

# 1 INTRODUCTION

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## 1.1 Study Background

In response to the request of the Government of the Republic of Senegal (hereinafter referred to as "the Government of Senegal"), the Government of Japan decided to implement the Study on Infrastructure Information Management System of the Dakar Metropolitan Area in the Republic of Senegal (hereinafter referred to as "the Study").

In February 1999, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the agency responsible for the implementation of official technical cooperation programs, sent a Preparatory Study Team to hold discussions with Department of Geographic and Cartographic Works of the Ministry of Equipment and Transport (hereinafter referred to as "DTGC") and Department of Urban Planning and Architecture of the Ministry of Urban Planning and Housing (hereinafter referred to as "DUA"). On 17 February 1999, DTGC, DUA and JICA agreed upon the Scope of Work for the Study.

In July 1999, JICA invited technical proposals for the selection of a consultant to implement the Study. A team of experts organized by PADECO Co., Ltd. and Asia Air Survey Co., Ltd. was consequently selected and contracted as the Study Team in September 1999, and mobilized immediately to Senegal.

On behalf of the Government of Senegal, DTGC and DUA coordinated the Study with regard to other governmental and non-governmental organizations concerned. This included the formation of a Steering Committee, for the smooth implementation of the Study. JICA also formed an Advisory Committee in Japan in order to supervise the study progress.

The Study was carried out in both Senegal and Japan for a period of one year and a half commencing in September 1999. Members of the Study Team and the Committees are listed in Appendix A1.1 in Volume II.

This Final Report was prepared by the Study Team to present the results of the study work, taking into account comments of parties concerned.

## 1.2 Objectives of the Study

### 1.2.1 Objectives

The objectives of the Study are:

- 1 to develop an Infrastructure Information Management System (hereinafter referred to as "IIMS") by Geographic Information System (hereinafter referred to as "GIS") for the Dakar metropolitan area; and
- 2 to transfer relevant technology to Senegalese side counterpart personnel during the course of the Study.

### 1.2.2 Study Area

The Study covers the Dakar Metropolitan Area of approximately 200 square kilometers including Dakar Department, Pikine Department, Rufisque Commune and Bargny Commune.

Figure 1.2.1 Study Area

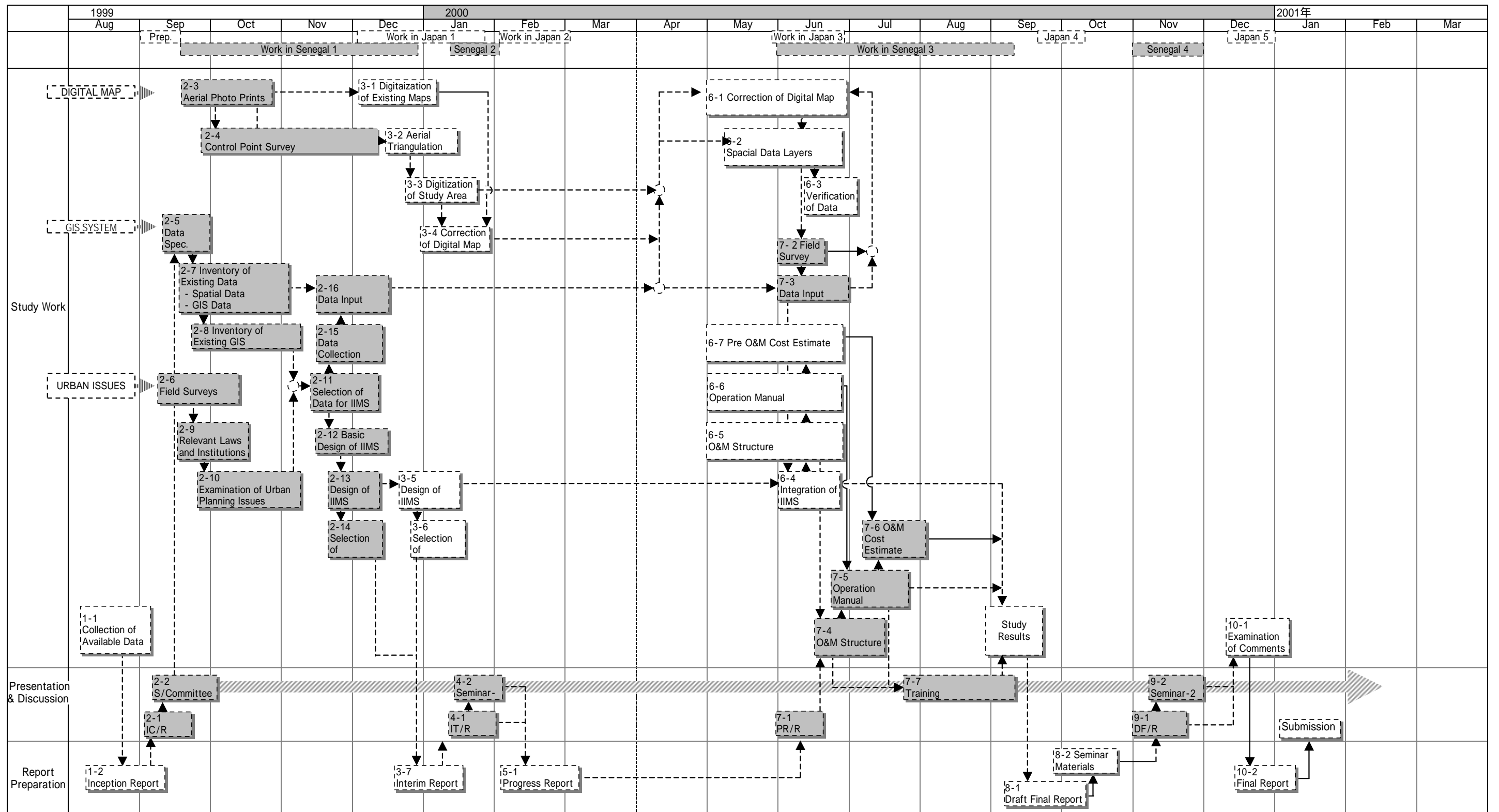


## 1.3 Study Management

### 1.3.1 General Work Flow

The general work flow of the Study is shown in Figure 1.3.1.

Figure 1.3.1 General Work Flow





### 1.3.2 Workshops

Periodic workshops were organized by the Study Team with participation of counterpart officials by DTGC and DUA, for discussion of major points of the study work and study directions.

The Workshops in the first year included the following:

- |                       |  |
|-----------------------|--|
| (1) 27 October 1999:  | i. Existing land use                     |
|                       | ii. Demographic distribution             |
|                       | iii. Urban Carte                         |
| (2) 10 November 1999: | iv. GIS Data                             |
|                       | v. Evaluation method of residential zone |
| (3) 24 November 1999: | vi. Summary of digital map preparation   |
| (4) 1 December 1999:  | vii. Function of the proposed system     |
|                       | viii. Basic design of the system         |
| (5) 15 December 1999: | ix. System design                        |

In June 2000, two sets of system hardware were delivered and temporarily installed at the Study Project Office within DTGC. From early July to Mid-September, training of DTGC and DUA officials was carried out almost every day. This training included installation and operation of hardware, installation of software, establishment of the Infrastructure Information Management System on hardware by inputting large quantities of data, and the operation of IIMS.

The Workshops in the second year included the following:

- |                        |                                   |
|------------------------|-----------------------------------|
| (1) 16 August 2000:    | i. GIS Application in DUA         |
| (2) 17 August 2000:    | ii. GIS for Urban Problems        |
| (3) 18 August 2000:    | iii. Conclusion and Practice      |
| (4) 7 September 2000:  | iv. GIS Data Structure            |
| (5) 8 September 2000:  | v. Data Input                     |
| (6) 11 September 2000: | vi. Data Conversion for IIMS      |
| (7) 12 September 2000: | vii. Relational Database          |
| (8) 13 September 2000: | viii. Data Maintenance & Practice |

The textbook used in the workshops in the second year is found in the Volume III: Textbook for Preparation of GIS System.

### 1.3.3 Seminars

#### (1) Introductory Seminar

The first seminar was held on 28 September, 1999, co-sponsored by DTGC, DUA and the JICA Study Team following the first Steering Committee meeting. Members of the Steering Committee and the National Map Committee attended the seminar. The concept of GIS, examples of GIS use in urban planning, etc. were presented by the Study Team. All points discussed during the seminar and a list of attendees are shown in Volume II: Appendices.

#### (2) First Seminar

A full-scale seminar was held on 25 January, 2000, co-sponsored by DTGC, DUA, and the JICA Study Team at Novotel Dakar. Some 50 people from various government agencies and the private sector attended.

All points discussed during the seminar and a list of attendees are shown in the Volume II: Appendices.

#### (3) Second Seminar

Another full-scale seminar was held in November 22, 2000 in Dakar, also co-sponsored by DTGC, DUA and the JICA Study Team. The seminar aimed at disseminating all the results of the Study and promoting effective use of IIMS among concerned agencies. Points discussed and a list of attendees are shown in Volume II: Appendices.

### 1.3.4 Training in Japan

During the Study period, one official from both DTGC and DUA received three-week training in Japan.

## 1.4 Terminology and System Establishment

### 1.4.1 Terminology

In this report some particular concepts are expressed in terms specific to this study. Some may not be readily understandable as their meanings are much more specific than their general usage. The following summary defines terms used in this study.

(1) GIS (Geographic Information System):

Any computerized system of data set and software in Senegal that can store and retrieve information linked to geographic location. The output of such a system is typically ordinary map or “thematic map” (See below)

(2) Thematic Map:

A map showing the location of the selected theme. A selected theme may only be represented by points on a map or may cover a certain area or a number of areas on a map.

(3) IIMS (Infrastructure Information Management System):

A GIS system specifically designed and established by this Study to assist the planning and management of urban infrastructure and services in Dakar.

(4) Spatial Data Infrastructure:

A set of computerized data files that forms the basis of data sets used in GIS. Since maps are most useful in providing information on geographic positions, they constitute the core of any GIS data sets. As such data sets should be commonly used by various agencies, it is highly desirable that a single national agency should be responsible for the management and updating of the Spatial Data Infrastructure. Since DTGC will take responsibility for this task, the Spatial Data Infrastructure in Senegal at present can be defined as the set of data files containing selected geographic and other information in IIMS that is to be maintained by DTGC.

(5) Other GIS Data:

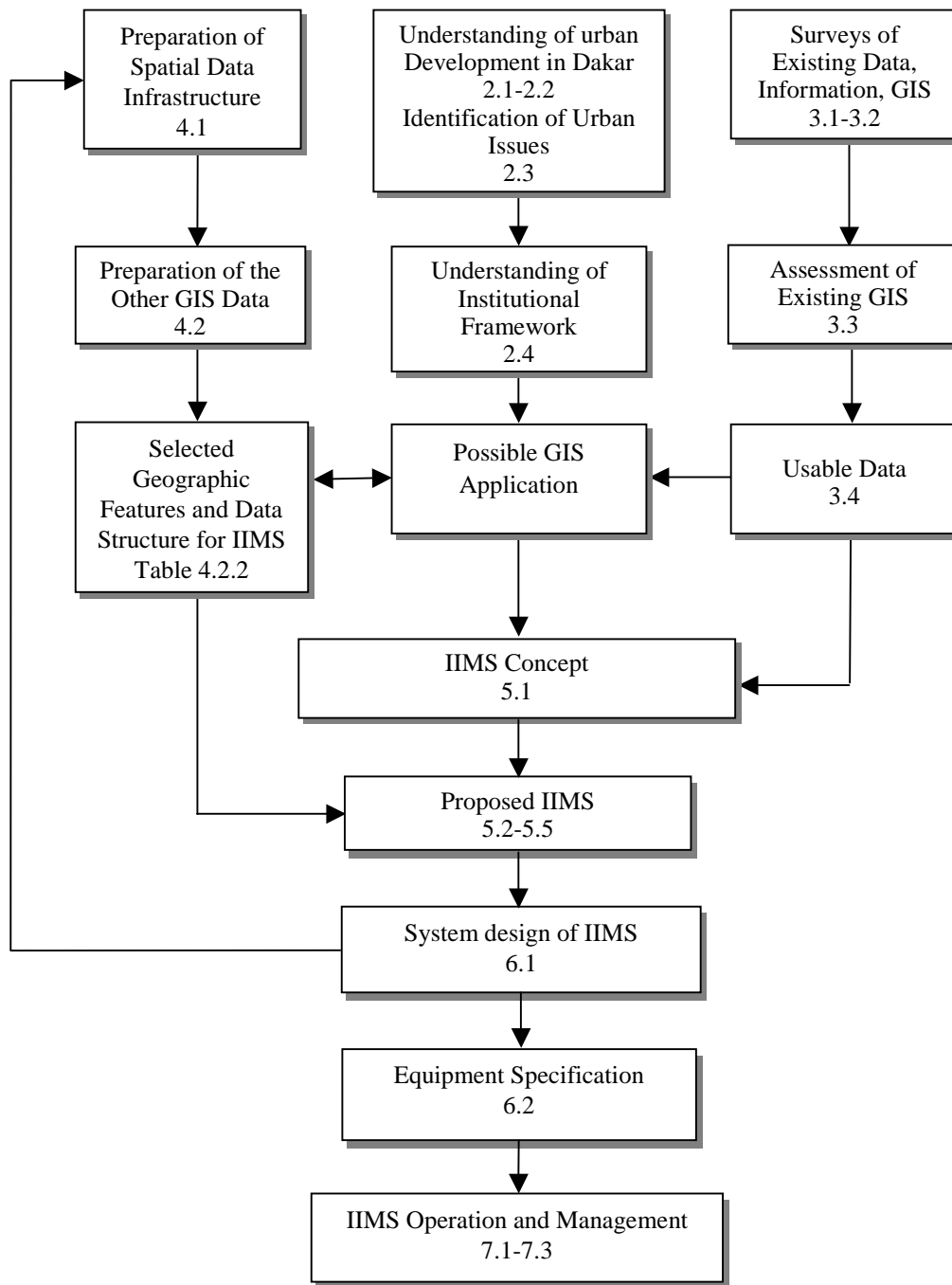
All data files to be included in IIMS but not in Spatial Data Infrastructure.

### 1.4.2 System Establishment Process

The IIMS has been planned and designed by means of a series of tasks performed by the Study Team in cooperation with counterpart agencies. Many tasks are interrelated and a great deal of information feed back took place. Figure 1.4.1 illustrates the process of establishing IIMS. The Figure also indicates relationships among various Sections of this report.



Figure 1.4.1 System Establishment Process



Note: Numbers in each box correspond to the sections or table of this report.

Source: JICA Study Team

The first task was to understand various aspects of urban development in Dakar. Field surveys and discussions with governmental officers and non-governmental individuals were carried out to identify pressing issues in urban development in

Dakar. Some ten issues were identified. Institutional framework of urban development was delineated and roles of agencies involved were clarified.

In parallel to the above, another survey was carried out concerning available data and existing GIS systems in Dakar, which were found to be scattered across many agencies at varying degrees of precision and format. A number of data files were included in the existing GIS systems. A detailed assessment of existing data and GIS systems was made in order to evaluate their suitability for the system to be created by the Study against their usefulness in addressing the urban issues as identified above.

A series of field measurements and associated surveys were carried out. This was designed to supplement available map information by providing missing information and verifying geographic data. In this way, a set of geographic and associated data could be compiled into a geographic data structure, which could then be commonly used by various agencies as the standard basis, i.e. Spatial Data Infrastructure. Additionally, other data that can also be identified by the location of its subject was collected and evaluated in terms of its relevance to the urban planning process.

Overall consideration of the above three elements led to the conceptualization of the Infrastructure Information Management System based on the latest GIS technology, available data, and technical and managerial feasibility.

System design was made to satisfy requirements, and specifications of necessary equipment were determined.

Four sub-systems were conceptualized as the initial tools of IIMS to assist urban planning and management in Dakar. System requirements were determined to gain a balance between what is desirable and what is readily available.

Lastly, operation and management of the IIMS following its completion were examined and recommendations were made to ensure sustainable operation of IIMS in Dakar.

## 1.5 Report Organization

This report is Volume I: Main Report of the Final Report of the Study on Infrastructure Information Management System of the Dakar Metropolitan Area in the Republic of Senegal.

The Final Report consists of four volumes and an executive summary as follows:

- 1 Executive Summary
- 2 Volume I: Main Report
- 3 Volume II: Appendices
- 4 Volume III: Application Textbook for DUA
- 5 Volume IV: Operating Manual