

Sustainable e-Operation for University Campus. G.I.S Contribution

Prof Islam El-Ghonaimy

Urban Designer and Landscape Architect Consultant

Department of Architecture, College of Fine Arts, Alexandria University, Egypt.

Affiliated with Department of Architecture and Interior, College of Engineering,

University of Bahrain, Bahrain

eslam-elghonaimy@yahoo.com

Abstract

University campuses meet the different academic disciplines. Such campuses are microcosms of cities where they meet academic facilities like colleges, libraries, common areas, sports buildings, roads and services, residential multiple students, staff and faculty, and facilities of various services such as business services and water purification stations, electricity, sanitation and other support facilities. Also, include places and services, recreational activities, education and sports that help to strengthen life. They have supported facilities and varied management issues, in a manner to meet the humanitarian needs of most users of such university cities.

Thinking about operation university campus, there is a need for dependency on effective accurate system, for university campuses. The existing system is to treat with the variables of the administration, operation and maintenance of complex and interrelated aspects. It was necessary to think and search for the perfect way, as part of management plans university campus to start the implementation phase and e-operation as well, which was concentrated on the employment of technology in solving many problems. The research idea depends on the thought that GIS can play positively in managing maintenance phase's obstacle for the formulation of outcomes management university campuses.

Keywords

University campus – G.I.S. – e-services and maintenance

1. Introduction

Technicalities of e-Operation has multi-application in urban planning field. It is an effective technique in the management of the academic process of education. It has the possibilities to share in urban spatial management in university campus in general and focus to the ability of spatial absorptive available to labs and classrooms, in particular. The speed and accuracy overlay the way for decision-makers in making their proper decisions in clear and strong processes of maintenance for the university campus in interrelated aspects. Its significant appears within the construction phase and extend to the operation simultaneously. It increases the life span of the project components of facilities.

As a pool of information in the hands of the analyst does not come to any other technology in its field. In addition to the code made great strides, it is worth mentioning that the techniques of e-services allow the use of different approaches and a variety of tools and sophisticated.

Remote sensing and geographic information systems (G.I.S.) can take care of spatial data for the implementation of a project. Also connecting its data is spatial since some time, and became the two flags associated with each other in most studies in the present day, especially after the dramatic rise in Computer Science in solidarity to facilitate the tasks of e-services

Research problem

Regularly, decisions makers face critical problems and difficulty while operating large urban projects. Running maintenance program for university campus interrelated aspects especially that most of the buildings that are under construction or under ready operation are not simultaneously especially whenever its life span of the components of these facilities is different. Moreover, management the services for the academic buildings needs more accuracy.

Also, the possibilities of spatial absorptive capacity available to labs and classrooms. In particular, the rapidity and accuracy is the main issue that worry decision makers to take clear and strong decisions.

Research idea

To deal with the multi-disciplinary activities and the variables items of maintenance within the university campus, it is necessary to find out the proper sustainable system to use. The proposed system should be accurate, has the flexibility and capability to include academic, services and infrastructure issues. With regard to the analysis and reasoning, GIS presents the suitable solution to operate the campus in term of academic and Maintenance, operate, Management and Development for future programs using the advantage tools of data entry and analysis in such item. It is expecting that G.I.S. will play significant role in inevitable for each of the following elements:

Objective of the study

Thinking in a strict e-controlling system to operate the multi components of the university campus in sustainable way. Moreover, this system should consider the different type of Users, places and activities in addition to the preservation of campus resources. Saving energy and the rationalization of consumption within the maintenance operations should be considered as well in order to improve the campus context (Figure 1).

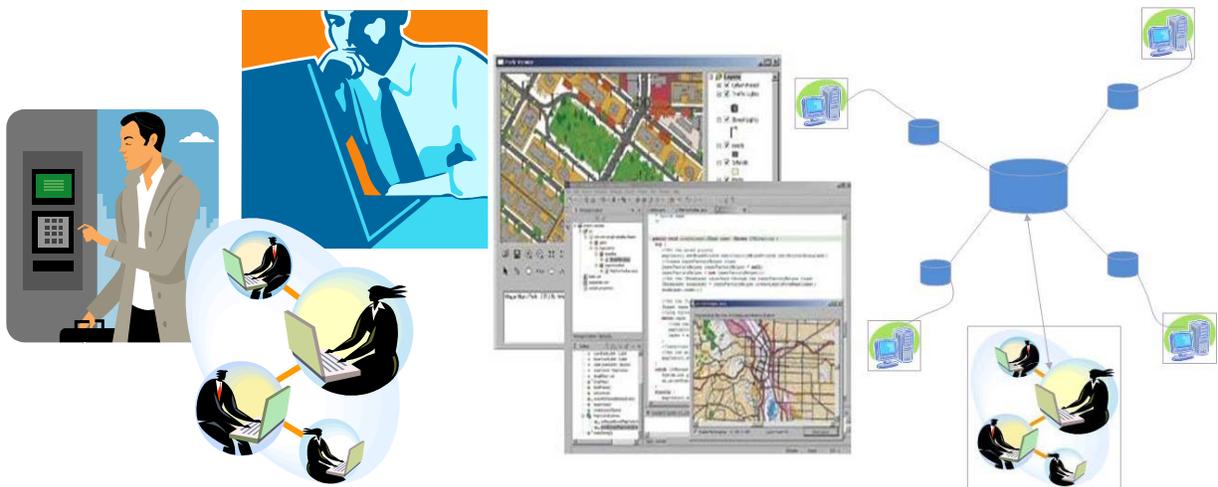


Figure 1. e-controlling via the use of G.I.S

2. Headquarters of the university campus

2.1 Patterns of the users of spaces in the university campus headquarters

Importance interaction of the people appears within and between spaces. Their level of satisfaction through its direct impact on the success or failure of any project. The supporting facilities work in its determination to provide a built environment that meets the needs and requirements of people who are using the spaces (Fogg, 1986). Type of Users, place, time and functions (activates) are the major four elements should be considered while designing the e-controlling system.

As presented in figure 2, users are divided into four sections namely: The owner, management, maintenance and operation, and the user. Places and related activities should be considered such as where the stresses in the same context while the different functions of open spaces as well. The importance of knowing the time and activities of every type of users of the project is to consider the type of services should be given. Desires of having accurate database, knowledge and analysis that are to enhance the understanding users’ needs in campus. It will raise the expectations of success and effectiveness of services that are provided to users.

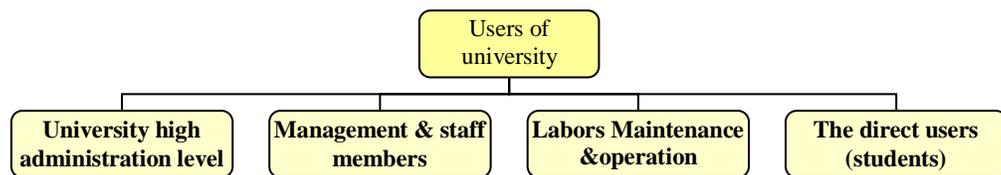


Figure 2. Illustration of the Patterns of the users of spaces in the university campus headquarters

- i. Self-absorption capacity of natural systems to local and global Natural Sink Capacity in which to contain the waste resulting from human activity in the areas of Architecture and Urbanism.
- ii. Reduce the use of non-renewable resources with stock selected. The resources that each end user and others stay the same material installed in manufactured or waste resulting from operations architectural and urban development.
- iii. Continue to use renewable resources, "Recycle" and "Reuse".

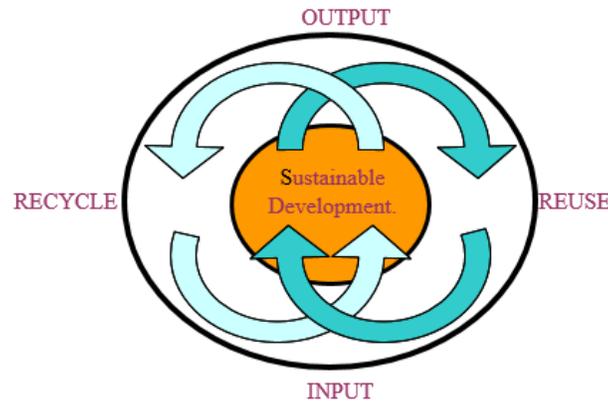


Figure 4: The basics of the process of Sustainable Urban Development (Abdallah 2007)

While in the nineties, we find that the Earth Summit held in Rio de Janeiro in 1992 had a set of challenges for all those interested in the cause of development. Perhaps the most important is to ask the question is essential to how the preservation of the environment to ensure that human continuity and survival. At the same time, continue the role of schema and architecture in the development of the environment around us.

2.4 Concept of sustainable development in university campuses

It is important here to realize that the essence of the concept of "sustainable development" in general depends on the re-definition of wealth and resources to include natural capital of clean air and fresh water and seas clean and fertile land and a plurality of plant. While, environmental issues is separate from the urban issues. Environmental solutions and physical support each other. It contributes positively to building better communities and purify. At the same time, make communities contiguous and dimensions of the future. Therefore, it is very logic when expose "the Sustainable Urban Development" to improve the Urban Spaces headquarters of university campuses. It achieves interoperability - which concerns us in the fields of architecture and construction process to ensure a balance between them.

3. e-operation for Dammam University is an example

University of Dammam is one of the educational institutions in the Kingdom of Saudi Arabia. it was established to serve the science and knowledge and research. The project in hand is to establish the headquarters of the University of Dammam. The project is located on the road to Dammam- Khobar coastal front of the current headquarters of the University, an area the total project land 2.5 kilometers square area of academic buildings 204,672 square meters total area of 568,235 square meters of facilities (Figure 5).



Figure 5: The regional location of the project

3.1 The major components of the campus of University of Dammam

The campus has been conceived to split the components of the project to 5 main parts as follows (Figure 6):

A. The academic portion:

- College of Architecture
- Faculty of Dentistry
- University Hospital
- College of Medicine
- College of Nursing
- College of Basic Sciences Applied
- Faculty of Applied Science

B. Heart of the project "mosques" and the region surrounding the administrative and academic services:

- Entertainment Centers
- Mosques
- Lecture Hall
- Food services
- Central Library
- Celebration Hall
- Telegraph and Telephone
- Students service center
- Students activities Centers
- Female students service center
- Student Affairs & Registration

C. Sports area:

- Stadium
- Stadiums sealed
- Stadiums open
- Indoor Stadium

D. Housing: Located in a separate area for the Campus academic, administrative and sports and includes:

- Nursing Housing
- Unmarried students housing
- Teachers housing (married)
- Married Student Housing
- Teachers housing (unmarried)
- Housing female students.

E. Service areas and infrastructure stations.

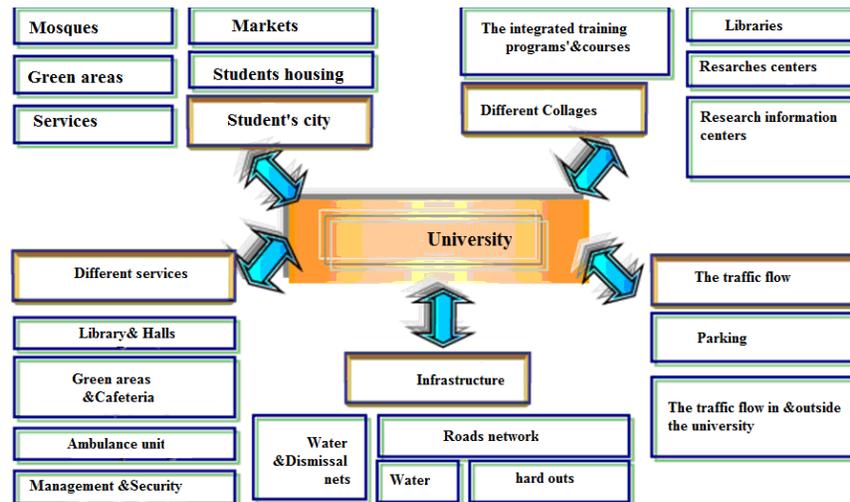
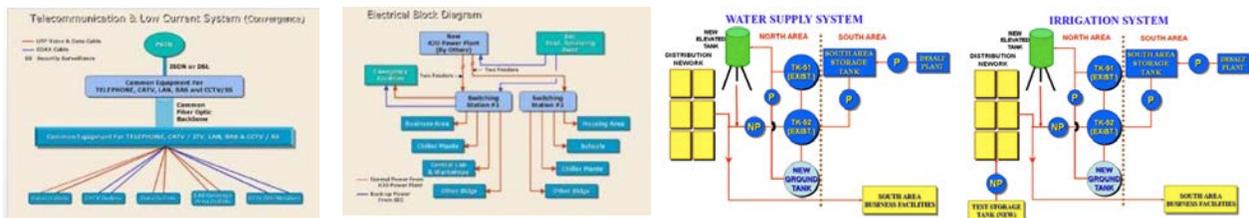


Figure 6. Structure of services and infrastructure in University of Dammam

3.2 Need follow up the implementation and the managed infrastructure facilities

Operation' the implementation and the maintenance for infrastructure and facilities came in stages to meet the need for urban growth. It comes caution that in traditional system it could result in conflict and duplication. Therefore, it highlights the importance of using the high technology system of maintenance and to follow-up of an integrated breadth and multiplicity of networks. This system should integrate the infrastructure facilities through a program to tie G.I.S. controls and coordination work time and type of activities, type and the correct place. The difficulty comes in setting up a mechanism for coordination between the infrastructures facilities in the implementation and maintenance (Figures 7, 8).



Telecommunication network

Electrical network

Control of irrigation systems and water supply

Figure 7. Structure of infrastructure networks in University of Dammam Campus

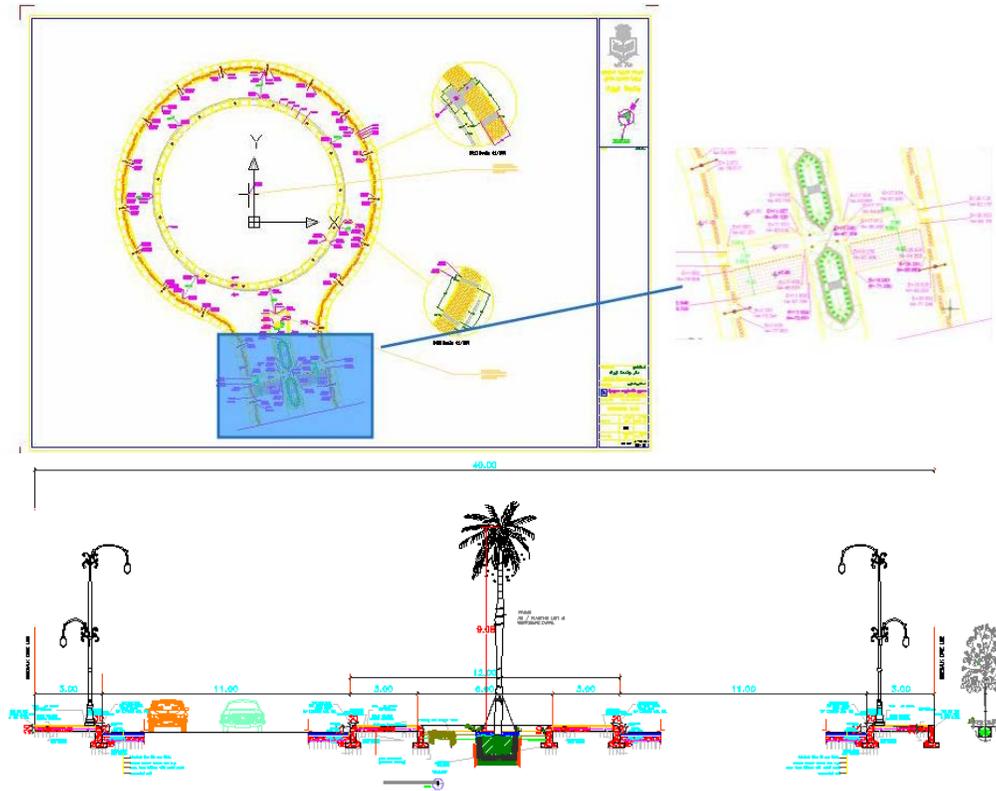


Figure 8: The signing of the streets and sidewalks inside the headquarters of the University of Dammam

Targeting the preserving of the resources, the idea of e-controlling the resources of the university campuses has to follow sustainability principals. Since the target is a strict mechanism to control the stages of management, operation, maintenance, development, and serious is the main target, so, taking the advantage of GIS is significant. It is in the planning stage, studies, and thinking to prepare a vision for the maintenance' phases obstacle for the formulation of outcomes management university Campuses. Achieve these objectives are by recruiting technology to disseminate and facilitate the circulation of information technology geographical within the administration as well as return the benefit of this data for all, in addition to being a strong source of media

3.3 Expectation of using G.I.S in controlling university Campuses

- a. Providing spatial information necessary to support urban management and help decision makers the right decisions based on accurate and current information regarding the maintenance management of the university
 - b. Following the movement of construction and building and the follow-up maintenance after construction.
 - c. Management of solid waste collection systems.
 - d. Designing risk management aspects
 - e. Monitoring and evolution of university urban change,
 - f. Facilitating the dissemination and exchanging of information on colleges and libraries between students inside and outside the university
 - g. Achieving proper communication between university users by linking the digital map information of colleges and research centers
 - h. The use of interactive (GIS) maps related to the information and research services will facilitate the managements' operation. This digital map will include of all the elements of the university (colleges, libraries, research centers, ambulance stations, information and services centers)
 - i. Flexibility in coordination and following-up the university needs and future requirements (such as extensions, expansions and increase the number of students and changing needs.
 - j. Follow up and monitor traffic inside the campus and the surrounding urban context.
 - k. Raising the awareness of users.
 - l. Improving the speed and accuracy of the physical maintenance, the construction and operating in clear vision.
- (Figure 9)

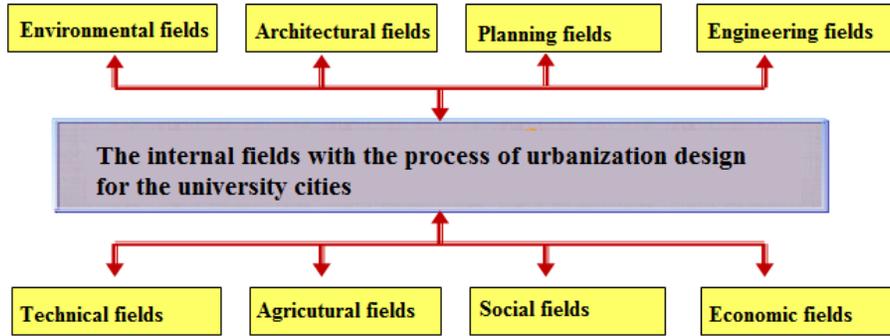


Figure 9. Overlapping the spatial information

3.4 Principals of applying the idea

The general thought to get the maximum efficiency depends on:

- | | | |
|------------------|--------------------|---------------------|
| a. Effort saving | b. The accuracy | c. High Performance |
| d. Integration | e. One team spirit | f. the cooperation |

The use of technology is appropriate in:

- Collection and entry, storage, processing, analysis of data
- Presentation of spatial information
- Descriptive of the specific elements under same responsibility,
- Entry of geographic information (maps - aerial photographs - visible) and metadata (names - tables)
- Retrieved and displayed on the computer screen or on paper in the form of maps and reports and graphs. (Figure 10)

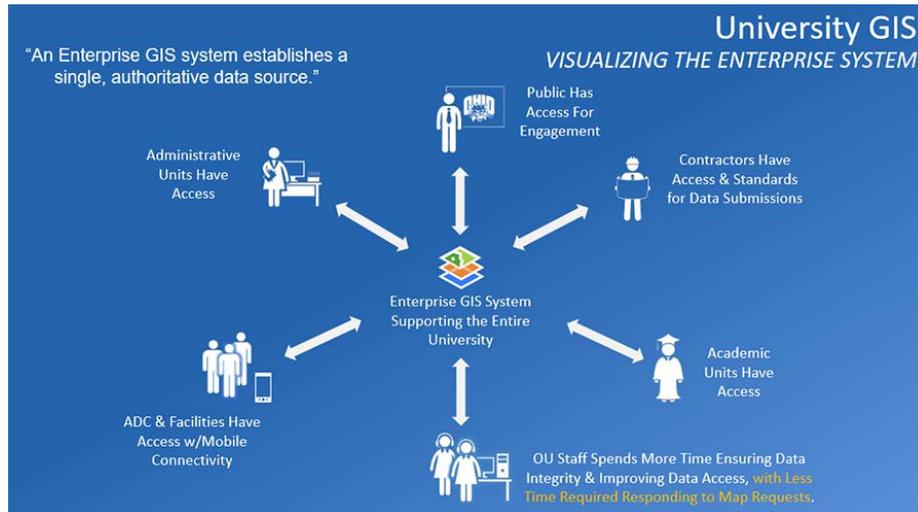


Figure 10. Principals of applying the idea (University, 2018)

3.5 Stages of the work and implementation the idea

There are four main stages to use GIS as follow:

- Phase I: Preliminary studies (data collection according to dividing the campus).
- Phase II: Preparing the database of spatial information of the University.
- Phase III: Preparing the database of the University Student Information.
- Phase IV: Preparing the training of cadres. (Figures 11 to 14)

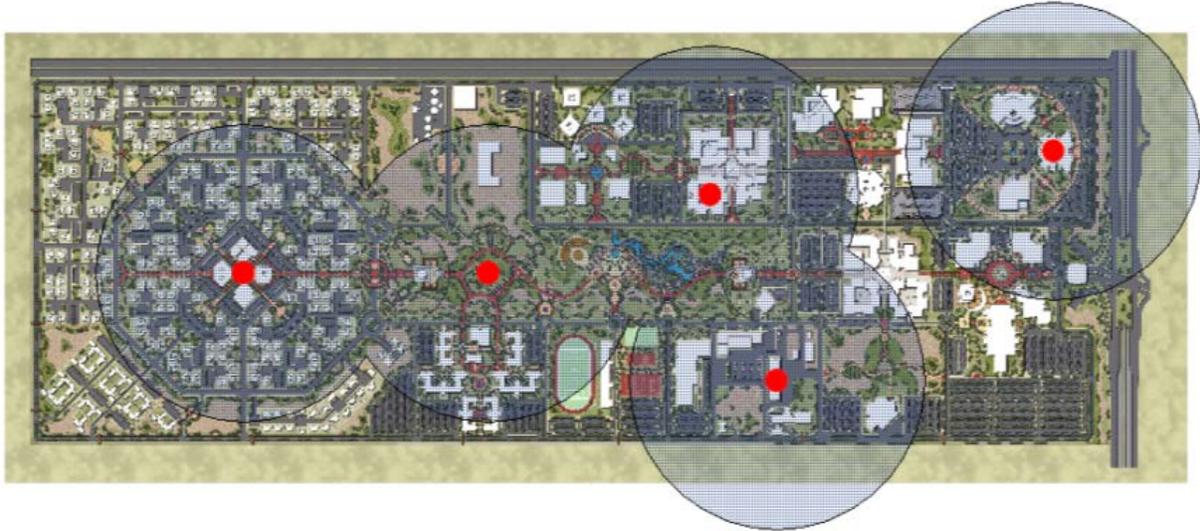


Figure 11. Dividing university campus master plan into sectors according to zoning of services

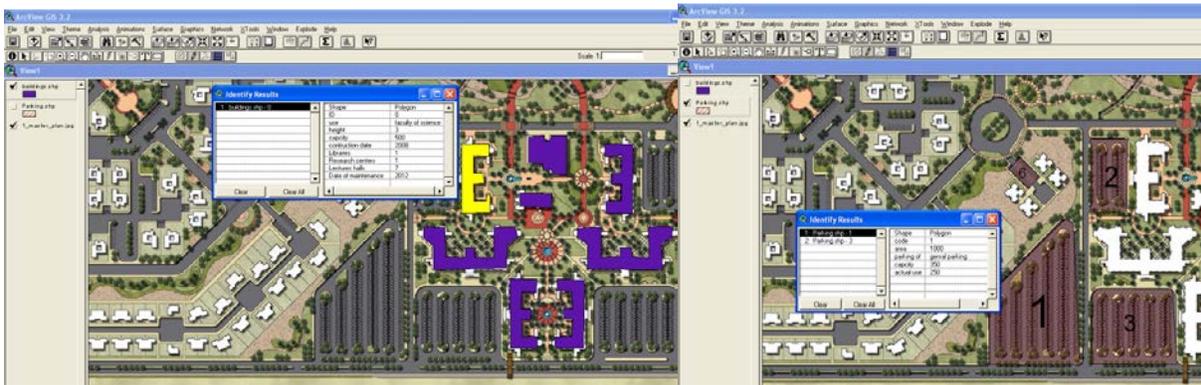


Figure 12. Data storage for colleges, parking, ...etc



Figure 13. Data comparative and analysis

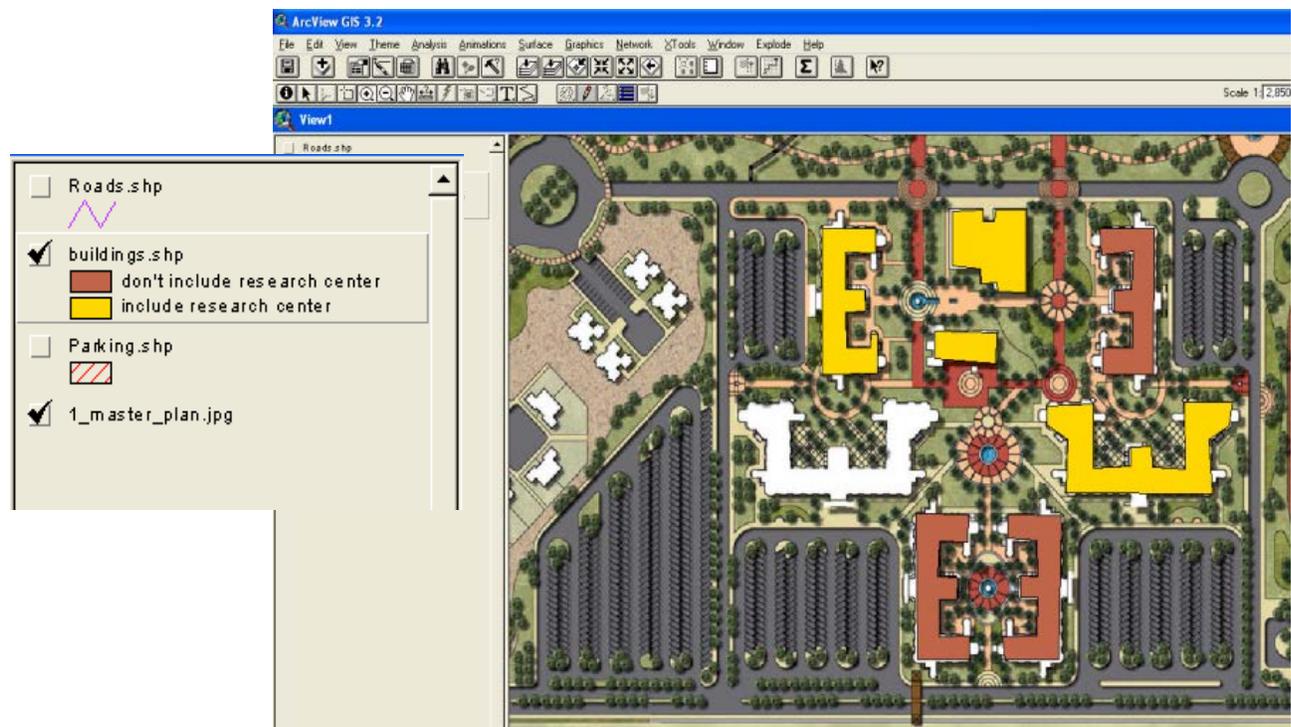


Figure 14. Presenting recommendations, notes and advising after data classification to control the campus

4. Conclusion of the research

Preparing Damam University GIS is not just mapping. It will be used in different levels. At a higher level, GIS should be a data analysis and decision-making tool for the University authority. With GIS as honest and accurate urban advisors tool, we can evaluate a variety of data to graphically assess economic and forecasts, services efficiency, space management, infrastructure conditions, energy use, procurement, and more. GIS can also allow the University to rationalize predictions and forecasts in different levels, create and to prepare more realistic' budgets, and have the data to justify the University's decisions.

From the above studies and the model that was design by the researcher, it is concluded the followings:

- 1- The Supervision at the university should pursue a renewable energy supply strategy that optimizes long-term supply and fuel price stability while preserving an ability to test and take advantage of other potential fuels.
- 2- University Planning has to develop an Enterprise GIS system that will be a single, authoritative data source for the University and useful in operating Dammam university campuses.
- 3- G.I.S. will be the successful tool in e-operating and management university Campuses, which is ultimately, will be integrated throughout the large number of users with different skills can manage, share, or use data to address a variety of needs including modification, visualization, analysis, and dissemination.
- 4- It has taken the initiative to be taking advantage of e- operating through GIS and linking all the departments that rely engine maps the GIS.
- 5- Through the development of "GIS Enabled Portal" and thus it is confident that in using G.I.S. system that the university campus will be managed and maintained in appropriate system. With web-based portals, users will be able to create their own maps, allowing GIS staff to focus their time maintaining the integrity of the data quality as well as mining the data for information.
- 6- G.I.S will help decision-makers, official employee of the management and maintenance, and technicians to choose the proper decision and complete the work assigned without conflict
- 7- Also ensure that no overlap or loss of information at this time or in the near or distant future and coordination between the different networks effectively and successfully.
- 8- Depending on the type of user accessing the web-based portals, different layers of information will be available for viewing and printing based on need, sensitivity of information, and security.

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Biography

Islam El-Ghonaimy is a senior ranking Urban Designer and Landscape Architect. Consultant since 2006 with a 30-year experience vetting the manifold disciplines of architecture, urban design and landscape architecture. He did the consultation services in City Urban Planner for World Institute for Development Economics Research of UNU, on 2007 and 2012 and as City Development Strategy Consultant, for World Bank projects with Arab Urban Developing Institute (AUDI), from 2005 till 2012. Professionally, is a motivated eager beaver, for his encompassing disciplinary interest in Environmental Studies.

Academically, in 2000 he has been accredited the Doctoral of philosophy degree, in "Environmental Assessment of Urban Area". Formerly, in 1995 he has been approved the M.Sc. degree in Environmental Management and Economic. In 1988, he has been certified the B.Sc. degree as an (Architect). In 2014, he has been assigned to hold down a professor rank.

Publications, 5 books, 8 handouts, 22 white papers in Refereed Professional Journals. Issued 56 Papers in Scientific and Professional Conferences and symposiums, 11 articles for un-Scientific Magazine and 5 unpublished technical Reports. He has many other Activities as that of Short-timed Courses, Editorial Board, and Organization Committee, referee in many conferences and academic symposiums.