8.2.6   *e*-Government Center Implementation Schedule

<Building Construction Schedule>

Table 8.24 Building Construction Schedule 2006-2009

Work schedule

| Year	2006	2007			2008			2009				H.Total
Period	09/Oct.	Middle of Nov.	July	September	December	May	July	march	April	July	August	
Work.	Submit Grant request	Decision	Preparation research	Decision	Design development	Construction Start	Underground construction	Concrete Construction	Interior, exterior construction	Landscape construction	Completion	
Payment schedule(Consaltant)				advanced payment of design	middle payment	Adjustment Payment of design		middle payment			Adjustment payment	
				420,000	68,000	135,000		396,000			528,000	1,547,000
Payment schedule Construction)						Advanced payment		middle payment			Adjustment payment	
						2,230,000		2,230,000			2,970,000	7,430,000
Total				420,000	68,000	2,365,000		2,626,000			3,498,000	8,977,000
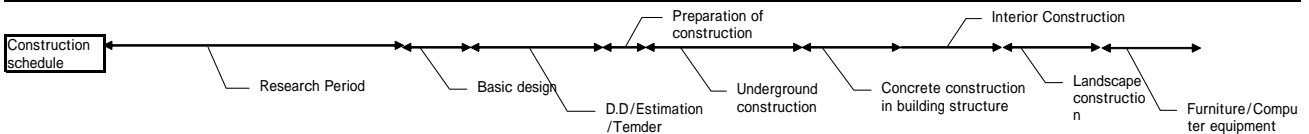
Source: JICA Study Team

<*e*-Government Center Schedule>

   e-Government Center facilities can be installed into the building from 1 month before the completion of building construction. That means that *e*-Government services can start the operation on or after building construction completion.

   Standard & Norms and Common Subsystem can proceed prior to *e*-Government Center and are migrated into *e*-Government Center. Other components must wait for *e*-Government Center to start operation.
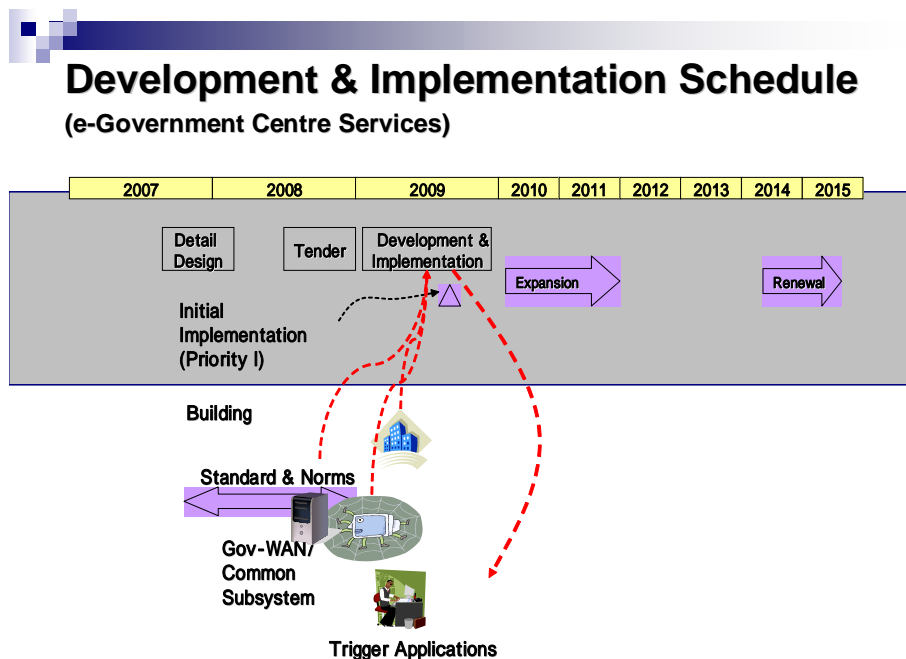
Source: JICA Study Team

Figure 8.8 Development & Implementation Schedule (*e*-Government Center Services)

   Detailed design tasks are as followings.

- Finalize necessary services
- Evaluate and select package software

- Estimate transaction volume and/or number of users
- Estimate necessary number of hardware resources
- Define charging scheme and pricing

Detailed design should be executed closely with the development of Common Subsystems.

One international consultant should be assigned as a team leader for all of detailed design project except the building design.

8.2.7 Operation and Maintenance Costs of the *e*-Government Center (SNET, Civil Protection, Ministries)

(1) Salary Expenses

Actual Salary Expenses

Institution	Number of employees	Salary expenses per year	Average salary per month per employee
SNET	140	$1,600,000.00	$952.38
Civil Protection	40	$468,829.17	$976.73
Ministry of Foreign Affairs IT department	13	$180,609.00	$1,157.75
Minstry of Education IT department	21	$236,329.00	$937.81

Salary Expenses in the New Building

ITEM	Number of employees	Average Salary per month per employee	Salary expenses per year
PERMANET			
SNET	120	$952.38	$1,371,428.57
Civil Protection	40	$976.73	$468,829.17
e-Government	20	$1,050.00	$252,000.00
SUBTOTAL	180		$2,092,257.74
PART TIME			
Building Management & Security	30	$700.00	$252,000.00
Maintanance and cleaning	40	$700.00	$336,000.00
SUBTOTAL	70		$588,000.00
TOTAL	250		$2,680,257.74

(2) Water Expenses

Calculation of the Water Consumtion Cost some Government Office

Institution	Employees	Safety Factor	Water Consumption (litre/day/person)	Water consumption per year (m3)	Water Expenses	Cost by cubic meter	Average
SNET	140	1.5	200	15,330	$10,000.00	$0.65/m3	
Ministry of Foreign Affairs	18	1.5	200	1,971	$2,000.00	$1.01/m3	$0.95/m3
Minstry of Education	30	1.5	200	3,285	$3,900.00	$1.19/m3	

Calculation of the Water Consumtion Cost for e-Government Center

ITEM	Amont	Safety Factor	Water Consumption (litre/day/person)	Water consumption per year (m3)	Water Cost	Cost by cubic meter
Number of employees	300	1.5	200	32,850	$0.95/m3	$31,207.50
Green area	2,000 m2	1.5	8	8,760	$0.95/m3	$8,322.00
TOTAL			208	41,610		**$39,529.50**

(3) Electricity Expenses

Calculation of the Electricity Consumtion Cost for e-Government Center

	AMOUNT	UNIT	Electricity Consumption of device (kW/h)	Safety Factor	Energy Consumption (kW/h)	Hour of use by day	Energy Consumption (kW/year)	Electricity supply cost ($/kWh)	Total Cost
Number of General PC	300	u	0.5	1.5	225	12	985,500		
Air conditionater area	6000.00	m²	0.1	1.5	900	12	3,942,000		
Lightening area	6000.00	m²	0.1	1.5	900	12	3,942,000		
SUBTOTAL							8,869,500	0.013	$115,303.50

Calculation of the Electricity Consumtion Cost for Server Center

	AMOUNT	No of PC	Electricity Consumption of device (kW/h)	Safety Factor	Energy Consumption (kW/h)	Hour of use by day	Energy Consumption (kW/year)	Electricity supply cost ($/kWh)	Total Cost
Number of server in mininst	14	30	0.5	1.5	315	24	2,759,400		
Data Storege	14	5	0.5	1.5	53	24	459,900		
Air Conditionater	700	m²	0.1	1.5	105	24	919,800		
SUBTOTAL							4,139,100	0.013	$53,808.30

| TOTAL COST OF THE ELECTRICITY FOR THE BUINDING:	$169,111.80

(4) Expenses without project

Item	SNET Actual expense 2006	Civil Protection Actual expense 2006
Permanent salary	$1,600,000.00	$468,829.00
Energy	$56,000.00	$40,000.00
Maintenance	$118,000.00	$33,585.00
Renovation		
PC, Servers, etc.		
TOTAL	$1,774,000.00	$542,414.00

(5) New Expenses with project

Item	Initial expense 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Initial building invest	$8,975,041.60											
Part time salary	$196,000.00											
Energy	$69,547.10	$208,641.30	$208,641.30	$208,641.30	$208,641.30	$208,641.30	$208,641.30	$208,641.30	$208,641.30	$208,641.30	$208,641.30	$208,641.30
Maintenance	$89,750.42	$269,251.25	$269,251.25	$269,251.25	$269,251.25	$269,251.25	$269,251.25	$269,251.25	$269,251.25	$269,251.25	$269,251.25	$269,251.25
Renovation						$448,752.08					$448,752.08	
PC, Servers, etc.						$912,000.00					$912,000.00	
TOTAL	$9,330,339.12	$477,892.55	$477,892.55	$477,892.55	$477,892.55	$1,838,644.63	$477,892.55	$477,892.55	$477,892.55	$477,892.55	$1,838,644.63	$477,892.55

8.3 Citizens' Master Database

8.3.1 System Configuration and Components
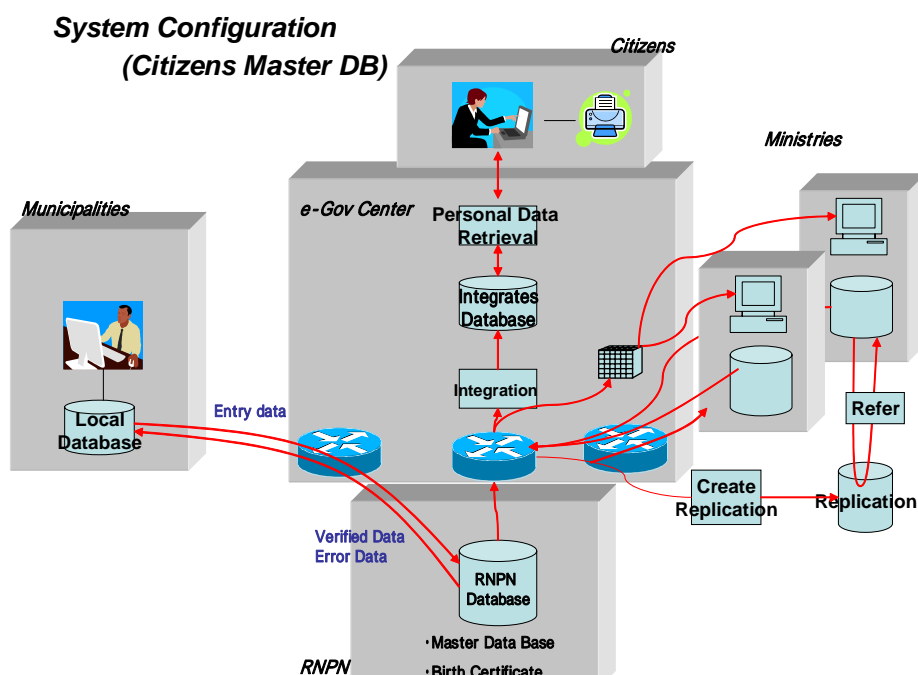
Source: JICA Study Team

Figure 8.9 System Configuration (Citizens Master DB)

Table 8.25 Components of Citizens Master DB

Component	Functions	Remarks
Citizens' retrieval of Birth Certificate	Print a Birth Certificate	Any citizen can retrieve and print his/her birth certificate.
	Integrated Database Creation	For citizens' access purpose, RNPN database and other citizens' personal database from many ministries are integrated and replicated into internet access environment.
	Request citizens' status	Citizens can request particular kinds of status which the integrated database contains.
Data entry by municipalities	Citizens' data entry	Function for municipality officers to enter citizens' data including fingerprints and scanned birth certificate.
	Data transmission to RNPN	Data entered at municipalities are to send to RNPN via standard data exchange interface. Data validation is executed. Invalid data are sent back to municipalities.
	Data feedback to municipalities	Valid data are transferred back to municipalities for their administrative purpose.
Data exchange with ministerial systems	Replication database creation	Master database is replicated for use by systems in other agencies which manage personnel data for ministerial purpose.
	Extraction of new and modified and deleted data	New, modified and deleted data are extracted from RNPN master database for other ministerial systems to update themselves by these.
Creation BI Cubes	Extract data to cubes for business intelligence	Data are extracted from RNPN master database to create multi dimensional database. This allows government users to do analysis and statistics.

Source: JICA Study Team

8.3.2 Interface and Data Exchange

There are a lot of interface between existing RNPN database and many systems or sub systems which are including systems of other agencies, municipalities, database which will be developed for citizens' access. All of these interfaces are vie data exchange that should follow the standard methodology, which is provided as an *e*-Government Center service. Supposed system interfaces are as follows.

Table 8.26 Supposed System Interfaces

Origin	Target	Types of Data Exchange
Municipalities	RNPN	DUI data entered by municipalities.
RNPN	Municipalities	DUI data verified DUI error data
RNPN Other agencies	*e*-Service Environment*	DUI, Birth certificate, and other citizens' personal data for Citizens' request and print.
RNPN	Agencies	Replication of DUI is created for other ministerial system to import necessary items or refer to get personal information. New, change and delete data are also created periodically.
RNPN	Business Intelligence	Create data cube for statistics and analysis.

Source: JICA Study Team

8.3.3 Hardware and Software, Renewal

Except facilities which are utilized for existing systems, all of hardware and software for them will be procured. Hardware may have to be renewed every 5 years after implementation.

Necessary hardware are shown on the Table 8.28.

8.3.4 Operation and Maintenance

The Data Center Group in the *e*-Government Center will be responsible for operation and maintenance of facilities of common sub-systems. The Software Service Group has to take care of the software including any changing of parameters.

Because multiple government agencies will be related to this application system, the role of *e*-Government Center includes coordination among them.

e-Government center's rolls of operation and maintenance are as follows.

Table 8.27 *e*-Government Center's Rolls of Operation and Maintenance

1	Regular Operation	Data Center Service Group	Cyclic operation of systems and checking that result. Even operation itself is automatic. The result whether the process is completed normally has to be conformed and report. Especially the result of data exchange is very important.
2	System Monitoring	Data Center Service Group	Whether errors or illegal processes, system faults have not happened or not have to monitored I the case, appropriate work have to be executed.
3	Performance monitoring	Data Center Service Group	Because traffic and data volume are expected to be growing up gradually, system response and resource situation have to be monitored regularly for next plan to add resources.
4	Trouble operation	Data center Service group	Knowing troubles happened, informing to related organization, ask engineers to come to fix. And reporting this for further analysis.
5	Customer service	Data center service group (Call center)	Receiving any inquiry from citizens who use this systems

Source: JICA Study Team

8.3.5   Cost Estimates: Development, Facilities, O&M, and Renewal

All the dedicated facilities are to be procured for this application system except agencies' individual working effort. For example, some agencies have to modify their system to relate to RNPN data by themselves.

Necessary hardware are shown in the Table 8.28. The hardware includes fingerprint readers and card scanners for Public Access Terminals. Such hardware can also be used for any kind of application systems, which requires recognition of each individual user.

Table 8.28 Cost of Necessary Hardware for Citizens Master DB

(US$ Million)

Category	Item	Unit Cost	Quantity	Cost	Comment
Detailed Design					6months
	Overseas Consultants	27	24	0.648	3 months
	Local Consultants	3.16	25	0.079	3 months
Hardware					
	Fingerprint Reader	0.4	550	0.22	
	Card Reader	0.2	550	0.11	
	APL Server	20	6	0.12	
	Web Server	20	6	0.12	
	DB Server	20	8	0.16	
	SAN Server	80	4	0.32	
Software					
	Oracle	50	7	0.35	
	Development Tools	5	10	0.05	
Development					
	OLAP	4	6	0.024	
	Portal	4	3	0.012	
	Entry/retrieval	5	48	0.24	
	Authentication			0.5	
	Common System			0.5	
PMC					12 months
	Overseas Consultants	27	20	0.54	3 persons
	Local consultants	3	36	0.108	3 persons
Total				4.10	
	Hardware Total			1.05	
	Software Total			0.4	

* All these investments will be made in the same year.
Annual O&M expense is estimated at US$ 395K.
Source: JICA Study Team

In summary:

Table 8.29 Summary of Cost Estimates for Citizens Master DB

	Item	Description	Cost (US$ Million)	Renewal cost (US$ Million)
Citizens' Master	Detail Design	Consulting Work	0.727	
	Hardware		1.05	1.05
	Software		0.4	
	Development		1.276	0.638
	PMC	Consulting Work	0.648	
	Total		4.10	

	Item	Annual Operation Cost (US$ Million)								
		09	10	11	12	13	14	15	16	17
Citizens' Master	Hardware /Software Maintenance Fee	0.395	0.395	0.395	0.395	0.395	0.395	0.395	0.395	0.395
	Outsourcing HR Fee									
	Government Staff Salary									
	Total	0.395	0.395	0.395	0.395	0.395	0.395	0.395	0.395	0.395

Source: JICA Study Team

8.3.6   Implementation Scheme

The core database of this application is the DUI database and the Birth Certificate database, which is exiting in the year 2006, and managed and operated by RNPN for the purposes of their systems. Therefore, it is natural for RNPN to assume a major role in developing this system. Some of common subsystems and *e*-Government services will be used for operating this system. For this, a close cooperation with implementing and operation organizations is required. Actual designing and development work are assumed to be done by a contractor.

Cooperation with the Standards & Norms work is also necessary. By this development, some of important items have to be defined. These are:

- Items related to Systems Development (Production control, Documentation, Development Methodology, Quality Assurance / Quality Control, System Migration);
- Name and code convention; and
- Data Management.

Common Sub-systems, which will be used in this application system, are:

- Business Intelligence (Statistics, Analysis);
- Enterprise data interface (data exchange with other agencies); and
- *e*-Government portal.

For this development process, below systems have to be prepared in advance.

- Project management system (This can be used for other components such as *e*-Government center construction, network construction, developing other application); and
- Document Management system.

When this system is in production, some services by *e*-Government Center will be used for:

- *e*-Government portal;
- Housing service; and/or
- Payment gateway.

Above services must be ready before the production cut-over of Citizens' Master Database system. Considering the above, planned implementing schedule is shown below. Connection with municipalities will take several years along with expansion of network connection with them.
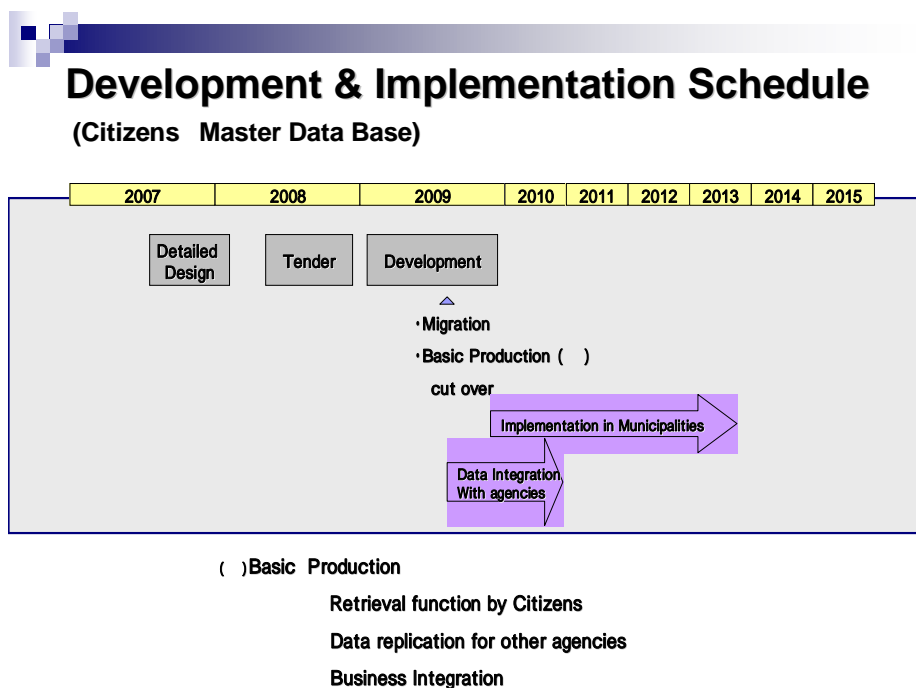
Source: JICA Study Team

Figure 8.10 Development & Implementation Schedule (Citizens' Master Data Base)

Detailed Design should be done at first. Tasks in the Detailed Design are as follows.

1) Survey of Current Situation

- Organization of related agencies
- Operation flow (RNPN, municipalities)
- Requirements for operational change
- Requirements for data exchange
- System configuration (hardware/ software)

2) Designing Business Operation

- New operation flow

3) Application Design

- I/O design
- Database design
- Process design
- Volume estimation
- Common program design

4) System Design

- Hardware configuration and / specifications
- Software configuration

5) Migration Plan

- Data migration plan
- Production cut-over plan by organization

6) Training Plan

7) Standardization Work

- Naming convention (program, database, field)
- Programming rule
- Message standard
- Standard of logging

The number of consultants for detailed design is estimated as:

- 4 international consultants:
  - Application engineers who have strong experience in design, development, implementation of database application for business operation including know-how of business process engineering; and
  - System engineers who are strong in new environment for application systems such as JAVA, .net, Linux, RDBMS, etc. with application system development experience.

The structure of implementing organization can be as shown below. Project owner will be RNPN. However, many agencies will be involved, and the *e*-Government Center will support them in terms of providing common sub-systems, coordinating many agencies, facilitating hardware, software, operation and maintenance.
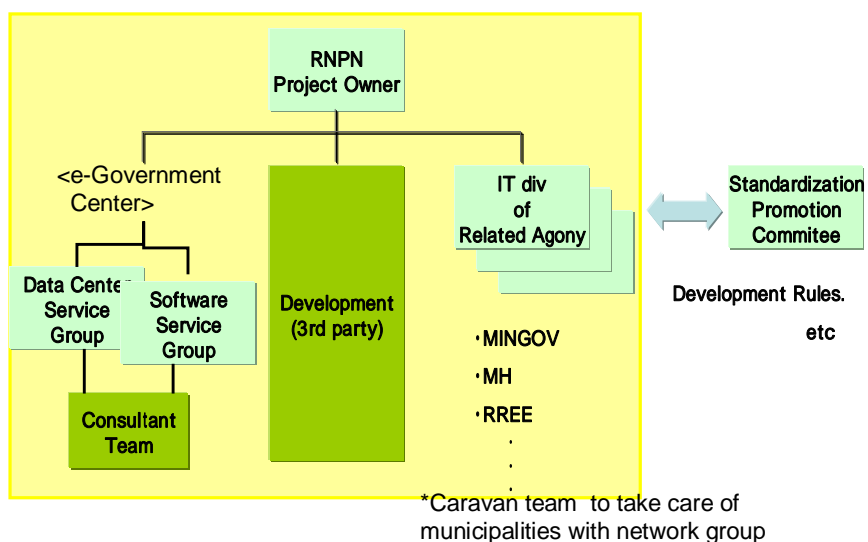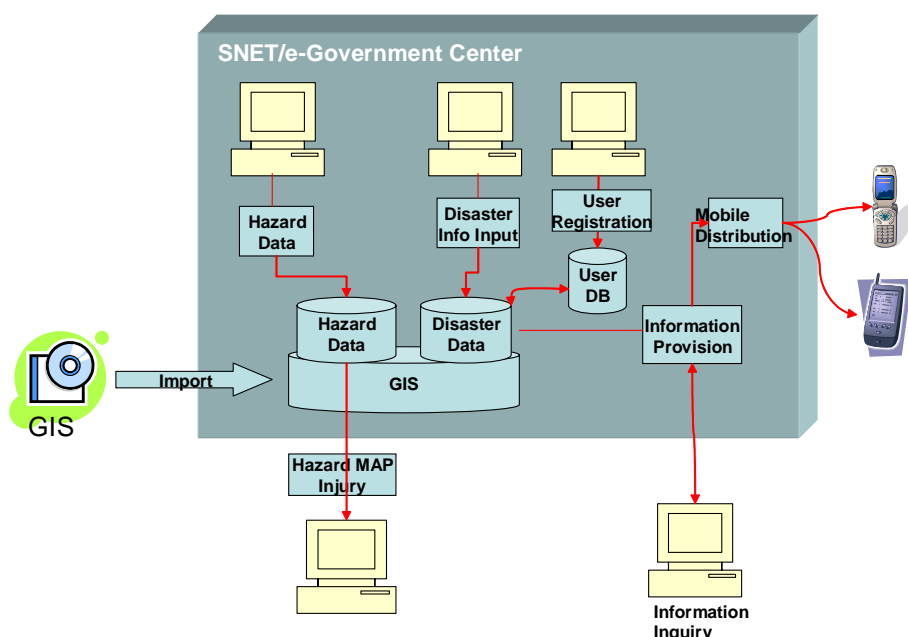

Source: JICA Study Team

Figure 8.11 Implementing Organization (Citizens Master Data Base)

8.4 Disaster Information System

8.4.1 System Configuration and Components

Source: JICA Study Team

Figure 8.12 System Configuration (Disaster Information System)

Table 8.30 Components of Disaster Information System

Component	Function	Description
Hazard Map	Map import	GIS data is imported from existing data into a new format oriented to this system.
	Hazard data input	Hazard data are input onto Map by SNET based on the information when disasters are occurred.
	Hazard Map Inquiry	Users (Citizens) can inquire hazard MAP information by some inquiry keys such as hazard type, address, etc.
Disaster Information	User Registration	Register users who can get information through mobile terminals with their profiles. User data have to relate to Citizens' master database.
	Disaster Information Entry	SNET staff will input disaster information once disaster happened.
	Disaster Information Inquiry	Citizens can inquire current situation and necessary information of disaster by accessing internet.
	Disaster Information Distribution	Information is distributed to mobile terminals (PDA, mobile phone) of registered persons. Technical solution for distributing information through multiple protocol has to be considered.

Source: JICA Study Team

8.4.2 Hardware and Software, Renewal

All of hardware and software are supposed to be procured for this application system. Hardware will be supposed to be renewed every 5 years to catch up with new advanced versions.

Assumed necessary hardware items are shown with respective costs in Table 8.31 below.

8.4.3   Operation and Maintenance

Under the presumption that SNET will be located in the new building, it is effective that all the hardware will be accommodated in the Data Center in that building. Also daily operation and maintenance except data management can be done by the *e*-Government Center.
Responsibility of both parties is clarified as follows.

- SNET is responsible for all kinds of data including GIS data.
- *e*-Government Center is responsible for regular operation, system monitoring, performance monitoring, call center (from end users) and trouble operation.

8.4.4   Cost Estimates: Development, Facilities, O&M, and Renewal

Estimated investment and O&M costs are shown below. Maintenance fee of hardware is calculated at annually 30% of the initial price and annually 20% in software licenses. Any cost of modifying and adding developed software is deemed to be borne by Technology Bank and/or SNET.

Table 8.31 Cost of Necessary Hardware for Disaster Information System

(US$ Million)

Category	Item	Unit cost	Quantity	Cost	Comment
Detailed Design					6 months
	Overseas Consultants	27	24	0.648	4 persons
	Local consultants	3.16	25	0.079	4 person
Hardware					
	APL server	20	6	0.12	
	Web server	20	4	0.08	
	Mail server	20	2	0.04	
	Mobile server	200	2	0.4	
	DB server	20	6	0.12	
	BI server	30	2	0.06	
Software					
	Oracle	50	7	0.35	
	Development tools	5	10	0.05	
Development					
	OLAP	4	6	0.024	
	Portal	4	3	0.012	
	Entry/retrieval	5	48	0.24	
	Authentication			0.5	
	Common system			0.5	
PMC					12 months
	Overseas Consultants	27	20	0.54	3 persons
	Local consultants	3	36	0.108	3 persons
Total				3.871	
	Hardware Total			0.82	
	Software Total			0.4	

* All the investments will be made in the same year.
* O&M cost concerning the above is US$ 0.326 million/year.
Source: JICA Study Team

In summary:

Table 8.32 Summary of Cost Estimates for Disaster Information Systems

	Item	Description	Cost (US$ Million)	Renewal Cost (US$ Million)
Disaster Info.	Detailed Design	Consulting Work	0.727	
	Hardware		0.82	0.82
	Software		0.4	
	Development		1.276	0.638
	PMC	Consulting Work	0.648	
	Total		3.871	

	Item	Annual Operation cost (US$ Million)								
		09	10	11	12	13	14	15	16	17
Disaster Info.	Hardware /Software Maintenance Fee	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326
	Outsourcing HR Fee									
	Government Staff Salary									
	Total	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326

Source: JICA Study Team

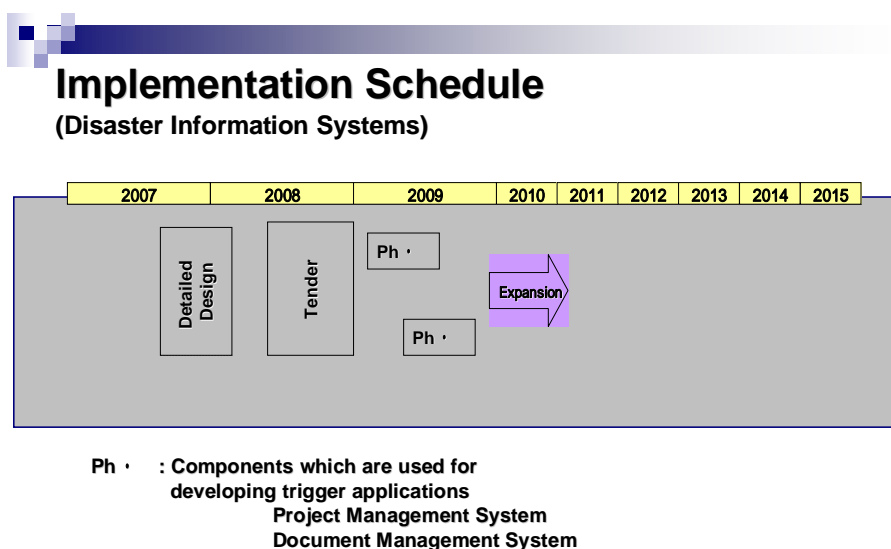### 8.4.5 Implementation Scheme

<Organization>

SNET is considered to be the responsible agency to implement this application. In order to penetrate communities by this application, cooperation with Civil Protection Department and representatives from municipalities is necessary.
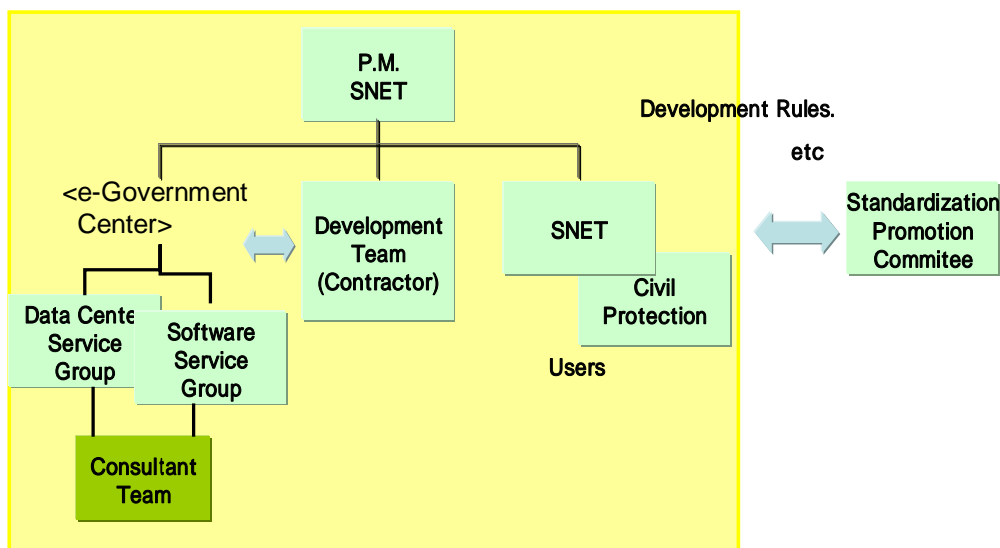
Source: JICA Study Team

Figure 8.13 Implementing Organization (Disaster Information System)

<Schedule>

Source: JICA Study Team

Figure 8.14 Implementation Schedule (Disaster Information System)

Tasks in Detailed Design stage are as follows:

1) Survey of Current Situation

    - Organization of related agencies SNET, Local community,etc
    - Operation flow SNET, Local community,etc
    - System configuration (Hardware/ Software)

2) Designing Business Operation

    - New operation flow

3) Application Design

    - I/O design
    - Database design
    - Process design
    - Volume estimation
    - Common program design

4) System Design

    - Hardware configuration and / specifications
    - Software configuration

5) Migration plan

    - Data migration plan
    - Production cut-over plan by organization

6) Training Plan

The number of consultants for detailed design is estimated as:

- Four international consultants:
  - Application engineers who have strong experience in design, development, implementation of database application; and
  - System engineers who are strong in new environment for application systems such as JAVA, .net, Linux, RDBMS, etc. and with application system development experience.

  Some must have technical experience and knowledge in Geographic Information Systems and mobile phone systems.
- Four local consultants

8.5 Standards and Norms

8.5.1 Components

Components of Standards & Norms are classified as below:

Table 8.33 Components of Standards and Norms

Classification	Global Standard	Description
Operation & Maintenance	ITSMS (IT Service Management Standard)	Operation and management to serve IT services. *e*-Government Center is seen as an organization that provides IT services to government agencies. So Standards & Norms in this category apply to *e*-Government Center, especially Data Center Service group and Network Service group. IT division of each government agency should also comply with S&N of this category, as they serve not only internal users but also citizens.
Network	ITSMS ISMS (Information Security Management Standard)	As network services, commitment of service level (performance) and ensuring security are very important. In *e*-Government Center, these must be guaranteed not only to government users but to citizens who access *e*-Government application systems and whose data are managed in the government systems.
Security & Data	ISMS	Both of physical security and logical security are to be incorporated. The former includes security of building or data center, or development environment (office for system developer), and IT facilities, media, etc. The latter includes data security and access control. Data related standardization will help achieve this. This category is very important so that all government ICTs have to comply with this.
Development	SPA (Software Process Assessment) <CMMI>	This ensures quality, efficiency (cost and due date) of software development and deliverables. The first target to achieve is the process management in the organization. This S&N system should be shared with the private sector to assist their global competition.
Common		Common policy to govern all of ICT activities in the government and above S&Ns. Every issue or item under each S&N has to be collated to this.

Source: JICA Study Team

8.5.2 Development and Operation

Regardless the timing of the establishment of *e*-Government organization, the Standardization Promotion Committee should be organized immediately. Technical assistance from some donor may be expected.

First of all, ICT policies have to be developed. ICT policies should shows a high level direction. When all other S&Ns are developed, referring to global standards (ISMS, ITSMS, ISO, CMMI, etc.) as guidelines, details are to be defined.

After developing Standards & Norms, continuous effort to maintain and expand them is required. The Standardization Promotion Committee should lead this effort.

Most part of the results should be open not only to government ICT staff but to ICT staff in private sector, and employees of ICT companies. One of the best ways for dissemination is to publish them on the web site and update them in time.

8.5.3　Cost Estimates

The number of man-months is estimated at 54MM of international experts and 54MM of local experts over 2years (21months). Total cost would be:

US$27K * 54 MM + US$4K * 54MM = US$1.7 mil.

Some amounts for stationary and other small expenses should be budgeted on top of the above.

Table 8.34 Cost Estimates for Standards and Norms

	Item	Description	Cost (US$ Million)	Renewal cost (US$ Million)
Standard Norms	Technical Assistance	Consulting Work	1.66	N.A.

Source: JICA Study Team

8.5.4　Implementation Scheme

The Standardization Promotion Committee should be organized within the *e*-Government center. The members should be drawn from both staff of the *e*-Government Center and part time people from other government agencies as well as the private sector, and academic institutes.

Those members are grouped into categories mentioned in Section 8.5.1 with experts who assist each area.

Even in Standardization Promotion Committee the case the *e*-Government Center cannot be established soon, this committee should be set up independently with a few dedicated staff and ad hoc members representing government agencies, the private sector, and academics, with experts possibly provided by some donor technical assistance.

Assuming that *e*-Government Center organization will be set up in early 2007, this activity should be launched immediately and technical assistance by experts can be expected from October, 2007.

The first activity should be the establishment of ICT policy.

The second highest priority is S&Ns in Security & Data and Development. It is because other components, Common Subsystems and Trigger Application Systems are closely related to these and these components are expected to start being designed soon.

It is assumed that developing Standards & Norms is 2 years project, although it is continuous activity and need maintenance.

Phase-I is divided into 2 stages.
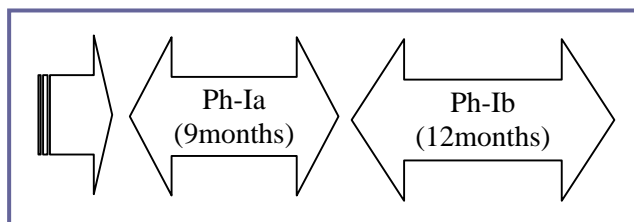
Source: JICA Study Team

Figure 8.15 Relationship of Phase Ia and Ib

It is assumed that developing Standards & Norms is 2 years project as a Phase-I component.
Phase-I is divided into 2 stages.

Main tasks of Phase-Ia are developing ICT policy and policies in each item. In Phase-Ib, detailed procedures should be reported as deliverables. Expected deliverables are shown below.

<Phase-Ia Activities>

When the *e*-Government Center is organized, "Standardization Promotion Committee" should be formulated immediately. This committee consists of a chairman who represents the *e*-Government Center, representatives of ministries, representatives of the private sector, which includes ICT companies and general industries that use ICT, representatives of academics.

It is expected that international consultants will assist developing these development. This assistance period is assumed 9 months.

Standardization Promotion Committee should hold its meeting at least once every 2 weeks with consultants. The deliverables are defined in Table 8.35. In order to prepare the deliverables, the following tasks are to be executed.

1) Define procedures to develop each S&N document.
2) Define and prepare tools to confirm the completion of each process.
3) Appoint persons in charge of developing each document. (Working Group)
4) Schedule Working Group meeting
5) Collect existing standard documents in the government.
6) Collect sample documents for review
7) Prepare document drafts
8) Review drafts
9) Finalize the documents
10) Define the tasks to be followed related to the document.
11) Define the means to check the compliance of this S&N
12) Plan and execute events to inform related persons of the results.
13) Open onto Web site.

Table 8.35 Phase-Ia Deliverables

Category	Deliverable	Description
Common	ICT Policy	Documents in which concepts concerning the management of system planning, system construction, system operation, and system renewal, etc. in *e*-Government is described.
Common	System Management Policy	Document in which basic policy of process relating to system construction is described. It is necessary to cover the processes in standard system construction.
Common	System Audit Standard	Document described to observe system management standards. Auditing standards are corresponding to this.
Common	Standard of Document Management	Documents, which define document type, protection level, approval level, and version management technique etc. of document used in *e*-Government. Moreover, changes in management are explained. The description format and the approval procedure etc. of each document are described in the detailed document. Coordination with document management system is necessary.
O&M	Operation Policy	Document for the basic policy to operation and management of the *e*-Government. The target service level to the users (people, enterprises, and government staff) is defined. Details of operation standards, execution procedures, etc. are described in the detailed documents.
O&M	Standard of Operation	Document in which O&M criteria are described in order to achieve the goals of the basic policy defined in Operation Policy. It is divided into system operation standards and network operation standards. Also it is divided into normal operation and operation in time of trouble.

Category	Deliverable	Description
S&D	Backup Policy (Hardware & Software)	Document in which basic policy for backup and recovery is described. Both the application systems and data should be covered. redundancy of the systems and the network, an automated Data backup, generation management and immediate recovery are included. Details of technical proposal, operation rules, and execution procedures are described in the documents of lower layers. These documents should be consistent with the documents of standardization related to security and the documents of standardization related to data.
S&D	Data Standard	Standard document that aims to achieve data protection and re-use in *e*-Government, and standard process to define database structure of each system. Detailof rules are described in the documents of lower layers
S&D	Standards of User Control	Standardization document that specifies user management (authentication management). Access level is provided based on user's authentication information. It is necessary to add the security level and the service level to control databases and the access to data. Detailed rules and execution procedures are described in the documents of lower layers.
Dev	Standard of Development Methodology	Document in which standard processes concerning system development is described to maintain quality that system management standards provided. A confirmation checklist is necessary to check missing processes at planning, or processes without confirmation during the project.

<Phase-Ib Activities>

Based on the Phase-Ia activities, documentations for more detailed definition will be executed. Standardization Promotion Committee will also be responsible for this activity assisted by International consultants. This time period can be assumed to be 12 months. The deliverables are defined in Table 8.36. Tasks are as follows.

1) Collect results in previous tasks.
2) Define procedures to develop each S&N document.
3) Define and prepare tools to confirm the completion of each process.
4) Appoint persons in charge of developing each document. (Working Group)
5) Schedule Working Group meetings
6) Collect the sample document for review
7) Prepare document drafts
8) Review drafts
9) Finalize the documents
10) Define the tasks to be followed related to the document.
11) Define the means to check the compliance of this S&N
12) Plan and execute events to inform related persons of the results.
13) Open onto Web site.

Table 8.36 Phase-Ib Deliverables

Category	Deliverable	Description
Common	Standards of Application and Approval	Document in which standard processes of application and approval procedures in *e*-Government and work flow are described. Details of application and approval level, and approval flow are described in the documents of lower layer. Work flow systems are closely related to this.
Common	Standard of Procurement (Standard of Configuration Management, Standard of Change Management	Document in which basic policy of purchasing, configuration management, and change management are described. These management works are executed to keep stable system operation and to provide the services, and to achieve the efficient use of facilities, and to reduce procurement cost. Details of criteria and

Category	Deliverable	Description
		exception handling, etc. are described in the document of lower level. Examples of related documents are Procurement Guidelines, Manual for Configuration Management, and Change Management
S&D	System Security Policy, Network Security Policy, Physical Security Policy	Document in which detailed standards are described to achieve basic policy under the security policy. It is divided into system security, network security, and physical security. The document describes in concrete terms, who can refer and edit certain information, who is permitted to execute certain operation, which data is encrypted, etc. The policy to prevent information use outside the purpose, the invasion from the outside, and the prevention of the leak of official secrets, etc. are major ones. It is necessary to set a security level to the severity, the maintenance of secret level, the use user layer, and the maintenance frequency etc..
S&D	Privacy Policy	Document in which basic policy of specializing in handling private information is described. How does the *e*-Government treat user's (people) private information, and what kind of responsibility there are in the emergency is declared.
S&D	Technical Guidelines about Security Issues	Document in which concrete execution procedures are described to achieve basic policy under the Security Policy. It is divided into system security, a network security, and physical security. How the destruction of data and systems are protected from infection of computer viruses, how does it deal with system down or the loss of data by the attack, the basis of selection of counter measure tools (hardware and software) and recommended operating procedures, etc. are described. These for network security will be developed under the Government WAN component, and for physical security will be included in building design.
S&D	Database Design Standards	It applies to the content of Standards of Design Document.
S&D	Technical Guidelines about Database	Detailed standardization document concerning database. Documents are needed by the purpose of use, by the composition software, by development method, and documents commonly used. These include norms like naming rules, property rules, SQL rules, standardization documents concerning the data access method, technical proposal to achieve efficient maintenance and/or backups. Examples are standards of data maintenance, naming conventions, and technical standards of data access method
Dev	Criteria for Evaluation	Document in which standard processes and procedures for executing quality evaluation and performance evaluation are described to keep system quality defined by system management standards. Documents related to network will be developed in the Government WAN component.
Dev	Project Management Standards	Document in which, to make quality maintenance, cost control, and observance of due date minimum target, standard processes and procedures for executing project management are described.
Dev	Standards of Design Document	Document in which types of design documents, description level, and description method of standard specifications, etc. are described in order to make development work smooth by clarifying instructions to persons in charge of work. Moreover, it becomes easy to re-use and enhance the system by standardizing the description level and the description method. Term and abbreviations used in specifications are separately necessary.

Category	Deliverable	Description
Dev	Technical Guidelines about Development	These are standardization documents that specify each development technology or development method, and documents that can be commonly used in areas not related to technology and technique. These include norms such as coding convention, naming convention, and character code rule, documents concerning processing methodology, exception processing, technical proposals aiming at quality improvement and the delivery period shortening by making class modules in the source level or business logic level.

Necessary Consultants skill and experience are:

<Phase-Ia>

Two international consultants and two local consultants are required. One international consultant should be with a certificate by EDPAA or corresponding certification. Such a person knows overall IT in general and has capacity to lead other people's work for standardization. With another international consultant, one of the two major portions can be shared, Operation & Management, and development. Roles of international consultants are to collect international cases, assist meeting, review procedures and deliverables. Local consultants will work with international consultants in communicating with agencies and will assist preparing documents. In principle, document description should be done by committee members.

<Phase-Ib>

Three international consultants and two local consultants are required. There are 3 parts to be taken care of, such as security related matters, system development matters, and data and database issues, which are to be handled by each.

8.6　Common Subsystems

8.6.1　Components

Components or functionalities considered are shown below.　Only those items with high priority (　or　) are subject for cost estimates.

Table 8.37 Components of Common Subsystem

	Name of Solution	Description	Priority
	ITSMS (IT Service Management)		
	CRM (Customer Relationship Management)	It is used for supporting Call Center and help desk. At the start, minimum hardware resources and software license will be ready.　It expands by increasing work there.	
	Purchasing Management System	By using unified system in all agencies, they can be well compliant to procurement policy of IT facilities.　But at the initial stage, this can be executed by paper work and Work Flow system.	
	Asset Management System	All of ICT facilities can be well managed not only for accounting view, but also in terms of controlling maintenance, versions, etc.　But at the initial stage, this can be executed by paper work.	
	License Management System	It helps managing many software licenses used in the government.　This may be considered in the next stage.	
	Remote-control Device or System	This may be in or after Phase-II	

	Name of Solution	Description	Priority
ISMS (Information Security Management)			
	Security Control System	At the initial stage, only software that is considered in Gov-WAN components will be inclusive.	
	Authority Management System	Consider in the next step	
	PKI (Public Key Infrastructure)	<Described in Network components>	**(Network)**
Database			
	BI (Business Intelligence)	It will be used for Citizens' Master Database system. So minimum configuration will be prepared from the beginning.	
	EAI (Enterprise Application Integration)	It will be used for Citizens' Master Database system. So minimum configuration will be prepared from the beginning.	
	EDI (Enterprise Database Integration)	For the time being, no need to exchange data with outside parties except banks which will be realized by Payment Online.	
	Database Management Utility		
SPA (Software Process Assessment)			
	UML Modeling Utility	Future object after S&N develop	
	Framework	Future object after S&N develop	
PMS (Project Management)			
	Project Management System	It is used for *e*-Government Platform construction project. So implementation is first priority.	
System Control			
	The Fault Control System	It helps to support managing quality of system development. In the future stage.	
	Load Testing System	This can be implemented in the later stage.	
Common			
	Document Management System	Necessary to develop trigger applications.	
	Work Flow (BPM)	Necessary to develop trigger applications.	
	GroupWare	Consider this in the next step	
	Process Management System	Including in Project Management System	
Others			
	Portal	Only portal for Citizens is considered Intra-government portal will be added in the later stage. User Authentication Function will be cooperated with this.	(only Portal for Citizens)
	Payment Gateway	This function is necessary for application like Birth Certificate retrieval. Fee for Birth certificate has to be collected online.	
	Video Conference	It can be implemented from small number of rooms.	

Source: JICA Study Team

8.6.2 Development and Operation

Necessary development of above systems and their implementation will be done by software service group of *e*-Government Center cooperating with other groups in the Center. After completion of development, these will be migrated into *e*-Government Center Services. So operation and maintenance will be also responsible for the Center.

8.6.3   Cost Estimates

Estimated development cost is shown below. O&M cost has been calculated by using annual rates on initial investment, such as 30% for hardware, and 20% for software. Cost of modifying or adding developed programs is considered as a part of the Technology Bank cost.

Table 8.38 Cost of Common Subsystems

Services	Unit price(US$ Million) Initial Investment	Server 0.030 Unit	Total	Storage 0.100 Unit	Total	Development 0.004 Unit	Total	Software 0.010 Unit	Total	Others 0.010 Unit	Total	Total (US$ Million
BI	Servers*2,Storage*2	2	0.06	2	0.20	40	0.16	30	0.30		0.00	**0.72**
EAI	Servers*2,Storage*2	2	0.06		0.00	40	0.16	50	0.50		0.00	**0.72**
CRM	[30User] Servers*4 PCs are included in EGC	4	0.12		0.00	20	0.08	30	0.30		0.00	**0.50**
Project Management	[300User] Server*4	4	0.12		0.00	20	0.08	20	0.20		0.00	**0.40**
Work Flow	[1000User] Server*4	4	0.12		0.00	30	0.12	20	0.20		0.00	**0.44**
Document Management	[1000Use] Servers*4,Storage*2	4	0.12	2	0.20	30	0.12	25	0.25		0.00	**0.69**
Authentication Service	Servers*6	4	0.12		0.00	40	0.16	10	0.10		0.00	**0.38**
e -Government Portal	Servers*6	6	0.18		0.00	40	0.16	10	0.10		0.00	**0.44**
Payment Gateway	Servers*6	4	0.12		0.00	40	0.16	10	0.10		0.00	**0.38**
Total			**1.02**		**0.40**		**1.20**		**2.05**		**0.00**	**4.67**

Source: JICA Study Team

In addition to above,

Cost for Detail Design is US$355K.
  (2 international consultants and 1 local consultant, 1 supporting staff)
Project Management Cost is US$252K.
  (1 international consultant and 1 local consultant)
O&M cost is US$836K.

A summary table is shown below.

Table 8.39 Cost Estimates for Common Subsystem

	Item	Description	Cost (US$ Million)	Renewal cost (US$ Million)
Common System	Detailed Design	Consulting Work	0.355	
	Hardware		1.42	1.42
	Software		2.05	
	Development		1.2	
	PMC	Consulting Work	0.252	
	Total		5.277	

	Item	Annual Operation Cost (US$ Million)								
		09	10	11	12	13	14	15	16	17
Common System	Hardware/Software Maintenance Fee	0.836	0.836	0.836	0.836	0.836	0.836	0.836	0.836	0.836
	Outsourcing HR Fee									
	Government Staff Salary									
	Total	0.836	0.836	0.836	0.836	0.836	0.836	0.836	0.836	0.836

Source: JICA Study Team

8.6.4 Implementation Scheme

Because common subsystems are to be used for all the agencies, the *e*-Government implementation agency should be responsible for their development and preparation of services in the *e*-Government Center. The implementation of this component should be done along with developing standards and norms, building the *e*-Government Center, and developing trigger application systems.

1) Organization
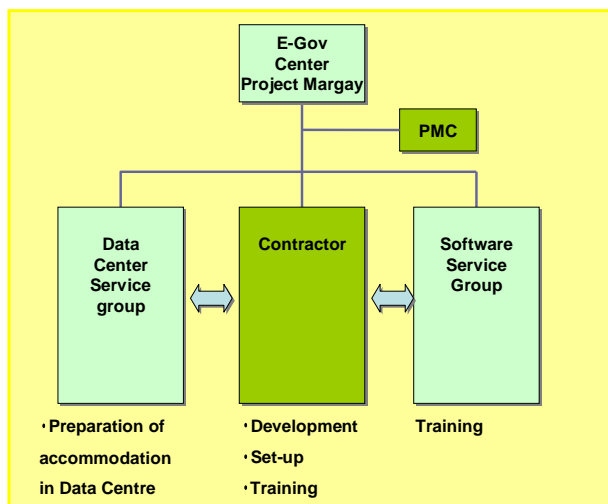
Source: JICA Study Team

Figure 8.16 Implementing Organization (Common Subsystem)

2) Implementation schedule
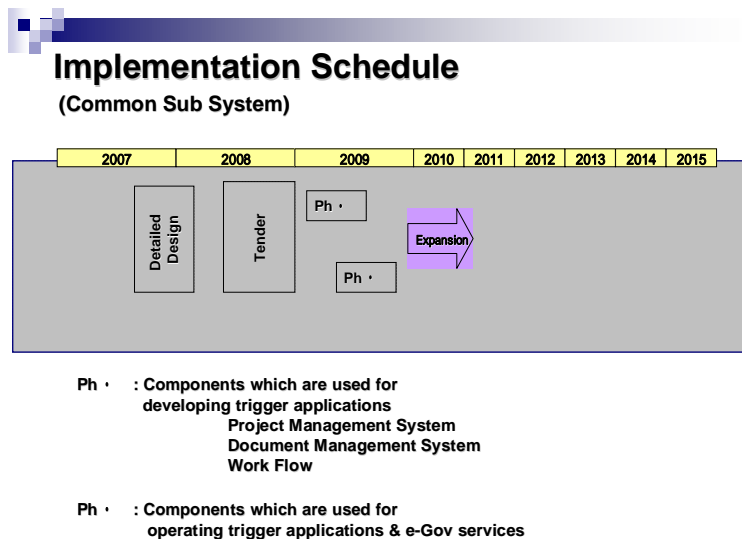
Source: JICA Study Team

Figure 8.17 Implementation Schedule (Common Subsystem)

<Detailed Design>
   Detailed design should include the following tasks.

1) Survey of Current Situation

- Collecting information on current installations of similar products in the government
- Collecting information on current functions of authentication and portals of each ministry

2) Designing Business Operation

- New operation flow

3) Application Design

- Select packaged software if available
- I/O design
- Database design
- Process design (if necessary)
- Volume estimation
- Common Program design

4) System Design

- Hardware configuration and / specifications
- Software configuration

5) Operation Design

6) Migration Plan

- Data migration plan
- Production cut-over plan by organization

7) Training Plan

Chapter 9   Implementation Program

9.1   Implementation Arrangements for *e*-Gov Organization

9.1.1   The Organization in Charge

The organization responsible for the *e*-Gov center must have clear authority with appropriate leadership and must ensure operations over a time frame beyond political changes through presidential administrations. As indicated in Chapter 6, some of the basic conditions are strong political support and capacity for inter-ministerial coordination and enforcement.

An integrated effort such as the implementation of an *e*-Government organization to manage the Platform, applications and interministerial coordination requires the convergence of several conditions, among which some of the most important are:

- A leader, such as a Government Chief Information Officer (CIO), with enough political and real power to lead and decide over all of the IT resources in the government, through a set of policies, budget revision and monitoring, standards, people, audits, and financial resources;
- An organization with enough high hierarchy within the government organization and enough technical, financial and political knowledge and abilities;
- A permanent and sustainable source of income and financial resources; and
- A very good relationship with the rest of the key actors outside the government, such as private and academic sectors.

The *e*-Government organization will be in charge of implementing, overseeing and programming the functions of the *e*-Gov platform and its applications in El Salvador. This organization has three elements to be defined, first, the ministry or entity in charge, second, the physical infrastructure, and third, the arrangement for directors and staff.
One of the ministries which could be a suitable candidate to house the *e*-Gov Center is the Presidential House.

The Presidential House: An *e*-Gov Center Department

The initiative and counterpart of the current study is under the *e*-Pais initiative of the Presidential House. Any project or initiative under the Technical Secretariat has a strong mandate because of its direct link with the President and presidential initiatives. Currently the *e*-Pais Project aims to develop IT related projects in all El Salvador with broad tasks to support the economic development agenda on technology and science issues, among which the *e*-Government initiative is one of the components.

The Technical Secretariat of the Presidency overseas and is above the ministries and organization as explained in Section 2.3. This authority coming directly from the Presidency confers it a strong capacity for inter-ministerial coordination and implementation of the policies needed for *e*-Government. During the workshop in August 2006, most of the senior government officers attending the event, including from the Ministry of Finance and Ministry of Internal Affairs, considered that The Technical Secretariat would be the best option to lead the *e*-Gov organization.

In addition, as is indicated in Chapter 6, The Ministry of Gobernacion is a very strong entity responsible for several areas, such as justice, public security, and public and interministerial powers in case of disasters and national emergencies. A Vice-Ministry of Technology could comply with the need to have the necessary enforcing powers if there is an appropriate legal framework approved and supported by legislation.

From previous chapters regarding the technical and managerial capacity of the Ministry of Gobernacion, it is evident that several services are already in place and though not strongly advocating a national plan for science and technology, this ministry containing strong leadership could be in charge of the *e*-Gov Center.

The Ministry of Gobernacion currently has two vice-ministries: the vice-ministry of Gobernacion and Justice and the vice-ministry of Citizens Security. The vice-ministry of Gobernacion oversees multiple tasks, which range from Firemen Unit to Radio and TV, media, postal services and emergencies. The vice-ministry of citizens' security oversees immigration, national police, antidrug units, and civil protection. One of the disadvantages is the wide nature of the vice-ministries, where activities such as fire protection and postal systems are joined and without a clear logic. An *e*-Gov center could therefore suffer from multiplicity and lack of ministerial support.

As the Figure 9.1 indicates, the multiple tasks oversee by the Ministry of Gobernacion makes it a powerful entity and therefore give them the strength to coordinate the *e*-Gov organization and enforce policies across ministries and organizations.

9.1.2   Legal Framework

According to the legal framework of El Salvador, in order to create a new ministry, vice-ministry, division or organization the executive branch can apply executive powers (See Box 9.1 below). The internal decree of the executive authorizes the Cabinet to create vice-ministries, organizations and units according to needs if the President proposes. The Article 31 of the **Internal Legal Law for the Executive Branch** indicates:

> "The Cabinet can create by decree, under request of the President of the Republic, new vice-ministries, dependencies and organizations when the management of public affairs would required".
>
> (**Art. 31.-** Cada Ministerio contará con un Ministro y por lo menos con un Viceministro. **El Consejo de Ministros podrá crear mediante Decreto, a propuesta del Presidente de la República, nuevos Viceministerios, dependencias u organismos, cuando la gestión de los negocios públicos así lo requiera**.)

The *e*-Government Center requires broad compromise from senior authorities of the government with powers to deal with interministerial Information Technologies issues including procurement, staff, equipment and policies, so it needs a clear mandate indicating by law its nature as "capacity to execute", also requires a legal basis stating its capacity to regulate, and apply and enforce norms and regulations if necessary.

Regarding the *e*-Government organization, three bodies of regulations and laws are relevant: 1) The **Constitution** and the **Internal Legal Law for the Executive Branch** mentioned before; 2) The **Law of Telecommunications**, and different **Regulation for Telecommunications**; 3) The **Law of Electricity**, and the **Regulations for Electricity**; and 4) The additional set of regulations such as those regarding the Plan Puebla Panama Area or International regulations like those of the International Telecommunication Unions (ITU), but those are not over the Constitution of the countries regarding the organization for *e*-Government.

A starting point for the legal framework to regulate the *e*-Government organization can be those of SIGET (Superintendencia General de Electricidad y Telecomunicaciones – General Superintendence of Electricity and Telecommunications) [www.siget.gob.sv] this has also to comply with current and foreseen laws in the country. For instance, regarding the physical national telecommunications network, the law that created SIGET and liberalized the telecom market changed the ownership of the infrastructure from public to private more than ten years ago, and it is very unlikely that this will change backwards in the near future. However current laws do not prevent explicity the government to own a network, a more flexible approach such as "the government managing a network" would be possible.

According to the **Law of Telecommunications**, SIGET's purpose is to regulate the activities of the telecommunication sector, specially the regulation of the public telephony service, utilization of the radio electric spectrum, access to essential resources, and the numbering plan, including the assignment of access keys to the multi-carrier system. SIGET is the entity that applies and looks after the fulfillment of norms and regulations established by this law and its protocols.
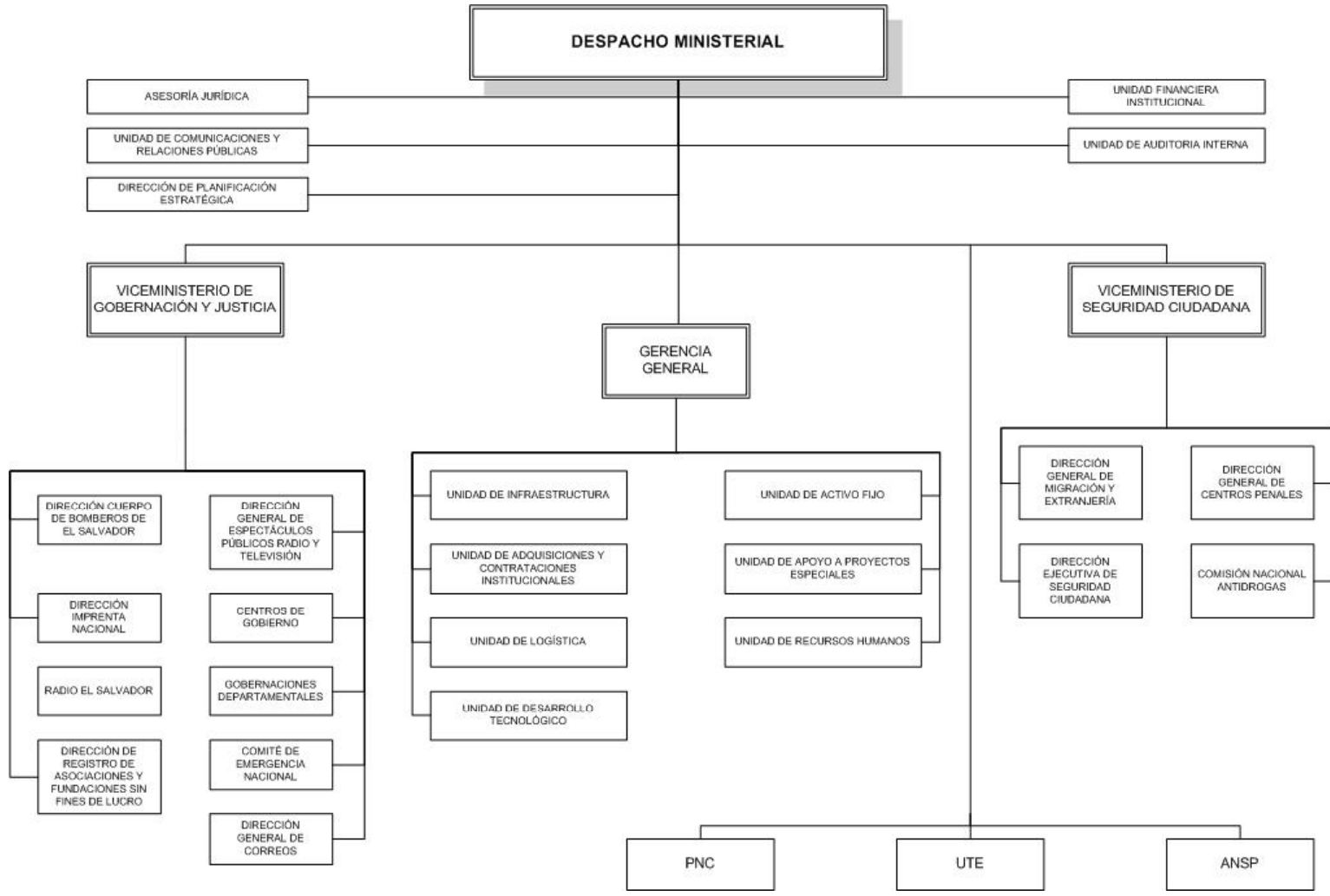
Source: Ministry of Gobernacion

Figure 9.1 Organization of the Ministry of Internal Affairs, Gobernacion

The **Law of Electricity** indicates the radio-electric spectrum is property of the State and SIGET will be the entity responsible of its administration, management and surveillance, in accordance to what is established in the Law and according to the international regulations applicable in El Salvador. SIGET will be entitled to carry out the coordination of the use of the radio electric spectrum with all foreign countries.

<u>The Organization</u>

There should be an executive organization that conducts all of the assigned duties in the *e*-Government Platform. The best option for this organization is to be under the Technical Secretary of the Presidency in order to have enough authority in the areas and matters related to the *e*-Government, as well as the proper overall strategic vision of the country and the necessary technology update knowledge.

In terms of functions the *e*-Gov center has several activities under its responsibility such as managing the Data Center, the Gov WAN, Training Center, Technology Bank, Standards and Norms, and others. These main roles are the minimum necessary to perform as an entity for *e*-Gov Center and need to be under a ministry with strong mandate and leadership.

Regarding the organization's arrangement for management, the *e*-Gov center could have as minimum five directors in charge each one of 1) Procurement, 2) Administration System, 3) Research and training, 4) Gov WAN, and 5) Installation System. Besides the functional and strategic advantages of creating the organization under the Technical Secretariat of the Presidency, according to national laws, in order to do this, only a presidential decree is needed.

According to the **Internal Legal Law for the Executive Branch**, article 53-D, the Technical Secretariat of the Presidency, among other duties, has to:

1) Advise the President of the Republic in the making of strategic decisions;
....
6) Propose the modernization policies of the public sector;
7) Facilitate and support the institutions of the public sector in the development of their modernization programs; and
8) Evaluate, along with the Minister of the corresponding Branch, the investment priorities and formulate in coordination with the office in charge of the Government's budget, the annual and multi-annual investment program, in order to submit it to the approval of the Ministry Cabinet.

Then, the proposal for creating a supporting organization under the Technical Secretariat of the Presidency is legally viable, technically functional and politically convenient. Combining this proposal with the strategy outlined in the *e*-País Strategic Program could provide the sustainability, accountability and general support that is needed in order to ensure its success.

Box 9.1 Law, Formation, Promulgation and Application in El Salvador

According to the Constitution (Articles 133 to 143) have exclusively law initiative the following:

- Member of Parliament
- The Republic President through the Ministries
- Supreme Court of Justice in matters relative to the judicial branch, notary, lawyers, Court's competence.
- City council: about local taxes.

All draft of law that is approved will have to be signed by most of the members of the Board of directors. The Assembly will keep one copy and two others will be sent to the President of the Republic All draft of law, after being discussed and approved, will be transferred within ten

---

working days to the President of the Republic, and if the president does not have any objections, it will become into Law.

If the President of the Republic does not have objections to the received project, then he will sign both copies. One copy he will send back to the Assembly and will keep the other one in his file. The text will also be published as a law in the corresponding official newspaper. If the President of the Republic vetoes a draft of law, he must send it back to the Assembly within eight working days stating the reasons for rejecting the law; if within the designated period of time he does not send it back, and then it will be published as a law.

In the case of veto, the Assembly will reconsider the project, and it will both ratify it with, at least, third of votes of the elect Deputies, or it will be send back to the President of the Republic, who will have to sanction it and to send it to publish. The term for the publication of the laws will be fifteen working days. If within that term the President of the Republic will not publish them, the President of the Legislative Assembly will do it in the official newspaper or any other newspaper of large circulation in the Republic.

9.1.3 Managerial Sustainability of the *e*-Gov Organization

Remunerations

One critical issue is to secure enough funds for the *e*-Gov organization to be able to exist and have a permanent competitive staff. As central bankers worldwide have a remunerative scale which prevent them from going to the private sector, though cannot be completely enforced, it is necessary for the top management receive salary competitive with standard levels. In the particular case of El Salvador, telecom operators are regional and multinational, therefore, the CIO of El Salvador must be on a scale similar or above the managers of the private sector in the telecommunication industry.

One suggestion is to offer the same remunerative scale of the International Telecommunications Unit for the top management. Funding for this *e*-Gov centers is provided by savings made by joint biddings for hardware and connectivity, better administration based on provision of services to different ministries and agencies of the government, and other sources such as credits, training, etc. This unit will be self-sustained in economic terms.

Non-Political Posts

The second issue is to secure the top management of the *e*-Gov center as an apolitical team. If possible the top director's term should not coincide with the presidential term, the top manager must be hired for six years or four years, and continuity based on ratification accordingly. The *e*-Gov director must be a recognized international specialist in the field, and his post, as well as his duties, based on close scrutiny, which must be technical and not political. Preparing necessary laws and regulations to guarantee this would permit hiring the staff and secure their dedication and trust.

9.1.4 Existing Efforts in Progress Supporting the *e*-Gov Center

It is extremely important to have a 'building block' approach and use what is already in place. The *e*-Pais initiative is part of the National Commission for Science and Technology created in 2000 by the Technical Secretariat.

(1) National Commission for Information Society

The National Information Committee (CNI - Spanish acronym) instituted by the National Council of Science and Technology, CONACYT (Spanish acronym), launched a National Information Policy proposal in July of 2000 with the objective of having it serve as a strategic horizon for the country in the ICT area and sector. The CNI had the representation and participation of twenty-eight entities from the public,

private, academic and professional sectors, and culminated its work with the approval from the Board of Directors of CONACYT, from the mentioned National Information Policy.

This is a broad multi-body structure, which has helped to support IT and the *e*-Gov platform initiative in different instances. The proposal for the National Information Policy was presented based on six main subjects: I. Management and administration of the information; II. Education and formation of human resources; III. Information applications; IV. Infrastructure, interconnectivity and data networks; V. National information industry; and VI. Positioning of the information technology sector in the economic and social development of the country.

The National Commission for Information Society, NCIS, directly under the President in December 2004, as explained in Section has the following objectives of:

- To increase the digital connectivity for majority of the population in all country;
- To improve the information of the academic, productive and governmental sectors available online;
- To promote the use of internet for all companies for the way to access local and world markets;
- To promote the education for ICT for increasing the access, collaboration and investigation; and
- To maximize the information levels and services offered by the Government online in order to obtain greater access to the population, to increase the efficiency, to facilitate the citizen participation, and to promote the transparency.

The chairman of the NCIS is the Technical Secretary of the Presidency, Eduardo Zablah, assisted by the executive director of *e*-País, Antonio Roshardt until August 2006, currently there is no person in charge of *e*-País though in the interim responsible is directly Presidential House. The first and immediate goal of the NCIS is to prepare a document that will contain a consensus of vision, objectives and projects that need to be promoted within a period of several years in the future, in order to take El Salvador into the path of the world of knowledge and information, and place the country among the top in the world in this area.

There are six thematic committees and two coordinating committees under the National Commission for the Information Society.

Legal and Institutional Framework
Chaired by Jorge Nieto, from SIGET
Human Resources
Chaired by Mario Andino, from Insaforp, and Juan Valiente, from Futurekids
Information Technology Industry and *e*-Commerce
Chaired by Pedro Argumedo, from FUSADES
***e*-Government**
Chaired by Alex Rivera, from the Ministry of Finance
National Connectivity
Chaired by Rafael Ibarra, from SVNet
Regional Connectivity
Chaired by Eduardo Cálix, from the Ministry of Foreign Affairs and Plan Puebla Panamá

In terms of Budget Allocation for the Committees, currently, there is no budget allocation for the NCIS. Everything that is being carried out so far is being sponsored by the Technical Secretariat of the Presidency of the Republic, under the presidential program *e*-País.

(2) *e*-Pais Initiative

The *e*-Pais initiative, also under Presidential House and conceived as the interim organization for *e*-Government as part of the NCSI was created in 2005 with the objective of promoting IT for education, science and competitiveness, by optimizing and expanding connectivity to all the country. This was the first counterpart of this feasibility study and its progress must be taken into account.

(3) Additional Initiatives

   Several efforts by both the private sector and public sector on connectivity and IT Technologies are currently in place. At present, some regional groups of private companies have strong intranet-works to support regional operations. The same is true for some ministries, such as Finance and Gobernacion, as well as the Centro National de Registros. All these examples of progress must be incorporated in the *e*-Gov agenda.

9.2   Overall Cos, Implementation Schedule, Funding and Packaging

   Overall project costs are summarized in Table 9.1, which includes basic O&M costs, which are considered to be borne by the Government. It should be noted that the costs cited in this report excludes taxes and general administrative costs associated with the Project.

Table 9.1 Overall Project Costs

Total 46,406Thousand$

COMPONENT 1: Government WAN

Item	Unit	Quantity	Unit Price	Cost	Total
Detailed Design	set	1	703	703	703
PMC	set	1	477	477	477
Cabling	set	1	2,210	2,210	2,210
Hardware(Net)	set	1	8,740	8,740	8,740
Hardware(APL)	set	1	720	720	720
Software	set	1	480	480	480
Connection with Municipality	set	1	628.8	629	629
PCs in PAT	set	1	1,200	1,200	1,200
Local Wireless Network	set	1	3,600	3,600	3,600
Total				18,759	18,759

COMPONENT 2: *e*-Government Center

Item	Unit	Quantity	Unit Price	Cost	Total
Detailed Design	set	1	169	169	169
PMC	set	1	282	282	282
Data Center Infrastructure	set	1	740	740	740
Hardware	set	1	2,170	2,170	2,170
Software	set	1	400	400	400
Total				3,761	3,761

COMPONENT 3: Citizens' Master Database

Item	Unit	Quantity	Unit Price	Cost	Total
Detailed Design	set	1	727	727	727
PMC	set	1	648	648	648
Hardware	set	1	1,050	1,050	1,050
Software	set	1	400	400	400
Development	set	1	1,276	1,276	1,276
Total				4,101	4,101

COMPONENT 4: Disaster Information System

Item	Unit	Quantity	Unit Price	Cost	Total
Detailed Design	set	1	727	727	727
PMC	set	1	648	648	648
Hardware	set	1	820	820	820
Software	set	1	400	400	400
Development	set	1	1,276	1,276	1,276
Total				3,871	3,871

COMPONENT 5: Common Subsystems

Item	Unit	Quantity	Unit Price	Cost	Total
Detailed Design	set	1	355	355	355
PMC	set	1	252	252	252
Hardware	set	1	1,420	1,420	1,420
Software	set	1	2,050	2,050	2,050
Development	set	1	1,200	1,200	1,200
Total				5,277	5,277

COMPONENT 6: EGC Building

Item	Unit	Quantity	Unit Price	Cost	Total
Detailed Design	set	1	924	924	924
PMC	set	1	660	660	660
Building Construction	set	1	7,391	7,391	7,391
Total				8,975	8,975

COMPONENT 7: Standards and Norms

Item	Unit	Quantity	Unit Price	Cost	Total
Technical Assistance	set	1	1,662	1,662	1,662
Total				1,662	1,662

Source: JICA Study Team

The project could be partly financed by a foreign concessional loan, and the government's own fund. Table 9.2 shows how such an arrangement might be made.

Table 9.2 Distribution by Financing Source

Sources	Amount (Thousand US$)
Project Implementation	
Foreign Loans	46,406
(Possible Foreign Grant)	(10,637)
Project Operation (El Salvador Own Fund)	
Total O & M (2010)	6,600
Total Renewal	15,646
Additional Equipment	13,570

Source: JICA Study Team

The Project may be divided into several packages for the ease in implementation. Implementation procedures would differ depending on the type of component, the type of fund to be utilized, the type of contractor who actually implement the component, and the schedule. Difference in implementation procedure would also require different approaches in monitoring the progress of implementation, calling for packaging of components rather than for one integrated package for tendering. Table 9.3 shows recommended packages into which the whole project should be divided.

Table 9.3 Recommended Implementation Packages

Package	Contract Type	Possible Foreign Fund	Component	Cost (US$ thousand)
1.	Procurement/ Construction/ Development	Loan	1. Gov. WAN	17,575
			2. e-Gov. Center	3,310
			3. Citizens' Master Database	2,726
			4. Disaster Information System	2,496
			5. Common Subsystems	4,670
2.	Design/Construction	Grant or Loan	6. e-Gov. Center Building	7,430
3.	Consulting Services	Grant or Loan	7. Standards and Norms	1,700
4.	Consulting Services	Loan	Consulting Services for Components 1-5	7,787

Note: Excluding price escalation. In the case of JBIC loan, 75% of the total project cost can be the subject of the loan. The remaining 25% should be financed by the Government.
Source: JICA Study Team

The most urgent issue is to establish the organization, which will promote *e*-Government with connectivity. This has to have at least 5 dedicated staff.

Even if the appropriate fund to develop *e*-Government Platform components is not found immediately, activity to develop Standards & Norms can be started earlier than other components. The same is true if it takes time for tendering. Even during this period, efforts on Standard & Norms can be made for components to follow. Technical Assistance is also expected.

Building constructions for the *e*-Gov Center is also a top priority for facilities of other components to be accommodated.

Implementation of Common Subsystems has to be completed earlier for implementing *e*-Government Services and Trigger application systems and any other systems to be implemented.

In this context, the implementation of *e*-Gov organization should be done as soon as possible this year, in order to secure the entity and people in charge of the implementation of the entire plan. A strategic plan for *e*-Gov organization follows in Box 9.2.

Box 9.2 Strategic Plan for *e*-Gov Organization

 Steps:

1. Select the organization in charge of *e*-Government, mainly under Presidential House
2. Based on the results of the NCIS report and the JICA Consultants report, empower the organization with a leading body, basically a director and a small groups of sub-directors secured by an adequate remuneration to guarantee as much as possible continuity.
3. Progress on approval of laws, regulations and norms to define the immediate roles of the *e*-Government organization.
4. Progress on funding for *e*-Government initiatives such to create the *e*-Government WANS, the activities for interministerial coordination and for connectivity.
5. Develop trigger applications to ensure support from citizens and offer them new and better services.

A sample overall implementation schedule is shown in Figure 9.2.

A sample funding schedule is presented in Table 9.4.

	2007												2008												2009												2010												2011											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Pledge																																																													
Signing of Loan Agreement																																																													
Consulting Services																																																													
Selection of Consultant			█	█	█	█	█	█																																																					
Detailed Design [EGC Building]									█	█	█	█																																																
Detailed Design										█	█	█	█	█																																														
Tendering Assistance [EGC Building]													█	█	█																																													
Tendering Assistance															█	█	█																																											
Construction Supervision [EGC Building]																		█	█	█	█	█	█	█	█	█	█	█	█	█																															
Construction Supervision																									█	█	█	█	█	█	█	█	█	█	█	█	█	█	█		█	█	█		█	█	█		█	█	█		█	█	█	█				
Construction Supervision [Standards and Norms]										█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█																															
Selection of Contractor																																																													
Pre-Qualification (incl.JBIC's concurrence)													█																																															
Preparation of Tender Documents (incl.JBIC's concurrence)														█	█																																												
Tender Period																█	█																																											
Tender Evaluation																		█																																										
JBIC's Concurrence of Tender Evaluation																			█																																								
Negotiation of Contract																				█																																							
JBIC's Concurrence of Contract																					█																																					
Signing on Construction Contract																						█																																			
L/C Opening, L/Com Effectuate																							█																																		
Construction Works																																																													
COMPONENT 1 : Government WAN																									█	█	█	█	█	█																															
COMPONENT 2 : e-Governemnt Center																									█	█	█	█	█	█																															
COMPONENT 3 : Citizens' Master Database																									█	█	█	█	█	█	█	█	█	█																											
COMPONENT 4 : Disaster Information System																									█	█	█	█	█	█	█	█	█	█																											
COMPONENT 5 : Common Sub Systems																									█	█	█	█	█	█																															
COMPONENT 6 : EGC Building																		█	█	█	█	█	█	█	█	█	█	█	█	█																															
COMPONENT 7 : Standards and Norms										█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█																															

Note: Construction of rural connectivity system continues to this period.

Source: JICA Study Team

Figure 9.2 Overall Project Schedule

Table 9.4 Annual Fund Requirement (US$)

Item	Total			2006			2007			2008			2009		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION															
I) Procurement / Construction	45,805	0	45,805	0	0	0	0	0	0	17,118	0	17,118	28,686	0	28,686
COMPONENT 1: Government WAN	17,579	0	17,579	0	0	0	0	0	0	5,860	0	5,860	11,719	0	11,719
COMPONENT 2: e-Governemnt Center	3,310	0	3,310	0	0	0	0	0	0	1,103	0	1,103	2,207	0	2,207
COMPONENT 3: Citizens' Master Database	2,726	0	2,726	0	0	0	0	0	0	682	0	682	2,045	0	2,045
COMPONENT 4: Disaster Information System	2,496	0	2,496	0	0	0	0	0	0	624	0	624	1,872	0	1,872
COMPONENT 5: Common Sub Systems	4,670	0	4,670	0	0	0	0	0	0	1,557	0	1,557	3,113	0	3,113
COMPONENT 6: EGC Building	7,430	0	7,430	0	0	0	0	0	0	4,808	0	4,808	2,622	0	2,622
COMPONENT 7: Standards and Norms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	7,594	0	7,594	0	0	0	0	0	0	2,485	0	2,485	5,108	0	5,108
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
II) Consulting services	6,983	2,066	9,048	0	0	0	3,056	835	3,891	2,089	624	2,714	1,837	607	2,444
Base cost	6,013	1,774	7,787	0	0	0	2,717	742	3,459	1,786	534	2,320	1,510	499	2,009
Price escalation	970	291	1,261	0	0	0	339	93	432	303	91	394	327	108	435
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (I +II)	52,787	2,066	54,853	0	0	0	3,056	835	3,891	19,208	624	19,832	30,523	607	31,130

Source: JICA Study Team

Chapter 10 Assessment of *e*-Government Platform Options

10.1   Economic Analysis

The economic analysis of the proposed project is carried out in this section by making a comparison between the two scenarios of with-project and without-project. Incremental cash flow is prepared based on the assumptions below, and Economic Internal Rate of Return (EIRR) of the project is calculated for evaluation.

10.1.1 Basic Assumptions

(1) Project Life

The project life is 12 years from September 2007 to August 2019. Government WAN and *e*-Government Center will begin operation in October 2009 while Citizens' Master Database and Disaster Information System will be operational in January 2010. A year in the present Chapter begins in September and ends in August. The year 2007, for example, covers the period of September 2007– August 2008 and the year 2008 covers the period of September 2008 – August 2009. The final year 2018 covers one-year period from September 2018 to August 2019.

(2) Base Year

Prices are expressed net of price escalation at the constant price level of 2006.

(3) Prices

All the prices are shown in local currency (US$).

(4) Standard Conversion Factor

Economic costs and benefits exclude incorporated market imperfections resulting from non-competitive pricing, externalities of the economy, and fiscal distortions such as duties and subsidies. A standard conversion factor is generally applied to local costs and benefits to convert them to economic prices. El Salvador, however, adopts an open trade policy, which has accelerated even further with the implementation of CAFTA (Central American Free-Trade Agreement with the United States) in 2006. There is no subsidy or duties on exports while there is no import duties levied on the main products imported for the present project. Hence, financial prices are used as economic prices for the analysis. (Standard conversion factor of 1.0 is applied.)

(5) Taxes

Economic costs and benefits exclude value added tax of 13%.

(6) Contingencies

Economic investment costs include 5% physical contingency. Price contingency is not included.

(7) Economic Discount Rate

International financial institutions such as the World Bank and Asian Development Bank generally apply 10% to 12% EDR, net of price escalation, to projects in developing countries. Considering the presence of qualitative benefit as well as incalculable quantitative benefits due to data unavailability, the project sets the target EDR at 10%.

10.1.2 Economic Project Costs

(1) Investment Costs

Financial investment costs explained in the previous chapters do not include physical contingency or 13% VAT. Financial investment costs are adjusted to economic investment costs by adding 5% physical contingency.

There is no investment costs under without project case.

The following table summarizes economic investment costs of the project, which amount to US$80.9 million including reinvestment costs.

Table 10.1 Economic Investment Costs

(US$ Million)

	Initial Investment Costs					Reinvestment Costs				Total
	2007	2008	2009	2010	Sub-total	2012	2013	2014	Sub-total	
Gov-WAN	12.2		2.7	2.7	17.6	9.5			9.5	27.0
e-Gov Center		7.2	3.2	0.3	10.7		1.6	0.2	1.9	12.6
Citizens' Master Database		1.8	0.9		2.7		1.1	0.6	1.7	4.4
Disaster Information System		1.7	0.8		2.5		1.0	0.5	1.5	4.0
Common Subsystems		4.7			4.7		1.4		1.4	6.1
Total Construction Costs	12.2	15.4	7.7	3.0	38.2	9.5	5.1	1.3	15.9	54.1
Consulting Fees	4.2	2.8	0.8		7.8				0.0	7.8
Total Base Costs	16.4	18.1	8.5	3.0	46.0	9.5	5.1	1.3	15.9	61.9
Physical Contingency (5%)	0.8	0.9	0.4	0.2	2.3	0.5	0.3	0.1	0.8	3.1
Total Economic Construction Costs	17.2	19.0	8.9	3.2	48.3	19.4	10.5	2.6	32.6	80.9

Source: JICA Study Team

Residual Value of Fixed Assets

Residual value of the building and facilities of *e*-Government Center (US$4.3 million) is included at the end of the project. The lifetime of the building and facilities of *e*-Government Center building are estimated at 47 years and 15 years respectively.

(2) Operation and Maintenance Costs

Financial operation and maintenance costs are used as incremental economic operation and maintenance costs, except for electricity/water and building maintenance costs of *e*-Government Center. The following actual costs of SNET and Civil Protection are subtracted from O&M costs of *e*-Government Center. These two organizations are to be housed in the Center.

Electricity and water: US$0.1 million p.a.
Building maintenance costs: US$ 0.25 million p.a.

The following table summarizes incremental economic O&M costs of the project.

Table 10.2 Incremental Economic O&M Costs

(US$ Million)

	2009	2010	2011	2012	2014	2018
Gov-WAN	2.9	3.0	3.0	3.0	3.0	2.8
E-Gov. Center	0.9	1.9	2.4	2.6	2.6	2.7
E-Gov. Center (building)	0.5	0.6	0.6	0.6	0.6	0.6
Citizens' Master Database	0.4	0.4	0.4	0.4	0.4	0.3
Disaster Information System	0.3	0.3	0.3	0.3	0.3	0.2
Common Subsystems	0.8	0.8	0.8	0.8	0.8	0.6
Total OM Costs	5.9	7.0	7.5	7.7	7.8	7.1
Physical Contingency (5%)	0.3	0.4	0.4	0.4	0.4	0.4
Economic OM Costs	6.1	7.4	7.9	8.1	8.2	7.5

Source: JICA Study Team

10.1.3 Quantitative Economic Benefits

The Study considers the items on the below table as quantitative economic benefits. Those items with an asterisk are mainly generated by respective component. Economic benefit items are discussed in the following section.

Table 10.3 Quantitative Economic Benefit Items by Component

Government WAN	* Reduction in Telecommunication Costs of the Central Government
	* Reduction in Telecommunication Costs of Municipalities
	Time Value Saved of Citizens Applying for Birth Certificates
	Cost Reduction of Municipality Employees Attending Citizens Applying for Birth Certificates
	Reduction of Citizens' Data Entry Cost
	Reduction of Damages to Citizens
Citizens' Master Database	* Time Value Saved of Citizens Applying for Birth Certificates
	* Cost Reduction of Municipality Employees Attending Citizens Applying for Birth Certificates
	* Reduction of Citizens' Data Entry Cost
Disaster Information System	* Reduction of Damages to Citizens
e-Government Center	* Reduction in Damages to RNPN, SNET and Civil Protection
	Facilitation for Other 3 Components to Achieve Respective Benefits
Standards & Norms/ Common Subsystems	Facilitation for Other 3 Components to Achieve Respective Benefits

Source: JICA Study Team

(1) Government WAN

1) Reduction in Telecommunication Service Costs

Central Government

The following table summarizes telecommunication service costs spent by the Central Government of El Salvador in the period from 2004 to 2006. It is assumed that telecommunication service costs of the Central Government, under the without-project scenario, will continue to increase by 3.7% per year (the same rate as in 2006), net of price escalation.

Table 10.4 Telecommunication Service Costs Spent by the Central Government

(US$ Thousand)

	2004	**2005**	**2006***
Telecom Service Costs	11,301	13,593	14,639
Change Y/Y (Net of Inflation)	-	+14.9%	+3.7%

*2006 data is the budget.
Source: Government of El Salvador

Telecommunication service costs of the Central Government are estimated for both the with- and without- project scenarios based on the following assumptions and are summarized in the table below.

- Breakdown of monthly telecommunication service fees: 2/3 phones and 1/3 data
- Breakdown of monthly phone fees: 2/3 to government and municipality offices and 1/3 to the others
- Total phone charges to government and municipality offices will gradually become zero in 2011 under with the project as free IP phones will be used.
- Data communication costs will be reduced by 40% under the with-project scenario due to volume discount from 2009 on.

Table 10.5 Telecommunication Service Costs of the Central Government
Under With and Without the Project

(US$ Thousand)

	2006	2007	2008	2009	2010	2011	2012	2013	2018
With Project									
Telecom Service Fees (Total)				10,507	10,141	9,733	9,282	7,948	9,512
Phones				7,247	6,760	6,229	5,650	4,183	5,006
To CG and Municipalities				3,623	3,005	2,336	1,614	0	0
To Others				3,623	3,756	3,893	4,036	4,183	5,006
Data				3,261	3,380	3,504	3,632	3,765	4,506
Without the Project									
Telecom Service Fees (Total)	14,639	15,174	15,729	16,305	16,901	17,519	18,160	18,824	22,528
Phones	9,759	10,116	10,486	10,870	11,267	11,679	12,107	12,549	15,018
To CG and Municipalities	6,506	6,744	6,991	7,247	7,512	7,786	8,071	8,366	10,012
To Others	3,253	3,372	3,495	3,623	3,756	3,893	4,036	4,183	5,006
Data	4,880	5,058	5,243	5,435	5,634	5,840	6,053	6,275	7,509
Incremental Telecom Service Fees				-5,797	-6,760	-7,786	-8,878	-10,876	-13,016
Cost Reduction (%)				-35.6%	-40.0%	-44.4%	-48.9%	-57.8%	-57.8%

(The costs include 13% VAT.)
Source: Government of El Salvador and JICA Study Team

Municipalities

The table below summarizes the estimate for telecommunication service costs spent by municipalities both under the with- and without- project scenarios based on the following assumptions.

- Number of municipalities: 262
- Municipalities connected to Internet: 1/3 of 262

- Breakdown of monthly telecommunications service costs among municipalities connected to Internet: 4/5 for phones and 1/5 for data
- Present average telecommunications service costs/municipality/month: US$75
- Breakdown of monthly phone costs: 2/3 to government and municipality offices; and 1/3 to the others
- Data communication costs will be zero under the with-project scenario, as rural wireless communication services will be used.
- Phone costs to government and municipality offices will gradually become zero from 2009 under the with-project scenario as free IP phones will be used.
- Annual increase rate of telecommunications service costs under without project case: 3.7% net of inflation.

Table 10.6 Telecommunication Service Costs of Municipalities
Under With and Without the Project

(US$ Thousand)

	2006	2007	2008	2009	2010	2011	2012	2018
With Project								
Telecom Service Fees (Total)				204	142	75	78	97
Phones				178	129	75	78	97
To CG and Municipalities				108	56	0	0	0
To Others				70	73	75	78	97
Data				25	13	0	0	0
Without Project								
Telecom Service Fees (Total)	236	245	254	263	273	283	293	365
Phones	189	196	203	203	210	218	226	281
To CG and Municipalities	126	130	135	135	140	145	151	188
To Others	63	65	68	70	73	75	78	97
Data	47	49	51	51	53	55	57	70
Incremental Telecom Service Fees				-59	-131	-207	-215	-267
Cost Reduction (%)				-22.5%	-47.9%	-73.3%	-73.3%	-73.3%

(The costs include 13% VAT.)
Source: JICA Study Team

(2) Citizen's Master Database

1) Time Value Saved by Citizens

The time saved by citizens in obtaining birth certificates by accessing the database through the Internet is calculated as incremental benefits in comparison to traditional methods. Birth certificates are required in applying for jobs, visas, and passports, renewing ID cards, marriage and for other procedures throughout the country. Santa Tecla Municipality reports that approximately 56% of 250 to 500 citizens coming to the office every day request the issuance of birth certificates. Other certificates such as those for death (13.5%), marriage (6.8%) and divorce (6.8%) account for additional 27% of total documents requested by the citizens.

Time value saved by citizens is calculated based on the following assumptions.

- Average working days per month: 22 days
- Average working hours per day: 7.5 hours
- Average income per worker/hour: US$1.9[1]
- Economic value produced by workers: Twice the salary
- Citizens with employment: 50% [2] of those requesting for birth certificates at home and municipalities (100% of those at office/others)

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[1] Average monthly income is reported to be US$321.2 in 2005 (Central Reserve Bank).
[2] The study assumes that some employed citizens ask their unemployed family members or friends to get birth certificates for them under without the project case.

- Average time required to get a birth certificate at municipalities: 0.5 hour in cities (63% of the total) and 2.5 hours in rural areas (37% of total) (1.24 hour on average)
- Average time to complete the Internet transaction at municipalities: 0.5 hour
- Time cost of Internet transaction at home and office: Zero (Internet transactions could be made even out of working hours, hence zero opportunity cost of time.)
- Average traveling time to the municipalities and back: 3 hours (both in the cities and rural areas)
- Annual growth rate of total population: 1.6% (up to 2010), 1.4% (2010 - 2015) and 1.3% (2015-2025)
- Internet penetration in 2005: 9.1% (1.6% home and 7.5% office/others)
  (Those with Internet access both at home and offices are only included in home data.)
- Target Internet penetration rate in 2018: 50% (35% home and 15% office/others)
- Internet penetration rate will increase at equal rates during 2006 - 2018, both for home and office/others.
- Target rate of those who make Internet transactions to those with access to Internet in 2018. (60% home and 15% office/others)
- Those who make Internet transactions in 2009 (15% home)
- The share of those who make Internet transactions at home to those with Internet access at home will increase at equal rates during 2009 - 2018.
- The share of those who make Internet transactions at office/others will be 1/4 of that for home users.
- The number of PCs installed at municipalities will gradually increase to 400 in 2010. (average 4 units for 100 municipalities)
- The number of application for birth certificates per PC/day at municipalities will gradually increase to 4 in 2013.
- The number of local wireless network will gradually increase to 300 in 2010.
- The number of application for birth certificates per PC/day/local wireless network will gradually increase to 4 in 2013.
- The frequency to apply for birth certificates: Aged 15 - 64 (59% of the population); once every three years, aged below 15 and over 64 (41%); once every six years
- Payment time cost for Internet transaction: Zero opportunity cost of time (Internet bank transfer or direct charge to the citizens' bank accounts)

Appendix 2 shows that an increasing number of people would use the Internet in order to acquire birth certificates once the Government WAN, the Government Portal and the Citizens' Master Database are developed and installed. The table forecasts the number of Internet users by location of computers, i.e., in the home, office and municipalities. 62% of birth certificate acquisition is expected to be made by Internet in 2018.

2) Cost Reduction of Municipality Employees Attending Citizens Applying for Birth Certificates

The efficiency of municipality employees attending the citizens applying for birth certificates will improve, as they no longer have to attend the citizens if they apply by Internet. Efficiency improvement is calculated as reduction in costs of these municipality employees based on the following assumptions.

- Average monthly salary of government employees attending the citizens at municipalities: US$320[3]
- Total cost of a municipality employee: 1.5 times the salary
- Working days per month: 22 days
- Working hours per day: 7 hours
- Average time required to prepare a birth certificate at the municipalities: 10 minutes in cities (63% of the total) and half an hour in rural areas (37% of total) (0.3 hour on average)

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[3] Average monthly salary of Central Government employees is reported to be US$458.63 in 2005 (Central Bank of El Salvador), approximately 70% of which is estimated as average monthly salary of those attending the citizens at municipalities.

Appendix 2 summarizes the cost reduction of municipality employees during the life of the project.

3)   Reduction of Citizens' Data Entry Cost

Docusal, a private company with 400 to 500 employees, is in charge of data entry of citizens' data of birth and death. Monthly outsourcing cost to *Docusal* is estimated at US$200,000. As municipalities will be able to enter the citizens' data by themselves, outsourcing costs to *Docusal* will be reduced from 2009. The study estimates that cost reduction rate will gradually reach 60% in 2018.

Reduction in outsourcing costs to *Docusal* is expected to increase gradually to US$ 1.3 million per year in 2018. (US$200,000× 12 months× 60%÷ 1.13 (VAT) = US$ 1.3 million)

(3) Disaster Information System

The Fifth Long-term Plan 2002-2009 Report of WMO (World Meteorological Organization) states that 'every dollar invested in national Meteorological and Hydrological Services produces an economic return many times greater, often ten times or more, apart from the incalculable benefit to human well-being.' Thus, the study assumes ten times return (economic benefits) to the annualized investment costs and annual O&M costs of Disaster Information System for each year of the operation period.

(4) *e*-Government Center

1)   Reduction in Damages to RNPN, SNET and Civil Protection

The reduction of damages to RNPN, SNET and Civil Protection are calculated below as incremental benefits of the *e*-Government Center.

It is assumed that a natural disaster will occur during the life of the *e*-Government Center (2009-2018) that will be large enough to damage and suspend the computer & telecommunication network system of RNPN, SNET and Civil Protection for one month under the without-project scenario. Expected damage to each institution under the without-project scenario is calculated based on the following assumptions. It is planned that SNET and Civil Protection will be housed in the anti-earthquake structured *e*-Government Center while RNPN's data will have a back-up system in the *e*-Government Center, under the with-project scenario. (CNR is excluded from the list as it plans to install the back-up system even in the without-project scenario.)

National Register of Citizens (RNPN)

To reiterate the role of Docusal, it is in charge of data entry of birth and death of the citizens of El Salvador. It is expected that Docusal will be assigned an additional month work to complete the data entry in case a natural disaster occurred. Monthly outsourcing costs to Docusal are estimated to be US$200,000 with VAT. Thus, the damage made under the without-project scenario is calculated at US$0.18 million (US$0.2 million ÷ 1.13 (VAT) = US$0.18 million).

SNET

SNET began operation in July 2002. SNET monitors, collects and analyzes meteorological data and provides information to the public. It is assumed that the SNET data will be destroyed by a natural disaster in 2012 under the without- project scenario. Unlike RNPN data, SNET data is not restorable as it is day-to-day metrological monitoring data; however, the damage, or incremental benefit, is calculated as accumulated costs of the employees over 10 years (2002-2012), based on the following assumptions:

- Average monthly salary of SNET employees: US$952.38
- Average cost of the employees: 1.5 times the salary
- Average number of SNET employees from 2002 to 2012: 100
- 3/4 of the data will be destroyed by the natural disaster.

The incremental benefit is calculated at US$ 12.9 million (US$952.38× 1.5 times× 12 months× 10 years× 100 employees× 0.75).

In addition, the replacement costs of SNET's equipment are assumed to be US$0.6 million (The approximate present value of equipment US$0.9 million× 0.75÷ 1.13 (VAT) = US$0.6 million).

Civil Protection

Civil Protection plays a coordinating role once the nation is struck by a disaster through the investigation of damages and contacting relevant offices for dispatching rescues, food and water, etc. From the below discussion, an annual average human damage caused by earthquakes and other natural disasters is estimated at US$14 million.[4] It is assumed that the operations of Civil Protection will be suspended once a natural disaster strikes San Salvador in 2012, increasing the damage by a conservative 10% under the without-project scenario. Thus, the incremental benefit is estimated at US$1.4 million.

Earthquakes

The table below summarizes the damages caused by earthquakes over the past 55 years in El Salvador.

Table 10.7 Earthquake Damage in El Salvador

	Magnitude	**Casualties**	**Injured**	**Refugees**	**Epicenter**
1951/5/6	6.2	More than 400	N.A.	N.A.	Jucuapa and Chinameca
1965/5/3	6.0	125	400	N.A.	San Salvador
1982/6/19	7.0	8	96	N.A.	Pacific region (affected San Salvador)
1986/10/10	5.4	1,500	10,000	N.A.	San Salvador
2001/1/13	7.6	944	5,565	1,364,160	Offshore (affected San Salvador)
2001/2/13	6.5	315	N.A.		Offshore (affected San Salvador)
Total	-	2,977	16,061	1,364,160	-
Total (US$ million)	-	381	5	219	-

Source: Civil Protection and JICA Study Team

Damages experienced by victims (dead, injured and refugees) are converted into economic value based on the following assumptions.

- Average age of the victims: 30 years old (assumed the national average age from the age structure[5])
- Proportion of the victims with employment: 50%[6]
- Average monthly income of the victims: US$321.2
- Economic value produced by workers: Twice the salary
- Average working years during the lifetime: 42 years (from 18 to 60 years old)
- Average period to recover from the injury: One month
- Average period to go back to the pre-disaster life for refugees: Half a month
- Population growth during the project life: Not considered

Total damages of the casualties, injured and refugees over the past 55 years are calculated at US$381 million, US$5 million and US$219 million with respective simple annual average damage of US$6.9 million, US$0.1 million and US$4.0 million, totaling to US$11 million. Assuming that the earthquake damage to Civil Protection would increase the victims by 10% under without project case, incremental benefits would be US$1.1 million.

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[4] Damages to houses and lands are not included in the analysis due to unavailability of data.
[5] Up to 9 (22.4%), 10-14 (11.6%), 15-64 (59.1%) and above 65 (6.9%)
[6] Children, older people, sick people and poor people tend to be affected more.

(US$321.2× 2 times× 12 months× 30 years (60-30)× 2,977× 50% + US$321.2× 2 times× 1 month× 16,061× 50% + US$321.2× 2 times× 0.5 month× 1,364,160× 50%)/55 years× 0.1 = US$1.1 million)

Other Disasters

There is no available data on victims of other natural disasters such as floods, landslides and volcanic eruptions in El Salvador. Assuming other disasters cause approximately 1/4 of the earthquake damages, as was reported by various government officials in related fields, simple annual average damage would be US$0.3 million.

Replacement costs of Civil Protection's equipment are ignored due to unavailability of the data.

In total, the reduction in damages to RNPN, SNET and Civil Protection is calculated at US$15.0 million. (0.18 + 12.9 + 0.6 + 1.1 + 0.3 = 15.0)

2) Facilitation for the Other Four Components to Achieve Respective Benefits

e-Government Center also assists three components – Government WAN, Citizen's Master Database and Disaster Information Management - to achieve respective benefits. Those benefits will not be realized to full extent without the facilitation role of the *e*-Government Center.

(5) Standards and Norms/Common Subsystems

Facilitation for the Other Four Components to Achieve Respective Benefits

Standards and Norms and Common Subsystems assist three components – Government WAN, Citizen's Master Database and Disaster Information Management - to achieve respective benefits. Those benefits will not be realized to full extent without Standards and Norms and Common Subsystems.

10.1.4 Conclusion

(1) EIRR

Incremental economic cash flow is prepared based on the above assumptions, and is shown as Appendix 3. Reduction in telecommunications service costs of the Central Government (Gov. WAN) is the largest, followed by economic benefit of Disaster Information System and Time Value Saved of Citizens (Citizens' Master Database). The economic internal rate of return (EIRR) is calculated at **17.3%**, which exceeds the target EIRR of 10%. Net present value of the project at 10% discount rate is US$18.3 million.

(2) Sensitivity Analysis

Table 10.8 summarizes the sensitivity analysis of the project's EIRR. EIRR is more sensitive to benefits than investment costs and special attention should be paid not to delay realization of economic benefits.

The switching value, which makes IRR equal the discount rate, is 1.32 times for investment costs and 0.84 times for economic benefits.

Table 10.8 Sensitivity Analysis (EIRR)

Base Case	Investment Costs (+10%)	Benefits (-10%)	Investment (+10%) & Benefits (-10%)	1 Year Delay in Realizing Benefits
17.3%	14.7%	12.9%	10.5%	9.9%

Source: JICA Study Team

It is concluded that the proposed project is beneficial to the economy of El Salvador.

10.2   Financial Evaluation

The current prevailing thinking within the Government concerning the implementation of the Government WAN project is that the Government invest in the construction of the initial infrastructure by itself and that a private sector company operates the system under a contract with the Government. In accordance with the contract the private company charges the Government periodically for an amount that covers actual operating cost plus profit deemed reasonable. In addition, the Government pays user charges to the ISP company that provides communication lines as is the case now.

The financial viability of the operating company depends solely on the amount of charge to the Government that is entirely dependent on the negotiation between them as virtually no investment of its own involves. Under such circumstances, it is meaningless to calculate the Financial Internal Rate of Return. No such calculation therefore has been made.

The above argument equally applies to other "outsourcing" activities such as the Call Center and the building maintenance. No financial evaluation of them by FIRR has been made.

10.3   Assessment of Options

10.3.1   Option 0: Do-Nothing

First option is that no proposed components will be executed.
Individual agencies can develop *e*-Services by themselves. But there are lots of drawbacks, including:

1) A decrease in the improvement of the quality and quantity of online services to citizens. Un-unified *e*-Government systems are inconvenient for citizens. It obstructs promotion of using *e*-Government;
2) The promotion of the ICT industry is not archived;
3) Social development is not accelerated by ICT, thereby expanding the digital divide;
4) Government efficiency, including costs, productivity and safety, is hampered. Local governments will remain non-systemized; and
5) The positive effect on PPP countries cannot be fully realized.

10.3.2   Option 1: Full Implementation

When full implementation is achieved, the necessary platform for *e*-Government will be available.

1) The quality and quantity of online services to citizens will be improved. Unified *e*-Government systems are easier for citizens to access any *e*-Government applications as they will easily promote the use of *e*-Government.
2) The ICT industry is promoted.
3) Social development is accelerated by the penetration of ICT in to rural areas, combating the digital divide.
4) Government efficiency, including costs, productivity and safety, is enhanced. Local governments will also benefit from this *e*-Government environment.

The positive effect on PPP countries will be fully realized.

10.3.3   Option 2: Partial Implementation

There are a several objectives to be achieved by the *e*-Government platform. The relation between objectives and components of *e*-Government are summarized in Table 10.9 below. It is also necessary to consider the relationship between *e*-Government components. For a certain component, other components might become necessary as preconditions. This relationship is shown in Figure 10.1. If full implementation is difficult and partial implementation possible, then this table and figure must be carefully taken into account in prioritizing the implementation of competing components.

Table 10.9 *e*-Government Target and Components

		Services to Citizen		Promotion of ICT Industry	Social Development	Efficiency of Governments (Operation and IT)				Effect to PPP
		Quality	Quantity			Cost	Productivity	Safety	Local Government	
1)	Government WAN									
(a)	Large area high-speed network connection among central government agencies.	***	*	-	-	***	*	***	**	*
(b)	Network connection of local government and central government	**	**	-	**	*	**	***	***	*
(c)	Security system that strongly defends network of the entire government	***	-	-	-	**	*	***	**	*
(d)	Application service of network system like e-mail, file transfer, etc.	-	-	-	-	*	**	**	***	*
(e)	Line construction to internet line un-constructed region	***	***	**	***	-	-	*	**	**
(f)	Installation of public terminal in public facilities such as schools	***	***	**	***	*	-	*	**	**
2)	*e*-Government Center									
(a)	Organization which manages whole of *e*-Government	***	**	*	*	*	**	**	**	*
(b)	Data Center with high level anti earthquake	***	*	**	*	**	**	***	**	**
(c)	ICT services provided by data center and its facilities.	***	**	**	*	**	***	*	**	**

		Services to Citizen		Promotion of ICT Industry	Social Development	Efficiency of Governments (Operation and IT)				Effect to PPP
		Quality	Quantity			Cost	Productivity	Safety	Local Government	
3 Standards & Norms										
(a)	Organization to develop, authorize, maintain, update and enforce Standards & Norms	***	**	***	*	**	***	**	**	**
(b)	List of Standards & Norms items	**	**	***	*	**	***	**	**	**
(c)	Procedure of updating Standards & Norms	**	*	**	*	**	***	*	*	*
(d)	Common subsystems	**	**	**	*	**	***	***	**	*
4 Trigger Application systems										
(a)	Disaster Information System	***	*	*	***	*	*	***	***	***
(b)	Citizens' database system	***	*	*	*	*	**	**	***	***

*** : The component effect large impact to target

** : Middle Impact

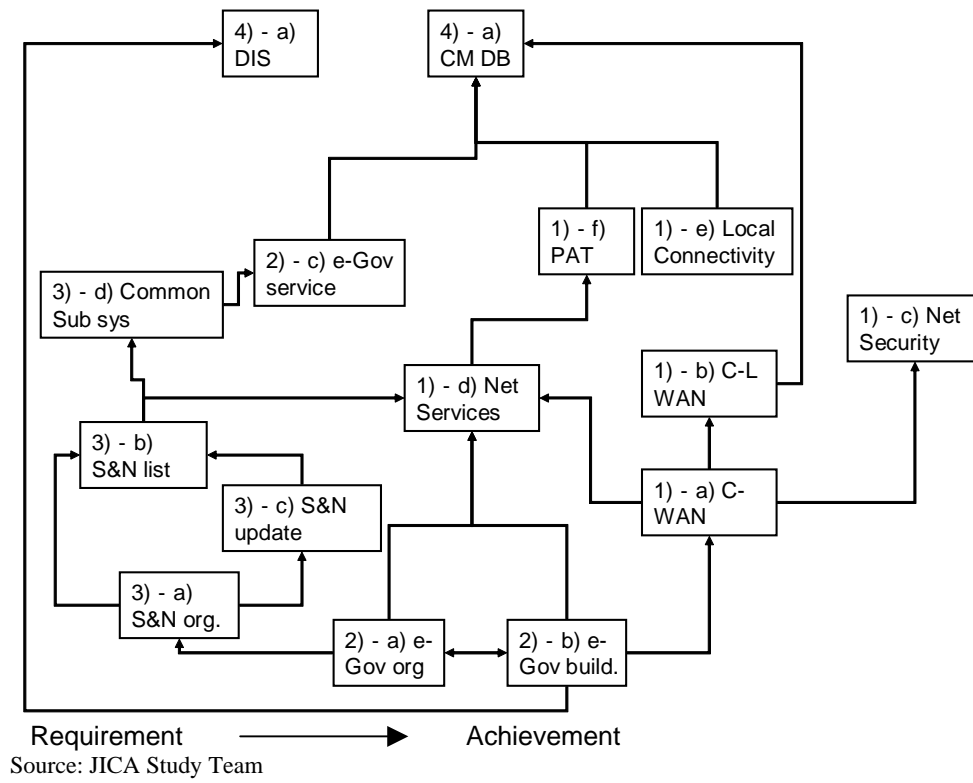* : Small Impact

- : No direct impact

Source: JICA Study Team

Source: JICA Study Team

Figure 10.1 Mutual Relationship Between Components

Chapter 11 Recomendations

11.1   Prerequisites

This Project assumes that the operation continues to be valid and a priority for the authorities of El Salvador, and that there will be available funds, that could come from their own resources and/or financing from the government to make sustainable implementation possible.

The project's sustainability also assumes that the Technical Secretariat of the Presidency continues to promote and decide to implement the *e*-Government Platform. There are two necessary conditions: Firstly that El Salvador's Government assigns a budget for the operation, maintenance, and training of *e*-Government personnel, and secondly, that the people trained for the operation of the *e*-Government Platform will keep their positions.

11.2   Necesary Steps

For the *e*-Government Organization

1. Select the organization in charge of *e*-Government. It is recommended that it is under the Presidential House.
2. Based on the results of JICA's and NCIS's reports, give authority to the organization in charge, which will be formed by a small group of directors, with a sufficient salary in order to guarantee their continuity.
3. Advance in the preparation and approval of regulations and laws, in order to define the immediate responsibilities of the *e*-Government Organization.[1]
4. Move forward in the matter of financing for *e*-Government initiatives, in order to create the Government WAN and associated systems, impel the coordination among Ministries and provide connectivity with the rural areas.
5. Develop trigger applications, in order to obtain the citizens' support and provide them services.

For the *e*-Government Platform

Once the *e*-Government Organization is established and working:

1. Appoint the Standards and Norms Committee and its functions.
2. Begin the coordination among Ministries.
3. Initiate the procedures to create the *e*-Government Platform.
4. Observe and avoid services duplication and unnecessary expenses.
5. Make and maintain up to date an ICT inventory for the government's facilities, their software and their hardware.

For the *e*-Government Center

1. This project recommends having a physical facility for the *e*-Government Center. This facility should be sufficiently protected, in order to preserve the country's data, and at the same time, it has to be the core of all the Government services and initiatives.
2. The *e*-Government Center will be located in El Salvador.
3. There have been initiatives to obtain this facility through a foreign technical cooperation. This project plans to integrate in a single facility the offices of Civil Protection, SNET and the *e*-Government Center. This effort should continue.

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[1] The appropriate regulation must be indicated in the executive decree approved by the cabinet where must be described the rules of the *e*-Gov organization. Then appropriate regulations must be added to related norms with SIGET and in the Law of Telecommunications and the law of Electricity.

For the Creation of the Government WAN

Once the *e*-Government Organization is established and working.

1. Establish norms for the creation of the Government WAN. El Salvador's Government should decide the procedure to follow, in order to establish these norms. If it is done through public tenders, transparency and diffusion must be assured.
2. Ensure the preparation and continuity, in order to select the specialists that will be in charge of the network management and of those who will be the link with the private sector.

For Standards and Norms

1. It is necessary to initiate the efforts on Standards and Norms as soon as possible, before initiating any related project.
2. The results and advances of the Standards and Norms must be spread extensively, as long as this doesn't imply security risks.
3. For the standardization process, advances should be made in the agreed procedures follow up, in a gradual and progressive way.

Appendix

Appendix 1: Sample design drawing for *e*-Government Center Building

El Salvador e-Government Project 01F Plan   1/250

El Salvador e-Government Project 02F Plan   1/250

El Salvador e-Government Project 03F Plan   1/250

El Salvador e-Government Project B01F Plan 1/250

El Salvador e-Government Project Section 1/250

El Salvador e-Government Project Elevation (South) 1/250

A1-2
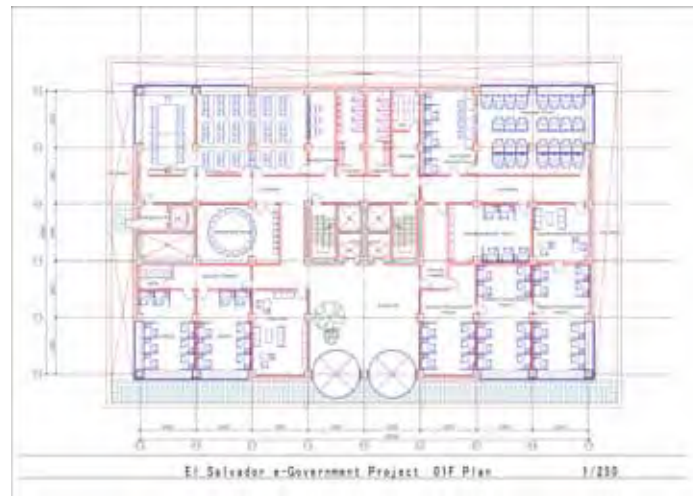
Appendix 2: Time Value Saved of Citizens Applying for Birth Certificates and Cost Reduction of Municipality Employees Attending the Citizens

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Population		6,875,000	6,984,646	7,096,041	7,209,213	7,324,190	7,441,000	7,545,238	7,650,937	7,758,116	7,866,797	7,977,000	8,080,701	8,185,750	8,292,165
Internet Users (Penetration Rate at Home and Office)		9.1%	12.2%	15.4%	18.5%	21.7%	24.8%	28.0%	31.1%	34.3%	37.4%	40.6%	43.7%	46.9%	50.0%
		625,625	855,351	1,092,245	1,336,477	1,588,222	1,847,658	2,110,926	2,381,207	2,658,647	2,943,392	3,235,594	3,531,888	3,835,339	4,146,082
Home Internet Users	Penetration Rate	1.6%	4.2%	6.7%	9.3%	11.9%	14.4%	17.0%	19.6%	22.2%	24.7%	27.3%	29.9%	32.4%	35.0%
	Home Users of Internet	110,000	291,206	478,164	671,011	869,888	1,074,938	1,283,851	1,498,407	1,718,721	1,944,914	2,177,107	2,413,022	2,654,702	2,902,258
	Those Who Make Internet Transactions					15.0%	20.0%	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%
	No. of Transactions by Internet					34,578	56,972	85,055	119,123	159,411	206,161	259,620	319,725	386,923	461,459
Internet Users at Office/Others	Penetration Rate	7.5%	8.1%	8.7%	9.2%	9.8%	10.4%	11.0%	11.5%	12.1%	12.7%	13.3%	13.8%	14.4%	15.0%
	Office Users of Internet	515,625	564,145	614,081	665,466	718,334	772,719	827,074	882,800	939,926	998,478	1,058,487	1,118,866	1,180,637	1,243,825
	Those Who Make Internet Transactions					3.8%	5.0%	6.3%	7.5%	8.8%	10.0%	11.3%	12.5%	13.8%	15.0%
	No. of Transactions by Internet					5,986	12,879	17,231	22,070	27,414	33,283	39,693	46,619	54,113	62,191
Municipality Internet Users	No. of PCs					200	400	400	400	400	400	400	400	400	400
	No. of Transaction/PC/day					2	2	3	3	4	4	4	4	4	4
	No. of Transactions by Internet					33,429	150,429	300,857	300,857	401,143	401,143	401,143	401,143	401,143	401,143
Local Wireless Network	No. of Wireless Network					150	300	300	300	300	300	300	300	300	300
	No. of Transaction/Network/day					2	2	3	3	4	4	4	4	4	4
	No. of Transactions by Internet					36,500	164,250	328,500	328,500	438,000	438,000	438,000	438,000	438,000	438,000
Total Number of Transactions by Internet						110,493	384,529	731,643	770,550	1,025,969	1,078,586	1,138,456	1,205,488	1,280,178	1,362,793
Total Transactions (Including Traditional Method)						1,940,910	1,971,865	1,999,488	2,027,498	2,055,901	2,084,701	2,113,905	2,141,386	2,169,224	2,197,424
Share of Internet Transactions to Total Transactions						**6%**	**20%**	**37%**	**38%**	**50%**	**52%**	**54%**	**56%**	**59%**	**62%**
Time Value of Citizens Applying for Birth Certificates (US$ Thousand)						**432**	**900**	**1,420**	**1,781**	**2,346**	**2,829**	**3,376**	**3,986**	**4,665**	**5,413**
Cost Reduction of Municipality Employees Attending Citizens (US$ Thousand)						**100**	**348**	**661**	**696**	**927**	**975**	**1,029**	**1,090**	**1,157**	**1,232**

(Four types of internet users are mutally exclusive.)

(The years cover the period of one year from September to August. E..g., the year 2007 covers the period from September 2007 to August 2008 and the year 2018 covers the period of September 2018 to August 2019.)

Source: JICA Study Team

Appendix 3: Incremental Economic Cash Flow of e-Government Platform

	Year	Economic Costs				Economic Benefits								Net Economic Benefit
		Investment Cost		O&M Costs	Total	Benefit 1	Benefit 2	Benefit 3	Benefit 4	Benefit 5	Benefit 6	Benefit 7	Total Economic Benefit	
		Initial	Replacement			Reduction in Damages to RNPN, SNET and Civil Protection	Reduction in Telecom Costs of Central Gov.	Reduction in Telecom Costs of Municipalities	Time Value Saved of Citizens Applying for Birth Certificates	Cost Reduction of Municipality Employees Attending Citizens Applying for Birth Certificates	Reduction of Citizens' Data Entry Cost	Reduction of Damages to Citizens		
1	2007	17.2			17.2									-17.2
2	2008	19.0			19.0									-19.0
3	2009	8.9		6.1	15.0		3.2	0.1	0.4	0.1	0.3	7.5	11.6	-3.5
4	2010	3.2		7.4	10.5		6.0	0.1	0.9	0.3	0.6	7.5	15.5	4.9
5	2011			7.9	7.9		9.0	0.2	1.4	0.7	1.0	7.5	19.7	11.8
6	2012		19.4	8.1	27.5	15.0	9.3	0.2	1.8	0.7	1.3	7.5	35.7	8.2
7	2013		10.5	8.1	18.6		9.6	0.2	2.3	0.9	1.7	7.5	22.3	3.6
8	2014		2.6	8.2	10.8		10.0	0.2	2.8	1.0	2.0	7.5	23.5	12.7
9	2015			8.2	8.2		10.3	0.2	3.4	1.0	2.4	7.5	24.9	16.7
10	2016			8.2	8.2		10.7	0.2	4.0	1.1	2.9	7.5	26.4	18.1
11	2017			8.2	8.2		11.1	0.2	4.7	1.2	3.3	7.5	28.0	19.8
12	2018	-4.3		7.5	3.2		11.5	0.2	5.4	1.2	3.9	6.3	28.6	25.4

EIRR 17.3%

(The years cover the period of one year from September to August. E..g., the year 2007 covers the period from September 2007 to August 2008 and the year 2018 covers the period of Septem to August 2019.)

Source: JICA Study Team