Gaza City: Virtual space and the control of physical space

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ABSTRACT

The interaction between virtual space and physical space is increasingly gaining more importance and consideration [1]. Much of the interest concentrates upon theorizing this interaction and investigating the different concepts behind it [2]. Another concern is to explore aspects of the physical space through its virtuality especially in the field of architecture and urban design [3]. Yet with the evidence that the increasing pace of development in multimedia, information and communications technology is exerting vast changes on the physical space, there is a disparate need for control over these very fast changes. Control of the physical space is the main subject of physical planning where it is crucial to develop new tools and procedures for better control of the urban change. Applications of data, information and communications technologies in urban planning and geographic information system (GIS) constitute one of the vital fields for the control and guidance of urban development.

In Gaza Strip for example, unprecedented developments resulted after the declaration of the Palestinian- Israeli peace agreements in 1994. Information and communications technologies and data sources were improved with the introduction of computers, modern telephone and wireless communications and satellite imaging. The new developments began to impinge the existing British Mandate system and the physical planning process. The municipality of Gaza city took the lead and became the most important and active local planning institution to benefit from the new situation. Although the new developments are in their early stage, the positive impact on the planning process and the control over the built environment in the city are paramount.

This paper aims at exploring the new developments of spatial technologies in the municipality of Gaza and their impact on the planning conduct and the built environment in the city.

1   BACKGROUND

The modern physical planning system in Palestine was early established during the British Mandate period at the beginning of the 20th century. Several ordinances consequently laid down the basis of this system from 1921 to 1948 [4]. Information and communications technologies and data sources were very simple and all the work was done manually [5]. The planning process went on in a traditional slow fashion depending on the fundamental doctrine of the period: "Survey- Analysis- Plan" [6]. The preparation of planning schemes took a very long period and continued for several years. Accordingly, the control over the built environment which is the main goal of the planning system was not efficient and the Palestinian settlements grown up mainly by their own. They were greatly affected by other factors much stronger than the physical planning system such as political complications and regional conflicts[4].

After 1948, this system was halted when Palestine was split into Israel, the West Bank and Gaza Strip [7]. The same system with the same conditions continued in Gaza Strip during the Egyptian role from 1948 to 1967 and under the Israeli occupation from 1967 to 1994 [8].

The Israeli- Palestinian peace process brought important developments to information and communications technology in the West Bank and Gaza. A Palestinian telecommunications company (PALTEL) was established in August 1995 with the scope of bringing Palestine to the most advanced technologies in the field. Internet access became also available through several Palestinian Service Providers [5]. Nowadays, most of the Palestinian governmental and non-governmental institutions are provided with telephone, email and internet access. Many of them have even launched their own web sites.

Although the same British Mandate physical planning system remained in force, the motivation and administrative conduct of the planning institutions were greatly developed. At the same time, several programs have been initiated by European donor countries for the development of the planning conduct in Palestine. One of the main projects was the project of "Physical Planning and Institutions Building' funded by Norway. It started in 1995 at the Ministry of Planning and International Cooperation (MOPIC) for the development of the physical planning system and the planning process [9]. The result was the preparation of two Structure Plans for Ramallah- Albereh and Gaza, and two Regional Plans for the West Bank and Gaza Strip. This project also brought vital developments to the planning process in MOPIC where a special urban and regional planning unit was established. Modern computers, plotters and projectors were employed and the data exchange was facilitated through modern telephony and the internet. The production of the plans was also digitized through software applications like Autocad and Coreldraw. The two regional plans provided the basic framework for some large strategic development projects while the two structure plans offered the base for detailed plans. Yet unfortunately, and because of basic needs and the lack of funding. The efforts were limited to the production of the basic statutory plans according to the British Mandate planning system model. The project could not bring any changes to integrate this system with the emerging technologies. Nor any mechanisms were introduced to customize the available technology and data sources. The other two major problems include:

- ??   The accuracy of the plans is very bad since they lack a satisfactory coordination system.
- ??   The project has terminated with no vision for updating and future development.

2   GIS PROJECT FOR GAZA MUNICIPALITY

All the previous deficiencies and shortages urged the municipality of Gaza to seriously consider the establishment of an efficient Geographic Information System (**GIS**) system in order to improve the spatial planning services in the municipality as the main tool for better control over the built environment in the city.

In order to achieve this aim the following objectives have also been considered:

- ??   To establish an entrusted data source for the municipality.
- ??   To provide the necessary hardware, software and personnel for the system.
- ??   To save old data archives which are badly damaged and seriously exposed for deteriorating.
- ??   To provide better customer services in the planning departments and other departments of the municipality.

3   ORIGINS OF THE PROJECT

?? In 1996, some donor countries supported the development of the municipal services of Gaza municipality. A field survey was thence funded by the World Bank in order to aid the planning departments of the municipality.

?? The same year a team of Argentinean Volunteers helped to conduct some planning exercises and to start developing the database of the municipality. Yet no decision was taken to establish a GIS system in the municipality.

?? In 1997, the awareness was raised among the decision makers in the municipality for the importance of GIS for the modern municipality. A visibility study was ordered.

?? A GIS department was the same year established upon the decision of the Mayor of the municipality **Mr. Aown Shawa**. The municipality adopted a comprehensive training program in order to develop the human capacity in the field. The World Bank funded a training course in some GIS software like Arc View and Arc Info where an Egyptian expert was the trainer.

?? The work on Arc View and Arc Info continued until 1999 where a new set of software was introduced. They were the products of the U.S company Intergraph especially Geomedia professional program.

?? By the end of 1999, the World Bank funded the completion of the of the hardware requirements of the system. A British team from Soil and Water company directed a new training course for Geomedia. This course was further elaborated by a Jordanian expert until the end of 2000.

4   DEVELOPMENTS AND TRANSFORMATIONS

?? In 1997 and after the establishment of the GIS department, the United Nations Development Program- West Bank and Gaza provided the municipality of Gaza with some old cadastral plans for the city from the days of the British Mandate in Palestine. These plans suffered from two shortages:

  ?? They did not have a good level of accuracy.

  ?? They lacked the definition of coordinate points and therefore they did not have a defined registration system. Each plan had its own scale and its own correlation with the arial photo of the city.

?? In the same year 1997, 141 blocks from these plans and the aireal photo of the city were digitized using Autocad and then were transferred to Arc View. Corrections were made and they helped the establishment of a database for planning purposes of the municipality.

?? After the completion of the training course of Geomedia in 2000, all the digital plans used in 1997 were transferred to Geomedia. They were also updated using the new arial photo of the city of 1999 (Figure 1).

Figure (1): Satellite Image Of Gaza Strip. (LANDSAT 7- 15m Resolution).

Source: Courtesy GIS department, Municipality of Gaza.

5   GEOMEDIA PROFESSIONAL APPLICATIONS FOR THE CITY OF GAZA

Geomedia Professional applications went through the following procedures:

?? The transformation of the cadastral plans which were digitized by scanning and Autocad to Geomedia files.

?? The transforming of the of the 1996 arial photo to Geomedia files.

?? Building database and comprehensive attributes for the details of the spatial characteristics of the city.

?? Each member of the GIS team is responsible for certain blocks of the plans and has special folders to save his work on the network for each feature of the city separately.

?? Information of the same feature is afterwards collected from the different officers and after being checked, it is saved in special folders on the network.

6   EXAMPLES OF GEOMEDIA PROFESSIONAL APPLICATIONS

There are two kinds of applications:

  ?? Structure (Outline) plan applications.

  ?? Detailed applications.

6.1 Structure (Outline) applications

6.1.1 Structure plan of Gaza city with general attributes for the administrative areas of the municipality (Figure 2)
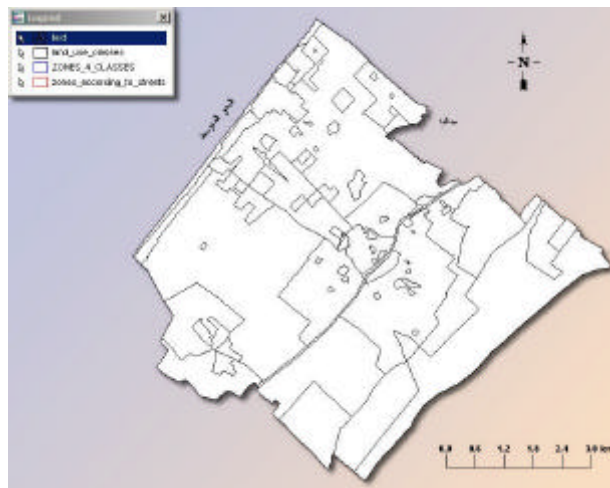

Figure (2): Structure plan of Gaza city. Source: Courtesy GIS . artment, Municipality of Gaza

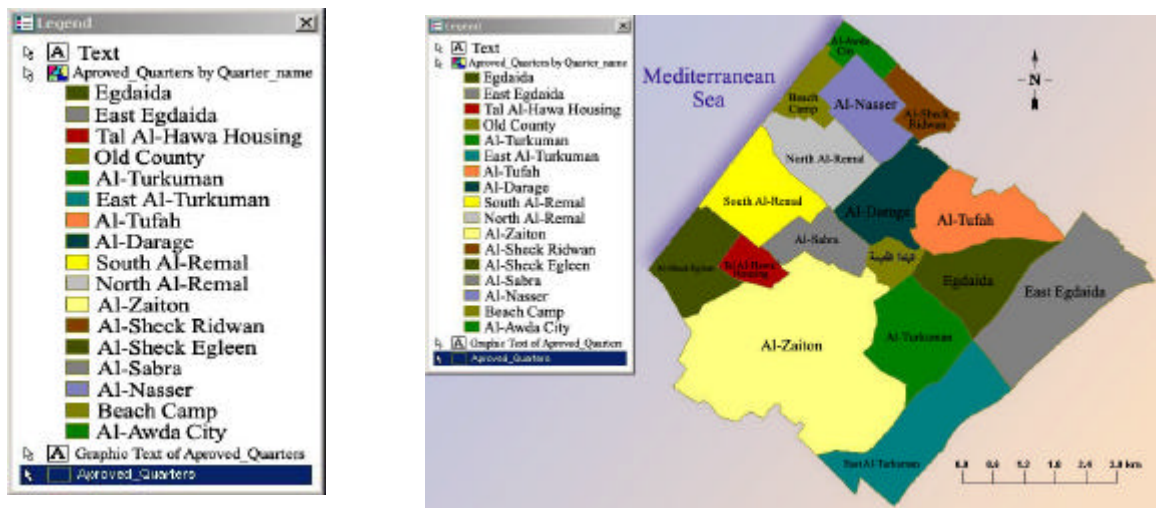### 6.1.2 Neighborhoods of Gaza with all their relevant data (figure 3)

Figure (3): Neighborhoods of Gaza with all their relevant data. Source: Courtesy GIS department, Municipality of Gaza
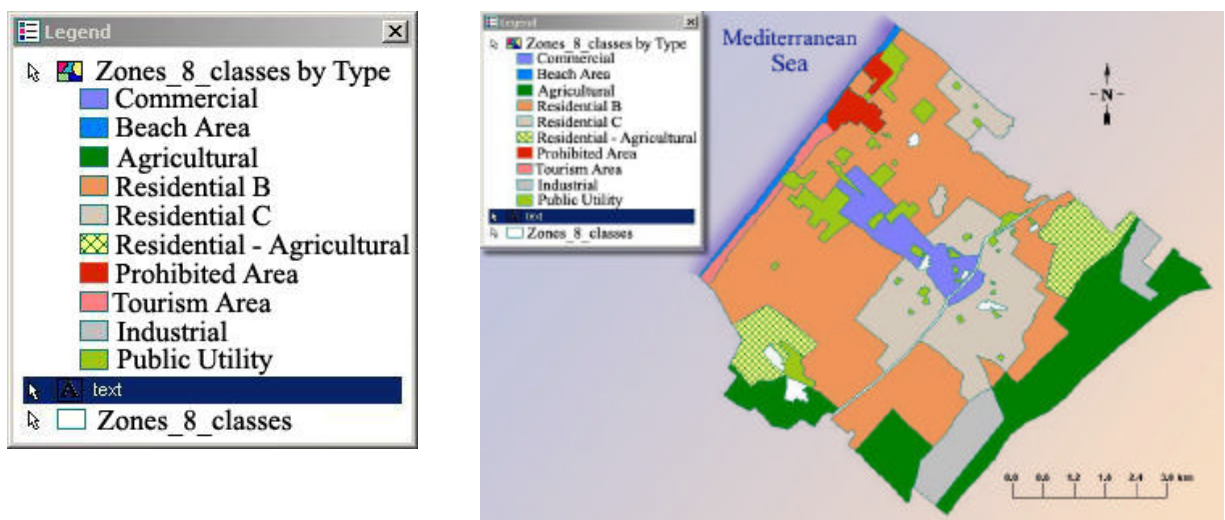
6.1.3 Landuse of Gaza (figure 4)

Figure (4): Landuse of Gaza. Source: Courtesy GIS department, Municipality of Gaza.
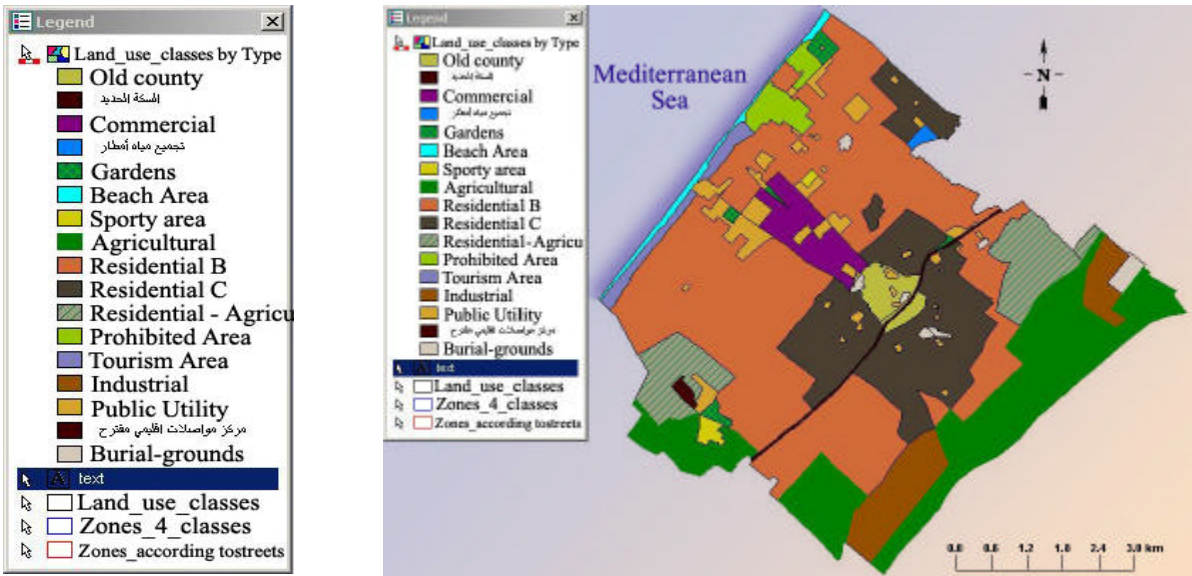
6.1.4 Special landuses of Gaza (figure 5)

Figure (5): Special landuses of Gaza. Source: Courtesy GIS department, Municipality of Gaza.

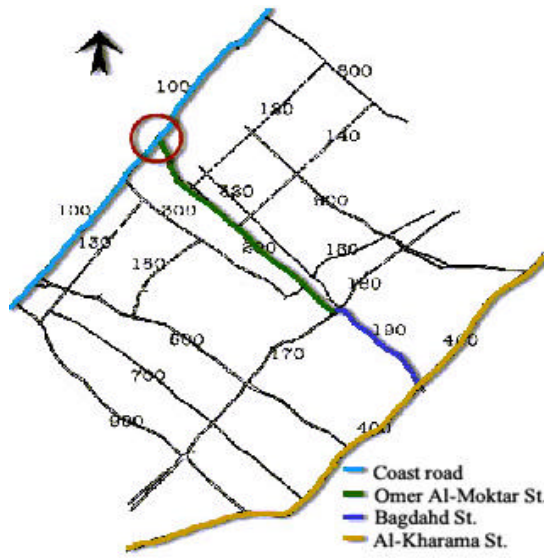## 6.2 Detailed applications

6.2.1 Street numbering

Figure (6): Street numbering. Source: Courtesy GIS department, Municipality of Gaza.

?? A base point was determined at the intersection of the main street (Omar Al-Mukhtar street) and the Coast street. This point was chosen because there is no streets beyond the Coast street which therefore became the first street next to the beach. Omar Al-Mukhtar street is also the most important street in the city (figure 6).

?? Coast street took the number 100 while Omar Al-Mukhtar street took the number 200.

?? Main streets took the number format X00. Collector streets took the number format XX0 while local streets took the number format XXX.

?? Special attributes of each street were also given in order to provide a more comprehensive database for the city (table 1).

Street_Name	Street_No
Right_Start	Street_Width
Right_End	Left_Start
Street_Location	Left_Start
Street_Type	Services
Street_Style	Notes

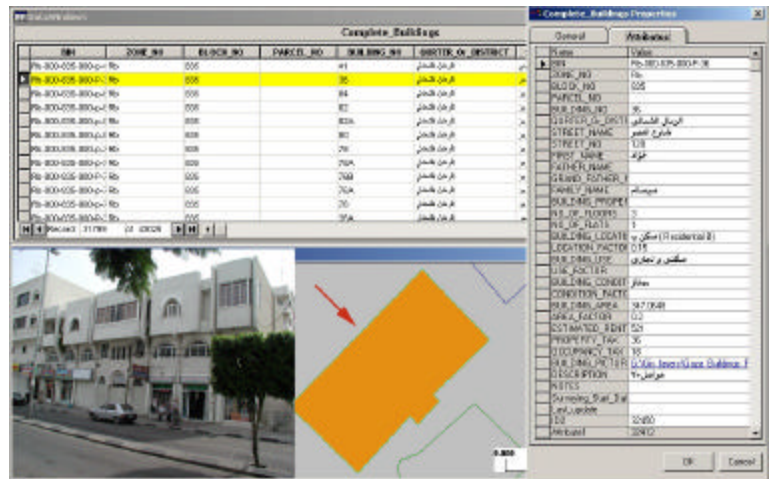Table (1): Special attributes of Gaza streets. Source: Courtesy GIS department, Municipality of Gaza.

6.2.2   Building plans

?? The city was divided into 468 blocks and each block was given its Identity Number.

?? Buildings in each block were numbered according to block and street numbers determined in the previous procedure.

?? Each building was given its detailed attributes which include (table 2).

Bin	CONDITION_Factor
First_Name	Building_Area
Father_Name	Area_Factor
Grand_Father_Name	Block_NO
Family_Name	Parcel_No
Quarter	Flat_NO
Building_Owner	No_Of_Flats
No_Of_Floors	Estimated_Rental_Value
Zone_NO	Occupancy_Tax
Building_Location	Property_Tax
Location_Factor	Description
Building_Use	Building_Picture
Use_Factor	Last_Update
Building_Condition	Notes

Table (2): Special attributes of Gaza building. Source: Courtesy GIS department, Municipality of Gaza.

?? A new photograph for each building was also introduced in its attributes in order to follow any changes in the physical character of the building (figure 7).

?? Surveyors recently conduct detailed survey for the buildings in order to update the existing data.

7   PROBLEMS AND DIFFICULTIES

Laying the foundations for such an intricate multi-leveled project is not an easy task. And with the complicated current conditions of the Palestinian territories, the launch of the project thought to be an impossible mission. Several problems and difficulties confronted the project and needed to be considered for the future development of the project. They can be categorized into Strategic problems and technical problems.

7.1   Strategic problems

?? The project started as special initiative of Gaza municipality with little support and coordination from other official Palestinian institutions. The pressure exerted on the municipality is enormous and other regional and national institutions should take their role.

?? There is a lack of coordination and cooperation between the municipality and the professional and academic bodies in Gaza like the Engineers Association and the Islamic University Gaza. This cooperation and coordination bring mutual benefit for both sides and widen the range for knowledge transfer and exchange.

?? The project needs numerous funding. Thanks to the efforts of the World Bank, but still there is a disparate need for international support for the municipality, the profession and the academia.

7.2   Technical problems

?? The existing of land plots and land registration maps are not accurate and they affect the accuracy of the virtual reality of the city.

?? Coordinate system is missing from these maps and therefore there is no registration system for the new plans. This also decreases the accuracy of the plans.

?? Some very dense areas like the refugee camp and the old town can hardly be distinguished at the existing areal photos and need much more detailed and accurate areal photos and/or field survey.

?? It is very crucial for keeping a continuous input from the changing physical space into the virtual space to provide the technology for continuous updating for the physical space.

8 COOPERATION AND INTEGRATION WITH OTHER INSTITUTIONS

In such a very complex environment, without accurate data there would be no real control over the built environment. Goals of social and economic development would therefore be hindered. The municipality of Gaza is quite aware that it should always develop and update its data sources. The Ministry of Housing is one of the most important sources of spatial data for the West Bank and Gaza. Its survey department contains most of the available information about land registration, land division, land survey, land ownership and land coordination. The Ministry of Housing was the first insntitute with which the municipality of Gaza sought cooperation and coordination. Main fields of cooperation included:

?? The completion of land registration surveys of the city of Gaza.

?? The creation of coordinates network of the city of Gaza.

The municipality of Gaza also plans to establish such cooperation and coordination with other institutes and data sources like the Ministry of Post and Telecommunications, the Palestinian Telecommunications company, Water Authority and Electricity Authority. The aim is to establish data sources about all aspects and features of the built environment in Gaza. Some agreements have also been signed to provide digital mapping services for some of these institutions.

CONCLUSION

The planning process outlined in this paper - though at grass root level, clearly indicate the role of computer and telecommunications technology. Not only this role is crucial for understanding the physical space through vertualizing, but also the presentation of this understanding. More importantly, these technologies provide the only mean for processing the physical space for planning and development in an unimaginable accuracy and speed. The system has also a tremendous ability for development and instant treatment of any problems and difficulties and for continuous updating for data. The work is now concentrating on building a three dimensional model for Gaza using Geomedia Professional. The second major "dream "of the municipality is to connect to satellite imaging through Intergaph, the host of Geomedia in order to provide continuous and accurate updating for the urban structure of the city. These two developments would provide for exploring the physical space of Gaza from one side and to provide accurate planning control for development change in the city. This project indeed creates a revolution in the planning process in Palestine where its applied for the first time and only in Gaza. Finally, it should be acknowledged that without the international cooperation between many institutions, this project would never have come to realty.

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