

King Fahad University of Petroleum and Minerals

Geographical Information System “GIS”

GIS implementation in Organizations: Strategies and Issues at Departmental Level

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Submitted To:
Dr. Baqer Alramadan

Prepared by:
Mohammed Alsaheel
20006194
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Introduction:

There are issues related to management considered to be major concern specially when organization is introducing and/or implementing new technology. This applied for all technologies and approaches invented in the organizations, but these management issues are claimed by many research to be existed when the technology is related to enterprising geographical information.

GIS (Geographical Information System) has various characteristics differentiate it from other technology, the major feature that is GIS provides and brings the management' concern is sharing the data at deferent degree of inputting, processing and presenting these data. However, sharing geographical data or enterprising GIS tools for integrating them to facilitate communication and minimizing effort is the main motivating reasons for GIS implementation.

It is clear that there is dilemma for GIS implementation, someone arguing that GIS implementation would encourage conflicts, and someone would prefer GIS features utilization among the targeted parties to overcome wasted time in communicating geographical information. To skip this conflict of ideas which are correct, and to facilitate and implement GIS within and between organizations, there should be an agreed on baseline of implementation and operating GIS. This is called implementation plan which must fulfill all parties' requirements and achieving objectives of implementation.

Literature Review:

Integrating GIS data within and/or between organizations provides massive benefits to every party involved. GIS technology facilitates data integration across organizations (Campbell and Masser 1991), and "can stimulate interorganizational alliances" (Kumar and Van Dissel 1996; Roche and Humeau 1999; Dedekorkut 2002).

The integration procedure or implementation of GIS is an innovation contributed to the organization, which require management commitment and Corporate level consideration. .Organization's strategies for managing Geographic Information Systems play a fundamental role in the success of the technology within or between the organizations (Rebecca Somers).

It is experienced by many organizations that are new technology adoptions resisted by people. However, the sudden increase in organizations adopting GIS technology has highlighted the fact that between and within organizations, there has been a general failure and often unwillingness to share data and information across boundaries, with along with low levels of coordination (Warnecke et al. 1998).

The problems here are typically not because of technical nature of GIS, reflecting instead a variety of "human" reasons why information continues to be treasured and organizations resist apparently obvious benefits from sharing data (Greenwood 2000; Nedović-Budić and Pinto 2000; Feick and Hall 1999).

Problem Statement:

Conflict of interest toward GIS implementation and utilization became an issue. Also guaranteed sustainable implementation would be a long term issue. Therefore, without implementation strategies and interaction mechanisms of integrating GIS within and between organizations besides motivating it, there won't be proper communication as it should exists when utilizing GIS.

GIS Management Strategies and Issues:

The best way to have a successful GIS implementation approaches is benchmarking some organizations approaches and concerns. Lessons learned from there implementation process and the benefit that they've got from GIS implementation can be evaluated and adopted according to the targeted purposes & needs. There are also number of research regard the strategies and management approaches in implementing GIS, these researches listed very useful factors that most probably help to guide the others in managing GIS implementation process. They held up these points and criteria as good advises and can work for many organizations.

A modification and update of mentioned factors and key points according to targeted organization' needs is essential. Even if theses factors and strategies locks matching your organization environment, a thorough evaluation is highly recommended by publishers of these factors. Also, it is preferred to add some other concerns that might target organization need.

The row material for building up strategies of having GIS implemented among organization/s is the organization's assets and other fields' assets. In other words, the GIS implementation strategies are derived from principles of project managements assets, information system development and management assets, re-engineering of business development. no need to re invent the wheel, the previously mentioned fields contains a useful principles and data that would help in application.

The following are some best practiced strategies and management approaches that would be helpful in GIS implementation:

1) GIS Implementation Process:

The basic steps in this process are planning, requirements analysis, design procurement & development, and operation and maintenance. GIS beneficiary organizations demonstrated that when they followed a good implementation process

they have good the fruit of GIS, on the other hand the organizations who haven't followed an implementation process end up with a failure in the system.

2) Strategic Vision, Scope and Organizational Impact of GIS:

To have direction an all operation activities it is very important to define vision for GIS role in the organization, scope and business operation relationship. These strategies would solve all of the disputes or at least it would decrease the degree of conflicts in the large scale of GIS base. And it will provide full understanding share of GIS privilege for multiparticipants system. Sharing and understanding the vision and scope of GIS in large scale application might consume time and effort but understanding the benefits behind it would make it possible and achievable.

3) Assessment of Organizational Risks:

In many resources the major identified risk in GIS implementation is the resistance to change. GIS mangers of implementation are commonly frustrated by illogical resistance toward GIS application. There are some researchers discussed this issue thoroughly and advised some assessments procedures to avoid such issues.

4) Coordinating GIS Participants and Users:

To have a proper coordination between participants and users of GIS within and between organizations, the organizational structure shall be evaluated and tested to facilitate this relationship. A harmonic emerging of GIS implementation techniques in the existing or modified structure eventually would provide a smooth implementation of GIS in the organization.

To achieve an acceptable degree of coordination between multipartidipants GIS users, committees and adhoc are formed to enhance the lateral communication within the participants and beneficiary organizations or departments.

5) GIS Committee and Team Environment's Management:

A clear charter of implementation addressing types of management issues and continuous focus on these issue is a must for each committee and team. The organizational professional interests should appropriately presented to each team member and enclosed clearly in the implementation charter.

Also number of the committee participants shall be determined in a way that makes it workable, and the most known workable committee size is 6-8 participants in such purpose.

Adequate time for committee working on GIS implementation processes plays a vital role toward success implementation. 25- 100% of member's time shall be consumed significantly in this process.

6) Communication and Providing Information:

It is clearly appears that is the communication and the right information availability on time within the committee members is very important for GIS implementation success. The communication level grows accordingly with committee number of members and participants. And it is also a function of application type deference's, and the professional background. The communication level varies also according to priorities, organizational interests and personnel agenda.

Committee members must know exactly the goals of implementing GIS; they should receive the right type of education and information at the right time.

7) Leadership and Support:

Two area of leadership are crucial to GIS implementation success:

- A skillful member whose capability to manage implementation and operation is considered and professional.
- A manger who can influence the policy of the organization.

There is a key ingredient in GIS extensive effort which by having project champion who provides executive level support and influence on the over all organization.

8) Managing and control of GIS:

In managing GIS and controlling it there might be two types of management, it is either to be centralized or decentralized. The selection of the management style of GIS project is varied up on the complexity and number of participants.

The three major area where GIS management could placed are in business line organization, in supporting line or at the executive line. The appropriate configuration of the management and control of GIS must be within organizational overall scope and policy or roles.

9) Personal Issues:

Currently, personal issues are heavily discussed topics in GIS fields. Most of these discussions are derived from the traditional view of large multipurpose GIS in public sector settings. there are a lot of issues related to personal or mainly staffing issues, they are includes: staff configuration, staff responsibilities, position requirements, position descriptions and pay scale, job classes and career paths, staffing training.

Same as other fields GIS needs the former factors to carefully considered and evaluated, but the new in GIS is that GIS need awareness of the technology.

10) Integrating GIS into organization's Operation:

Depending on all of the above issues success and fulfillment, GIS integrating to operation of the organization is next important step that needs to be considered as strategically vocal point in the implementation process.

The primary factor for integrating GIS into operation of the organization is to understand the role that GIS will play in the organizational goals achievement.

There many other factors that might affect adopting GIS into the operation of the organization, these factors include:

- Educating users: appropriate training shall be delivered to every one in.
- Training: which functions differently than education because it is the practices of the exact application of GIS in there organization.
- Involvement of users in design and planning phases of building the system.
- Operation transition: This would be the publishing step.
- Organizational Change: This is always subjected to huge resistance by people. It is a source of beurocratical operating procedure.
- Personal and Career Issues: people likes to see the benefit from there perspectives.
- GIS Support Services: GIS will run smoothly once technical support environment and database once the support environment built well.

Most of the organizations concentrate on the technical part of the system and ignoring the other parts that as known previously plays a vital role toward successful implementation.

What is remaining?

It is argued that implementing GIS unique, or in other words it is customized based on the nature of each organization. So, there is no one best way to implement or no one best way to manage implementation. There some areas also needs to be considered in GIS implementation management which includes:

- Performing reliable cost-benefits analysis.
- Measuring GIS effectiveness
- Managing implementation in dynamic organization.
- Controlling perspectives towards the system.
- Maintaining the appropriate organizational model for GIS or building relationship between enterprise and others.

GIS Model in Organization: Interaction Mechanisms and Motivation:

Despite of the obvious benefits gained from GIS, an annoying resistance to this technology encountered during implementation and adoption. This paper shows some qualities and strategies for implementation. But the data exchange within or between organization needs mechanisms regulate and motivate it properly. Nedović-Budić and Pinto (2000) identified two factors that shape the processes involved in data-sharing activities:

- 1) Motivations for engaging in data-sharing activities.
- 2) Structural characteristics of the interaction mechanisms implemented by the data-sharing entities.

Motivation of Data Sharing:

It is assumed that there are number of benefits gained by every organization and/or department involved in the GIS database. So, effectiveness and efficiencies enhancement in each party involved in the system is the main goal behind

implementing it. Nedović-Budić and Pinto (2000) identified three major points provided to involved parties linked with GIS:

1) Cost Saving:

By decreasing the workmanship on data collection, processing and acquisition on hard copies or even in an individual servers and difficulties encountered during search or archiving of any small or large data will lead to wasting cost doing it.

2) Improved Data availability:

By connecting different libraries in different organization or department will provide comprehensive geographical information.

3) Enhance Interorganizational Relationship:

It is assumed that when GIS implemented properly, it will generate a huge cross interorganizational communication. This will result a new joint services and missions update.

Interaction Mechanisms:

Either formal or informal kind of communicating GIS data can be applied. Therefore, a structure is recommended by many researchers even if informal type of communication is applied. However, due to dynamical character of some of GIS information an informal procedure of communicating data within organization or between them is highly recommended, to avoid bureaucratic way of transition and to save the time targeted by implementing GIS.

Case Study:

A complicated services organization located in U.S. has benefited from GIS system.

A government Organization covers 412.8 square miles of 11 cities, and it is called Department of Environmental Services.

(DOES) operate and maintains wastewater collection, transportation, and treatment systems in the unincorporated areas of the county and in certain in corporate areas. DOES owns, operates, and maintains 870 miles of sewer lines, 17,500 manholes, 200 pump station and grinder pumps, and ten wastewater treatment plants.

DOES operate in three main functional Departments, these departments are:

Administration,

Engineering,

Operations

Challenges towards Implementation:

Collecting and integrating information and GIS data or they called assets was the major challenge to have a full implementation. Physical assets accumulated in many different databases, formats, and applications over tens of years. DOES had over 50 unique, homegrown databases being utilized for work order, asset management, and billing applications. Compounding the problem, the IT applications and databases were physically isolated across the three operating divisions and geographical locations.

GIS system selection:

GIS implementation committee searched number of GIS-based asset management solutions and evaluated the products based on the following criteria:

:

- 1) Ease of use. User interface—look and feel
- 2) Configurability/customization
- 3) Database architecture
- 4) Querying and reporting features
- 5) Seamless integration with GIS
- 6) Web services/service-oriented architecture
- 7) Open office compatibility
- 8) Data linking to other databases
- 9) Price/affordability

VUEWorks™ (VUEWorks, Inc., www.vueworks.com) was the best software based on their criteria and all other management issues.

Positive changes gained after using GIS:

By using a comprehensive and well structured approach to the long-term GIS implementation management of assets as tools for the efficient and effective delivery of services DOES gained a lot of benefits such as:

- Better decision making in identifying and managing our infrastructure needs,
- Improved regulatory compliance
- More meaningful financial reporting,
- Improved reliability of our collection system,
- Cost savings.

Conclusion:

Managing any innovation will lead to make it works according to its planed and defined objectives and goals. offcourse, lake of a good management procedure and unclear goals definition innovation would parable lead to fail of the innovation.

GIS is a powerful system, and if you just imagine the benefits on daily work efficiency and effectiveness (if it has a full implementation) you will say that is every organization can adopt it to its system smoothly. But the reality is the opposite based on many research, while initiators advertising and trying to convince their organization to utilize GIS tools in their work procedure, a huge resistance against the change in their background is usually encountered.

But many organizations told that despite of the difficulties that they have experience in adopting GIS system, a massive number of benefits gained by implementing it. Furthermore, GIS utilizing organizations told that a new opportunities has been realized helping to increase profit of their organizations, and there were indirect positives has been added to their services and their life became much much easier than before using it. It is also important to mention that if the implementation of GIS system doesn't follow proper and professional planning, operating and controlling procedures, it will lead to a useless system and eventually to cost wasting and bad impression.