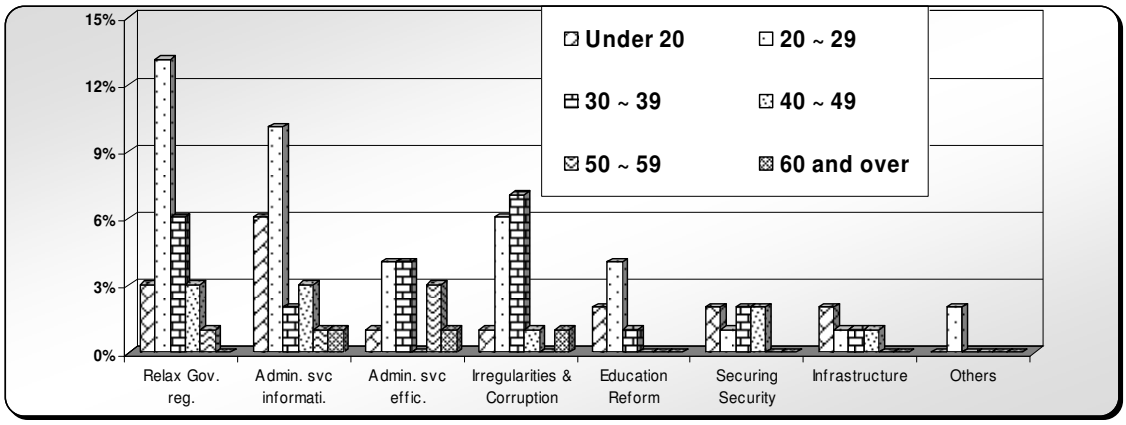


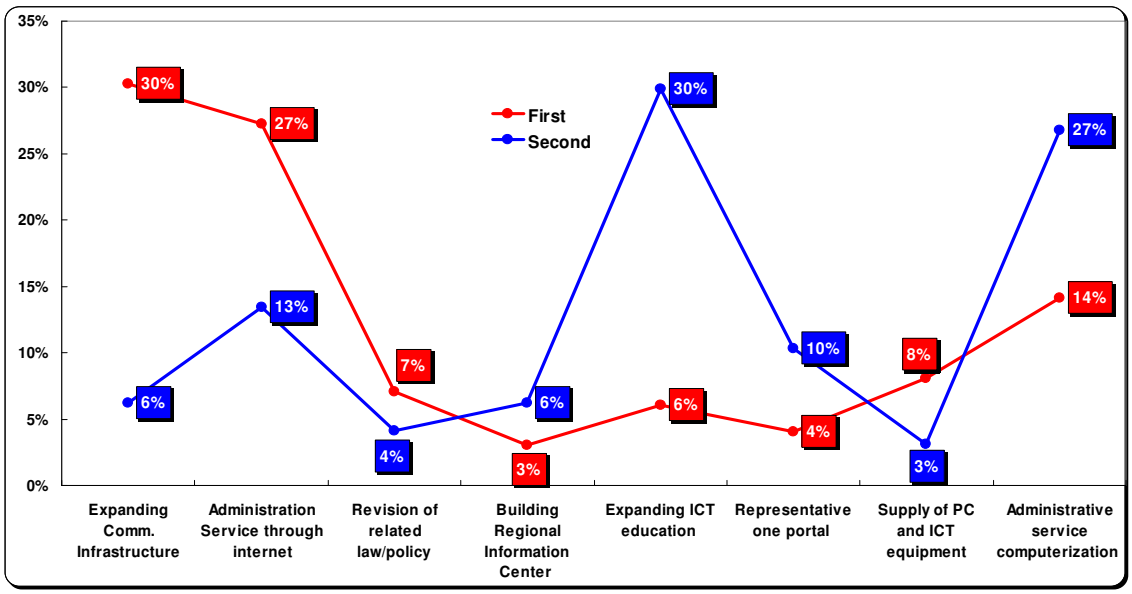
Figure 35. What is the Most Important for Development of the Nepali Economy (by Age)



4.2.14. High Priority Projects Needed to Realize the e-Government in Nepal

Respondents cited the following projects as having the highest priority if Nepal were to realize the e-government: Expansion of the communication infrastructure (30%), provision of administrative service through the Internet (27%). As the project with the second highest priority, expanding ICT education was selected by 30% of respondents and computerization of administrative services was chosen by 27% of respondents. This shows that in order to construct the e-government in Nepal as envisioned by the public, communication infrastructure needs to be expanded, the Internet needs to be distributed to the wider public, and administrative services need to be computerized.

Figure 36. High Priority Projects needed to Realize the e-Government in Nepal



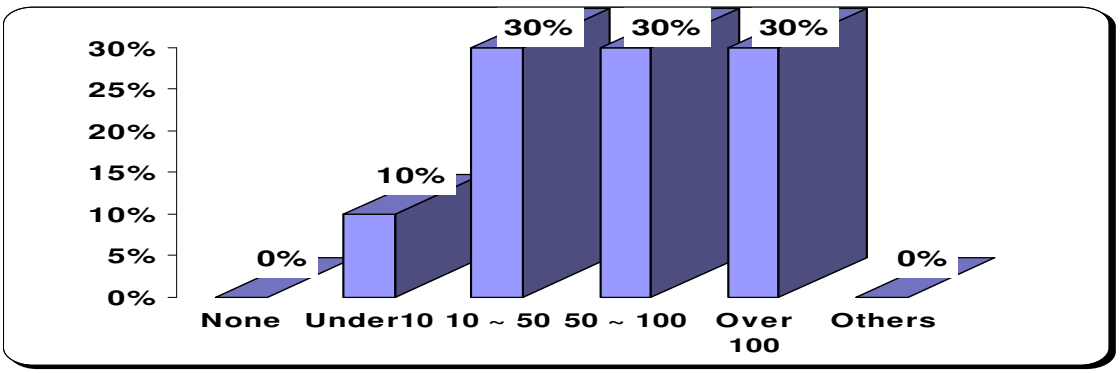
4.3. Analysis of Company Survey

When investigating the requirements by stakeholders of the e-government master plan, such as citizens, businesses and the government, several companies were randomly selected. Among those companies, five are electronic communications providers, three are service companies and two are education-related companies. Two of these companies have less than 10 employees, five have ten or more but less than 50 employees, one have 50 or more but less than 100 employees, and two companies have 100 or more employees. The survey was conducted in a face-to-face method, by visiting each company, between Mar 23 to 25. Questions for the survey were composed of three types: Those on the current ICT environment, on how to improve national administrative service and some general questions.

4.3.1. Number of PCs Owned by the Company

90% of respondents said that they have ten or more PCs in the company. It shows that relatively large-sized companies with good PC penetration rate participated in the survey.

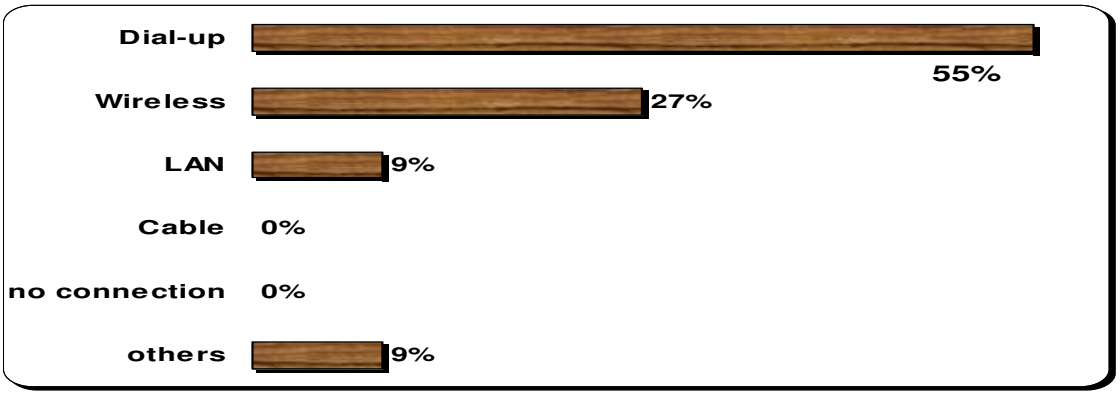
Figure 37. Number of PCs Owned by the Company



4.3.2. Internet Access Methods

To the question that asked how the company accesses the Internet, 55% answered the dial-up method, showing small difference from the general public (70%). The dial-up method is still a predominant way to access the Internet, and thus, internet speed needs to be improved.

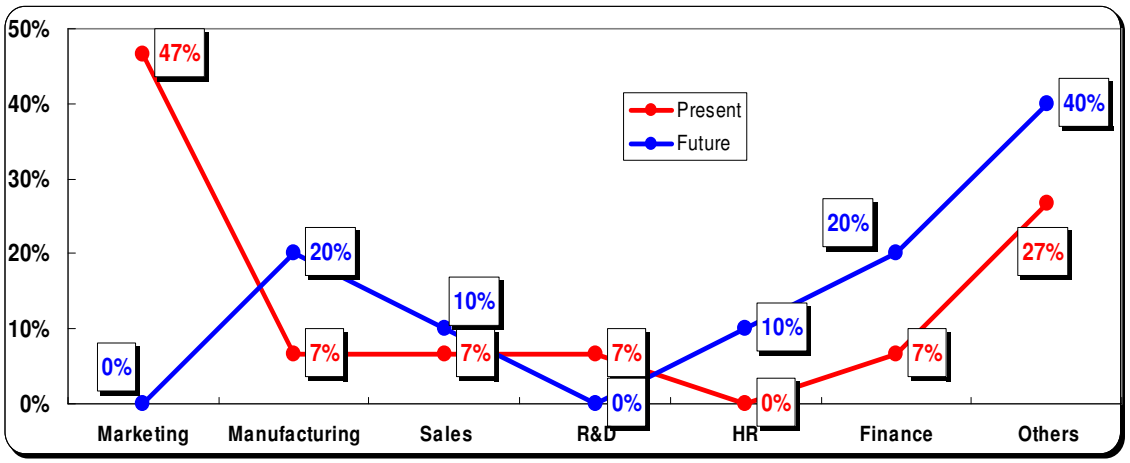
Figure 38. Internet Access Methods



4.3.3. Comparison Between Processes That Are Already Computerized and Processes That Are To Be Computerized

Computerization of company processes that are already completed are in the order of marketing (47%), manufacturing (7%), sales (7%), and finance (7%). Those processes that need to be computerized are in the order of finance (20%), manufacturing (20%), sales (10%), and HR (10%).

Figure 39. Comparison between Processes that are already Computerized and that are to be Computerized

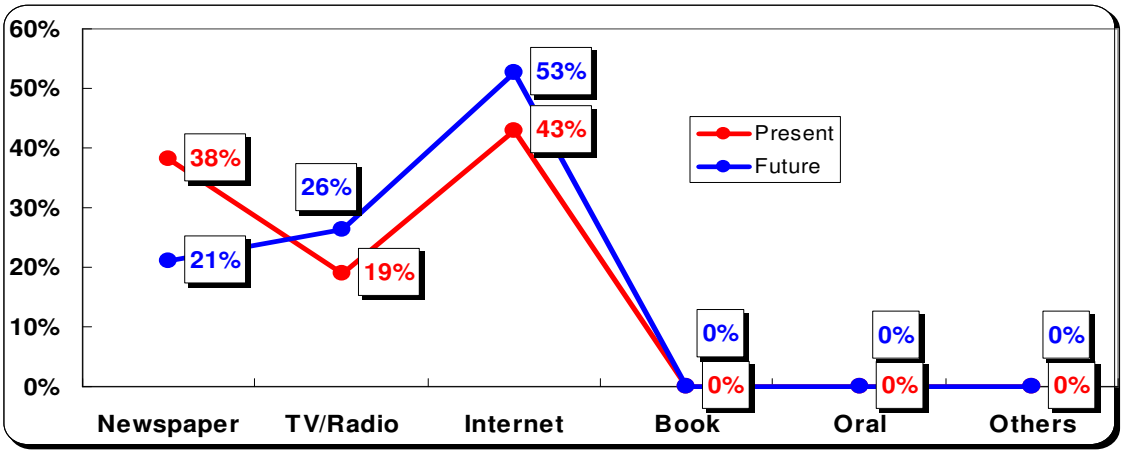


4.3.4. Media Used to Get Information (Present & Future)

Respondents cited the Internet (43%), newspaper (38%) and TV (19%) as the present media used to get information. This shows that just like the general public,

companies have much higher expectations on the Internet (53%) than on any others as the future medium to get information.

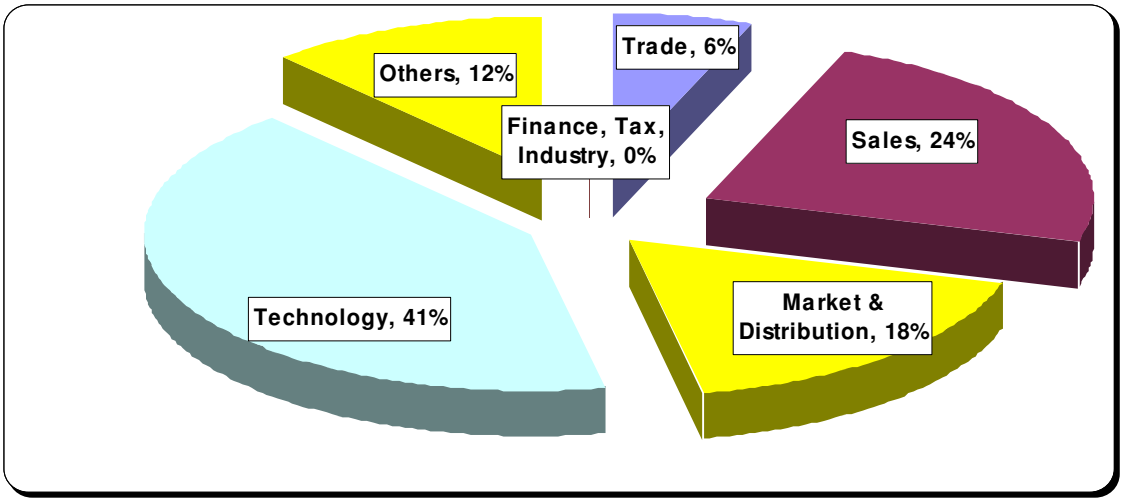
Figure 40. Media Used to Get Information (Present & Future)



4.3.5. Information that the Company Needs(Choose 2)

To the question that asked what information a company needs, technology-related information topped the answer at 41%, followed by sales-related information at 24%, market and distribution-related information at 18% and trade-related information at 6%. In this survey, electronic communications providers and service companies accounted for 80% of respondents, explaining why there is such high demand for technology-related information.

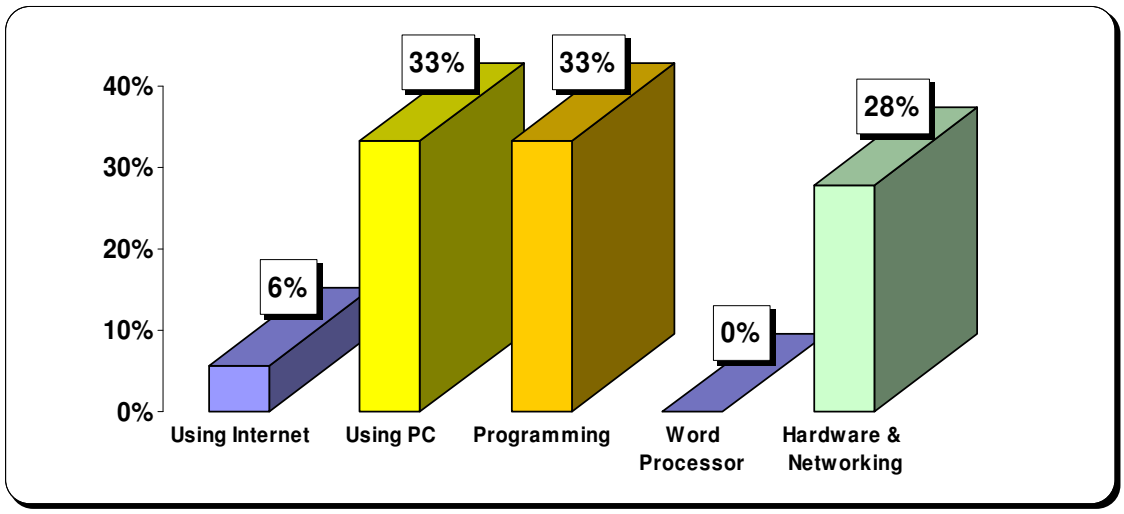
Figure 41. Information that the Company needs



4.3.6. IT Training Courses the Company Needs

To the question that asked what kind of IT education is needed, courses on how to use PCs and how to do programming accounted for 33%, respectively. They were followed by the hardware & networking course, which was 28% of answers. This shows that Nepal needs IT training programs designed for various steps, from basic introduction to how to use a PC to programming courses that teach how to develop actual applications, etc.

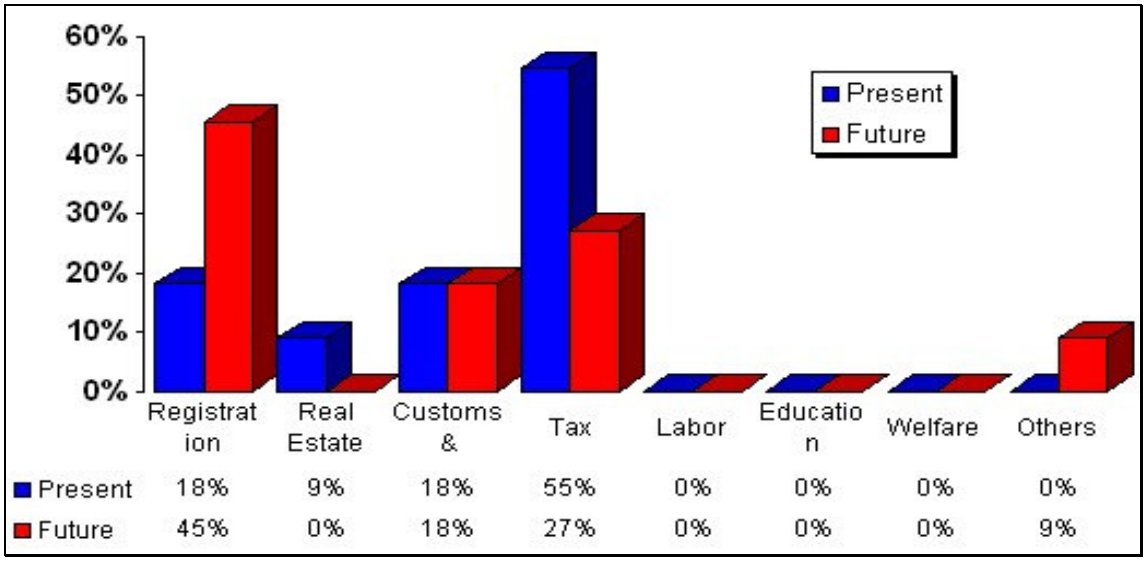
Figure 42. IT Training Courses the Company needs



4.3.7. Most Frequently Used Administrative Service

To the question that asked which administrative service is most frequently used by the company, 55% answers that currently tax service is the most frequently used service. It was followed by customs & trade and registration, which both accounted for 18% of answers, respectively. Yet, to the question that asked which service they expect to use the most in the future, registration service was selected by 45% of respondents. It shows that in the future, there will be high demand for government's registration services, along with the tax service.

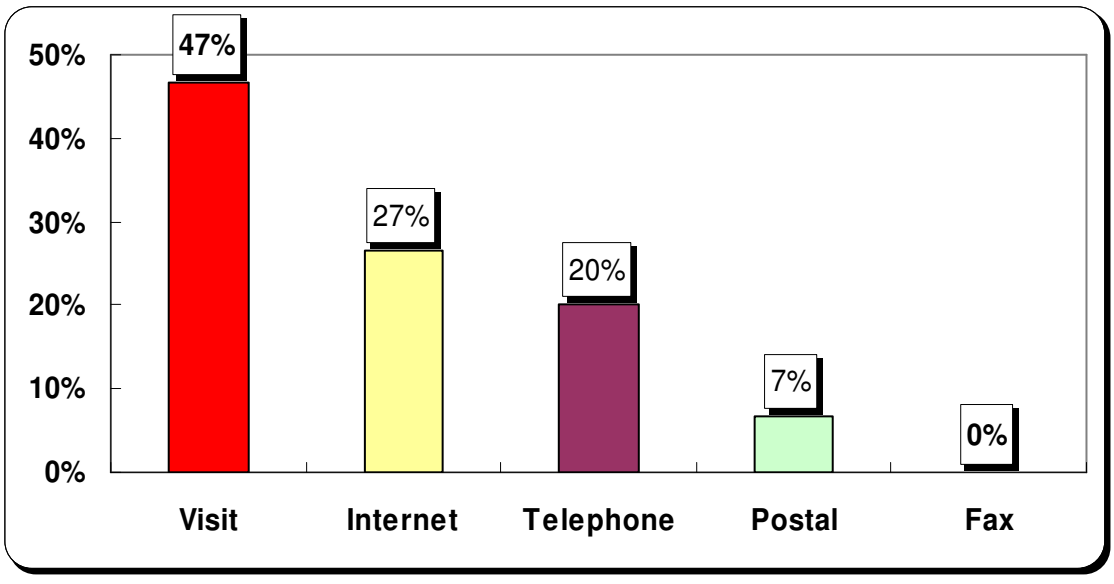
Figure 43. Most frequently Used Administrative Services



4.3.8. Ways to Get Administrative Services

As for the way to get administrative services, just like the general public, most of companies (47%) visited government agencies in person. Next most common way was through the Internet at 27%. Compared to the fact that only 4% of citizens used the Internet to get administrative services, it shows that companies have higher Internet utilization rate and that the Internet is used more actively among companies.

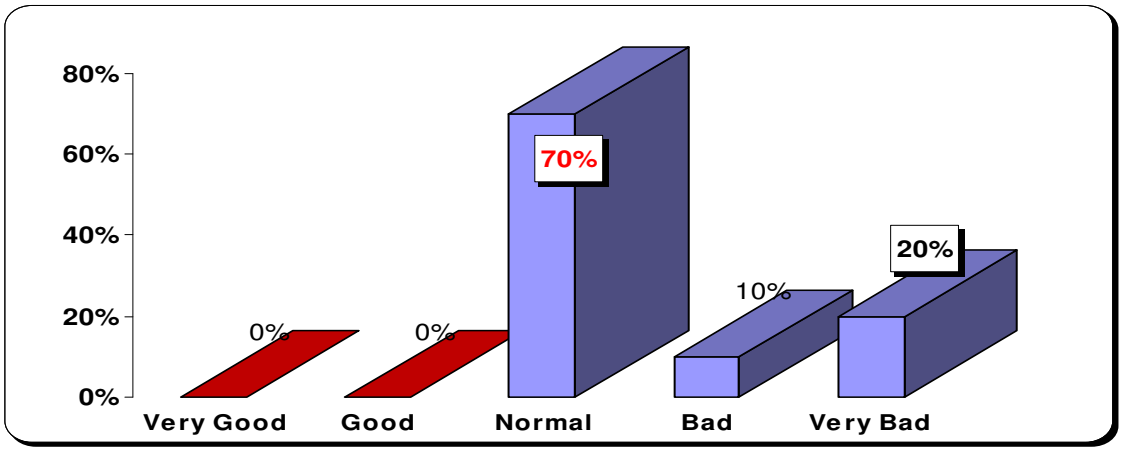
Figure 44. Ways to Get Administrative Services



4.3.9. Level of Satisfaction on the Government's Administrative Services

No one answered 'very good' to the question that asked about their satisfaction on the government's administrative services. It shows that companies are more dissatisfied with the government's services. Thus, government's services to companies need to be improved in particular.

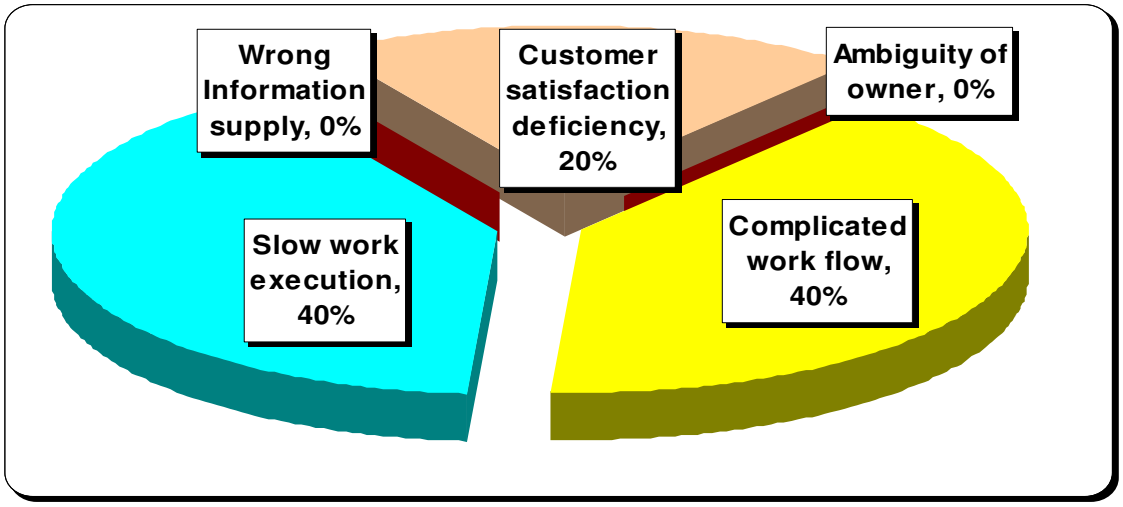
Figure 45. Level of Satisfaction on the Government's Administrative Services



4.3.10. What Should Be Improved In The Government's Administrative Services

To the question that asked why the government's administrative services are so poor, 40% of companies cited complicated work flow and another 40% cited slow work execution. Thus, these areas need to be improved.

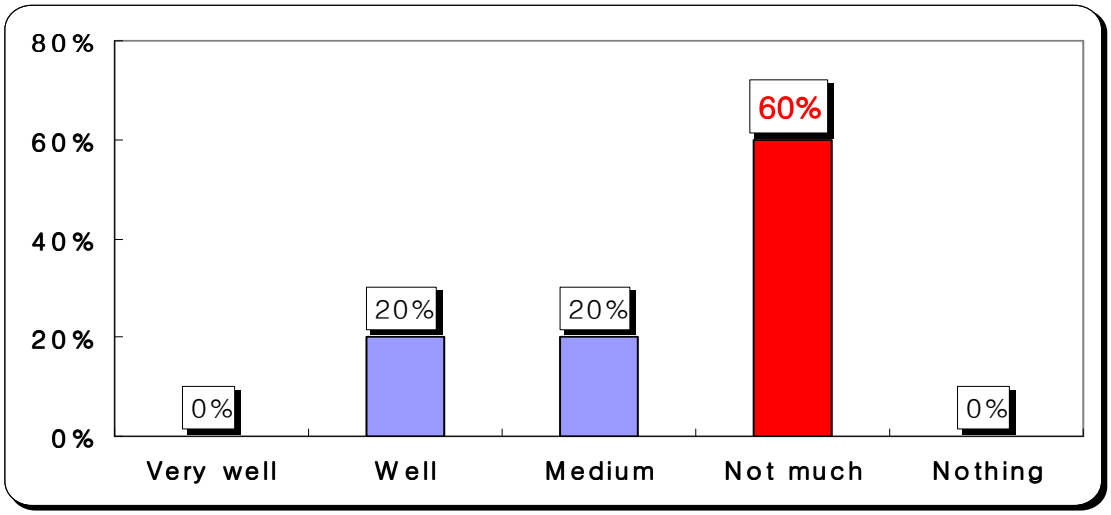
Figure 46. What should be Improved in the Government's Administrative Service



4.3.11. Level of Understanding on Nepali ICT projects

To the question that asked the company's level of understanding on the ICT project implemented by the Nepali government, 60% of respondents answered 'Not Much', indicating that they have low understanding of the project. Thus, the ICT project needs to be executed more aggressively.

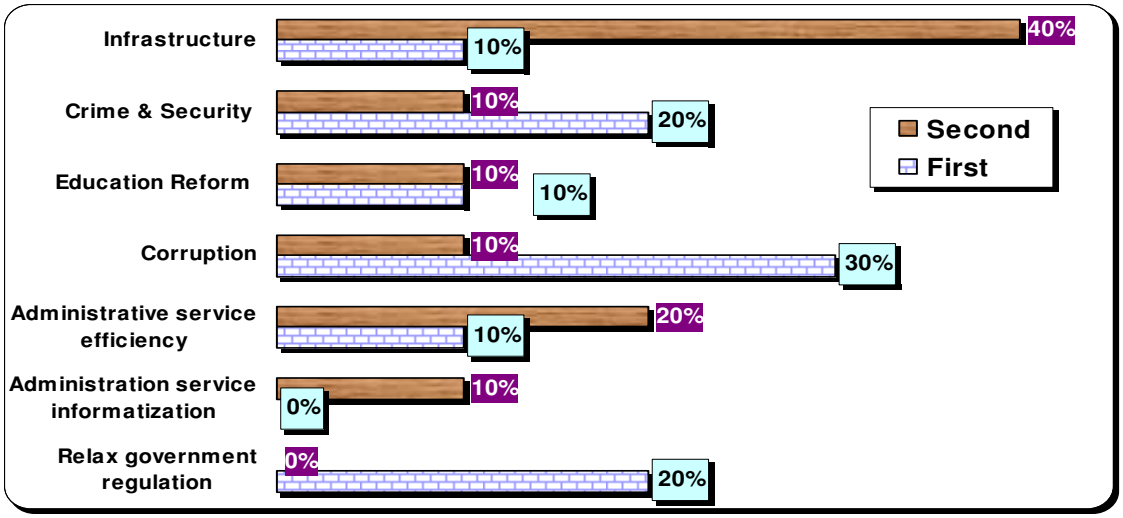
Figure 47. Level of Understanding on Nepali ICT Projects



4.3.12. Priority Tasks for the Industrial Development (Choose 2)

To the question that asked what is the first thing that the government needs to do in order to develop its industry, 30% answered eradication of corruption, 20% answered security and fight against crime. Yet, when asked what the government needs to do second, 40% selected construction of infrastructure and 20% selected efficient administrative services. These results can be summed up as meaning that the first thing to do is to root out corruption and crime, and then establish infrastructure and make administrative services efficient.

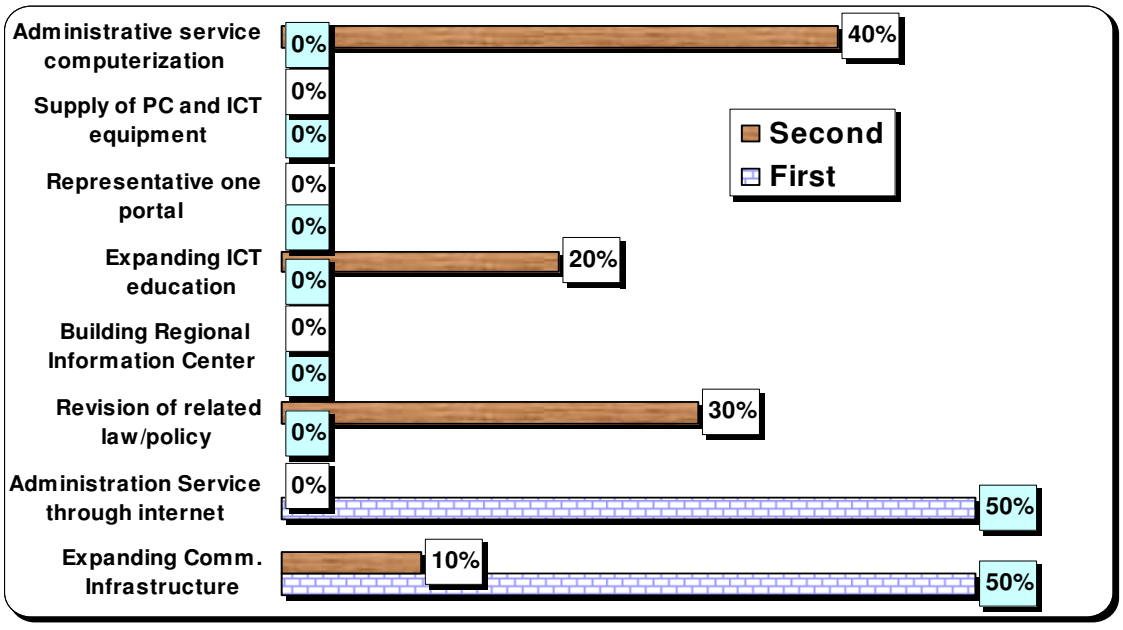
Figure 48. Priority Tasks for the Industrial Development



4.3.13. Priority Tasks to Implement the e-Government (Choose 2)

When asked what is the priority task that the government needs to implement to realize the e-government, companies answered that information telecommunication infrastructure needs to be established (50%), administrative services need to be provided through the Internet (50%), administrative services need to be computerized (40%), and then the legislative system needs to be restructured (30%).

Figure 49. Priority Tasks to Implement e-Government



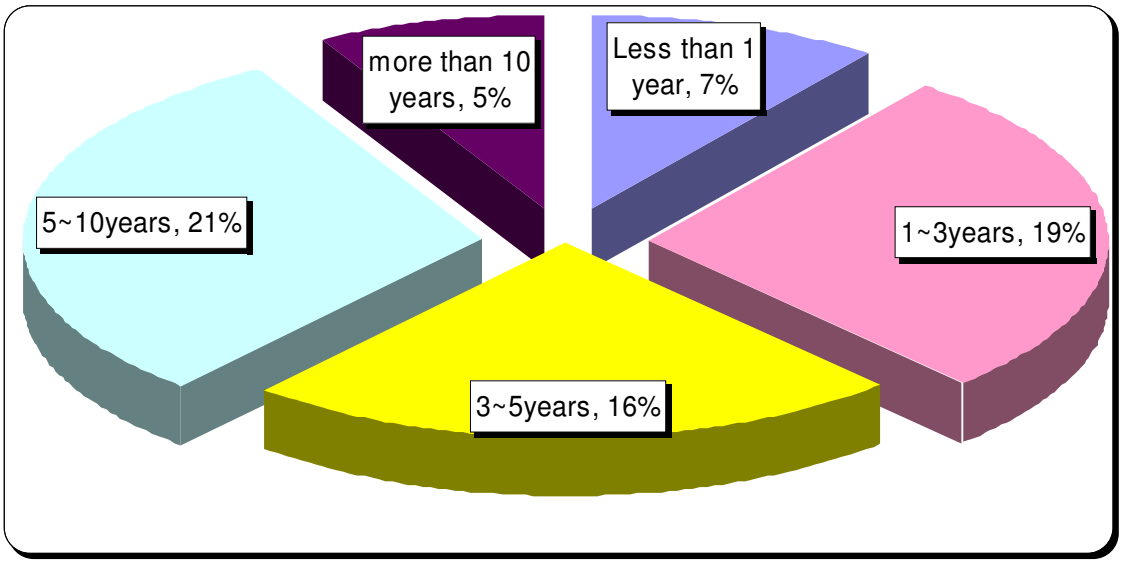
4.4. Analysis of Civil Servants Survey

Civil servants were selected as the next stakeholders to investigate requirements on the e-government master plan. 43 civil servants were selected randomly, and the survey was conducted in face-to-face, from March 19 to April 4. The survey was composed of three parts: questions on the current ICT environment, on how to improve national administration service and some general questions.

4.4.1. Period Since First Started Using PCs for Work

Most of civil servants, 30%, have used PCs for 5-10 years. It shows that the level of PC usage is relatively higher among government agencies compared to the private sector, where the 1 year usage accounted for the majority of answers.

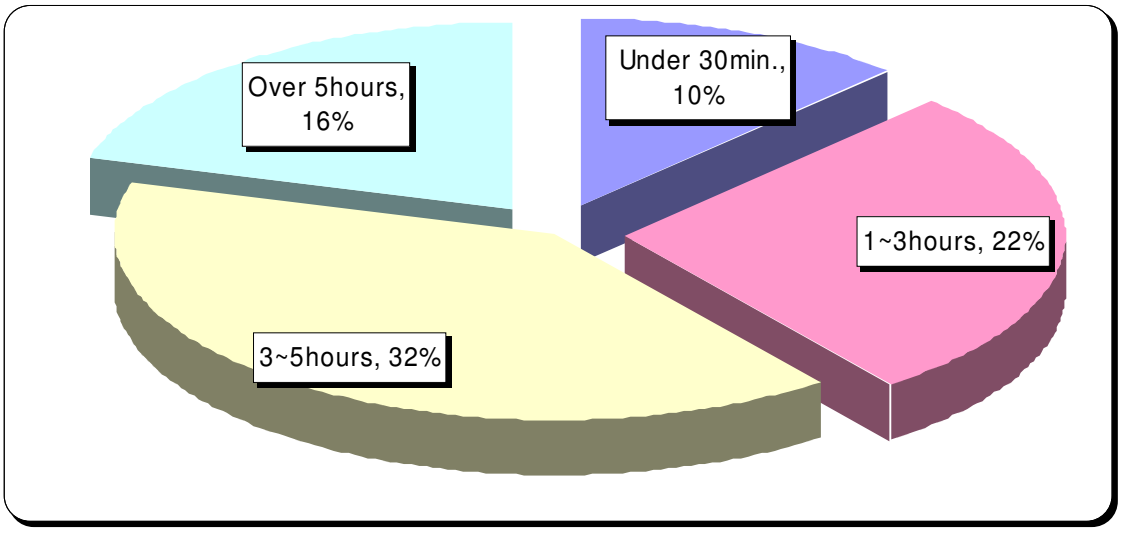
Figure 50. Period since First Started Using PCs for Work



4.4.2. Average Time Spent on PC per Day

86% of those surveyed used PCs for one hour or more on average per day, showing that the time spent on PC is longer among civil servants than among the general public.

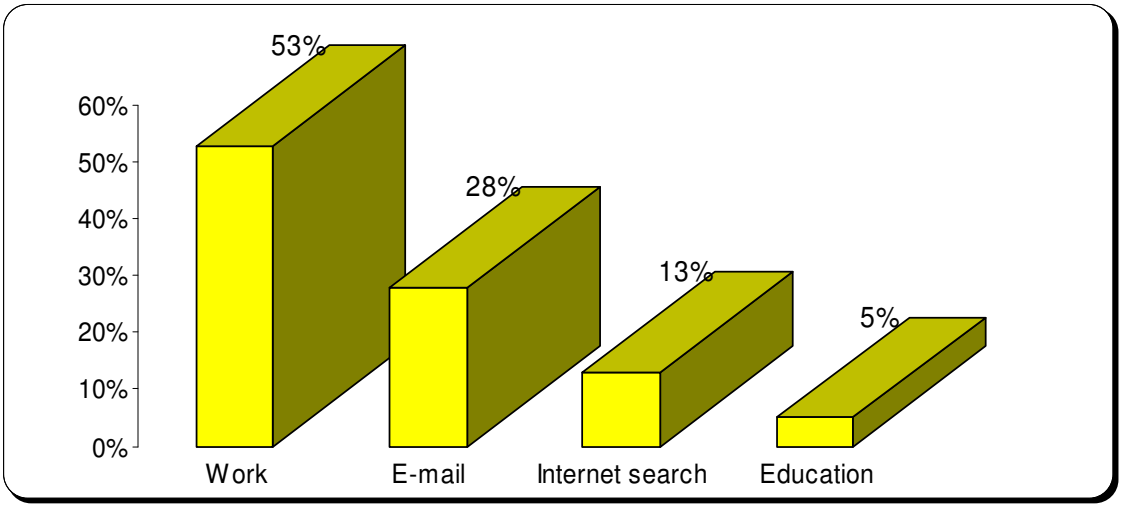
Figure 51. Average Time Spent on PC per Day



4.4.3. Main Purpose of Using PC

To the question that asked what the main purpose of using PC is, 53% answered for work, and it was followed by for e-mails at 28%. It shows that while the general public uses the Internet for Internet browsing the most, civil servants mostly use PCs for their work.

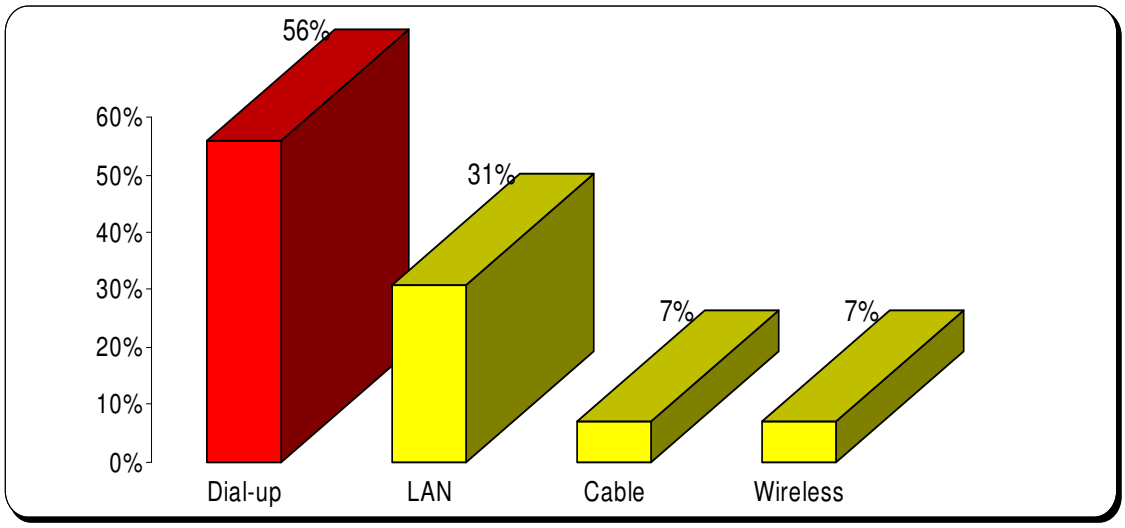
Figure 52. Main Purpose of Using PC



4.4.4. Internet Access Methods

As the method used to access the Internet, the dial-up accounted for 56% of answers, making it the most commonly used method, just as in the other two groups. However, among civil servants, LAN accounted for 31%, which shows that government agencies have higher LAN penetration rate than companies or the public. Still, the dial-up method is one of issues that need to be improved at government agencies as well.

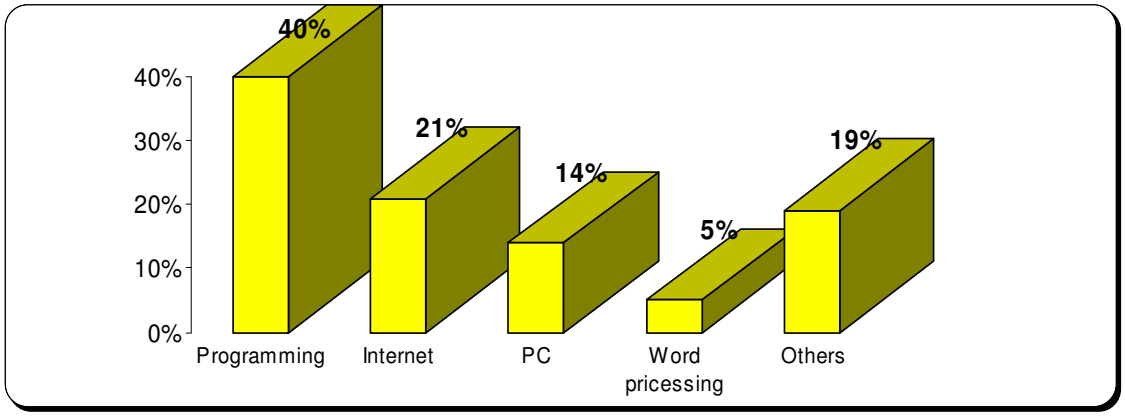
Figure 53. Internet Access Method



4.4.5. IT Training Courses that Civil Servants Want to Take the Most

To the question that asked about the IT training course, 40% of respondents selected programming courses, and it was followed by how to use the Internet at 21% and how to use PCs at 14%. Some civil servants asked for professional training courses, such as those on network, DB, web hosting and etc, showing that various training programs need to be devised to meet different level of computer proficiency.

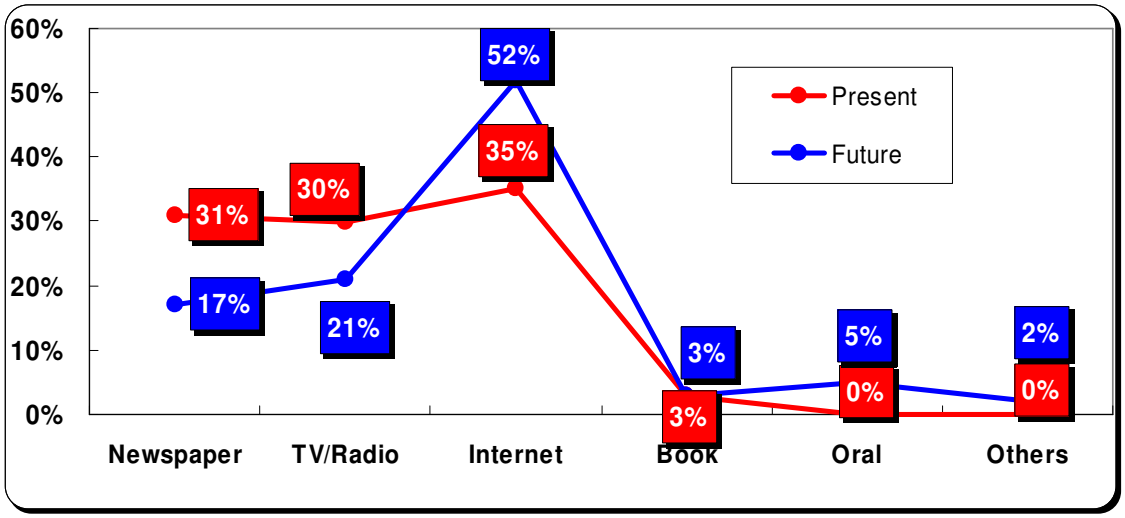
Figure 54. IT Training Courses that Civil Servants Want to Take the most



4.4.6. Medium Used to Get Information (Present & Future)

Just like in other groups, usage of newspaper and TV to get information is expected to decrease while the Internet is expected to rise as the dominant medium for getting information at 52% in the future.

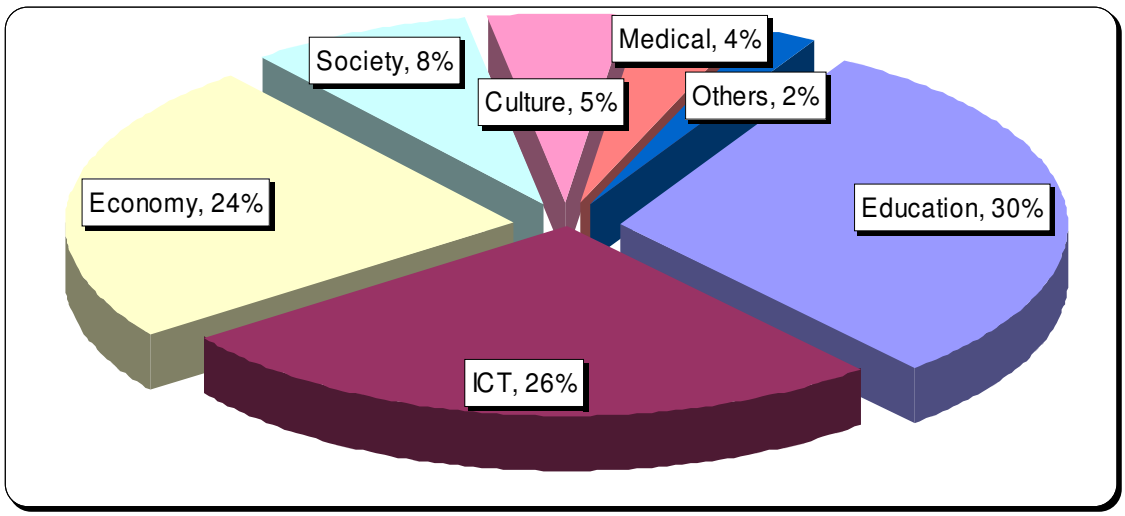
Figure 55. Medium Used to Get Information (Present & Future)



4.4.7. Information Required the Most Relating to Work

To the question that asked what kind of information civil servants need in relation to their work, education-related information accounted for 30%, ICT-related information accounted for 26% and economy-related information accounted for 24%.

Figure 56. Information Required the most Relating to Work



4.4.8. Level of Cooperation with Other Government Agencies

When asked about the cooperative relationship with other government agencies, 43% responded 'Normal' and 38% responded 'Good', showing that 90% of respondents have positive perceptions. On what needs to be done to improve such cooperative relationship, 29% cited improvement on slow work execution and 24% selected better knowledge sharing. It means that more information sharing is required among government agencies and that administrative processes should be handled more promptly.

Figure 57. Level of Cooperation with Other Government Agencies

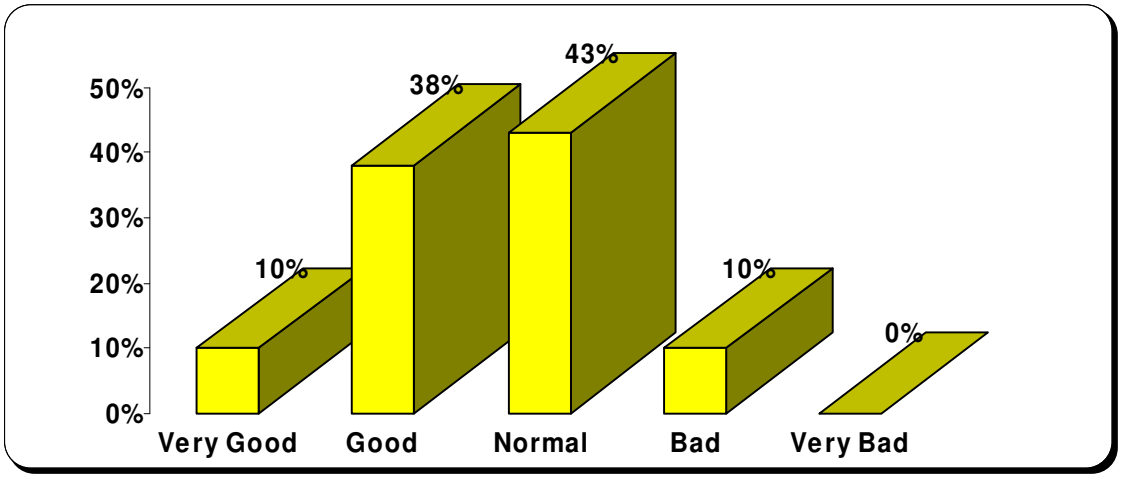
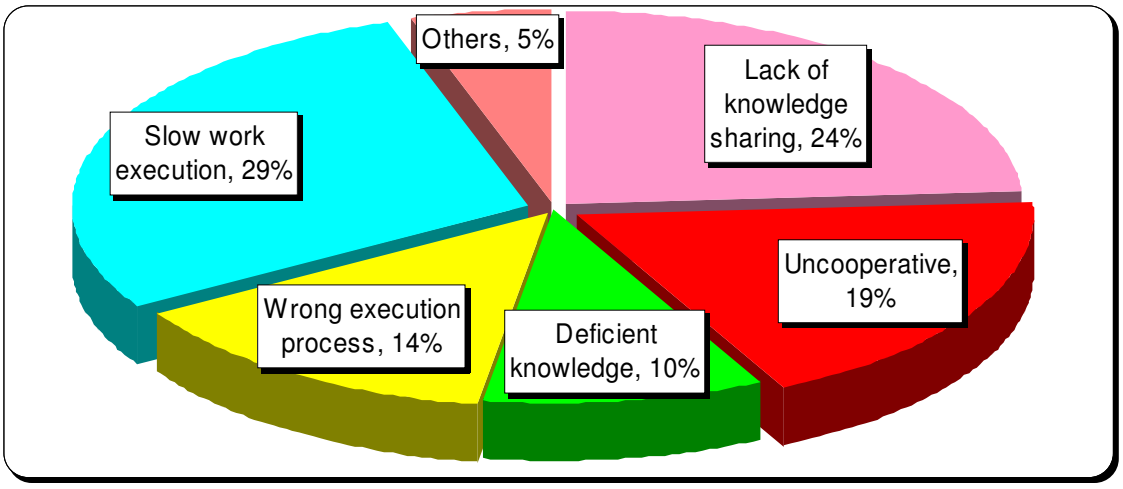


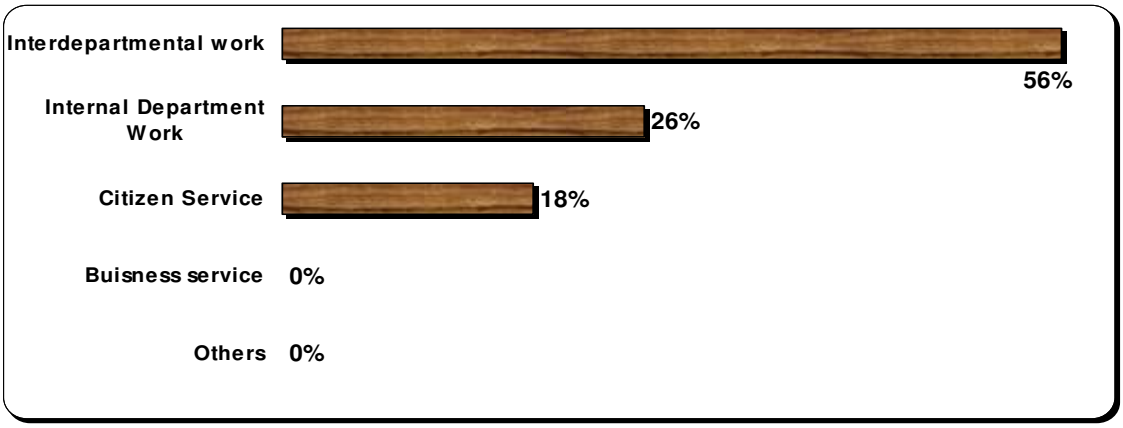
Figure 58. Measures to Improve Cooperation with Other Government Agencies



4.4.9. The Most Important Thing to be Done to Improve Administrative Services

In order to improve administrative services, 57% of respondents said that interdepartmental work needs to be improved and 26% said that department's internal work needs to be improved. It means that the government's work process should be more efficient.

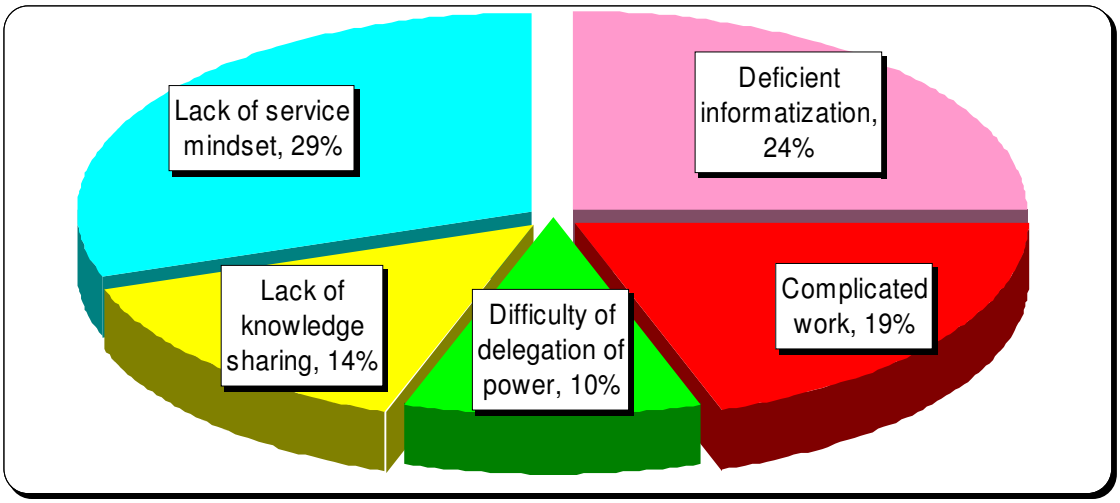
Figure 59. The most Important Thing to be Done to Improve Administrative Services



4.4.10. The Reason Administrative Process Needs to be Improved

Respondents cited insufficient informatization (32%), low service mindset (29%), lack of information sharing (25%), complicated work flow (23%), and various other issues as what needs to be improved.

Figure 60. The Reason Administrative Process Needs to be Improved



4.4.11. Most Useful Administrative Services for Citizens and Companies

Administrative service that citizens and companies find the most useful is National ID service, at 51%, as also found in the other survey group. Health service, customer service and tax service accounted for 6% of answers, respectively. As the administrative service that needs to be computerized the first, 74% chose the Citizenship Card, making it the first project that the Nepali government needs to pursue in the future.

Figure 61. Most Useful Administrative Services for Citizens and Companies

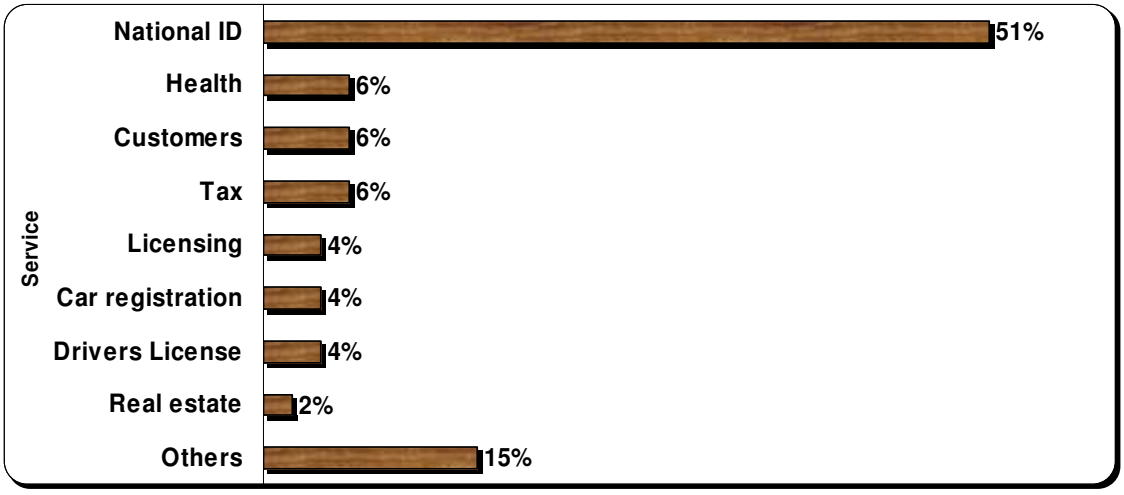
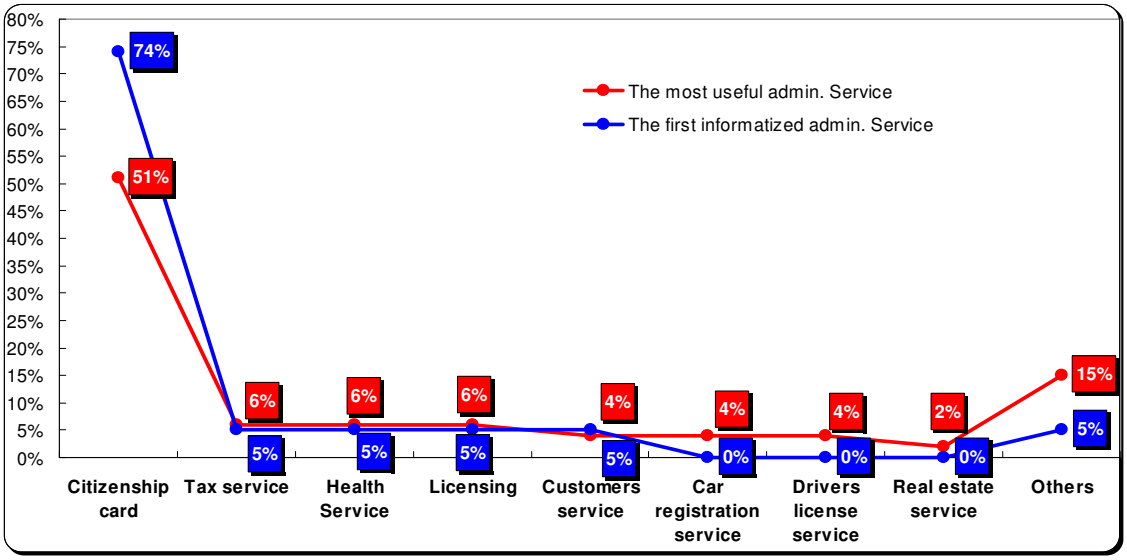


Figure 62. Administrative Service that Needs to be Computerized the first



4.4.12. Whether Regulations/Policies on Computerization Exist in the Department

When asked whether the respondents' department has regulations/policies on computerization, 73% answered 'no', showing that regulations on computerization are not prepared yet. Also, to the question on respondent's level of understanding on the government's ICT project, 14% said 'Nothing', 33% said 'Not much' and 26% said 'Medium'. All in all, negative responses accounted for 73% of the total, showing that civil servants have low understanding on the project just as the other two survey groups. This is attributable to the fact that the government's performance on ICT projects was minimal or it had limited impacts on stakeholders.

Figure 63. Whether Regulations/Policies on Computerization Exist in the Department

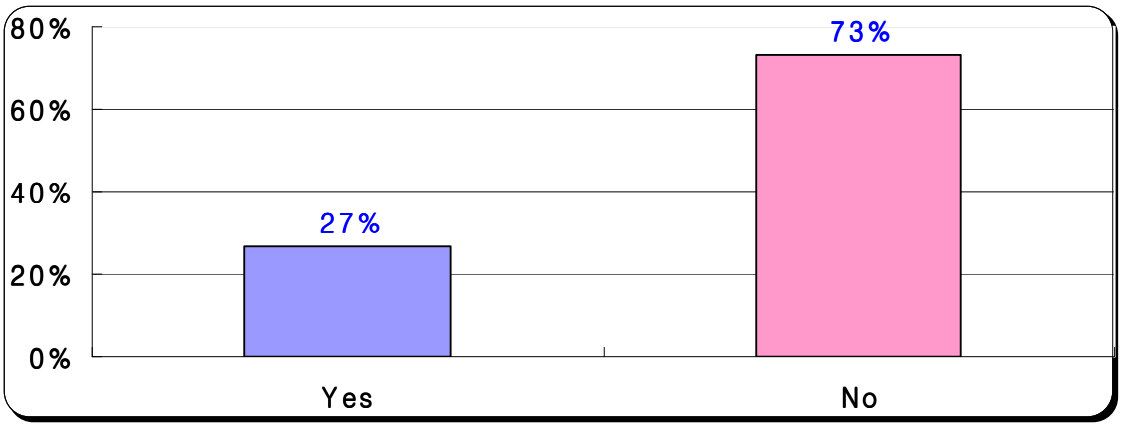
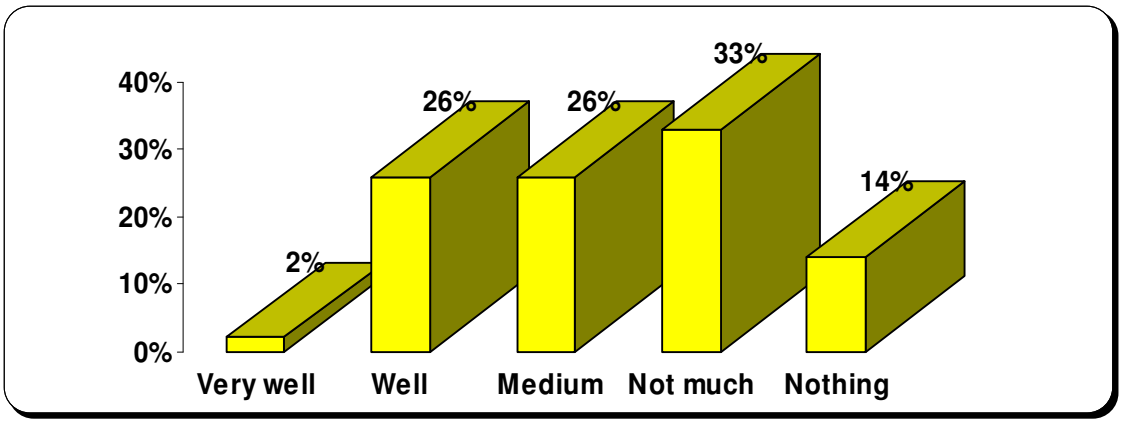


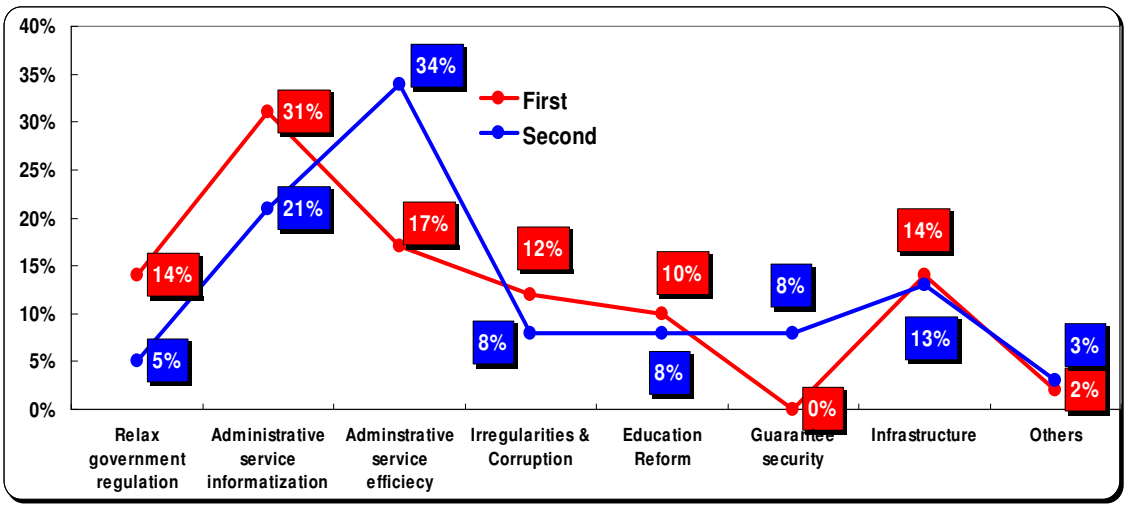
Figure 64. Level of understanding on the ICT project



4.4.13. The Most Important Thing to be Done for Development of the Nepali Economy

To the question that asked what the Nepali government should do to develop its economy, informatization of administrative service accounted for 52% and provision of efficient administrative services accounted for 52%, when the priority number one and number two were added together. It shows that civil servants regard administrative services as a key area that needs to be informatized and improved before anything else.

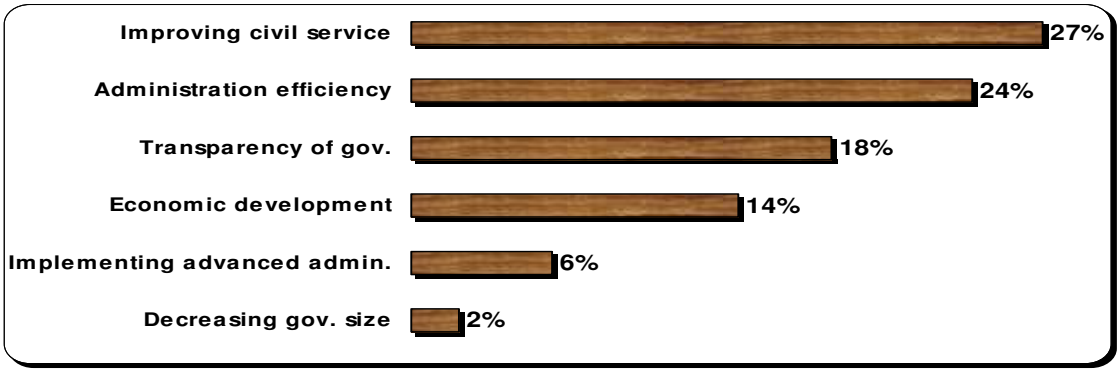
Figure 65. The most Important Thing to be Done for Development of the Nepali Economy



4.4.14. Goal of the e-Government Project

When asked what the goal of the e-government is, 27% of respondents said improving civil services, and it was followed by administrative efficiency at 24%, transparency of the government at 18%, and economic development at 14%. It indicates that the goal of the e-government is not limited to one subject, but encompasses the development of Nepal as a whole.

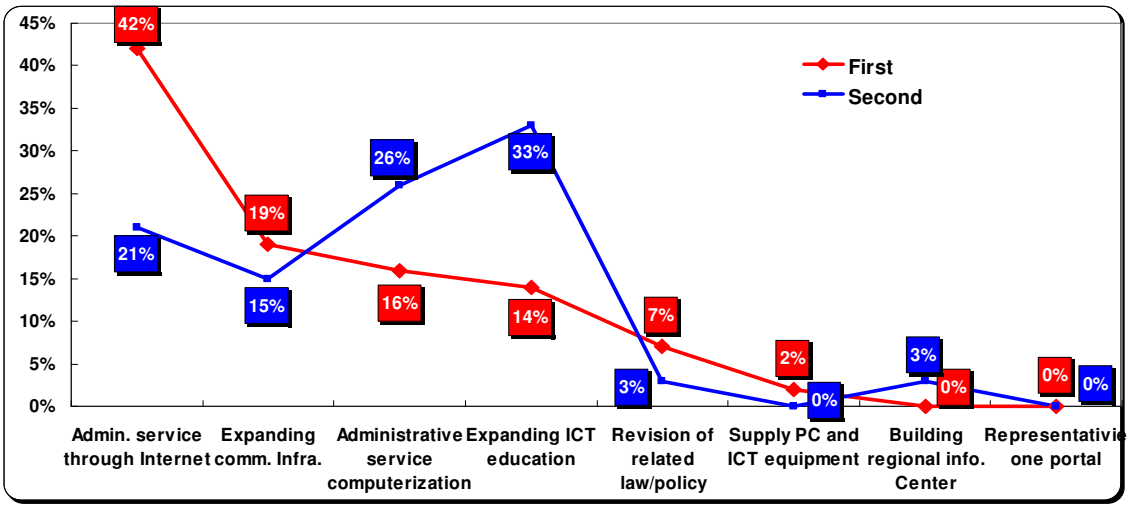
Figure 66. Goal of the e-Government Project



4.4.15. Top Priority Project Needed to Realize the e-Government

When two choices made for the survey are summarized, it shows that 63% respondents cited providing administrative services through the internet, 47% cited expanding ICT education and 42% cited expanding communication infrastructure, as key tasks that the government needs to carry out in order to realize the e-government plan.

Figure 67. Top Priority Project Needed to Realize the e-Government



4.4.16. Implication

- Improve Internet connection method by having tolerance of multimedia environment
- Introduce ICT education opportunities and adopt various ICT education curriculum
- Supply ICT equipment at low price for Internet service
- Achieve Internet penetration into all industries including Nepali major industry, agriculture
- Establish laws on ICT to execute e-government
- Start computerization with NID and education environment for the most frequently used and important administration
- Focus on citizen first when building e-government
- Computerize government administration to eradicate corruption and satisfy citizens

4.5. Analysis of Site Survey

To identify the current state of Nepali ICT and what needs to be improved, a site survey on seven government offices which were busiest government offices directly dealing with the citizen, was conducted from March 26th 2006 to March 29th 2006.

4.5.1. DAO (District Administration Office in Katmandu)

DAO's main function is providing basic administrative service for the general public, such as issuing citizen certificate, registering marriage, issuing passport, and registering refugee. Other tasks include registering non-government organization, and maintaining the law and order of society, which make the office closely linked to everyday lives of the public. To analyze the current state of administrative service in Nepal, DAO was visited for survey and the results are as summarized in table 15. The interviewee was Sushil Ghimire, the Chief District Officer.

Table 15. Survey Result of DAO in Kathmandu

Current State	Implication
• Two weeks for issuing citizen certificate, registering marriage • Need corresponding department / office approval and review to provide administrative services • Computerization of citizen certificate since three years ago • Dual data management (paper and computer) • No future plan for computerization • Visit to the administrative organization after downloading forms from the one-portal website • Insufficient computerization budget and manpower • Overlapping weapon record system with arms-related administration at the Police Department • Three computers are connected through LAN • Insufficient ICT infrastructure	• Need to reduce time to provide service through improved steps of administrative services • Need for computerized inter-department approval system • Need for a measure to reduce number of citizen and corporate visit to administrative offices • Establishment of Infrastructure • Arrangement of resources through funds and aids • Employment and nurturing of ICT HR • Measure to promote commonly shared DB

4.5.2. Telecentre in Sankhu

Telecentre is created to reduce the digital divide in the rural area. Currently, there are 22 telecentres operated by Nepali government and 50-60 operated by NGOs. Telecentre provides the Internet and government services to rural population. Those who want to use telecentre in rural areas should pay about NRs. 25~30 at most. The interviewee was Ramita Shrestha, the administrator of government telecentre in Sankhu

Table 16. Survey Result of Telecentre

Current State	Implication
• Annual operation cost around USD$8,500 • High cost for using satellite Internet • Lack of computer experts and hardware • Internet used largely for chatting and e-mail • Mostly students use computers • English Windows used • Letter literacy is at 57%, while computer literacy is at 4~5% • Lack of ICT curriculum in public education	• Provide measure to cut operation cost (including with government fund) and enable inexpensive Internet access • Devise plan for Telecentre to become self-supporting • Improve computer literacy through IT education such as providing ICT curricula in public schools • Need for Nepal Windows

4.5.3. Government Computer Center

Computer center implements annual ICT plan and program, and manages long-term and short-term ICT plan and budget. It also operates and manages 22 websites, e-mail servers, and SQUID for government departments. All of such maintenance and network maintenance are currently operated by two to three employees.

Table 17. Survey Result of Computer Center

Current State	Implication
• Management of 22 government websites • All equipment managed by small number of people • Computer center operated at one location • Irregular training for government employees	• Need to upgrade HW/SW • Back-up measure in case of war, earth quake, terrorism and other forms of disaster • Law/regulation to prevent internal/external entry and privacy information leak • Regular training

4.5.4. KMC (Kathmandu Metropolitan City) & LRO (Land Registration Office)

KMC is in charge of approving and managing vital registrations (birth, death, marriage, divorce, etc.), certification of relation, citizenship certification, and building infrastructure (electricity, telephone, etc). Basic infrastructure such as website and wireless LAN is already established, and revenue system, taxation system, and GIS system are already built and in operation at KMC. The interviewee was Bimala Rana, the Deputy Mayor of KMC.

LRO records around 200-300 visits a day for administrative work on land-related purchase, donation, and registration. It utilizes DLIS (District Land Information System) software developed by MoLR based on Visual Basic and MS-Access. It runs on a single server with Windows XP OS. LRO's database construction will be completed in three to four months. The interviewee was Ghauda Mani Guragain, the Computer Officer of LRO.

Table 18. Survey Result of KMC & LRO

Current State	Implication
• Construction and operation of website and wireless LAN • Construction and operation of revenue, taxation and GIS systems • Construction and operation of DLIS • Unable to access the Website • Five-year old GIS server • Back-up system non-existent	• Need for continuous maintenance of Website • Need of ICT experts • Development of public-private partnership model • Need to financial support measure • Need of appropriate HW/SW upgrade • Need to introduce back-up system

4.5.5. Police HQ (Police Headquarter) & TMO (Transport Management Office)

The Police Headquarter is linked through optical fiber internally, and its connection with district police offices, valley police offices and Nepal Police Academy is either via leased line or dial-up. It has constructed and is operating multiple databases such as PMIS (Personal Management Information System), CRS (Criminal Record System), DLRS (Driving License Record System), RIS (Rental Information System), and WRS (Weapons Record System). The interviewee is Mahesh Singh Kathayat, the IT Officer in Police Headquarter.

TMO, in charge of driving test for driving license and vehicle registration, has

14 offices in 14 zones. Around 250 citizens take the test every day. All work is manually done and managed in paper form. The interviewee was Chief Officer of the TMO.

Table 19. Survey Result of Police HQ and TMO

Current State	Implication
• Dial-up connection between HQ and offices in Police HQ • Construction and operation of various systems such as PMIS and CRS • Most administrative tasks at VRO conducted manually • Restrictions in managing documents in paper format such as illegibility. • Insufficient number of ICT-skilled manpower • Most of ICT Staff is at type writer level	• Need of efficient and inexpensive Internet implementation method • Need to recruit, train and develop ICT employees • Computerization of VRO • Need to implement data security system

5. Benchmarking

In order to establish e-Government Master Plan in Nepal, it is essential to benchmark other countries, along with analyzing policies and requirements related with ICT of Nepal. Thus, in this paper, we selected the U.S., which is the best-prepared country in terms of the e-Government Readiness Index studied by the UN. Next, Korea, which received the highest mark in Asia. Lastly, India, which is Nepali neighboring country with similar cultural and religious background was selected. Result of this study needs to be organized into informatization status, legal status, major projects and success factors of each country, to be utilized as lessons learned when establishing the e-government in Nepal in an efficient manner.

5.1. Case Study of Korea's e-Government

ICT history, major projects, and e-government plan of Participatory government were studied for case study of Korea's e-government. Next, organization and laws for establishing e-Government more efficiently are listed. The success factors to establish e-Government in Korea rapidly were studied.

5.1.1. Korea's Journey to the e-Government

- First Stage (Mid 80s ~ Mid 90s)

Korea's strides for the e-Government began in the mid 80's when the 'National Basic Information System' project was first implemented. Through this project, national basic information was systemized into databases for more convenient government administration. This included resident registration, real-estate, vehicles, etc. Now, services of these fields are provided anywhere regardless of the applicant's residence. Since the mid 90's, 'Korea Information Infrastructure' project was put forth in time with the trend of building information superhighways in advanced economies. Also by establishing 'Framework Act on Informatization Promotion' as the legal background, Korea has achieved much progress in informatization. The world-class information and communication infrastructure with the highest broadband Internet penetration in OECD member economies is a good example.

- Second Stage (Mid 90s ~ Late 90s)

The government started providing real-estate registration, patent application, and military administration services online and e-document approval and exchange spread rapidly within the government. It was the time of informatizing administrative procedure of central and local governments for the enhancement of productivity. Especially in June 1999, the Ministry of Government Administration and Home Affairs and the Ministry of Information and Communication jointly established the 'Comprehensive Plan for e-Government' and a systematic framework for Korea's e-Government implementation. Since 2000, the informatized online administrative services have been transformed from government-oriented services to citizen-oriented services. More civil services have been brought online and more information has been integrated for the convenience of the people.

- Third Stage (2001 ~ Current)

Korea's efforts to implement e-government were even accelerated in January 2001 by the establishment of the Special Committee for e-Government. The Committee, composed of experts and professionals from the public, private and the academia, is under the Presidency and has continuously supported and monitored the eleven high-payoff initiatives to be completed by the end of 2002. The initiatives were already implemented and in service since November 2002. After the current

president got elected, the government established a new roadmap for the "Participatory Government" program with 31 different projects.

Table 20 is 11 projects under the past administration between 1998 ~ 2002.

Table 20. 11 Projects Under The Past Administration Between 1998~2002

Category	Projects	Responsible Government Agencies
Innovation of Government Services to the Public (G2C & G2B)	Administration Services Innovation through e-Government Single Window(G4C)	Min. of Government Administration and Home Affairs
	Information Exchange System for 4 Major Insurances	National Pension Corporation National Health Insurance Corp. Labor Welfare Corporation Human Resources Development Services
	National Taxation Services System based on the Internet	National Tax Service
	National e-Procurement System	Public Procurement Services
Improvement of Administrative Productivity (G2G)	National Finance and Accounting System	Min. of Finance and Economy
	Administration Information Project (City/County/District)	Min. of Government Administration and Home Affairs
	Education Administration Information System	Min. of Education and HR Development
	Standardized Personnel Management System	Civil Service Commission
	Introducing e-Approval and e-Document	Min. of Gov. Adm. and Home Affairs
Foundation of e-Government	Implementation of Public Key Infrastructure and the Government Digital Signature	Min. of Gov. Adm. and Home Affairs Min. of Information and Communication
	Leveled Implementation of Government Integrated System	Min. of Gov. Adm. and Home Affairs Min. of Information and Communication Ministry of Planning and Budget

5.1.2. e-Government Vision (2003 ~ 2007)

The roadmap of "Participatory Government" seeks to provide a totally integrated and intelligent government services. Below illustration shows that the common functions should be integrated and fully systemized. In addition, the government is trying to architect the e-government with a common ICT environment standard that will enable all the government organizations to share information and cooperate.

Vision

- Realize the world's foremost open e-government
- Move from innovating service delivery to network based government
- Move from enhancing efficiency and transparency of public sector to knowledge based government
- Move from realizing sovereignty of the people to participatory government

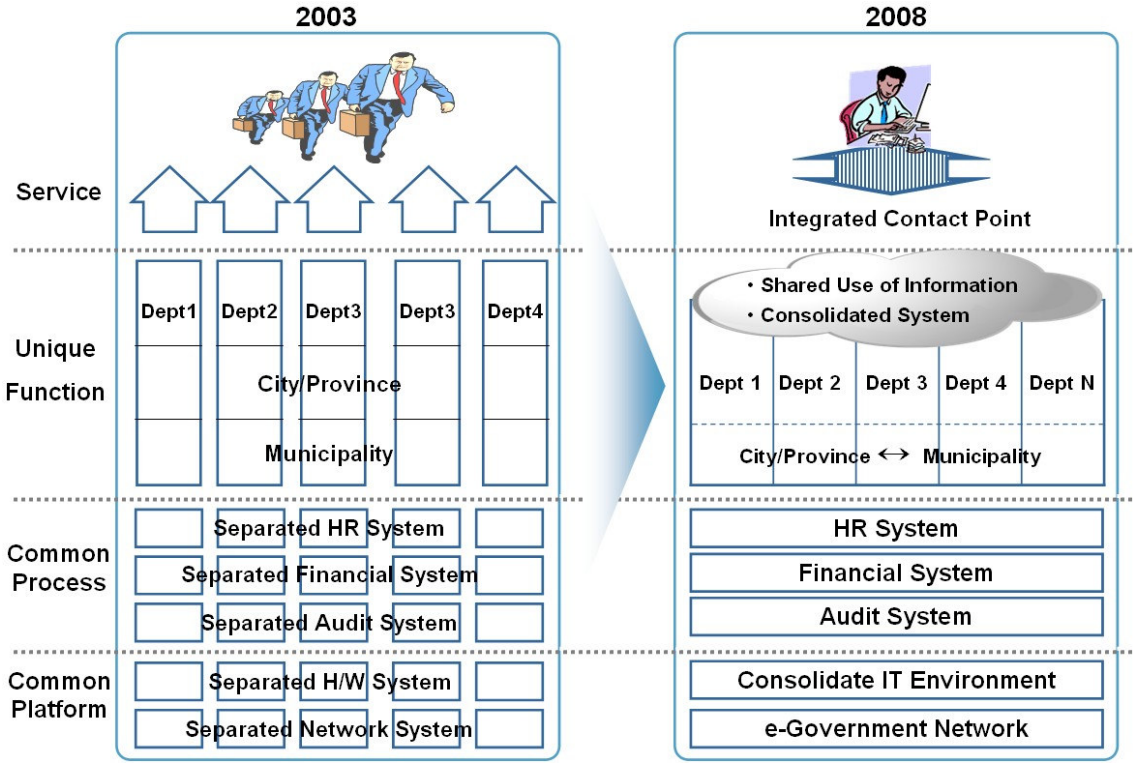
Objectives

- Public services
  - Raise public service quality through digitalization and providing on line services
  - Raise e-Government service usage rate
- Administrative efficiency
  - Maximize efficiency of public administration by enabling real time administration through integrated information resource management, electronic work processes and information sharing
- Administrative democracy
  - Expand political participation by providing administrative information and strengthening citizens' control of personal information

5.1.3. Criteria for Task Selection

The current administration, in order to check the progress of "Participatory Government" project, determined criteria for task selection seeking to set up further upgraded e-government vision, goal, and project monitoring system.

Figure 68. Service Concept of Korea[51]



The tasks have been identified by public pledges, extracted by e-Government Presidential Committee, selected by department, and suggested by citizens. And then those tasks are classified by selection criteria which consist of connectivity with government innovation, effectiveness of government's competitiveness, and satisfying the needs of citizens, feasibility and urgency.

The final tasks have been determined by Committee with consideration to their big ripple effect, securing efficient service and infrastructure. As a result, 4 areas, 10 agendas, and 31 tasks were chosen and reviewed by a specialized committee to be integrated into the e-government roadmap.

5.1.4. The Roadmap of "Participatory Government"

As stated above, the Participatory Government selected 10 major agendas, 31 major tasks (and 45 detailed plans) in four areas, such as business method

[51] Government Innovation & e-Government, Presidential Committee on Government Innovation and Decentralization

innovation, service innovation, information resource management innovation, and legislative system restructuring. The agendas and tasks are being implemented as scheduled. (Refer to Table 21.)

Table 21. Four Areas with 10 Agendas, 31 Tasks and 45 Detailed Plans for the e-Government Project

Area	Agenda	Task	Detailed Plan
Innovation of the business method	Establishment of electronic business processing	1. Computerize the entire document handling process	1.1. e-Document circulation system 1.2. e-Archiving system 1.3. e-Ledger system
		2. Computerize local governments' finance information	2.1. Computerization of the local governments' finance data 2.2. Adopt more sophisticated way to manage government's finance data
		3. Realize local e-Government	3.1. Informatization in city and province administration 3.2. Advance administration information system for City/County/District
		4. Establish e-Audit system	
		5. Realize e-National Assembly	5.1 Set up a portal for participation in National Assembly activities 5.2. Secure comprehensive security infrastructure for the National Assembly
		6. Establish comprehensive criminal justice system	
		7. Deploy comprehensive information system for HR management	7.1. Set up HR MIS for local governments 7.2. Enhance e-HR management system
		8. Build information system	

Area	Agenda	Task	Detailed Plan
		for foreign affairs management	
		9. Real-time management of government tasks (System managing government tasks)	
	Expand sharing of administrative information	10. Expand sharing of administrative information	10.1. Expand sharing of administrative information 10.2. Establish nationwide information sharing strategy 10.3. Extend KMS of administrative bodies
	Re-design the process with focus on services	11. Develop Business Reference Model (BRM)	
Innovation of services for the people	Improve the services for the people	12. Advance Internet civil petition system	
		13. Provide comprehensive national safety management services	
		14. Link registrations of buildings and real estates, improve the way of linking	14.1 Enhance construction administration information use 14.2. Manage and link real estate information 14.3. Maintain buildings ledger.
		15. Advance comprehensive national tax services	
		16. Comprehensive national welfare services	
		17. Comprehensive information service on food and drug	17.1. Food and drug safety management services 17.2. Agricultural produce and livestock safety management services

Area	Agenda	Task	Detailed Plan
		18. Job information services	
		19. Internet service for administrative adjudication	
	Improve the services for enterprises	20. Single window service supporting businesses	
		21. Comprehensive national logistics service	
		22. e-Trade service	
		23. Comprehensive support services for foreigners	
		24. Support for e-Government's venturing into overseas	
	Electronic participation by the people	25. e-Participation by citizens	25.1. Extend citizens' online participation 25.2. Encourage the use of e-government services 25.3. Expand online disclosure of administrative information 25.4. e-Voting and e-Election
Innovation of Information Resources Management	Standardization of information resources integration	26. Establish government-wide network	
		27. Advance e-Government's telecommunication network	
		28. Apply ITA to all levels of government	
	Strengthen the information protection structure	29. Set up a structure to protect information	
	Expertise in staff and organizations	30. Supplement staff and organizations dedicated to informatization	

Area	Agenda	Task	Detailed Plan
	dedicated to informatization		
Restructuring the legislative system	e-Government legislative system restructuring	31. Prepare laws to realize e-Government and to secure safety	

As a result of the Government's proactive pursuit of the e-government project, Korea won the 5th ranking in the e-Government Index released by the UN which compares each member countries' preparation status for the e-Government as well as their electronic services.

- Korea is recognized as a well-established e-Government country, with the ranking jumping from 13th in 2003 to 5th in 2005.
- The IT powerhouse, Korea, comes 3rd in the world when it comes to National Informatization Integrated Index (NCA, Aug. 2005), 1st for Digital Opportunity Index (ITU, Nov. 2005), and 2nd for technological competitiveness.
- Korea is the indisputable number one player in high-speed Internet subscription. (77% of households are subscribers)
- The government's way of working and services delivered to its citizens has improved greatly
- Digitalization became more common: 96.7% e-approvals and 97.4% of e-document exchanges among administrative bodies
- Citizens now can file civil petitions at home: file, peruse, and print civil petitions through the Internet

5.1.5. Organization for the e-Government Project

In the organization for the e-Government project, the President's leadership, coordination and cooperation among government departments and administrative/budgetary/technological supports are crucial to the success of the e-

Government. The e-Government Expert Committee under the Government Innovation Decentralization Committee that is the advisory body for the President is comprised of civil servants on deputy minister level and representatives of the private sector.

Administrative supports are provided through coordination and consultations among Ministry of Government Administration and Home Affairs (administrative support), Ministry of Information and Communication (informatization fund and IT support), and Ministry of Planning and Budget (budgetary support and support for government innovation).

Especially the Korean Government organized NCA(National Computerization Agency) which is a statutory agency founded by Article 10 of the Framework Act on Informatization Promotion for the purpose of promoting informatization and to support development of related policies for national agencies and local autonomies.

As the core agency of national informatization entrusted by government and the people with providing policies and technical expertise, NCA is leading the way in the construction of u-Korea towards a first-class nation in information and communication.

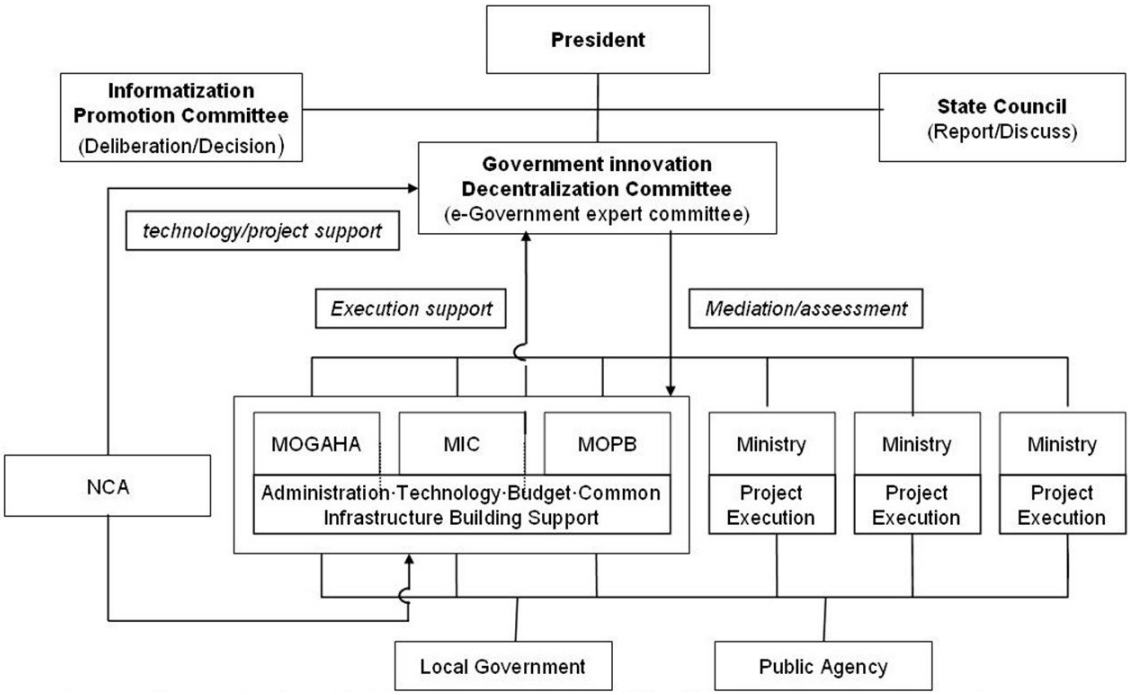
More detail mission of NCA is

- Providing expertise in developing and implementing the National Framework Plan on informatization Promotion
- Supporting Information communication standardization and developing/maintaining information systems for inter-agency information sharing
- Supporting information resource management in the public sector
- Supporting supervision, standardization and evaluation of public informatization business

Therefore all projects that each ministry conducts are initiated in this agency, and it could reduce redundancy and manage national resources efficiently.

Organization chart for the e-Government project is as in Figure 69.

Figure 69. Organization Chart for the e-Government Project[52]



5.1.6. Laws and Regulations on Informatization

5.1.6.1. Initiation of Informatization (1980 ~ 1994)

- Law on computer network expansion and promotion of network use of 1986
  - Developing network for government agencies
  - Developing, distributing and promoting the use of network technologies and devices
  - Developing and fostering of network businesses

5.1.6.2. Expansion of Informatization (1995 ~ 1999)

- Framework Act on Informatization Promotion of 1995
  - Adopting policy direction for informatization promotion
  - Protecting intellectual property and personal information
  - Establishing infrastructure for IT industry

[52] e-Government roadmap of Participatory Government, Presidential Committee of Innovation and Decentralization

- Training of IT professionals

- Electronic Signature Act of 1999
  - Promoting informatization and enhancing convenience by determining basic requirements to secure security and reliability of electronic documents and promote their use
  - Adopting basic policies to ensure safety and reliability of electronic signature and to boost its use
  - Adopting policies and technological standardization for effective linking of electronic signature
  - Making other preparations to make sure that electronic signature is secure and reliable and promote its usage
- Framework Act on Electronic Commerce of 1999
  - Defining legal requirements of e-Commerce transactions, securing security and reliability of e-Commerce, and laying the foundations for e-Commerce
  - Adopting international rules on e-commerce
  - Securing security and reliability of e-commerce
  - Developing related technologies and standardization

5.1.6.3. Growth of Informatization (2000 ~)

- Software Industry Promotion Act of 2000
  - Laying the groundwork for the growth of software industry and its competitiveness by determining preparations necessary for promoting software industry
  - Providing support to software start-ups and nurturing entrepreneurs
  - Providing R&D and distribution of software technologies
  - Encouraging the use of software and facilitating its distribution
- Act on Establishment and Use of National Geographic Information System of 2000
  - Adopting basic policy direction for establishment and use of geographic information system
  - Training professional resources about establishment and management of geographic information system
  - Using and distributing geographic information system
- Act on Knowledge and Information Resources Management of 2000

- Defining requirements in management and usage of knowledge/information resources, facilitating, encouraging continuous use by enhancing usefulness of the resources
- Managing, using and sharing of knowledge and information resources
- Assessing management of knowledge and information resources

- Act on Digital Divide Reduction of 2001
  - Ensure uninhibited access and use of information for the low-income earners, rural residents, the disabled, the elderly, and women who have difficulties in accessing or using ICT services due to economic/regional/physical/social conditions
  - Ultimately improving their quality of life and realizing balanced national economy
  - Establishing criteria for selecting applicants
  - Providing research, development and informatization education
- e-Government Act of 2001
  - Facilitating projects to realize e-Government by defining basic principles, procedures and implementation methods, and raising quality of life in the era of knowledge and information by enhancing productivity, transparency, and democratic quality of administrative organizations
  - Linking projects to carry out administrative innovation and to realize e-Government
  - Creating innovation of work procedure for informatization
  - Conducting task execution and service delivery through information and communication network
  - Identifying citizens' complaints about operation of e-government and making quick improvements
- Act on Promotion of Information and Communication Network Utilization and Information Protection of 2001
  - Developing and distributing information and communication network technologies
  - Standardizing information and communication network
  - Facilitating information sharing through information and communication network and boosting Internet use
  - Protecting personal information collected, processed, saved, and used through information communication network, and developing and

distributing related technologies
- Improving security and reliability of network

- Act on Consumer Protection in Electronic Commerce of 2002
  - Defining requirements for fair trading of goods and services through e-Commerce and mail-order sales, to protect consumers' rights, contribute to sound growth of national economy through enhanced market confidence
- Implementation of Enforcement Ordinance and Act on Development of e-Learning Industry of 2004
  - Determining requirements for the development of e-learning and facilitating it

5.1.7. Key Success Factors

Korea's fame as the 'World's IT Powerhouse' was achieved through the large-scale investments in telecommunication infrastructure that started in 1980s as well as through great faith, passion and efforts of the Government and the private sector.

Other nations are paying close attention to Korea's successful informatization, and Korea itself has confidence that it can join the rank of developed countries in the 21st century through moving toward a knowledge and information society.

- Strong leadership of the President who is determined to raise national competitiveness through informatization and effective implementation of its plan
- Sophisticated telecommunication network and a focus on IT and human resource development through "selection and concentration" strategy
- Investment and resource procurement that achieved successful attraction of investment and risk diversification at the same time

5.2. Case Study of United States e-Government

Same as the case study of Korea's e-Government, ICT history, major projects, e-government plan of current government, organization of e-government project and law were studied for the case study of United States' e-Government.

5.2.1. ICT History

5.2.1.1. Clinton Administration

The Clinton Administration wanted to use information technology to improve Americans' quality of life and reinvigorate the economy. The administration identified technology as the "engine of economic growth." Among its top priorities was accelerating the development of a National Information Infrastructure of high-speed telecommunications networks, advanced computer systems, and software.

Electronic government can overcome the barriers of time and distance to perform government business and give people public information and services whenever and wherever. To bring electronic government into reality, two things were thought to be required.

- Leadership to place information technology at the center of the business
- Commitment to the necessary support mechanisms

The administration set forth 13 Implementations with 49 Action Plans under the NPR (National Performance Review)

IT01 Provide Clear, Strong Leadership to Integrate Information Technology into Government Business
IT02 Implement Nationwide, Integrated Electronic Benefit Transfer
IT03 Develop Integrated Electronic Access to Government Information and Services
IT04 Establish a National Law Enforcement/ Public Safety Network
IT05 Provide Intergovernmental Tax Filing, Reporting, and Payments Processing
IT06 Establish an International Trade Data System
IT07 Create a National Environmental Data Index
IT08 Plan, Demonstrate, and Provide Government wide Electronic Mail
IT09 Improve Government's Information Infrastructure
IT10 Develop Systems and Mechanisms to Ensure Privacy and Security
IT11 Improve Methods of Information Technology Acquisition
IT12 Provide Incentives for Innovation
IT13 Provide Training and Technical Assistance in Information Technology to Federal Employees

5.2.1.2. Bush Administration

Expanding Electronic Government, or “E-Government,” was one of the five key elements of the President’s Management Agenda. Initiated in July 2001, this effort was designed to make better use of information technology (IT) investments to eliminate billions of dollars of wasteful federal spending, reduce government’s paperwork burden on citizens and businesses, and improve government response time to citizens – from weeks down to minutes. A key goal is for citizens to be able to access government services and information within three “clicks,” when using the Internet.

The Federal government is taking a two-pronged approach in e-government. One path is through modernizing IT investments within agencies using the principles of e-business. The second path is through integrating IT investments across agencies centered around groups of citizens (i.e., individuals, businesses, other governments and federal government employees). There have been measurable improvements in how government serves citizens to date, as a result of both agency-specific efforts and the 24 cross-agency initiatives.

5.2.2. Current Status

5.2.2.1. Vision

The vision for reforming government emphasizes that "government needs to reform its operations—how it goes about its business and how it treats the people it serves.” The vision is guided by three principles:

- Citizen-centered, not bureaucracy or agency-centered
- Result-oriented, producing measurable improvements for citizens
- Market-based, actively promoting innovation

E-Government is critical to meeting today’s citizen and business expectations for interaction with government. It will enable agencies to align efforts as needed to significantly improve service and reduce operating costs. When e-government initiatives are deployed effectively, conducting business with the government is easier, privacy is protected and security provided. Citizens and businesses can visit one point-of-service online or by telephone that reflects the “United States Government.”

The vision combines successful online operating practices with the federal

government's human capital and physical assets to build a "click and mortar" enterprise. The goal is that services and information will rarely be more than three clicks away when using the Internet. Achieving this vision requires agencies to integrate and simplify their operations.

5.2.2.2. Objectives

e-Government provides many opportunities to improve the quality of service to the citizen. An effective strategy will result in significant improvements in the federal government, which includes the following goals

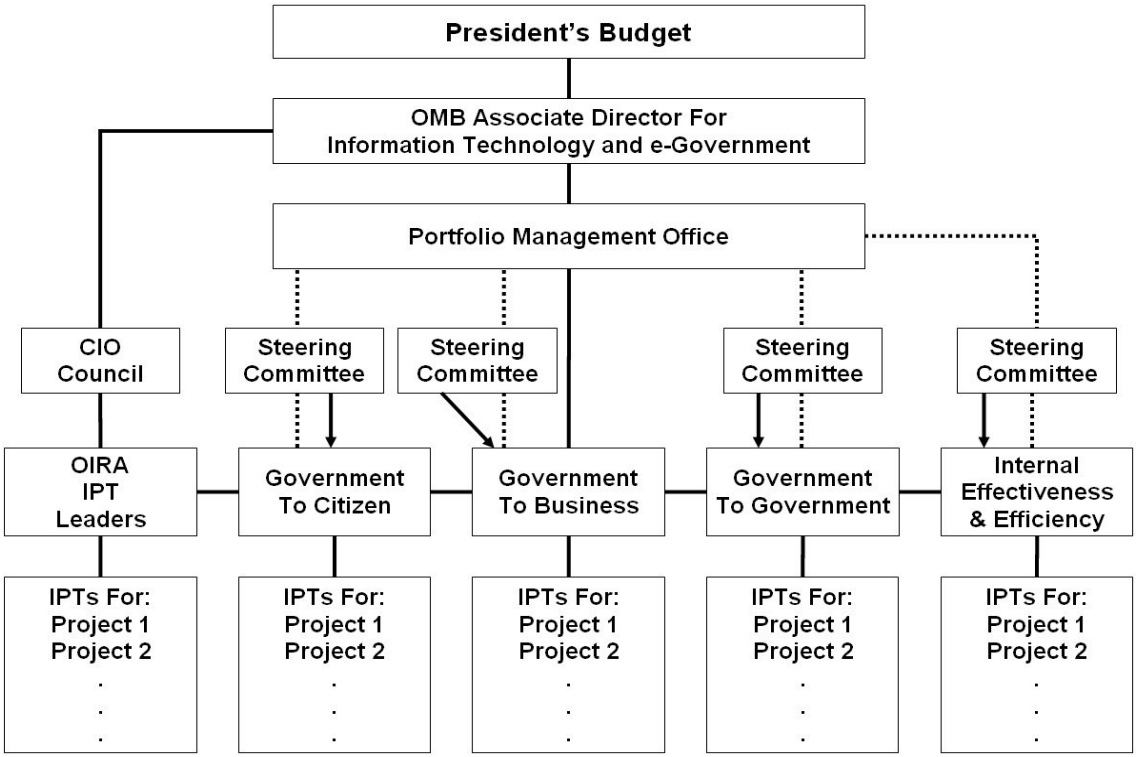
- Simplifying delivery of services to citizens
- Eliminating layers of government management
- Making it possible for citizens, businesses, other levels of government and federal employees to easily find information and get service from the federal government
- Simplifying agencies' business processes and reducing costs through integrating and eliminating redundant systems
- Enabling achievement of the other elements of the President's Management Agenda
- Streamlining government operations to guarantee rapid response to citizen needs

5.2.2.3. Organization

In implementing the Action Plan, responsibility of the daily management and leadership are taken by:

- Senior agency officials who comprise the President's Management Council
- The Office of the Associate Director of OMB for IT and E-Government and other OMB staff
- Members of the CIO, CFO, and Procurement Executive and Human Resources Councils.

Figure 70. e-Governance Structure in United States



PMC members volunteered to be "managing partners" for each of the initiatives. Other members volunteered to participate in those efforts as partners. The managing partners establish program offices to ensure that the initiatives are implemented, and the partners will cooperate in the planning and implementation of the initiative. OMB oversees this process and works with the agencies on adequate funding for the initiatives. Consequently, OMB hired four Portfolio Managers, reporting to the Associate Director for IT and e-government, responsible for overseeing the progress in the e-government initiatives.

The PMC also focus on organizational and process changes across government agencies to facilitate citizen-centered transformation. As such, the Council will be a key component of governance for the transformation of the federal government to e-government. To help this transformation, the CIO Council, with participation from the other federal management councils, will form portfolio steering groups to focus on E-Government in each of the four citizen segments: G2C, G2B, G2G, and Internal Efficiency and Effectiveness. Portfolio Steering Group members are from agencies that make up the project teams for each of the initiatives. In addition, the G2G Steering Committee includes representation from official state and local government organizations. The steering committees advise agency program managers concerning their initiatives and help remove

barriers to the implementation of the initiatives. The Committees also support their corresponding portfolio manager, an OMB employee who is responsible for making government more citizen-centered through daily interaction with the managing partners who they oversee.

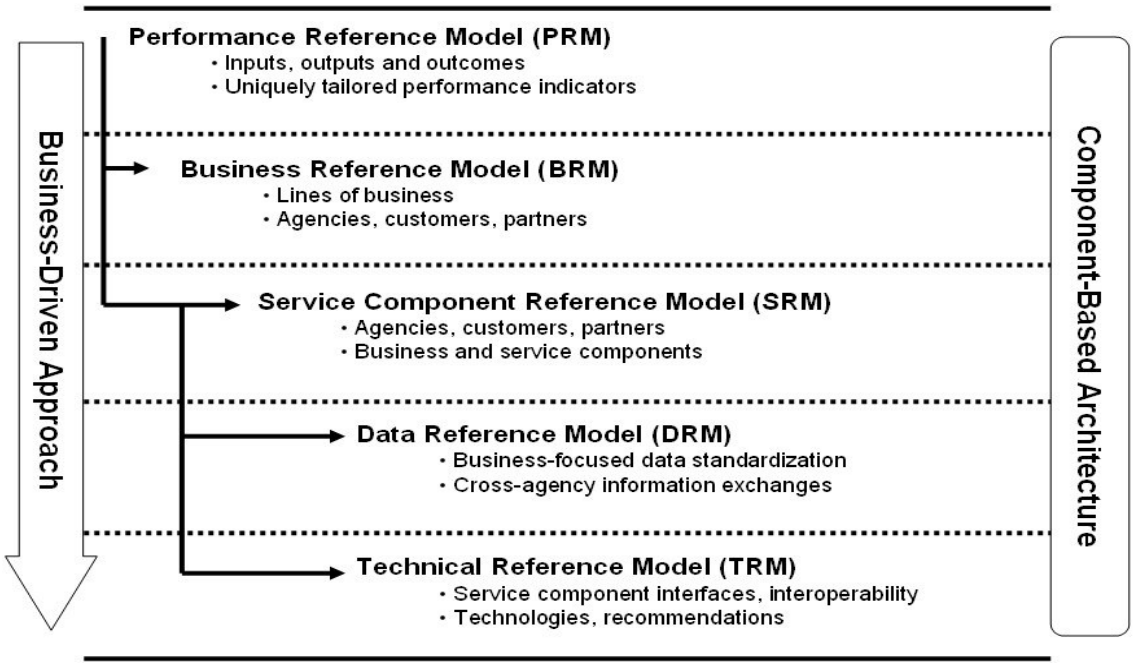
Metrics are used to track progress both for the agency and the cross-agency e-government. The President's Management Council is closely involved and tracks e-government progress at its regular meetings. OMB works with Department and agency e-government leaders, as well as their CIOs, to ensure success. Progress is tracked for each e-government initiative, and agency success and cooperation is documented in the President's Management Agenda Scorecard.

5.2.2.4. Methodology

To transform the Federal government to one that is citizen-centered, results-oriented, and market-based, the Office of Management and Budget (OMB) is developing the Federal Enterprise Architecture (FEA), a business-based framework for government-wide improvement.

The FEA is constructed through a collection of interrelated "reference models" designed to facilitate cross-agency analysis and the identification of redundant investments, gaps, and opportunities for collaboration within and across federal agencies.

Figure 71. Performance Reference Model (PRM)



- Performance Reference Model (PRM)
  - The PRM is a reference model or standardized framework to measure the performance of major IT investments and their contribution to program performance.
- Business Reference Model
  - The Business Reference Model is a function-driven framework for describing the business operations of the Federal Government, independent of the agencies that perform them.
  - The BRM is the first layer of the Federal Enterprise Architecture and it is the main viewpoint for the analysis of data, service components and technology.
- Service Component Reference Model
  - The Service Component Reference Model (SRM) is a business and performance-driven, functional framework that classifies service components with respect to how they support business and/or performance objectives.
- Data Reference Model
  - The Data Reference Model (DRM) describes, at an aggregate level, the data and information supporting government program and business line operations. This model enables agencies to describe the types of interaction and exchanges occurring between the Federal government and citizens.
- Technical Reference Model
  - The TRM is a component-driven, technical framework used to categorize the standards, specifications, and technologies that support and enable the delivery of service components and capabilities.

5.2.2.5. 24 + 1 e-Government Initiatives

In the fall of 2001, the Office of Management and Budget (OMB) and Federal agencies identified 24 e-government initiatives. Operated and supported by agencies, these Initiatives are providing high-quality and well-managed solutions for tax filing, federal rulemaking and e-training among others. The 24 are divided among four key portfolios: Government to Citizen, Government to Business, Government to Government, and Internal Efficiency and Effectiveness. E-Authentication is a separate

initiative that provides secure and robust authentication services to the 24 Initiatives.

In the spring of 2005, OMB kicked off the Information Technology (IT) Security Line of Business Task Force. This task force is working toward identifying problems and proposing solutions to strengthen the ability of all agencies to identify and manage information security risks, as well as implementing improved, consistent, and measurable information security processes and controls across the government. The task force is also looking for opportunities for savings or cost-avoidance through reduced redundancies and economies of scale.

5.2.2.6. Government to Citizen

The Government to Citizen Initiatives provides one-stop, on-line access to information and services to citizens.

- GovBenefits.gov
  - Provides a single point of access for citizens to locate and determine potential eligibility for government benefits and services
- Recreation One-Stop
  - The Recreation One-Stop initiative will make it easier for citizens to plan vacation (or a brief recreational break during a business trip), and make reservation for a campsite, cabin, or tour at federal recreation sites
- IRS Free File
  - Creates a single point of access to free on-line preparation and electronic tax filing services provided by Industry Partners to reduce burden and costs to taxpayers
- e-Loans
  - Creates a single point of access for citizens to locate information on federal loan programs, and improves back-office loan functions
- USA Services
  - Develop and deploy government-wide citizen customer service using industry best practices that will provide citizens with timely, consistent responses about government information and services via e-mail, telephone, Internet, and publications

5.2.2.7. Government to Business

The Government to Business Initiatives is committed to helping business interact efficiently and effectively with the Federal government. These Initiatives help reduce burden on businesses, provide one-stop access to information, and enable digital communication using the language of e-business (XML).

- e-Rulemaking
  - Allows citizens to easily access and participate in the rulemaking process. Improves the access to, and quality of, the rulemaking process for individuals, businesses, and other government entities while streamlining and increasing the efficiency of internal agency processes
- Expanding Electronic Tax Products For Businesses
  - Reduces the tax-reporting burden on businesses while improving the efficiency and effectiveness of government operations, provides timely and accurate tax information to businesses, increases the availability of electronic tax filing, and models simplified federal and state tax employment laws
- Federal Asset Sales
  - Identify, recommend, and implement improvements for asset recovery and disposition, making it easier for agencies, businesses, and citizens to find and acquire/buy federal assets
- International Trade Process Streamlining
  - Export.gov makes it easy for Small and Medium Enterprises (SMEs) to obtain the information and documents needed to conduct business abroad
- Business Gateway
  - The Business Gateway (“BG”), business.gov, will provide the Nation's businesses with a single, internet-based access point to government services and information to help businesses with their operations.
- Consolidated Health Informatics
  - Adopts a portfolio of existing health information interoperability standards (health vocabulary and messaging), enabling all agencies in the federal health enterprise to “speak the same language” based on common enterprise-wide business and information technology architectures

5.2.2.8. Government to Government

The goal of the Government to Government (G2G) portfolio is to forge new partnerships among different levels of government. These partnerships facilitate collaboration between different levels of government, and empower state and local governments to deliver citizen services more effectively.

- Geospatial One-Stop
  - Provides federal and state agencies with single point of access to map-related data, enabling the sharing of existing data to maximize geospatial investments to leverage resources and reduce redundancies
- Disaster Management
  - Help citizens and members of the emergency management community at the local, tribal, state, and federal levels by improving public safety response through more effective and efficient interoperable data communications and to serve as a unified point of access to disaster preparedness, mitigation, response and recovery information
- SAFECOM
  - Functions as the key Federal coordinator for promoting and providing support to local, tribal, state, and Federal public safety agencies for the improvement of public safety response through more effective and efficient interoperable wireless communications.
- e-Vital
  - Promotes automating death registration method with the states (Electronic Death Registration (EDR)).
- Grants.gov
  - Creates a single portal for all general grant customers to find and apply for grants online

5.2.2.9. Internal Efficiency & Effectiveness

The Internal Efficiency and Effectiveness Portfolio's focus is to apply industry best practices to government. FY 2004 accomplishments continued business transformation successes by increasing cross-agency partnerships, empowering citizen focus and prudent utilization of resources, and encouraging stovepipe systems reductions.

- e-Training
  - Supports the development of the federal workforce and advances the accomplishment of agency missions through simplified and one-stop access to e-Training products and services
- Recruitment One-Stop
  - Provides state-of-the-art online recruitment services to federal job seekers that include online job posting, intuitive job searching, resume warehousing, online application submission, automated eligibility and status feedback, applicant data mining and integration with sophisticated automated assessment tools
- Enterprise HR Integration
  - Develops policies and tools to streamline and automate the electronic exchange of standardized HR data needed for creation of an official employee record across the Executive Branch
- e-Clearance
  - Streamlines and improves the quality of the current security clearance process through the deployment of automation and common systems and policies to manage the security clearance process
- e-Payroll
  - Standardize and consolidate Government wide Federal civilian payroll services and processes by simplifying and standardizing HR/payroll policies and procedures and better integrating payroll, human resources, and finance functions
- e-Travel
  - Provides a government-wide web-based service that applies world-class travel management practices to consolidate federal travel, minimize cost and produce superior customer satisfaction. From travel planning and authorization to reimbursement, end-to-end service will leverage administrative, financial and information technology best practices to realize significant cost savings and improved employee productivity
- Integrated Acquisition Environment
  - Creates a secure business environment that facilitates and supports cost-effective acquisition of goods and services by federal agencies, while eliminating inefficiencies in the current acquisition environment

- e-Records Management
  - Provides policy guidance to help agencies better manage their electronic records, so that records information can be effectively used to support timely and effective decision making, enhance service delivery, and ensure accountability

5.2.2.10. E-Authentication

The E-Authentication Initiative will provide trusted and secure standards-based authentication architecture to support federal e-government applications and initiatives. e-Authentication minimizes the burden on businesses, public and government when obtaining services on-line by providing a secure infrastructure for on-line transactions, eliminating the need for separate processes for the verification of identity and electronic signatures.

5.2.2.11. 5 Line of Business

In the spring of 2004, OMB announced the formation of five lines of business task forces. Five initiatives were identified by a thorough review of agency enterprise architecture data as following.

- Case Management
  - Utilize common solutions and data standards so that it is easily and appropriately shared within and between federal and local agencies
- Financial Management
  - Improves business performance while ensuring integrity in accountability, financial controls and mission effectiveness
- Grants Management
  - Supports end-to-end grants management activities that promote citizen access, customer service, and agency financial and technical stewardship
- Human Resource Management
  - Provides common core functionality to support the strategic management of human capital
- Federal Health Architecture
  - Have safer and healthier citizens who have improved access to health related information and services

5.2.3. Future Plan

The future model of e-government is as following. Before, the services provided would be agency specific and the user would need to go to each agency for the agency specific service. But in the future, the citizen only needs go to a service that is a service for the citizen. The one point connection of the service will synchronize with different agencies to accomplish the single service. Before provision of single service for the citizen, the citizen had to go to each agency which had services related to it. Now, in a citizen centered service, the citizen need not care about which agency is related to the service.

Also, each agency should be more efficient and effective by selecting core services in the agency. The agency should build the core services with excellence. But for non-core services, the agency should use a commercial provider for competency.

5.2.4. Law

5.2.4.1. THE E-GOVERNMENT ACT OF 2002 (P. L.107-347)

Congress recognized the importance of E-Government through the passage of the E-Government Act of 2002, signed into law by the President on December 17, 2002. In summary, this legislation:

- Codifies and expands the e-government leadership role of OMB through the establishment of an Office of E-Government and IT headed by an administrator appointed by president
- Authorizes several initiatives (e-Rulemaking, Geospatial One-Stop, e-Records Management, e-Authentication and Disaster Management), and endorses the FirstGov.gov portal
- Sponsors ongoing dialogue with state, local and tribal governments, as well as the general public, the private and non-profit sectors to find innovative ways to use IT to improve the delivery of government information and services
- Establishes an e-Government Fund, administered by GSA, to support IT projects approved by OMB that enable the government to conduct activities electronically. The Act authorizes funding through FY07.

5.2.4.2. Government Paperwork Elimination Act (GPEA, 1998).

GPEA seeks to "preclude agencies or courts from systematically treating electronic documents and signatures less favorably than their paper counterparts," so that citizens can interact with the federal government electronically (S. Rep. 105-335). GPEA states that electronic records and their related electronic signatures are not to be denied legal effect, validity, or enforceability merely because they are in electronic form.

5.2.4.3. Clinger-Cohen Act (1996)

This was intended, among its many other purposes, to "reform acquisition laws and information technology management of the Federal Government." The Congress and President enacted the Information Technology Management Reform Act and the Federal Acquisition Reform Act. These two Acts, together known as the Clinger-Cohen Act, require the heads of Federal agencies to link IT investments to agency accomplishments.

5.2.4.4. Federal Acquisition Streamlining Act of 1994, Title V (FASA V)

There are two major components of the Federal Acquisition Streamlining Act Title V (FASA V). First, agencies must demonstrate sound decision-making and a results-oriented focus when planning for projects. Second, agencies must effectively manage ongoing programs to achieve intended results. This Act, and subsequent amendments and directives found in the Federal Acquisitions Regulations (FAR), provides the legislative impetus for electronic procurement.

5.2.4.5. Government Performance Results Act of 1993 (GPRA)

The Government Performance and Results Act (GPRA) seeks to shift the focus of government decision making and accountability away from a preoccupation with the activities that are undertaken - such as grants dispensed or inspections made - to a focus on the results of those activities, such as real gains in employment, safety, responsiveness, or program quality. The act required government agencies to link performance to results and fosters short-term business planning and long-term

strategic planning. The law also requires that agencies develop performance plans that articulate their target performance goals and progress towards meeting these goals.

5.3. Case Study of India's e-Government

5.3.1. History

The Ministry of Communications and Information Technology which was formed in 1999 is the apex agency under which various related organizations work towards development of initiatives for advancement of IT in the country. The Information Technology Act 2000 of India has provided legal recognition for electronic transactions such as data exchange and other means of electronic communication, commonly referred to as electronic commerce.

The Government of India has set up a Centre for e-Governance (CEG). The primary activities of the Centre are to showcase the best practices in the area of e-governance, conduct programs for creating awareness among decision makers in the central and state governments, demonstrate the feasibility of concepts in e-governance to the decision makers through workshops, help the central and state governments in defining and implementing policy changes, and to enrich the repository of best practices through continuous interaction with subject experts from India and abroad.

India ranks 59 out of 71 countries on the e-Governance Index (2004), and 50 on the Network Readiness Index (2002). In 2005, the Government unveiled the National e-Governance Plan (NEGP) with the following vision: "All government services should be accessible to the public, throughout his life through a one-stop-shop (integrated service delivery), ensuring efficiency, transparency, and reliability at an affordable costs to meet the basic needs of common man." Some examples of e-government services currently available in India are the following: land records are accessible at the village level through web-enabled GIS based records; and application, registration, tax returns, and payment of bills are conducted online.

All government ministries and departments have web sites. A National Informatics Centre has set up kiosks in remote parts of the country to advance the goal of computer education and to increase awareness on ICT. Research and development in e-governance has also been the focus of the government.

However, some issues need to be addressed for the realization of the e-India dream. Slow implementation of e-governance initiatives with long gestation periods

and inefficient coordination among ministries in implementing e-government programs. Funding of all e-initiatives need to be sustainable in the long term.

Issues of privacy and authentication also need to be handled sensitively. One of the major challenges to implement e-governance in India is providing e-services to 70 percent of the Indian population that lives in rural areas. Future plans aim to deliver a SMART Government to the people such as (S) Simple, (M) Moral, (A) Accountable, (R) Responsive and (T) Transparent Government. The Government of India is committed to the realization of e-India.

5.3.2. E-Governance Action Plan

The Government of India has approved the National E-Governance Action Plan for implementation during the year 2003-2007. The Plan seeks to lay the foundation and provide the impetus for long-term growth of e-governance within the country. The plan seeks to create the right governance and institutional mechanisms, set up the core infrastructure and policies and to implement a number of Mission Mode Projects at the center, state and integrated service levels to create a citizen-centric and business-centric environment for governance.

5.3.2.1. Vision

Implementation of e-Governance at all levels of the government to improve efficiency, transparency and accountability at the Government-citizen interface.

5.3.2.2. Strategy

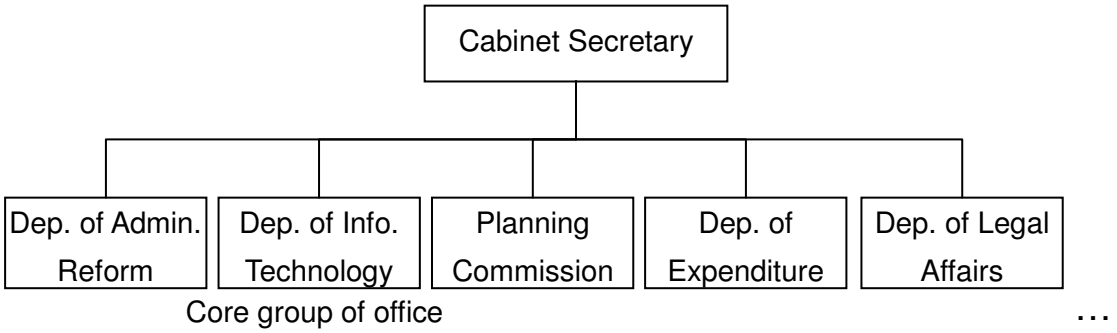
e-Government strategies in India are as following:

- Create centralized initiative, decentralized implementation
- Identify services to be targeted
- Prioritize services (mission), identify measurable service goals (outcomes)
- Identify, appoint and empower mission leaders
- Create mechanism for effective private sector participation
- Put in place a common infrastructure, policies, standards and framework
- Provide service delivery through Common Service Centers
- Think big, start small and scale fast

5.3.2.3. Organization

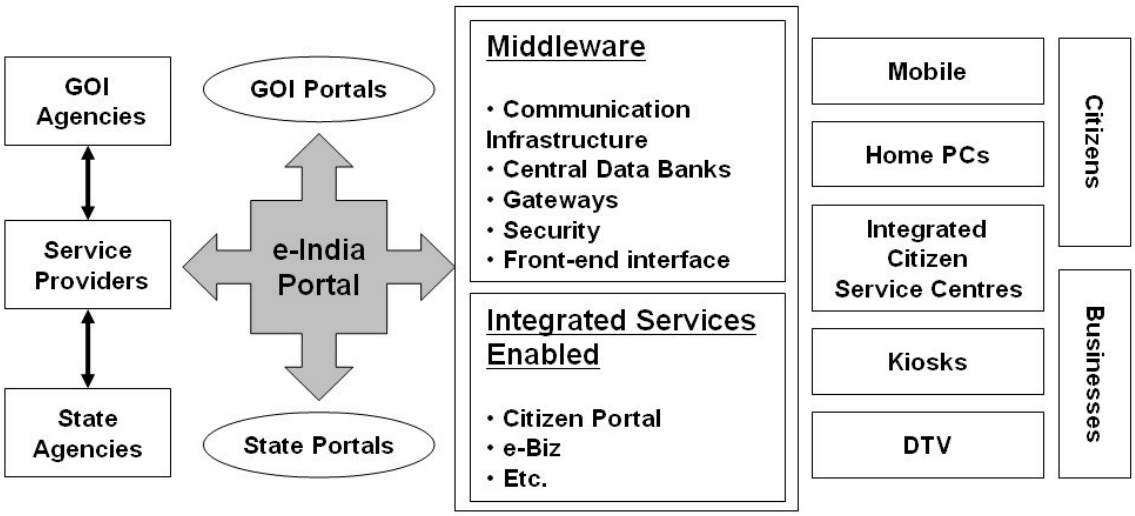
The E-Governance Division of the Ministry of Information Technology, has entrusted the study of developing frameworks for the assessment of e-Governance projects, to the Center for Electronic Governance, IIMA (CEG-IIMA) and the National Institute for Smart Governance, Hyderabad (NISG)

Figure 72. e-Government Organization of India



5.3.2.4. Framework of e-Governance

Figure 73. e-Governance Framework of India[53]



As depicted in the diagram, the e-Governance Framework includes back-ends

[53] Electronic Governance National Action Plan, DIT

(databases of the different government agencies, service providers, state governments etc.), middleware and the front-end delivery channels (home PCs, mobile phones, kiosks, integrated citizen service centers etc) for citizens and businesses. The middleware comprises of communication and security infrastructure, gateways and integrated services facilitating integration of inter-departmental services.

5.3.2.5. Assessment Framework

e-Governance Assessment Frameworks (EAF version 2.0) has been created for the assessment of the projects and initiatives. The objectives were to assess whether and to what extent a given e-Governance project has the characteristics of a good e-governance project delivering value to the stakeholders. Also it guides the funding of e-governance projects at various stages of their life-cycle and provides guidelines for mid-term assessment of ongoing initiatives so that corrections, if needed can be applied.

In the framework, the projects were divided into 4 categories for different frameworks:

- Government to Citizen in Urban Environment (G2C-U)
- Government to Citizen in Rural Environment (G2C-R)
- Government to Business (G2B)
- Government to Government (G2G)

With attributes predefined in the framework, the final result will be a quantified score of the project. The following general guidelines in the framework are for the final quantified score.

Table 22. Assessment of Project

No.	Score Range	Category	Remarks
1	70 and above	Extremely Good	Qualifies for further investment of resources/replication
2	50 to 69	Good	Scope for marginal improvements
3	40 to 49	Satisfactory	Amenable to improvements through course correction and gap filling
4	Below 40	Poor	Not worthy of pursuing further

5.3.2.6. e-Government Projects

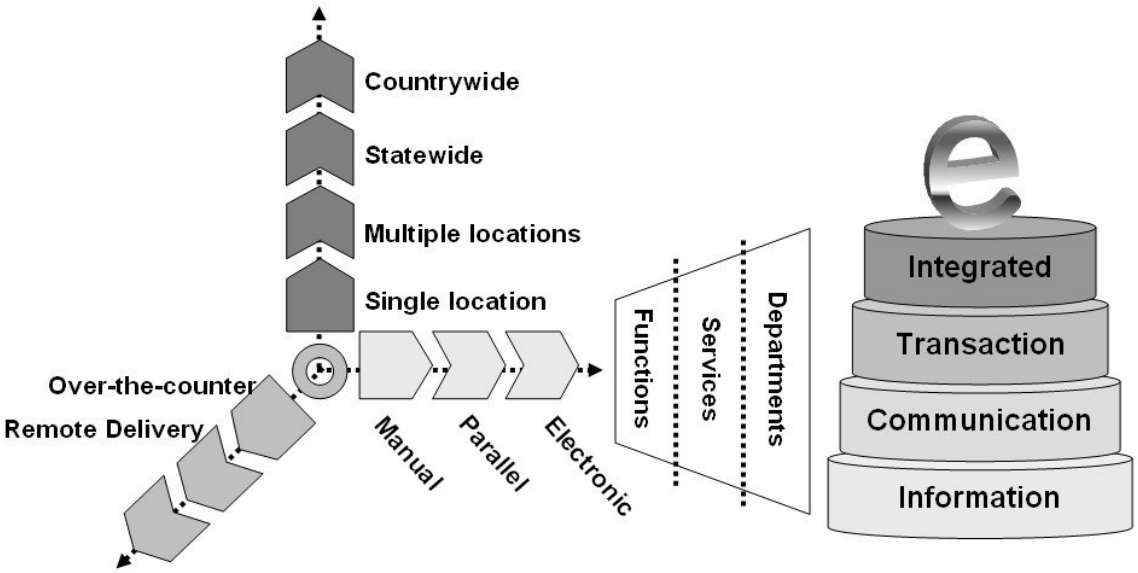
Table 23. e-Government Projects

Part	Mission Mode Project	Line Ministries/Departments Responsible
Central Government	Income Tax	Ministry of Finance/Central Board of Direct Tax
	Passport Visa & Immigration Project	Ministry of External Affairs/Ministry of Home Affairs
	DCA21	Department of Company Affairs
	Insurance	Dep't. of Banking
	National Citizen Database	Ministry of Home Affairs/Registrar General of India (RGI)
	Central Excise	Department of Revenue/Central Board of Excise & Custom
	Pensions	Dep't. of Pensions & Pensioners welfare & Dep't. Of Expenditure
	Banking	Dep't. of Banking
State Government	Land Records	Ministry of Rural Development
	Road Transport	Ministry of Road Transport & Highway
	Property Registration	Department of Land Resources
	Agriculture	Department of Agriculture & Cooperation
	Treasuries	Ministry of Finance
	Municipalities	Ministry of Urban Development and Poverty Alleviation
	Gram Panchayats	Ministry of Rural Development
	Commercial Taxes	Ministry of Finance
	Police(UTs initially)	Ministry of Finance
Integrated Services	EDI (E-Commerce)	Ministry of Commerce and Industry
	E-Biz	Department of Industrial Policy & Promotion/ Department of Information Technology
	Common Service Centres	Department of Information Technology
	India Portal	Department of Information Technology/ Department of Administrative Reforms and Public Grievances
	EG Gateway	Department of Information Technology

5.3.3. Future Plan

The Future Model of e-Government is as following. The e-government goal will not be built within a short period of time but will be executed step by step. Therefore, in the long-term India will be able to provide efficient, transparent and accountable services to the citizens.

Figure 74. Future Model of e-Government



5.3.4. Law

5.3.4.1. THE INFORMATION TECHNOLOGY ACT OF 2000

An Act to provide legal recognition for electronic transactions such as data exchange and other means of electronic communications, commonly referred to as electronic commerce. This involves the usage of alternatives to paper-based methods of communication and storage of information, to facilitate electronic filing of documents with the Government agencies.

This act is also the basis for e-Government in India. It recognizes both the use of electronic records and digital signatures. It also mentions the use of both of them in the government and its agencies.

5.3.5. e-Seva project executed by Government of Andhra Pradesh[54]

As citizens had to run around various departments for payment of utility bills and had to spend long hours to pay the utility bills, Government of Andhra Pradesh has taken a vital leap in providing citizens with convenience and comfort in all transactions with the government. e-Seva is one of the major IT project undertaken by the government of Andhra Pradesh as a part of e-governance.

e-Seva is built on the success of TWINS (Twin Cities Network Services) pilot project, which was launched in December 1999 in Hyderabad, the state capital. It is designed to provide citizens of Hyderabad and Secunderabad to handle integrated 19 services pertaining to six departments for delivery on a one-stop mode. Services range from utility bill/tax payments, issue of certificates, provision of information and facilitation. TWINS has been renamed e-Seva as the state government plans to extend it to major towns and municipalities in the state. e-Seva is a citizen service with a difference, which provides a clean, transparent, efficient and effective administrative system through state-of-the-art electronic technology. Citizens are benefited by the direct interface with the government, which saves time, energy and money and gives hassle free dealings with the administration. All the administrative departments come to the customer under one roof offering the citizen a wide range of citizen friendly services.

e-Seva is a government project built on public-private partnership model. Infrastructure and buildings are provided by the government. Staffs are provided by the government as well as by the private sector. Government recruits the staffs through deputation and the respective department pays salaries. Private sector hires the staff through tenders and they are protected by the minimum wage act. Private sector provides the network and the software.

An Integrated Approach

- Integration of departments - central and state governments
- Integration of services
- Integration of G2C and B2C

[54] Improving Citizen – Government Interface through e-Governance: A Study of India, Dr. Y. Pardhasaradhi, Associate Professor of Public Administration, Osmania University, Huderabad, INDIA

- Efficiency, Reliability, Transparency and Scalability are the watchwords at e-Seva

Salient features of e-Seva

- 46 e-Seva centres (with 400 service counters) spread over the Twin Cities and Ranga Reddy District.
- All service counters are facilitated with an electronic queuing system.
- Operating from 8.00 am to 8.00 pm, on all working days and 9.00am to 3.00pm on holidays (Second Saturdays & Sundays).
- 'One-stop-shop' for over 66 G2C and B2C services.
- No jurisdiction limits - any citizen in the twin cities can avail of the services at any of the 46 e-Seva service centres.
- Online services: e-Forms, e-Filing, e-Payments.
- Payments by cash/check/DD/credit card/Internet.

5.4. Implication

5.4.1. Computerization

- Initiate computerization in basic national administration such as NID, and then expand government-wide, integrating each computerized administration step by step for efficiency
- Focus more on quality of civil services, which means reduction of visits and documents providing convenient and simple services
- Build an efficient and transparent administration
- Set up procedure to establish e-government such as master plan, action plan and strategic framework
- Adopt policies to build knowledge based society
- Execute EA project for preventing redundant ICT investment
- Implement BPR/ISP for effective execution of projects

5.4.2. Organization

- Organize ICT committee in charge of ICT development such as policy and project
- Organize ICT working agency in charge of developing and implementing the National Framework Plan and Supporting supervision,

standardization and evaluation of public informatization business

- Establish e-government executing organization under direct leadership of the national leader and have strong leadership to propel e-Government and support
- Maintain close collaboration with ICT related organizations

5.4.3. Laws and Regulations

- Enact laws and regulations to prevent redundant ICT investment
- Periodically assess executed projects and apply the results of assessment to future plan
- Reform regulations in line with ICT development such as Informatization Promotion Law and Digital Signature Law.
- Regulate criteria for task selection

5.4.4. HRD

- Develop human capacity

5.4.5. Standardization

- Adopt national Information Technology Architecture by executing Information Technology Architecture(ITA)/EA

6. CCR(Critical Customer Requirement)

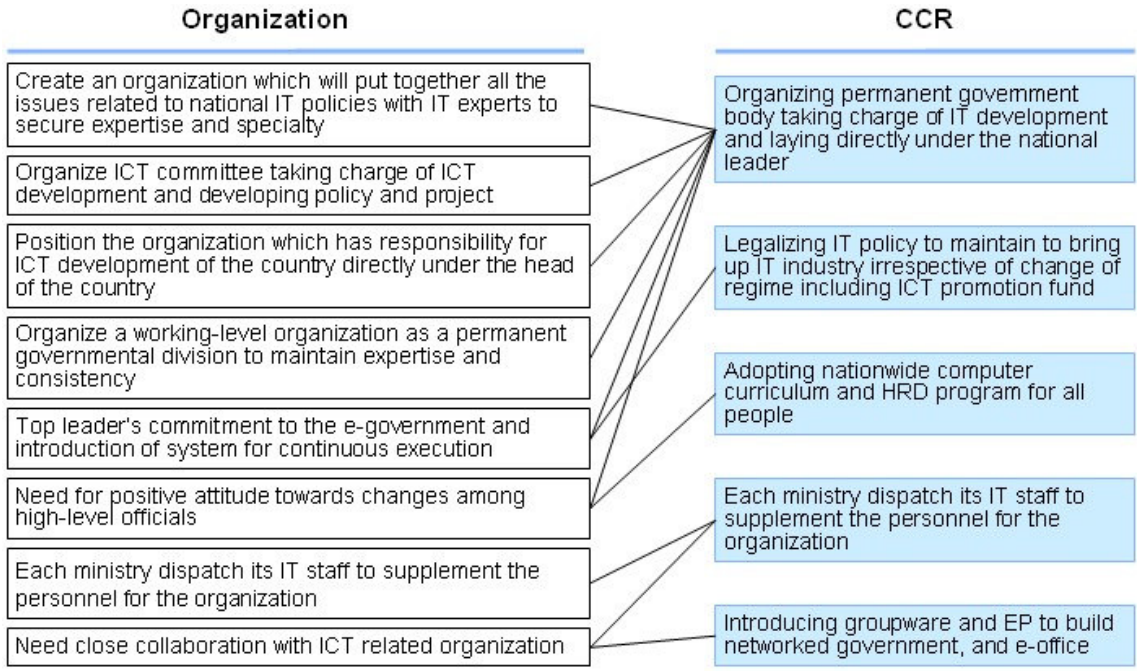
93 implications were extracted through analysis and study of current ICT state of Nepal shown in this chapter after eliminating the redundancies and rearranging them. Now, these implications would be used to build the strategies to establish the e-government of Nepal. To simplify development of strategies, these implications were classified into 6 categories: Organization, Computerization, HRD, Law and Regulation, Infrastructure and Budget.

Based on these implications, 21 Critical Customer Requirement was dug out by means of selecting the prerequisites and foundation of establishing e-government of Nepal. Identified Critical Customer Requirements would be used not only for primary subject of workshop for building vision and mission, but also for developing the strategies to reach the goal of e-government of Nepal.

6.1. Implication Summary

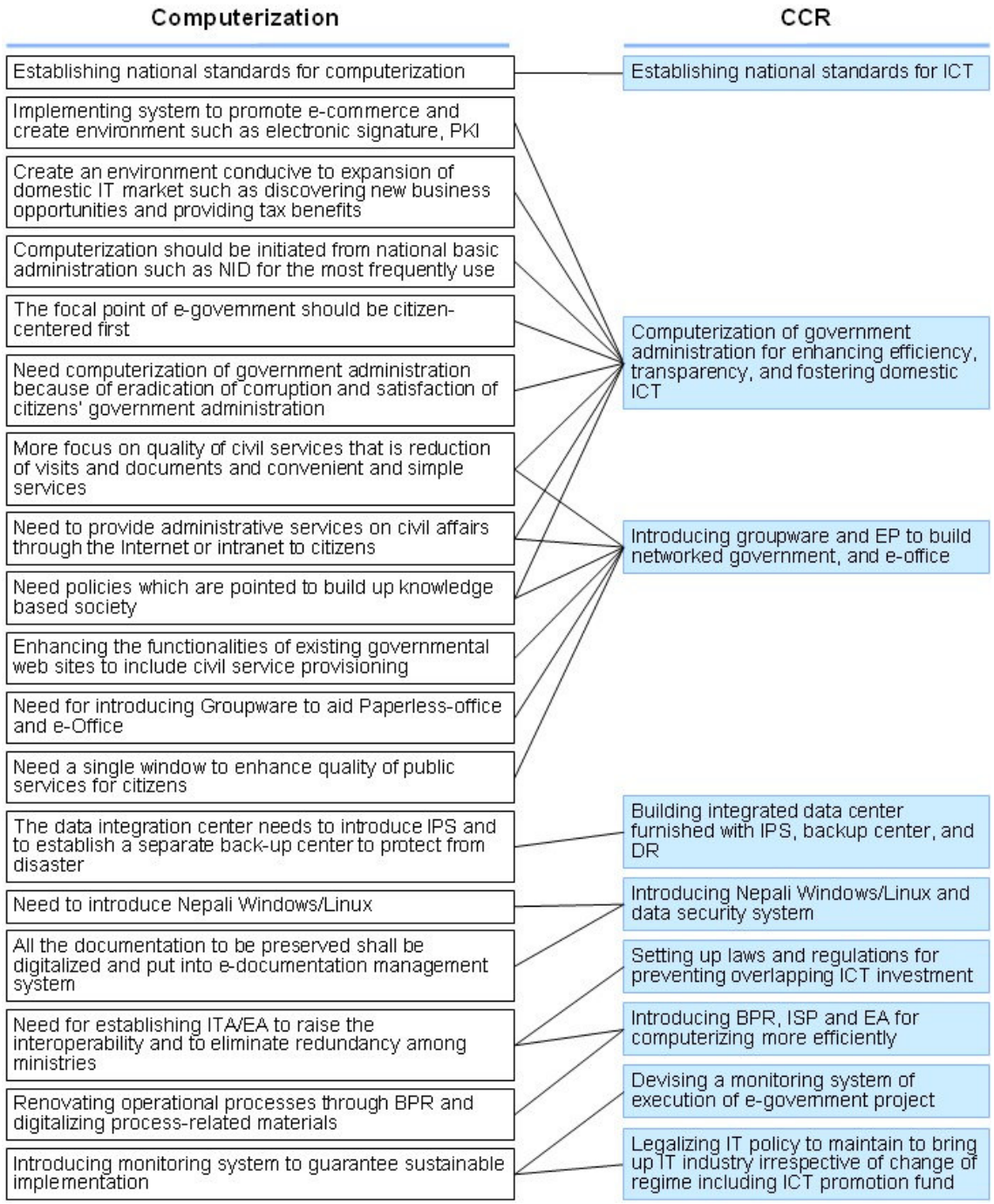
6.1.1. Organization

Figure 75. Implication and CCR (Organization)



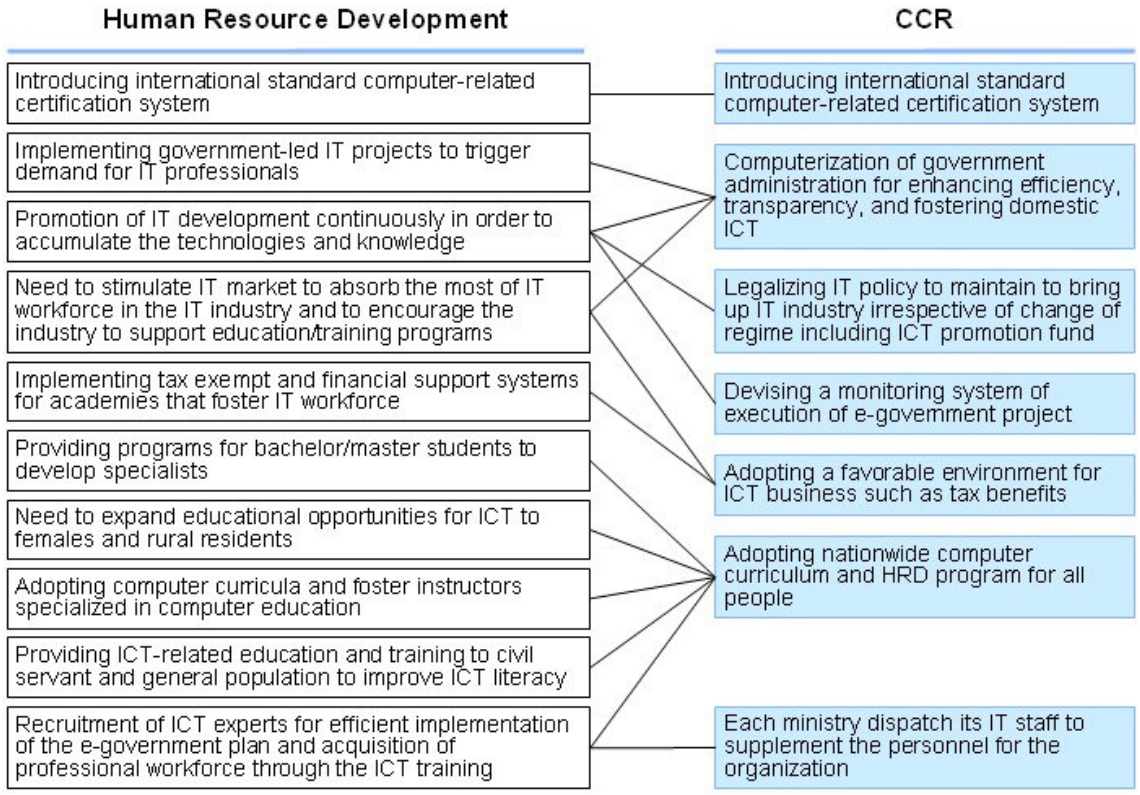
6.1.2. Computerization

Figure 76. Implication and CCR (Computerization)



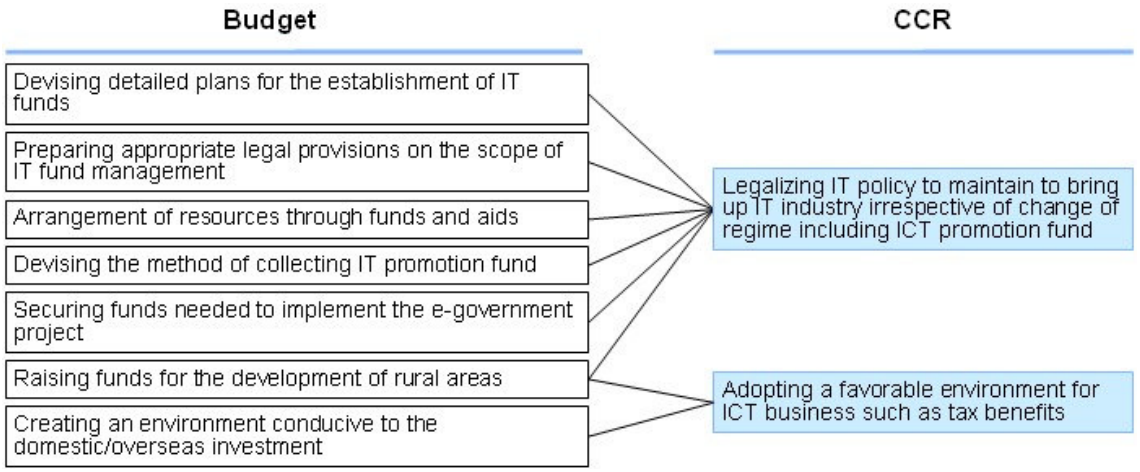
6.1.3. Human Resource Development

Figure 77. Implication and CCR (HRD)



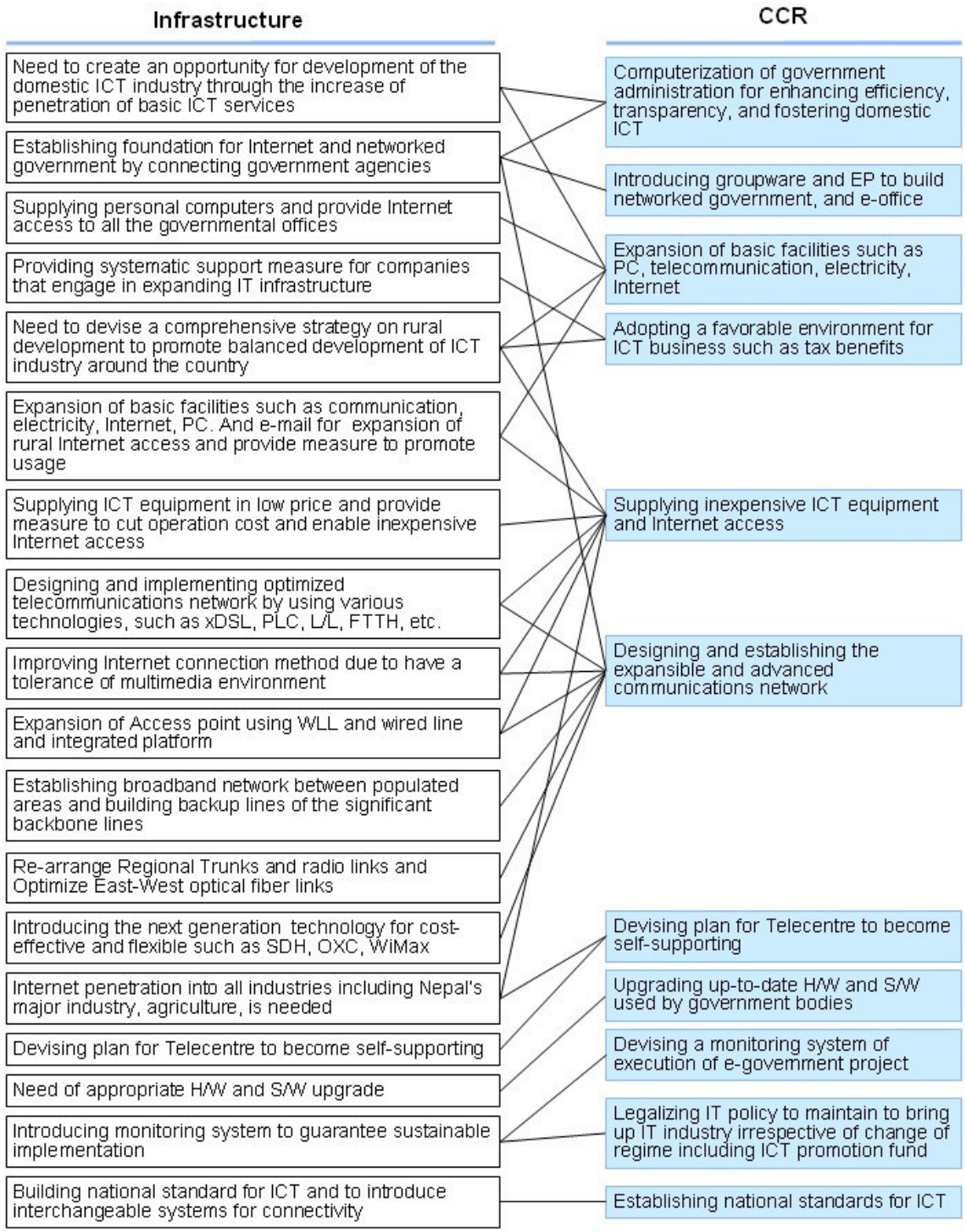
6.1.4. Budget

Figure 78. Implication and CCR (Budget)



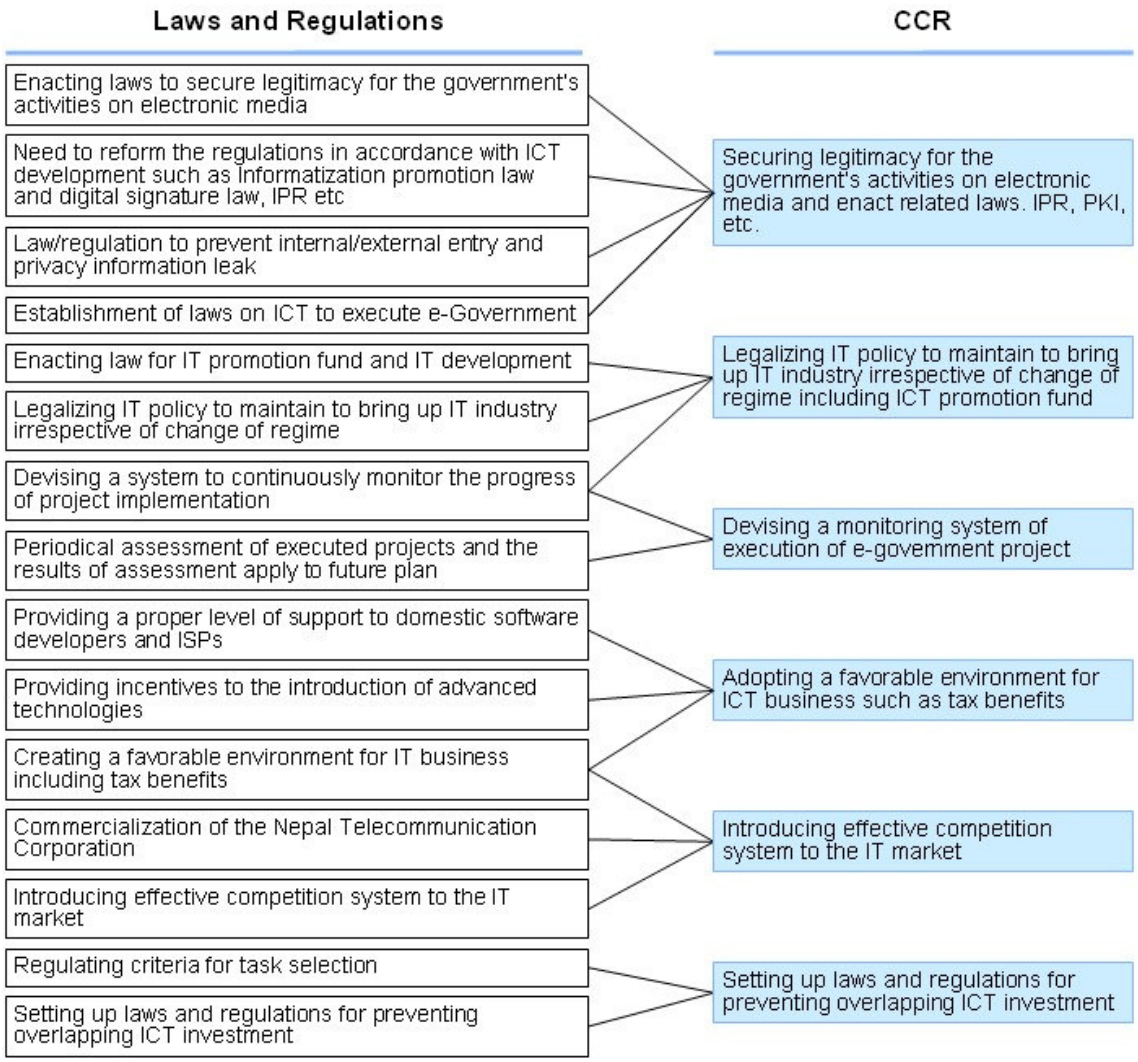
6.1.5. Infrastructure

Figure 79. Implication and CCR (Infrastructure)



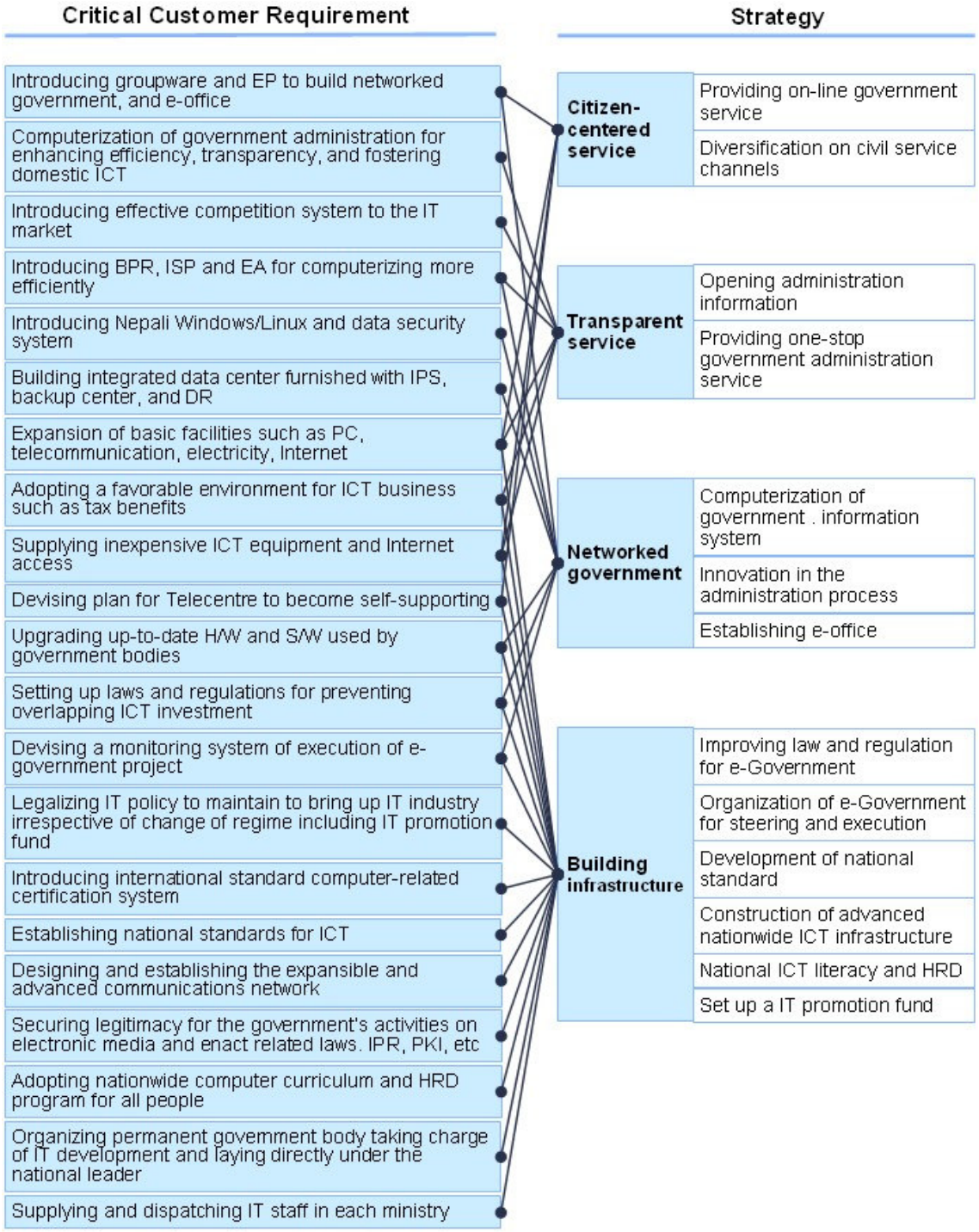
6.1.6. Laws and Regulations

Figure 80. Implication and CCR (Laws and Regulations)



6.2. CCR and Strategy

Figure 81. CCR and Strategy



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III. Vision and Strategy

1. e-Government Vision and Mission

1.1. Overview

In the previous chapter, bibliographic study, survey and interview were conducted to review and analyze Nepali current policy, ICT status and requirements for e-government. Cases of leading e-government countries (Korea, United States) and the ICT trends were also analyzed to help build the e-government of Nepal. Based on implications generated through this analysis, the CCR (Critical Customer Requirement) needed for e-government in Nepal was identified. Based on the CCR, directions for strategies were established which can be categorized into G2C, G2B, G2G and infrastructure.

Being in the infant stages of introducing ICT, it is extremely important for Nepal to carry out the e-government project that fits the situation of Nepal by utilizing lessons learned from the e-government requirements, new technologies and advanced cases. These efforts will prepare the grounds for Nepal to leap forward in the international market.

Against this backdrop, vision and mission needed to realize the e-government in prompt and effective manner, as well as strategies to achieve such vision and mission, were established.

The vision and mission sets the goal of e-government project and it also allows the Nepali people, including public servants, to understand what the government wants from this project and why, and to share the value of the project. This, in turn, makes it possible to implement the e-government plan effectively and efficiently.

With such background, a workshop on preparing the vision statement and mission statement was hosted. Also, while the target period of vision is set for 10 years or longer, the target period for the vision of Nepali e-government plan was set for five years. This is to take greater consideration of the dynamic developments in information communication and to draw up detailed executable plan.

The workshop on assuming the vision for this project was held in a conference room of MoEST in Nepal on May 15, 2006, with 34 participants from Nepali public, private, academic, and industrial circles, formed into four working groups.

KIPA's consulting team has generalized and summarized opinions from the workshop and has created a vision statement and a mission statement. This vision

statement is utilized as a guide for implementing strategies while the mission statement is utilized as a guide for formulating strategies.

1.2. Vision

In general, a vision can be defined as a comprehensive concept describing images of a business success. In other words, it is the future target image that Nepal wants to achieve in five years through the e-government.

Key words generated from the workshop on vision establishment include: improvement in national income, enhancement in national competitiveness, improvement in administrative services for the people, realization of the knowledge based society, citizen-centric, transparent government, good governance and etc. All participants representing each sectors of the society wanted the e-government project to deliver economic development and transparent administrative services that would increase convenience and living standards of citizens.

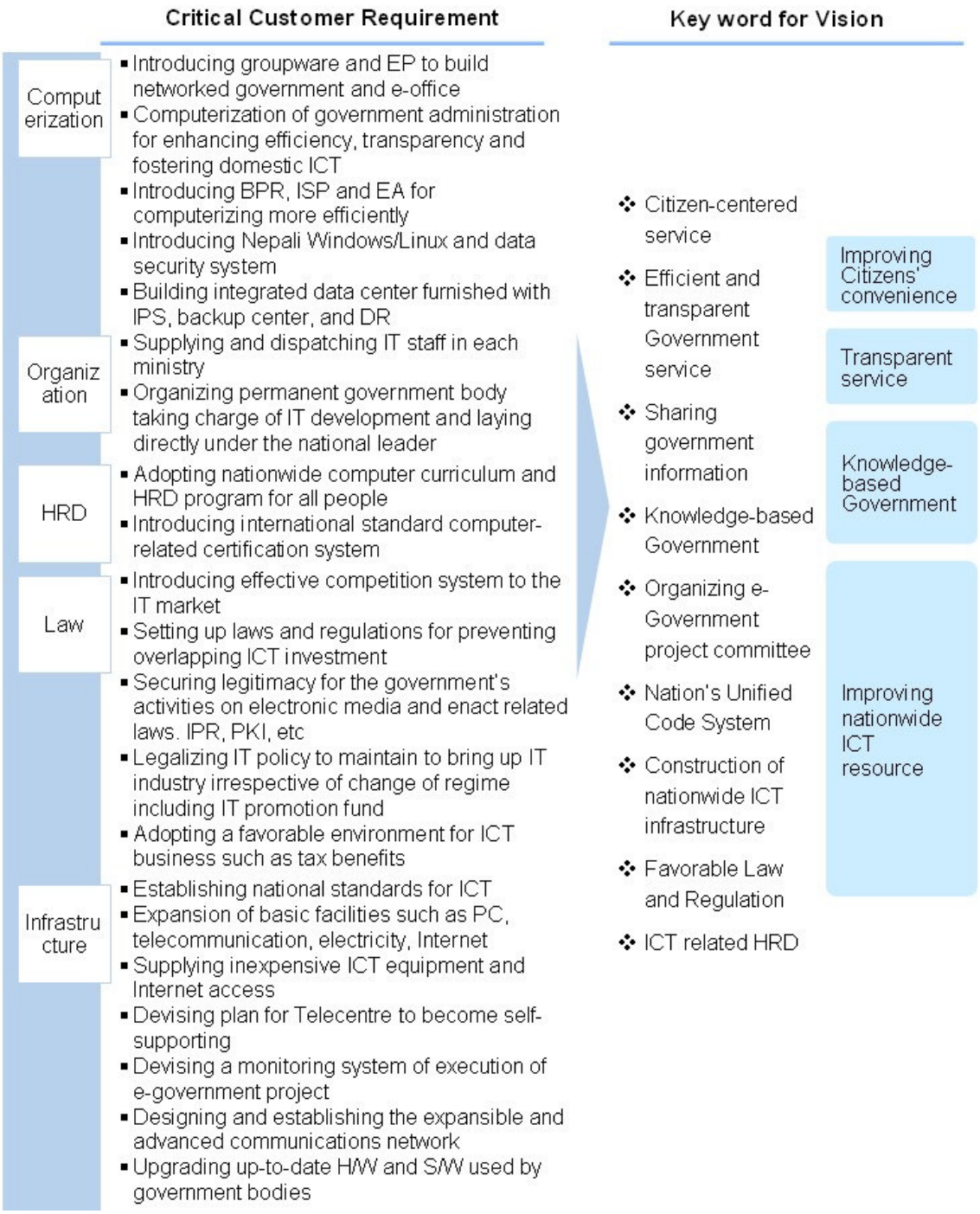
Key words from the workshop were categorized into G2C, G2B, G2G by using the CCR mentioned in the previous chapter and their interrelations were marked up as shown in figure 82.

These key words have the common goal of building Nepal, which is a developing country, into a developed country with higher average living standards by equipping the country with ICT and utilizing ICT as the new growth engine. In five years, all the government agencies in Nepal would be interconnected via network and Nepal will provide citizen-centric and transparent services for its people. Through this, it will establish the knowledge-based society. Ultimately, Nepal will maximize the use of ICT to create values for individuals, organizations, industries and all other parts of society, and create synergy effect through networking. In this respect, the vision statement for the Nepali e-government is defined as following.

The e-government vision is ‘The Value Networking Nepal’ through

- Citizen-centered service
- Transparent service
- Networked government
- Knowledge based society

Figure 82. CCR and Key Words for Vision



1.3. Mission

In the mission statement, key words on purpose of pursuing the e-government, key words on businesses, and key words on values that each member needs to share to achieve the goal were identified.

Key words presented at the workshop on vision statement held in Nepal are as following.

Key words presented as the purpose of e-government are as following:

- Strengthening the national competitiveness
- Improving the quality of life
- Realizing an equitable society
- Achieving social and economic development
- Carrying out balanced development of the country

Key words presented in the business sector are as following:

- Providing value added, quality services
- Increasing the citizen participation
- Providing efficient administrative services to citizens
- Realizing transparent government
- Developing and nurturing the information industry

Key words for sharing value are as following:

- Assuring human rights
- Promoting livelihood
- Upgrading social behavior
- Realizing an equitable society that transcends racial and regional differences
- Protecting human dignity
- Guaranteeing human rights and their interests

Taking these keywords, a mission statement that includes purpose, business and value were drawn up as following.

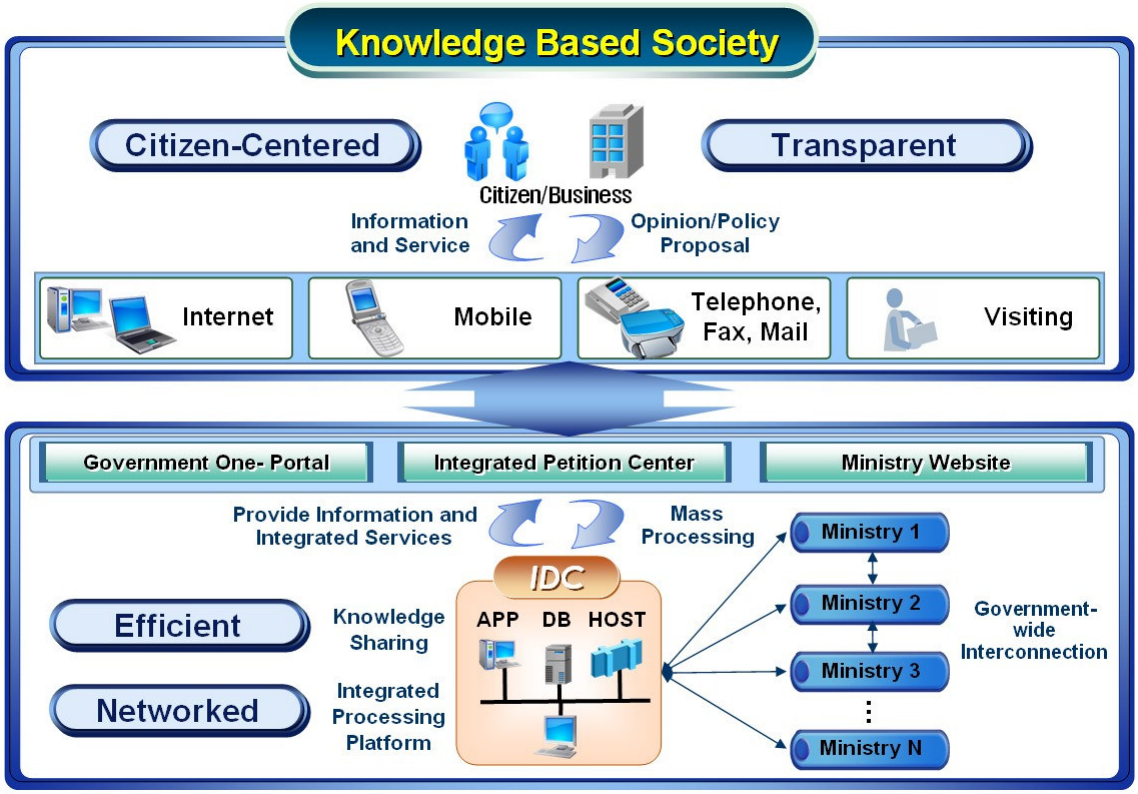
The E-government mission statement:

Improve the quality of people's life without any discrimination, transcending regional and racial differences, and realize socio-economic development by building a transparent government and providing value added quality services through ICT.

1.4. Future Image

The future image of Nepali e-government, when the vision and mission for e-government are achieved, is a government that provides administrative services to its people through various channels, improving the convenience of the people. Also it will be a government that provides integrated and transparent administrative services for companies so that they can have greater competitiveness. Within the government, all the agencies and departments will be linked through the network to enhance efficiency in process. Through this, the Nepali government would be able to realize a knowledge-based society. Below is a diagram of the future image.

Figure 83. Future Image



2. Strategy and Projects

2.1. Overview

The vision and mission statement were developed in order to set the basic direction of strategies based on CCR generated from the As-Is analysis as mentioned in Chapter 2 and to present the future image of Nepali e-government.

Yet, more specific goals and strategies are required to achieve this future image.

Thus, administrative services were categorized into G2C, G2B and G2G according to its type, and its respective goals and strategies were prepared. To provide these services, it is essential to prepare legal and institutional foundations and supply network and other equipments that meet the situation of Nepal. As such, goals and strategies for the ICT infrastructure needed to realize each service types were also established.

Moreover, detailed goals for each areas, strategies to achieve them and projects that need to be executed through these strategies were also identified. Importance of each of these projects will be assessed and will be properly allocated in the roadmap for the establishment of e-government in Nepal.

Detailed goals in establishing the e-government in Nepal are defined as following.

- G2C: Provide customer-tailored services
- G2B: Provide transparent and prompt services
- G2G: Networked and knowledge based government
- Infrastructure: Favorable ICT infrastructure and legal framework

Specific strategies and projects to be executed for each of these goals are as following.

2.2. Goal and Strategies – G2C

G2C refers to administrative services that the government provides to its citizens through the establishment of the e-government. Its goals and strategies are as following.

Goal:

- To build a citizen-oriented civil service by providing on-line government service using ICT and diversifying civil service channels

Strategies:

- On-line public service
  - Computerizing and providing administration service on-line to provide citizens with easy access to government administration
  - Constructing supporting system for expanding Internet service
- Diversification of civil service
  - Convenient servicing of civil petitions through various ways such as visits, on-line, fax, e-mail, and telephone
  - Providing civil service that is available anytime and anywhere

Projects:

- NID, Government Representative Portal, Passport Registration System, Social Insurance Information System, e-Health, e-Election, e-Vehicle, e-Driver license, e-Petition, e-Pension, e-Post and e-Agriculture

2.3. Goal and Strategies – G2B

G2B refers to administrative services that the government provides businesses and industries through the e-government. Its goals and strategies are as following.

Goal:

- To provide integrated information and service in each industry and enhance the enterprise competitiveness through the one-stop and transparent G2B service

Strategies:

- One-stop public service
  - Providing integrated government administration information to businesses that support economic activities via on-line
  - Supporting business activities with fast & personalized information
- Opening of administration information and process
  - Opening government administration information and procedures of

business petitions to enhance business competitiveness
- Clarifying the procedures of business petitions

Projects:

- Recruitment and Employment Information System, e-Customs, e-Procurement, Business Registration and Approval Management System, e-Patent, e-Tourism and e-Commerce

2.4. Goal and Strategies – G2G

G2G refers to information and administrative services that is provided in government agencies and its departments through the establishment of e-government. In order to enhance national competitiveness, this process should be improved and integrated through reengineering. Its detailed goals and strategies are as following.

Goal:

- To standardize government administration process, and computerize administration, and share administration information to enhance effectiveness

Strategies:

- Standardization of government administration
  - Making a standard for administration procedure by executing BRM (Business Reference Model) and introducing a groupware
  - Executing e-Approval and e-Document
- Computerization of government administration
  - Changing government administration into an automated and paperless office through ICT
  - Enhancing government's administration process
- Integration of government information system
  - Integrating all computerized administrations through KMS execution
  - Establishing an integrated government ICT center

Projects:

- e-Tax, Immigration Management System, e-Education, e-Land, e-MIS, Groupware, e-Pollution, e-Authentication, KMS and GIS

2.5. Goal and Strategies – Infrastructure

Infrastructure is the foundation needed to realize the e-government and to provide advanced services in Nepal. Without this foundation, all the services mentioned above cannot be provided, and thus infrastructure needs to be laid out before anything else. This includes law/system, communication network and equipments, human development, organization, budget and etc. Its detailed goals and strategies are as following.

Goal:

- To fulfill the requirements for realizing the e-government which are expanding nationwide ICT infrastructure, strengthening ICT education, and installing favorable laws and organizations

Strategies:

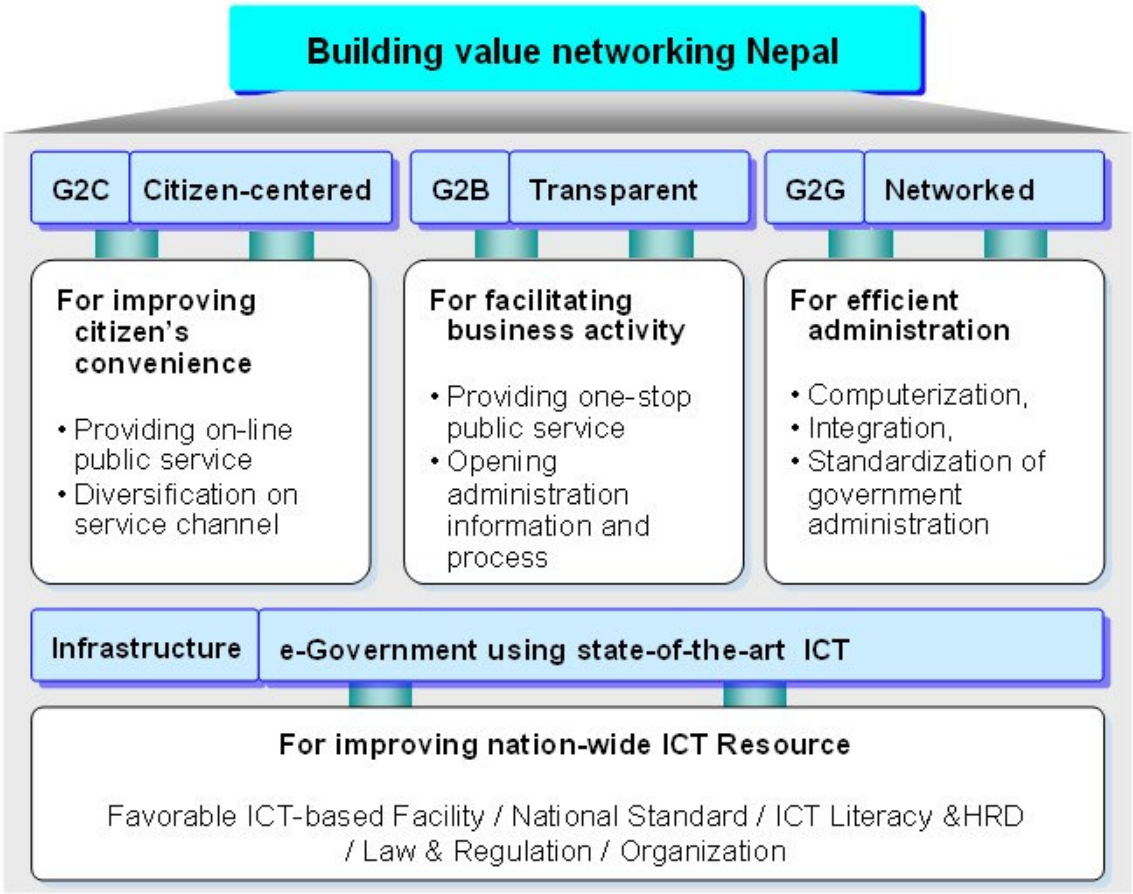
- Construction of advanced nation-wide infrastructure
  - Building the nationwide communication network and improving the capacity in accordance with network traffic
  - Expanding internet coverage and improving capacity of the ICT infrastructure
  - Distributing inexpensive Internet and PC
- Development of national standard
  - Developing the nation's Unified Code System
  - Establishing system and security standard at the government level
  - Establishing a national standard model of business, IT systems and technology to enhance interoperability and prevent duplication
- National ICT literacy and HRD
  - Establishing HR development programs
  - Providing education opportunities and developing useful ICT education program for citizens to facilitate e-government participation
- Improvement of Law and Regulation
  - Establishing favorable law and regulation on e-government
  - Establishing favorable laws to prevent redundant ICT investment
  - Establishing and revising the legislations to drive systems supporting new technology

- Organization of e-Government Committee
  - Empowering the e-government projecting committee
  - Establishing an authorized organization to promote e-government systematically and efficiently at the government level

Projects:

- EA (Enterprise Architecture), Communication Network, Government Integrated Data Center, Public Key Infrastructure

Figure 84. Goal and Strategies



3. Project Identification

In the previous chapter, Nepali vision and mission for the e-government were established. Also, goals and strategies of administrative services to achieve the vision and mission, goals within the government and detailed strategies to achieve those goals were identified. Goals and strategies for laying the foundation were also

established. Moreover, projects to be executed through these strategies were also selected.

Below are the details of projects selected to determine priority projects and prepare for the establishment of e-government.

3.1. G2C

3.1.1. National Identification(NID) System

3.1.1.1. Definition

The NID System should be used as the fundamental database for establishing the national policy, because population statistics is fundamental. It seeks to develop all citizens' basic personal database and provide personal identification via ID cards. It also helps online services for the public, supports prompt actions to civil service and reduces duplicate documents for civil petitions.

3.1.1.2. Functions

- Assigning unique number to all citizens including children
- Furnishing residents related information to government ministries and public agencies (immigration management, criminal inspection, taxation, etc.)
- Providing public civil service to the people (inquires and issuances of certificates)
- Providing NID issuance and identification check service

3.1.1.3. Expected Effects

- Simplicity of personal identification by unique number in election, crime inspection, passport, immigration and taxation
- Utilization of crime inspection using name, age, address, sex and fingerprint
- Accurate information about population and residence movement of citizen
- Establishment of efficient government utilizing national administration service such as election, security, and taxation
- Installation of fast and exact national policy based on the fundamental database
- Provision of on-line administration service via sharing of civil information among ministries

- Easy verification of personal identification for administration service every place and every time
- Increased convenience and efficiency in administration for citizens through on-line civil service process

3.1.2. Government Representative Portal

3.1.2.1. Definition

The Government Portal is a single window lined with e-government, information providing system, and operation infrastructure in order to maximize efficiency/productivity and provide rapid/high quality administration services to citizens. One website helps to reduce the cost (money/human resource/space) compared to operating separate websites. Also it helps the customers easily find administration services through just one website.

The Government Portal seeks to provide convenient service to citizens by reducing the number of paper documents and office visits. It also promotes administrative democracy and transparency through various services of e-Petition Service Center such as processing civil petition, furnishing administrative information and gathering public opinions.

3.1.2.2. Functions

- Offering information on civil petitions, agencies-in-charge, required documents, and relevant laws and institutions
- Applying and issuing of civil petitions on only one website
- Sharing administrative information among ministries and agencies
- Real-time processing of the civil petitions

3.1.2.3. Expected Effects

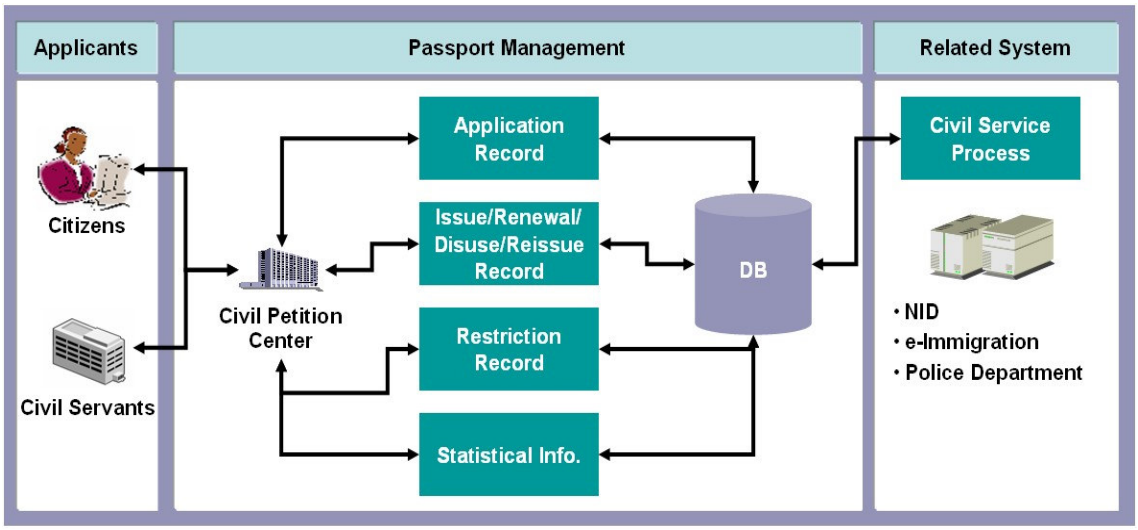
- Greater convenience for citizens and reduced volume of documents through on-line application for civil petitions and information sharing
- Independence and transparency of the administration with real-time inquiry for civil service process
- Reduced government expenses through information sharing online
- No visit to offices for getting administration service
- Reduction of operation cost through management of one website and less equipments

3.1.3. Passport Registration System

3.1.3.1. Definition

The Passport Registration System seeks to provide citizens with convenient immigration process and enhance the country's international confidence by developing a passport issuance system. Issuance of fully-automatic photo-embedded passport with state-of-the-art security functions will help prevent forgery and alteration. This project will cost about $20 million.

Figure 85. Passport Management System



3.1.3.2. Functions

- Issuing photo-embedded passport with strengthened security that can be identified by passport reader of ICAO standard
- Providing information on overseas diplomatic agencies including its national economic, political status
- Tracking the process of issuing passport real-time

3.1.3.3. Expected Effects

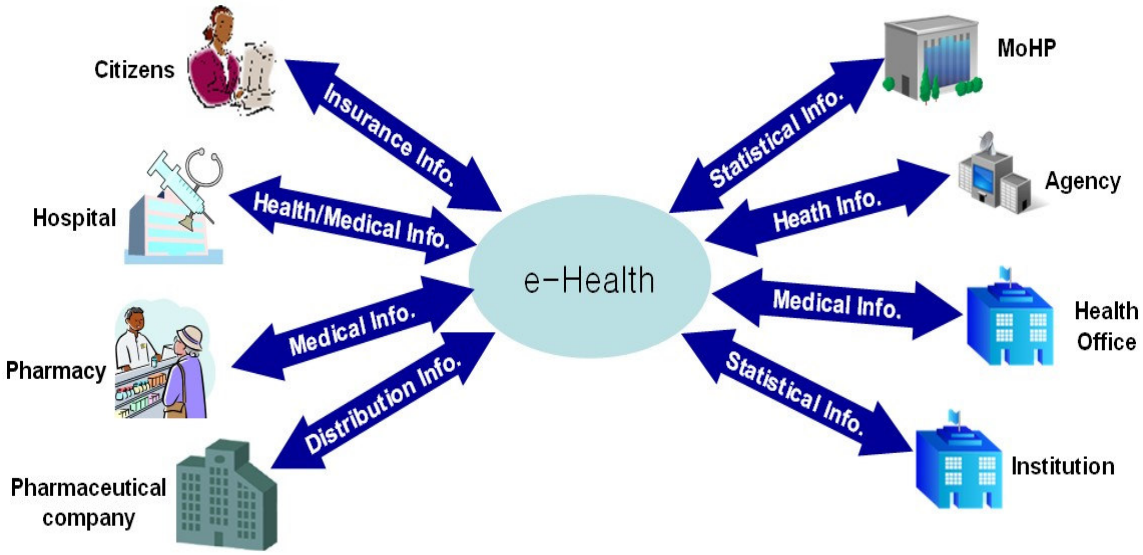
- Reduced time for consular operation with shared passport data
- Convenient issuance of passport with less visits to public office
- Reduced passport issuance fee using electronic forms

3.1.4. e-Health

3.1.4.1. Definition

The e-Health System promotes preventive medicine to help the public maintain their health, and the tele-medicine for patients to get medical treatment via electronic devices without having to go to hospitals. This project will cost about $30 million.

Figure 86. e-Health



3.1.4.2. Functions

- Enabling the public to easily access health information and maintain their health by preventing diseases
- Providing simple medical treatments using electronic devices
- Sharing patients' health information between the e-Health System and medical institutions such as hospitals
- Sharing stock information of medical supplies between health offices and medical institutions

3.1.4.3. Expected Effects

- Checking and transportation of stock of medical supplies
- Provision of medical service statistics to agencies and institutions
- Medical treatments for patients in areas with limited access to medical facilities using electronic devices

- Maintenance of public health by preventing diseases
- Effective medical care for patients through data sharing between the 1st and the 2nd medical institutions

3.1.5. e-Vehicle

3.1.5.1. Definition

The e-Vehicle System helps manage vehicle-related matters promptly and accurately including financial resources, registration, regular check-up, safety inspection, issuing of certificates, vehicle mobilization for national emergency, etc. This project will cost about $23 million.

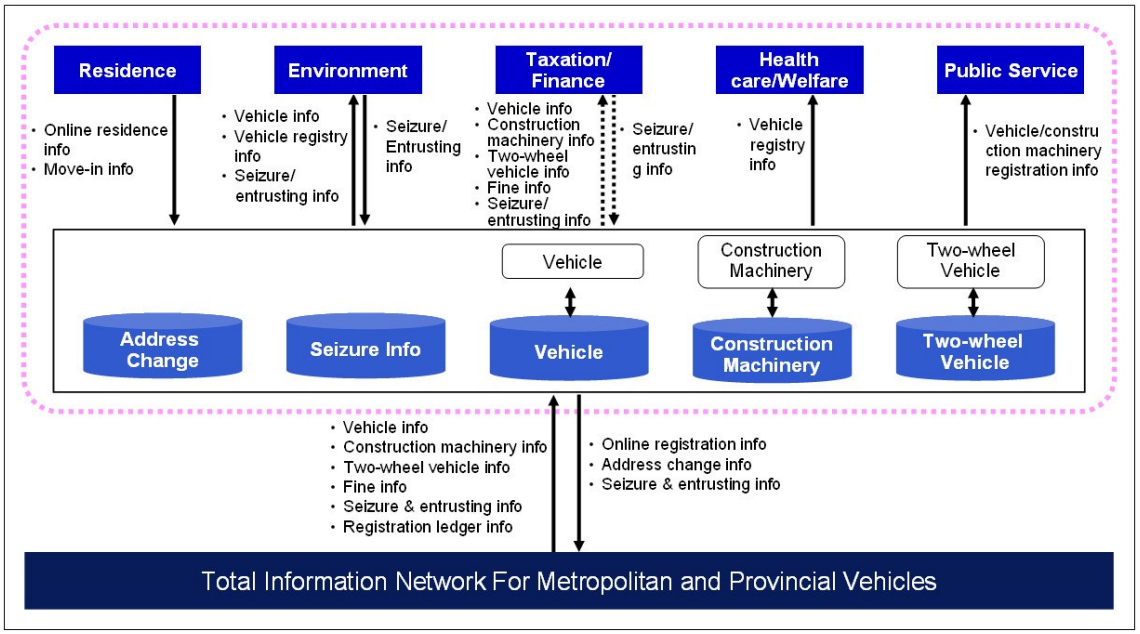
3.1.5.2. Functions

- Registering new vehicles, and changing/transferring/canceling vehicle registration
- Issuing certificates, and opening them for public reading
- Identifying vehicles
- Providing support for regular vehicle check-up and safety inspection
- Providing various statistical data for vehicles
- Providing taxation data
- Designating vehicles to be mobilized for national emergency, issuing the obligation notice, addressing changes in vehicle mobilization, and designating replacement vehicles

3.1.5.3. Expected Effects

- Streamlining of organizations in charge of vehicle-related affairs
- Optimization of organizations in charge of creating/keeping/managing vehicle-related data
- Prompt handling of services for the public
- Prompt and effective establishment of relevant policies using e-Vehicle System which provides statistical data and policy standards by regions, time periods, and vehicle types

Figure 87. e-Vehicle



3.1.6. e-Driver License

3.1.6.1. Definition

The e-Driver License System will help manage issue/renewal/loss/disuse/reissue of driving licenses efficiently, select drivers subject to safety education and produce various statistical data by creating and managing driving license DB. This project will cost about $21 million.

3.1.6.2. Functions

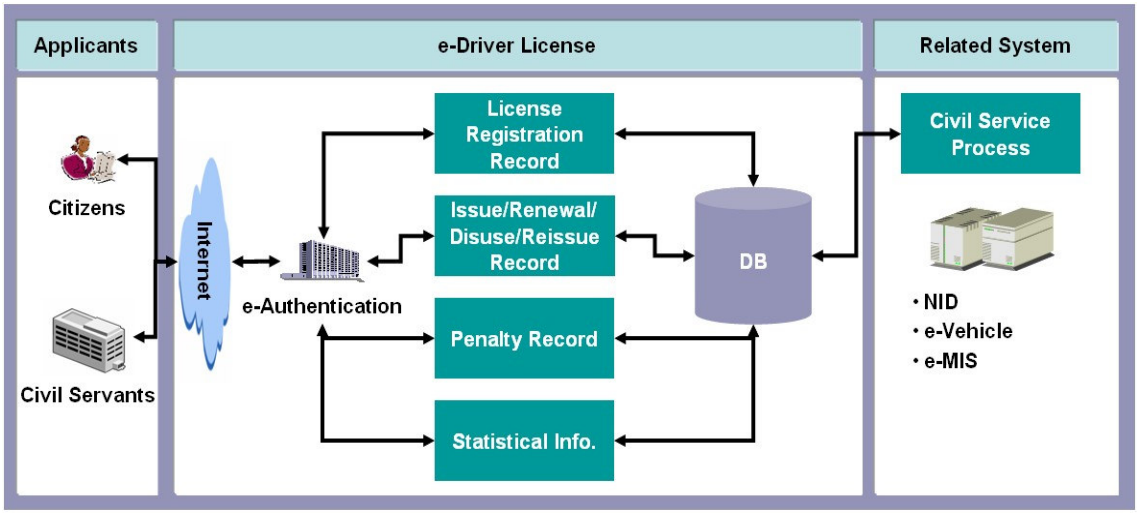
- Providing support for issue/renewal/loss/disuse/reissue of driving licenses
- Selecting drivers subject to periodic education for safe driving
- Producing various statistical data related to driving license
- Identifying drivers

3.1.6.3. Expected Effects

- Prompt and efficient issuance of driving license through simplified procedures

- Enhanced safety driving awareness through public safety education
- Statistical data available for relevant government agencies when establishing policies

Figure 88. e-Drivers License



3.1.7. e-Agriculture

3.1.7.1. Definitions

E-Agriculture System delivers quick and accurate information to farmers about status and technical trend of agricultural market via the Internet. Thus, it increases the quality and productivity of agricultural products. This project will cost about $20 million.

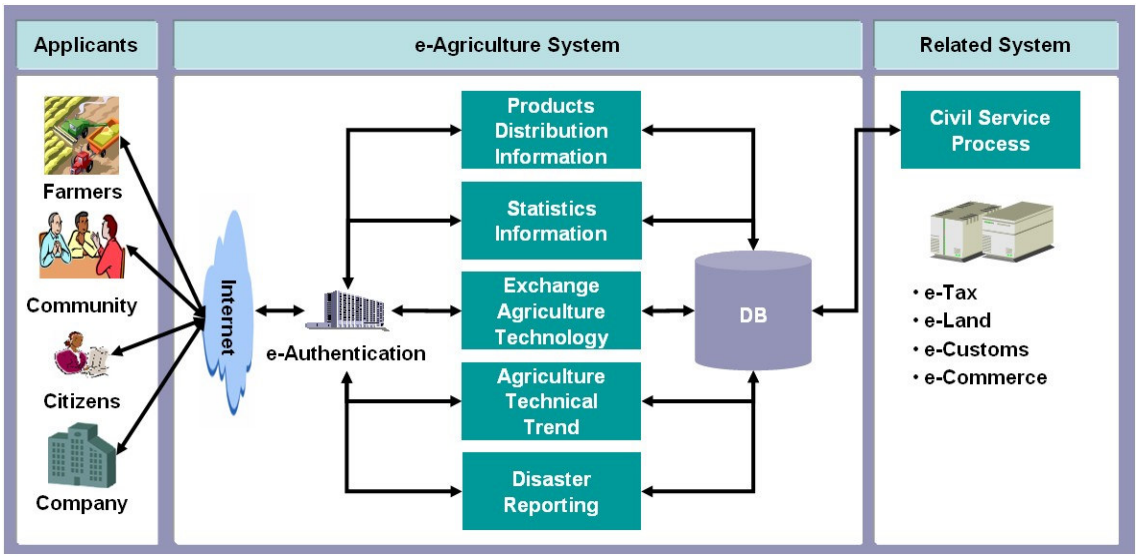
3.1.7.2. Functions

- Periodically updating information on status and technical trend of agricultural market
- Updating agriculture products and circulation statistics and dates of agriculture policy establishment
- Developing high added value products with accumulated data

3.1.7.3. Expected Effects

- Greater crop yields
- A move from labor-intensive cultivation to technical-intensive cultivation

Figure 89. e-Agriculture



3.1.8. e-Post

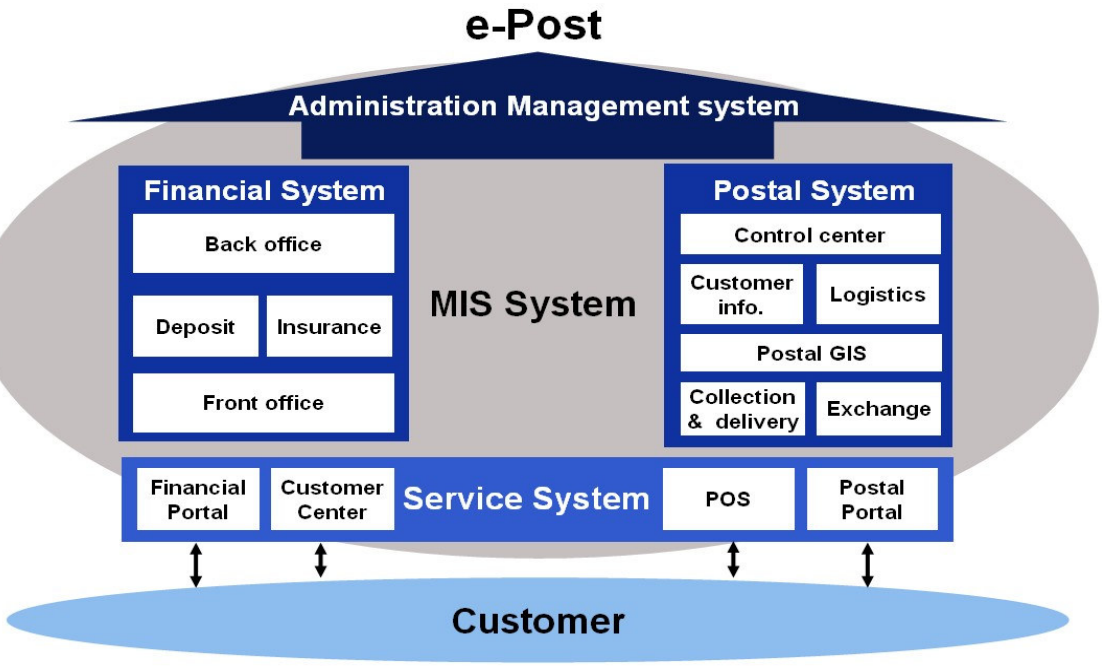
3.1.8.1. Definition

e-Post consists of postal delivery service and postal banking service. Postal delivery service provides citizens with user-friendly and reliable method of delivering goods. Especially, it provides a cheap and convenient way of providing banking services to the citizens anywhere through the internet.

3.1.8.2. Functions

- Postal System
  - Information Exchange, Delivery Administration, Tracking Administration, Transportation Administration, Service Control
  - Address Administration, Transportation/Delivery GIS, Postal Code Administration, Postal Customer DB, Service, Service History Administration
- Postal Banking System
  - Banking Service, Insurance Service, etc.
  - Customer Information Administration, Financial Goods Administration, Analysis and Earnings Administration

Figure 90. e-Post



3.1.8.3. Expected Effects

- Upgraded service in the rural areas through advanced postal and banking service nationwide
- Efficient and reliable delivery service through advanced delivery system
- Elimination of digital divide through diverse financial services nationwide
- Provision of alternative means of postal and banking service like the Internet

3.1.9. e-Petition

3.1.9.1. Definition

Through the e-Petition System, the civil petition can be filed and addressed on-line without current paperwork, and the results can be accessed on-line for public reading.

3.1.9.2. Functions

- The public: filing a civil petition, reading the results, and getting various certificates issued on-line
- Public officials: addressing the civil petition on-line
- Opening the process and results of civil petition on-line for public reading
- Protecting user information through authenticity and confidentiality

3.1.9.3. Expected Effects

- Disclosure of civil petition handling process through an automatic link to the administrative system, assuring transparency in administrative affairs
- The 'no-visit' civil service available for the public by filing civil petition and issuing certificates at home or at work

3.1.10. e-Election

3.1.10.1. Definition

The e-Election System enhances efficiency in the voting process using electronic devices that will automate current manual voting process. Introducing the e-Election System will enhance efficiency in voting by reducing time required for ballot counting and error counting. It will also advance democracy by encouraging more citizens to vote. In addition, with significant reduction in voting cost, the voting system can be used widely in the decision-making process.

3.1.10.2. Functions

- Analyzing ballot counting results more promptly and accurately through electronic ballot counting
- Providing easy to use and access interface
- Providing the tele-voting function such as telephone voting, SMS (Short Message Service Text) voting, and Internet voting

3.1.10.3. Expected Effects

- Realization of greater democracy with a higher turnout of voters
- Reduced time and human resource to list-up voters
- Reduced voting time and cost through the use of digital devices
- High accuracy and prompt counting of votes
- Provision of information about candidate's career through digital devices

3.1.11. e-Pension

3.1.11.1. Definition

Pension is a kind of social security and customers are citizen (if existed), civil servants, soldier, teachers, etc. The e-Pension System enhances efficiency in pension-

related work as it can sort out pensioners, calculate contributions and benefit amount, etc., automatically by creating a DB. Therefore, the system gives pensioner lists, calculation of pension amount, acceptance term by personal number. Also, it helps to give monthly / yearly statistics and simulate future pension status. Pensioners would also be able to access relevant information on-line promptly and accurately.

3.1.11.2. Functions

- Sorting out pensioners and calculating contributions and benefit amount
- Providing pension-related information to pensioners on-line
- Providing PR services for public welfare

3.1.11.3. Expected Effects

- Information required for establishment of pension policies available through accurate calculation of pension contributions and benefit amount
- Enhanced transparency in pension operation
- Serving as a new foundation for public welfare policies

3.1.12. Social Insurance Information System

3.1.12.1. Definition

The Social Insurance Information System seeks to improve the quality of civil service, petition service and efficiency of social insurance management operating system by reducing redundant reports and inefficient processes.

3.1.12.2. Functions

- Online reporting services(ex, Application/Changes/Withdrawal for Business and Membership)
- Insurance bill inquiry and payment service via the Internet portal site
- Providing basic statistics database of social insurance
- Managing user information, e-application for civil petition, and service inquiries

3.1.12.3. Expected Effects

- Limited number of document types through standardization of service forms
- Internet reporting and rapid process available online (convenient service

and reduced time)

- Round-the-clock service available 365 days

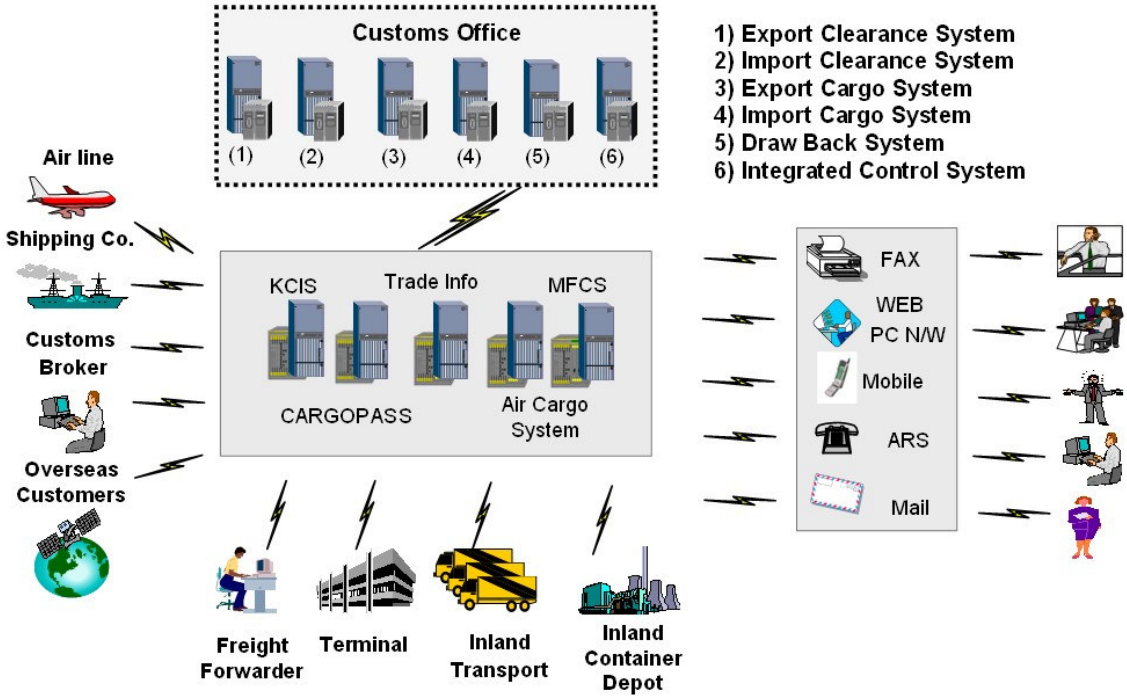
3.2. G2B

3.2.1. e-Customs

3.2.1.1. Definition

e-Customs seeks to provide citizens with better services for import and export of goods. This can be accomplished by building a customs clearance system with computerized management of customs procedures, enabling the country to actively respond to the international trade market. It also supports the establishment of national trade policy and provides information on each ministry's trade policy. This project will cost about $32 million.

Figure 91. e-Customs



3.2.1.2. Functions

- Supporting establishment of national comprehensive trade policy (including internal/external trade related policies)
- Providing import/export related public services to citizens (including customs clearance, other trade related information, and

shipment/warehouse/delivery/stockpiles of bonded goods)

- Providing basic DB to draw up each import/export related ministry's policy
- Managing tax demand/collections for trade

3.2.1.3. Expected Effects

- Optimized drafting/filling/managing of trade data through integration of related agencies/windows and minimized work process
- Strengthened productivity of civil service through reduced service time
- A fast, appropriate establishment of trade policy by furnishing various statistical analysis

3.2.2. e-Procurement

3.2.2.1. Definition

e-Procurement seeks to conduct all procurement procedure on-line via the Internet by redesigning the existing complex and paper document-based procurement service. It also enhances efficiency and transparency in procurement through a unified procurement window. This project will cost about $40 million.

Figure 92. e-Procurement

3.2.2.2. Functions

- Announcing publicly for bidding of all government-wide projects
- Enabling online process for registering as a contractor, bidding on public project, signing contract agreement, and receiving payment for services

- Standardizing e-Catalog System for procurement supplies
- Enabling company to bid on nationwide tender through one time registration

3.2.2.3. Expected Effects

- Increased quality of supplier service, reduced purchasing price from market competition
- Enhanced transparency in procurement process through minimized office visits
- Fairness and reasonableness in supplier selection
- Transparent and reliable procurement service through open report of each process
- Promotion of private sector's B2B through standardization of e-Commerce in the public sector

3.2.3. Business Registration and Approval Management System

3.2.3.1. Definition

The Business Registration and Approval Management System seek to improve convenient public service with a one-time business registration, which can be applied to all administration services requiring a business registration certificate. This project will cost about $30 million.

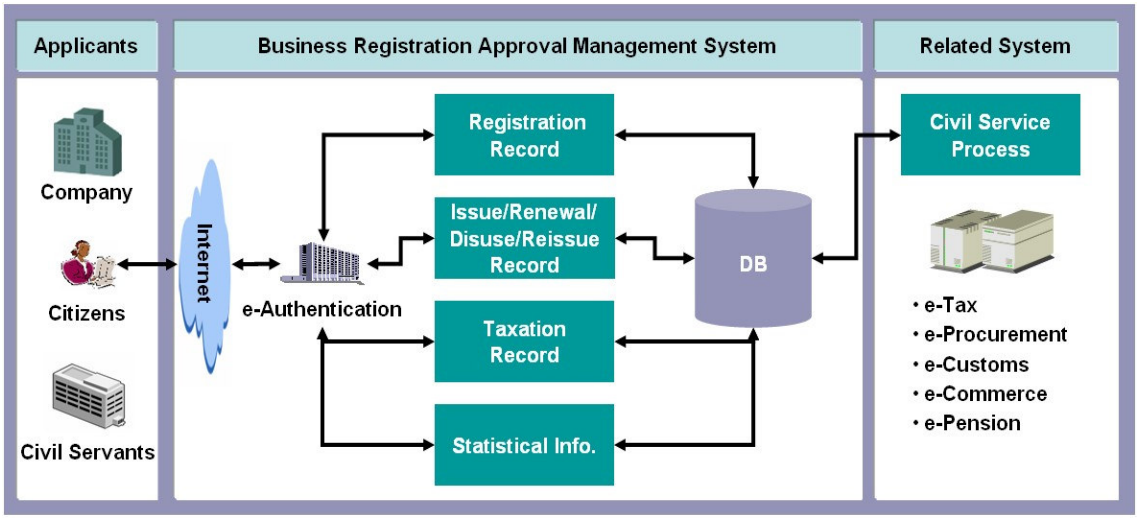
3.2.3.2. Functions

- Furnishing business registration information to related agencies
- Providing public service on business registration to citizens (petition and issuances of certifications)

3.2.3.3. Expected Effects

- Efficient administration through information sharing among agencies related to business registration
- Reduced time for public service through removal of unnecessary, additional registration process (tax return, subscription for 4 insurances)

Figure 93. BRAMS



3.2.4. e-Commerce

3.2.4.1. Definition

The e-Commerce System helps to create a market place for free on-line commercial transactions. The system will promote commercial transactions and boost the economy through on-line B2C/B2B/G2B commercial transactions. This project will cost about $30 million.

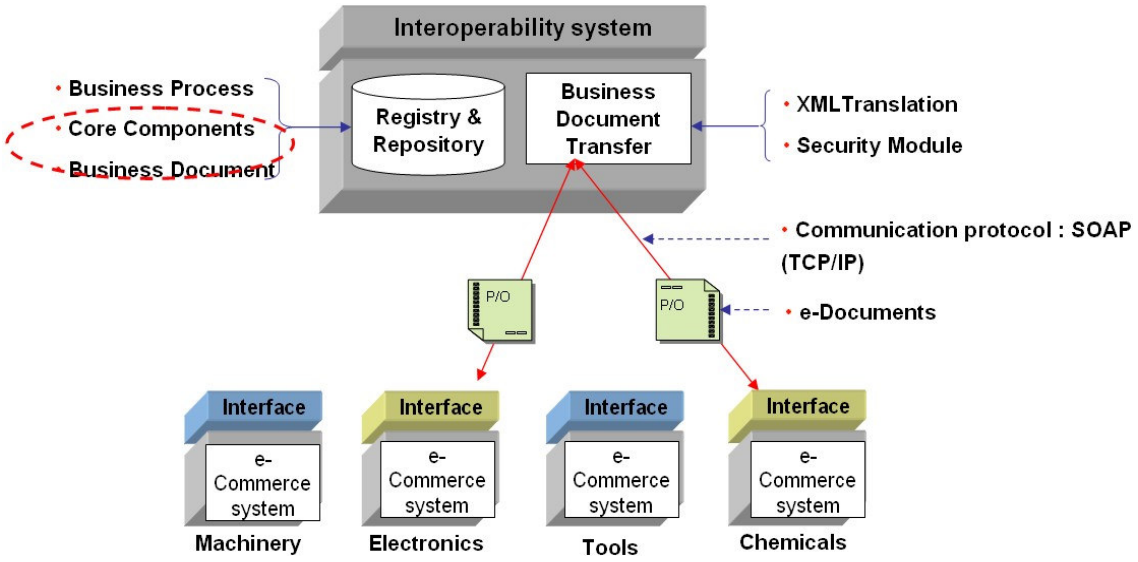
3.2.4.2. Functions

- Creating a market place for on-line commercial transactions
- Providing security and authentication services for reliable commercial transactions
- Managing regulations and laws for on-line commercial transactions

3.2.4.3. Expected Effects

- Establishment of strong foundation for reliable commercial transactions
- Promotion of business activities through reduced cost from on-line transactions
- Market expansion by overcoming time and space limitations
- Diversification of commercial distribution by developing new sales channel

Figure 94. e-Commerce



3.2.5. Recruitment and Employment Information System

3.2.5.1. Definition

Recruitment and Employment Information System seeks to develop a comprehensive employment information network supporting employment rate and enhancing employment stabilization. This can be done by analyzing and unifying the scattered DB and establishing a state-of-the-art information distribution network.

3.2.5.2. Functions

- Providing recruitment/employment information service and labor/job information service on-line
- Providing information service for law/institution on labor and employment and financial support
- Providing long distance advice service

3.2.5.3. Expected Effects

- Increased employment with information service on favorable jobs, job advice, and real-time career test service
- Access to low cost information for job seekers and recruiting companies through on-line employment information system

3.2.6. e-Patent

3.2.6.1. Definition

e-Patent System seeks to provide prompt public service like issuing a certificate of inscription via computerized application for patent and patent examination/valuation. Also, it seeks to provide information about already registered goods, design, utility models and brand without visiting a patent office. The purpose of system is to provide technological innovation and create knowledge based environment by efficiently protecting intellectual property against disputes.

3.2.6.2. Functions

- Registering for patent through e-Application Service
- Opening patent examination process via on-line
- Issuing patent related certificates
- Providing reference search service for domestic patent statistics

3.2.6.3. Expected Effects

- Real time opening of public service process will be available by simplifying electronic civil service procedure and improving functions of e-process
- Increased transparency, safety and reliability through open examination process and strengthened security for patent document
- Development of global network for online international patent and trademark

3.2.7. e-Tourism

3.2.7.1. Definition

The e-Tourism System can promote the tourism business by providing reliable tourism information to foreign and local tourists on a real-time basis through the web-based services with a DB of nationwide tourism information.

3.2.7.2. Functions

- Providing user-friendly interface
- Integrating the nationwide tourism information and storing tourism

information in DB

- Providing tourism information to foreign and local tourists

3.2.7.3. Expected Effects

- Creation of a website for each tourist spot, giving information on its uniqueness, location, weather conditions, language and other details of the place to help tourists decide where to visit
- Promotion of tourism and dissemination of tourism information around the world through the central website, which is linked to other tourism sites

3.3. G2G

3.3.1. e-Tax

3.3.1.1. Definition

The e-Tax System is an online tax payment service offered by the national taxation agency for tax payers to file and pay taxes. It also enables citizens to apply for public certificates and receive tax advice at home and work via the Internet and mobile phones. This project will cost about $40 million.

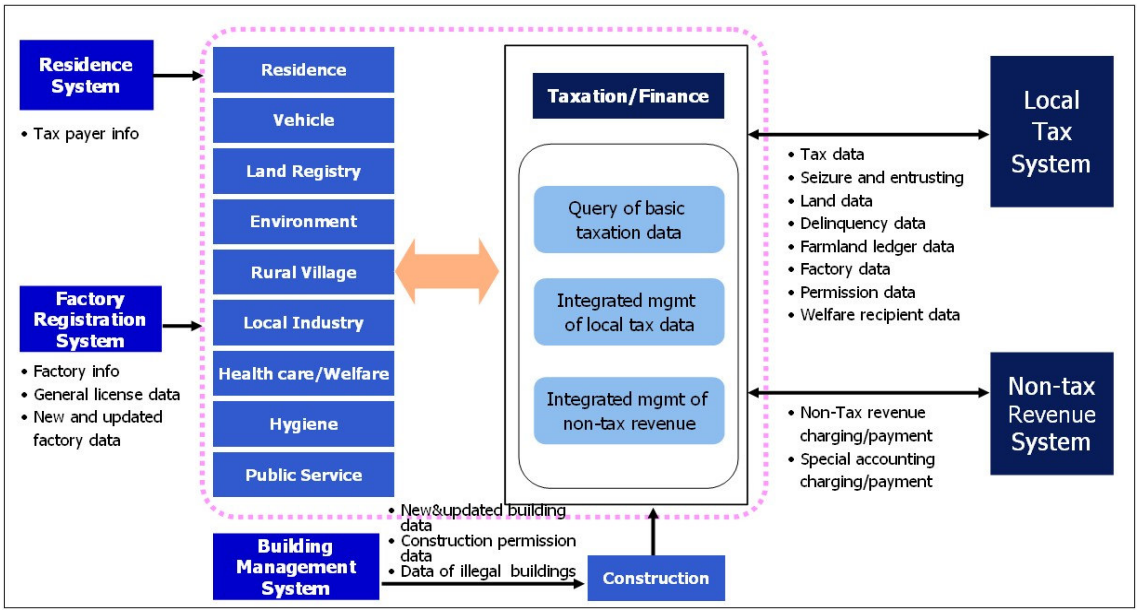
3.3.1.2. Functions

- Providing on-line tax return service covering for reporting, filing of tax return and checking result
- Providing e-billing service for national, local, income, and inhabitants tax and service for relevant information inquiry
- Providing certificate issuance/inquiry via the Internet, reporting/application for civil service petition via Internet, e-civil service to check process of national tax return
- Offering information service via Internet and mobile phones for taxpayers on national tax return and e-billing

3.3.1.3. Expected Effects

- Tax service available both at home and work, reducing number of visits to a tax office and saving time and expenses in service process
- Reduction of time, labor, and cost consuming paper application forms
- Fair and high quality Internet services available round-the-clock nation-wide

Figure 95. e-Tax



3.3.2. Immigration Management System

3.3.2.1. Definition

Immigration Management System seeks to provide advanced immigration service to people through usage of immigration records DB to certify aliens and domestic residents who enter Nepal and efficiently manage immigration administration. The system also realizes convenient immigration service with a rapid, exact airport procedure based on shared information among related agencies. This project will cost about $26 million.

3.3.2.2. Functions

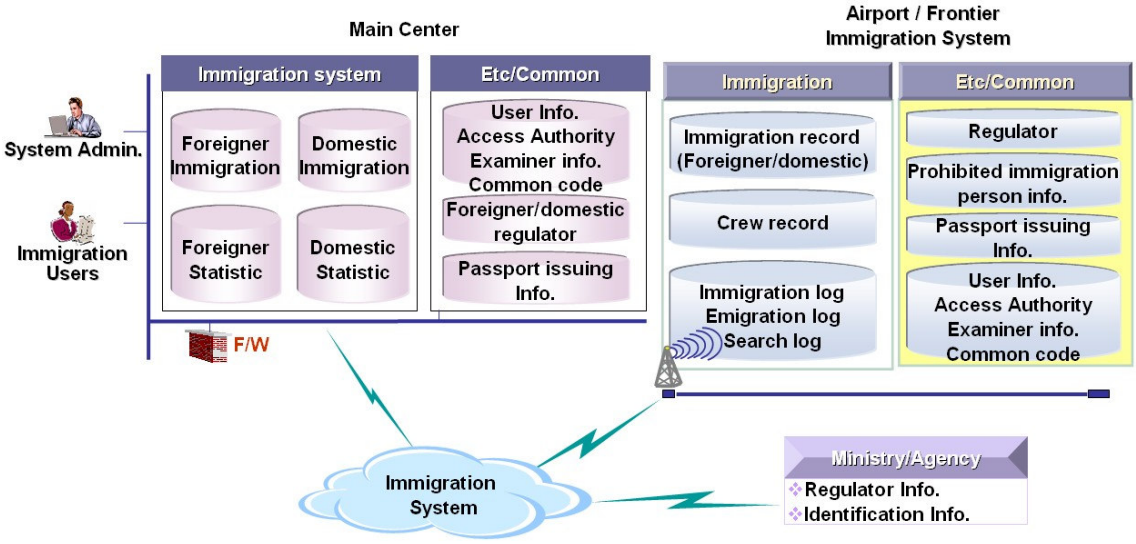
- Furnishing information on immigration to government ministries and public agencies
- Providing a nation-wide immigration service for citizens (opening information on immigration administration, inquiries/issuances of certificates)

3.3.2.3. Expected Effects

- Accommodations provided to alien and domestic residents through rapid, correct immigration procedures

- Identification of aliens' stay in Nepal, ensuring their residential activities
- Improved civil service via issuances of certificates such as Entry Certificate

Figure 96. Immigration



3.3.3. e-Education

3.3.3.1. Definition

The e-Educational Administration System seeks to provide people with educational administration service via the Internet and enhance citizens' conveniences with on-line issuance of educational certificates available in every educational institution. The system also takes the lead in standardizing and improving service procedures and developing required laws and regulations to increase efficiency. Thereby, it enables teachers to focus fully on their job of teaching.

3.3.3.2. Functions

- Furnishing information on educational administration to related ministries and public agencies
- Providing the public with educational administration service (opening information on educational administration, counseling on education, inquiries/issuances of certificates)

3.3.3.3. Expected Effects

- High quality education by ensuring teachers to focus fully on their job of teaching
- Active communication between schools and families via Internet counseling
- Innovative service that satisfies the needs of people
- Increased productivity of educational administration through digitalized administration

3.3.4. e-Land

3.3.4.1. Definition

Real property registration system is a management system that allows a registration officer (public official) to register real properties and legal relationship in an official registry in accordance to the law and to keep maintenance of the registry.

Unlike movable properties, it is rather difficult to keep track of the ownership or occupants of real properties. For this reason, the government makes public notice of real property information and its legal relationship through the registry.

The e-Land System helps understand the individual/household ownership of houses and land. And the system also seeks to enhance efficiency in realty taxation work by creating a DB of nationwide realty information (house or land ownership of individuals and households). The core function of this system is to provide information for decision-making related to realty by sorting out realty information and creating a DB. This project will cost about $23 million.

3.3.4.2. Functions

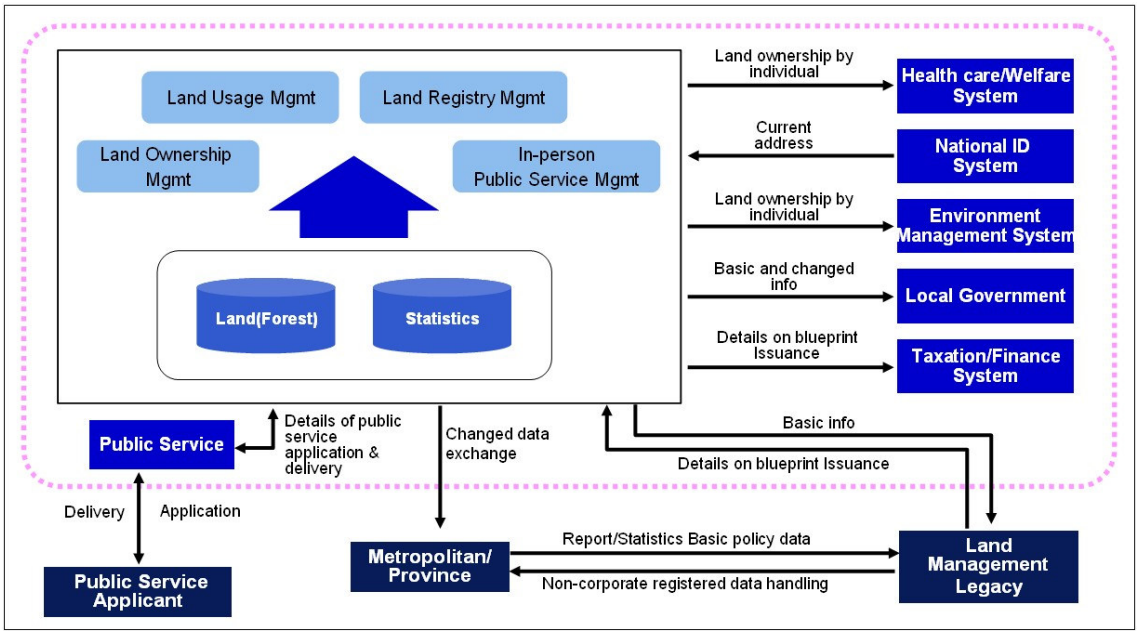
- Registration of ownership of real property
- Enabling government agencies or officials to analyze policy data or create new data.
- Correcting errors in taxation related to land or buildings
- Providing space analytic data and visualized data using GIS

3.3.4.3. Expected Effects

- Relevant information and data available for establishing policies
- High-value added information available using GIS

- Enhanced work efficiency among government agencies with regard to taxation and statistical data
- Reduction of land fraud using real-time verification
- Reduction of cost (time, money and human resource) to find certificate of registration

Figure 97. e-Land



3.3.5. e-Authentication

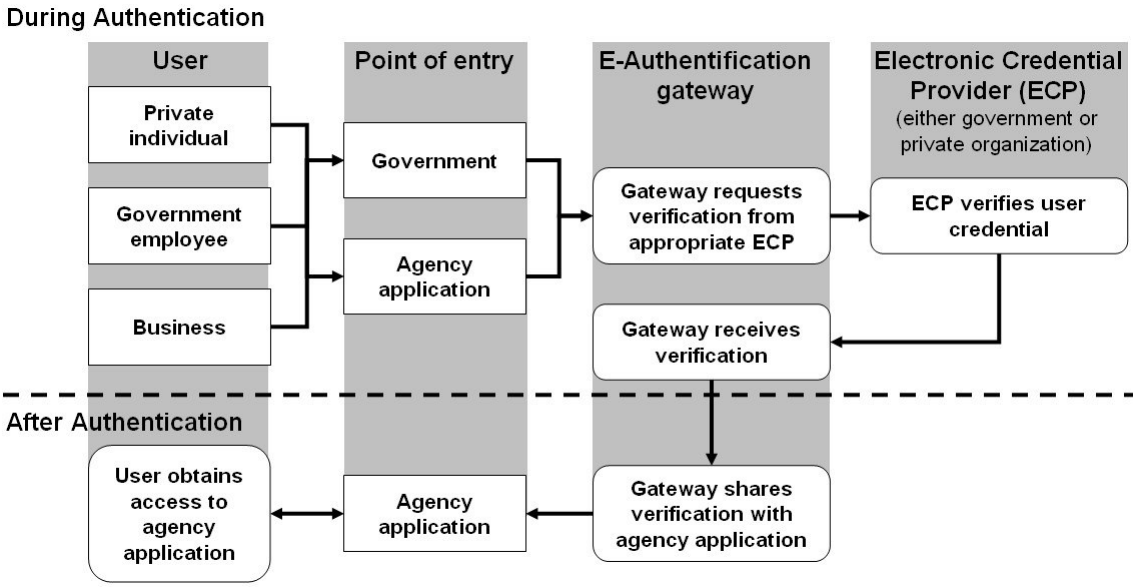
3.3.5.1. Definition

The e-Authentication System is for identifying on-line users through individual ID number, PKI, Smart Card, etc. This system helps reduce cost by saving time and simplifying the process through elimination of off-line authentication process. It also lays the foundation for e-commerce by ensuring security of on-line transactions. This project will cost about $10 million.

3.3.5.2. Functions

- Authenticating users on-line
- Controlling access to information depending on the user's authority

Figure 98. e-Authentication[55]



3.3.5.3. Expected Effects

- Enhanced reliability of on-line transactions by guaranteeing security
- Enhanced accuracy and efficiency of on-line transactions and cost reduction by replacing off-line authentication process

3.3.6. Groupware

3.3.6.1. Definition

The Groupware seeks to share information and to communicate in real-time. Also it seeks to store and manage distributed information efficiently and support cooperative work among workers. The system increases speed of business process and minimizes the use of paper through e-Bulletin and e-Approval System. Especially, it is very useful when an organization has remote work places. It also improves business efficiency through information sharing, e-mails, and schedule management.

3.3.6.2. Functions

- Composing the first page for the individual and the group
- Managing personal schedule and data

[55] GAO analysis of e-Authentication Gateway process

- Providing single-sign-on to various systems which is connected to groupware
- Sharing information with individuals, groups or users
- Approving e-documents quickly
- E-mail, messenger, and personal schedule management

3.3.6.3. Expected Effects

- Cost reduction for storing and purchasing paper and documents
- Rapid and efficient administration service through groupware system
- Easy access to old documents and increased utilization of information by civil servants
- Effective communication and co-work within a team and the administration

3.3.7. MIS (Management Information System)

3.3.7.1. Definition

The MIS System helps operation and management of government agencies and provides support for decision making by creating a DB related to budget, personnel, finance, etc. of the government and providing this information to government agencies.

Also, local government administration system is included in MIS because local government should use the same system as the central government administration system. Therefore, central government administration system such as NID, e-Land, e-Tax, e-Vehicle, e-Health, etc. should be computerized first, and then the local government administration system will be propagated, which consists of each central government administration system.

3.3.7.2. Functions

- Providing information required for decision-making
- Helping in writing various reports using DB
- Providing analytic information for establishment of polices and plans
- Providing uniform work standards

3.3.7.3. Expected Effects

- More efficient decision making using accurate information
- Enhanced efficiency and effectiveness in government affairs
- Efficient allocation of internal government resources through information sharing
- Creation of uniform working standards

3.3.8. e-Pollution

3.3.8.1. Definition

The e-Pollution System helps prevent environmental pollution and establishes policies to restore polluted areas by measuring and quantifying pollution of air, water, etc. with digital devices and ICT.

3.3.8.2. Functions

- Measuring pollution of air, water, etc. with digital devices and ICT
- Quantifying and analyzing pollution of each area concerned and sharing such information
- Promoting public awareness about seriousness of environmental pollution on-line
- Minimizing pollutants using the technical devices

3.3.8.3. Expected Effects

- Establishment of environmental policies based on accurate analytic data of environmental pollution
- Pollution prevention through on-going monitoring
- Increased awareness for the need of environmental protection by cautioning on the seriousness of environmental pollution

3.3.9. Knowledge Management System(KMS)

3.3.9.1. Definition

The KMS effectively shares information such as manuals and handbooks, which are produced and managed by all agencies. It will increase competitiveness

and change disordered and informal data into intellectual property.

3.3.9.2. Functions

- Connecting with all information system such as agencies' KMS, law and regulation information, innovation portal and etc.
- Providing various search methods such as integrated search, subjected search and directory search
- Providing nation-wide searching window and connection path
- Constructing government integrated knowledge classification system

3.3.9.3. Expected Effects

- Creation of the foundation for knowledge-based society
- Reproduction of knowledge which is produced from the system

3.3.10. GIS (Geographical Information System)

3.3.10.1. Definition

The GIS supports decision-making by means of providing the appropriate information. Geographical information is a combination of the location and information of time related phenomena. They are registered, stored, processed and analyzed in the computer.

3.3.10.2. Functions

- Providing accurate and quickly needed information for land-related policy establishment of the government agencies
- Providing traffic information which is most important in ITS (Intelligent Transportation System
- Predicting environmental change with database of animal, plant, water, atmosphere and waste information for large sized construction
- Supporting scientific agriculture with database of the earth's surface inclination, the soil, the geological features and cultivation technique to provide optimized soil management guideline
- Predicting earthquakes with information on geological features and earthquake occurrence cases. Also predicting flood arrival hour with

rivers and the rainfall information, etc.

3.3.10.3. Expected Effects

- Speedy and accurate decision making based on analysis of various geographical data which relates to space
- Prediction of future changes
- Viewing of various statistical data
- Time and cost reduction for production, amendment and maintenance of map

3.4. Infrastructure

3.4.1. Enterprise Architecture(EA)

3.4.1.1. Definition

EA provides a unified information standard at the government level by defining services and work procedures of each agency and the relationship between current conditions of ICT and future tasks. It also ensures information sharing within the administration, standardizes processes, and establishes ICT Governance by developing link information among architectures and by building EAMS which manages ICT resource information.

3.4.1.2. Functions

- EA Management Policy: establishing management standard and organization, and building management process, implementation plan for targeted EA, and investment plan
- Enterprise Architecture Framework Offer: providing Performance Reference Model, Business Reference Model, Data Reference Model, Service Component Reference Model, Technical Reference Model

3.4.1.3. Expected Effects

- Creation of communication tool between work processing organization and ICT organization
- Formulation of the basis for cooperative utilization of public information by establishing interoperation system and standardization
- Clearance of redundant projects and fair estimation of project cost

- Decision-making to introduce information technology based on technologies, principles, and guidelines

3.4.2. Communication Network

3.4.2.1. Definition

Communication Network provides affordable telecommunications services for users, ensuring local and global connectivity. A major investment in communication network is necessary to construct e-government, e-learning, and e-commerce, and to allow the country to be part of the “networked” and interdependent global knowledge economy.

3.4.2.2. Functions

- Constructing nationwide communication network
- Establishing communication network that connects all government agencies
- Constructing communication infrastructure for Internet access in rural areas
- Designing and constructing suitable communication network to fulfill communication needs

3.4.2.3. Expected Effects

- Consolidation of background for efficient promotion of e-government
- Construction of the foundation to foster ICT industry
- Provision of IT services to rural areas
- Elimination of digital divide

3.4.3. Government Integrated Data Center (GIDC)

3.4.3.1. Definition

Government Integrated Data Center provides e-government service model to central government departments, government agencies and local governments.

This would provide a single facility to house the hardware, software and staff. It would be physically secure (guarded premises with controlled physical access) and protected against natural disasters (fire, floods, etc.) and malicious attack. It would

provide 24 X 7 X 365 service levels (adequate monitoring staff, backup hardware, etc.) and should be equipped with redundant environmental controls (duplicate sources of electrical power, air conditioning, etc.)

3.4.3.2. Functions

- Providing a single facility to house the hardware, software and staff
- Providing a single gate for security
- Providing protections from dangers like fire, flood, theft and malicious attack)
- Managing servers, databases, network equipments, electric supplies and applications
- Troubleshoot problems of facilities
- Providing seamless services

3.4.3.3. Expected Effects

- Minimized investment cost by using GIDC basis facilities
- Improved stability and efficiency of Data Center that provides Internet access, e-government management
- Secure government email service
- Minimized operation cost through centralized installation because operating cost of one centralized center is lower than operating cost of distributed center
- Increase efficiency through the increase of the number of equipments managed by one administrator

3.4.4. Public Key Infrastructure(PKI)

3.4.4.1. Definitions

The Public Key Infrastructure uses public key to enhance confidentiality and authentication in an open network environments that requires high security. Therefore, confidentiality and authentication are critical to prevent adverse effects of digitalization. This project will cost about $10 million.

3.4.4.2. Functions

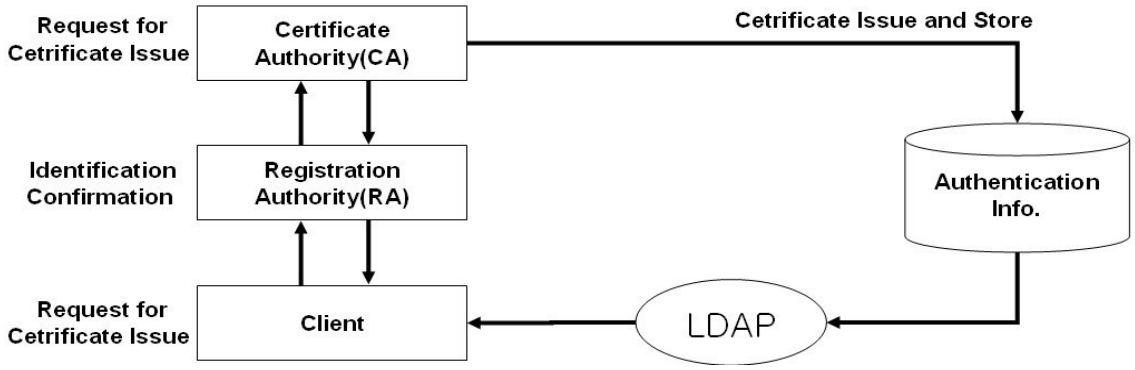
- Issue/renew/revoke certificates
- Encoding information(confidentiality)

- Preventing forgery of information(integrity)
- Checking user identity(authenticity)
- Enhancing user reliability through electronic signature(non-repudiation)

3.4.4.3. Expected Effects

- Promotion of reliable on-line commercial transactions
- Replacement of face-to-face, paperwork-oriented transactions

Figure 99. PKI



IV. Promotion Plan

In the previous chapter, prerequisite projects which should be executed for establishing Nepali e-government were identified, and these projects were incorporated into e-government road map in the order of their priorities including their outlines.

To actually launch the predefined e-government projects, more detailed functions and specific requirements of projects must be defined.

Therefore, to facilitate the establishment of Nepali e-government, details of phase 1 of e-government roadmap from 2007 to 2008 will be identified in this chapter. Detailed functions include budget, required manpower and period.

1. e-Government Roadmap

1.1. Overview

In Chapter 2, the ICT status of Nepal, as well as its benchmarking and Information Communication Technology trend was analyzed. Based on this analysis, the vision, mission and strategies for Nepal to realize the e-government were presented in Chapter 3, together with projects to be conducted. As previously mentioned, Nepali e-government master plan has set these goals to be achieved in five years from 2007. Thus, project schedule and action plans must be drawn out to meet the time frame.

In order to set realistic and specific goals, development models of other institutions and those of Korea were taken as reference, and the e-government development model that fits the Nepali situation was created. After developing the e-government model for Nepal, the target level for 2011 was determined and conditions needed to achieve such level were defined.

While all the projects defined in the previous chapter need to be executed, it is realistically difficult to implement them all at the same time due to insufficient budget and system, lack of technical workforce, insufficient awareness among people and infrastructure. Thus, prominent figures from all the sectors of Nepal and the consulting team from KIPA Korea has evaluated the feasibility of these projects, such as its importance and possibilities, and determined their priorities.

The order of priority was reflected in the roadmap, which Nepal has to implement to achieve the target level in five years. Other essential issues, such as creation of organization, preparation of related laws and regulations, human development plan, and securing budgets were prepared separately.

1.2. e-Government Promotion Stage

The UN-ASPA (UN & the American Society of Public Administration, 2002) has defined the level of e-government into five-stages according to the level of Internet- and web-based government services. Each stage is as following.

Table 24. e-Government Stage

Stage 1	• Emerging web presence • Creation of the government website. Basic and limited level of information is provided in a static manner
Stage 2	• Enhanced web presence • Expansion in government websites. Increased dynamics in information through regular updates of information/contents
Stage 3	• Interactive web presence • Usage of electronic formats. 2-way communications via web (online application, confirmation and response)
Stage 4	• Transactional web presence • Provision of actual online services, process handling and electronic payment
Stage 5	• Fully integrated web presence (seamless) • All services and links are provided on a single government portal, and all the administrative services can be processed on-line

Also, Deloitte has defined the development of e-government into six stages; from Stage 1 of each government agencies providing services through their own channels according to their respective level of using web-based application programs and their level of organizational innovation (Information Publishing); to Stage 6 of

complete integration in the Back Office, Front Office and information/service provision channels (Full Integration and Enterprise Transformation).

These standards play an important role in examining developments in e-government status of each country. Korea also checks its development stage by evaluating websites of its government agencies and departments every year. In the course of such evaluation, websites that are well-presented and operated are discovered and announced to the public. Through these activities, Korea tries to improve the convenience of its people and make its administrative process more efficient. The e-Government Headquarter of Korea in 2005 announced Korea's e-government to be in Stage 4 of the UN-ASPA's development stage and some parts are already in Stage 5. Since 2006, Korea enhanced mobile services to safely land in Stage 5. Mobile services allow administrative services to be provided whenever and wherever.

In April 2002, the Digital Philippines Foundation of the Philippines examined 140 government websites based on the five stages of e-government defined by the UN-ASPA. The result showed that it was impossible to access 14% of the websites and 24% was in Stage 1, 42% in Stage 2, 19% in Stage 3, and no government agency had reached Stage 4, where administrative services can be completely delivered on-line. It also showed that these government websites did not have uniformity as they were independently created by their respective organizations.

As in above cases, many countries are assessing their government websites to evaluate their current level and to resolve problems. This is to provide better services to its people and renovate administrative services, which will ultimately enhance national competitiveness.

1.3. e-Government Promotion Model of Nepal

In order to create the e-government promotion model of Nepal, it is important to make general evaluation on its current level of e-government according to the promotion stage of UN-ASPA. According to the evaluation, Nepal is well into the first stage, providing limited services through websites. It is still not able to keep its information/contents up-to-date, which is a condition to enter the second stage. Also, while some departments are using electronic formats as required in the third stage, its

level of 2-way communications is still not smooth. Taking these into account, Nepali e-government status can be assessed as spreading over the first stage to the third stage.

An ideal model for Nepal was designed by considering the Nepali conditions, international standards and research results. This e-government development model is comprised of four stages. The reason why Nepal has four stages while UN-ASPA has five stages is because Nepal has great difference in the level of e-government among each government agencies and their service levels differ greatly as well. Thus, by reducing the stages, all government agencies can achieve higher level of e-government in a shorter period of time.

First stage is to computerize the internal process of the government. There is no connection amongst government agencies and no changes in administrative process are required. With partial online connection, some service application forms or information can be provided on the web. This is where Nepal is currently standing as shown in the previous assessment.

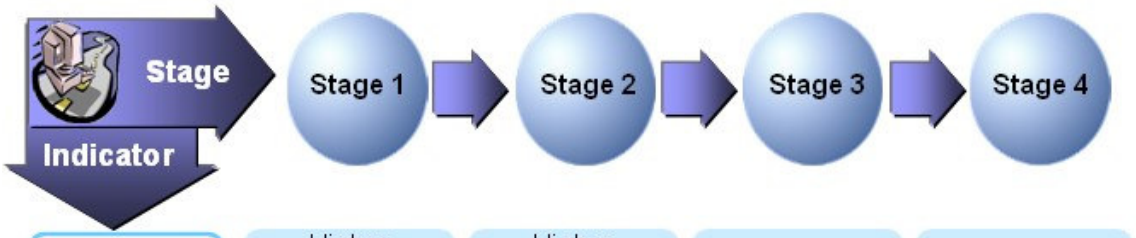
Second stage is to provide more comprehensive and citizen-centric services through innovation in administrative process via BPR and connection of government agencies.

Third stage is to provide integrated services through connection of government agencies and to handle the citizen's requests online through the web. In this stage, all the government agencies are interconnected and the process on handling integrated services can also be improved. At this stage, it is possible to provide citizen-centric, customized services.

Fourth stage, which is the last stage, is same as the final fifth stage of UN-ASPA's model. All processes are integrated and the knowledge-based government is established, realizing the ubiquitous environment where citizens and businesses can get all the services they want wherever they are.

Figure 100 shows four stages of Nepali e-government model. For each stage, its respective core value and goal, as well as services and functions needed, conditions required to achieve changes in processes are specified.

Figure 100. Promotion Model of Nepali e-Government



Indicator	Stage 1	Stage 2	Stage 3	Stage 4
Core Value	Higher productivity inside an agency	Higher productivity Cross agencies	Inter agency collaboration	Partnership with the private sector
Goal/Sector	Digitalization / Own	Clustering / G2G	Service / G2C, G2B	Value / All2All
Service	Provider driven	Provider driven (pseudo citizen-centric)	Citizen centric	Citizen driven
	Information	Government portal	Personalized & customized	Intelligent
	Publishing / download	interacting	Transacting / Web self-service	Value portal on the value-network
	Wire-connected	Wire-connected	Wireless / semi-ubiquitous	ubiquitous
Information sharing	Isolated from other agencies	Partially integrated in a cluster	Fully integrated in a cluster	Value-networked among clusters
Process Innovation	No process innovation	Internal BPR	Cross-agency BPR	Value-chain creation
Participation	Off-line (N:0)	Web bulletin board (N:1)	Service-transaction based (1:1)	Multiple-transaction based (1:N)
ICT	Local computing	Web computing	Analytical computing	Ubiquitous computing

Now, let's look at conditions that Nepal needs to satisfy in each stage in order to leap from stage 1 to stage 2 and 3 in a short period of time.

First, in order to move up from the first stage to the second stage, following conditions should be satisfied.

- Provision of online administrative services
- Creation of a common platform and standardization for information distribution
- Creation of a responsible body for consistent execution of the plan

- Creation of an information sharing system within the government

Following conditions should be satisfied for Nepal to move up from the second stage to the third stage:

- 2-way transaction
- Access to services through various channels and media
- Knowledge-based administrative process
- Pan-governmental collaborative network for knowledge sharing

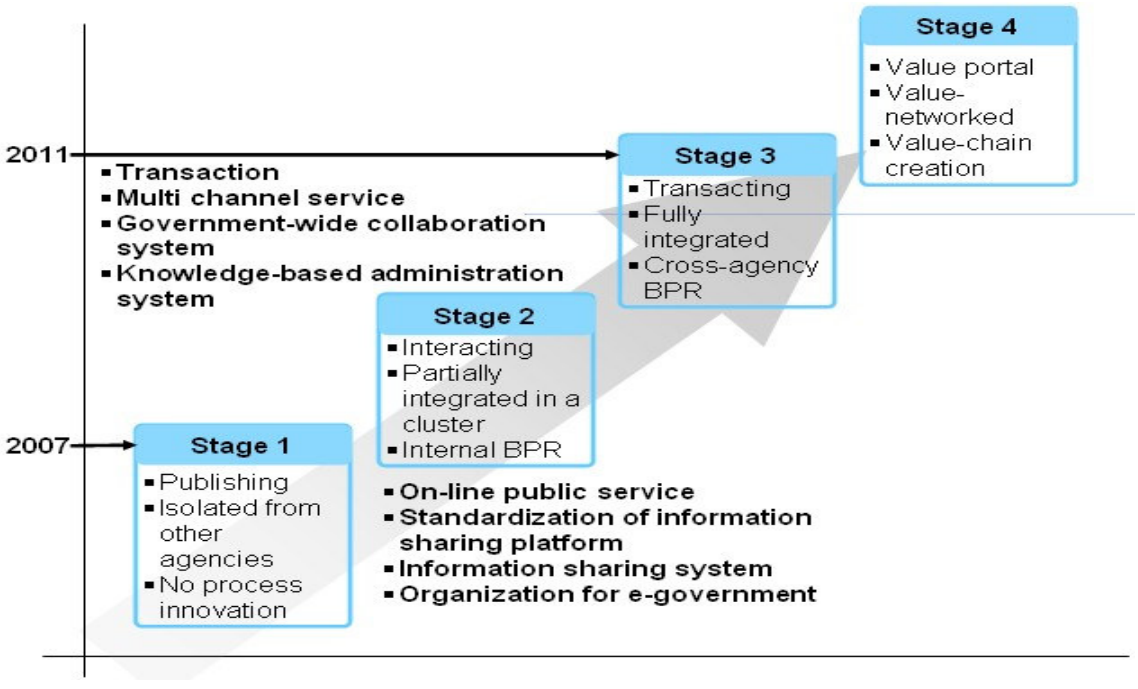
Here, continuous expansion of service areas and ICT infrastructure is essential.

Also, as already defined in previous chapter, the Nepali e-government mission statement says “By realizing a transparent government and providing value added quality services through ICT, improve the quality of life for all the people without any discrimination among regions or races and realize socio-economic development.”

In order to achieve this mission statement, the goal is set to enter ‘Stage 3 e-government’ by 2011 with consideration to internal competency of Nepal in pursuing the e-government in the past, changes in external environments, citizen’s demand for informatization and etc.

When this is put into a diagram, it is as following.

Figure 101. Goal of Nepali e-Government



1.4. Method of Project Priority Evaluation

In the previous chapter, projects to be executed to establish the e-government in Nepal were defined. These projects need to be carried out by the Nepali government with continuous attention. In order to do so in an effective manner, all the budget, workforce, organization and other conditions needed to perform the project should be prepared. Goal of the Nepali e-government master plan creation project is to define projects for five year period from 2007. To achieve the goals mentioned in Chapter 3 within this period, priorities should be evaluated and decide the order for each projects.

For this purpose, Nepali e-government TFT reviewed and held discussions on 33 projects defined in the previous chapter and the steering committee and five KIPA consultants also made some evaluations.

In order to set priorities, each project will be evaluated in the aspect of importance and feasibility. Then, projects will be classified for each phase. Prioritization is important for the following reasons. 1) It helps the Government achieve suitable resource allocation among investment options. 2) Analytical assessment accompanied with prioritization is useful for creating a linkage between expected outputs of projects and program level objectives. 3) The estimation of expected effects and costs requires the assessment of demand for e-services, since deviation in demand, both in term of the volume and speed of uptake, causes the change in the expected value generated by a given activity. 4) The focus it brings to gauge the level of demand among user group (citizens, businesses and civil servants) will lead the way to stakeholder participation and consultation, which is critical in reducing the occurrence of supply-driven projects.

One of the major indicators is importance which has two valuation bases such as emergency and effect/impact, and the other indicator is feasibility which also has two valuation bases, such as technological realization and institutional realization.

Evaluation method is as following.

Emergency is evaluated with consideration to policy, requirements of users, and phase of e-Government implementation. When a project is needed immediately, 8~10 points are given; when a project is needed in a short-term period (2~3 years), 4~7 points are given; when a project is needed in a long-term period (4 years), 0~4 points are given.

Effect/impact is evaluated with consideration to objectives and other factors of

the project. When all citizens and government departments/agencies are effected by the realization of the project, 8~10 points are given; when many citizens and ministries/agencies are effected by the realization of the project, 4~7 points are given; when a few citizens and ministries/agencies are effected by the realization of the project, 0~4 points are given.

Feasibility of technological realization is assessed with consideration to the technological level of and capacity to implement the project. When it is fully possible to implement project, 8~10 points are given; when it is a little difficult to implement project, 4~7 points are given; and when it is very difficult to implement project, 0~4 points are given.

Table 25. Criteria of Project Priority Evaluation

Evaluation Indicators		Evaluation Criteria	H (8-10)	M (4-7)	L (1-3)
Importance	Emergency	Consideration on policy, requirements of users, and phase of e-Gov. implementation	Immediate (within 1 year)	Short-term (2-3 years)	Long-term (4 years)
	Effect /Impact	Consideration on the objectives and other factors to implement the project	All citizens and ministries/agencies are affected by the realization of the project.	Many citizens and ministries /agencies are affected by the realization of the project	A few citizens and ministries /agencies are affected by the realization of the project
Feasibility	Technological Realization	Consideration on the technological level and capacity to implement the project	Fully possible to implement project	A little difficult to implement project	Very difficult to implement project
	Institutional Realization	Consideration on the law and regulation to implement the project	Fully possible to lead implementation immediately	Amendment or enactment of law/ regulation is needed	Amendment and enactment of law/ regulation are needed

Institutional realization is assessed with consideration to laws and regulations related to the project implementation. When it is fully possible to lead implementation immediately, 8~10 points are given; when an amendment or enactment of laws/ regulations is needed, 4~7 points are given; when both the amendment and enactment of laws/ regulations are needed, 0~4 points are given.

Points generated from these assessments on each projects went through the portfolio analysis and then were reflected on the roadmap according to their priorities.

1.5. Result of Project Priority Evaluation

As the first step for making evaluation in Nepal, all projects were assigned to members of the e-government working committee according to evaluation criteria. Then everyone's markings were tallied into a single chart. They were sorted into emergency column and each project was re-marked according to the evaluation criteria.

Next, members of the e-government steering committee agreed on most of the top 20 projects. Few changes were made according to their suggestions. For example, e-Driver's License and e-Vehicle were put together as one project. Steering committee also decided to include e-Education and e-Health priority projects

This evaluation result went through internal deliberation within the KIPA Consultant Team and the final result was generated in table 26.

1.6. Portfolio Analysis

For the portfolio analysis, each project was scored based on the evaluation criteria, and its result was first marked on the importance table per each project and grouping was conducted. Then, the feasibility score, which is the second evaluation criteria, was determined to evaluate what is important and possible per each project and it was reflected on the roadmap.

Table 26. Result of Evaluation

No.	Project	Sector	Importance		Feasibility	
			Emergency	Effect/ Impact	Technological Realization	Institutional Realization
1	Government Portal	G2C	10	10	8	8
2	e-Agriculture	G2C	6	6	5	5
3	e-Health	G2C	6	7	5	4
4	NID	G2C	10	8	8	6
5	Passport Management	G2C	7	7	5	5
6	e-Vehicle	G2C	8	7	6	7
7	e-Drivers License	G2C	8	7	6	7
8	BRAMS	G2B	6	6	8	5
9	e-Customs	G2B	7	7	6	8
10	e-Procurement	G2B	7	7	5	4
11	e-Commerce	G2B	6	5	6	3
12	e-Tax	G2G	8	9	6	4
13	e-Land	G2G	7	8	7	6
14	e-Education	G2G	7	8	9	7
15	Immigration	G2G	8	4	8	7
16	e-Authentication	G2G	8	8	6	6
17	Groupware	G2G	9	10	7	8
18	PKI	Infra	8	8	6	5
19	GIDC	Infra	9	9	7	9
20	EA	Infra	10	8	8	8

1.6.1. Portfolio Analysis – Importance

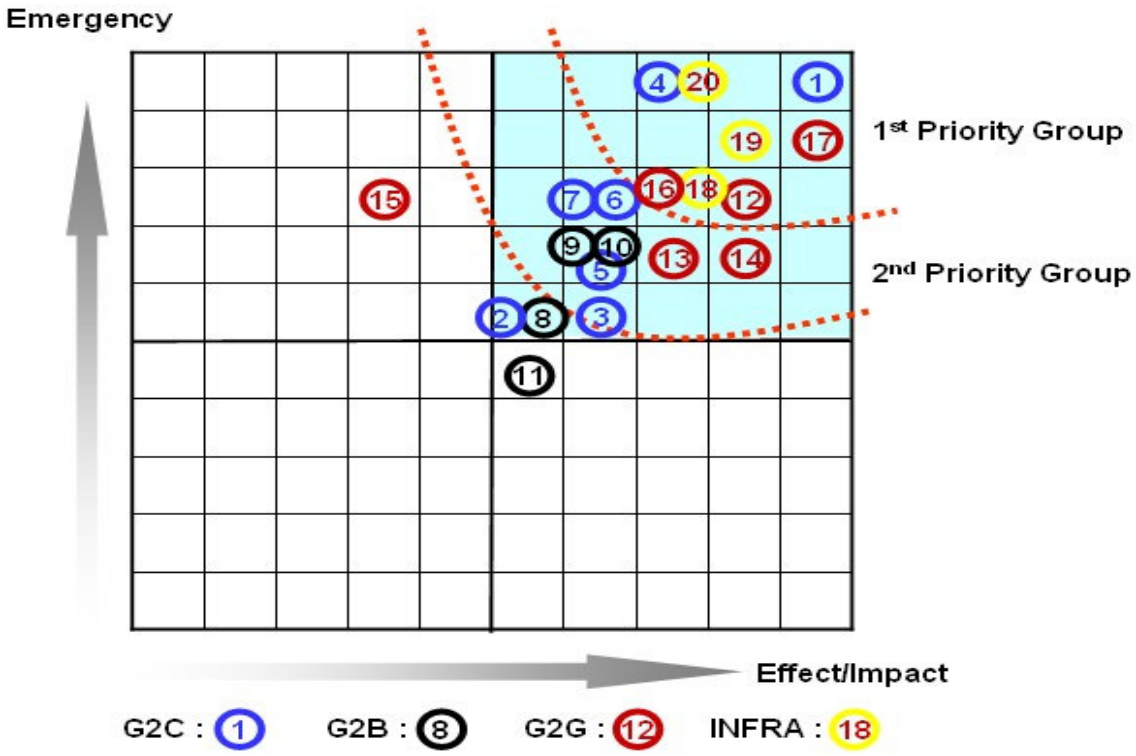
The important indicators of each project were classified by detailed indicators of emergency and effect/impact. The 1st classification result is in the figure 102.

In the table 26, eight projects such as Government Portal(1), NID(4), e-Tax(12), e-Authentication(16), Groupware(17), PKI(18), GIDC(19), and EA(20) have high scores in terms of emergency and effect/impact, putting them the 1st priority group. Then, eight projects such as e-Health(3), Passport Management(5), e-Vehicle(6), e-Drivers license(7), e-Customs(9), e-Procurement(10), e-Land(13) and e-Education(14) are in the 2nd priority group.

Immigration(15) got high score in the emergency column, but got low score in the effect/impact column. It shows that this project needs to be implemented immediately but its effect and connection with other processes are low. E-Commerce(11) has low emergency but high effect/impact, showing that has high efficiency.

On the 1st priority group and the 2nd priority group defined above, the second evaluation standard, feasibility analysis, was conducted.

Figure 102. Project Portfolio Analysis



1.6.2. Project Portfolio Analysis – Feasibility

The projects of the 1st and the 2nd priority groups were evaluated on feasibility. The feasibility indicators of each project were classified by detailed indicators of technological realization and institutional realization.

If a project is technically feasible but there is no institutional foundation to support the project, it is difficult to implement the project, and it is the same the other way round. Thus, in the feasibility analysis, 7 standards on technical feasibility and 7 standards on institutional feasibility were used, respectively. Among the 1st priority group defined in the importance analysis, there were five projects that satisfied 7

standards in two indicators, which are Government Portal(1), NID(4), Groupware(17), GIDC(19), EA(20). These projects need to be conducted with the top priority in terms of both importance and feasibility, and thus are classified as projects to be executed in the phase 1.

When feasibility analysis was conducted on the 2nd priority projects defined in the importance analysis, the e-Education(14) satisfied the above conditions. Thus, when e-Education(14) is added to the list, total of six projects are classified to be conducted in phase 1.

Next, seven projects which include four projects among the 2nd priority projects that satisfy six technical feasibility standards and six institutional feasibility standards, such as e-Vehicle(6), e-Drivers license(7), e-Customs(9), e-Land(13), and then three projects that were excluded from the phase 1 of the 1st priority projects, such as e-Tax(12), e-Authentication(16), PKI(18), were classified to be executed in phase 2.

Table 27. Project List of Implementation in Phase 1

No	Project	Sector	Importance		Feasibility	
			Emergency	Effect/ Impact	Technological Realization	Institutional Realization
1	Government Portal	G2C	10	10	8	8
4	NID	G2C	10	8	8	6
14	e-Education	G2G	7	8	9	7
17	Groupware	G2G	9	10	7	8
19	GIDC	Infra	9	9	7	9
20	EA	Infra	10	8	8	8

Table 28. Project List of Implementation in Phase 2

No	Project	Sector	Importance		Feasibility	
			Emergency	Effect/ Impact	Technological Realization	Institutional Realization
6	e-Vehicle	G2C	8	7	6	7
7	e-Drivers License	G2C	8	7	6	7
9	e-Customs	G2B	7	7	6	8
12	e-Tax	G2G	8	9	6	4
13	e-Land	G2G	7	8	7	6
16	e-Authentication	G2G	8	8	6	6
18	PKI	Infra	8	8	6	5

When result is classified into implementation phases, it is as following.

Table 29. Final Result of Analysis

Phase	Priority	Project	Sector	No
1	1	Government Portal	G2C	1
	2	Groupware	G2G	17
	3	EA	Infra	20
	4	GIDC	Infra	19
	5	NID	G2C	4
	6	e-Education	G2G	14
	7	PKI	Infra	18
2	8	e-Authentication	G2G	16
	9	e-Tax	G2G	12
	10	e-Customs	G2B	9
	11	e-Vehicle	G2C	6
	12	e-Drivers License	G2C	7
	13	e-Land	G2G	13
3	14	e-Procurement	G2B	10
	15	Passport Management	G2C	5
	16	Immigration	G2G	15
	17	BRAMS	G2B	8
	18	e-Health	G2C	3
	19	e-Commerce	G2B	11
	20	e-Agriculture	G2C	2

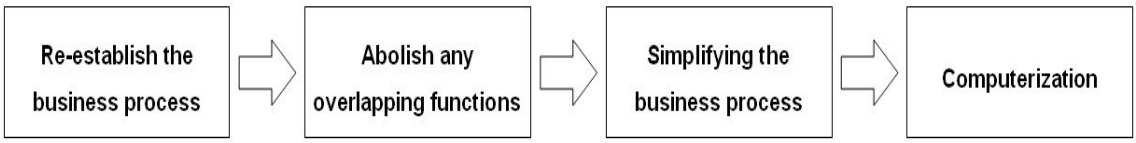
1.7. Implementation Strategy of Project

So far, vision and mission needed to efficiently establish the e-government in Nepal were formulated, and strategies and projects required to achieve them were also identified. Based on these, project priorities were determined to create a plan that is actually executable.

Here, strategies needed in actually implementing projects were established so that any problems that may arise during the execution of projects can be minimized and that projects can be implemented continuously to achieve the target as planned.

Following strategies were devised based on lessons learned from the analysis on Nepali current e-government status and benchmarking in the Chapter 2. Their objectives are to provide the foundation needed for Nepal to continuously pursue the e-government plan.

Figure 103. Process of Computerization



There are three implementation strategies.

First is maximizing the effect of informatization through the process innovation.

- Computerization of existing processes merely automates processes without giving any other effects
- Before computerization of processes, business processes need to be realigned to eliminate unnecessary processes, which can increase work productivity. Also, any overlapping functions among government departments or agencies should be abolished to bring greater efficiency in administrative processes
- In particular, unnecessary processes should be clearly eliminated to streamline processes before realizing computerization. Only then, the true e-government that delivers efficient and prompt administrative services can be realized.

Second is introduction of the project implementation and management structure

- Introduce the system of assigning goals and giving awards to the project owner and the project executing organization
- Create the e-government arbitration committee to arrange and implement the pan-governmental project
- Implement the project deliberation system to prevent overlapping investments

- Conduct regular inspection and reporting on project implementation

Third is promotion of the IT industry through the e-government

- Develop and apply cutting-edge ICT technologies in the e-government project
- Expand participations by domestic IT businesses through the government's continuous efforts to develop ICT projects
- Expand technologies accumulated through e-government project into the private sector IT projects

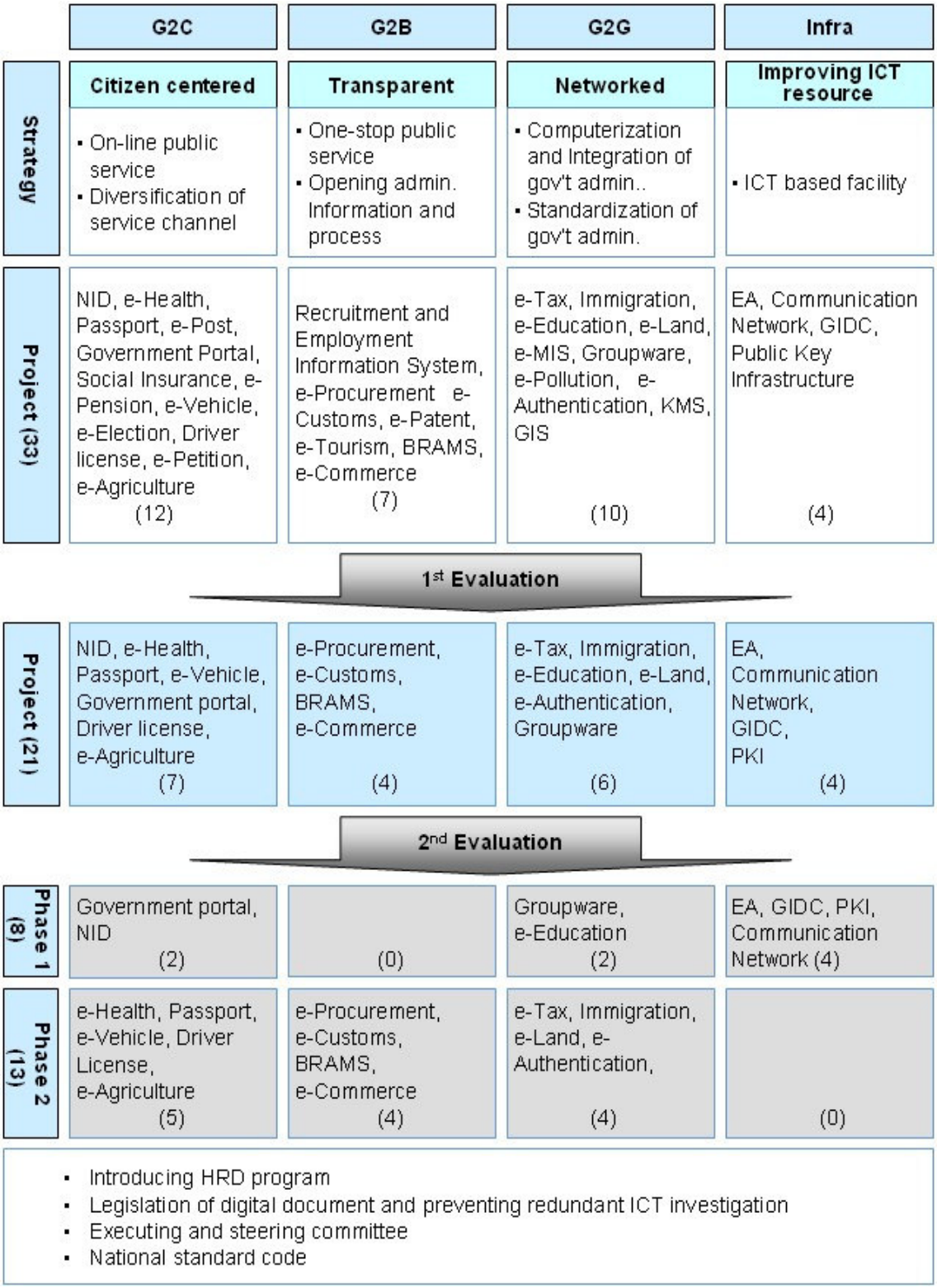
These implementation strategies should have the objectives to: deliver convenience in administrative services for citizens and enhance national competitiveness through more efficient administrative process by effectively and continuously executing the Nepali e-government; facilitate employment through promotion of the domestic IT industry; diversify profit structure through expansion of the cutting-edge industry; and ultimately, improve the average living standards of the people.

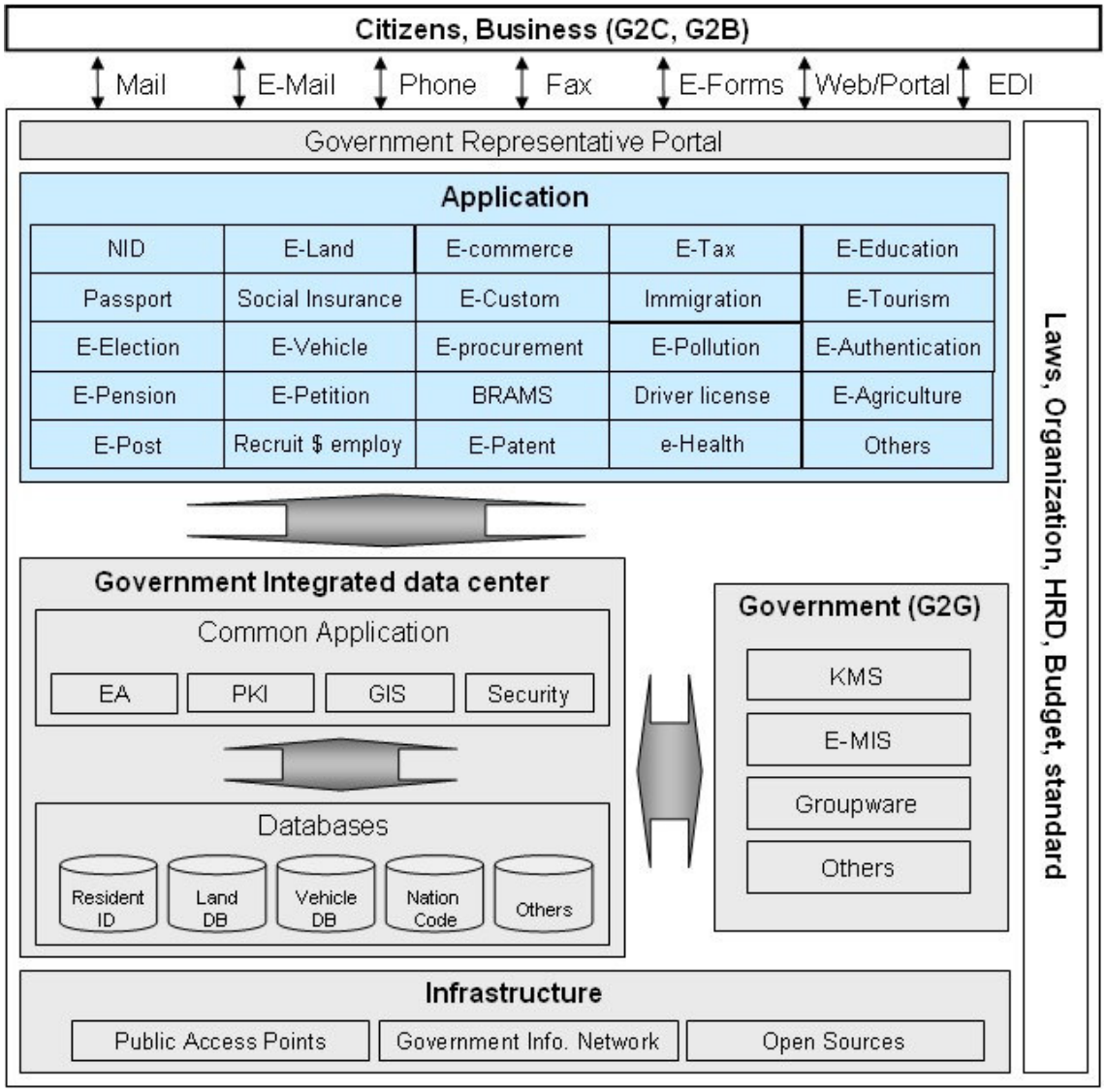
1.8. e-Government Roadmap

Results from the assessment above are summarized into the roadmap below according to each stage, so that it can help Nepal establish the e-government in a realistic and efficient manner and jump to the 3rd stage of e-government model by 2011.

First of all, goals and strategies for each sector of e-government project and projects to achieve them are as following:

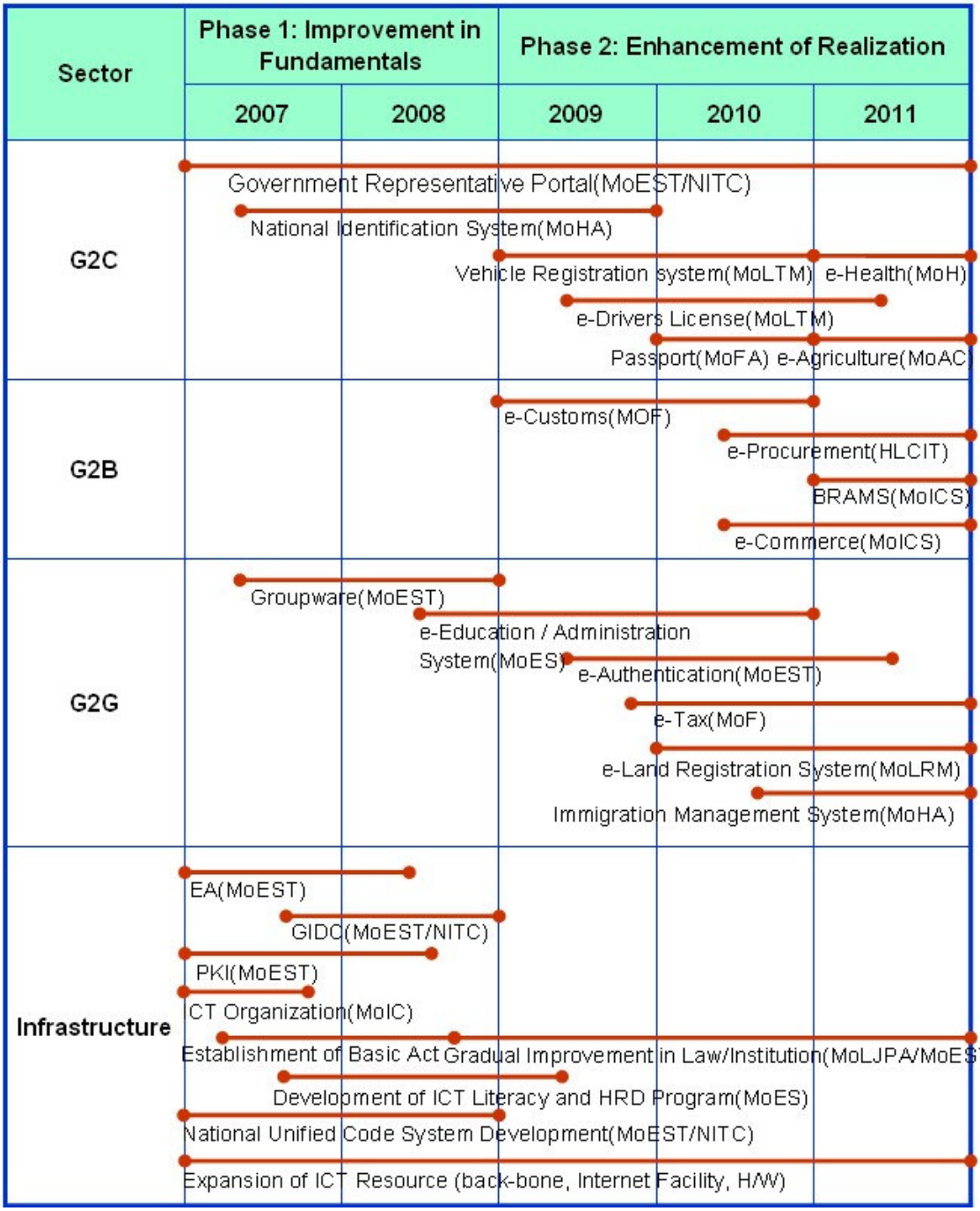
Figure 104. Goal and Identified Projects of e-Government





Its priorities and schedule based on the five-year plan is as following:

Figure 105. Implementation Plan for e-Government Project

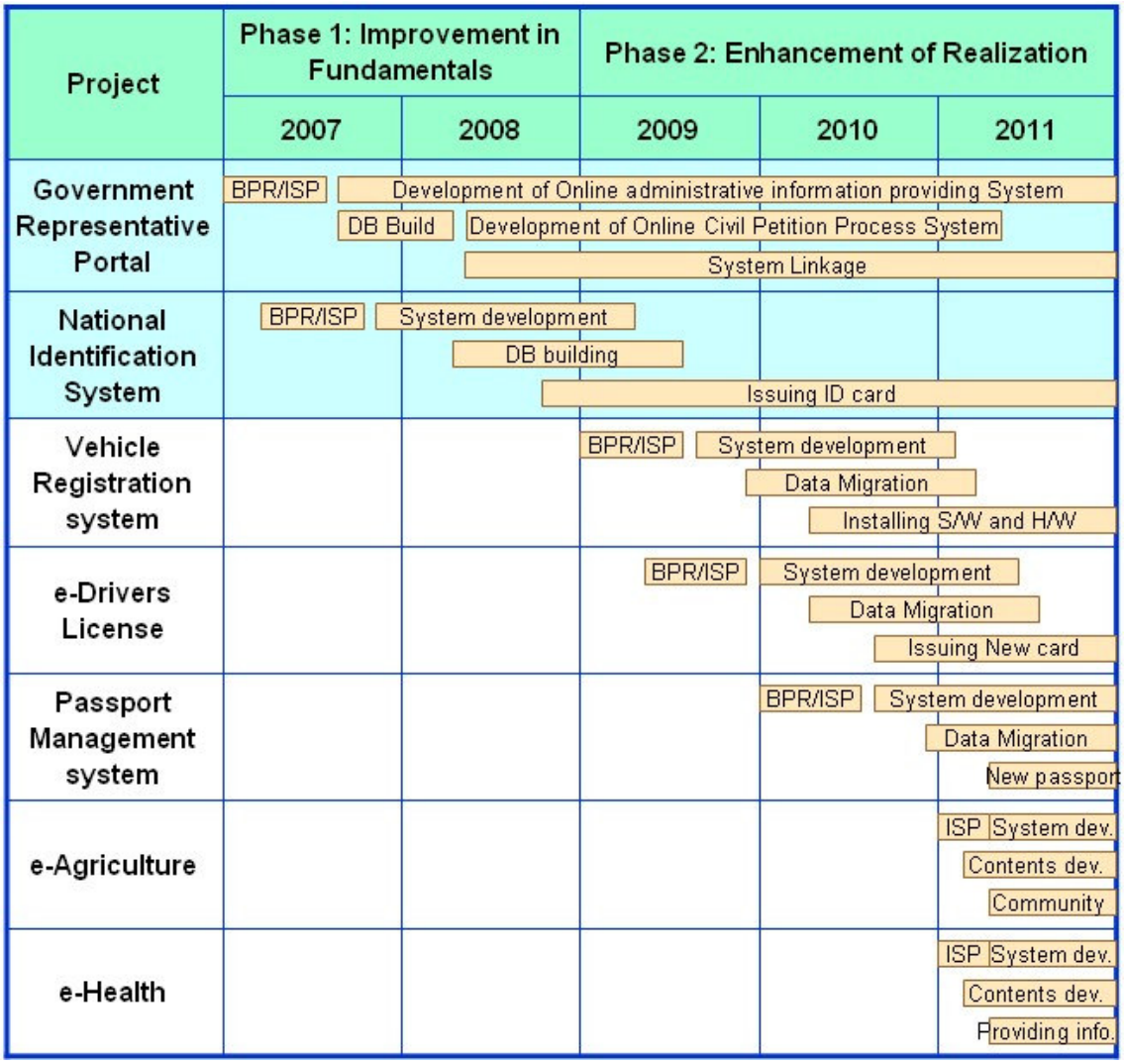


Following detailed roadmap is drawn up with detailed phases for each project in the G2C, G2B, G2G, and Infrastructure sectors, according to the entire project schedule above.

In the G2C sector, Government Representative Portal and National Identification System are implemented in phase 1, and Vehicle Registration System,

Drivers License Management System, Passport Management System, e-Health, and e-Agriculture are conducted in phase 2. Also, all projects should go through the BPR/ISP stage, so that the project can be executed in a more efficient and systematic manner.

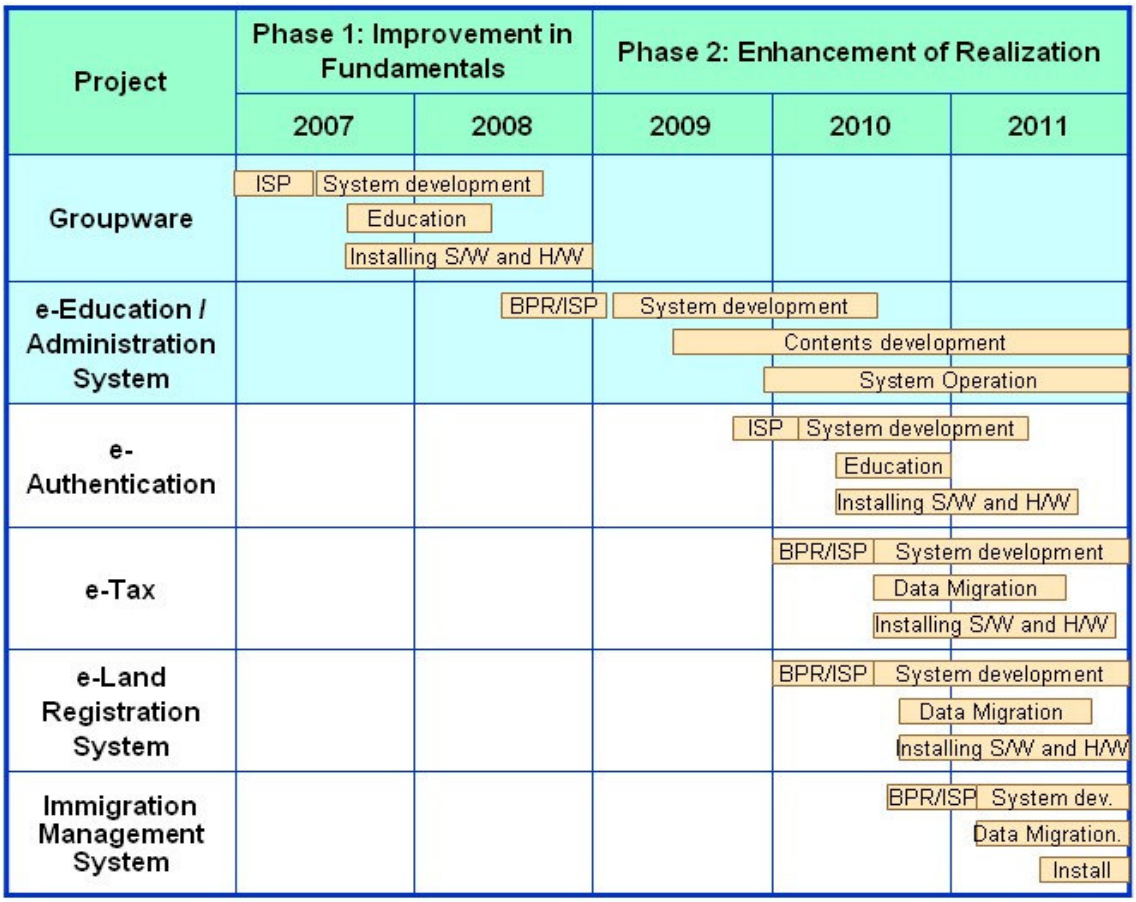
Figure 106. Detailed Roadmap – G2C



In the G2B sector, e-Custom, e-Procurement, e-Commerce, and BRAMS are conducted in the second stage which starts in 2009. Once the computerization is realized within the government and the ICT infrastructure is expanded, more effective ways to support businesses can be devised.

Figure 107. Detailed Roadmap – G2B

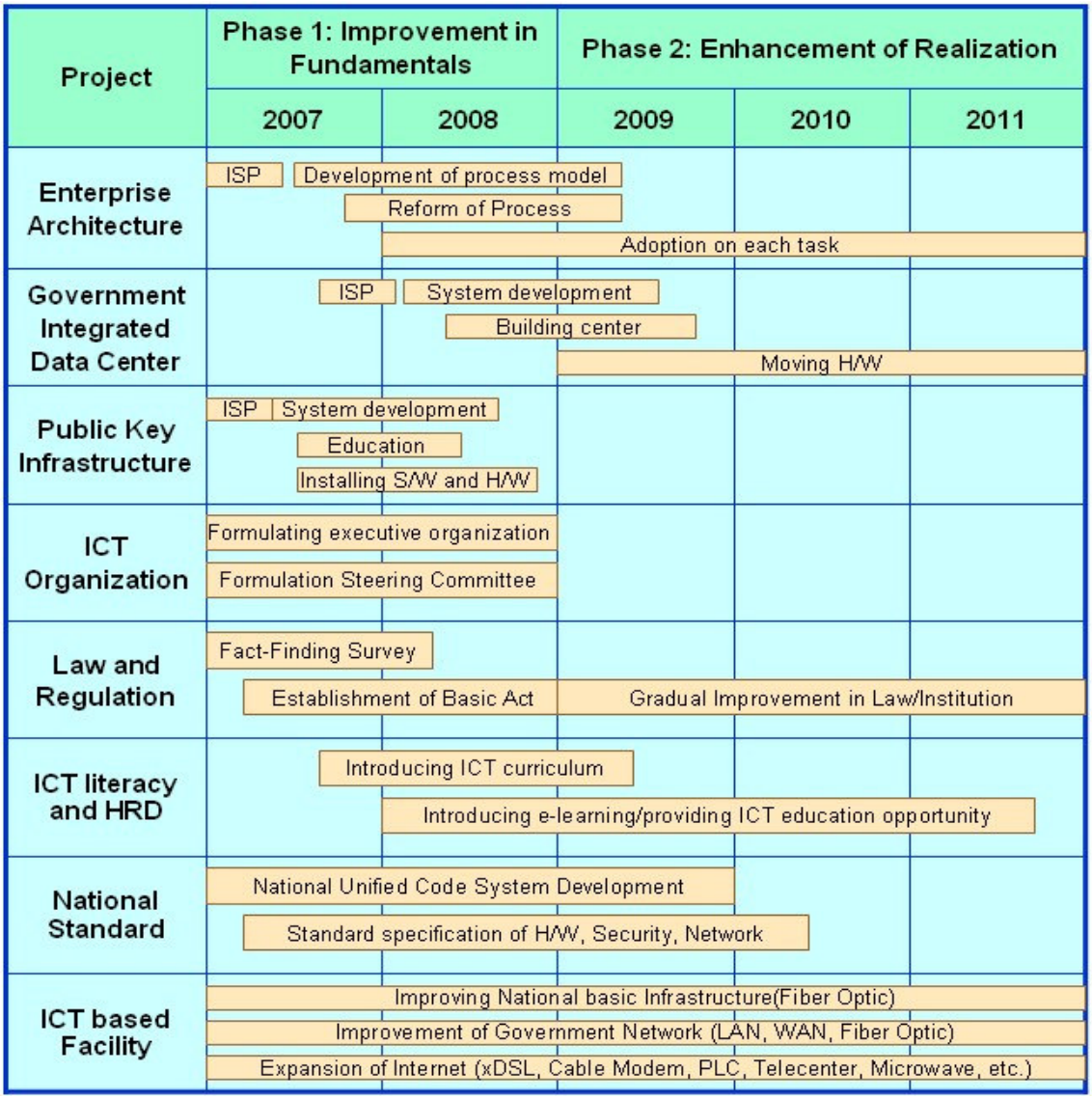
Figure 108. Detailed Roadmap – G2G



In the G2G sector, Groupware and e-Education are executed in phase 1, and e-Tax, e-Land Registration System, e-Authentication, and Immigration Management System are executed in phase 2. This is planned to meet the expansion in the ICT infrastructure.

In the infrastructure sector, Enterprise Architecture, GIDC and PKI are implemented in phase 1. The ICT infrastructure needs to be continuously implemented from the first phase. Creation of the executing body, introduction of laws/institutions, ICT training, standardization and etc should be implemented in the first phase to support other projects and to establish the e-government more efficiently.

Figure 109. Detailed Roadmap – Infrastructure



Detailed plans such as tasks, schedules and budgets are specified separately for those projects to be executed in phase 1 as marked in the detailed roadmap above.

When the actual project is carried out according to this roadmap, Nepal will be able to achieve the level of e-government as it initially aimed. In order to realize the e-government, not only the implementation of target projects is required, but also the creation of the e-government organization, preparation of laws/system, training of ICT personnel and securing budget as described in the evaluation criteria above are essential. Through these, technical and systematic feasibility can be enhanced.

In order to create an environment where the e-government project can be executed smoothly, Nepal needs to make the following preparations as identified in the benchmarking studies.

2. Legal Framework

Across the world, paper documents are being converted to digital documents and more services are processed through computer such as conducting administrative work online. Nepal has also adopted electronic system where civil application forms are downloadable from the government websites. Growing usage of computer will soon evolve the working process to become more efficient where citizens would use their computer to access government websites and get things done directly.

This kind of changes in working method however cannot be expanded without justifying the reason for adoption to the users. It also requires the government to establish a systematic foundation to accelerate the change. The government should thereby build the groundwork to nurture domestic ICT industry and provide convenient administrative services for civil applicants who would no longer have to visit administrative bodies in person. This is also the objective of the e-government. However to justify the cause, it is first necessary to institutionalize and reform related laws and systems.

This Chapter will state the legal framework which will be the systematic foundation necessary for creating e-government of Nepal. Legal framework has been drawn from the analysis of Nepali law/system status and benchmarking studies in Chapter 2.

Only the system and basic contents that should be included in the law and

ordinance will be stated here because the details should be adjusted to fit the circumstances of Nepal.

2.1. To-Be Model

Through status analysis and benchmarking studies, it has been found that there are 3 categories of legal framework which Nepal needs to institutionalize in order to promote ICT and effectively establish the e-government. They are Laws on National Informatization Promotion, Laws on ICT Industry Promotion, and Laws on ICT Infrastructure Construction.

Responsibility of enacting the prerequisite laws related to e-government depends on R&R of each ministry. The laws related to one or more ministries should be enacted by the ministry which is arbitrated by e-government steering committee. Lastly, umbrella laws such as law on e-government and law on disclosing administrative information should be designed by e-government steering committee.

2.1.1. Laws on National Informatization Promotion

In order to carry out e-government and informatization project in an efficient and consistent manner, the following laws must be enacted to build the supporting legal framework that would integrate scattered informatization services within the government and promote informatization of government and private sector.

- Law on Informatization Promotion
  - Law to improve living standards of the people and support economic growth by promoting informatization, building foundation for ICT industry and consolidating the ICT foundation
- Law on E-Government Creation
  - Law to improve living standards of people in the age of informatization by stating the basic principles of electronically processing administrative work which will promote efforts to establish e-government and enhance productivity, transparency and democracy of administrative bodies
- Law on Disclosing Administrative Information
  - Law to secure the right to know for citizens, increase civil participation in state affairs, and secure transparency of national administration by

stating regulations on civil rights to request for information held and managed by public organization, and their responsibility to disclose its information

2.1.2. Laws on ICT Industry Promotion

Launch of e-government is ultimately for the development of the nation and wellbeing of its citizens. By promoting the ICT industry, more job opportunities will be created, which will increase the living standards and ultimately contribute to the growth of economy from export of accumulated knowledge. To achieve the above objective, legal framework to promote ICT industry must be enacted. The following are the necessary laws.

- Law to Promote Software Industry
  - Law to increase living standards and achieve economic growth by building the foundation for S/W industry development and enhancing its competency
- Law to Promote Online Digital Contents Industry
  - Law to increase living standards and achieve economic growth by building the foundation for online digital contents industry and enhancing its competency
- Law on E-Transaction
  - Law to secure safety for consumers and promote e-transaction in the age of informatization by setting up basic policy on e-transaction such as granting equivalent legal efficacy on e-documents, securing credibility of e-transaction, protecting the consumers, and promoting e-transaction
- Law on Automation of Trading
  - Law to enhance industrial competency and promote economic growth by automating trading process which will simplify its process, speed up circulation of trading information, cut lead time and cost
- Law on Intellectual Property Rights
  - Law for the protection of intellectual creation of human that has value such as literature, art, music, play, published material, database and computer program. The specific laws enacted to balance the profit of creator and interests of public are copyright law, patent law, utility model law, design law, and trademark law

2.1.3. ICT Infrastructure Construction

To promote national informatization efforts, issues that arise in the process of informatization should be solved systematically such as the gap between rural and urban district, leakage of personal information, invasion of telecommunication network, identification theft on the Internet. These kinds of issues could become a major roadblock for building an e-Government. Therefore, these problems should be solved systematically to secure safety and earn credibility for effective settlement of e-Government in Nepal. The following laws should be enacted to resolve such issues.

- Law to Narrow the Informatization Gap
  - Law to increase the living standards and achieve balanced development by providing ICT access to those with limited access for economic, regional, physical, or social reasons such as low income family, people living in fishery and farming regions, physically challenged, senior citizens and female
- Law on Protection of Personal Information
  - Since the promotion of sharing administrative information after the passage of e-Government Law, more and more personal information DB are being shared. This law prevents illegal usage and distribution of personal information, protects the right of information subject and encourages appropriate usage
- Law on e-Signature
  - Law that grants legal efficacy to online e-signature such as fingerprint scan and password equivalent to written signature or legal seal on paper document
- Law on Protection of Telecommunication Secrecy
  - Law to protect telecommunication secrecy and promote freedom by allowing access for only certain people and after going through strict legal procedure
- Law on ICT Network Usage Promotion and Information Protection
  - Law to enhance living standards and improve public welfare by building the foundation for informatization society through promotion of ICT network usage and protection of telecommunication service users

2.2. Prerequisite Laws

Law reforms are the key task to undertake in order to successfully achieve the e-government. Offline oriented laws and systems will inevitably become an obstacle. Therefore, the following 6 types of laws should be reviewed before any other ICT laws in order to create an e-government with strong systematic foundation.

Schedule for legislation of prerequisite laws defined above are depending on implementation of e-government projects related to each law. Therefore the order of legislation is Law on Informatization Promotion first, and then Law on e-Transaction, Law on Protection of Personal Information, Law on e-Government, and law on Disclosing Administrative Information.

2.2.1. Law on Informatization Promotion

The following should be included in the law to promote informatization, create the foundation for ICT industry and consolidate the ICT foundation.

- Establish a plan and system to promote informatization
  - Establish informatization promotion plan and policy, create informatization promoting committee, and appoint informatization promotion head
- Promote national informatization
  - Execute public informatization and dissemination of information culture, and protect information such as the right of user and intellectual property rights
- Create foundation for ICT industry
  - Conduct ICT standardization, nurture ICT talents, support ICT related agencies, cooperate internationally on informatization promotion
- Consolidate ICT foundation
  - Manage high speed national network, interconnect ICT network
- ICT Promotion Fund
  - Raise fund and manage resources, usage, and operations

2.2.2. Law on e-Transaction

The following should be included in the law to protect consumer rights and enhance market credibility by stating regulations on fair transaction of goods and services on the Internet.

- E-transaction and internet sales
  - Electronic document usage and storage of transaction record, securing credibility of online payment, cooperation with delivery service company, operation of cyber mall and complaint of telecommunications service companies, supply of information on identity and transaction condition, application withdrawal and limitation on indemnity, responsibility of telecommunications mediator, prohibited acts, etc.
- Consumer rights protection
  - Insurance contract on consumer damage compensation, consumer protection guideline on e-transaction, registering system for blocking spam ads, etc
- Survey and supervision
  - Violation survey, disclosed information search, information disclosure on acts of violation, evaluation, fairness of certification, etc.
- Revision measures and penalty levy
  - Recommendation on correcting act of violation, revision measure and penalty levy, application of consumer damage dispute mediation

2.2.3. Law on e-Government

The following principles should be included in the law to create and operate e-government which is focused on the convenience of the public, electronic processing of major services, internet disclosure of administrative information, joint usage of administrative information, private information protection, technological development for creating e-government and outsourcing of operations.

- Principle on achieving and operating e-government
  - Focused on convenience of the public, work reforms, electronic

processing, disclosure of administrative information, joint usage of administrative information, private information protection, prevention on redundant S/W development, outsourcing of technological development and operations

- Computerization of administrative management
  - Writing, sending, receiving, acknowledgement of e-document, certification of e-signature, joint usage of administrative information, administrative knowledge management, reconstruction of work in administrative body, standardization, building of ICT network, security measures, opinion gathering through ICT network, working online, telecommuting and training, enhancement of ICT technology utilization skill of public servants, etc.
- Electronic service for civil application
  - Electronic processing of civil application, checking online necessary documents, civil application without visiting in person, identification check, electronic notification and announcement, etc.
- Reduction of document work
  - Less of paper documents, plan to reduce document work, report of reduction results, document reduction committee, etc.
- Execution of E-Government Projects
  - Establishment of mid to long term e-government project plan, achievement evaluation, execution of test projects
  - Distribution and spread of informatization system, support of informatization promotion fund

2.2.4. Law on Protection of Personal Information

The following should be included to prevent illegal usage and dissemination of personal information, protect the right of information subject and encourage appropriate usage.

- Collection and processing of personal information
  - Collection of personal information, ownership scope and announcement of personal information, writing the subject of personal information file, securing safety of personal information, usage and restriction on supply of processed data

- Reading and revising of processed information, etc.
  - Viewing of processed information, limitation and revision of viewing, appeal of dissatisfaction, application by proxy
- Penalty and guidance supervision

2.2.5. Law on E-Signature

The following should be included to secure safety and credibility, promote its usage, and ultimately promote national informatization and increase living standards

- Certification Authority
  - Select certification authority, reason for disqualification, regulations of certification work, certification service, work processing of certification authority, suspension or discarding of certification work, reform order, stoppage or cancellation of certification work, penalty levy
- Certificate
  - Issuance of certificate, termination of validity, stoppage or discarding of validity, identification check with certificate, management of certificate
- Securing safety and credibility of certification work
  - Securing of certification authority safety, operations of certification facilities and management of records, time check for e-documents, management of e-signature generation information, registration of certification error, protection of e-signature generation information, protection of personal information, management of e-signature certification, user compliance regulations, reparation liability
- Execution of E-Signature Certification Policy
  - Establishing policy for development of e-signature certification, interconnection of e-signature, technology development and training for e-signature certification

2.2.6. Law on Disclosing Administrative Information

The following should be included to guarantee the right to know for the citizens, allow people to participate in state affairs, and secure transparency in national administration

- Obligation of person requesting for information disclosure and public organization that hold the information
  - Obligation of person requesting for information disclosure and public organization that hold the information, disclosing of administrative information, writing and sharing of information index
- Information disclosure process
  - Information not to be disclosed, method for requesting disclosure, decision whether to disclose information, deliberation committee on disclosing information, notification of decision whether to disclose information, partial disclosure and electronic disclosure, cost payment
- Process to appeal for dissatisfaction
  - Objection application, administration judgment, lawsuit, request not to disclose information by 3rd party
- Information disclosure committee
  - Establish information disclosure committee, form the members, oversee the system, request for data submission, report to national assembly

3. Organization

3.1. Organization Model

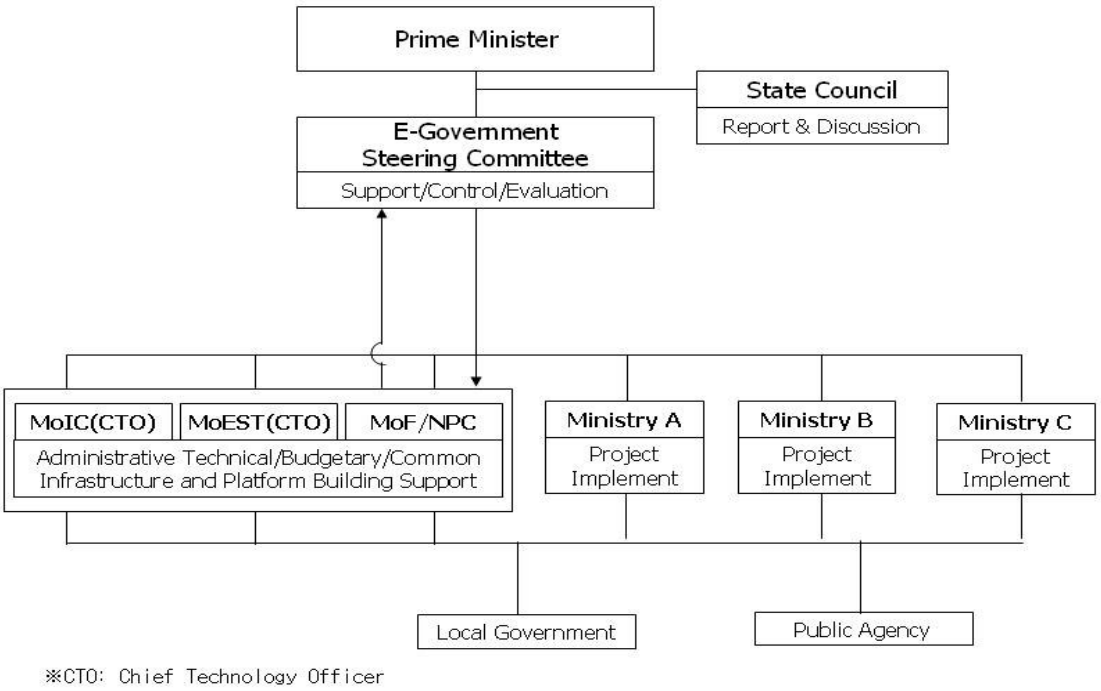
In Chapter 2, based on status review and benchmarking studies of countries with advanced ICT organization, Nepal should first create organizing bodies that can effectively build the e-government of Nepal. It will require establishment of e-government steering committee under the supervision of the head of state. Also it will require establishment of one national operation committee similar with the working committee under the e-government steering committee. The e-government steering committee can be the expanded organization of HLCIT.

This committee should establish, execute, and evaluate national ICT policy in order to prevent redundant investment and conduct national informatization project in an efficient and consistent manner.

Role of government agency to secure budget, HRD, and establish national ICT infrastructure must be clearly stated. And the role of the subject for carrying out informatization project within each agency should be clearly defined to undertake full responsibility. The ICT organization will be composed of the following. A government-

wide reorganization might be reconsidered for efficiency and effectiveness.

Figure 110. Organization To-Be Model



3.2. R&R (Roles and Responsibilities)

Detailed roles and responsibilities of each government agencies in pursuing the e-government are as following:

3.2.1. Prime Minister

- Strong leadership and ownership for implementing e-Government
- Clarifying of roles and responsibilities

3.2.2. e-Government Steering Committee

- Establishing vision and goal of e-Government
- Basic planning for e-Government
- Selecting project and operating multi-ministries related projects and nation-wide key projects
- Appropriately distributing budget and human resources for e-Government

- Building favorable law and regulations for e-Government
- Monitoring and evaluating each e-Government project
- Developing basic plans of government-wide common infrastructure
- Committee should consists of about 10 ICT experts from industry and academia, about 15 secretaries of ministries and under 20 ICT staffs and general management staffs from ministries

3.2.3. MoEST(NITC)

- Organizing e-Government executive organization and participation
- Approving and monitoring the general terms of interconnection between networks
- Monitoring projects operated by the each ministry
- Preparing, submitting and implementing long-term and short-term ICT plan, annual program and budget
  - Supporting the discovery, public bidding, screening and selection of projects to receive governmental support
  - Supporting the selection of successful bidder and signing contracts
  - Supporting the project management and supervision, evaluating results and conducting publicity activities
  - Supporting the distribution and proliferation of developed services
- Preparing and submitting periodic report on the plan and programs operated by the center to the board
- Establishing ICT standards
- Making the National Framework Plan on ICT promotion in both public and private sectors
- Creating ICT Development Center
- Developing and implementing HRD program for ICT

3.2.4. MoIC

- Determining and setting technical standard and certifying network equipment
- Managing communication licenses
- Planning and establishing a nation-wide information infrastructure
- Approving and monitoring tariffs of dominant operators in the market

- Contacting and working with international organizations and institutions related to communications and information

3.2.5. MoF

- Assigning budget for e-Government projects
- Coordinating and mobilizing project with related ministries

3.2.6. Ministries

- Planning and executing each ministry's e-Government plan
- Redesigning current government service process to fit the e-Government
- Collaborating with other ministries to create efficient government administration
- Revising of laws and regulations for e-Government at the ministry level
- Supporting government administration for e-Government implementation, such as organizing and publicizing
- Planning, adjusting and reviewing the autonomous tasks of government agencies

4. Budget Planning

One important factor to successfully execute e-government projects is securing the budget. There are many methods of securing budget from ADB, World Bank and developed countries such as ODA, securing capital through tax collection and fund raising, and financing through financial companies.

Methods for Nepal to secure budget will be stated below, and the appropriate measures can be selected depending on the characteristics and period of the project.

4.1. Domestic Efforts

4.1.1. Fund raising

Countries that have already built the e-government have installed policies to raise exclusive fund for the promotion of ICT industry. For example, Korea raised information technology promotion fund to aggressively build national information

infrastructure and computerize administrative work.

In order for Nepal to promote ICT industry and smoothly establish e-government, financial resource or funds should first be secured. There are many ways to raise funds such as securing special budget of the government, selling government owned bandwidth to private companies for their business, or asking for donations from private companies who wins IT business rights such as being the wireless career.

The informatization promotion fund should be used for R&D of ICT, development, installment and distribution of ICT standards, training of ICT personnel, and projects to establish the foundation for ICT industry. The fund should be operated by the key government body of ICT such as MoEST or MoIC.

Nepal government should enact law regarding fund operation in order to prevent misuse, promote national informatization by expanding ICT infrastructure, and ultimately make ICT industry the new growth engine of the country.

4.1.2. Special Purpose Tax

Other than fund raising to promote informatization, special purpose tax could be imposed for certain period to secure budget for promoting informatization and realizing the e-government. In other words, this special purpose tax should be levied on ICT businesses or import/sales of related facilities, but the economic environment of Nepal should first be considered. The fund raised through tax collection can be used for its original purpose of purchasing ICT facility and expanding its infrastructure. This method should also be backed by legal regulations so that tax levy and usage of collected tax would be transparent.

4.2. ODA (Official Development Assistance)

Nepal may secure budget not just within the country but also outside of Nepal. One method of raising fund is through ODA (Official Development Assistance).

OECD Development Assistance Committee (DAC) is composed of central/regional government, government agency or public organization of granting countries, which grants loans, donations and technology support to developing countries or international organization for economic development and improved welfare.

4.2.1. Bilateral ODA

Assisting country supports beneficiary country (developing country) directly by providing assistance fund or commodity goods free of charge or with compensation.

- Free grant: beneficiary country is granted with cash or goods without any financial obligation. In other words, developing country does not have the obligation to pay back.
  - Ex) Technology support, food assistance, disaster relief, etc.
- Grant with compensation: beneficiary country is granted with cash or goods with financial obligation. In other words, developing countries must fulfill their obligation to pay back the granted fund.
  - Ex) Assistance in public development program or business of developing countries, etc.

4.2.1.2. EDCF (Economic Development Cooperation Fund)[56]

EDCF is a bilateral ODA loan program to help developing countries spurt industrial growth and improve economic stability, as well as encourage development of a sound economic relationship between Korea and other countries.

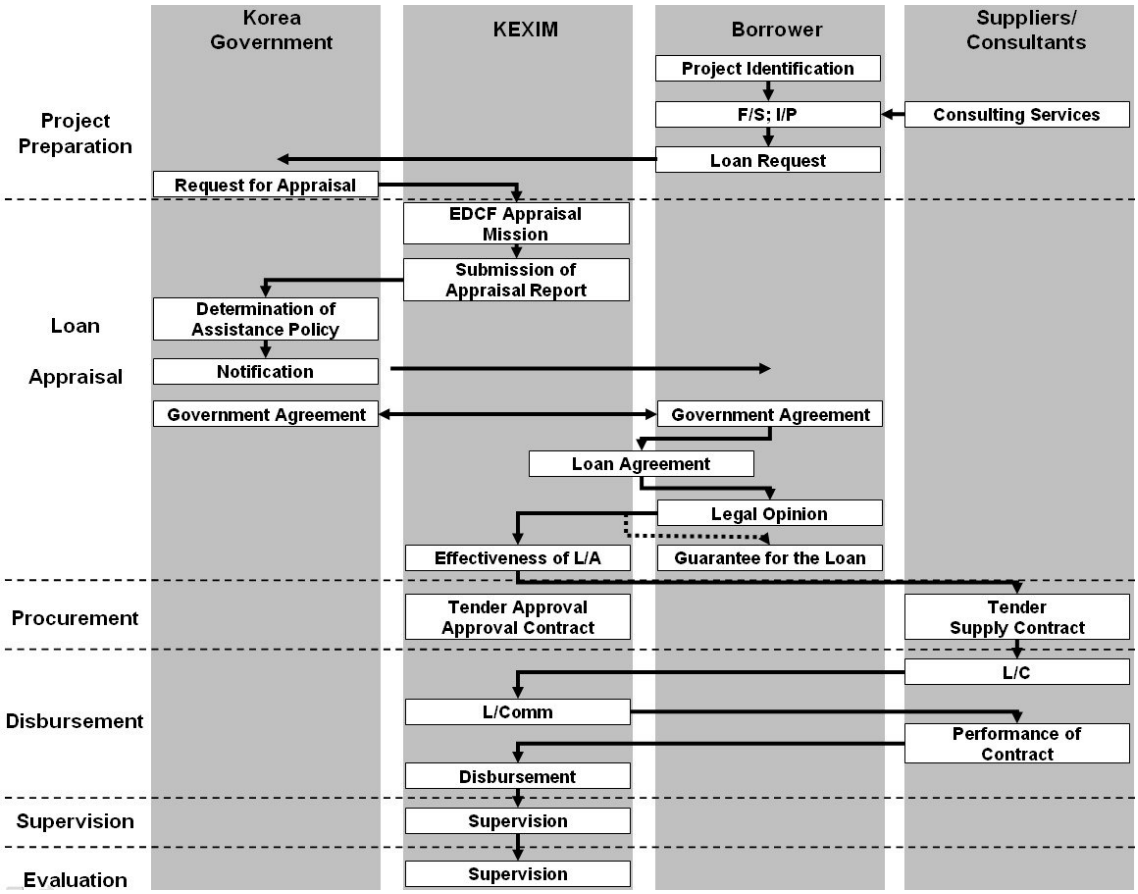
In terms of economic infrastructure assistance, among other fields, EDCF has emphasized the importance of reducing the “digital divide” by seeking ways to assist developing countries in their development of the information technology (IT) industry.

Loan Procedures

- Loans to foreign governments are granted in accordance with a standard procedure, which starts with project identification then proceeds to preparation, appraisal, loan negotiation, loan agreement, project implementation and supervision, and ends with the evaluation of completed projects

[56] http://www.koreaexim.go.kr

Figure 111. Loan Procedure Chart of EDCF



Terms and Conditions for EDCF Loans

- Loan Amount : Up to 80% of the total project cost
- Interest Rate : 0.5% ~ 3.0%
- Repayment Period : Up to 30years, including a maximum 10 year grace period
- Denomination : Korean Won

4.2.1.3. OECF (Fund granted by JBIC)[57]

OECF refers to loan granted by Japan to developing countries since 1961 or the organization in charge of the fund. The fund was granted with the objective to promote cooperation with global economy by contributing to industrial growth and economic stabilization of developing countries.

[57] http://www.jbic.go.jp

The major usage of OECF are credit financing for government agencies of developing countries or financing loans to Japanese or local companies doing business in developing countries.

The OECF provides long-term, low interest loans and/or takes equity in significant private sector projects which are linked to the fulfillment of its objectives.

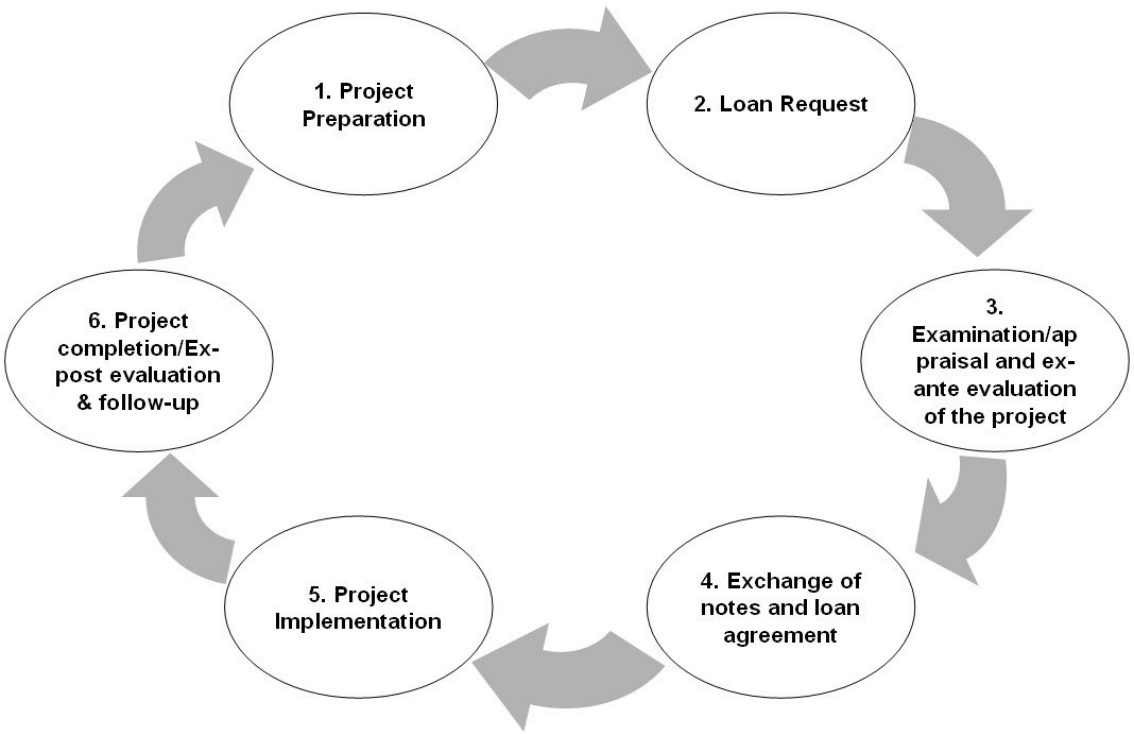
Project Cycle of ODA Loans

- ODA loans follow six steps. Lessons learned from the ex-post evaluation in the final stage will be fed back to the first stage of project preparation. This flow of steps is the project cycle.

Terms and Conditions for OECF Loans (In case of least developed countries)

- Interest Rate (General Terms) : 0.65% ~ 0.80%
- Repayment Period (General Terms) : Up to 30years, including a maximum 10 year grace period

Figure 112. Project Cycle of OECF



4.2.1.4. USAID (U.S. Agency for International Development)[58]

USAID is an independent federal government agency that receives overall foreign policy guidance from the Secretary of State. USAID supports long-term and equitable economic growth and advances U.S. foreign policy objectives by supporting:

- Economic growth, agriculture and trade
- Global health
- Democracy, conflict prevention and humanitarian assistance

4.2.2. Multilateral ODA

Assisting countries indirectly support the beneficiary countries through financing or donations (contributions) from international development organization such as the World Bank, ADB, UNDP etc. or through concessional loans of international bodies.

4.2.2.1. ADB(Asian Development Bank)[59]

ADB provides financing for projects that will effectively contribute to economic and social development of the country concerned and have the strongest poverty reduction impact in conformity with the country and ADB strategies.

Project identification may require the help of outside experts, especially in smaller and less developed DMCs (Developing Member Countries). If so, ADB can provide technical assistance to help a country identify and prepare a project for possible financing.

Project Cycle

- The various stages from country programming to project completion and evaluation are known collectively as ADB's project cycle
- The documents produced are disclosed according to specific disclosure requirements and criteria for confidentiality under the new Public Communications Policy (PCP).

[58] http://www.usaid.gov
[59] http://www.adb.org

Terms and Conditions for ADF Loans

- Interest Rate : 1% ~ 1.5%
- Repayment Period (Project Loans) : Up to 32years, including a maximum 10year grace period

4.2.2.2. World Bank[60]

The World Bank is a vital source of financial and technical assistance to developing countries around the world. It is made up of two unique development institutions owned by 184 member countries—the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). Each institution plays a different but supportive role in our mission of global poverty reduction and the improvement of living standards. The IBRD focuses on middle income and creditworthy poor countries, while IDA focuses on the poorest countries in the world. Together they provide low-interest loans, interest-free credit and grants to developing countries for education, health, infrastructure, communications and many other purposes.

Project Cycle

- Projects range across the economic and social spectrum in these countries from infrastructure, to education, to health, to government financial management.
- The projects of the Bank finances are conceived and supervised according to a well-documented project cycle. Documents produced as part of the project cycle can be valuable sources of information for interested stakeholders wanting to keep abreast of the work. The Bank is financing for businesses wishing to participate in Bank-financed projects. Below is a step-by-step guide to the project cycle, the documents that are produced as part of the process, and how to access them.

[60] http://www.worldbank.org

5. HRD (Human Resource Development)

HRD is an essential element for successful implementation of the e-government. As already explained in the e-government requirements analysis in Chapter 2, HRD was found to be one of the most important factors in the successful implementation of the e-government as well as one of the biggest obstacles faced by Nepal in introducing the e-government.

In HRD, broad range of targets, such as public servants, citizens and students, should be taken into account. In particular, education for married women, people living in the rural area and the disabled, who have relatively fewer opportunities to get training on how to use a computer, should be included.

By utilizing the Informatization Promotion Fund, ICT trainings should be facilitated, computer literacy should be improved and the digital divide should be narrowed.

To achieve these goals, Nepal should:

- Introduce a computer-related curriculum for the secondary education and above
- Introduce an internationally certified ICT Certificate
- Introduce a training program to develop ICT experts
- Expand the provision of e-learning
- Conduct ICT training on public servants according to their level and improve computer literacy
- Establish ICT-related departments at universities and provide supports
- Introduce programs for the elderly, housewives and handicapped people
- Introduce the Informatization Village and improve computer literacy

Through the execution of the above, the impacts will be:

- Improve the computer literacy
- Increase the need of computer utilization
- Foster the ICT industry
- Improve the abilities of operation
- Standardization of operating equipment
- Bridging digital divide through e-learning and informatization village
- Increase ICT-related human resource

- Improve quality of ICT curricula
- Eradicate computer illiteracy

For example, the environment should be formed so that women can take formal education equal to the men, which will eradicate illiteracy gap between the gender. Also, central/local government should open computer' lectures to women and the handicapped in telecentres, schools and village offices.

In general, courses on informatization are comprised of: basic IT course that teaches the basics of computer; developer course on how to develop a system; system administration course for system introduction and for system operation managers; multimedia specialist course; and mastery course.

To develop the ICT resources, Nepal has to introduce the following type of step-by-step ICT training courses.

- Basic IT courses for regional Residents, Students, Public Staff, etc.
  - Basic computing course
  - Microsoft Word/Excel/PowerPoint
  - Homepage making
- Developer Courses
  - Web programming course
  - Web design course
  - Java programming course
  - C programming course
  - Visual C++ professional course
  - Fundamental of SQL
  - Mobile programming course
- System Administrator Courses
  - Internet courses
  - Security courses
  - Windows 2000 administrator courses
  - CCNA course
  - Linux/Unix course
  - System programming course
  - MS-SQL server course
  - Oracle database course

- Multimedia Specialist Courses
  - Graphics and publishing design course
  - Flash course
  - Auto CAD course
  - Animation course
- Mastery Courses
  - Security master course
  - PC master course
  - Network master course
  - Web master course
- e-Government courses
  - National informatization CIO course
  - National informatization expert course
  - e-Government course
  - Telecommunication policy course
  - National informatization policy course

To accomplish the fast implementation of Nepali e-government, the internal process of the government must be computerized. For this, the issue of educating the civil servants responsible for each government process is important. For the quick adaptation of the civil servants to the computerization, the following strategy should be utilized.

- Stage by stage implementation of the education system
  - Provide basic IT education for all the civil servants by distributing PCs
  - Increase IT specialists through IT education matching each specialized process
  - Increase IT literacy rate by educating in stages
- Implementation of Chief Information Officer(CIO) system
- Promotion and Compensation system linked to the IT education and its outcome
- Increased usage of computer
  - Limit use of paper where computer has been distributed
  - Implement groupware so that computer is used for exchanging electronic documents and communication

Table 30. ICT Education for Civil Servants

Course	Subject	Object
Basic course	PC, word processor, e-Mail, Internet, windows	All civil servant
Operator course	Server, network, NMS, SMS, peripheral, PC	Operator
Developer course	WEB, SQL, Java, Linux, Developing tool	Developer
Manager course	Groupware, approval, key management	All manager
CIO course	Policy development, national IT development	CIO

6. Infrastructure

6.1. Access point

Depending on the quality of copper line in use, xDSL can be adopted to expand Internet connection in densely populated cities. If the quality of a copper line is bad, high-speed and low-cost Internet connection can be provided to the Nepali by using cable modem and PLC.

Burying optical fiber cables to link offices in mountainous district requires enormous efforts and expenses. Therefore, it is better to use WiMax, microwave, WLL, and satellite network, considering the location of the office and traffic.

The ways to provide Internet services to the people living in rural or mountain areas need to be sought as well. If optical fiber cables are built at telecentres, schools, government and public offices and rural/mountain areas, they can serve as infrastructure that provides reliable and high-speed Internet services. To access mountain areas from areas where fiber cables are buried, it is effective to utilize WiMax, WLL, microwave, and copper wire, considering frequency of the connections, number of users, and feasibility of network buildup. Access methods need to be designed depending on distance between the backbone network and access points, topography, altitude, and whether there are copper lines or not. Considering current conditions of Nepal, the first way to provide Internet connections to rural/mountain areas is to build a telecentre. Using a telecentre is the easiest way for the people living in rural/mountain areas to access the Internet.

The second way is to set up access points at schools or government and public offices. In other words, PC rooms at schools designed in the e-Education project, or PC rooms at public offices can act as access points.

Consulting team recommends informatization of administration service first. Expansion of access to rural and mountainous area needs to be after that. Without

informatization of administration service, connectivity itself has no meaning because there will be no intending contents to utilize. In this case, there is high probability that access network to be just used for web-surfing, e-mail, chatting and games. e-Seva of India case is very good example to utilize telecentres. e-Seva is for electronic services to citizens acting as a single window. Government of AP maximized usage of e-Government system using e-Seva centres only after government was informatized. Such as, access network is able to do proper role with contents to use at telecenter.

6.2. Standardization

In order for a country to establish an e-government and to pursue national development by promoting ICT industry, it is inevitable that the country should standardize various codes generated from automation of administrative businesses and ICT devices. Such ICT related national standardizations necessary for establishing e-government are as following.

Standardization includes the ICT code system, equipment, interface, protocol, network, language, application, security, and etc.

- Code system
  - Centralized code system applied to all government levels is required. Common codes can be determined by looking into codes generated when automating the government's administrative businesses.
  - Address code, item code, ID number system, institution code, date format, etc.

- Hardware/software
  - Set the standard on PCs, communication equipments, S/W, etc used in Nepal to secure interoperability, to enhance convenience in usage and to expand distribution at lower prices
  - Specifications on standard PCs and communication equipments for the administrative network
  - Create the national standard security system
  - Nepali language to be used in applications
  - Standard interface for the administrative network
  - Development tool and language for the administrative network

7. Expected Benefits

Priority projects based on e-government strategies which were dug out to accomplish the e-government vision of Nepal were identified in chapter 3. Through successful implementation of these projects by Nepali government, Nepal could jump from Stage 1 to Stage 3 in 2011 on previously defined e-government development model of Nepal. Thus, Nepal will be placed in the middle range of UN e-government index, and also the following benefits will be realized in Nepal.

- On-line processing of administrative procedure through single departmental point of contact
- Knowledge based government through government-wide KMS
- Provision of real-time and no-visit administration service which is related to civil life such as tax, welfare, health, employment, etc.
- Real time sharing of DB on residents, real estate, taxation and buildings
- Continuous service oriented process reform and systematic informatization
- Drastic reduction of paper work and office visits due to expanded online service
- Online processing of international trading, logistics and enterprise undertaking/operating service

Table 31. Expected Benefits

Application	Current	Stage 1 (2008)	Stage 2 (2011)
UN e-government readiness index	126	100	80
Visiting government agencies	90% Visit	70%	Under 40%
Connectivity of government agencies	Isolated	Ministry level	All agencies
Connecting method	Dial-up	xDSL, LAN	High speed

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V. Action Plan

1. Government Representative Portal

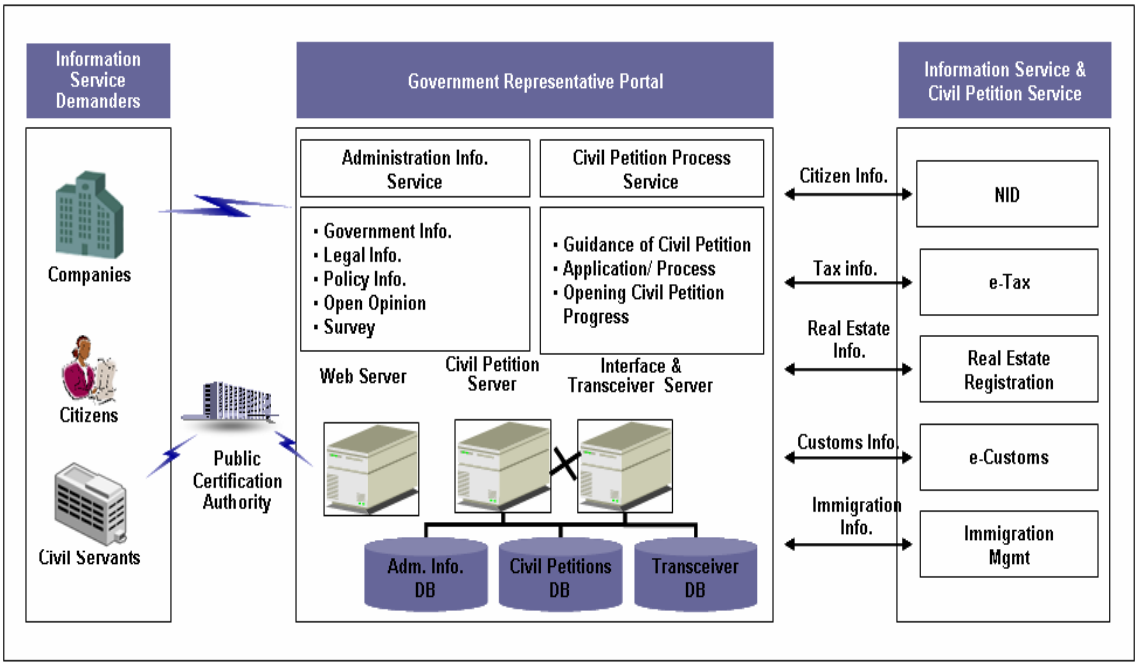
1.1. Overview

Through the Government Representative Portal, information on administrative services can be shared with citizens, such as providing introduction to all civil services, making it possible to make applications for administrative services and inquire all the civil applications filed. Also, as civil applications are handled directly on the Internet, greater transparency and convenience can be guaranteed.

The portal service dramatically reduces the citizens' need to visit administrative agencies and workload of civil application divisions in government agencies. It can also improve the quality of life for the people.

1.2. Conceptual Image

Figure 113. Conceptual Image of Portal



1.3. Facts Found and Expected Improvements

Table 32. Facts Found and Expected Improvements of Portal

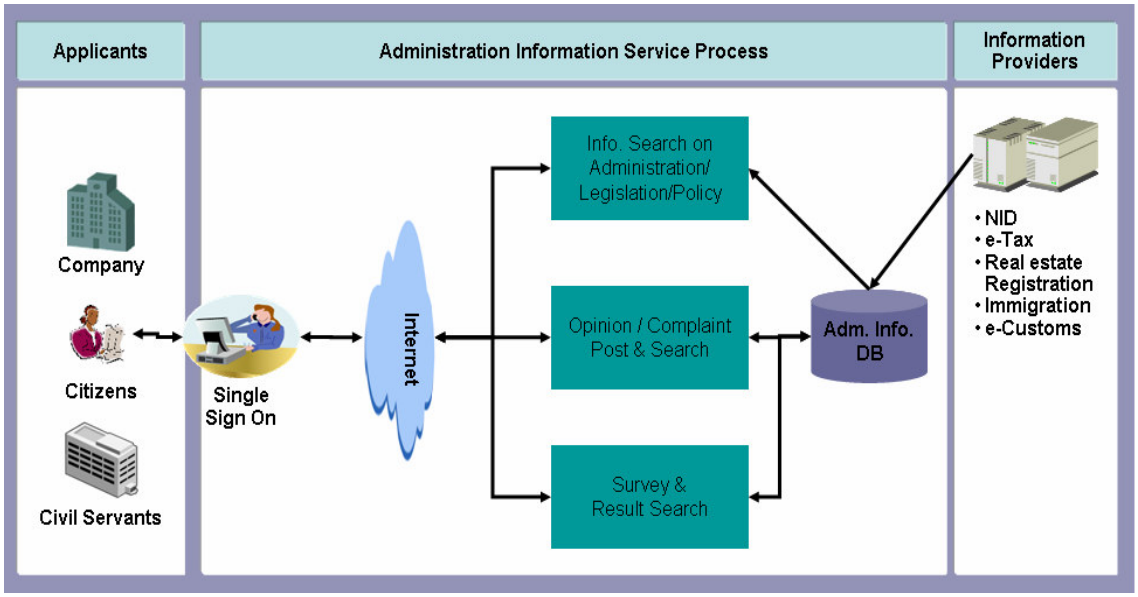
Category	Facts	Improvements
Administration Info. Service	• Some government agencies operate their websites • Partial information service on legislation and policy • Websites usually are not updated promptly	• Comprehensive information service covering administration, legislation and policy • Increased participation of people via online window
Civil Petitions	• Some information on civil petitions • No electronic process for civil petitions • No open procedure of civil petition service	• Batch information service for civil petitions • Electronic civil petition service • Open procedures of civil petition service via Internet
System Interface	• No interface with information providers	• Interface will be built with information providers
Management Infra	• No architecture to establish the Government Representative Portal • Incomplete administration process for electronic civil service • Poor law/regulations for electronic civil petition service	• ISP execution for the Portal • BPR execution to enable electronic civil service process • Improvement in law/regulations for electronic civil service process

1.4. Implementation Strategy

1.4.1. Administration Information Service

Portal allows citizens to get information on administration, legislation, policy and other government issues without having to visit government agencies. Also, through this portal, citizens' opinion can be collected and participation in e-democracy can be realized.

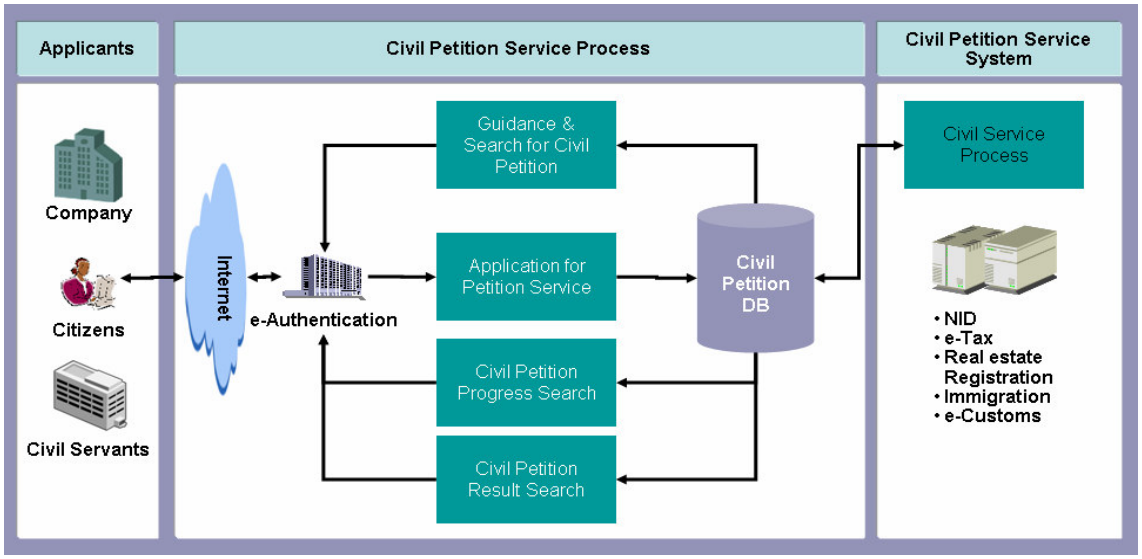
Figure 114. Administration Information Service



1.4.2. Civil Petition Service

Portal allows citizens to get or handle various administrative services and processes, including information searching, without visiting government agencies.

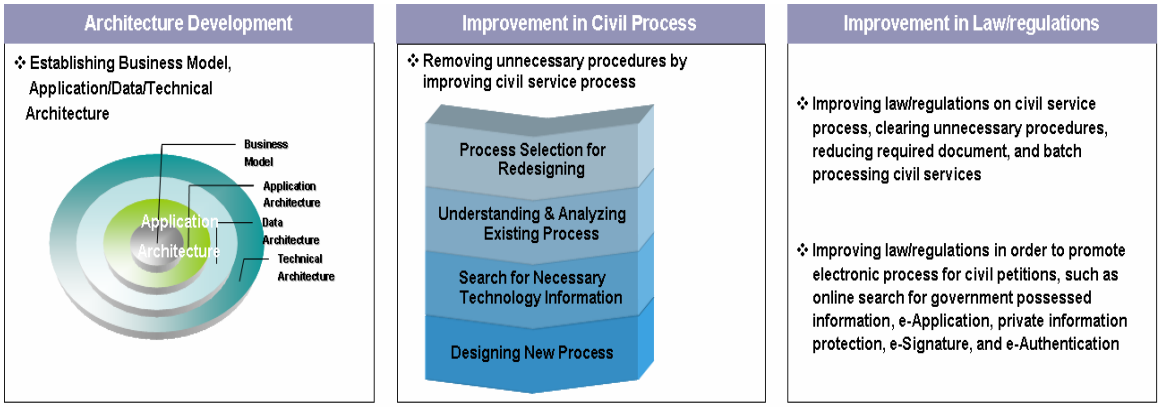
Figure 115. Civil Petition Service



1.4.3. Management Infrastructure Development

Management infrastructure needed to operate the Government Representative Portal is as following:

Figure 116. Management Infrastructure Development



1.5. Detailed Strategy Promotion Plan

Table 33. Detailed Plan of Portal (Phase 1)

Task		M	M+3	M+5	M+7	M+9	M+11	M+13	M+15	M+17	M+19
ISP/BPR											
Admin. Info.	Analysis[61]										
	Design[62]										
	Imple.[63]										
	Test[64]										
Civil Service	Analysis										
	Design										
	Imple.										
	Test										

[61] Identification of work procedure and ministry/agency
[62] Development of a model of integrated pop portal with requirements reflected
[63] Implementation. Coding of portal for each ministry/agency
[64] Coding of portal and test for each ministry/agency

1.6. Expenses for Project Execution

Table 34. Expenses of Portal

Classification	Calculation Basis	Amount(US$)
Consulting	• Consultant for BPR/ISP : 15M/M • Average unit cost : $15,000/M	• N/A
Development	• Consultant for Groupware : 23M/M • Average unit cost : $10,000/M	• N/A
H/W. S/W	• Server: 2 CPU * 2GB MM * 2 NT Server (for Web Server) + 4 CPU * 4GB MM * 1 NT Server (for Civil Petition, Transceiver Server) • Storage: 16GB(for Web Server) + 128GB(for Civil Petition Server)+ 64GB(for Transceiver Server) = 208GB (RAID 5) • Software: DBMS(2EA), Web Application Server(2EA), Portal with license fee	• N/A
Total		• N/A

1.7. Expected Effects and Considerations

1.7.1. Expected Effects

Acceleration of e-government projects and enhanced international confidence of the country

- The basis of e-government will be expanded by e-Government technologies including e-signature
- Various information services for citizens, companies, and civil servants will enhance convenience of the public and efficiency of the business activities and service managers

Improved satisfaction of citizens and credibility of government service

- Immediate handling of civil petitions will save time in process and minimize visits to the civil service window
- Enhanced service transparency and reduced time and cost

Enhanced productivity in administration and cost efficiency

- Integrity and values of information will be enriched by preventing

redundant information and reducing errors occurred

1.7.2. Consideration

- Basic administration information system should be installed (NID, Real estate Registration, e-Tax, etc.)
- Nation-wide ICT infrastructure should be developed (Very high-speed network service, ICT equipment supply to citizens, low Internet fee, etc.)
- Process for modification of contents should be defined in BPR/ISP and executed systematically
- Ensuring participation of citizens in policy making process

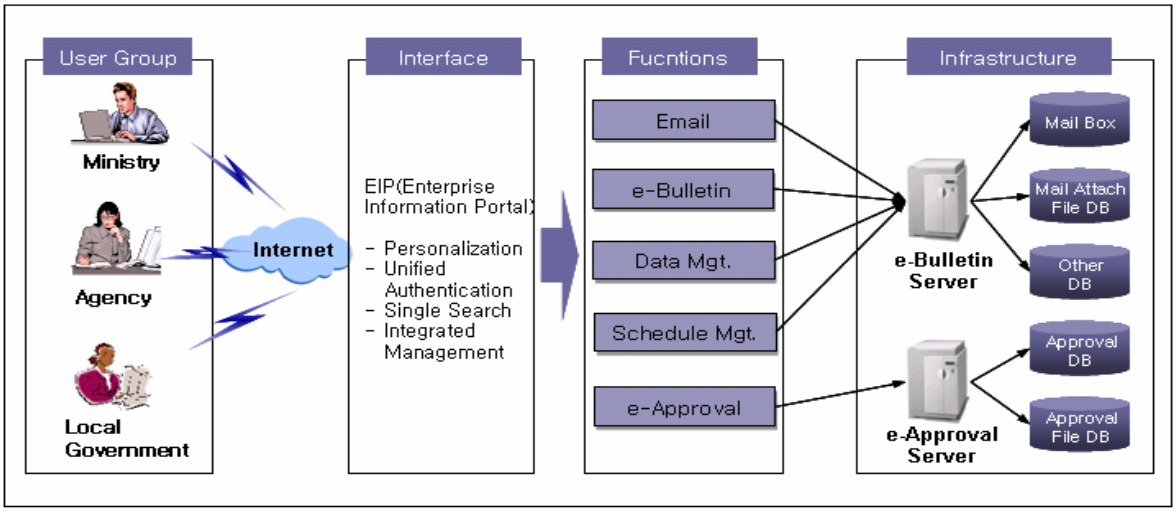
2. Groupware

2.1. Overview

Major objectives of groupware is to handle processes that were previously done through paper or face-to-face now via e-Bulletin, e-Approval system, allowing works to be done faster. By providing functions such as co-working of staffs, information sharing, email, and schedule management, Groupware can realize the networked government and improve the work efficiency.

2.2. Conceptual Image

Figure 117. Conceptual Image of Groupware



2.3. Facts Found and Expected Improvements

Table 35. Facts Found and Expected Improvements of Groupware

Category	Facts	Improvements
• Information Exchange	• Some ministries have mail servers and use email system • Disconnections often occur by fault of mail servers	• Introduction of government-wide mail server • Improvement of information exchange functions
• Information Sharing	• Most documents are privately owned when requested they are shared • Information sharing among agencies is done by paper documents	• Information required for work process will be shared and exchanged among work groups online
• Workflow Management	• Approvals are processed by paper document	• Improvement in administration service process through introduction e-approvals • Computerization of reports for administration service process
• Data Management	• Management of manual work process	• Various database, such as personal business cards and document, will be registered and managed in the system

2.4. Implementation Strategy

Groupware system should be designed with the up-to-date information technology and integrity in order to respond to rapid changes in the management environment. There are many changes in the information technology environment,

such as the introduction of e-Biz, EC, Mobile Computing, Open System, Java, XML, LDAP(Lightweight Directory Access Protocol), e-signature. Also, external changes are occurring fast such as globalization, confidence enhancement in the public sector, transfer to the knowledge based information society, and etc.

Considering these changes, the Groupware needs to be designed with the following five directions in mind:

- Ensuring full-scale expansion and supporting global standard
- Providing web and mobile service environment
- Integrating with Portal and KM
- Strengthening functions of workflow through compatibility with other systems
- Strengthening security functions (e-Signature, Authentication, etc)

Strategy for realization needs to be established by considering with the following five directions in mind:

- Introducing functions of Portal
- Strengthening Functions of e-Approval
- Supporting e-Document distribution
- Offering mobile function
- Providing architecture with scalability & global standard

2.4.2. Introducing Function of Portal

Through groupware, team members should be able to cooperate with each other, perform the same project and access the same data. To do so, it should be designed to function as a gate to other systems. First page of groupware should be comprised of the page that is relevant for each individual member or his/her group. Its menu set should be designed differently according to the user's authority or responsibility (My Page Setting). Also, each individual user should be able to manage his/her own schedule and data. Moreover, a single sign-on system should be established for users to get authentication for accessing other system via groupware.

Table 36. Description of Main Functions of Groupware

Functions	Description
First Page	• First page organization based on individuals / groups
Menu Set	• Different menu set for different users (my page setting) • Schedule and data management for different individuals
Single Workplace	• Link to on-going relevant systems • Compatibility with future information system
Single Sign-On	• Single authentication for all system

2.4.3. Strengthening Functions of e-Approval

Groupware's e-Approval function will create the paperless office environment by defining approval template, differentiating approval process for each template, and entitling management regulation for approval document. Groupware's e-Approval is as following.

- Defining e-Approval template per business function such as approvals, applications, reports
- Establishing approval process per defined template
- Defining the regulation of document mgmt.(Mgmt. code system, storage period, security level, etc)
- Defining objects for approval mgmt(Approval system, organization structure management rules, etc)

2.4.4. Supporting e-Document Distribution

e-Document Distribution System speeds up public administration service through functions such as document delivery and work sharing among administration agencies. Main functions of supporting e-Document Distribution are as following.

- Supporting e-Document distribution within the administration which uses independent homogeneous groupware
- Supporting e-Document distribution within administration which uses independent heterogeneous groupware and abides by the standard after establishing "Gov. Authentication Standard for e-Signature"
- Approving distribution by e-Approval
- Managing internal / external documents separately

Figure 118. e-Approval Flow

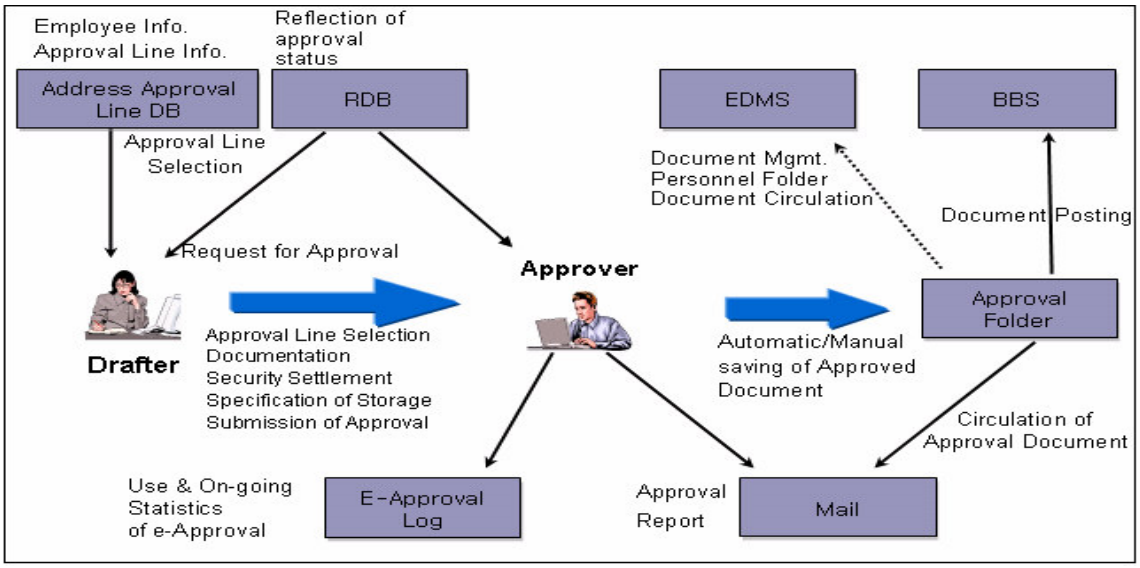
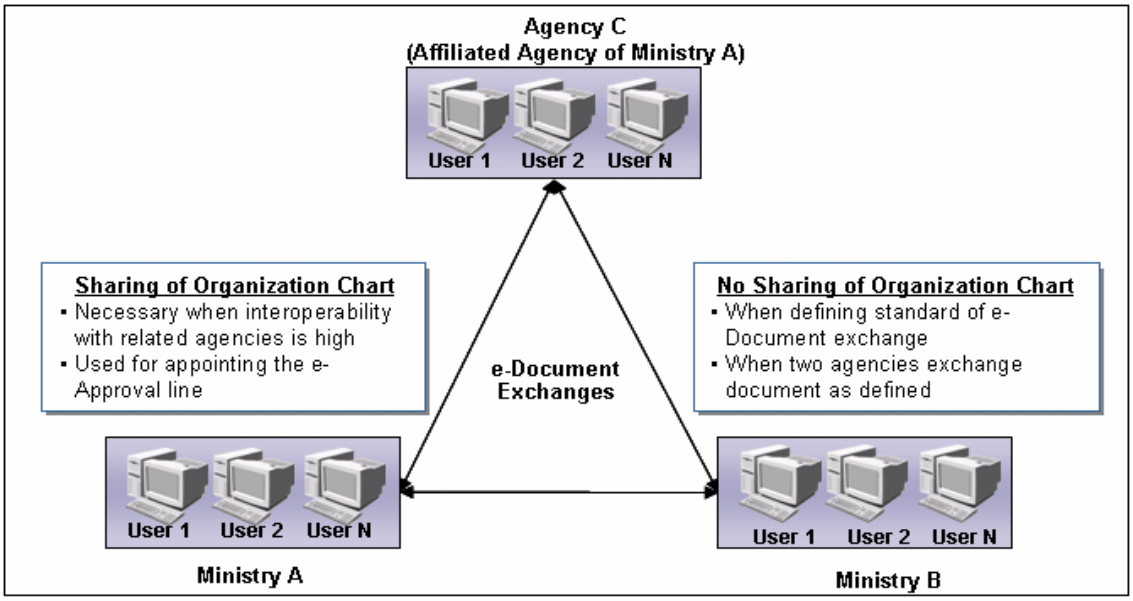


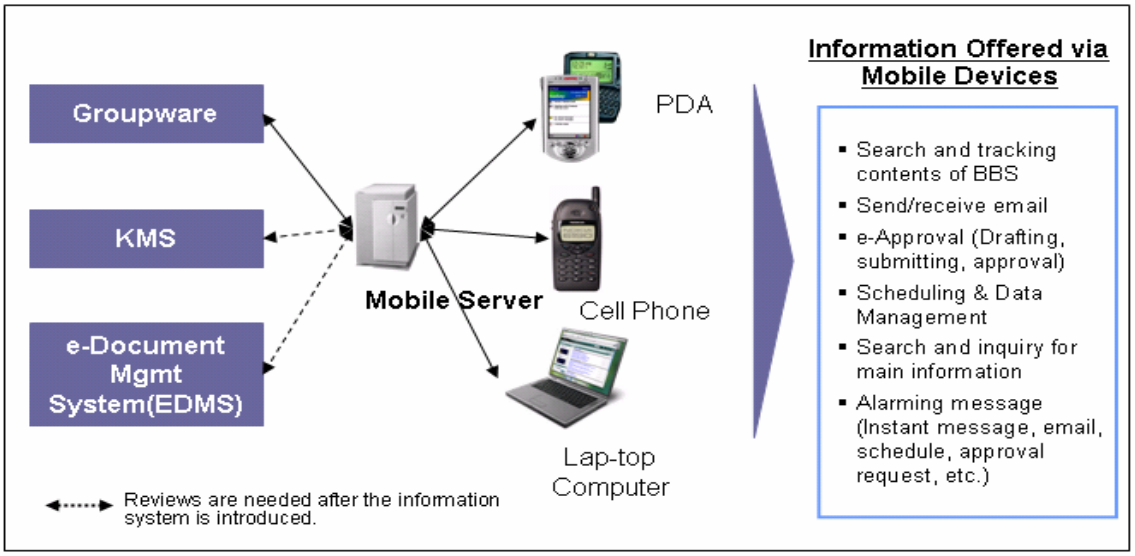
Figure 119. e-Document Distribution Flow



2.4.5. Offering Mobile Service

Mobile service for groupware information should be considered in order to enable civil servants to easily collect and share work related information via portable devices. Applicable information for this service should undergo in-depth reviews according to future needs for administration service.

Figure 120. Mobile Service Concept



2.4.6. Architecture with Scalability & Global Standard

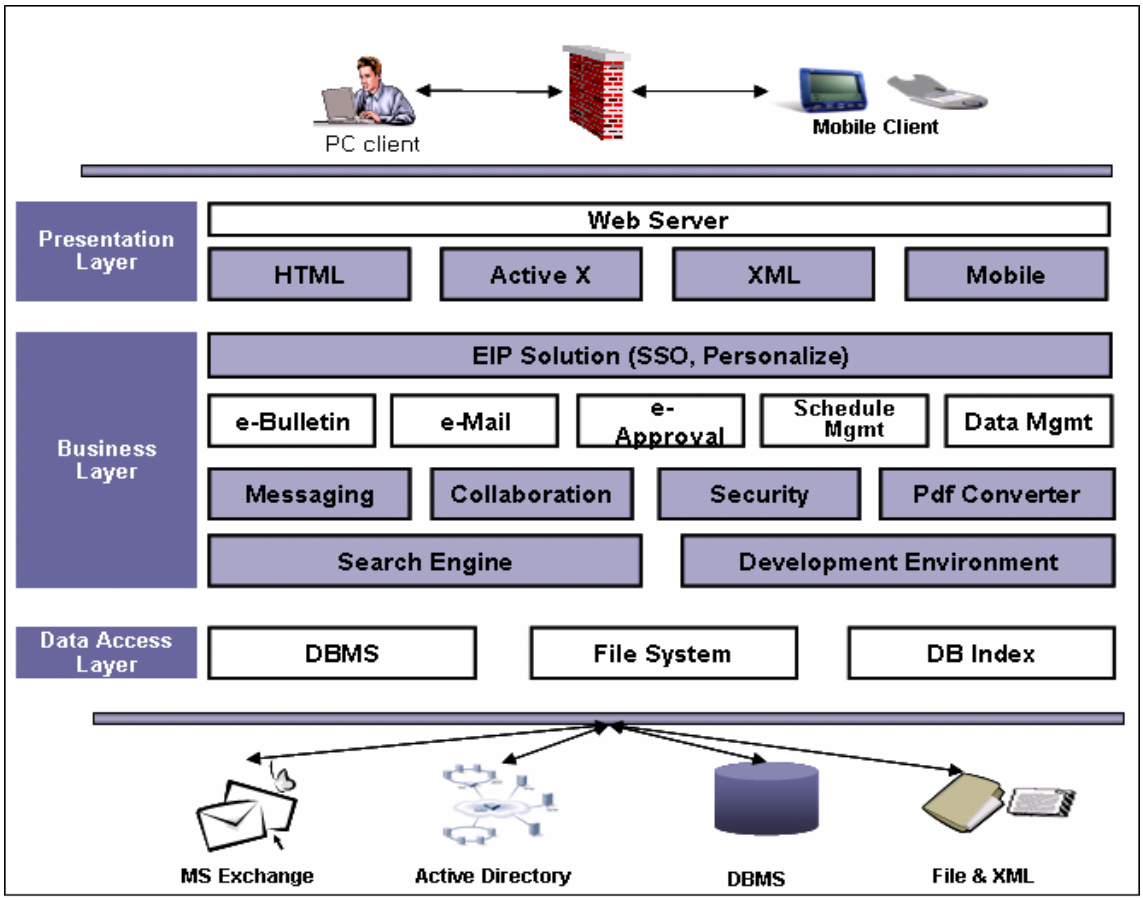
Due to rapid changes in information technologies, the groupware architecture should be designed to support scalability and the global standards. Client technology should be able to support various standard internet technologies, information delivery should be able to transfer required information to the right objects in the right time, extensible component should be able to support component based development in order to correspond to various required functions and infrastructure should be certified server groups which are safe and expandable.

2.5. Detailed Strategy Promotion Plan

Table 37. Detailed Plan of Groupware

Task	M+1	M+3	M+5	M+7	M+9	M+11
BPR/ISP						
Analysis						
Design						
Implementation and TEST						
Installation and Education						
Improvement in Law/Institution						

Figure 121. Architecture of Groupware



2.6. Expenses for Project Execution

Table 38. Expenses of Groupware

Classification	Calculation Basis	Amount(US$)
Consulting	• Consultant for BPR/ISP : 15M/M • Average unit cost : $15,000/M[65]	• N/A
Development	• Development and Consultant for Groupware : 30M/M • Average unit cost : $10,000/M	• N/A
H/W, S/W	• Server : (4CPU*2GB MM) * 2 NT Server(for e-Approval, e-Bulletin Server)	• N/A

[65] Average unit cost for consulting is based on the Korean including travel expenses.

Classification	Calculation Basis	Amount(US$)
	• Storage : Total storage = 100MB * manpower * 2=1.96TB(RAID 5) (for e-Approval, e-Bulletin Server) • Software : DBMS, Groupware Packages with license fee, Search Engine etc.	
Others	• LAN construction	• N/A
Total		• N/A

2.7. Expected Effects and Considerations

2.7.1. Expected Effects

- Reduced cost for storing documents and purchasing paper
- Reduced expenses for document delivery
- Rapid and efficient processing of administration service using groupware system
- Easy access to old documents and prompt utilization of information by civil servants
- Effective communication and co-work within a team and the administration
- Systematic document management system available by transferring approval document into electronic forms

2.7.2. Consideration

- Groupware managers of each ministry should be selected to take responsibilities for explaining on requirements and work process of e-approval and groupware
- Relevant law or institution is a prerequisite for document distribution and sharing among agencies
- Accounting system and inventory system can be supplemented

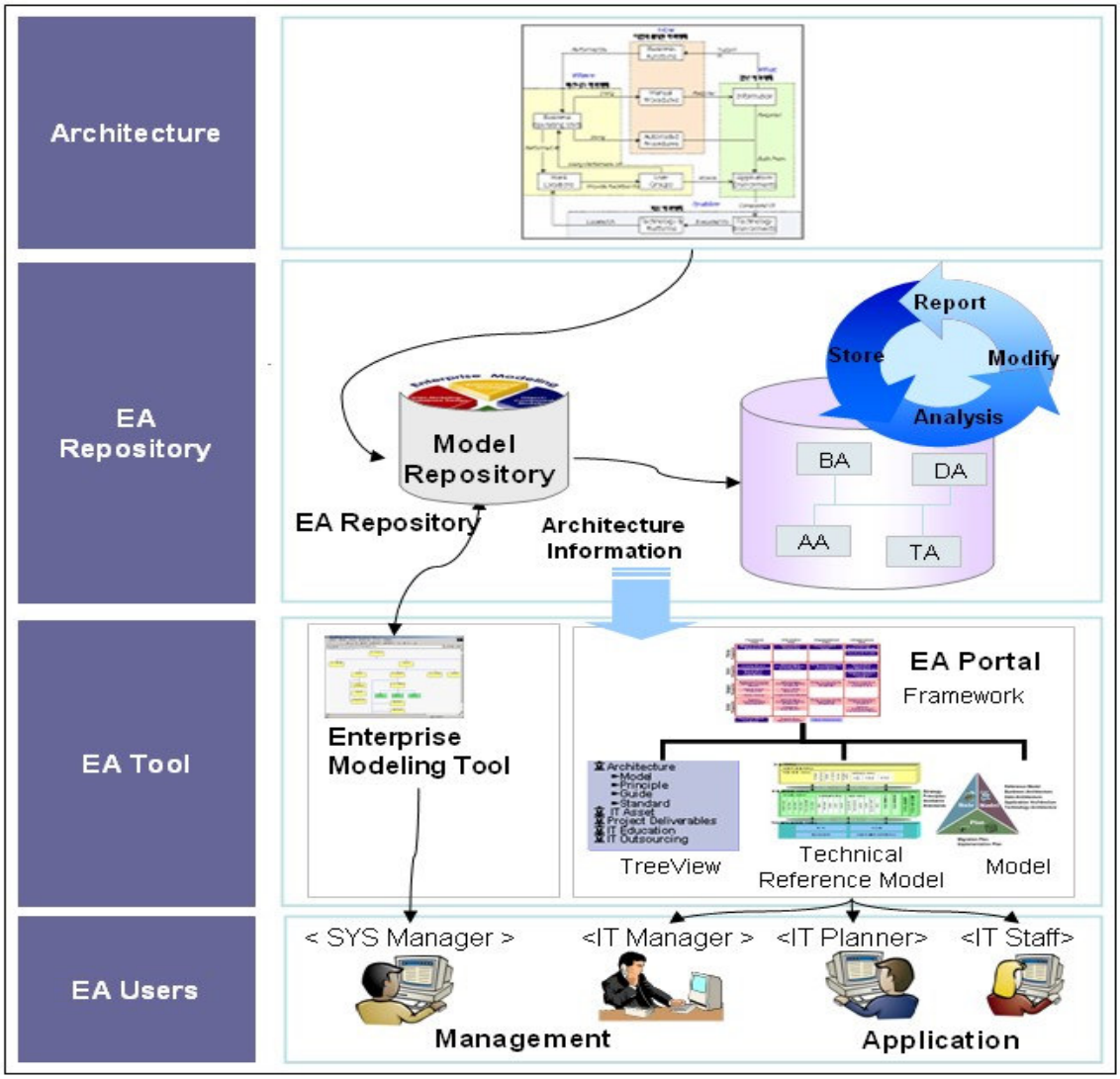
3. EA(Enterprise Architecture)

3.1. Overview

EA provides a unified information standard at the government level by defining services and work procedures of each agency and the relationship between current conditions of ICT and future tasks. Also, it ensures information sharing within the administration, standardizes processes, and establishes ICT Governance by developing link information among architectures and building EAMS which manages ICT resource information.

3.2. Conceptual Image

Figure 122. Conceptual Image of EA



3.3. Facts Found and Expected Improvements

Table 39. Facts Found and Expected Improvements of EA

Category	Fact	Improvements
Management of information resource	• Business processes of government agencies are not linked together • Administrative services for citizens are delayed due to complicated and overlapping procedures, causing inefficiency • Difficult to share major information among government agencies and departments • Lack of capacity to systematically store and control the standardized information that can be used across the government • Efficiency is compromised as government business is not systemized	• Create a system that links business processes of different government agencies • Create the EA data with detailed information used jointly by all government agencies • Consolidate the management of government information and process

3.4. Implementation Strategy

E-government can be linked more actively to innovation of government process by establishing the EA. EA guarantees interoperability of different information systems and allows the government to process business in a more effective, transparent and prompt manner. Thus, citizens can receive all the government services in one-stop wherever and whenever they want.

3.4.1. Compositions of the EA Structure:

- EA Vision: Future vision and goals of EA
- EA Framework: A tool to comprehensively systemize the knowledge of an enterprise(institution, company, organization).
- EA Reference Model: Information that an enterprise (institution, company, organization) should refer to when managing and operating the EA
- EA Application System: Automated system that provides various functions to the EA process owner and EA information user to efficiently access the EA information
- EA Management System: Process, organization, personnel system needed to systematically manage/apply/revise the established EA information
- EA Information: Information needed to discern the key compositions that can best explain the enterprise (institution, company, organization) and express their relationship

3.4.2. Introduce scientific concept into the e-government plan and advance the e-government project by introducing and embracing the EA.

Establish the EA data and keep them up-to-date

- Establish a reference data that all the government agencies can utilize with a common standard in terms of government affairs, data, information service, information technology infrastructure, and data protection. In particular, for information resources jointly used by all government agencies, in particular, establish detailed EA data and continuously manage its changes.

Link the EA with the e-government implementation process

- The establishment and maintenance of EA is not performed as a separate function or process, but are linked to and incorporated into all the processes involved in informatization, from informatization planning to information service delivery. Moreover, as the level of EA utilization improves, continuous efforts should be given to reflect EA-related data and process in the e-government management activity.

Pursue continued innovation and automation of the e-governmental EA

- The ability to have an integrated management over EA-based e-government cannot be acquired through a one-time project or event, but can be mastered and acquired through continuous efforts. Thus, the change process should be scientifically controlled and the improvement process should be automated and computerized. Implementation of the e-government itself should be systemized as well.

3.4.3. Enhance individual agency's ability to pursue informatization through the expansion of EA

Provide a guideline on introduction of EA

- It is clear that EA is an important tool that can dramatically enhance the government's informatization capacity, but there are many difficulties for individual agencies to access EA on their own. Thus, a standardized guideline on how individual agencies can introduce EA should be prepared and distributed proactively.

Present the best EA cases

- The government itself needs to realize an integrated management system for the EA-based informatization, reflect it in the government affairs, and test the process of innovation on its own. Then, its result should be defined and presented as the best case, giving a tool for individual agencies to embrace EA more easily.

Nurture EA professionals

- One of the most important factors in introducing EA in individual agencies and in advancing their informatization capacity is to nurture and secure EA professionals. Thus, the government needs to actively train EA workforce by developing and operating special programs on nurturing EA professionals for the public agencies.

3.5. Detailed Strategy Promotion Plan

Table 40. Detailed Plan of EA

Task	M+1	M+3	M+5	M+7	M+9	M+11
BPR/ISP						
Analysis						
Design						
Implementation and TEST						
Installation and Education						
Improvement in Law/Institution						

3.6. Expenses for Project Execution

Table 41. Expenses of EA

Classification	Calculation Basis	Amount(US$)
Consulting	• Consultant for BPR/ISP : 15M/M • Average unit price : $15,000/M	• N/A
Development	• Development and Consultant for Groupware : 27M/M • Average unit price : $10,000/M	• N/A
H/W. S/W	• Server: (2CPU*2GB MM) * 1 Linux Server • Software: DBMS, Modeling Tool (assuming 3 administrators)	• N/A
Total		• N/A

3.7. Expected Effects and considerations

3.7.1. Expected Effects

- EA is utilized as communication tool between work processing organization and ICT organization.
- The basis for cooperative utilization of public information is formulated by establishing interoperation system and standardization
- Provision of currently overall state of informatization and plan
- Implementation of information system and operation which are suitable in business and aim of system

- Clearance of redundant projects and fair estimation of project cost
- Softness in business change and updated technology appearance
- Decision-making to introduce information technology based on technologies, principles, and guidelines
- Through redesign and combination of business elements, the agile characteristic of the government increases
- Improvement of re-utilization of equipment

3.7.2. Considerations

- The need for organizations and professionals to continue evolving management of Enterprise Architecture
- Need for law and institution for EA management process and budget management
- Expand EA gradually after establishing the pilot system

4. GIDC (Government Integrated Data Center)

4.1. Overview

Objective of establishing a data center is to provide e-Government service model to central government departments, government agencies and local governments. GIDC helps to build environment for server co-location, focusing on the government. GIDC also helps to improve security by introducing security-fortified e-mail application, implementing an e-mail system in the data center and connecting with appropriate security systems, such as firewalls and IDS.

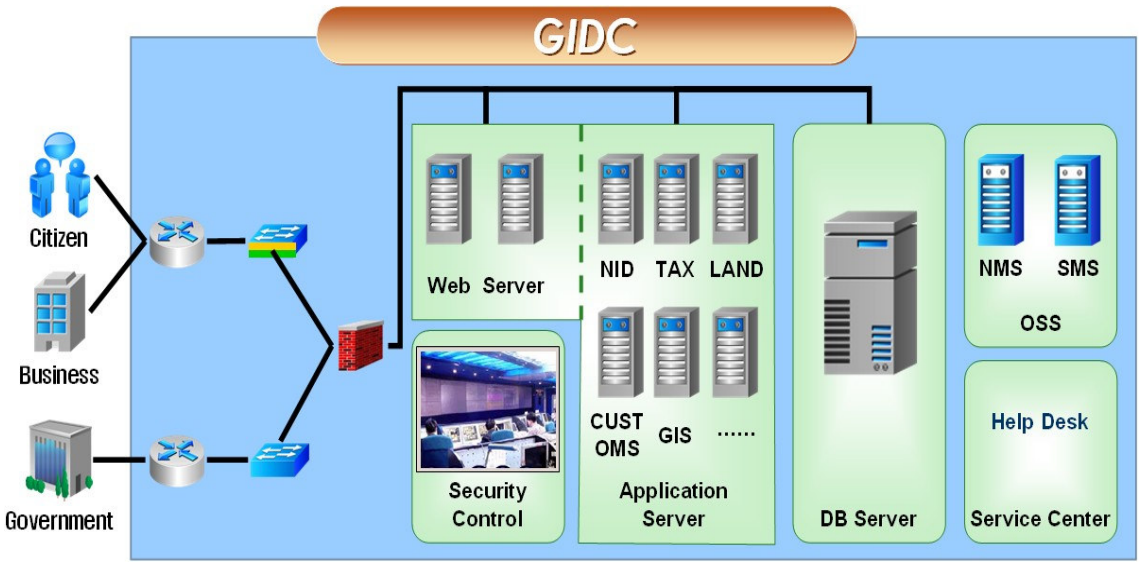
4.2. Conceptual Image

GIDC integrates the management of different servers used across government agencies. It seeks to reduce operating cost, resolve the difficulty of linking different servers and relieve system security issues rising from separate management of servers.

Also, GIDC provides co-location function for e-government services as well as secured government e-mail. For its implementation, security strengthened e-mail application and additional e-mail function are applied. GIDC utilizes GIDC based facilities connecting with other services. This minimizes investment costs spent for the

purpose of easy operation and management.

Figure 123. Conceptual Diagram of GIDC



4.3. Facts Found and Expected Improvements

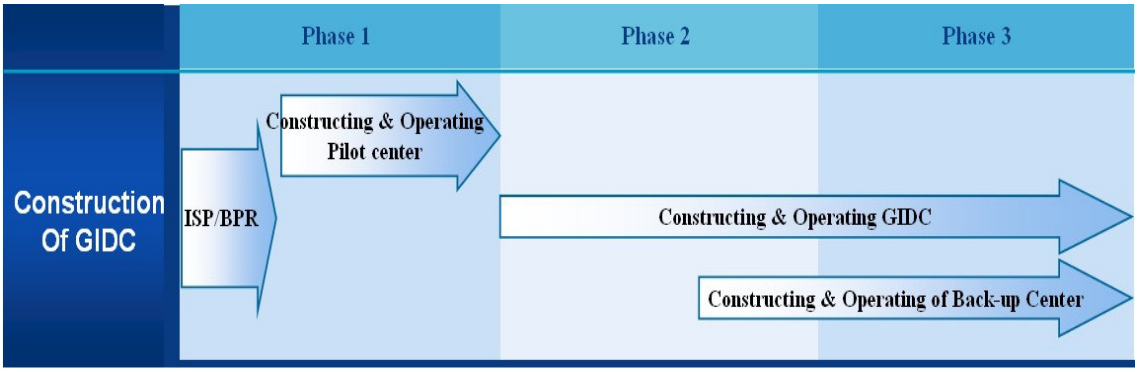
Each government agency is managing and operating its own servers and DB. Because of that, each agency requires their own operating staff, and there are big differences in terms of system use because of the different levels of the workforce.

Against this backdrop, implementation of GIDC can innovate government's management of information resources and establish world-class infrastructure for the e-government. Integration of IT environments is indispensable in order to lay the foundations for the e-government. Currently, IT powerhouses such as the U.S. and Canada are aggressively pursuing integration of IT environments. Likewise, the Nepali government also needs to build information infrastructure, enhance the quality of administrative services, and innovate its management of national information resources through the GIDC project. This leads to better quality of administrative services provided by the government to the private sector, and more efficient IT investment. Establishing a system for centralized use of national IT resources is to improve reliability of priceless information resources and lay foundations for the e-government by innovating management of information resources.

4.4. Implementation Strategy

Planning for active information sharing among administration agencies and constructing a government-wide integrated computing environment is a prerequisite for establishing a pilot center. Development of an integrated data center should be gradually carried out as described below.

Figure 124. Phase of GIDC



4.5. Detailed Strategy Promotion Plan (Phase 1)

Pilot center performs pilot stages of the e-government project before introducing the e-government across the country. Pilot center provides support for stable and pre-meditated introduction of the project by conducting a pilot operation.

- Secure resources for the ICT across the government by actually introducing the e-government projects and defining the roles and responsibilities of the pilot center
- Prepare the know-how and handbook to minimize errors in the pilot center operation
- Create an integrated computing environment for the actual operation of the e-government projects
- Play the role of beachhead in providing overall strategies for the e-government and guaranteeing the integrated computing system
- Provide the foundation for a full-fledged establishment of the GIDC

Table 42. Detailed Plan of GIDC

Task	M	M+1	M+2	M+3	M+4	M+5	M+6	M+7	M+8	M+9

Task	M	M+1	M+2	M+3	M+4	M+5	M+6	M+7	M+8	M+9
ISP/BPR										
Implementation										
Transfer										

4.6. Expenses for Project Execution

Table 43. Expenses of GIDC

Classification	Calculation Basis	Amount(US$)
Consulting	• Consultant for ISP : 20M/M • Average unit cost : $15,000/M	• N/A
Development	• Consultant for GIDC : 24M/M • Average unit cost : $10,000/M	• N/A
H/W, S/W	• Server : (4CPU * 2GB MM) * 2 Server • Network : Router, Switch • Storage : 876 GB • Software : DBMS, Web Application server • PC for test	• N/A
Others	• Peripherals	• N/A
Total		• N/A

4.7. Expected Effects and Considerations

4.7.1. Expected Effects

- Minimization of investment cost by using GIDC based facilities
- Improved stability and efficiency through concentrated central management within Data Center that provides Internet access and management for e-government
- Offering of basic environment for government co-location and secured e-mail service
- Minimization of operation cost through centralized installation
- Easy expansion and upgrading of equipment in the future

4.7.2. Consideration

- Need to draw up investment plan with a view to expand facilities step by step by forecasting overall demand according to informatization plans of all government departments
- Need a standardized and organized management of operation procedures for information resources and centers. Need to establish a system that can manage the history and versions of the standards and procedures
- Need to establish an operation management system that monitors operation status of information system, application programs, and DB in real time, and manages them in an integrated manner
- Architectures should be standardized to facilitate implementation of standardized systems. Information resources management system should be built. In addition, a resources management system also needs to be established for effective management of information resources
- Need to assign professional staff dedicated to system operation, provide them with training on expert skills to improve their expertise and efficiency. Also need to secure expertise in technology savvy businesses by introducing outsourced services

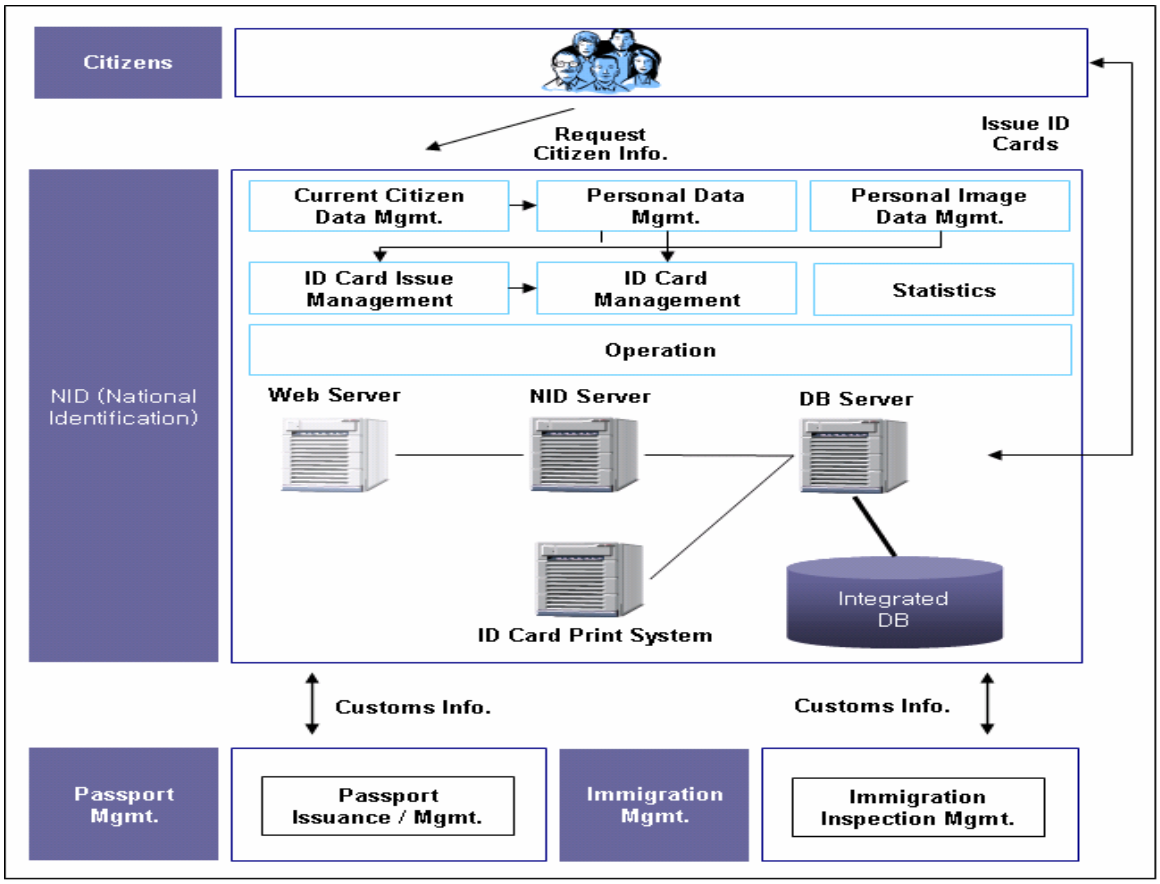
5. NID(National Identification)

5.1. Overview

The NID System should be designed to develop basic personal database of the citizens and provide personal identification with ID cards. It can be used as the fundamental database for establishing national policy, because population statistic is fundamental. It can also help online service of government for the public, support prompt actions of civil services available in ministries and public agencies, and reduce duplicate documents of civil petitions.

5.2. Conceptual Image

Figure 125. Conceptual Image of NID



5.3. Facts Found and Expected Improvements

Table 44. Facts Found and Expected Improvements of NID

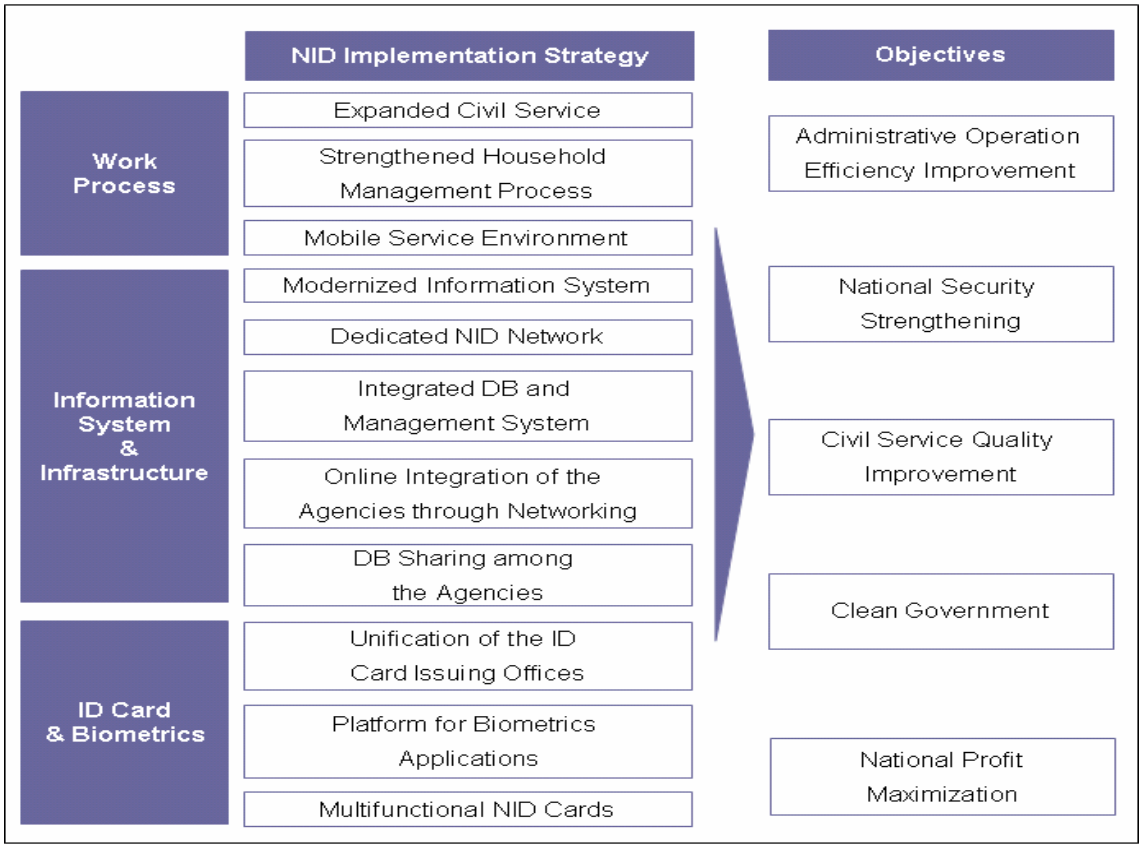
Category	Fact	Improvements
Unique number	• Citizens don't have unique number • It is difficult to identify two or more people having same name	• Each citizen including children should be assigned unique number
Operation Process	• ID card focused civil service in inadequate • Civil service processing is often delayed and	• Improvement in the quality of civil service • Digitization of the family book • Cutting down in process

Category	Fact	Improvements
	administrative efficiency is low	duration and improved administrative efficiency
Information System	• It is difficult to improve the operation as the information system cannot support it • It is difficult to manage the security of the resident data	• Improvement of the information system • Fostering internal capability to manage their own system
Network and Infrastructure	• Low operation efficiency • No sharing of the mutual information • Difficulty in enhancing system and operation due to shortage of IT staff	• Real time sharing of information • Assurance of data integrity • Improved data security • Expansion and fostering of IT staff
ID Card	• N/A	• Improvement of ID card quality • Devising means of preventing ID card counterfeits
Security	• Weak ID card security • Difficulty in using the ID card for identification due to lack of biometric information • Lack of network security	• Strengthening ID card security • Establishment of legal/regulatory basis for using biometric information
Integration with Other Agencies	• The operation efficiency of the various government agencies is low • The civil service process is prolonged an inconvenient	• Increased connectivity with other government agencies • Adopting procedure for integrating resident data • Integration of the resident data between the government agencies

5.4. Implementation Strategy

New NID System should assign unique number to all citizens, improve work process, establish information system and infrastructure, and issue ID cards. Implementation strategies and objectives of NID are as following.

Figure 126. Implementation Strategy and Objectives of NID



5.4.1. Work Process

The government of Nepal manages 8 resident registration operations (birth, death, ID card issuing, marriage, divorce, change of residence, information change and adoption). Once the new NID System is implemented, the government operations will be expanded to more operation. It will also improve credibility and efficiency of government operations.

Table 45. Implementation Strategy of NID

Expanded Citizen Management	Strengthened Household Management Process	Mobile Service Environment
• The government operation will be expanded from 8 operations to more operations.	• The basis of citizen management is individual registration and household (family and/or cohabiting	• Citizens will be able to receive civil service on mobile devices • Citizens in remote areas will not need to travel far

Expanded Citizen Management	Strengthened Household Management Process	Mobile Service Environment
• Process will be reengineered with the enhanced infrastructure • Civil service including personal identification will be expanded	members) management. • Household management is an important factor used for statistics, taxation and housing policies	to receive the civil service

5.4.2. Information System & Infrastructure

The NID System needs to improve information system and build infrastructure. First, information system should be modernized, and based on standard application program interface, ensuring seamless integration of the components. Standard information system platform allows S/W and data reusability. Design of the process and data is separated. The system is centrally managed. Servers are dual and backup process is automated. Second, DB which is established and system which is managed are integrated. All data is managed by the HQ office which maintains the integrated data. Information is shared through integrated data model management. DB is centralized. DB is managed to be efficient for operation. Third, Online/Network should be integrated and DB should be shared among the Agencies. Personal information of an agency is opened to other agencies. Data access is controlled according to the agency and data type. DB, which is shared, improves operation efficiency. Last, NID Network should be dedicated for the civil service. Equipments are needed to support various applications with consideration to central/regional data center. It is designed to use the multilevel network based standard protocol. Network management system is at the center to manage the nationwide integrated network.

5.4.3. ID Card & Biometrics

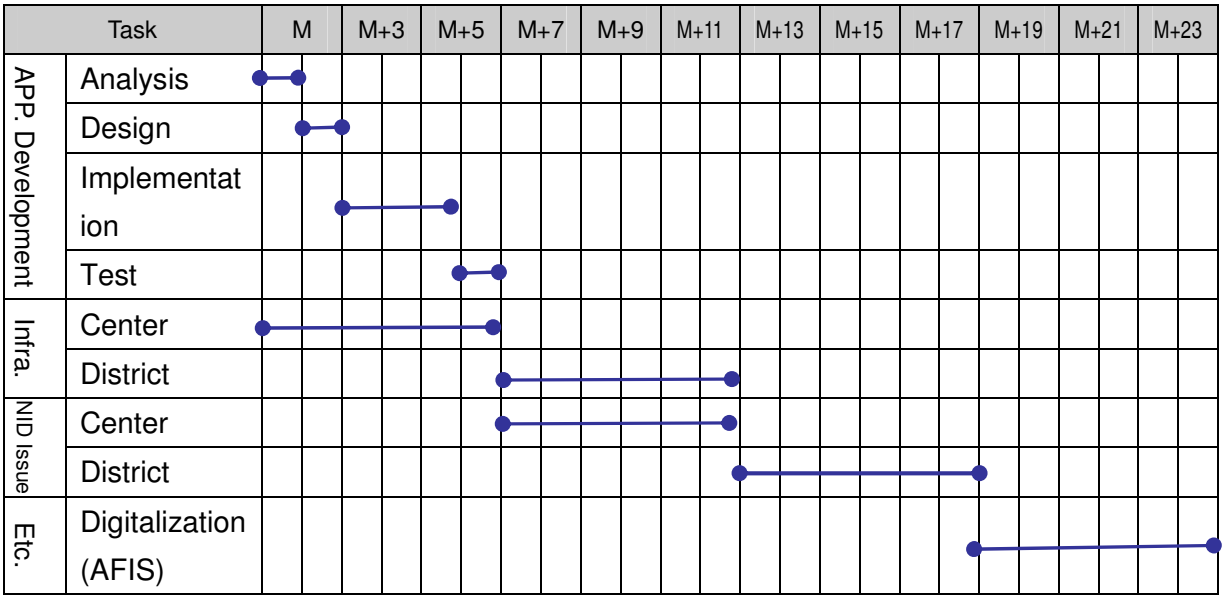
The ID card uses the integrated circuit(IC) technology to guarantee protection of personal information. This would strengthen government function, increase convenience, security and control for the citizen. This multifunctional card would also become the foundation for transforming the country into an advanced welfare society.

The PIN number in multifunctional NID card prevents other people from using

the card. IC card data is embedded in encryption algorithm. Security and electronic key function are improved in order to preventing counterfeiting and forgery. Personal identification paper is no longer needed because personal information is embedded. Platform for biometrics application is needed to manage biometric information for national security purpose. It is a system selected for optimum performance compared to its cost. It also integrates operation of the ID card and biometric system.

5.5. Detailed Strategy Promotion Plan

Table 46. Detailed Plan of NID



5.6. Expenses for Project Execution

Table 47. Expenses of NID

Classification	Calculation Basis	Amount(US$)
Consulting	• Consultant for BPR/ISP : 20 MM • Average unit cost : $15,000/M	• N/A
Development	• Developer : about 415MM • Average unit cost : $6,000/M	• N/A
Card Part	• Server : (2CPU, 2GB MM, 76GB*4HDD) * 50NT • 1 EA Server per 300,000 issues • Card : about 15,000,000EA	• N/A

Classification		Calculation Basis	Amount(US$)
		• Software : Card Application	
Infra Part	Center	• Server : (4CPU, 4GB MM)*3 Linux Server(for DB, AFIS Server) • Storage : 8TB(Disk Array for DB Server) • Software : DBMS, AFIS (Automated Fingerprint Inspection System)	• N/A
	District	• Server : (1CPU, 1GB, 76GB*4HDD)*75 Linux Server (for DB Server) • Software : DBMS(75 EA)	
Total			• N/A

5.7. Expected Effects and Considerations

5.7.1. Expected Effects

- The automated procedures of NID System will reduce time and cost of administration process and the government will become more efficient through inter-agency process integration
- National security will be strengthened. The system will ensure accurate personal identification and prevent ID card counterfeit/forgery. It will make sure that the government agency's basic data is reliable. It also supports the foundation of realizing a credit oriented society comes true
- The NID system will improve the quality of civil service. Easy to use one-stop civil service will make the public feel more convenient because of fast processes
- The transparent administration process of NID system will create a clean government image
- ICT application that leads ICT industry will maximize national profit and integration of tax, health insurance, national pension, and other systems will increase national revenue

5.7.2. Considerations

The nation-wide ICT infrastructure should be developed such as very high-speed network service, ICT equipment supply to citizens, low internet fee, etc. The

law / regulation on New ID Card issuance and its practical usage should be legislated first. Using IC card as the medium for ID card was once considered. Considering the situation of budget, usage, efficiency, etc. using barcode card or magnetic stripe card with enhanced security function instead of IC card is thought to be more practical.

BPR/ISP should be executed before implementation of NID. Adjustment of substantial work flow among ministries should be defined in BPR/ISP.

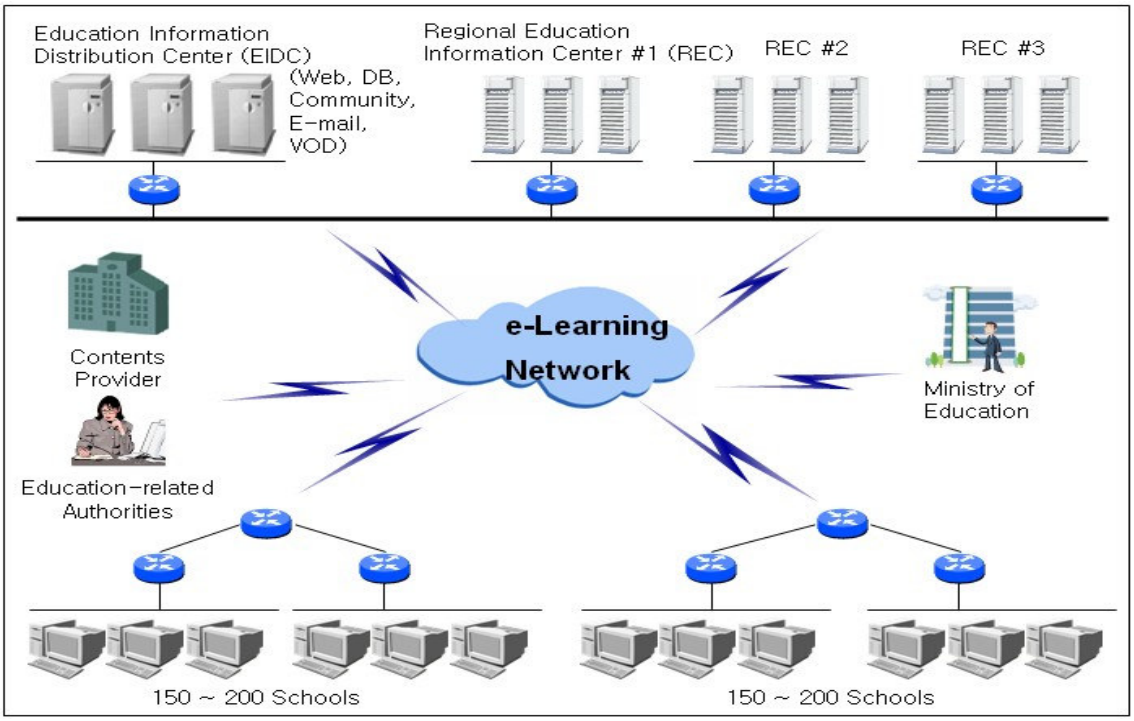
6. e-Education

6.1. Overview

The e-education system gives an opportunity of high quality education inexpensively to the people who are not only in big cities like Kathmandu but also in rural area. Through the e-education system, inequality in education opportunity can be solved. Students in rural areas will have equal access to high quality education contents compared to urban students. EIDC (Education Information Distribution Center), REC (Regional Education Information Center) and LAB are necessary to create learning opportunities in cyberspace and provide good educational contents for various teaching-learning methods.

6.2. Conceptual Image

Figure 127. Conceptual Image of e-Education



6.3. Facts found and Expected Improvements

Table 48. Facts Found and Expected Improvements of e-Education

Category	Facts	Improvements
Infrastructure of Education	• Benefits of education are not evenly spread across the country due to geographic and economic limitation • Difference in quality of education between cities and rural areas. • Lack of infrastructure (educational facilities and contents) needed to nurture competitive workforce	• Create e-education system that can overcome limitation of time and space by using the Internet • Distribute educational contents through the e-education system

6.4. Implementation Strategy

6.4.1. Prerequisites to effectively utilize e-Education

6.4.1.1. Nationwide Very-high-speed Information Communication Infrastructure for e-Education

A nationwide very-high-speed information communication infrastructure has to be built. It is a new environment created by computer and communication technology: Communication infrastructure must first be constructed to build and utilize ICT. It is a prerequisite for transmitting multimedia contents such as moving images and animation. Transmission of simple text or data cannot satisfy individuals' educational needs for visual and auditory sources of information.

6.4.1.2. Contents for Educational Training

It is important to secure good quality data, information and contents for educational training. Therefore, a national educational training information management system, EIDC, should be established. Many people are engaged in educational training and have created numerous and various sets of informative materials in the form of report and textbooks that could be shared with others.

Many of these have been accumulated but, unfortunately, they are not duly

utilized. Unnecessary efforts have been made repeatedly in creating knowledge and information already developed by others. Through EIDC and REC, contents can be created, distributed and accumulated.

The wasted time and resources could have been reallocated in creating new knowledge and information. Therefore, it is important to establish a management system “EIDC” and “REC” to store, control and utilize knowledge and information effectively. In order to extend opportunities and enhance the quality of education, active development of good educational resource and information is important, as long as it is managed systematically for effective utilization.

6.4.1.3. Human Resource for Management and Operation

Qualified professionals in charge of educational training, such as teachers, trainers, counselors, technical tutors and administrators of EIDC and REC are required.

In the knowledge and information society, the quantity and quality of the individuals’ knowledge and information are the foundations for national competitiveness. Creating new value, continuing education and training are getting more attention than ever before. Mobilizing cyberspace will increase access to education for everyone at a low price, at their convenience, without limitations of time and place, and will provide a venue for people to exchange information and ideas.

6.4.1.4. Key Success Factors

The relevant rules and institutions need to be restructured to ensure success. Individual participants must have ready access to very-high-speed information infrastructure, removing access barriers and securing access to all necessary educational materials. The systems for the protection of individual privacy must also be in place.

6.4.2. Details for e-Education Platform

6.4.2.1. e-Education Platform

e-Education Platform is composed of the e-education solutions, software tools

and servers for e-education service and the contents authoring tools.

6.4.2.2. e-education functions

Education Information Sharing Channel

- The nationwide educational information sharing service prevents the development of already existing contents which will greatly reduce the cost of production and distribution of educational information
- By establishing a communal usage system and comprehensive service system of educational contents, a one-stop search can be conducted on educational information held by several education departments and EIDC, including teaching and learning materials, training materials, education administration materials. Through this service, the teacher and student may save time in obtaining teaching and learning materials at once, and finding information one needs easily by specifying conditions such as class, subject, grade, semester, chapter, and unit.

Learning Community Channel

- Learning Community Channel will help students and teachers establish a human network, engage in learning and research activities and share knowledge through cyberspace stationed community. Learning Community, a voluntary online learning and expert community, expands the range of learning and shares professional knowledge. Learning community is open to students, teachers and parents who wish to participate.
- Learning community is a new learning place where people living in other regions or countries will jointly conduct research study on subject of common interests and share results. Lively and exiting learning experiences can be obtained, with groups that are wishes to jointly study, establish community rooms, and share opinions.
- Learning Community expands the scope of learning through diverse activities, such as project based learning, cooperative learning, discussion and debate, web pen pal, resource based learning, adventure learning, etc.

- Learning Community provides the infrastructure for knowledge generation and facilitates the sharing of professional knowledge and resources through support of research activities aimed at enhancing one's expertise. Teachers improve their teaching and educational research by employing advanced information communication technologies. A matching service is provided to find new members for learning and research activities and build a new human network that transcends time and space.

Teaching and Learning Channel

- A site with high quality teaching resources including multimedia contents, lesson plans and references should be prepared for teachers. Students can gain access to a variety of interesting online textbook, animations and digital books, which would contribute to cultivating talented students. A variety of dynamic content and service for teacher and student will support school education.

Multimedia teaching materials

- Multimedia Teaching Resources are a digital teaching database designed to allow teachers to use information communications technology for their classes. It provides various forms of data, such as graphics, sound, moving images, animations and modules, depending on nature of subjects.
- Teachers can stimulate curiosity of their students with moving images about a dayfly in a science class and a diagram simulation program in a math class. Also, Multimedia Teaching Resources helps teachers develop bright ideas about their classes, rather than merely providing data. Textbook is compiled in a word format and presentation data in a power point format. It is also transformed to other forms of teaching resources when used for textbooks made by teachers.

Online textbook

- Online textbook is a web based learning courseware. It is to lead students to pursue self-directed learning, and eventually promote

creativity and problem-solving skills. It provides a rich experience and an interesting learning environment for students. Students may evaluate themselves through quizzes after completion.

Cyber teachers

- Cyber teachers will help students solve their curiosity on any subject. Cyber teachers are free consulting service provider who responds to questions on all subjects and sends out e-mail to the inquirers. As soon as an inquiry is registered, registered teachers who currently work at schools will provide an answer within 24 hours. Also it is a quality one-to-one customized education service which complements self-regulated learning.

6.5. Detailed Strategy Promotion Plan

Table 49. Detailed Plan of e-Education

TASK		M	M+3	M+5	M+7	M+9	M+11	M+13	M+15	M+17
EIDC										
REC										
LAB										
Construction of Network	Network Design									
	Cargo Delivery									
	Training									
	Construction of Cable									
	Integration of Equipments									
	Test									
	Stabilization									

6.6. Expenses for Project Execution

Table 50. Expenses of e-Education

Classification	Calculation Basis	Amount(US$)
Consulting	• Consultant for BPR/ISP : 15MM • Average unit cost : $15,000/M	• N/A
EIDC(1 Site)	• Server : (1CPU, 4GB MM, 73GB HDD)*4 Linux Server (for Web Server, DB Server, Community Server, Mail Server) + (1CPU, 1GB MM, 146GB HDD)*2 Linux Server(for VOD Server) + (1CPU, 1GB, 38GB HDD) * 1 Linux Server(for NMS Server) • e-education S/W Development • Center Construction • Software : DBMS, VOD	• N/A
REC(3 Sites)	• Server : (2CPU, 4GB MM, 500GB HDD) * 2 Linux Server (for Web Server, Community Server) + (2CPU, 4GB MM, 1.5TB HDD) * 1 Linux Server (for DB Server) + (2CPU, 2GB MM 1TB HDD) * 1Linux Server • Center Construction • Software : DBMS	• N/A
LAB(500 Sites)	• LAB Construction	• N/A
Network	• Network Construction	• N/A
Total		• N/A

6.7. Expected Effects and Considerations

6.7.1. Expected Effects

- Equal educational opportunities and higher education quality through the Internet, which offers education at low cost with no limitation in time/space limitations
- Establishment of balanced educational policies between rural and urban area
- Promotion of online contents industry

- Enhanced national competitiveness through knowledge transfer and training of human resources
- Increased computer literacy of the grassroots people through distribution of PCs for e-education
- Better understanding of educational concepts through utilizing ICT as materials supporting class
- Increase student motivation through 3D and moving pictures

6.7.2. Considerations

- Produce and distribute consistent educational contents by establishing a long-term educational plan
- Realize high-quality education by developing and promoting various educational contents
- Develop joint national projects on e-education and prevent duplication in projects through the nation-wide consolidation
- Remove any discriminating curricula and materials for rural people
- Utilize facilities of e-Education to eradicate of computer illiteracy for rural people
- Provision of lecture CD to mountainous region for off-line education.

7. Communication Network

7.1. Overview

Establishment of the communication network is the most important foundation for efficient implementation of the e-government, which includes establishment of national administrative network needed for informatization of regional administration. Foundation for the development and promotion of the IT industry can be prepared by building the communication network. It provides the IT services and benefits of the e-government for people living in rural areas, and also narrows the digital divide between urban and rural areas.

Building the communication network should be implemented step-by-step, as it is a large-scale national project that requires enormous amount of staff and budget.

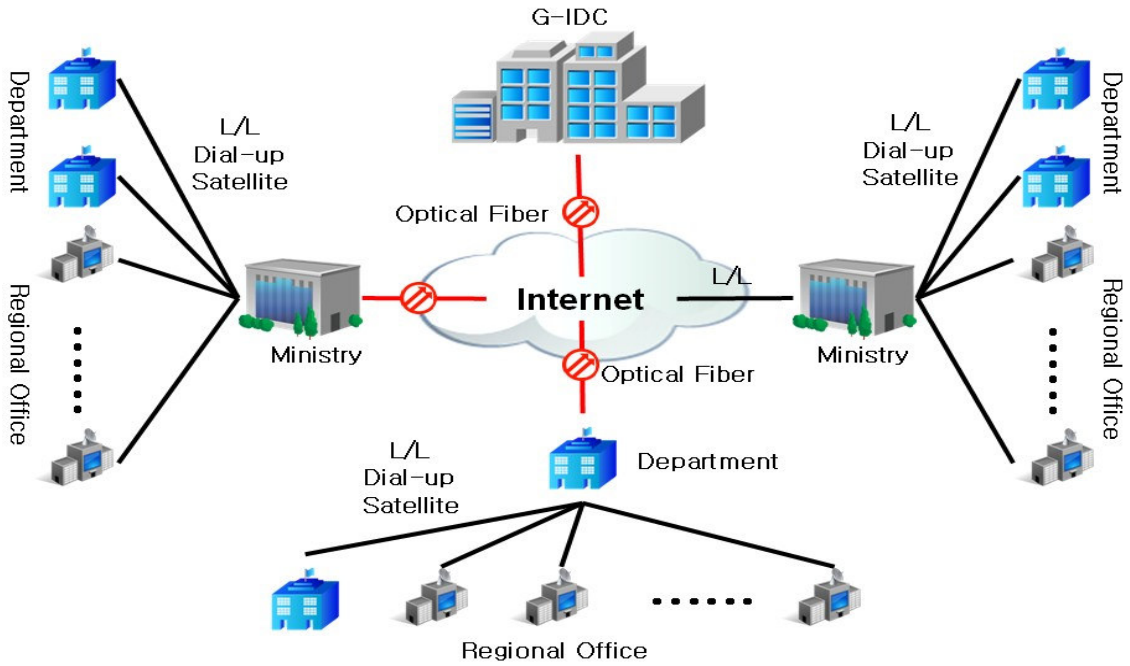
The communication network project is not only about building the backbone network, but it is also code standardization, ITA (Information Technology Architecture), Windows language standardization, etc.

7.2. Conceptual Image

Construction of communication network should not be limited to the capital city of Kathmandu or any specific region, but should be conducted on the entire country. Yet, it is too broad to present a nation-wide communication network in this project. Thus, only the conceptual image of a nation-wide backbone network, which is a core factor in the e-government, will be presented here. Figure 126 shows the conceptual image of this communication network.

Construction of communication network may include not only the construction of network, but also the distribution of PCs, printers and other peripherals, and electricity, road and etc. In this master plan, construction of the national fiber optic communication network will be introduced. More specific design of the project will be presented through the project feasibility study.

Figure 128. Conceptual Image of Communication network



7.3. Facts Found and Expected Improvements

Nepal is proceeding with building east-west highway SDH optical fiber project that runs across the country. The main route will be comprised of STM-4, while some routes will use STM-16. Between the main route and major cities will be STM-1 links.

But currently, Terai districts, the city at the southern Nepal, Kathmandu valley and Kaski region are linked with one another through optical fiber cables. It requires more than these optical cables to establish nationwide administrative network.

As such, additional fiber cable backbone network needs to be built to connect major cities. The additional network should be built with reliability and rapid connection, forecasting demand of 5 years ahead. The additional backbone network requires optical transmission device of over 10Gbps considering future surge in traffic. Meanwhile, the additional fiber cable backbone network can be built by direct buried, duct or aerial. The consulting team recommended going with duct to facilitate the future maintenance.

It is expected that the fiber cable linking China to India will go through Nepal. This physical network can be utilized as a way to deal with telephone or Internet traffic that goes in and out of Nepal.

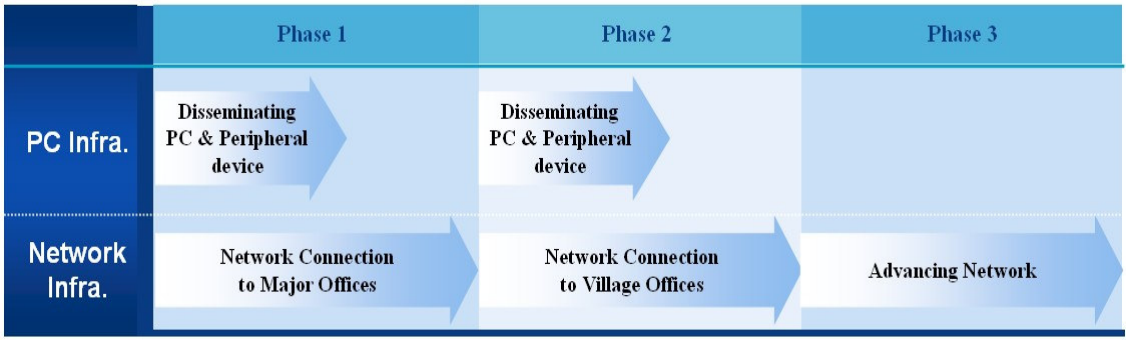
7.4. Implementation Strategy

Building communication network is a project that requires a long period. On top of that, the project needs to be proceeded continuously even after 2011, which is the target date of this plan.

Communication network for establishing e-government can be divided into distributing PCs and building telecommunication network. PC distribution can be split into phase 1 and phase 2, and those phases can be implemented with the telecommunication network plan at the same time. It will be efficient to distribute PCs when HRD plan targeting PC literacy improvement is implemented, because that can facilitate PC use.

Communication network can be divided into 3 phases. In Phase 1, optical fiber cables and existing technology such as WLL, CDMA, GSM and etc. are built to connect major cities. At the same time, government agencies are provided with PCs, Internet and LAN connections. In Phase 2, middle and small cities are linked with one another through a network. Then, in Phase 3, small scale administrative bodies are also accommodated in the network, and the established network becomes more advanced.

Figure 129. Phase of Communication network



7.5. Detailed Strategy Promotion Plan (Phase 1)

The communication network model for Phase 1 proposed by the consulting team is fiber cable backbone network that runs east and west, and connects major cities in the country. The east-west optical fiber cable currently under construction goes through Terai district and densely populated areas.

- The next step to establish national-wide network is setting up optical cable that links the hill districts. The cable in the following picture goes through hill districts and links major cities with large populations.
- It is recommended that 10Gbps MSPP backbone is established for areas or nodes with high level of data traffic and 2.5Gbps MSPP backbone is used for areas with relatively low level of data traffic.
- The optical fiber cable connecting Pokhara and Kathmandu is established with the speed of 2.5Gbps. Expansion to 10Gbps MSPP is recommended.

Once the project is completed, resources are provided to link mountain districts. The final target model will be determined through detailed project design.

Figure 130. Communication network Diagram

Table 51. Detailed Plan of Communication network

Task	M	M+3	M+6	M+9	M+12	M+15	M+18	M+21	M+24
Feasibility Study	●	———	●						
Cable Construction			●	———	———	———	———	———	●
Equipment Installation								●	●
TEST								●	●

7.6. Expenses for Project Execution

The expenses for building fiber cable suggested in the following table, are ball park figures assuming that the cable will be built through duct method and 24 cores will be factored in the calculation. The expenses will be calculated more accurately through the feasibility study.

Table 52. Expenses of Communication network (Phase 1)

Classification	Calculation Basis	Amount(US$)
Consulting	• Consultant for ISP : 20M/M • Average unit cost : $15,000/M	• N/A
Fiber Cable Construction	• Average unit cost : $40/m • Distance : 700Km	• N/A
H/W, S/W	• MSPP(10G) : 6EA * $80,000 • MSPP(2.5G) : 14EA * $40,000	• N/A
Others	• Peripherals	• N/A
Total		• N/A

7.7. Expected Effects and Considerations

7.7.1. Expected Effects

- Preparation for the foundation needed to pursue the e-government by securing the national backbone communication network
- Improved efficiency and effectiveness by reducing the lead time required in service delivery
- National network with reliability through construction of another east-west crossing cable
- Easier communication and narrowing the digital divide by securing a patch that connects to the rural and mountainous areas
- 23 districts, 25% of national overall population can be directly or indirectly affected by new communication network
- Job creation effect of 38,000 person of total man-days and high-class equipment use ability improvement
- Easier implementation of future technology like IPv6, WiMax, home network and IP-media through implementation of state-of-the-art IP technology
- Preparation of the detour when severance of Terai's optical cable is occurred
- Easier and higher speed access to agencies and telecentres like using WiMax and WLL without satellite access with high rental fee

7.7.1.2. Considerations

The above-mentioned project and cost are a high-level project plan and a rough figure. Accordingly, to implement the project, detailed implementation plans should be drawn up through the feasibility study with consideration to specific conditions of Nepal, such as population, future traffic, feasibility, roads, and stations.

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VI. Recommendation for Success

All the countries around the world are strategically pursuing the e-government project with the same fundamental goals such as citizen-oriented service, efficient and transparent government and socio-economic development. However, according to their respective conditions, such as its population, language, land, industry, etc., different strategies are adopted. This means to pursue the project in the most suitable and efficient method according to the country's characteristics and to achieve the pre-defined goals of the e-government.

In order to implement the e-government project that suits the current conditions of Nepal and execute it most effectively, key success factors as following were identified, based on the analysis of ICT status of Nepal. Lessons learned from the cases of developed countries that have already established the e-government and are further developing it were taken into consideration as well.

Key Success Factors Needed to Realize the E-Government:

- Manage factors needed to successfully implement the e-government
- Measure factors that assess the progress to verify whether the e-government plan is implemented in the purported direction, consistently and continuously

Managing Factor

- Head of the government's strong will to raise national competitiveness through realizing e-government, and strong standing of the implementation organization
- Organizational and institutional system that allows effective and continuous implementation of the e-government plan regardless of change in regimes, and systematic communication among government departments
- Advancing communication network based on forecast of future demand and bold introduction of cutting edge technologies
- Fostering domestic ICT workforce by expanding participation of domestic ICT companies in the e-government project and securing foundations to promote ICT companies and continue the promotion
- Introduction of a fund mechanism that can attain both large scale

investment and risk diversification at the same time

Measuring Factor

- Monitoring and assessing progresses and managing performance by checking progresses regularly and step by step, confirming that the e-government project is going in the right direction
- Establish a system that assesses usage status after the completion of the project, compares performance against the original plan, and reflects the assessment result to the future projects
- Assessment of performance against original plan for aggressive and continuous progress of the project and implementation of an accurate incentives/remuneration system based on performances
- Seeking advice based on superior levels of technologies after assessing adequacy of technological level per implementation step

This master plan may be reviewed and amended by the steering committee every two years in accordance with technological developments and expansion of services as a result of the rapid change in the information technology sector.

The changed details in the e-government master plan should be put in statutory form and stored and managed in a database. Also the results of implementing the amended plans should be reported and evaluated. Through executing this procedure, the e-government master plan will continuously evolve so that the e-government in Nepal can be established in a more efficient and effective way.

The detail processes of reviewing and amending are as following

- Survey of current state (MoEST)
  - State of implementation of the action plan
  - Installation of infrastructure
  - Requirements of citizen/business/civil servant
  - Technological trends
- Examination of details to be changed in the master plan based on surveys of the current state (MoEST)
- Making amendment plans including details to be changed (MoEST)
- Deliberating (e-Government Steering Committee)
- Putting details that needs to be changed in a statutory form(e-

Government Steering Committee)

- Implementing the changed plan and reporting the execution result(MoEST)
- Appraisal (e-Government Steering Committee)

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Annex A. Analysis of ICT Trend

1. Overview

In the past, terminals were connected in a closed network where a mainframe was installed at the center, and character user interface was used. Now, system is deployed in a distributed and user oriented manner, and graphic user interface is used.

Networks evolved to use the Internet and the Intranet.

As information technology advances rapidly, substantial changes are expected in terms of system establishment and operation methods. Especially, as the use of the Internet becomes more widespread, Peer-to-Peer and Web-base systems will be utilized, and the use of Object-Oriented Language and Natural Language is expected to grow.

Considering that Nepali performance on the e-Government readiness index requires more improvement, if it makes use of the rapid growth of IT and deploys e-Government, it will seize the opportunity to raise its performance on the index. In this regard, relevant and cutting-edge technologies' trends are analyzed as follows. New technologies applicable to Nepali conditions have been examined by 5 areas: IT Planning, Application Support, Communication and Network, Security, and System Management,

Table 53. Summary of ICT Trend

Categories	Content	Technologies
Planning	IT Planning Services: Standard & Technique for planning blueprint & action plan	EA, ISP, BPR
Application Support	Application Support Services: Standard, tool and technology for supporting integration information & applications	Groupware, EP, KM
Security	Security Services: Technology & protocol for integrity and authorization	VPN, IPS(Firewall, IDS), PKI, DRM
Communication and Network	Communication & Network Services: Protocol & Equipment for transmitting from node to node	OXC, MSPP, Metro Ethernet, WiMax, PLC
System Management	System Management Services: Technology for managing ICT assets such as H/W, N/W, and DBMS	IDC, DR

2. Enterprise Architecture(EA)

2.1. Introduction

Enterprise Architecture is for systematizing value chain model of organization so that various stakeholders and ICT personnel can understand the model easily. Therefore, the process of constructing Enterprise Architecture is not simply implementing ICT project but enhancing the organization's competitiveness in market by developing IT administration system.

EA includes architectures and systems in the organization that utilize information technologies. It describes relationship between work and management processes, and information technologies. In addition, it serves as basic strategic information resources explaining tasks, necessary information to execute the tasks, technologies needed to support tasks, and change process to implement new technologies for changed work requirements.

EA contains the followings.

- As-Is status of business/IT on an enterprise level, and To-Be plan: stakeholder(Planner, Owner, Designer, Builder), view (business, data, application, technical infrastructure, security, etc.) architecture model
- Program and roadmap to transform As-Is business/IT into To-Be
- Reference model that allows procurement, development, integration, and progress management of IT by service component unit
- Principles, standards and guidelines applied to the lifecycle of IT planning, investment decision, development, operation, and performance assessment

2.2. Features

- EA serves as a strategic resources reserve comprised of models defining current (As-Is) and future (To-Be) architecture environment, and process changes to proceed into the To-Be.
- As an enterprise-level cooperative tool to deal with common subjects in an organization, EA function collects and stores common information.

- EA describes the current conditions of an organization and detailed vision and goal by accurately analyzing current conditions, and suggests standard/recommendations that can reduce the gap between the current status and the goal.

3. Information Strategy Planning(ISP)

3.1. Introduction

Information Strategy Planning (ISP) designs a desirable future business model that enables optimized business operation to cope with environmental change while achieving an effective management strategy. It then sets up an information strategy implementation plan from an IT perspective to support this design efficiently.

ISP provides the framework for integrated information system that allows information sharing of diverse groups by supporting organization's vision that sets the direction of business to that of IT advancement and by defining overall information management strategies. In the long term, ISP saves human resources and costs dedicated to information system.

3.2. Purpose

First of all, ISP aims at linking IT and system plans to strategic business plans. Through this, ISP establishes information strategy based on management strategy, improves communications regarding effective use of IT within an organization, and allows user-oriented planning satisfying information requirements of tasks and prioritization. In addition, ISP intends on setting up technological strategy to make the best use of new information technologies.

Second, ISP helps smooth interaction among existing independent systems. It defines the most effective information management organization, and future information structure regarding system development based on appropriate information sharing system. ISP lays the groundwork to increase user confidence in new system by making users participate in system development and management.

3.3. Execution Procedure

Table 54. Execution Procedure for ISP

Stages	Tasks
Environment analysis	SWOT analysis, CSF check
Work analysis	Definition of work function model and core process
Information system analysis	Assessment of function/technology quality Examination of IT infrastructure
Information model design	Study of advanced cases, design of information model
Design of information architecture	Analysis of component technology, design of information architecture
Implementation plan	Realignment of execution plans per task, implementation planning per task, definition of implementation organization, and analysis of return on investment

4. Business Process Reengineering(BPR)

4.1. Introduction

BPR is a management technique that reestablishes and implements the present processes such as business, organization, corporate culture to satisfy the requirements to realize a vision, and strategy of business system.

4.2. Purpose

BPR detects works that cut the flow of data, inappropriate or overlapped works, or those that cause bottleneck in information processing or errors, and deploys new system through business process reengineering with a view to raise the value of information system and quality, reduce costs, and secure competitive advantage.

4.3. Requirements for Successful BPR

BPR is not just about speeding up work process, but about making fundamental changes to work method by using information technology. The success factors are:

- Identification of works centering around processes, not around

departments

- Shift from focus on procedures to data when analyzing and designing works
- Dedication of more time to work analysis and design than to deployment
- Move from microscopic to macroscopic change
- Best use of new technologies
- Teamwork before individual capability

By applying the above mentioned three components, BPR is implemented through 4 processes, reduction in cycle times, reduction in cost, quality improvement and service improvement,

Table 55. BPR Components

Components	Description
Process	Simplification of work procedure Process simplification Work flow
Technology	Information technology Work technology Project management technology
Human resources	Organization, responsibilities, rules and work habit Incentives and training

5. Groupware

5.1. Introduction

Groupware is software designed to improve the productivity of individuals with common goals or interests. Groupware relies on computer networking to open communications channels among people and to share data.

Traditional groupware systems like Lotus Notes were designed for corporate intranets and other LANs to support collaborative work. They essentially combined the functionality of email, messaging and conferencing, and document management systems. More recently, groupware applications have been designed with similar functionality for the Internet.

5.2. Features

Groupware enables corporation's computer users to prepare, approve, and maintain documents by using PCs connected to communication networks such as LAN. Office software such as co-authoring system using Word Processor, calculation and database are bundled and combined with communication functions such as e-mail, e-bulletin, e-approval, data sharing, and e-conference. This was designed to group scattered computers, create a synergy effect and raise work quality. Groupware also allows users to integrate dispersed information in different departments and to standardize work processes. For this reason, groupware is emerging as a core component to improve corporate productivity.

The following results are expected with the introduction of groupware

- Groupware boosts work efficiency, thereby effectively supports BPR, which reengineers organization and work flow in an innovative way. It also transforms vertical work structure to horizontal one, and facilitates communications among organization members.
- From the perspective of management efficiency, groupware allows users to access information scattered all around the world, effectively utilize such information, and to identify work flow in real time in order to respond to changes strategically. Cost reduction is achieved due to low network usage fee and maintenance cost.
- By realizing paperless office and enhancing competitiveness, groupware saves time and cost and can create new businesses using cyber space. It also enables promotion activities and service delivery targeting customers all around the globe and effectively responds to changes in management conditions and IT.

6. Enterprise Portal(EP)

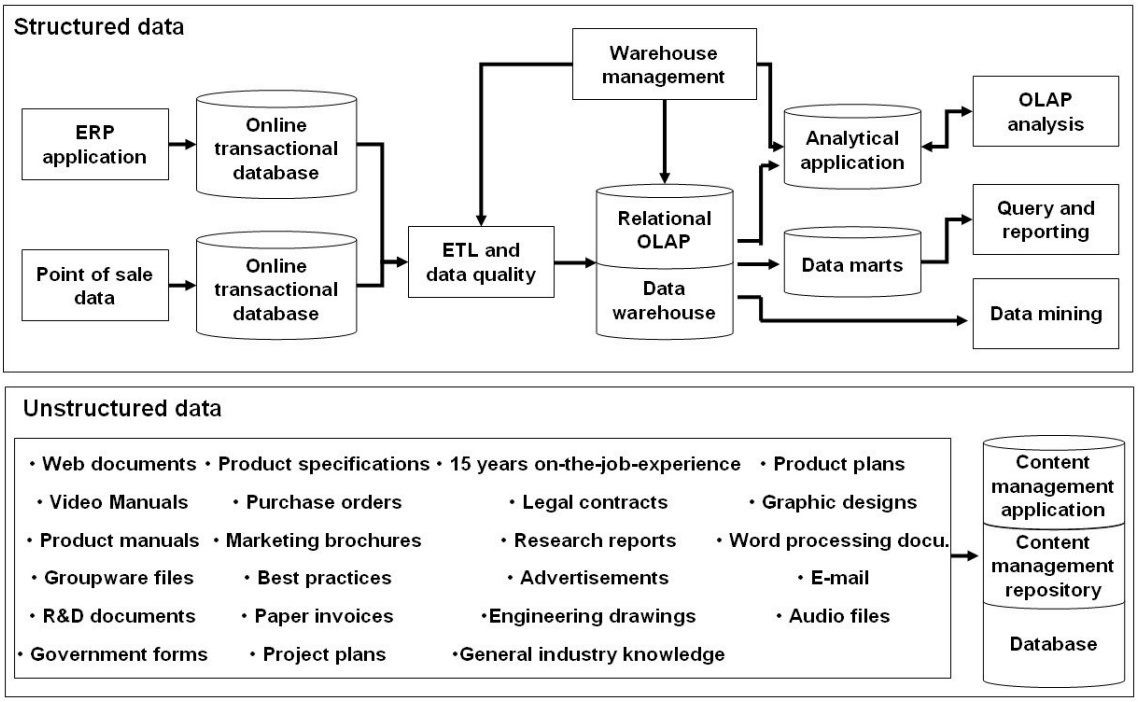
6.1. Introduction

Enterprise Integration Portal is a concept for a Web-site that serves as a single gateway to a company's information and knowledge base for employees and customers, business partners, and other general purposes

6.2. Features

EP provides a single window for corporation's information, system, and process. It is a comprehensive framework combining Enterprise Information Portal(EIP) and Enterprise Application Integration(EAI) solutions, and at the same time, achieving both effectiveness in information use sought by EIP and efficiency in system and process operation intended by EAI.

Figure 131. Diagram of EP



Results of introduction

- Everything related with corporation's works is provided through a single window in web environment, resulting in effective use/reuse and management of resources, and convenient use of resources without a separate training.
- By allowing users to access corporate resources depending on their authorities, swift distribution of necessary resources is expected. Ultimately, EP can strengthen organization's capacity by fostering its members' capability.
- Widespread information sharing shortens time necessary to realize an

organization based on knowledge. As a result, an organization's efforts can be channeled into maximizing profit.

- Members of the organization can collaborate by using community functions, and have stronger sense of belonging due to effective distribution of corporate culture, value, and vision.
- Constant information delivery leads to more competitive information delivery to other corporations or customers.

7. Knowledge Management(KM)

7.1. Introduction

The Gartner Group defines knowledge management as "management methodology to create, gather, structure, access and use corporation's intellectual resources, that contains not only database, documents, work related rules and procedures, but also expertise and experiences of employees."

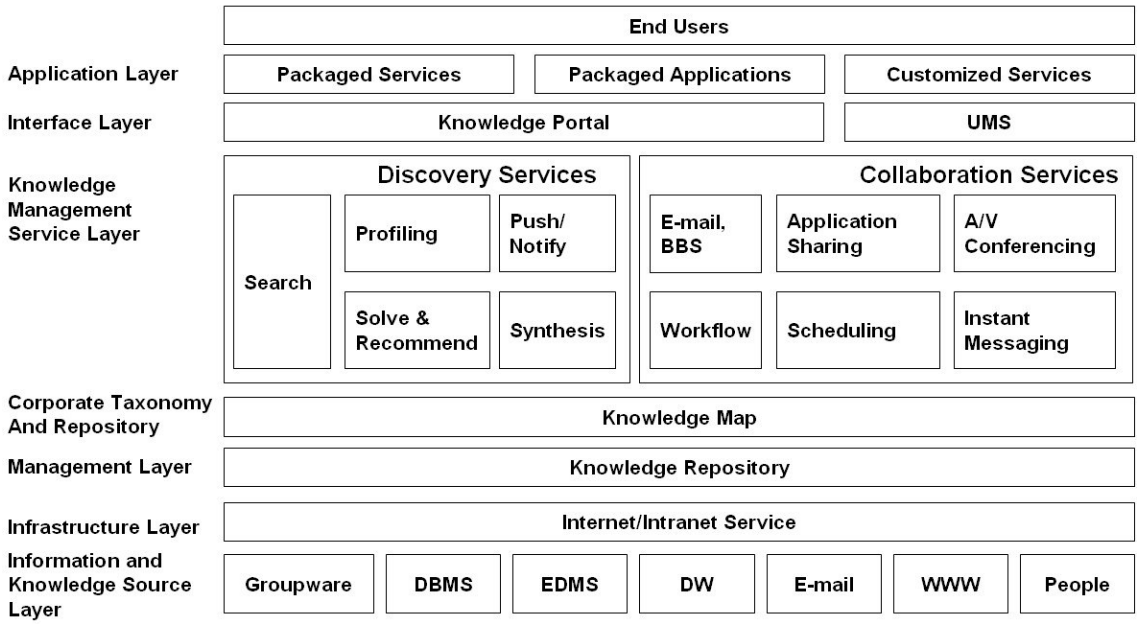
Knowledge Management System can be defined as support provided through IT for series of individual/organization's activities ranging from creation, to use, and to accumulation of knowledge conducted based on knowledge. KM is IT system that supports comprehensive knowledge management process in order to maximize the value of intellectual resources located within an organization.

7.2. Features

KM prepares "knowledge map" by extracting data that can be managed and utilized as knowledge by an organization, and by categorizing knowledge to help sorting and perusing. Data to be used as knowledge is extracted from digitalized data of knowledge, know-how, other inherent knowledge in individuals, data saved in individuals' information devices, output data of organization's information system, and the Internet and web data.

Accumulated data is made use of by users and evolves into more sophisticated form. As Internet use becomes more widespread, web-based portal site system is being developed to process work processes such as the Intranet, mail service, and electronic approval in a comprehensive manner.

Figure 132. Architecture of Knowledge Management System by Gartner Group[66]



- Information and knowledge source layer
  - Knowledge management system is based on knowledge and information. They are scattered in groupware in the organization, DBMS(Database Management System), EDMS(Electronic Document Management System), DW(Data Warehouse), E-mail, WWW(World Wide Web), and people.
- Infrastructure layer
  - Infrastructure layer refers to information technology infrastructure needed to exchange knowledge and information. Information is shared through e-mail, file server, the Internet/Intranet, etc.
- Corporate taxonomy-repository management layer
  - The layer categorizes knowledge depending on its characteristics for the purpose of systematic knowledge management and usage, and supports service that separately saves knowledge depending on categorization.
- Knowledge repository
  - The repository manages acquired knowledge in a safe and systematic manner, and supports security for crucial information, linkage between

[66] Source: Ovum, Gartner Group

related knowledge, and effective management of accumulated information of large volume.

- Knowledge map
  - Knowledge map logically maps out an organization's information structure using IT, to help its users with easy access to information and understanding about the whole picture. This 'know-where' knowledge map is meta-knowledge, and can structure the map by knowledge types, topics, groups, and locations taking organization's conditions into consideration. It also provides personalized map and multiple view types.
- Knowledge portal
  - Knowledge portal delivers web-based integrated interface that enables its users to efficiently search dispersed information/knowledge all around the enterprise with convenience to allow them to acquire necessary information whenever and anywhere they want.
  - Knowledge portal, through Personal View, provides personalized interface by maintaining personal knowledge map and profile with a view to help users to search necessary information easily. It analyzes users' patterns by analyzing log files and personal profiles, and through this, offers personalized services comprised of recommendations and one-to-one customized information.

8. Virtual Private Network(VPN)

8.1. Introduction

Virtual Private Network (VPN) uses tunneling technique to link different networks connected to the public network. The linkage is like the one made by a dedicated line. In other words, the virtual network allows its users to use Internet service providers' public network like a dedicated line.

8.2. Features

Providing a perfect security environment is at the heart of the VPN technology that uses the Internet network. The major enabling technologies are tunneling and encryption.

VPN's tunneling technology forms a virtual "tunnel" for information exchange

that is not affected by external factors on the Internet network. A session is made based on predetermined protocols on the network, and the tunnel is protected from other users.

Among tunneling protocols, VTP and L2F rely heavily on hardware, therefore, they are not proper for many and unspecified users but for service providers who intend to deliver VPN services through a separate network. Major VPN solution providers such as Bay Networks and Cisco Systems are embedding standardized technologies into their routers and RAS products.

Multiple tunneling techniques are distinguished from each other depending on number of layers and points where tunnels begin. There are Layer 2 and Layer 3 tunneling techniques.

Table 56. VPN Protocol

Security Gateway	OSI Layer	Security Protocol
Application Proxy	Application Layer	SOCKS v5, SSL
	Presentation Layer	
Session Layer Proxy	Session Layer	
	Transport Layer	
Packet Filtering	Network Layer	IPSec
	Data Link Layer	PPTP, L2TP
	Physical Layer	

9. Intrusion Prevention System (IPS)

9.1. Introduction

Software and hardware that have an object of detecting and addressing illegal use of system resources by intrusion, and abuse of internal users' are called Intrusion Detection System (IDS).

Intrusion Preventing System (IPS) is more advanced concept in that it proactively blocks possible attacks to minimize losses as an active security system.

9.2. Features

- Technological components of IPS (by the Gartner Group, 29/05/2003)[67]

[67] Management Update: The Future of Intrusion Prevention, Going Beyond Detection.

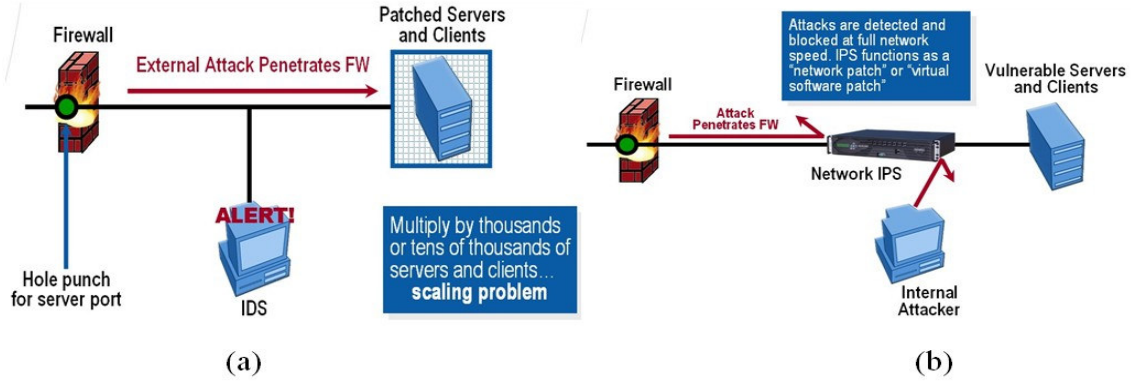
- Products in “in-line” to ensure prevention and high-speed response
- Support session aware inspection
- Diverse prevention measures: blocking malicious session through signature, protocol anomaly detection and traffic analysis to minimize false positives, etc.

- Environments and limitations of existing solutions
  - A fire wall is applied in the environment where trusted/untrusted networks can be clearly divided. It effectively blocks unauthorized access to user information and system, but not the malicious behaviors of authorized users/systems.
  - IPS is used in the environment where malicious behaviors of authorized users need to be monitored. The solution detects and blocks malicious behaviors during sessions, but afterwards, there is no other ways to prevent those behaviors than linking with a fire wall.
  - Virus/worm solution eliminates malicious programs parasitic on a specific file, thereby effectively gets rid of malicious programs that are spread through mail or file sharing. However, it cannot address technical attacks targeting vulnerabilities.
  - L7 Switch is configured at the front end of a fire wall to mitigate Denial of Service (DoS)/ Distributed Denial of Service (DDoS) attacks. It cannot detect/block attacks based on sessions or take detailed blocking measures.

- Effects of IPS
  - Eliminate network service errors triggered by worms and hacking.
  - Cut network cost by proactively blocking malignant/unnecessary traffic.
  - Reduce management cost by appropriately coping with attacks and by taking preventive measures.
  - Provide beefed up security by addressing vulnerabilities of OS or applications.

13 October 2004, G. Young

Figure 133. (a) IDS (b) IPS[68]



10. Public Key Infrastructure (PKI)

10.1. Introduction

PKI enables the users of the public networks such as the Internet where security is not guaranteed, to use a couple of a private key and a public key that is issued by a reliable institution in order to exchange data or money safely. PKI provides a digital certificate that identifies an individual/institution, and directory service that users use to save and retrieve certificates when necessary.

10.2. Features

PKI utilizes public key encryption sentence which is the most common method to authenticate a message sender and to encrypt a message on the Internet. Typical encryption sentence involves making secret key used for encryption and decryption of a message and sharing it. Such secret key or private key system has fatal vulnerability that if the key is exposed to or stolen by a 3rd party, it can be easily decrypted. That is why public key encryption and PKI method are preferred on the Internet (Private Key System is also called symmetric cryptography, while Public Key System is called asymmetric cryptography.).

PKI's components are:

- Certificate Authority(CA) that issues and validates a digital certificate

[68] The Case for Intrusion Prevention. Technology Overview, Ken Low, 3Com Corporation.

- Certificate containing a public key or public key information
- Registration Authority(RA) that serves as agent of CA before a digital certificate is issued to an applicant
- More than one directories that save certificates containing public keys
- Certificate management system

Mechanism of public and private keys encryption

- A public key and a private key are made at the same time by a CA using a same algorithm a.k.a. RSA. The private key is provided only to a requester, and the public key is revealed as part of a digital certificate in a directory to which anyone can access. The private key is never shared with other people or sent over the Internet. To decrypt a text that is encrypted by someone using a public key disclosed on the open directory, a user uses a private key. In other words, if someone wants to send a message, he/she finds out a sender's public key through a central manager, encrypts a message using the public key, and the recipient decrypts it with his/her private key. The sender proves that he/she is the real sender by sending an encrypted message along with a digital certificate encrypted using his/her own private key. The process is summed up in the below table.

Table 57. Principle of PKI

What	Who	Which Key
Transmission of encrypted message	Receiver	Public key
Transmission of encrypted signature	Sender	Private key
Decryption of encrypted message	Receiver	Private key
Decryption of encrypted signature	Sender	Public key

11. Digital Rights Management (DRM)

11.1. Introduction

DRM stands for Digital Rights Management. The technology protect rights and interests of content providers, prevents illegal copy, and supports content creation, distribution, and management including collection of fee and settlement. DRM includes digital copyright management technology that makes sure that only legitimate users use and pay for certain contents, software and security technology

that is necessary for copyright approval and exercise, and payment/settlement technology.

11.2. Features

Digital Object Identifier (DOI) hides confidential information including an identification number given to a digital content, INDECS(Interoperability of Data in E-Commerce System) that records data set necessary for e-Commerce, and watermarking in digital data to ward off piracy.

DRM's core technologies are divided into "passive" and "active" technologies as follows:

- Passive technologies
  - Digital Watermarking/Fingerprinting: Discourage frauds
- Active technologies
  - Encryption: Prevent Direct Access
  - Secure module: Tamper proof / Obfuscation
  - Authentication: Ensure the Identity for Access Control

11.2.1. Watermarking

Watermarking prevents non-owners' illegal manipulation, and proves a real owner by extracting a watermark from the information that has been changed from its original form. Watermarking can be applied to the following areas:

- Marking copyright and ownership of multimedia data
- Preventing illegal copy of multimedia data
- VOD, AOD, satellite pay TV services
- Ensuring integrity of multimedia data and authentication
- Initials labeling
- Medical examination records

11.2.2. Fingerprinting

Fingerprinting allows a seller to find out a legitimate purchaser of distributed digital data with an objective of preventing illegal distribution of digital information. Fingerprinting can be used for the following areas.

- Identifying purchaser of digital data

- Identifying if a copy has been copied illegally
- Preventing illegal copy of software products
- Serial numbers of e-Currency

12. Optical Cross Connector (OXC)

12.1. Introduction

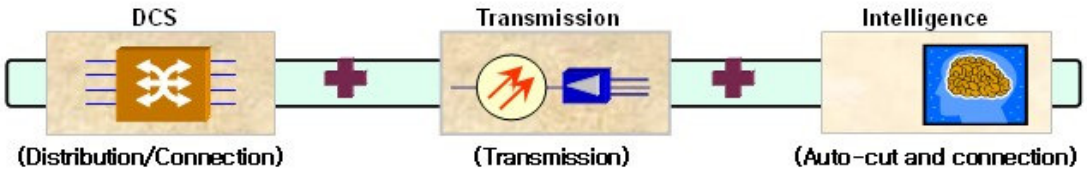
As the traffic in metro network increases, different environments such as metros or metro backbones need to be connected seamlessly. The solution to this is Optical Cross Connect (OXC) that connects optical networks and transforms one-to-one/ ring structure into the network of mesh structure. At the early stage of optical network development, point-to-point connection was used to increase transmission volume and switching and routing functions were configured by default using optical technologies

Those measures, however, met limitations soon. Now, dynamic wavelength routing is replacing fixed wavelength routing. This is basic concept of OXC.

12.2. System

OXC conducts electronic cross-connection and grooming for inputted optical signals and secures network survivability by executing intellectual operation functions such as line composition and automatic cut/recovery.

Figure 134. Advantage of OXC



12.3. Features

Expected benefits with the introduction of OXC are:

- Network
  - Making distribution node intelligent, helps coping with traffic increase and dynamic distribution of network resources.

- Integration of multi-directional transmission networks simplifies network, and grooming maximizes high-speed signals' utilization of bandwidth. As a result, the number of transmission routes can decrease drastically.

- Investment management
  - Mesh network saves 25 to 35% of CAPEX and OPEX.
  - Diverse supports for connections between WDM networks save interface cost and allow customized investment.
- Service delivery
  - Agile network that provides the highest level of network reliability and quick service configuration is deployed. In addition, dedicated broadband connection service can be delivered. The service guarantees Quality of Service (QoS) and security.
  - The foundation to deliver diverse optical services can be formed by linking to customer MSPP.
- Customized service delivery
  - Customized products going beyond existing 2M, 45M, 155M products can be provided.
  - Time spent for line configuration in backbone network can be saved.

13. Multi Service Provisioning Protocol (MSPP)

13.1. Introduction

Source data before IP traffic is mapped in a physical layer, is comprised of different services due to different network layers/mappings. Therefore, it is impossible to transmit the Internet data directly through WDM or wavelength. That is why the next generation networking device, MSPP, made its debut to process/transmit different forms of data through a single optical transmission device, SDH.

13.2. Features

Multi-Service Provisioning Platform (MSPP) solution accommodates voice signal (T1/T3/OC-N) and data signal (10BaseT, FE, GbE) on a stable platform based on TDM. The new optical transmission system supports pre-distribution function,

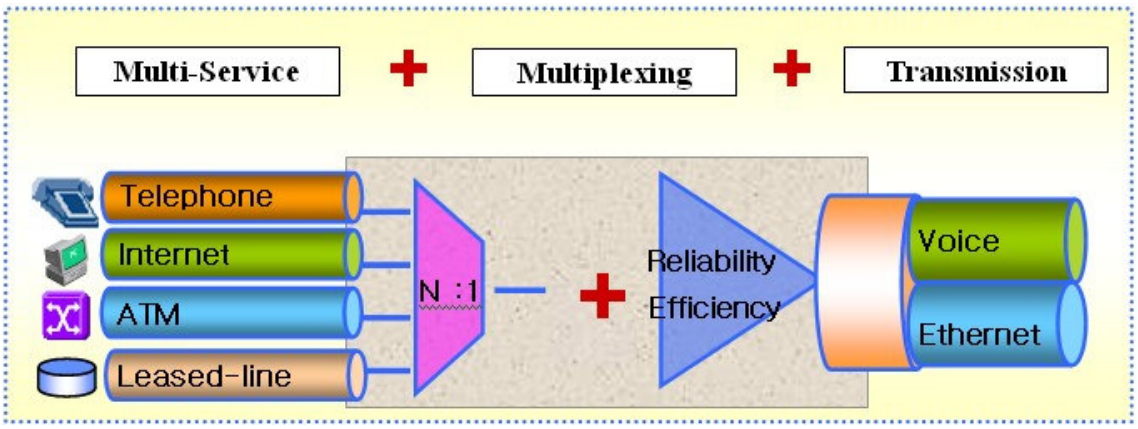
DWDM solution, multi-ring, etc. Basic standards making up MSPP are as follows: using ITU-T G.7041 and Generic Framing Procedure, packet data is mapped to SDH. Virtual Concatenation defined in ITI-T G.707 is used to effectively manage bandwidth (e.g. m * VC12(2Mbps), n * VC3(45Mbps), k * VC4(155Mbps)), and ITU-T G.7041 Link Capacity Adjustment Scheme is used to prevent increase of hitless bandwidth.

The most distinct characteristic of MSPP network is that it can provide quality service through a single device equipped with multi-service function unlike the past transmission method that established different networks per different service such as voice, dedicated line, ATM, and Ethernet.

MSPP is capable of high-speed service ranging from 2M to 100M. It also provides failure management/recovery function that is equivalent or better than that of the current symmetric device. In addition, thanks to security function that differentiates itself from public network data service, it can establish a perfectly private network for subscribers.

MSPP accommodates multiple services such as dedicated line, the Internet, telephone, etc., on a single platform, and delivers them in an integrated way, to provide bandwidth effectively.

Figure 135. Overview of MSPP



14. Metro Ethernet

14.1. Introduction

Metro Ethernet service links to LAN using a simple switch through a network comprised of gigabyte Ethernet, not through existing routers/optical transmission equipments.

14.2. Features

Metro Ethernet's features are as follows:

- Unlike SONET[69], it adopts packet exchange method. Therefore, link bandwidth is used effectively by sharing.
- Metro Ethernet network does not use existing SONET and ATM, but use Ethernet switch (L2/L3) for a direct link through dark fiber[70] in order to build up a network.
- SONET/SDH network is a line exchange network based on TDM, and its users are allotted with predetermined bandwidths such as N*64K, T1(1.544Mbps), E1(2.048Mbps), and T3(45Mbps). By contrary, Ethernet that employs packet exchange method can allocate diverse bandwidths to requesting users.
- 95% of LAN has become Ethernet, therefore, if MAN and WAN are built based on Ethernet, network overheads including protocol conversion can be eliminated.

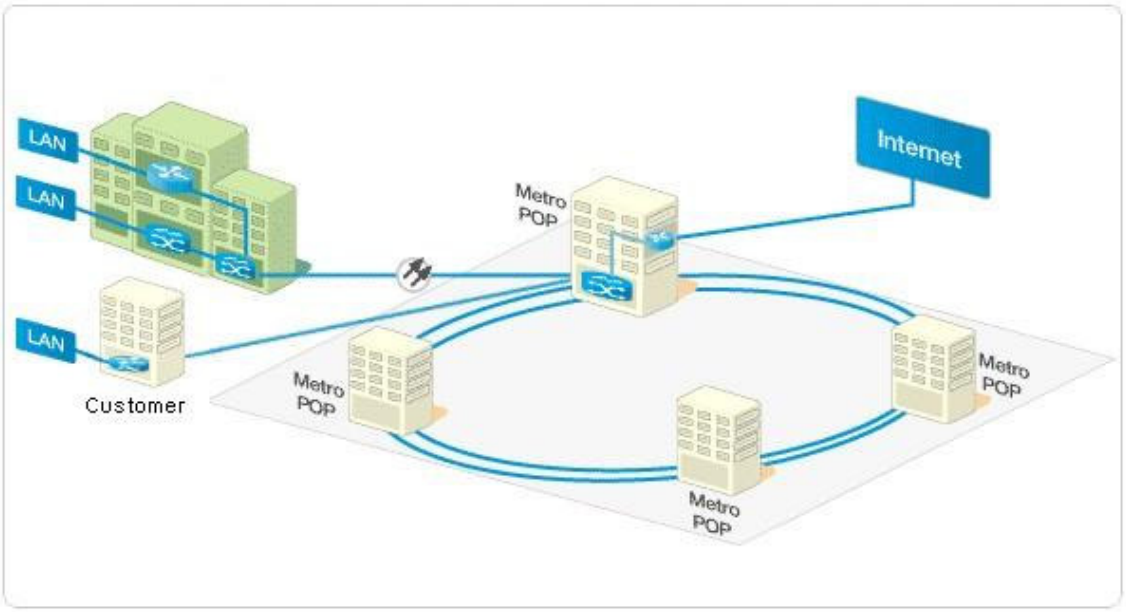
Metro Ethernet's advantages and disadvantages are:

- Advantages:
  - Because it doesn't need routers or optical transmission devices, the number of intermediate devices and linkages between devices drops, resulting in fewer errors.
  - Affordable cost to introduce equipments
  - Fairly low bandwidth usage fee and real-time/web based provision function
  - Bandwidths can be allocated by 1Mbps or 512kbps units, so users can choose optimal bandwidths for them.
  - Metro Ethernet manages services and supports interface that is interoperable with long-distance network.
  - Metro Ethernet is capable of sending the maximum data volume of an optical fiber.

[69] As SONET/SDH was, in the first place, designed mainly for voice transmission, it cannot deal with soaring amount of data traffic in a flexible matter.
[70] Dark fiber : Installed, but not used optical cable

- Disadvantages:
  - As it is oriented toward data, there are limitations to support voice traffic.
  - Lags behind existing SONET equipments in quality.
  - Weaker QOS and security functions than ATM.
  - All of the subscriber line (within a premise), subscriber access network and metro core network require an optical cable.

Figure 136. Overview of Metro Ethernet



15. WiMax[71]

15.1. Introduction

WiMax is a broadband wireless technology that is largely supported by the computer and the telecom industry's cost-effective and standard base. It is engineered to deliver the latest type of ubiquitous fixed and mobile services such as VoIP, Information Technology and Video at very low costs. WiMax systems are able to cover a large geographical area, up to 50km and to deliver significant bandwidth to end-users up to 72 Mbps.

[71] WIMAX an efficient tool to bridge the digital divide, November, 2005. WiMAX FORUM WHITE PAPER. http://www.wimaxforum.org

WiMax can be summarized as follows:

- WiMax stands for “World Interoperability for Microwave Access”
- WiMax/IEEE802.16 is a global standard-based technology for Broadband Wireless Access Equivalent of Wi-Fi Alliance for IEEE 802.11
- WiMax forum will certify interoperability of IEEE 802.16 AND ETSI HiperMAN

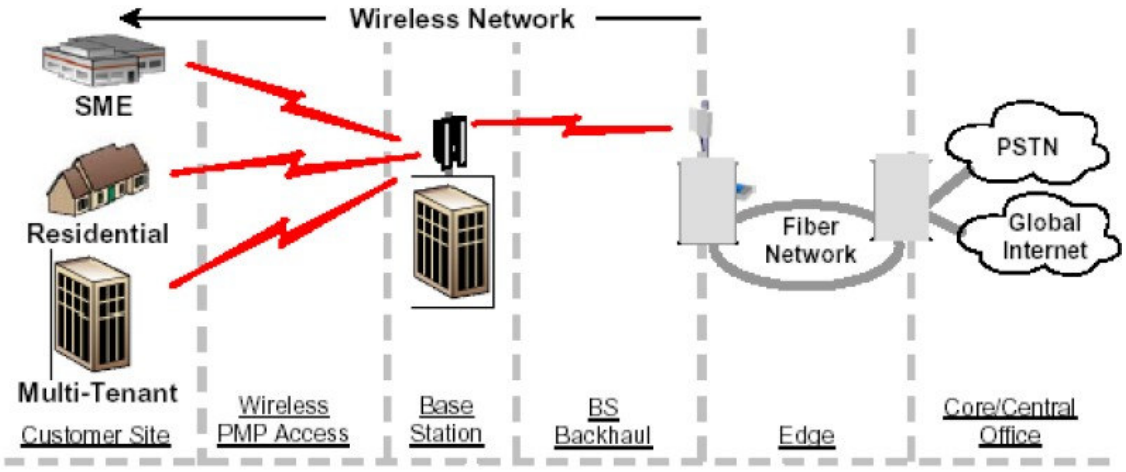
15.2. Features

WiMax based access networks will enable operators and service providers to cost-effectively reach million of new potential customers providing them with broadband ICTs access. This is even truer for developing countries and rural areas for which the cost/profitability and the demand factors are essential. This obviously includes adequate coverage, reliability, performances (throughput), capacity and applications.

- Wide coverage
  - Even more important than the range limitation, the coverage is essential for the operator/service provider.
  - WiMax, thanks to its OFDM technology, has been optimized to provide excellent Non-Line-Of-Site (NLOS) coverage (up to 15 Km around the base station) and long range transmission up to 50 Km in LOS conditions.
  - Combining both LOS and NLOS coverage, WiMax is the ideal solution for getting the exact requested coverage in the most economical way.
- Flexibility
  - Wireless is more flexible and thus easier to deploy according to the market demand (Capex follows the needs).
  - WiMax technology benefits of a wide coverage and can be deployed as a Point Multipoint “last mile” connection but also as part of the backhaul to the PSTN and Internet access points.
- Easy to install
  - Ease of installation is one of the key factors to lower deployment costs in developing countries or rural areas.
  - Thanks to the NLOS/LOS coverage advantage, the operator/service

provider can easily plans a 95% predictability coverage ensuring high installation success rates and controls deployment costs.

Figure 137. Overview of WiMax



16. PLC (Power Line Communication)

16.1. Introduction

Power Line Communication (PLC) uses a power line as a medium to send voice and data with high frequency signals over hundreds of KHz to dozens of MHz. This technology allows home networking, intelligent appliances and power network management. Especially, high-speed access technology, an application of PLC, and low speed control technology through home network are getting attention from telecommunication service providers or power companies as next generation telecommunication technologies.

16.2. Features

As PLC executes communications through a power line, it is harder to deploy than data transmission using a communication cable or an optical fiber. It needs to be able to send data while addressing high load, interferences, noise, fluctuating impedance, weakening signal, and limited power for transmission. ,

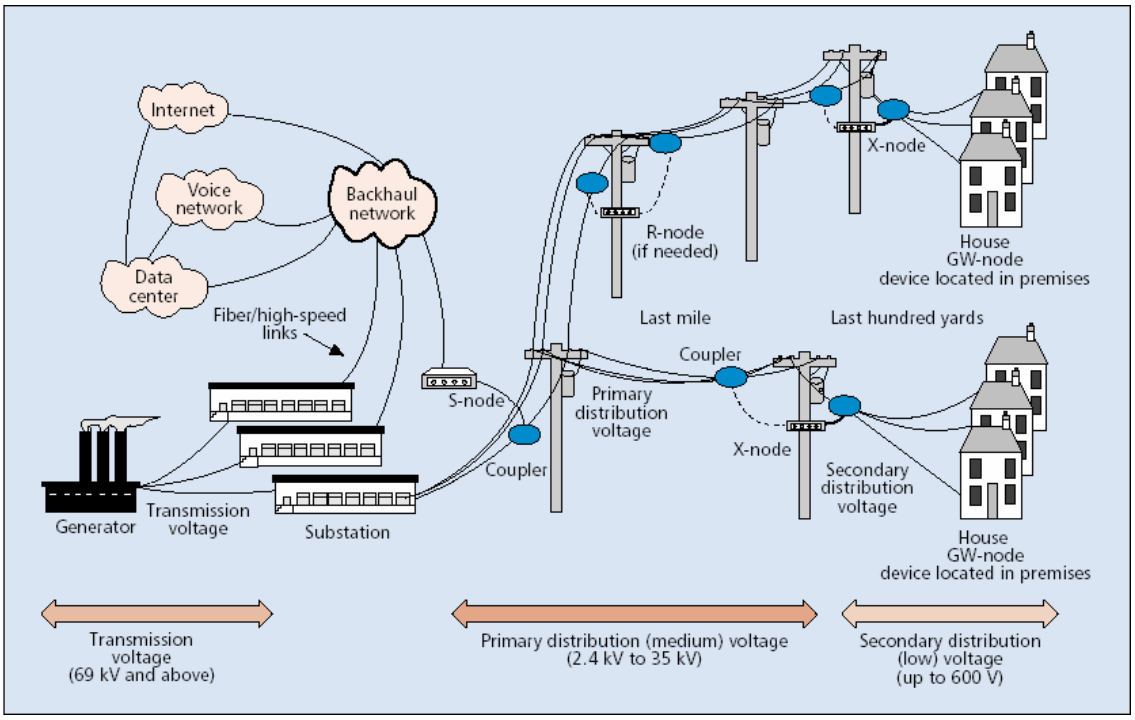
Despite the above-mentioned limitations, considering the fact that all households have power lines, little cost is spent for network configuration. That is why many companies all around the world are proceeding with power line projects.

Households using AC 220V or 110V lines are provided with electricity from a

transformer within a premise, to an indoor power distribution panel, and to electric outlets. End users' PLC modem is plugged into the outlet, then they are connected to a PLC gateway located in a power distribution panel, goes through a PLC router in a transformer, and finally they are connected to the Internet backbone.

In this process, a PLC router connects to a backbone network, and delivers data packet to a PLC gateway located in a power distribution panel, using a power line. As PLC providers use the existing infrastructure throughout the process, they can cut network configuration costs.

Figure 138. PLC Architecture[72]



17. Internet Data Center (IDC)

17.1. Introduction

Internet data center leases out computerization or network facilities to corporate/individual customers. It also provides maintenance services to customers' facilities. Equipped with cutting-edge facilities, security function, and a perfect communication network, the center operates and manages server or communication equipments on behalf of individual corporations, As Internet businesses grow,

[72] Technical viability of Power Line Communication(PLC), Sasanka Usgoda Arachchi

demand for the Internet data center is going up as well.

Internet data center's major function is to manage a corporation's server utilizing security facilities and management resources. The center may lease server storage space or lease both space and a server. Customers need to factor in service types, reliability of service quality, security, safety, and service delivery time when they select the Internet data center.

17.2. Features

As the number of information systems increase, government organizations expect that possible shortage of IT facilities/equipments or space to house them may lead to deteriorated quality and safety of administrative services. .

For the government bodies to effectively execute IT investment and operation/management budget, they need to cut costs by coordinating overlapped IT investments and by sharing IT environments. They also need to invest in new service development. If information resources operated separately by different government agencies are integrated and operated together, the government's IT resource management can be innovated, and the foundations for e-Government can be prepared.

The followings need to be taken into consideration to establish an integrated data center:

- Integrated operation/management structure with a view to effectively operate information resources
  - Work manager and operation group.
  - Build integrated operation/management system that manages real-time monitoring of data center's IT resources, facilities, security and network status by different areas.
- Security of information resources and integrated security management system to beef up security
  - Establish information protection management system that complies with the government's laws, standards, and international standards.
  - Establish hacking analysis system and threat management system.
- Integrated information resources management system that sets up systematic categorization and management process for information resources

- Set up technological standard and resources categorization structure adequate for diverse information resources of the integrated data center.
- Establish information resources management process based on classifications of resources

- Integrated data center's backbone facilities and the infrastructure that can be shared by e-Government
  - Set up high-speed, high-volume storage and tape backup equipments to configure the common infrastructure.
  - Install internal facilities of the central command center and security equipments in machine room (location based service equipment, CCTV, etc.).
  - Realize secure network environment by adopting double structure of lines and equipments, and management system, NMS.

18. Disaster Recovery (DR)

18.1. Introduction

Disaster Recovery is the activities that back up the whole of data, system, and business flow and protect enterprise's computer system from natural, technological, artificial calamity, and unexpected losses.

Increasing concerns over threats such as hacking and terror attacks, and financial reputation losses from system failure, growing reliance on IT system increase, and laws and regulations for disaster recovery gave a rise to the need of disaster recovery. Decreasing prices of solutions and equipments including CPU, DISK network also boosted the need.

18.2. Features

Table 58. DRS's Components

Components	Description
BIA(Business Impact Analysis)	• Priority of recovery • Recovery point objective • Recovery time objective
Backup Center	• Operation method, technology type and location of backup center

Components	Description
Backup Measure	• Hot Standby, DB shadowing, remote backup, OS backup, simple backup
Operation Measure	• Organization structure, business-as-usual/recovery operation procedure, and mock training procedure, etc.

Table 59. Disaster and Factors

Factors		Disasters
External	Natural Factors	Earthquake, typhoon, storm, heavy rain, flood/inundation
	Artificial Factors	Terrorism, fire, destruction of facilities (telecommunication, electric power, waterworks, etc.)
		Computer hacking, virus
		Information leakage, labor dispute
	Social Factors	Occupation, strike
Internal	Operating Factors	Mistake, data loss, program & software defaults
		Heavy transaction
	Technological Factors	H/W damage, software defect, telecommunication & network faults, Facilities

Table 60. Technology for Recovering Disaster

Technology	Solution
Data backup	Tape/Disk backup, RAID, DB Replication
Dual System	Mirror Site, Hot Site, Warm Site, Cold Site
Backup Center	Fire extinguisher, Automatic fire alarm and extinguishing system with halon gas, leakage extinguisher
Facilities	IDS, IPS, Firewall
Security	HA (High Availability) System, Dual Network & Power line

19. Implication

- ISP/BPR needs to precede establishment of IT for efficiency.
- Need for establishing informatization architecture to raise the interoperability and to eliminate redundancy among ministries.
- Need for introducing Groupware to aid Paperless-office and e-Office
- The data integration center needs to introduce IPS(Firewall and IDS) and to establish a separate back-up center to protect information data

from disaster

- Need for a single window to enhance quality of public services for citizens
- Need to ensure the security and safeness with establishing PKI for active e-Commerce
- Need to introduce advanced Optical Cross Connector(OXC) for simplifying network structure and providing ability to process increasing traffic efficiently and customer-tailored service.
- Need for building nationwide communication network by using WiMax which is advanced communication technology and cost-effective and flexible.

Annex B. Interviewee List

EC	Matrika Prasad Shrestha
MoAC	Secretary. Ganesh Kumar K.C.
MoAC	Nilkanth Pokharel
MoCTC	Joint Secretary.
MoCTC	Under Secretary. Shankar Prasad Kharel
MoD	Secretary.
MoD	Naresh-raj Kharel
MoES	Under Secretary. Diwakar Dhungel
MoEST	Joint Secretary (tech). Ishwor Singh Thapa
MoF	Joint Secretary. Atma Ram Pandey
MoFA	Under Secretary.
MoFSC	Under Secretary. Eak Narayan Aryal
MoFSC	Raju Shrestha
MoGA	Under Secretary. Ram Prasad Ghimire
MoGA	Under Secretary. Baldev Prasad Joshi
MoHA	Secretary. Bal Krishna Prasai
MoHA	Narayan Prasad, Jagat bandhu
MoHP	Joint Secretary. Vinod Jnawali
MoHP	Section Officer in HRs, Computer Officer in HMIS
MoIC	Joint Secretary. Suresh Man Shrestha
MoICS	Secretary.
MoICS	Kiran Prasad Acharya
MoLD	Under Secretary. Krishna Prasad Devkota
MoLD	Durga Prasad Bhurtel
MoLJPA	Secretary. Kul Ratna Bhurtel
MoLJPA	Hum Bahadur D.C.
MoLR	ICT Staff
MoLRM	Joint Secretary. Babu Ram Acharya
MoLTM	Secretary. Dipendra Bikaram Thapa
MoLTM	Laxmi Narayan Upreti
MoPPW	Joint Secretary. Om Dharananda Rajopadhyaya
MoPPW	Ishwori Prasad Paudyal
MoWCSW	Nava Raj Lamsal

MoWR	Joint Secretary. Anup Kumar Upadhyaya
NPC	Joint Secretary. Bhagwati Kumar Kafle
NPC	Shiva Hari Bhattarai
NVC	Krishna Kumar shrestha.
NVC	Jiban Bahadur Pradhan
Peace	Under Secretary. Ravi Sharma Aryal
PSC	Joint Secretary. Madhav P. Dhakal
WECS	Kiran Prasad Giri

Abbreviation and Acronym

ADB	Asian Development Bank
ADF	Asian Development Fund
ADSL	Asymmetric Digital Subscriber Line
AFIS	Automated Fingerprint Identification Systems
AOD	Audio on Demand
ATM	Asynchronous Transfer Mode
B2B	Business to Business
B2C	Business to Customer
B2G	Business to Government
BBS	Bulletin Board System
BG	Business Gateway
BIA	Business Impact Analysis
BMIS	Budget Management Information System
BPR	Business Process Reengineering
BRAMS	Business Registration and Approval Management System
BRM	Business Reference Model
CA	Certificate Authority
CAN	Computer Association of Nepal
CAPEX	Capital Expenditure
CCNA	Cisco Certified Network Associate
CCR	Critical Customer Requirement
CCTV	Closed Circuit Television
CDMA	Code Division Multiple Access
CEG-IIMA	Center for Electronic Governance, IIMA
CFG	Centre for e-Governance
CFO	Chief Financial Officer
CIAA	Commission for the Investigation of Abuse of Authority
CIO	Chief Information Officer
CMM	Capability Maturity Model
CRS	Criminal Record System
CSIO	Cottage and small Industry Office
CTO	Chief Technology Officer
DAC	Development Assistance Committee

DAO	District Administration Office
DBMS	DataBase Management System
DCA	Department of Company Affairs
DCS	Digital Cross System
DDoS	Distributed Denial of Service
DECS	District Expenditure Control System
DLIS	District Land Information System
DLIS	Drivers License Issuance System
DLRS	Driving License Record System
DMCs	Developing Member Countries
DMS	Document Management System
DOD	Department of Defense
DOI	Department of the Interior
DOI	Digital Object Identifier
DOJ	Department of Justice
DoS	Denial of Service
DoTM	Department of Transportation Management
DR	Disaster Recovery
DRM	Digital Right Management
DRM	Data Reference Model
DSAT	Domestic Satellite Trunk
DSL	Digital Subscriber Line
DVRS	District Voter Registration System
DW	Data Warehouse
EA	Enterprise Architecture
EAI	Enterprise Application Integration
EAMS	Enterprise Architecture Management System
EC	Election Commission
EC	Electronic Commerce
EDCF	Economic Development Cooperation Fund
EDMS	Electronic Document Management System
EDR	Electronic Death Registration
EHRI	Enhanced Human Resource Integration
EIDC	Education Information Distribution Center
EIP	Enterprise Information Portal
e-MIS	Electronic Management Information System

EMS	Education Management System
EP	Enterprise Portal
EPA	Environmental Protection Agency
ETA	Electronic Transaction Act
ETSI	European Telecommunications Standards Institute
F/S	Feasibility Study
FAR	Federal Acquisitions Regulations
FASA	Federal Acquisition Streamlining Act
FCGO	Financial Controller General Office
FEA	Federal Enterprise Architecture
FMIS	Financial Management Information System
FTTH	Fiber to the Home
G2B	Government to Business
G2C	Government to Citizen
G2C-R	Government to Citizen in Rural Environment
G2C-U	Government to Citizen in Urban Environment
G2G	Government to Government
G4C	Government for Customer
GAS	Government Accounting System
GBDe	Global Business Dialogue on Electronic Commerce
GIDC	Government Integrated Data Center
GIS	Geographic Information System
GPEA	Government Paperwork Elimination Act
GPRA	Government Performance Results Act
GSA	General Services Administration
GSM	Global System for Mobile communication
HFC	Hybrid-Fiber Coaxial
HHS	Department of Health and Human Services
HLCIT	High Level Commission for Information Technology
HP	Hewlett-Packard
HQ	Headquarters
HR	Human Resources
HRD	Human Resource Development
HUD	Department of Housing and Urban Development
HURDIS	Human Resource Development Information System
IAE	Integrated Acquisition Environment

IBM	International Business Machines Corporation
IBRD	International Bank for Reconstruction and Development
IC	Integrated Circuit
ICAO	International Civil Aviation Organization
ICT	Information Communication and Technology
IDA	International Development Association
IDC	Internet Data Center
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers
IICS	Integrated Industry and Commerce System
INDECS	Interoperability of Data in E-Commerce System
INGO	International Non-Governmental Organization
IPR	Intellectual Property Rights
IPS	Intrusion Preventing System
ISC	International Switching Center
ISO	International Organization for Standardization
ISP	Information Strategic Planning
ISP	Internet Service Provider
IT	Information Technology
ITA	Information Technology Architecture
ITU	International Telecommunication Union
IVRS	Integrated Voter Registration System
JSP	JAVA Server Page
KIPA	Korea IT Industry Promotion Agency
KMC	Kathmandu Metropolitan City
KMS	Knowledge Management System
L/A	Loan Agreement
L/C	Letter of Credit
L/L	Leased Line
LAC	Local Access Coverage
LDAP	Lightweight Directory Access Protocol
LMS	Library Management System
LOS	Line Of Site
LRO	Land Registration Office
MAN	Metropolitan Area Network
MCM	Office of the Prime Minister and Council of Ministers

MIC	Ministry of Information and Communication
MIS	Management Information System
MoAC	Ministry of Agriculture and Co-operative
MoCTCA	Ministry of Cultural Tourism and Civil Aviation
MoD	Ministry of Defense
MoES	Ministry of Education and Sports
MoEST	Ministry of Environment, Science and Technology
MoF	Ministry of Finance
MoFA	Ministry of Foreign Affairs
MoFSC	Ministry of Forest and Soil Conservation
MoGA	Ministry of General Affairs
MOGAHA	Ministry of Government Administration and Home Affairs
MoHA	Ministry of Home Affairs
MoHP	Ministry of Health Population
MoICS	Ministry of Industry, Commerce and Supplies
MoL	Ministry of Law, Justice and Parliamentary Affairs
MoLD	Ministry of Local Development
MoLRM	Ministry of Land Reform and Management
MoLTM	Ministry of Labour and Transport Management
MOPB	Ministry of Planning and Budget
MoPPW	Ministry of Physical Planning and Works
MoWCSW	Ministry of Women, Children and Social Welfare
MoWR	Ministry of Water Resources
MSPP	Multi-Service Provisioning Platform
MTF	Medium Term Expenditure Framework
NCA	National Computerization Agency
NCC	National Computer Center
NEGP	National E-Governance Plan
NGO	Non-Governmental Organization
NID	National Identification Card
NISG	National Institute for Smart Governance
NITC	National Information Technology Center
NITDC	National Information Technology Development Council
NLOS	Non-Line-Of-Site
NLRC	Nepal Law Reform Commission
NMS	Network Management System

NPC	National Planning Commission
NPR	National Performance Review
NRs	Nepal Rupees
NT	Nepal Telecom
NTA	Nepal Telecommunication Authority
NTC	Nepal Telecommunication Corporation
NVC	National Vigilance Center
O&M	Operation & Management
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OECF	Overseas Economic Cooperation Fund (Japan)
OFDM	Orthogonal Frequency Division Multiplexing
OMB	Office of Management and Budget
OPEX	Operating Expenses
OSGP	One Stop Government Portal
OXC	Optical Cross Connector
PABX	Private Automatic Branch Exchange
PCP	Public Communications Policy
PIS	Personal Information System
PIS	Passport Information System
PKI	Public Key Infrastructure
PLC	Power Line Communication
PMIS	Personnel Management Information System
PPIS	Project Performance Information System
PPP	Public Procurement Portal
PPSS	Personnel Policy Support System
PRM	Performance Reference Model
PSC	Public Service Commission
PSTN	Public Switched Telephone Network
QoS	Quality of Service
R&D	Research & Development
R&R	Roles and Responsibilities
RA	Registration Authority
RAID	Redundant array of Inexpensive Disk
RDB	Relational Database Management System
REC	Regional Education Information Center

RF	Radio Frequency
RGI	Registrar General of India
RIS	Rental Information System
RSAT	Regional Satellite Trunk
RTF	Rural Telecommunication Fund
SDH	Synchronous Digital Hierarchy
SLC	School Leaving Certificate Examinations
SME	Small and Medium Enterprises
SMS	Server Management System
SONET	Synchronous Optical NETwork
SQL	Structured Query Language
SRM	Service Component Reference Model
STM	Synchronous Transport Module
SWOT	Strength, Weakness, Opportunity, Threat
TDM	Time Division Multiplexer
TFT	Task Force Team
TMIS	Teacher Management Information System
TMO	Transport Management Office
TRM	Technical Reference Model
UN	United Nations
UN-ASPA	UN & the American Society of Public Administration
USAID	US Agency for International Development
USDA	United States Department of Agriculture
VA	Veterans Administration
VB	Visual Basic
VDC	Village Development Committees
VOD	Video on Demand
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VRIS	Vehicle Registration Information System
VSAT	Very Small Aperture Terminal
WAN	Wide Area Network
WB	World Bank
WDM	Wavelength Division Multiplexing
WiFi	Wireless Fidelity
WiMax	Worldwide interoperability for Microwave Access

WLL	Wireless Local Loop
WRS	Weapons Record System
WWW	World Wide Web
xDSL	x Digital Subscriber Line
XML	extensible markup language

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