Infrastructure Information & Decision Support Centre

(IIDSC)

(GEOMATICS /BIM/DSS)

2024

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1. *Preface:*

IIDSC is a British specialised Centre that gives consultations in different area:

- Establishment of dedicated National Centres in Middle Eastern Countries
- Provide sate of the art geomatics and BIM solution to manage urban infrastructure and superstructures
- Provide training in related fields (Facilities and Assets Management -FAM) and other geomatics and BIM fields

2. *Introduction:*

Considering a specific element within any infrastructure system in Urban cities:

- ✓ *Wouldn't it be nice to organise all information about infrastructure of Urban cities*
- ✓ *Wouldn't it be great to detect whether any infrastructure element is malfunctioning?*
- ✓ *Wouldn't it be great to generate a five-year development plan by a click of a button?*
- ✓ *Wouldn't it be efficient to organize the management of infrastructures among institutions in a very effective way?*
- ✓ *Finally, wouldn't it be intelligent to obtain a several-scenario solution for any development, planning, reporting, analysis, visualisation, mapping, operation, and maintenance programs by a press of a button and/or by a click of a mouse?*
- ✓ *Well, this is the dream of an engineer, a decision maker, a planner, and even a politician.*

3. *Infrastructure Information & Decision Support Centre*

The idea of IIDSC was the result of a thorough field assessment, field evaluations and extensive contacts with concerned infrastructure management institutions and ministries in Urban cities.

This Center is intended to serve as a *management tool* and a *solution provider* for the infrastructure systems in the Urban cities. To accomplish such a mission, this center has been built around two main components:

- ✓ *A Geographic Information System (GIS), and*
- ✓ *A Decision Support System (DSS).*

4. *IIDSC Definition:*

The Infrastructure Information and Decision Support Centre (IIDSC) will document, manage, maintain, update, analyse, and support decisions on all infrastructure elements; namely:

- Water distribution systems
- Water resources (including ground water)
- Wastewater networks and treatment facilities
- Roads networks
- Electricity / Power networks

- Housing & Lands register
- Telecommunications networks
- Solid waste disposal sites and collection networks
- Harbours, airport and other main infrastructures

5. *IIDSC Objectives:*

- ✓ To accommodate a decision Support System for different users.
- ✓ To maximize the benefit and channeling of information.
- ✓ To maximize the coordination of funding.
- ✓ To produce the five-year PDP (5year and one year) in the infrastructure sector.
- ✓ To create more job opportunity.
- ✓ To develop a proper institutional capacity.
- ✓ To prioritise the different projects identified for the Infrastructure Sector.
- ✓ To assist ministries and authorities in planning development and making effective decisions in their fields.
- ✓ To manage, maintain, and update information on different elements of infrastructure.
- ✓ Enhancing inter-institutional links.
- ✓ To help investors in performing their assessment studies.
- ✓ To serve as spatial analysis tool for all concerned institutions.
- ✓ To support research initiatives (including graduate research).
- ✓ To produce reports for different fields.

6. *Infrastructure elements*

The following are among the Infrastructure elements that can be managed by ***IIDSC***:

- Water distribution systems.
- Water resources (including ground water).
- Wastewater networks and treatment facilities.
- Roads networks.
- Electricity / Power networks.
- Housing & Lands register.
- Telecommunications networks.
- Solid waste disposal sites and collection networks.
- Harbors, airport and other main infrastructures.

7. *Geomatics:*

A baseline study is needed to materialise the Centre in a realistic and profitable work.

Objectives of introducing GIS as seen by concerned officials in Urban cities seems to be limited to producing maps and a database system. Sources of information are mainly the

billing system of the municipalities. The municipal staff is the collectors, analysts, as well as the designers. Furthermore, the municipalities never thought in applying spatial models in their activities in delivering municipal services. Nevertheless, all the institutions seem to be in agreement of the potential in the GIS use as a management tool.
It is evident that current institutions with GIS. Production of base maps seems to be the main purpose of the GIS to serve the different users..
Today's vast and complex infrastructure problems call for interdisciplinary solution approaches at a political as well as at a professional level. *Therefore, the development of IIDSC will move toward a balanced sustained developed future*. *Also, Urban cities in its resources associated with many severe Infrastructure problems seem to be ideally suited for this technology.*

8. BIM as a base for Infrastructure Management:

Asset and infrastructure management is a critical component of infrastructure projects, involving the systematic and coordinated activities required to optimise the lifecycle of physical assets, such as buildings, bridges, roads, and utilities. Effective asset management ensures that these infrastructure components remain functional, safe, and cost-effective throughout their operational lifespan.

It is essential for Urban cities to master this technology.

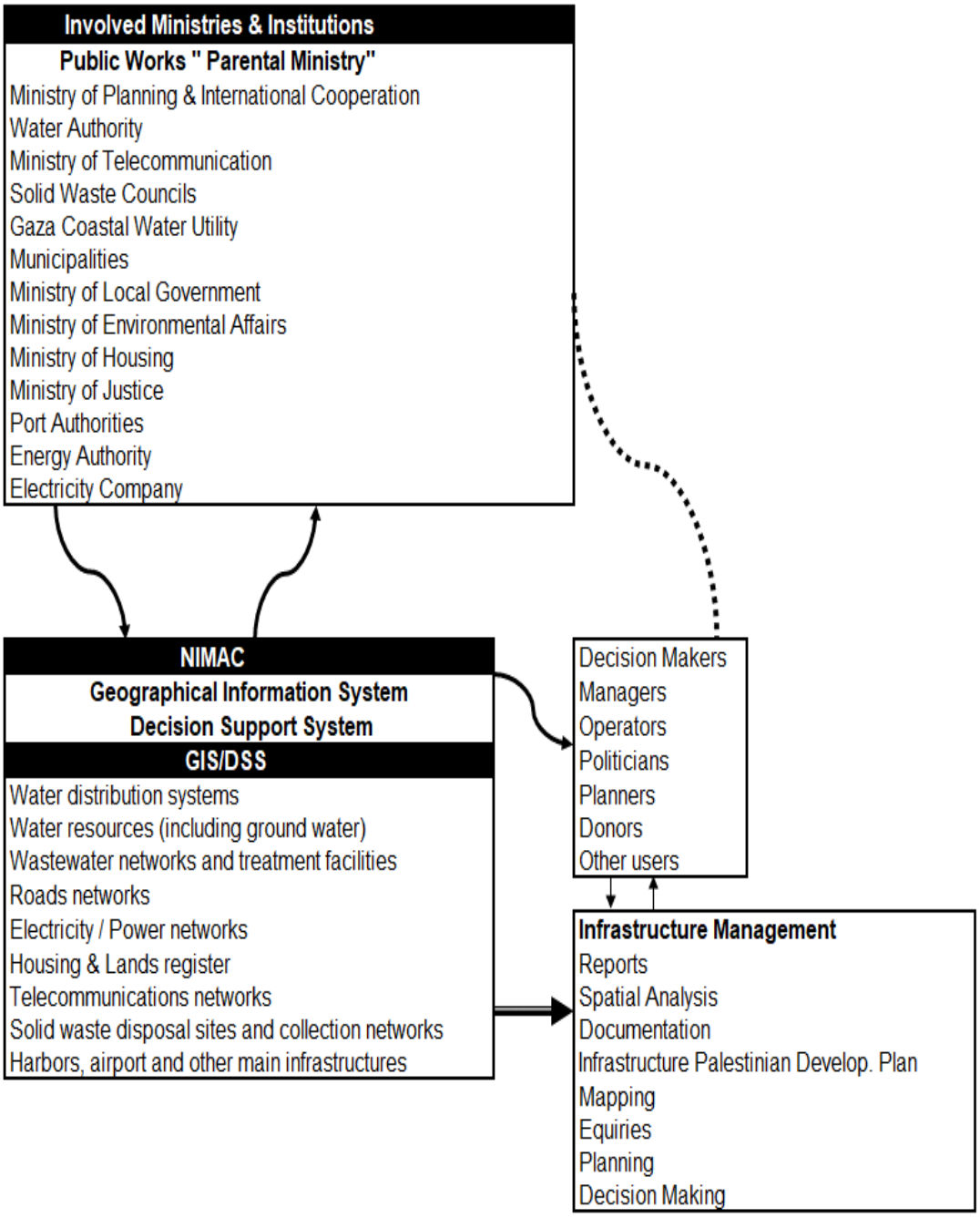
9. Decision Support System (DSS)

Using GIS solely falls short of achieving the attainable ultimate benefit. GIS in conjunction with decision support systems (DSS) can have a great role in planning, design, budgeting, and operation and maintenance.
A Decision Support System (DSS) implies data processing and analysis that generates results to be used in decision making. Such DSS is applicable in all infrastructure sectors. The DSS is designed to meet the needs and resources available to each sector.
In general, the following considerations should be considered whenever designing a DSS:

- ✓ DSS must function within the organisational structure of a given agency.
- ✓ DSS must consider the flow of requests for decision support from decision- maker to the technical staff.
- ✓ DSS must generate meaningful results from data to support decision making.
- ✓ The database for DSS should have temporal and spatial identifications.

Production of base maps seems to be the main purpose of the GIS to serve the different users. No decision support system has been implemented in Urban cities.

10. Operational Chart of IIDSC



11. Our approach to Setup national Centres in Middle Eastern Countries:

1> Forming the Board of Institutions heads
2> Contracting the British Centre to establish the IIDSC (Five years)
3> Baseline study
4> Strategic Plan and Executive Plans
5> Setting out the services costing structure
6> Starting the IIDSC services (Contractors, institutions, Planners, Developers)
7> Training of local staff
8> Handover the IIDSC to the Board

12. Training Centre of IIDSC:

A vital part of the sustainability of the work of IIDSC is to train the staff of the concerned institutions/ministries to perform professional tasks. This would include training programmes (in house) on GIS, DSS, Mapping, Field surveying, Data acquisition, RD equipment, Networking, documentation, reporting, IIDSC software development, Database, and other programmes.
The training would also include field work and live training on IIDSC to have a ready to work-team.

13. Required Data for IIDSC in Urban cities

Principal goal here is to compile a national database from various sources to be able to best meet the information needs for the formulation and implementation of NIICE. The contents of such a database has to be closely related to Urban cities principal infrastructure problems, issues and coupled with standard geographical layers, such as topography and population. Examples of the required data are as follows:

- Inventory data on physical description of infrastructure facilities including geographically based construction and material data.
- Usage history of the infrastructure (e.g. water usage for water supply systems)
- Conditions for monitoring and evaluation data
- Maintenance history and operation data
- Maintenance intervention criteria, decision criteria, maintenance policy, unit cost and budget data
- Design and analysis data
- Maintenance and construction priority list data

14. Data Details

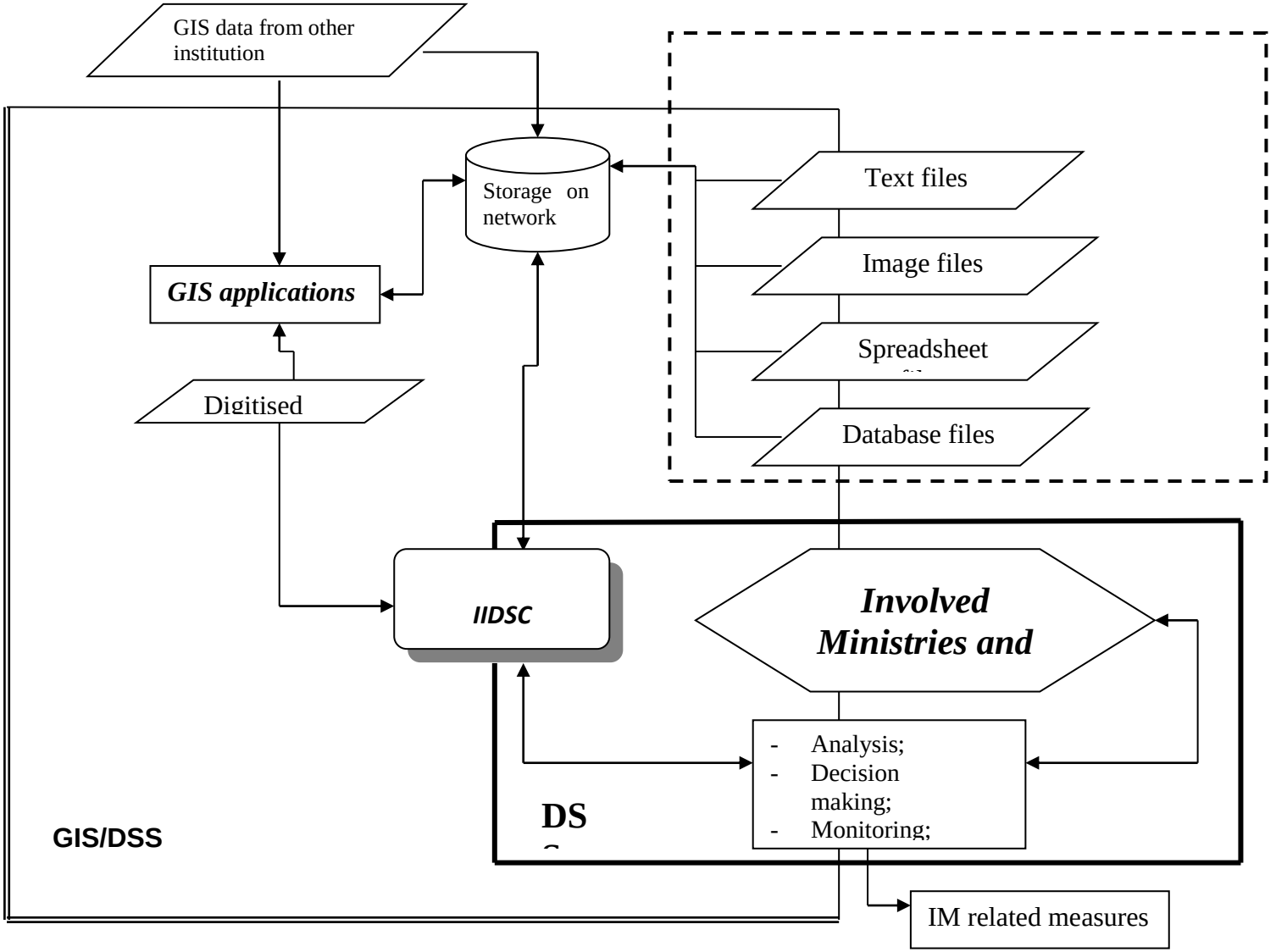
Levels of data detail are important because cost of data collection is expensive. Therefore the following levels of data details are proposed throughout for the NIICE to ensure satisfaction of data requirements at different levels of decision making.

- Sectorial level: Includes data aiming at the comparison between the infrastructure sector with other sectors such as health, and others.
- Infrastructure Network level: The data collected aims at planning priorities and scheduling of operation and maintenance work within the overall budget constrains
- Project level: Data required for physical implementation of infrastructure network decisions.
- Operational level: Data required for operation management.
- Research and Development level: Detailed and precise data should be collected.

N.B. These data will be collected/acquired/updated on different frequencies as needed.

To summarize, the present use of the GIS is restricted to producing maps and does not represent an effective management tool. Moreover, the institutional set-up has overlapping and conflicting roles and responsibilities and, thus; lacking any proper and effective decision support system (DSS).

Data Flow for National Infrastructure Information & Management Centre (IIDSC)



Sample DSS Framework for Water Supply Infrastructure