Document for studying and evaluating human resources and their need for training

Consulting engineering services project to study the

development of geographical information in the municipality of Medi

2013-06-09 AD

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Reviews

The name	Occupation
M. Hassan Jabaei	Project manager

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Project information

Project information	
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the beneficiary		The project is sponsored by the Secretariat	M. Walid Barakat
The representative of the beneficiary		Project manager from the Secretariat	M. Akram Alsarani
Project manager from the implementing agency		Project Manager from the Implementing Entity:	M. Hassan Jabaei

A general definition of the project

The project aims to develop a strategic plan to develop geographic information systems in the Municipality and to establish an electronic

infrastructure for geographic information. The plan is based on defining the future vision of the secretariat in relation to geographic information

systems and identifying future initiatives and projects required to achieve the vision and strategic tasks. The plan also defines the roadmap and

provides the operational tools for developing geographic information systems in the secretariat for the next three to five years.

The project also aims to prepare a plan to transform the currently used work environment. *MapInfo* In Medina Municipality to the new work

environment *Esri* Based on the standards and criteria approved by the Ministry of Municipal and Rural Affairs.

The project includes the following main elements:

- Study and evaluation of the current situation and geographical data available to the Secretariat

- Preparing a strategic plan to develop the geographical information system in the Secretariat

- Issue recommendations for establishing an electronic infrastructure for spatial information (*SDI* In the Secretariat

- Preparing a brochure of conditions and technical specifications for the project of transferring data and applications of the

  system *GIS* From the current situation " *MapInfo* To the new work environment *Esri*

an introduction

Geographic information systems consist of five basic elements: spatial information, descriptive, technical infrastructure (computers), application programs, qualified technical staff, standards and work procedures.

This report focuses on the technical staff, as the technical staff is an important part and essential factor in geographic information systems, and the points that must be taken into consideration for the technical staff, which are related to education, training, budgeting, management and coordination.

As GIS includes people of various disciplines, including administrators, programmers, engineers and geographers. We also find a discrepancy in the degree of education, so we find some specialists in geographic information systems who hold a diploma or a bachelor's degree, and others hold a higher degree such as masters and doctorates. For the successful application and activation of geographic information systems in any institution, all employees of that institution must be involved in the stages of project implementation, from analyzing and specifying requirements, setting goals, requesting proposals and determining the appropriate ones.

The strength and success of any institution in implementing and activating geographic information systems is measured by the strength of its technical staff in this field. Therefore, guidelines for training, encouragement, reward, building and development of the technical capabilities of the technical staff to face the changes and development in the field of GIS.

The importance of the technical staff to operate and maintain the geographical information system

A well-trained technical staff to manage and operate this system is one of the effective elements, as it is assumed to have the ability to spatial analysis and good knowledge to deal with specialized media and sites, and a high possibility of using the programs prepared in these systems. These systems have a level of efficiency and they are:

- Academic achievement: It refers to the specialization as it must be compatible with the work of this system.

- Using flexible methods of dealing with the system, knowing the system's capabilities and exploiting the features available in it efficiently and flexibly to obtain the best desired results.

- The ability to deal with the information network and specialized data sources that it can access.

The level of academic achievement and the quality of specialization are the two basic rules on which work is being done to prepare the staff who is responsible for operating and managing this system, and then comes the role of experience that must be obtained through training and practice in the field of work to which it is entrusted, and corresponding to the use of GIS applications And training courses on operating the system and making use of its features that contribute to achieving this goal.

In order to implement and activate the uses of geographic information systems on a large scale in the Secretariat, this requires the qualification of users with different levels of knowledge and experience with GIS, and continuous training and capacity building should be made to keep pace with the rapid progress in the field of geographic information systems, and this includes trained and qualified technical staff who It will be his responsibility to maintain and operate the system.

The goal of the report

The main objective of the report is to evaluate and analyze the expertise and qualifications of the secretariat in the field of geographic information systems, and to develop a detailed plan for building and strengthening capacities and qualifying the current technical staff in the Department of Geographic Information Systems and other departments for the successful application and activation of GIS in the Secretariat.

Report content

During the interview phase, identification and analysis of requirements and their priorities, the departments 'technical staff have been identified who will be the main users of GIS when the process of converting the environment currently used from MapInfo products to ESRI products.

This report includes:

- Developing, building and strengthening capacities by preparing a training plan based on the human resources, technical staff and skills present in the departments of the Secretariat in general and the management of geographic information systems in particular, and based on what is required and expected to operate an effective GIS system in the Secretariat.

- Describe For sessions Training

Capacity building and strengthening

With the adoption of the Medina Municipality to use, implement and activate a central geographic information system that adopts ESRI technologies supported by geographic applications, it will be important to develop and build multiple levels of skills and capabilities in GIS systems capable of activating, operating and developing the system later, and this requires not only technical training, but Also, capacity building at all levels to enhance the appropriate technical skills required to achieve optimal use of geographic information systems. The plan and methodology of training and qualification of technical personnel is consistent with the approach adopted by the Secretariat to develop and build capacity for employees.

Principles for capacity building and strengthening

In order to establish, operationalize and deploy a pilot GIS, it is important for the Secretariat to consider adopting the following principles and methodologies:

1. Adopting a policy and framework for implementation that ensures compatibility between the secretariat's business strategy and procedures and geographic information systems.

2. Promoting and adopting an open communication environment for coordination between employees on various aspects related to work and routine procedures, information exchange, as well as developing the Secretariat's projects.

8. Building a culture of change management, and creating an advanced vision for project management, making it visible and available to all.

1. Introducing some criteria into the routine of management activities without neglecting flexibility and innovation.

2. Developing flexible capacity-building programs specifically designed for the secretariat's staff, which will encourage the decision-makers in the secretariat to work on continuous self-development. This leads to improved employee experience in several areas, including specialization in geographic information systems and information technology.

Operating levels

Generally, the available resources and potential operators of the system can be classified into administrative levels, professional levels, technical levels, and operational levels.
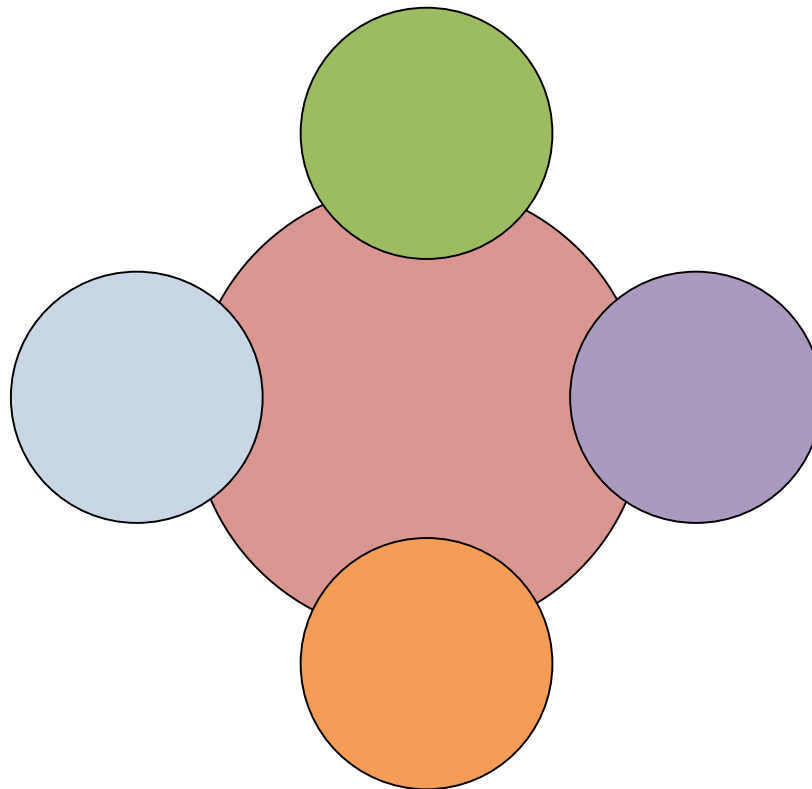
Figure 1: Operating levels

- Administrative levels: It consists of users at the management level, including administrative directors, department directors, heads of departments, and some department employees whose tasks require browsing data only.

- Professional levels: consist of the employees who supervise the operation of the GIS system and the development of new requirements. They will also carry out complex tasks such as analyzing, providing assistance and solving user problems. This category includes engineers.

- Technical levels: It consists of the employees who will work on the following tasks:

  1. GIS system on a daily basis, as it will require full access to the GIS system and application developments.

  2. System maintenance.

8. Hardware maintenance, and this category includes database administrators, system administrators, programmers, and geographic information systems analysts.

- Operational levels: It consists of employees who use the system on a daily basis to collect, update and enter data, prepare and print maps, prepare and print analytical reports. This category includes painters, technicians, operators and surveyors.

In this report, training for employees will be defined on the basis of the employee's career field (administrative, professional, technical, or operational).

Categories of trainees

The following is a description of the various categories of trainees:
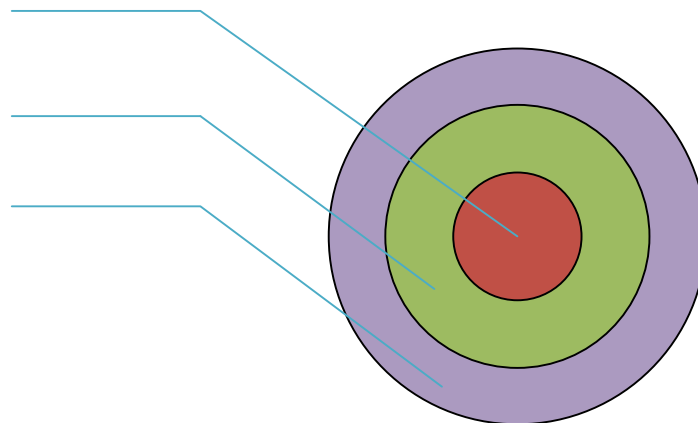
the shape 2: **Categories of trainees**

- End users: will be trained to operate web applications and geographic information systems, and this is the vast majority of users who receive detailed training on the main functions of the system applications that will serve them in their day-to-day work. These users can be one of the following categories:

1. Data surfers

2. Business application users

8. Users of geographic information systems applications

- Advanced users: They will be trained to use the GIS program and its annexes, as this training can be directed to users specializing in a specific field such as planning and who use advanced functions to conduct detailed studies or conduct strategic evaluation for decision-making. And these users are the most powerful users.

- Development staff: They will be trained in programming and developing geographic applications at the GIS Department. System

- Administration: They will be trained to administer the system

- The training plan will progress from simple to advanced levels.

The figure below highlights the depth of training provided to each level of GIS user.
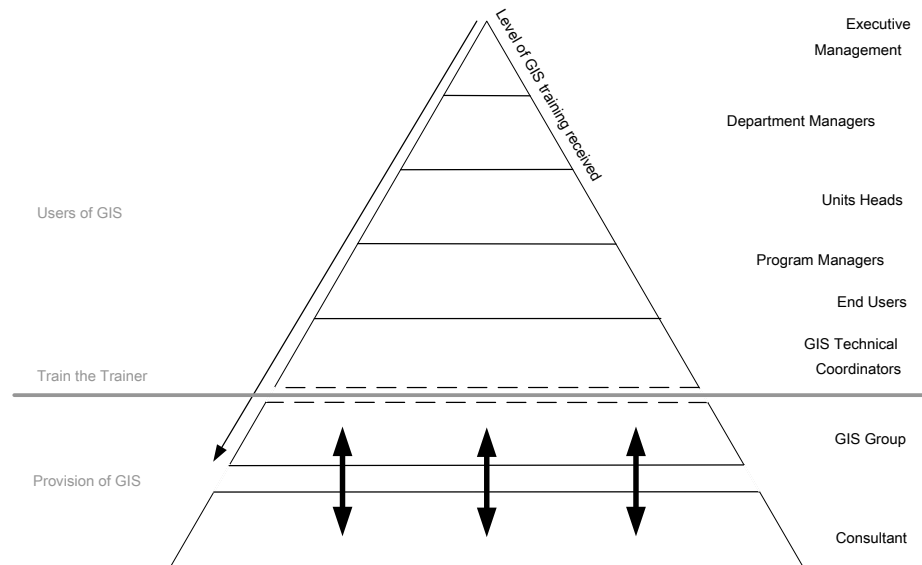
the shape 3: **GIS user levels versus training level**

Evaluating the technical capabilities of the staff

The Khatib and Alami team worked closely with the departments in the secretariat, especially with the employees of the GIS department in the secretariat, relying on experiences and experiences in working with employees during the interview, evaluation and analysis phase, as Khatib and Alami identified the employees' needs for training and enhancing their capabilities in terms of relevance to their responsibilities and jobs in managing systems Geographical information now and in the future.
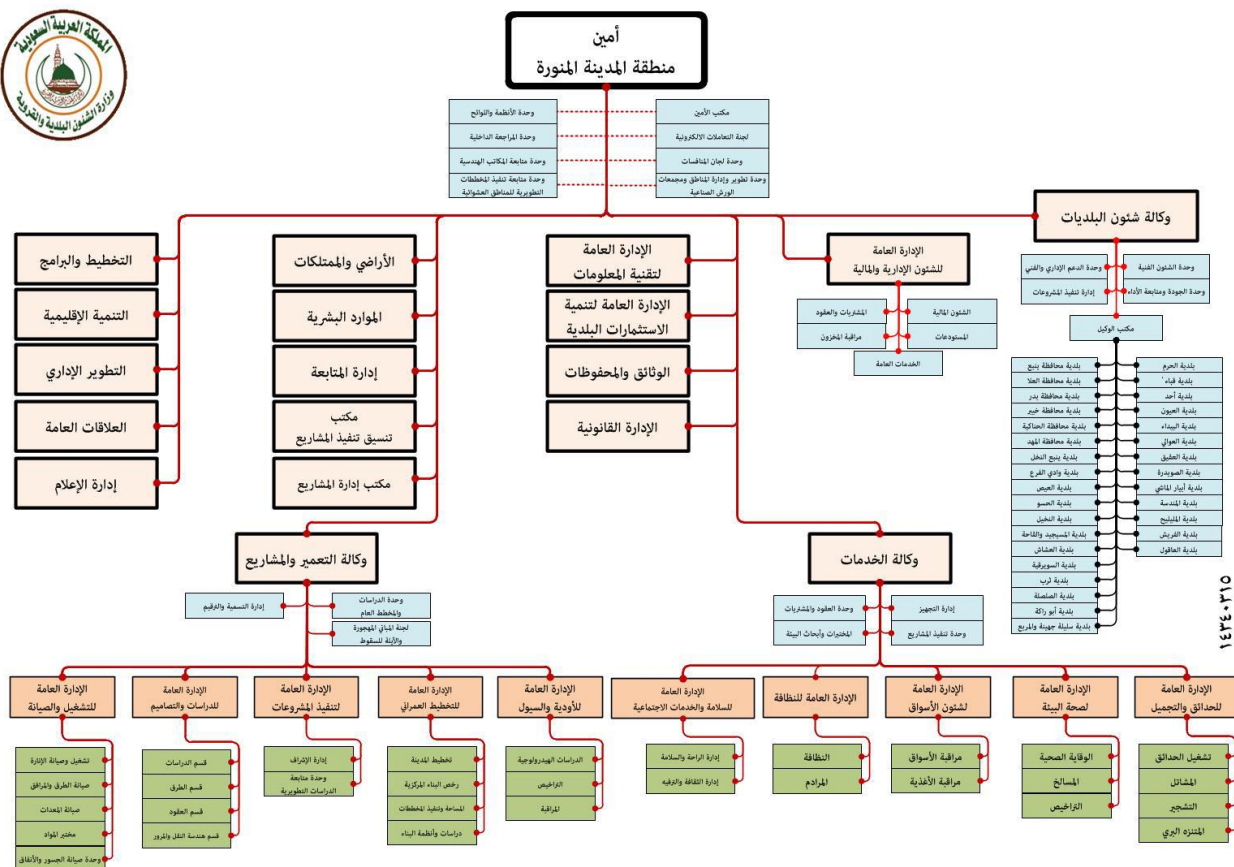
the shape 4: The organizational structure of the Municipality of Medina

The current organizational structure

Geographic Information Systems Department

The following is the organizational structure of the General Department of Information Technology showing the location of the Department of Geographic Information Syst

```
                        Information Technology Management
    ┌──────────┬──────────┬──────────┬──────────┬──────────┐
Maintenance   Training   Service    Information  Information  Systems
unit f        unit f     unit       Systems Unit Security Unit Development Unit
Networks      Technical  e          Geography
              support
```
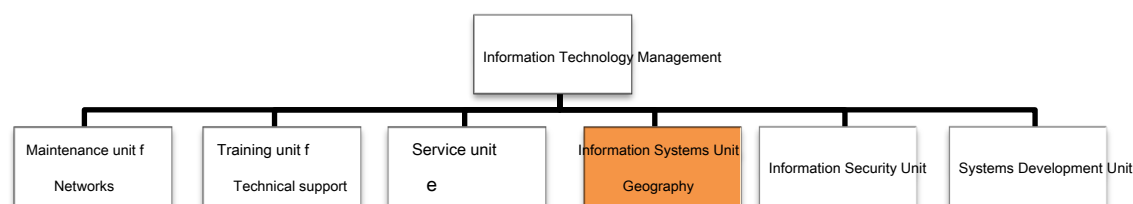
the shape 5: **The organizational structure of the General Administration of Information Technology**

```
                    manager director
                           │
                    Assistant Director of Administration
                           │
                              Assistant
    ┌──────────┬──────────┬──────────┐
Data analyst  Data analyst  System Analyst /  Business Analyst \
                            Programmer        And programmer
```
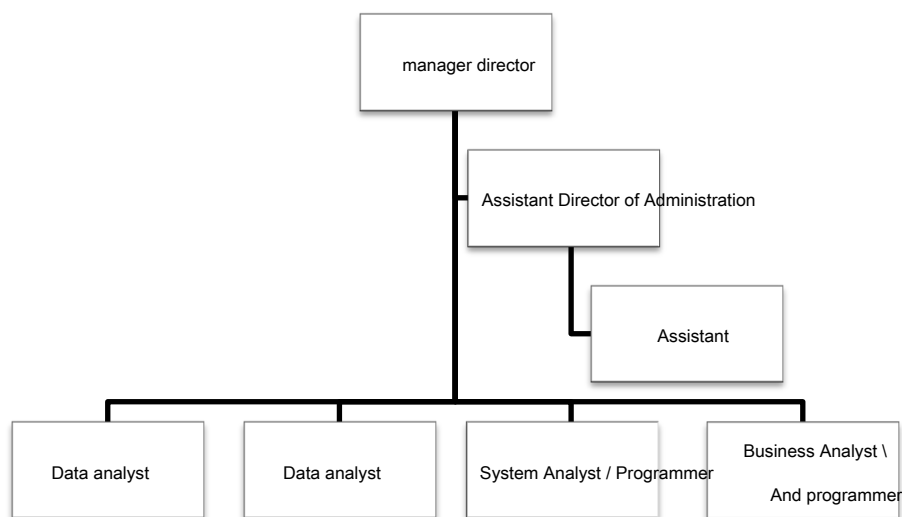
Figure 6: The current organizational structure of the GIS department

The table below highlights the current job positions and responsibilities of the GIS management staff:

Current job location	Responsibilities
Systems Department Manager Geographical information	• Strategic planning to upgrade the geographic information systems in the secretariat • Establishing a growth plan for GIS in the short and long term, providing leadership and focusing on aspects of GIS development • Coordinate and supervise the activities and tasks of GIS management and employees such as (spatial analysis, data models, developing and managing databases, index data, updating maps and GIS data, quality assurance standards and procedures) • Interacting with departments in the secretariat to meet the needs and requests of other departments.

Assistant Director of
 	
Geographic Information Systems Department
	• Supervising programmers and securing their needs.
	• Coordinating meetings with other agencies. Follow up
	• on transactions and their procedures
	• Responsible for change management in terms of applications and
	• geographic data, playing the role of a geographic information system analyst, including:
	   • Collecting and evaluating
	   • geographical data Design and printing of maps
	   • Analyze data according to users' needs
	   • Transferring data to geographic information systems and residing in index data.
	   • Verifying the accuracy and validity of geographical data
	   • Design, prepare and define digital maps.
	• Install Linux OS
	• Define servers
	• Contribute to the systems architecture
	• Linux OS support,
	• application scan

Assistant	• Map design and printing • Geographical data correction • Verify the accuracy and correctness of the data

Current job location	Responsibilities
	• Designing, preparing, editing and printing digital maps to • follow up on projects' work • Application maintenance (MapInfo)
Data analyst / number 2	• Design and production of geographic information systems maps • Analyze data according to user needs in order to produce the maps required to collect, evaluate • and automate the data • Transforming data into geographic information systems, housing pilot data, 3D analysis • and modeling (D8), network analyzes, verifying data accuracy and correctness, and • implementing quality control procedures Designing, preparing and editing digital maps • and printing paper maps • Design symbols and colors for digital maps
Business Analyst / Programmer	• Gather business requirements and translate them into system requirements • Web & Desktop Application development. Correction of geographic • information systems data • Screening applications
System Analyst / Programmer	• Follow up on applications, maintain them and ensure their continuity. • Collect business requirements and translate them into system • requirements. System design processes according to business requirements • Web & Desktop Application development. Participate in building • spatial databases. • GIS applications test. Central server • management of the system • Installing, definitions and updating the Oracle server software and the necessary • software Create and follow up backup and restore operations Work as part of a • team to provide support when needed • Linux OS installation • Define application servers • Define web servers

Current job location	Responsibilities
	• Installing web applications • Server setup and load balancing verification • Preparing and designing the architectural structure of the systems

Table 1: Responsibilities for the current staff

The proposed organizational structure

This clause includes the types and levels of individuals who will be subject to various decision-making rights. The proposed organizational structure

also aims to facilitate the decision-making process for the concerned persons while maintaining the channels of information exchange and

communication open to leave the space available for others who may not be directly concerned with the matter to express their opinions. The

structure also provides a mechanism that allows decisions to be raised to higher levels when lower levels fail to reach the appropriate consensus,

to ensure that appropriate solutions are reached.

We will clarify the responsibilities and detailed roles of the various departments of the secretariat concerned with implementing the strategic plan for

geographic information systems, noting that the intention of all of this is to provide a general guide for the roles and responsibilities in the

Municipality of Madinah without excluding any amendments that may occur in the future to serve the initiatives of the GIS management
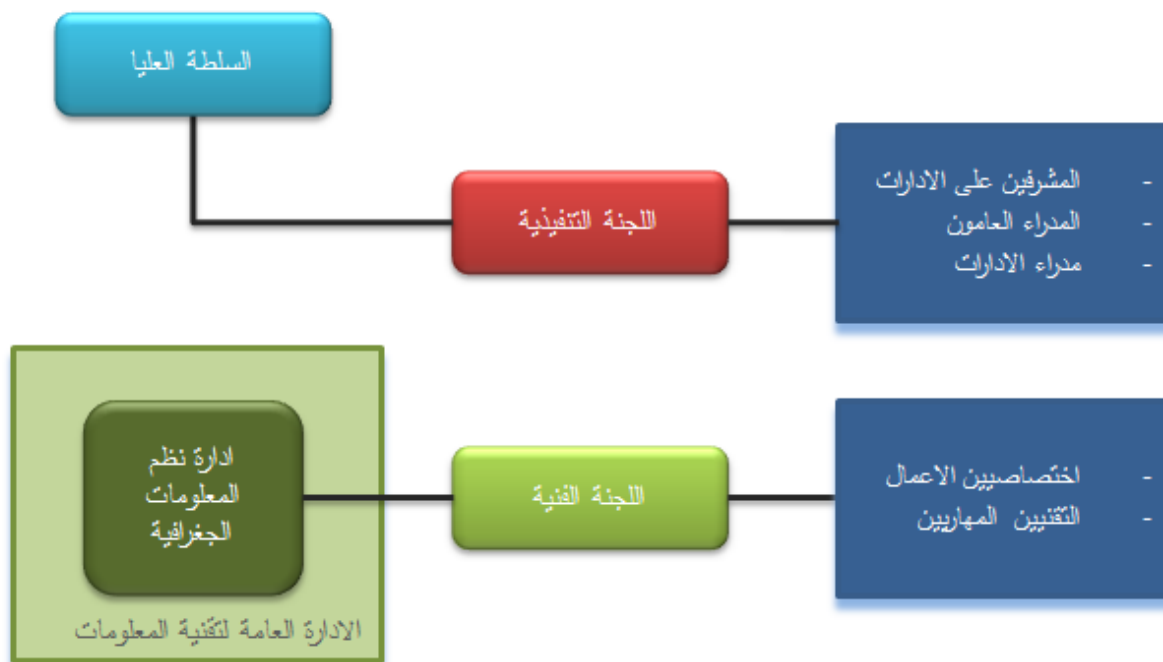
Figure 7: Typical Architecture Diagram

The chart above highlights the following:

- The Department of Geographic Information Systems is a sub-department of the General Administration of Information Technology.

- The General Administration of Information Technology submits reports to higher authorities

- The Executive Committee and the Technical Committee act as a coordinating and advisory body

- The Executive Committee is made up of directors and directors of business departments

- The technical committee is comprised of technical initiators and business professionals

- The executive and technical committees serve the requirements of geographic information systems in particular in addition to the

  requirements of the general administration of information technology in general.

Supreme authority

The highest authority is the agency responsible for implementing the GIS strategy. This entity may be represented by the Secretary, the agent,

or any other body that bears the responsibility of evaluating the goals and objectives of the GIS.

executive committee

The function of the executive committee revolves around representing all departments through their directors, in a manner that ensures the

expression of interests and priorities of all departments during the decision-making process. It will also have a leading role in evaluating and

coordinating issues related to geographic information systems in the Municipality of Medina at the institutional level, and managing GIS policies, in

addition to deciding on issues that cannot be addressed at the level of the technical committee.

Technical Committee

This committee includes members from various units and departments of the Medina Municipality. The formed team is seen as a team of technical

initiators who are originally business professionals in every department. This committee holds its meetings at least once a month with the aim of

technical coordination across various departments, including matters related to GIS components (for example: applications, databases,

infrastructure, and capacity building of stakeholders). The committee also has the right to form groups for a specific period of time in order to

address technical issues according to

the need. It is taken into consideration when selecting the members of the technical committee, that is, its members are among the initiators or direct users in each department.

Department of Geographic Information Systems

The personnel of the Geographic Information Systems Department provide support to the geographic system development process. From this standpoint, the administration should be strengthened with highly qualified and efficient individuals to ensure their ability to meet all users' needs, otherwise other departments will independently secure their needs in this field. Since most GIS work is performed and performed by consultants and contractors, criteria for selecting contractors / consultants and evaluating proposals are extremely important.

The personnel of this department support users' activities in the use and development of data and applications. These responsibilities include system administration, technical assistance, project implementation, training, assistance in developing new applications and databases, in addition to operating various systems.

Users of geographic information systems in different departments

Different departments can include specialized GIS users to fulfill the following roles:

- Users of geographic information systems applications and tools.
- Geographic information systems analysts with specialized experience. The GIS department can train employees in various departments to carry out the basic tasks of geographical analysis, issuing maps, and representing data. However, in some cases, some needs require the process of storing the results of the analysis in the central database, in which case it is necessary for the employees of the GIS department to intervene to complete the required. If the request for these operations is repeated several times, then the management personnel will be used to automate these processes.

The job structure of the geographic information systems team

اللجنة التنفيذية - - - - اللجنة الفنية

ادارة نظم المعلومات الجغرافية

مدير ادارة نظم المعلومات الجغرافية

مساعد مدير ادارة نظم المعلومات الجغرافية

وحدة التواصل والعلاقات

عمليات الدعم (Help Desk)

ادارة المشاريع

البيانات

الانظمة والتطبيقات

التدريب
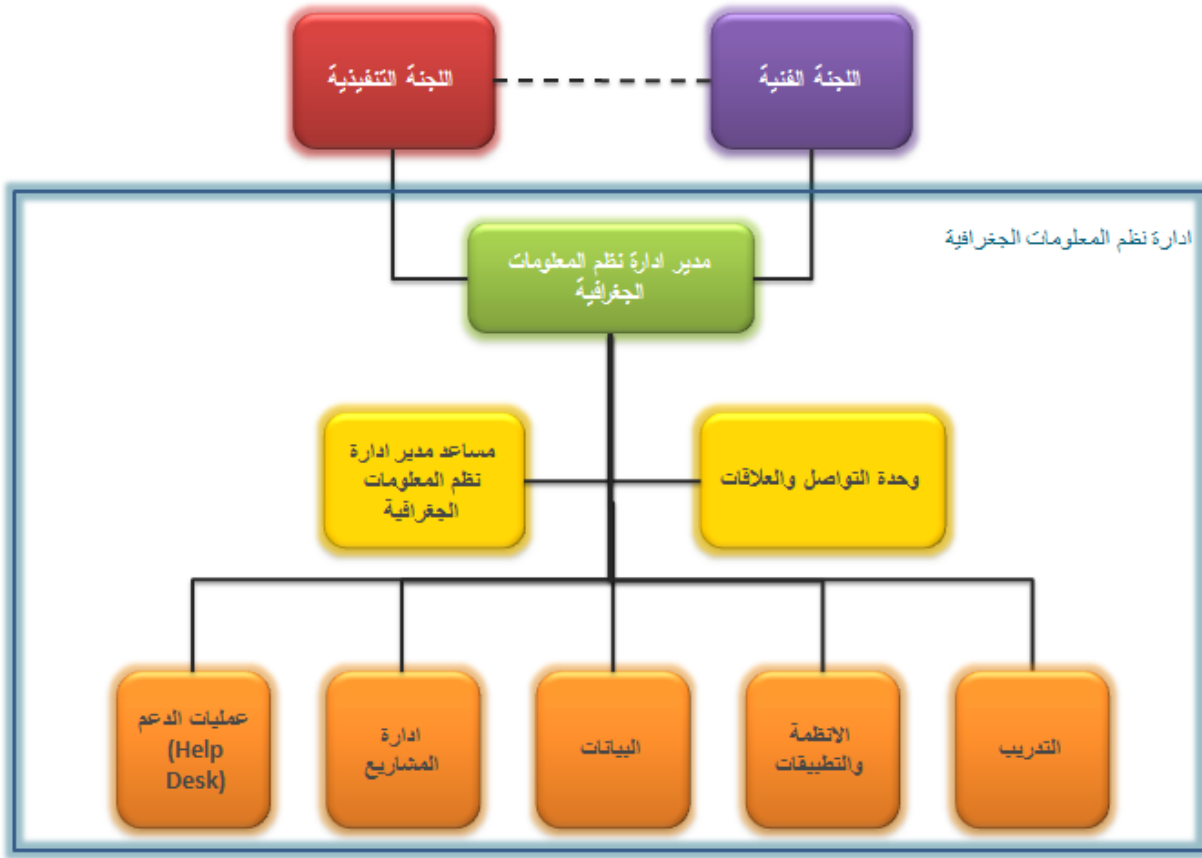
Figure 3: The functional structure of the GIS team

The technical team is responsible for providing technical services to establish, operate and maintain the administration of geographic information systems, geographic data, applications, and provide emergency support and training services. The team is headed by the Director of the Geographic Information Systems Department, as this team consists of the following groups:

- Support and support operations
- Project management and consulting services
- Data development services
- Application development services
- Training

Tasks and responsibilities of geographic information systems management

It is hoped to provide the necessary support and administrative support for the management of geographic information systems in order to be able

to carry out its responsibilities through communication with departments and external bodies in addition to internal communication with all

departments of the secretariat. The importance of this role lies in building communication channels between the employees of the administration on the one hand and all t

- **Director of Geographic Information Systems:** He is responsible for managing the administration in addition to coordinating efforts

  between the executive committee and chairing the technical committee. This manager has the support of a team of heads of technical

  teams, each of which is specialized in a specific field. The manager also has to promote the administration and its services.

- **Operations Support Team:** This group undertakes the daily system administration tasks and its members are supposed to possess

  basic skills such as managing databases and repairing software-related technical failures. This team will also be responsible for

  coordinating the activities of the systems department with the General Department of Information Technology. His responsibilities include:

  - Geographic Information Systems Manager: The team is responsible for analyzing, designing, implementing, and maintaining systems architecture

    Geographical information. These tasks are critical to achieving non-functional requirements such as performance, availability, and

    security.

    Systems evaluation

    Designing and sizing the geographic system

    Geospatial installation and configuration

    Geographical system synthesis

  - Spatial Information Management: Spatial data is the basis of geographic information systems. It is therefore imperative that

    spatial data management take a wide place of attention by implementing stringent procedures for data uploading, security,

    consistency, integrity, backup, and synthesis.

    Geospatial database management and synthesis

    Security and geographic database availability

    Geo database recovery

Copy management

- Web Services Administration: This team is responsible for managing web services, which includes:

    Data publishing services

    Metadata services

    Application services

    Development and analysis of mapping services

- Helpdesk: This team provides answers and answers to questions and provides solutions to simple problems. As for complex

    problems, they will be referred to the appropriate and competent person.

- **Consulting and Project Management Team:** This team is responsible for assessing the current state of the department and making

    necessary proposals and additional improvements. In addition, this team provides consultancy services related to geographic

    information systems with regard to conducting an assessment of user needs, defining requirements for geographic information systems,

    and proposing system development proposals in the various departments of the secretariat based on the scope and requirements of the

    business. This team also provides advice to the technical committee. The services of this team are summarized as follows:

    - User needs assessment

    - Geographic information systems

    - analysis implementation plans

    - Preparing tenders

    - Project management, including projects that are outsourced to documentation

    -

- **Data development team:** Geographic information systems include a mixture of data that form the basic unit of this technology. Usually,

    the process of developing a large volume of data is initially outsourced. As soon as this step (data transfer) is completed, the GIS team,

    in turn, takes over responsibility for data and databases for the modernization and maintenance authority, especially for matters of

    importance at the level of the Secretariat and its various departments, while working hard to implement the update processes based on

    the agreed work procedures established to develop and modify the data. Data management tasks include the following:

- Modeling and design of databases at the physical level. Data

- collection and preparation

- Data evaluation

- Geo-reference identification / handling of aerial and satellite imagery and

- projections

- Data transfer

- Format conversion (formula)

- 3D model development,

- metadata generation

- Quality assurance and control procedures Quality

- assurance and control practice Map design (map

- template design)

- Layer design (coding, display, annotations)

- **Application development team:** This team is responsible for the simple task of designing, programming and testing GIS software. In addition, the Applications team designs and implements limited systems that focus on mobile and desktop applications and those that are linked to the Internet and servers. Every development task is treated as a project that requires design, writing, and testing. It is assumed that the members of this team have high experience and skills in GIS practices. The applications team also tests and checks the quality of the applications submitted by the consultants. This requires a solid background in Web technologies, including programming and web design. The team implements additional job development processes that are possible in the event of the availability of human resources and sufficient time. The services of this team are summarized in the following tasks:

  - Application design

  - Office application development

  - Mobile application development

  - Server application development

  - Web development

- Training materials and instructional references

- the test

- **Training team:** This team handles internal training tasks. Initially, I run systems <u>the information</u> Geographical appointment of a training coordinator to oversee the identification of needs, and the development of training programs in addition to coordinating training activities. At this stage, a third party may undertake the training. At a later stage, after acquiring the required skills, the training team prepares and provides the necessary training to the various employees of the secretariat's departments or any new employee joining the Department of Geographic Information Systems. Training and mentoring is needed at several levels. The need also arises to maintain the continuity of spreading awareness at different levels and to support capacity building internally, especially when focusing on sharing geographical data. It is also recommended to hold a series of awareness-raising courses that focus on the vertical application of this technology (for example, planning, transportation, utilities, and land management), and initial training will be required to introduce GIS software.

Suggested job titles

The table below shows the proposed and required job titles for management as an initial stage. Where the number of the staff increases in conjunction with the demand and need for employees. The staff list below focuses on professional employees. It is also necessary to provide some administrative staff for administrative and secretarial affairs.

the number	Job title	Unit	the number Minimum *	the number Maximum **
1.	Systems manager <u>The information</u> C.		1	1
2.	Geographical Assistant Director of Geographic Information Systems (he can deal with following up communication channels and job awareness with the support of the GIS consultant and coordinator <u>Training)</u>		1	1
3.	Geographical database manager / data security and protection / systems analyst	Operations Support Unit	1	2
4.	Geographic information systems consultant / project management and consulting unit analyst		2	4

the number	Job title	Unit	the number Minimum *	the number Maximum **
	Business			
5.	Spatial Data Expert / Database Designer	Data Development and Processing Unit	1	2
6.	Geo data technician / geographic information systems analyst / rapher map art expert Cartog	Data Development and Processing	2	6
7.	programs developer	Unit Application Development Unit	2	4
8.	Training Coordinator (He will perform the duties of this position as a business analyst until there is a need for an additional full-time person)	Training unit		1
Total			10	21

Table 2: The proposed job titles

Minimum number *: is the minimum number of persons required at this stage to operate geographic information systems.

The maximum number **: It is the maximum number of people that can grow in the next 2 years with the expansion of geographic information systems in Medina Municipality.
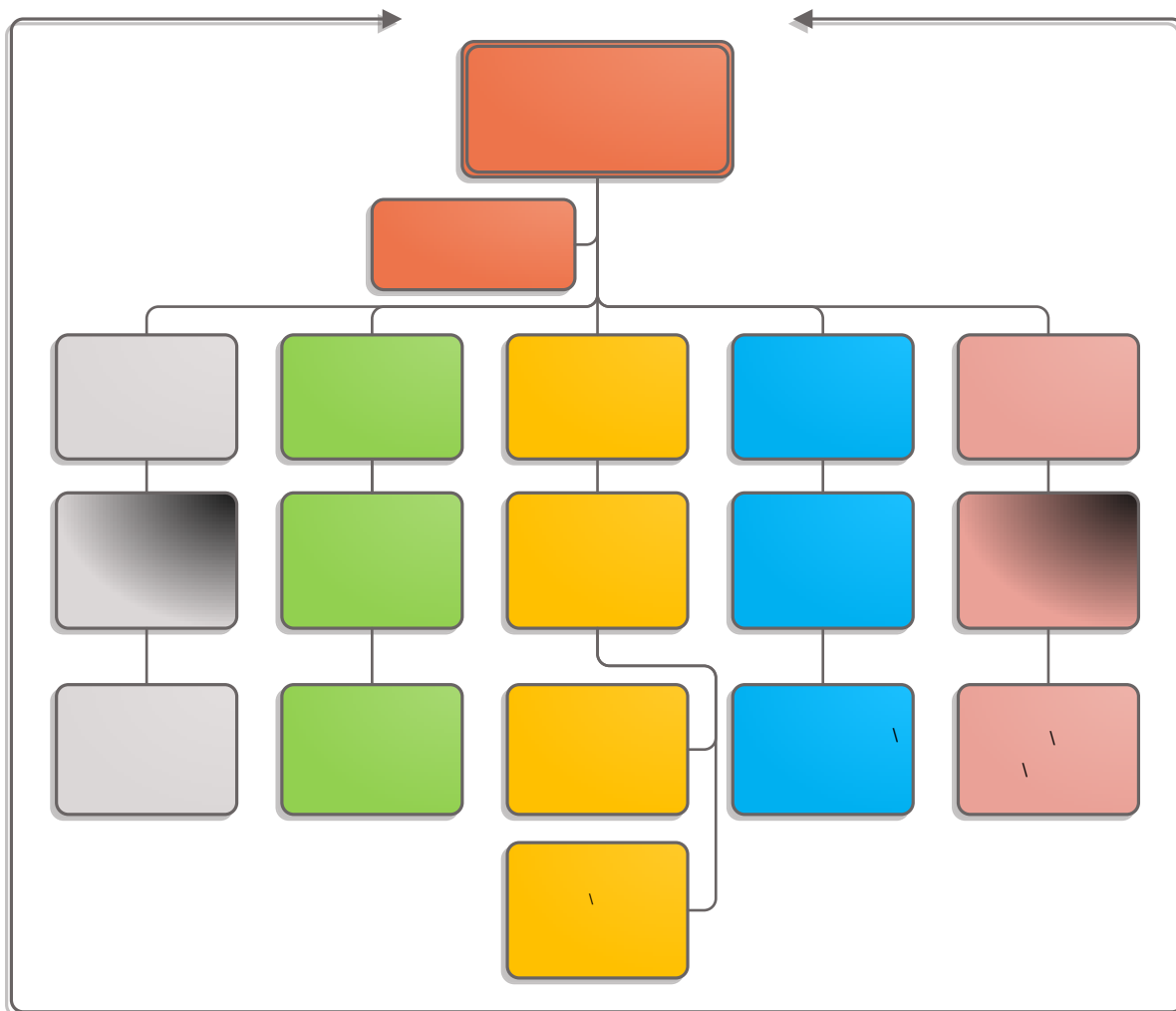
Figure 9: The organizational structure of the GIS department

Analyzing employee skills

This section focuses on identifying the skills of the technical staff present in managing geographic information systems, and on identifying the skills required for each job title based on the proposed organizational structure. It also includes analyzing gaps in order to reach the training requirements that each employee must acquire.

Each of the existing employees has been appointed to fill a position in the new structure based on their current skills.

| Identify training needs | → | Analyze gaps in skills | → | Map each resource to a position | → | Identify skills required by position | → | Identify skills of exiting resources |

Figure 11: Assessment of technical staff skills

Skills will be classified according to the table below:

Classification	The level of classification	Classification description
0	unaware	Nothing is known about it
1	Aware	Has knowledge and is familiar with concepts but has never applied them in real situations
2	effective	Possess the knowledge or skills necessary for routine situations, sometimes requiring Guidance
3	Deft	Possesses a wide range of knowledge, experience and skills to handle cases Complex without directing
4	expert	Trains and supports others to benefit from his extensive, specialized expertise

Table 8: Classification level

Skills assessment of current human cadres

The table below shows the current skills of the human cadres based on the classification level that was shown in Table 8:

Langs	SW / Extensions uage	Data Development	GIS / Spatial DataManagement	App Design & Development	Professional Services	General Skills	
3 4							GIS Manager
3 4							GIS Manager Assistant
3 4		3 3 2 2 3 3 3 3 3 3 3 3 3 3 3		3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 2 2 3 3 3 2 3			Assistant
3 4		3 3 3 2 3 3 3 3 3	3 3 3	3 3 3 3 3 3 2 2 2	3 3 3 3 3 2 2		Data Analyst
3 2		3	3 3 3 3 3	2 3 3 3 3	3 3 3 3 2	2 2	System Analyst / Developer
3 4		2	3 3 3 3 3	2 2 2 3	3 3 3	2 2	Business Analyst / Developer

Table 4: Current employee skills

Column headers (reading vertically, left to right):

- Arabic, English
- Project Management Skills, Team Leadership, Planning Skills, Documentation / Writing Skills, Communication Skills (client / staff), Public Relations & Networking, Presentation Skills (Giving Presentations), Preparing Presentations, Estimation, Research, Analytical Skills, User Needs Assessment
- GIS Analysts, Training Plan, Implementation Plans, RFP Preparation, Application Design, ArcGIS Desktop Development, ArcGIS Mobile Development, ArcGIS Server Development, Web Development, VB.NET
- Flex, Silverlight, Android Development, iOS (objective C), Java for Android, Java, Java Script, Manuals and Training Material, HTML5 & JavaScript CSS, Testing, Web Services Development, System Architecture / Design, System Administration, Support, GIS SW / ArcSDE system admin and Coding, ArcGIS Server Admin & Tuning, Spatial Database Security
- Oracle Admin / Tuning, Map Services Analysis and Optimization, Database Back up and Recovery, Version Management, Physical DB Design (functional), Data Conversion & Compliant
- Data Evaluation, Georeferencing / Raster Manipulation, Projection, Data Automation (Digitizing), Format Conversion, Leveraging 3D models, Metadata, UA / UC Procedures, Map Design, Layer Design (symbology, visibility, labeling)
- ArcGIS, 3D Analyst, Spatial Analyst, Network Analyst, Interoperability Extension

required skills

The table below displays the skills required for each of the job titles that were identified in the proposed organizational structure based on the classification level that was clarified in Table 8:

Languages	SW / Extensions	Data Development	GIS / Spatial DataManagement	App Design & Development	Professional Services	General Skills		Position / Skill
3 4 1 1	1 3				3 3 3 3 3	3 3 3 3	3 3 3 3	GISManager
3 4 1 1	1 3							GISManager Assistant
3 4	3		3 3 3 3 3 3 3 3		3 3 3	3 3	3	GISDatabase Administrator / Data Security / SystemAnalyst
3 4 1 2 2 3	2 3			3 3 3	3 3 3 3 2 3	3 3 3	3	GISConsultant / Business Analyst
3 4 3 3 3 3 3 3 3 3		3 3 3 3 3			3 3	2		Spatial Data Expert / Database Designer
3 1 1 2 2 2 3 2 2 3		3 3 3				2		GISData Technician / GIS Analyst / Cartographer
3 1 1 1	1 3			3 3 3 3 3 3 3 3 3 3 3 3	3 3	2		Application Developer
3 4	3				3	3 3	3 3	Training Coordinator

Table 5: Skills required by job title

The proposed job titles for the current human cadre

The number of people	Current job title	Suggested job title
1	GIS Manager	GIS Manager
1	GIS Manager Assistant	GIS Manager Assistant
1	Assistant	Analyst GIS Consultant / Business
2	Data Analyst	GIS Data Technician / GIS Analyst / Cartographer
1	System Analyst / Developer	Application Developer
1	Business Analyst / Developer	Analyst GIS Consultant / Business

Table 6: Installing job titles in their new locations

Additional human resources required based on immediate needs

the number	Job title	the number The lowest	Current issue	The required number
. 1	GIS Manager	1	1	0
. 2	communication outreach function with the GIS Manager Assistant (can handle the support of the GIS Consultant and the Training Coordinator)	1	1	0
. 3	GIS Database Administrator / Data Security / System Analyst	1	0	1
. 4	GIS Consultant / Business Analyst	2	2	0

the number	Job title	the number The lowest	Current issue	The required number
. 5	Spatial Data Expert / Database Designer	1	0	1
. 6	GIS Data Technician / GIS Analyst / Cartographer	2	2	0
. 7	veloper Application De	2	1	1
. 8	analysts until there is a need for a full time (will be handled by one the business person)			
	Total	10	7	3

Table 7: Human resources required

Skills gap analysis and preparation of a training plan

Since the GIS environment currently in place in the Secretariat adopts MapInfo software technologies, and since the project plan and direction of

the Secretariat necessitates the transformation of the Esri environment, therefore the capacity building and strengthening plan aims to train GIS

employees on GIS programs that adopt Esri technology, starting from Beginning to advanced levels for employees of the GIS Department. As for

the other departments, the training plan will be based on training employees of different departments on GIS for beginners and intermediate levels,

which will help them perform their daily tasks.

GIS Manager

Skill	level Skill Current	level Skill Required	Training material required
Project Management Skills	4	3	Optional: Advanced GIS Project · Management
Team Leadership	4	3	
Planning Skills	4	3	
Documentation / Writing Skills	3	3	
Communication Skills (client / staff)	3	3	
Public Relations & Networking	3	3	
Presentation Skills (Giving Presentations)	3	3	
Preparing Presentations	3	3	
Estimation	3	3	
Research	3	3	
Analytical Skills	3	3	
User Needs Assessment	3	3	
GIS Analysis	3	3	
Training Plan	3	3	
Implementation Plans	3	3	
RFP Preparation	3	3	
Application Design	1		
ArcGIS Desktop Development			
ArcGIS Mobile Development			
ArcGIS Server Development			
Web Development			
VB.NET			
Flex			
Silverlight			
Android Development			
IOS (objective C)			
Web Services Development			
Java for Android			
Java			
Java Script			

GIS Manager			
Skill	level Skill Current	level Skill Required	Training material required
Manuals and Training Material			
HTM5 & JavaScript & CSS			
Testing			
System Architecture / Design			
System Administration			
Support			
GIS SW / ArcSDE system Inst and Config			
ArcGIS Server Admin & Tuning			
Spatial Database Security			
Oracle Admin & Tuning			
Map Service Analysis and Optimization			
DatabaseBack up and Recovery			
Version Management			
Data Collection & Compilation Physical DB Design (Dictionary)	3		
	3		
Data Evaluation	3		
Georeferencing / Raster Manipulation	3		
Projection	3		
Data Automation (Digitizing)	3		
Format Conversion	3		
Developing 3D Models	1		
Metadata	2		
QA / QC Procedures	3		
QA / QC			
Map Design			
Layer Design (symbology, visibility, labeling)			
ArcGIS		3	ArcGIS Desktop I • ArcGIS Desktop II: Tools and • Functionality GIS III: Desktop ArcGIS • Workflows and Analysis
3D Analyst		1	Introduction to 3D Analyst •

GIS Manager			
Skill	level Skill Current	level Skill Required	Training material required
Spatial Analyst		1	Introduction to Network Analyst •
Network Analyst		1	Introduction to Spatial Analyst •
Interoperability Extension		1	Introduction to Interoperability •
Arabic	4	4	
English	3	3	

Table 3: Skills Gap Analysis for GIS Manager

GIS Manager Assistant

er Assistant Manag GIS			
Skill	level Skill Current	level Skill Required	Training material required
Project Management Skills	2	3	Advanced GIS Project Management •
Team Leadership	3	3	
Planning Skills	2	3	Advanced GIS Project Management •
Documentation / Writing Skills	3	3	
Communication Skills (client / staff)	3	3	
Public Relations & Networking			
Presentation Skills (Giving Presentations)	3	3	
Preparing Presentations	3	3	
Estimation	2	2	
Research	3	3	
Analytical Skills	3	3	
User Needs Assessment	3	3	
GIS Analysis	3	3	

er Assistant Manag GIS			
Skill	level Skill Current	level Skill Required	Training material required
Training Plan	2	2	
Implementation Plans	2	2	
RFP Preparation	2	3	
Application Design	3		
ArcGIS Desktop Development			
ArcGIS Mobile Development			
ArcGIS Server Development			
Web Development			
VB.NET			
Flex			
Silverlight			
Android Development			
IOS (objective C)			
Web Services Development			
Java for Android			
Java			
Java Script			
Manuals and Training Material			
HTM5 & JavaScript & CSS			
Testing	3		
System Architecture / Design	2		
System Administration	2		
Support	2		
GIS SW / ArcSDE system Inst and Config			
ArcGIS Server Admin & Tuning			
Spatial Database Security			
Oracle Admin & Tuning			
Map Service Analysis and Optimization			
DatabaseBack up and Recovery			
Version Management			
Data Collection & Compilation Physical DB Design (Dictionary)	3		
Data Evaluation	3		

er Assistant Manag GIS			
Skill	level Skill Current	level Skill Required	Training material required
Georeferencing / Raster Manipulation	2		
Projection	2		
Data Automation (Digitizing)	3		
Format Conversion	3		
Developing 3D Models			
Metadata	2		
QA / QC Procedures	2		
QA / QC	3		
Map Design	3		
Layer Design (symbology, visibility, labeling)	3		
ArcGIS		3	ArcGIS Desktop I • ArcGIS Desktop II: Tools and • Functionality ArcGIS Desktop III: GIS Workflows • and Analysis
3D Analyst		1	Introduction to Network Analyst •
Spatial Analyst		1	Introduction to Spatial Analyst •
Network Analyst		1	Introduction to 3D Analyst •
Interoperability Extension		1	Introduction to Interoperability •
Arabic	4	4	
English	3	3	

Table 9: Skills gap analysis for - GIS Manager Assistant

Assistant -> GIS Consultant / Business Analyst

In the proposed organizational structure, we suggest that the assistant be appointed to become his job title GIS Consultant / Business Analyst

and this requires him to acquire the training courses mentioned below:

/ Business Analyst sultant GIS Con			
Skill	level Skill Current	level Skill Required	Training material required
Project Management Skills	3	3	Advanced GIS Project Management ·
Team Leadership	2		
Planning Skills	2	3	Advanced GIS Project Management ·
Documentation / Writing Skills	3	3	
Communication Skills (client / staff)	3	3	
Public Relations & Networking			
Presentation Skills (Giving Presentations)	3	3	
Preparing Presentations	3	3	
Estimation	2	2	
Research	3	3	
Analytical Skills	3	3	
User Needs Assessment	3	3	
GIS Analysis	3	3	
Training Plan	2		
Implementation Plans	2	3	
RFP Preparation	2	3	
Application Design		3	
ArcGIS Desktop Development			
ArcGIS Mobile Development			
ArcGIS Server Development			
Web Development			
VB.NET			
Flex			
Silverlight			
Android Development			

/ Business Analyst sultant GIS Con			
Skill	level Skill Current	level Skill Required	Training material required
IOS (objective C)			
Web Services Development			
Java for Android			
Java			
Java Script			
Manuals and Training Material			
HTM5 & JavaScript & CSS			
Testing	3		
System Architecture / Design			
System Administration			
Support			
GIS SW / ArcSDE system Inst and Config			
ArcGIS Server Admin & Tuning			
Spatial Database Security			
Oracle Admin & Tuning			
Map Service Analysis and Optimization			
DatabaseBack up and Recovery			
Version Management			
Data Collection & Compilation Physical DB Design (Dictionary)	3		
Data Evaluation	3		
Georeferencing / Raster Manipulation	2		
Projection	2		
Data Automation (Digitizing)	3		
Format Conversion	3		
Developing 3D Models			
Metadata	2		
QA / QC Procedures	2		
QA / QC	3		
Map Design	3		
Layer Design (symbology, visibility, labeling)	3		

/ Business Analyst sultant GIS Con			
Skill	level Skill Current	level Skill Required	Training material required
ArcGIS		3	• ArcGIS Desktop I • ArcGIS Desktop II: Tools and Functionality and Analysis ArcGIS Desktop III: GIS Workflows
3D Analyst		2	• Introduction to 3D Analyst • Introduction to Network Analyst
Spatial Analyst		2	• Introduction to Spatial Analyst Learning
Network Analyst		2	• ArcGIS 3D Analyst
Interoperability Extension		1	• Introduction to Interoperability
Arabic	4	4	
English	3	3	

Table 11: Skills gap analysis for - GIS Consultant / Business Analyst

Data Analyst -> GIS Data Technician / GIS Analyst / Cartographer

In the proposed organizational structure, we suggest that the two data analysts be appointed as their job titles GIS Data Technician / Data

Analyst:

Analyst / Cartographer ian / GIS c Techni GIS Data			
Skill	level Skill Current	level Skill Required	Training material required
Project Management Skills			
Team Leadership			
Planning Skills			
Documentation / Writing Skills			
Communication Skills (client / staff)		2	
Public Relations & Networking			
Presentation Skills (Giving Presentations)			
Preparing Presentations			
Estimation			
Research			
Analytical Skills			
User Needs Assessment			
GIS Analysis			
Training Plan			
Implementation Plans			
RFP Preparation			
Application Design			
ArcGIS Desktop Development			
ArcGIS Mobile Development			
ArcGIS Server Development			
Web Development			
VB.NET			
Flex			
Silverlight			
Android Development			

Analyst / Cartographer ian / GIS c Techni GIS Data			
Skill	level Skill Current	level Skill Required	Training material required
IOS (objective C)			
Web Services Development			
Java for Android			
Java			
Java Script			
Manuals and Training Material			
HTM5 & JavaScript & CSS			
Testing			
System Architecture / Design			
System Administration			
Support			
GIS SW / ArcSDE system Inst and Config			
ArcGIS Server Admin & Tuning			
Spatial Database Security			
Oracle Admin & Tuning			
Map Service Analysis and Optimization			
DatabaseBack up and Recovery			
Version Management			
Data Collection & Compilation Physical DB Design (Dictionary)	3		
	3		
Data Evaluation	3		
Georeferencing / Raster Manipulation			
Projection			
Data Automation (Digitizing)	3	3	for ArcGIS with Data Editing • Desktop
Format Conversion	3	3	for ArcGIS with Data Editing • Desktop
Developing 3D Models	3	3	
Metadata	3	3	
QA / QC Procedures	3		
QA / QC	3	3	for ArcGIS with Data Editing • Desktop
Map Design	3	2	Designing Maps with ArcGIS •

Analyst / Cartographer ian / GIS c Techni GIS Data			
Skill	level Skill Current	level Skill Required	Training material required
Layer Design (symbology, visibility, labeling)	3	2	Designing Maps with ArcGIS ·
ArcGIS		3	ArcGIS Desktop I · ArcGIS Desktop II: Tools and · Functionality ArcGIS Desktop III: GIS Workflows · and Analysis for ArcGIS with Data Editing · Desktop · Designing Maps with ArcGIS Building Geodatabase ·
3D Analyst		2	Introduction to Network Analyst · Introduction to Spatial Analyst Learning ·
Spatial Analyst		2	ArcGIS 3D Analyst Introduction to 3D ·
Network Analyst		2	Analyst ·
Interoperability Extension		1	Introduction to Interoperability ·
Arabic	4	1	
English	3	3	

Table 11: Skills gap analysis for - GIS Data Technician / Data Analyst

System Analyst / Developer -> Application Developer

In the proposed organizational structure, we suggest that a systems analyst / application developer be appointed as their job title only application developer:

Skill	level Skill Current	level Skill Required	Training material required
Developer lication App			
Project Management Skills			
Team Leadership			
Planning Skills			
Documentation / Writing Skills	2		
Communication Skills (client / staff)	3	2	
Public Relations & Networking			
Presentation Skills (Giving Presentations)	2		
Preparing Presentations	3		
Estimation	3		
Research	3	3	
Analytical Skills	3	3	
User Needs Assessment	3		
GIS Analysis			
Training Plan			
Implementation Plans	2		
RFP Preparation			
Application Design	3	3	
ArcGIS Desktop Development		3	•
ArcGIS Mobile Development		3	•
ArcGIS Server Development		3	Introduction to ArcGIS Server •
Web Development	3	3	
VB.NET			
Flex		3	Flex • Building Web Applications Using • the ArcGIS API for Flex

Developer lication App			
Skill	level Skill Current	level Skill Required	Training material required
Silverlight			
Android Development			
IOS (objective C)	3	3	
Web Services Development	3	3	
Java for Android			
Java	3		
Java Script	3	3	
Manuals and Training Material	2	3	HTM5 & JavaScript & CSS •
HTM5 & JavaScript & CSS		3	
Testing	3	3	
System Architecture / Design	3		
System Administration	3		
Support	3		
GIS SW / ArcSDE system Inst and Config			
ArcGIS Server Admin & Tuning			
Spatial Database Security	3		
Oracle Admin & Tuning			
Map Service Analysis and Optimization	2		
DatabaseBack up and Recovery			
Version Management			
Data Collection & Compilation Physical DB Design (Dictionary)			
Data Evaluation			
Georeferencing / Raster Manipulation			
Projection			
Data Automation (Digitizing)			
Format Conversion			
Developing 3D Models			
Metadata			
QA / QC Procedures			
QA / QC			
Map Design			
Layer Design (symbology, visibility, labeling)			

Skill	level Skill Current	level Skill Required	Training material required	
Developer lication App				
ArcGIS		3	ArcGIS Desktop I	•
			ArcGIS Desktop II: Tools and Functionality	•
			ArcGIS Desktop III: GIS Workflows and Analysis	•
			Building Geodatabase	•
3D Analyst		1	Introduction to Network Analyst	•
Spatial Analyst		1	Introduction to Spatial Analyst	•
Network Analyst		1	Introduction to 3D Analyst	•
Interoperability Extension		1	Introduction to Interoperability	•
Arabic	2	1		
English	3	3		

Table 12: Skills gap analysis for - Application Developer

Analyst Business Analyst / Developer -> GIS Consultant / Business

In the proposed organizational structure, we suggest that a business / application developer be appointed to become a business analyst only:

Skill	level Skill Current	level Skill Required	Training material required
Project Management Skills		3	Advanced GIS Project Management •
Team Leadership			
Planning Skills		3	Advanced GIS Project Management •
Documentation / Writing Skills		3	
Communication Skills (client / staff)		3	
Public Relations & Networking			
Presentation Skills (Giving Presentations)	2	3	
Preparing Presentations	2	3	
Estimation		2	
Research		3	
Analytical Skills		3	
User Needs Assessment	3	3	
GIS Analysis	3	3	
Training Plan			
Implementation Plans	2	3	
RFP Preparation		3	
Application Design	3	3	
ArcGIS Desktop Development			
ArcGIS Mobile Development			
ArcGIS Server Development			
Web Development	3		
VB.NET			
Flex			
Silverlight			

Title row of table: **/ Business Analyst sultant GIS Con**

/ Business Analyst sultant GIS Con			
Skill	level Skill Current	level Skill Required	Training material required
Android Development			
IOS (objective C)			
Web Services Development			
Java for Android			
Java	2		
Java Script	2		
Manuals and Training Material	2		
HTM5 & JavaScript & CSS			
Testing	3		
System Architecture / Design	3		
System Administration	3		
Support	3		
GIS SW / ArcSDE system Inst and Config			
ArcGIS Server Admin & Tuning			
Spatial Database Security	3		
Oracle Admin & Tuning			
Map Service Analysis and Optimization	2		
DatabaseBack up and Recovery			
Version Management			
Data Collection & Compilation Physical DB Design (Dictionary)	3		
Data Evaluation			
Georeferencing / Raster Manipulation			
Projection			
Data Automation (Digitizing)			
Format Conversion			
Developing 3D Models			
Metadata			
QA / QC Procedures			
QA / QC			
Map Design			
Layer Design (symbology, visibility, labeling)			

Skill	level Skill Current	level Skill Required	Training material required
ArcGIS		3	ArcGIS Desktop I • ArcGIS Desktop II: Tools and • Functionality ArcGIS Desktop III: GIS Workflows • and Analysis Building Geodatabase •
3D Analyst		2	Introduction to Network Analyst • Introduction to Spatial Analyst Learning •
Spatial Analyst		2	ArcGIS 3D Analyst Introduction to 3D •
Network Analyst		2	Analyst •
Interoperability Extension		1	Introduction to Interoperability •
Arabic	4	4	
English	3	3	

/ Business Analyst sultant GIS Con

Table 18: Skills Gap Analysis for Business Analyst / GIS Consultant

Capacity building needs

the number	Training material	acquired skills	Number The people Required Their attendanc
1	Advanced GIS Project Management	Project Management Skills • Planning Skills •	4
2	ArcGIS Desktop I	ArcGIS •	7

the number	Training material	acquired skills		Number The people Required Their attendance
3	ArcGIS Desktop II: Tools and Functionality	ArcGIS	·	7
4	Workflows and Analysis ArcGIS Desktop III: GIS	ArcGIS	·	7
5	Introduction to 3D Analyst	3D Analyst	·	7
		Developing 3D Models	·	
6	Learning ArcGIS 3D Analyst	3D Analyst	·	4
		Developing 3D Models	·	
7	Introduction to Interoperability	Spatial Analyst	·	7
8	Introduction to Network Analyst	Network Analyst	·	7
9	Introduction to Spatial Analyst	Interoperability Extension	·	7
10	Building Geodatabase	ArcGIS	·	5
11	Editing Data with ArcGIS for Desktop	ArcGIS	·	2
		Data Automation (Digitizing)	·	
		Format Conversion	·	
		QA / QC	·	
12	Designing Maps with ArcGIS	ArcGIS	·	2
		Map Design	·	
		Layer Design (symbology, visibility, labeling)	·	
13	Introduction to ArcGIS Server	ArcGIS Server Development	·	1
14	Flex	Flex	·	1

the number	Training material	acquired skills	Number The people Required Their attendance
15	Building Web Applications Using the ArcGIS API for Flex	Flex •	1
16	HTM5 & JavaScript & CSS	HTM5 & JavaScript & CSS •	1

Other departments of the Secretariat

The table below highlights the training plan for each of the employees of the other departments in the secretariat:

#	Administration	Suggested training
1.	General administration of Information Technology	ArcGIS Desktop I • Introduction to ArcGIS Server • ArcGIS Server Enterprise Configuration and • Tuning for Oracle Configuring and Managing the Multiuser • Geodatabase Programming the ArcGIS Server API for • Flex
2.	The General Administration of Urban	ArcGIS Desktop I • ArcGIS Desktop II: Tools and Functionality • Editing Data with ArcGIS for Desktop • Learning ArcGIS 3D Analyst • Designing Maps with ArcGIS •
3.	Planning, City Planning Department	
4.	Survey management	
5.	Building Studies and Regulations	
6.	Department, Central Building Permits	
7.	Department, General Administration	
8.	for Naming and Numbering, General	ArcGIS Desktop I • ArcGIS Desktop II: Tools and Functionality • Editing Data with ArcGIS for Desktop • Designing Maps with ArcGIS •
9.	Administration of Valleys and Floods, Hydrological Studies Department	
11.	General Administration for Studies and Design	
11.	Department of studies and the general plan	

#	Administration	Suggested training
12.	General Administration of Gardens and	
13.	Beautification Nurseries Department	
14.	Afforestation Department	
15.	Parks Operation Department	
16.	Wild park management	
17.	General Administration of	
18.	Environmental Health, Slaughterhouse Department	
19.	Health Protection Department	
21.	Licensing Department	
21.	General Administration of Market	ArcGIS Desktop I •
22.	Affairs, Department of Food Control	ArcGIS Desktop II: Tools and Functionality •
23.	Market Watch Department	Editing Data with ArcGIS for Desktop •
24.	General Administration of Safety and Social Services	Designing Maps with ArcGIS •
25.	Social Services Department	
26.	Department of Culture and Entertainment	
27.	Comfort and Safety Management	
28.	Land and property management	

#	Administration	Suggested training
29.	Property Inspection Department	
31.	Department of property	
31.	Grants section	
32.	Real estate evaluation department	ArcGIS Desktop I •
		ArcGIS Desktop II: Tools and Functionality •
33.	Land and property management	Editing Data with ArcGIS for Desktop •
		Designing Maps with ArcGIS •
34.	Expropriation management	
35.	Management of ramshackle buildings	
36.	The General Administration for Municipal Investments	

Training method

Various training methods have been studied to ensure that the training program guarantees knowledge transfer. It is proposed to implement the training program in parallel with the activation and operation of geographic information systems. The aim is to ensure that the staff of the Secretariat are trained in the concepts and are able to use technologies and thus that sustainable capacity is built and strengthened. The training courses focus on concepts and tools.

The following training methods are suggested:

Coach-led training: The training mode consists of training classes. Lectures and practical training are provided by trainers who direct the trainees to apply practical exercises and answer various types of questions during the training.

On-the-job training: It consists of personal sessions for employees, where the trainer provides a training session with an employee to review the training materials, and then apply through the system and answer questions that will help the employee better understand and be able to use the GIS system to perform their daily tasks. This activity consists of on-site trainers to support users on special applications in their work environment after training courses (as their information is up-to-date) with direct access to operating the system. On-the-job training provides a training experience outside of the training classroom. This training will be applied to updating data, and using applications during use and activation of the system.

Conferences and seminars: Specific executives and managers are chosen to attend these regional or international conferences and seminars. Where these conferences are an opportunity to keep up with the latest technology of geographic information systems and to follow the best practices.

Professional Education Development: Al Madinah Municipality can be supportive of the further professional development of employees, including sponsoring some educational opportunities inside and outside the Kingdom.

The study of capacity building and strengthening emphasizes the need to build capacity through self-training and its inclusion of a culture of learning, and confirms that the Secretariat's employees take into consideration self-development, knowledge and self-learning.

Consulting engineering services project to study the development
of geographical information in the municipality of Medina

PED_34008-Capacity Building Plan-v1.1
09/6/2013

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Coach-led training methodology

The training courses combine personal training, hands-on experience and classroom participation to create a rich learning environment. With the time divided equally between the lectures and the exercises, the trainees will have ample time to practice the skills and apply what they have learned. Individual attention, interaction, and the ability to get answers to questions are key to the effectiveness of instructor-led training.

After obtaining the necessary training and knowledge, the trainees will be divided into teams suitable for daily workshops and trainings, which will equip the participants to work in a team. At the end of the training, trainees will acquire the skills and knowledge necessary to operate and activate the system.

One of the aspects that should be included in the training modules is to focus on showing how users can find help through documents (such as online materials) in the first place rather than asking for help and technical support. Users often overlook this valuable source of help before seeking help and outside technical support.

Coaches

Instructors must be Esri certified and have previous training experience from similar courses implemented. In addition, the training team should be experts in training in areas relevant to (Esri) software.

The language

The official language in training is English. Training materials and lectures are in English. However, trainers must speak Arabic, and if required, trainers must be able to provide additional explanations in Arabic. However, there is no need to convert the training into Arabic, in order to teach the technical terms for GIS, which the trainees should be familiar with.

Training materials

Providing the trainees with high color and printed copies of the training materials in addition to digital copies. These materials typically include lecture notes, step-by-step exercises, and statements for practical training.

training place

The training is conducted in the Municipality of Medina.

It is assumed that the training headquarters is equipped with a capacity to accommodate the number of potential trainees for each training course, and that the training hall is equipped with the following:

- Furniture
- Computers are sufficient for the number of potential trainees
- Required software and licenses
- Writing pad and projector.

Certificates

After completing the training course, trainees receive a certificate of attendance signed by the trainer attesting to participation in each training session. In order to obtain this certificate, trainees must fully attend all training hours for the course. Certificates are not provided to those who only attend part of the training course.

Training evaluation

After each training, the trainees evaluate the trainer and the training course.

Accessories

Appendix 0: Description of training courses

Advanced GIS Project Management

This course describes tasks and issues that project managers must address at different

project, involved with a less than satisfactory GIS, or who is seeking ways to improve a will be based on real world examples. It is a must for anyone embarking on a GIS small discussion groups to address issues pertinent to real case studies. The course support and how to revive floundering GIS programs. The participants will be working in techniques for implementing GIS. Issues covered include how to gain organizational and vendors. This course presents an overview of the successful and unsuccessful techniques, budgeting, staffing, sustaining program support, and managing consultants Topics include strategic planning, work program development, project management stages of GIS project development by striking a balance between theory and practice.

successful implementation.

Audience

GIS managers, GIS project managers, and GIS professionals

Goals

After completing this course, you will be able to

Gain knowledge in managing a GIS Project in all its phases: User Needs •

Needs Assessment, Database Design, System Design, Data **,** Survey

Conversion, Application Development, and Training.

Get hands on experience in managing a GIS project. •

Acquire all skills needed to prepare a GIS project documentation such as •

Request for proposal, proposal, and various project deliverable •

documentations.

Better understand the issues of staffing and budgeting, team work, and •

consultant-client relationship through real world case studies.

Topics

Introducing GIS Technology Advances •

Preparing RFPs •

Writing a Proposal and Winning the Project •

Implementing the Project •

Evaluation and Documentation •

Prerequisites

No Prerequisites and Recommendations are needed for this course.

ArcGIS Desktop I: Getting Started with GIS:

geographic data, create maps, query a GIS database, and analyze data using common will develop basic software skills by working with ArcGIS Desktop 10.0 tools to visualize properties of GIS maps, and the structure of a GIS database. In course exercises, you This course teaches the fundamental concepts and basic functions of a GIS, the

analysis tools.

Audience

Individuals who do not have any prior GIS education or workplace experience •

with GIS.

Managers and GIS support staff who need to understand how GIS fits into their •

organization.

Goals

After completing this course, you will be able to:

Understand what GIS is, what it can do, and how others are using it. •

See how your organization can benefit from a GIS. •

Create a basic GIS map. •

Work with different types of geographic data. •

Access information about geographic datasets and features. •

Apply a systematic approach to analyzing data in order to find patterns and •

relationships.

Topics

GIS overview •

Functions of a GIS -

- Real-world applications

• Components of a GIS map

- Features and layers

- Map scale

• Exploring a GIS database

- Attribute tables

- Relationship between features and attributes

- Symbolizing and labeling features based on their attributes

• Map layouts

- Data view and layout view

- Layout tools

- Map elements

- Understanding location

• exporting a map layout

- Location systems for maps and globes

- Map projections

- Measuring area and distance on a map Finding

- location coordinates on a map

• Representing real-world features

- Raster data and vector data

- The geodatabase

• Geographic data

- Tabular data

- Working with Item Description to explore geographic data

• Querying data

Attribute queries	-
Location queries	-
Analyzing spatial relationships	•
Buffering features	-
Overlaying features	-
Solving problems with GIS	•
GIS analysis process	-
Applying GIS tools to analyze a geographic problem	-
Creating a map layout to present results	-

Prerequisites

Knowledge of Windows-based software for basic file management and browsing is

required.

ArcGIS Desktop II: Tools and Functionality

Desktop functionality and be prepared to work with the software on your own to create and workflows. By the end of the course, you will understand the range of ArcGIS course exercises, you will use ArcGIS tools to efficiently perform common GIS tasks teaches how to use it to visualize, create, manage, and analyze geographic data. In this course introduces the fundamental concepts of ArcGIS Desktop 10.0 software and

GIS maps, work with geographic data, and performing GIS analysis.

Audience

GIS professionals and others who have GIS knowledge but no ArcGIS software

experience

Goals

After completing this course, you will be able to

- Create a file Geodatabase to store and manage geographic data.
- Create and edit geographic data to accurately represent real-world objects.
- Explore geographic data in ArcMap.
- Classify, symbolize, and label map features to improve map visualization and

interpretation.

- Create data by geocoding addresses.
- Query and analyze GIS data to support decision making.
- Create maps to share with others

Topics

Map layers •

- Symbolizing categorical data
- Symbolizing quantitative data
- Exploring geographic data
- Making a map layout Working
- with map text
- Understanding coordinate systems and map projections
- Managing tables
- Editing features and attributes
- Creating Geodatabase and feature classes
- Getting locations from tabular data
- Solving spatial problems with query and analysis

Prerequisites

This course requires knowledge of fundamental GIS concepts

ArcGIS Desktop III: GIS Workflows and Analysis

them to your analyzes. The skills taught in this course are applicable to all types of GIS will be able to determine which tools and functions to use in a given situation and apply models, and work through a challenging analysis project. By the end of the course, you Geodatabase, you will organize and prepare data for analysis, create geoprocessing efficient workflow that supports GIS analysis. Working with data stored in a Advance your ArcGIS Desktop 10.0 skills in this course that teaches how to create an

analysis.

Audience

to extend their basic skills in the areas of data creation and editing, geoprocessing GIS analysts, GIS specialists, and other experienced ArcGIS Desktop users who want

models, and GIS analysis.

Goals

After completing this course, you will be able to

- Add data from different sources to a Geodatabase.
- Create and use Geodatabase components that maintain data integrity and prevent errors during data creation and editing.
- Solve common spatial data alignment problems.
- Use a variety of geoprocessing tools to perform an analysis that supports decision making.
- Build a complex model to automate an analysis workflow.

Topics

- Getting data into a Geodatabase
- Geodatabase behavior

Editing GIS data •

Aligning spatial data •

Managing geoprocessing tools and settings •

Analyzing GIS data •

Using Model Builder for analysis •

GIS analysis projects •

Prerequisites

ArcGIS Desktop II: Tools and Functionality •

Editing Data with ArcGIS for Desktop

data automation and practice with tools and techniques that help ensure data integrity maintaining data stored in a Geodatabase. You will learn a recommended workflow for accurate data is essential. This course teaches methods for accurately creating and To produce GIS maps and analysis results that support informed decision making,

during editing.

GIS technicians, specialists, and other experienced ArcGIS users who need to create

and maintain their organization's geographic data.

After completing this course, you will be able to

Apply a standard editing workflow to manage updates to your GIS database. •

Efficiently create and edit feature geometry and attributes. •

Solve common data alignment issues. •

Maintain spatial relationships among features using topology. •

Editing workflow •

Preparing to edit •

Editing feature geometry •

Editing feature attributes •

Data integration and alignment techniques •

Data integration and quality control •

Sharing and editing •

Project: Implementing the editing workflow •

ArcGIS Desktop II: Tools and Functionality •

Introduction to ArcGIS Server

Overview

In this course, you will acquire the skills needed to share GIS content on the web or

geoprocessing models, and feature templates for use in web applications that support across the enterprise.
You will learn a workflow to publish maps, imagery,

Visualization, analysis, and editing of GIS resources.

Audience

GIS analysts, specialists, and other experienced ArcGIS Desktop users who •

want to share their GIS content in a web mapping application.

Developers who need to understand ArcGIS Server 10.0 functionality in order •

to incorporate GIS services into custom applications.

Goals

Author and dynamic publish and cached map services.   •

Design and generate a map cache to maximize map service performance.   •

Configure a geoprocessing model and publish it as a geoprocessing service.   •

Publish an image service from a mosaic dataset to visualize change over   •

time.

Publish a feature service to enable editing in a web application.   •

Extend a web mapping application using sample code and the ArcGIS API for   •

JavaScript.

Topics

ArcGIS Server overview •

Designing map services •

Authoring dynamic map services •

Authoring cached map services •

Using GIS services for visualization •

Using GIS services for analysis •

Using GIS services to edit spatial data •

Serving GIS data on the web •

Prerequisites

ArcGIS Desktop II: Tools and Functionality •

ArcGIS Server Enterprise Configuration and Tuning for Oracle

within an ArcGIS Server 10.0 enterprise Geodatabase to centrally store and manage this course prepares Oracle database administrators to maximize ArcSDE technology

editing environment and strategies for maintaining and managing an enterprise settings for spatial data. Techniques for maintaining Geodatabase performance in an You will become familiar with the ArcSDE architecture and learn how to manage storage data, provide robust data security, and deliver multiuser access and editing capabilities.

Geodatabase are also presented.

Audience

Experienced Oracle database administrators who need to install and configure an

ArcGIS Server 10.0 enterprise Geodatabase.

Goals

After completing this course, you will be able to

- Configure Oracle to support ArcSDE.
- Install, configure, and optimize ArcSDE.
- Create multiple ArcSDE workspaces.
- Customize storage for vector and raster data.
- Configure, create, and monitor connections.
- Implement nonversioned and versioned editing workflows.
- Optimize enterprise Geodatabase performance.

Topics

ArcSDE geodatabase overview •

Configuring Oracle for ArcSDE •

Installing ArcSDE •

Managing ArcSDE connections •

Managing vector data storage •

Geodatabase editing •

Managing raster data storage •

Prerequisites

ArcGIS Desktop II: Tools and Functionality •

ArcGIS Desktop III: GIS Workflows and Analysis •

Building Geodatabase

Errors according to rules and behaviors you set. This course is taught using an ArcInfo that maintain spatial relationships between features and automatically locate and fix Geodatabase. In course exercises, you will create advanced Geodatabase elements Geodatabase, migrate existing data to a Geodatabase, and edit data stored in a manage, and maintain the quality of your GIS data. You will learn how to create a This course teaches the essential concepts and skills you need to centrally store,

license of ArcGIS Desktop 10.0.

Audience

GIS data managers, analysts, specialists, data technicians, database administrators, and

Other experienced ArcGIS Desktop users

Goals

After completing this course, you will be able to:

Create a file Geodatabase and add shape files, CAD files, coverages, and •

Excel spreadsheets to it.

Store and manage raster data in a file Geodatabase. •

Create and apply attribute domains, subtypes, topology, and relationship •

classes to model data and ensure data integrity during editing.

Create Geodatabase annotation to store and reuse text and graphics that •

describe features or areas on a map.

Create a geometric network to model and analyze a directed flow network •

such as a utility network.

Define a Geodatabase schema to efficiently model and store your data. •

- Introduction to the Geodatabase
- Attribute validation rules
- Relationship classes
- Annotation
- Geodatabase topology
- Geometric networks
- Building a schema
- XML data interchange
- Vector data
- Raster data

Prerequisites

- ArcGIS Desktop II: Tools and Functionality

Designing Maps with ArcGIS

Overview

standard cartographic workflow to efficiently produce high-quality maps for print and applying fundamental cartographic design principles. You will learn how to follow a properly designed for their audience and delivery medium, with an emphasis on this course teaches how to create attractive maps that are easy to interpret and online use.

Audience

Cartographers and GIS analysts, specialists, mapping technicians, and others who need to produce maps using ArcGIS software.

Goals

After completing this course, you will be able to

Topics

- Cartographic planning process
- Evaluating data
- Cartographic design principals
- Advanced symbology techniques
- Map text
- Designing a map for the web
- Creating maps for print
- Creating map layouts and map series

Prerequisites

- ArcGIS Desktop II: Tools and Functionality

Configuring and Managing the Multiuser Geodatabase

Overview

Geodatabase for efficient data storage and delivery of data access and editing Geodatabase architecture and installation options, and how to configure the your organization's critical geographic data assets. You will learn about the multiuser This course prepares you to successfully deploy a multiuser Geodatabase to manage

capabilities to many users. Although course exercises use the enterprise Geodatabase, many course concepts also apply to workgroup Geodatabase.

Audience

Spatial database administrators and GIS data managers who need to create, configure, and manage a multiuser ArcSDE Geodatabase.

Goals

After completing this course, you will be able to

- Install ArcSDE technology and configure it for your relational database management system.
- Create and connect to a multiuser Geodatabase.
- Efficiently load and update data in a multiuser Geodatabase.
- Configure storage settings to support your organization's data management workflows.
- Set up user roles and permissions to provide secure data access.
- Apply best practices to optimize Geodatabase performance.

Topics

- Introduction to the Geodatabase
- What is ArcSDE?

- Loading data into the Geodatabase
- Connecting to the Geodatabase
- Managing storage settings
- Spatial types
- Configuring permissions
- Associating data
- Geodatabase maintenance
- Managing locks
- Bringing it all together

Prerequisites

- ArcGIS Desktop II: Tools and Functionality

Learning ArcGIS 3D Analyst

properties. Students also create realistic models by draping aerial photographs over surfaces in

three-dimensional perspective, symbolize them, and set three-dimensional both raster and vector surfaces.

Working mostly with models of terrain, students display and analysis. This course teaches what a surface

model is and shows how to create ArcGIS 3D Analyst software provides advanced tools for three-dimensional

modeling

surfaces and displaying two-dimensional features in three dimensions.

Audience

This course is designed for those who want to apply three-dimensional visualization

and analysis techniques to their spatial data.

Goals

A student who completes this course will be able to

- Understand the structure of 3D data types, such as TINs, rasters, and 3D features.

- Use ArcCatalog to preview and manage 3D data.

- View and navigate data in 3D perspective using ArcCatalog, ArcMap, ArcScene, and ArcGlobe.

- Explore 3D analysis techniques such as finding steepest paths, calculating surface volume, and determining visibility between points.

- Set 3D viewing properties for 2D data.

- Create 3D surface models and 3D features.

- Convert 3D data from one format to another.

Derive and display analytical surfaces such as slope, aspect, and viewshed •

from elevation models.

Create and display surface models by interpolation from point data. •

Create an animation file in ArcGlobe. •

Topics

- Introduction to ArcGIS 3D Analyst •
- Displaying 3D Data •
- Creating and Converting 3D Data •
- Symbolizing and Analyzing Data •
- Calculating Raster Surfaces •
- Interpolating Raster Surfaces •
- Introduction to ArcGlobe •

Prerequisites

This course requires knowledge of fundamental GIS concepts

Programming the ArcGIS Server API for Flex

Overview

Appearance of the application to the layers that are included in the viewer as well as the configuration files can

be edited in any text editor and control everything from the Server Viewer can be controlled through the use of

XML configuration files. These attractive, functional web applications with just a little knowledge of how the

ArcGIS GIS applications without the need for programming experience! Anyone can build The ArcGIS Server

Viewer for Flex provides an excellent framework for creating web

widgets that are available to the user.

Audience

This course is designed for beginner to advanced level GIS programmers who wish to

Want to learn more about deploying GIS-enabled Web mapping applications easily and GIS managers
and GIS analysts who use ArcGIS Server and / or ArcGIS Online and learn how to create rich inter-net GIS
applications using ArcGIS Server's Flex API.

quickly.

Goals

Skills related to creating GIS web applications with ArcGIS Server's Flex API. These After successfully

completing these course users will have acquired a number of new

new skills include:

Fundamental understanding of ArcGIS Server Application development •

An understanding of Flex Builder •

Fundamental understanding of ArcGIS Server's Flex API •

Create custom GIS web applications •

How to integrate Bing Maps with the Flex API •

This course includes 7 modules.

- Module 1: Introduction to the ArcGIS Server Viewer for Flex
- Module 2: ArcGIS Server for Developers
- Module 3: Basic Concepts of the ArcGIS Server API for Flex
- Module 4: Flex and ActionScript Basics
- Module 5: Advanced Concepts of the ArcGIS Server API for Flex
- Module 6: Using Bing Maps with the Flex API
- Module 7: Creating Custom Widgets for the ArcGIS Server View for Flex

Prerequisites

understanding of GIS and ESRI's ArcGIS platform. They should also have an This course is not for new computer or ArcGIS users. Students should have some basic

understanding of basic programming concepts.