

# **Urbis Hanoi 2010, GIS Instrument for Comprehensive Management of Urban Development Information**

**Ir Michel VAN ACKER, Belgium**

**Key word:** GIS, Hanoi, cadastre, patrimony, town planning

## **SUMMARY**

The rapid growth of the urban area of Hanoi, highlighted by the recent geographical extension of the province from 900 to 3.300 km<sup>2</sup>, causes a whole series of difficulties in urban management. All the fields are concerned: social problems, environmental pollution, solid and liquid waste management, traffic jam, real estate speculation, etc

The analysis, the comprehension and the management of urban information can be largely facilitated by a geographical information system which integrates the data spatially and temporally and supports effective collaboration between all the administrations concerned what could contribute to the installation of the E-Government concepts.

The General Administration of the Patrimonial Documentation (“GAPD”) of the Ministry for Finances of Belgium collaborates actively in the project UrbIS Hanoi. This collaboration finds its origin in 2 European projects carried out within the framework of the program Asia Urbs with the towns of Hanoi, Toulouse and Brussels, followed by 3 years of preparation of the new project.

From 2000 to 2003: realization of European project ASIA REHAB with the responsibility for the creation of the GIS on a pilot block of the Old Quarter of Hanoi.

From 2003 to 2006: realization of European project HANOI 2010 with the responsibility for the creation of the GIS on the whole area of the Old Quarter of Hanoi.

From 2006 to 2009: missions of training and assistance in GIS and preparation of the project UrbIS HANOI 2010 to set up a GIS for the whole area of the Province of Hanoi in close cooperation with the Vietnamese Authorities and the Belgian Cooperation.

The Hanoi Department for Natural Resources, Environment, Housing and Land Administration (“DONRE”) has been one of the partners receiving the assistance of the GAPD and participating in the European Projects. The DONREH was officially charged by the Hanoi Popular Committee of the realization of UrbIS HANOI 2010. The DONREH is ready to start the project, the structures and the people necessary are already installed.

# **Urbis Hanoi 2010, GIS Instrument for Comprehensive Management of Urban Development Information**

**Ir Michel VAN ACKER, Belgium**

## **1. INTRODUCTION**

Each one knows it, Vietnam is a country which experiences a very fast development. That involves in particular big changes of the urban cores. Hanoi is certainly one of the cities which knew the greatest modifications these last years, with impressive prospects and objectives for 2020.

Each year, the socio-economic development of Hanoi results in a growth of the urban and industrial areas to the detriment of the agricultural zones. This real urban explosion generates many problems, in all the fields, for example the migratory flow, the employment, the increase in the traffic, the pollution, the evacuation of solid waste and waste water, the water provision and all the equipment.

The administrations of the city are confronted with these problems and the difficulty of the management of all that relates to the ground, in a context of land speculation.

For several years, the town of Hanoi has faced the situation and multiplies the projects.

The modification of the size of the province in August 2008 with the annexation of whole or part of close provinces brings certain solutions but does not simplify really the situation, since surface grew from 900 to 3.300 km<sup>2</sup> and the population doubled.

Here graphically this increase in territory, the zone corresponding to the initial territory is darker. That corresponds to an extension towards the East of approximately 45 km and towards the South of approximately 40 km.

The reorganization of the administrations according to the new territory of the province is in progress.



In such a context, it is essential to use tools for better knowing the situation and its evolution and to study the measures to be taken. All these evolutionary problems and these phenomena are imbricate, in space and time. The analysis, the comprehension and the management of urban information can be largely facilitated by a geographical information system which integrates the data spatially and temporally and supports effective collaboration between all the administrations concerned what could contribute to the installation of the E-Government concepts.

The authorities of Hanoi charged the Department for the Natural resources and the Environment (DONRE, department in charge of the cadastral register of Hanoi) of the study

of the installation of a Geographical Information System (GIS) to be used as tool of assistance for the management of the city.

The General Administration of the Patrimonial Documentation (GAPD) of the Ministry of Finances of Belgium (responsible for the Belgian cadastral register) collaborates actively with the DONRE for the modernization of the cadastral register of HANOI and the installation of a GIS. This collaboration started within the framework of the ASIA REHAB project, intensified within the framework of the HANOI 2010 project, was maintained since this time and its continuation is requested by the Vietnamese partners.

## **2. 2000-2003 : ASIA REHAB PROJECT**

### **2.1 Partners**

In 2000, it is within the framework of the program Asia Urbs of the European Union that the towns of Hanoi, Toulouse and Brussels joined to carry out the ASIA REHAB project together. The travelling expenses and the necessary equipment were funded by the European Union and the services of the Vietnamese, French and Belgian experts were offered by each partner.

At this time I was the manager of the Geomatic department of the IT Center of Brussels Region. I was in charge of the realization of the GIS tool to the ASIA REHAB project. As collaboration with the DONRE (Land register of Hanoi) was important, the Belgian Cadastral register Administration was associated within the realization of the project.

### **2.2 Objectives of the project**

The key objective of ASIA REHAB project was to give a new dimension to the cooperation with HANOI, while bringing an assistance to the development and the implementation of the Plan of Safeguarding, Restoration and Development of the Old Quarter starting from exemplary achievements and of methodological contributions as well in the urban and architectural fields as in the economic and data-processing or social and cultural sectors.

ASIA REHAB project was intended to lay the bases of a durable project of safeguard and development of the Old Quarter of Hanoi. This project had to propose solutions to manage the problem of keeping the population in place while allowing economic and commercial development of the Old Quarter.

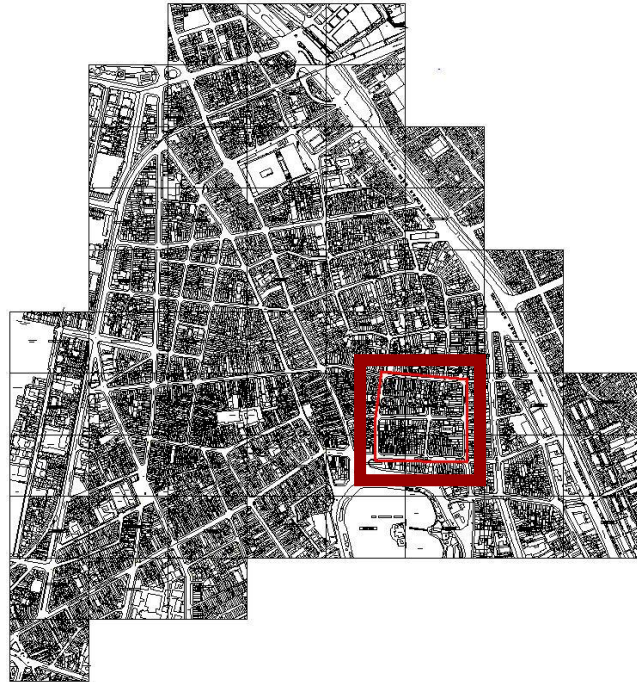
Five objectives were given within the framework of ASIA URBS program:

- Objective 1. To reinforce the implementation of the Plan of Safeguarding, Restoration and Development and to intervene firstly on small house blocks of the Old Quarter
- Objective 2. To support the installation of the financial tools appropriate to the restoration of the patrimony
- Objective 3. To insert the Plan of Safeguarding, Restoration and Development in a global project of urban, economic, social and cultural development

- Objective 4. To apply by the Vietnamese State the model of HANOI in other old centers of the Vietnamese cities
- Objective 5. To develop the exchanges with Europe by the installation of an information tool for the project

## 2.3 Study zone

The zone of study was located around the small Hang Be block in the middle of the Old Quarter of Hanoi.



## 2.4 Realization of a GIS

### 2.4.1 Principle

The realization of a GIS is based on the combination of a numerical map and alphanumeric databases, in order to allow a spatial access to the sets of data, for example, to produce a map of the quarter by drawing all the houses in different colors according to their interest, of their state or their architecture.

The juxtaposition of several analyzes based on different criteria is of very particular interest for the architects, for example, to show the relation between the height of the buildings and other criteria resulting from the technical analysis or social investigation.

### 2.4.2 Realization of a numerical cadastral map

The installation of the GIS requires the realization of a numerical “intelligent” map which allows the “attachment” of the contained information in the alphanumeric databases.

It is a map composed of objects identified each by his particular code. They are thus not only lines and texts which are drawn but areas delimited by closed shapes which are systematically associated with “identifiers” codes. These codes allow the join between these graphic objects and the data recorded in the databases if the same coding system is used.



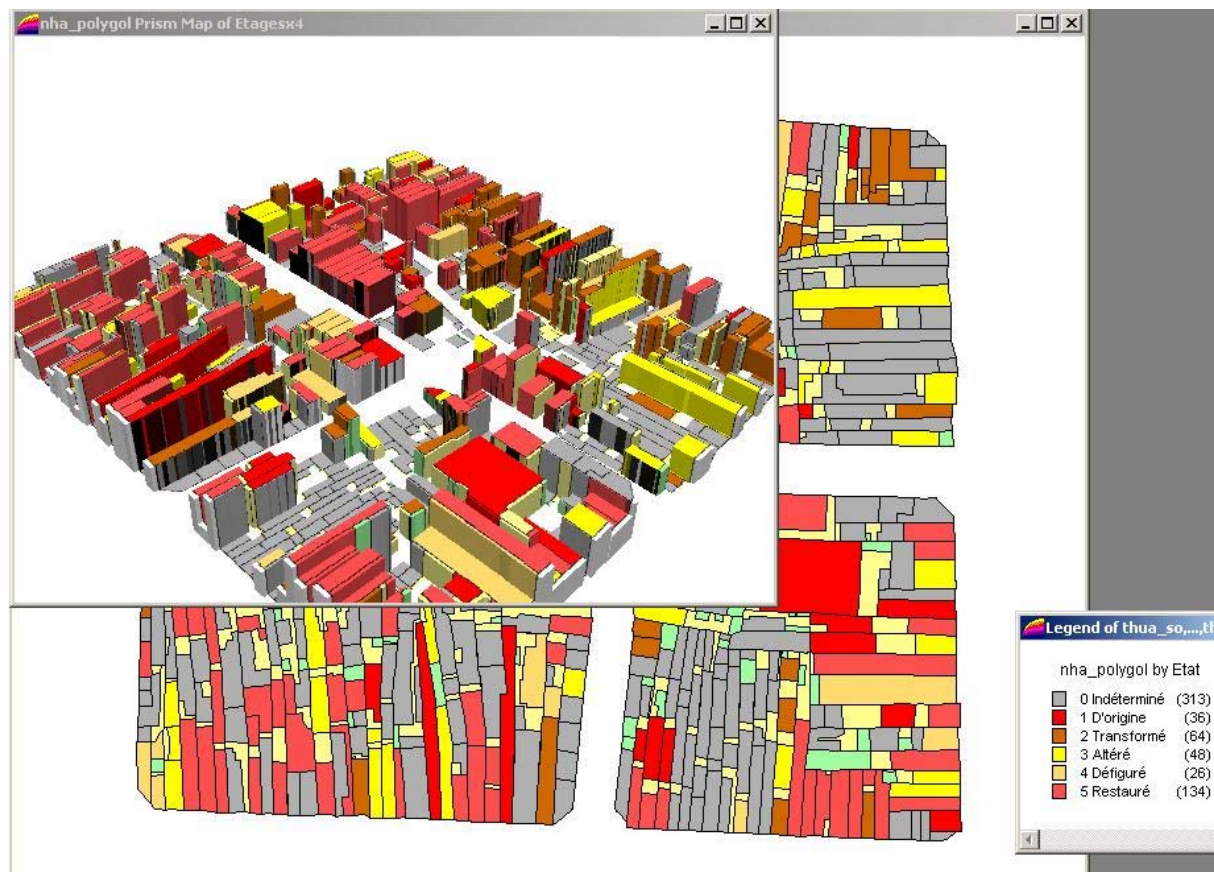
#### 2.4.3 Realization of the inventory database of the Old Quarter

The experts of the Office of Management of the Old Quarter of Hanoi carried out the encoding of the survey forms in a database and collaborated with the experts of the Cadastre to improve the map according to the observations carried out on the ground.

A social survey had been carried out by the Service of the Statistics of the District of Hoan Kiem. The coding, which was used for the addresses (number, street, district), has allowed the use of these data by the Office of Management of the Old Quarter since this last introduced into its data bank the coding of the streets (a number by street in each district) used by the Service of the Statistics of the District.

#### 2.4.4 Use of the GIS

The GIS was used to analyze and represent the data necessary to several actions of the project.



## 2.5 Conclusions

The ASIA REHAB Project financed by the European Union within the framework of the ASIA URBS program made it possible to initialize the Plan of Protection, Safeguarding and Restoration of the Old Quarter of Hanoi by approaching at the same time all the aspects which contribute to the success of the project: structure, regulation, finances, social, economy...

Experience sharing between the European experts Toulouse and Of Brussels and the experts of Hanoi led to the concretization of a overall project, of a global method of intervention, based on modern computer tools: a Geographical Information System (GIS) which integrate notably the digitalization of the Cadastral register.

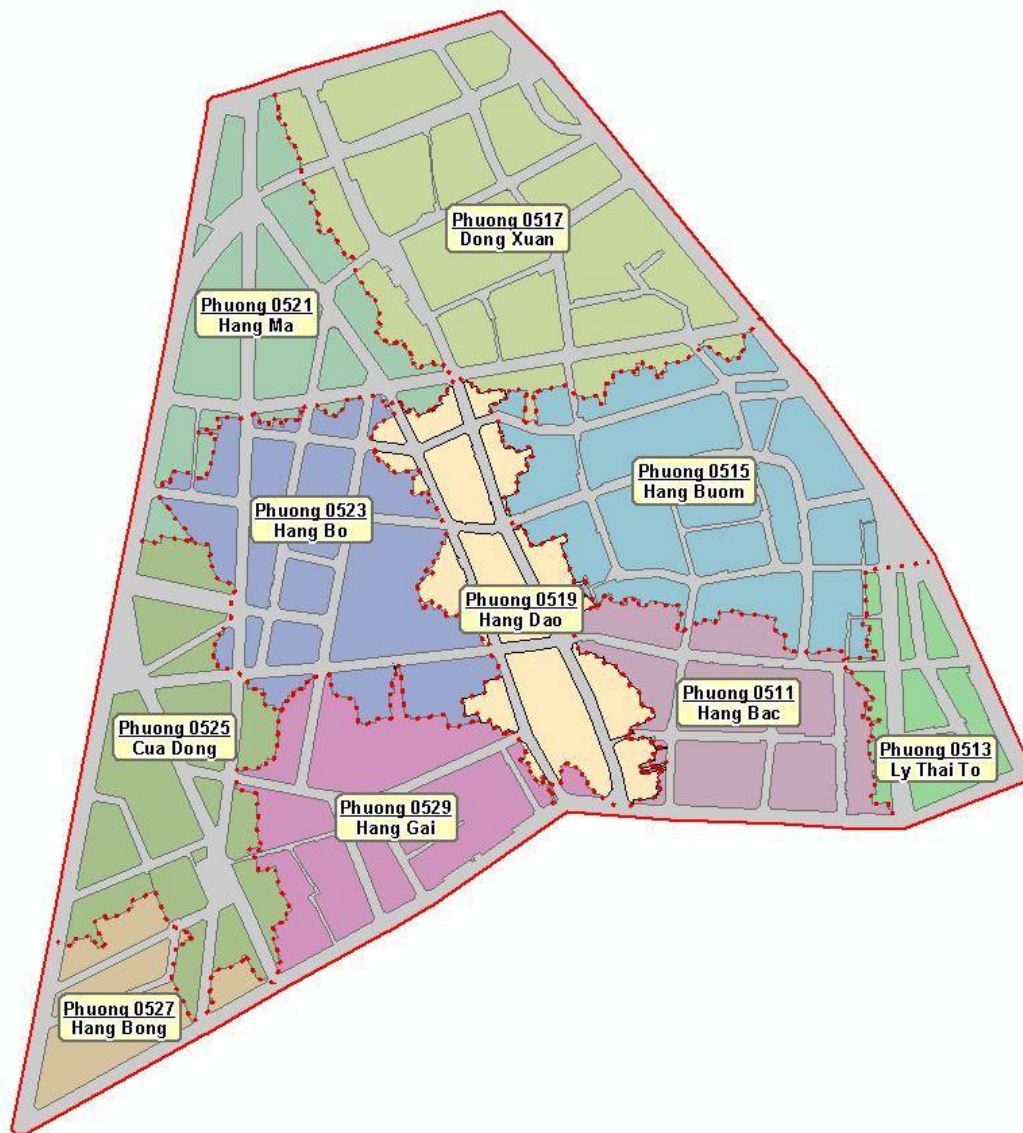
## 3. 2003-2006 : HANOI 2010 PROJECT

### 3.1 Amplification of the effects of the first project

Once the foundations of the project of restoration and development of the Old Quarter had been layed by the ASIA REHAB project, the HANOI 2010 project made it possible to set up a more operational phase. Exceptionally, the European Union agreed to support a second project on the basis of the result of the first.

By directing the generalization of the GIS carried out on the pilot block to the whole of the Old Quarter, the General Administration of Patrimonial Documentation was an important partner of this project HANOI 2010. Thanks to this project the festivities of the Millennium of

the creation of the Town of HANOI in 2010 will benefit of concrete achievements to come from restoration of the built patrimony and development of the immaterial patrimony.



### 3.2 Objectives of the project

With the European contract Hanoi 2010, covering the period of January 2004 to March 2006, the will of the Popular Committee was to prepare then to start of the operations of restoration of greater scale for the emblematic demonstrations envisaged in 2010 at the time of the thousand years of creation of Hanoi.

This second contract approached new themes which gave to the project a global approach of social and urban development applied to an old center.

Thus, beyond the architectural questions, this project integrated stakes such as:

- Economy, with the taking into account of the traditional trades, of their role in the economic activity of the Old Quarter and their current difficulties.
- Culture, by the comprehension of the daily life of the inhabitants and the proposals to produce original cultural creations in the long term.
- Urban displacements in order to consider solutions for traffic jams in the Old Quarter and in relation with the European teams which work already on this subject.
- Communication, by the development of an overall plan and the installation of an Internet site dedicated to the project.

Four objectives were assigned for the project (translated into 15 specific actions):

1. To preserve the cultural identity and the material and immaterial patrimony of the Old Quarter
2. To durably continue the restoration of the Old Quarter
3. To associate the inhabitants with the restoration
4. To ensure the diffusion of the experiments of protection of the patrimony in Vietnam and other Asian countries

### **3.3 Action of generalization of the GIS to the whole of the Old Quarter**

#### **3.3.1 Context and specific objectives of this action**

Project HANOI 2010 aimed at generalizing the Geographical Information System (GIS) to the whole of the Old Quarter. The realization of the GIS on the totality of the perimeter of the quarter of the 36 streets was necessary to the good performance of the majority of the other actions.

#### **3.3.2 Two level of detail**

It was materially not possible to apply to the whole of the Old Quarter the same concept of very detailed cartography as in the preceding project. The project was to be carried out in 2 years and the cadastral maps already digitized by various companies presented too many problems of homogeneity and update.

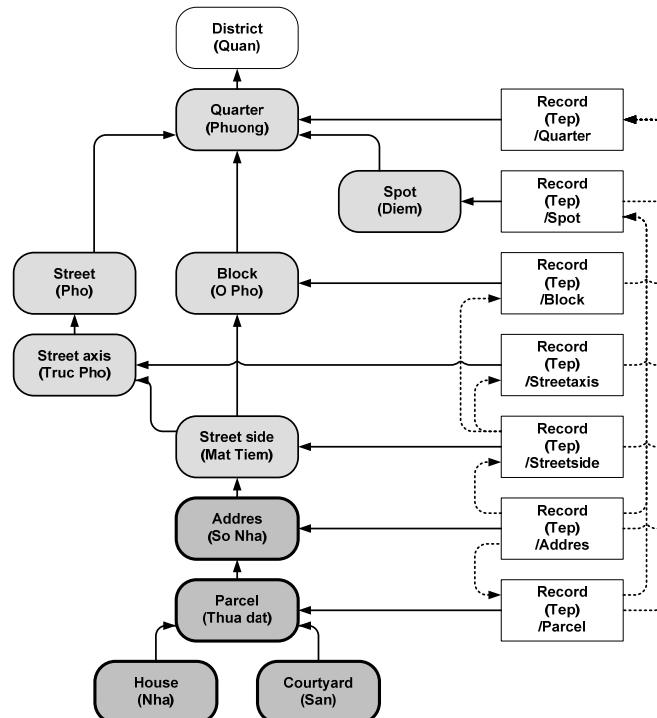
It has was necessary to design a mixed solution:

- To work on the highest level of detail only on in-depth studied small zone, in extension of the zone of the preceding project.





The coding of all the objects in accordance with the systems used in the databases, for the district, quarters, streets and addresses guaranteeing in this manner a coherence with the documents of town planning of the City of Hanoi and the social survey carried out by the district of Hoan Kiem. Additional codes were created for the small islands, the faces of street and the axes of street.



### 3.3.3 Achievements

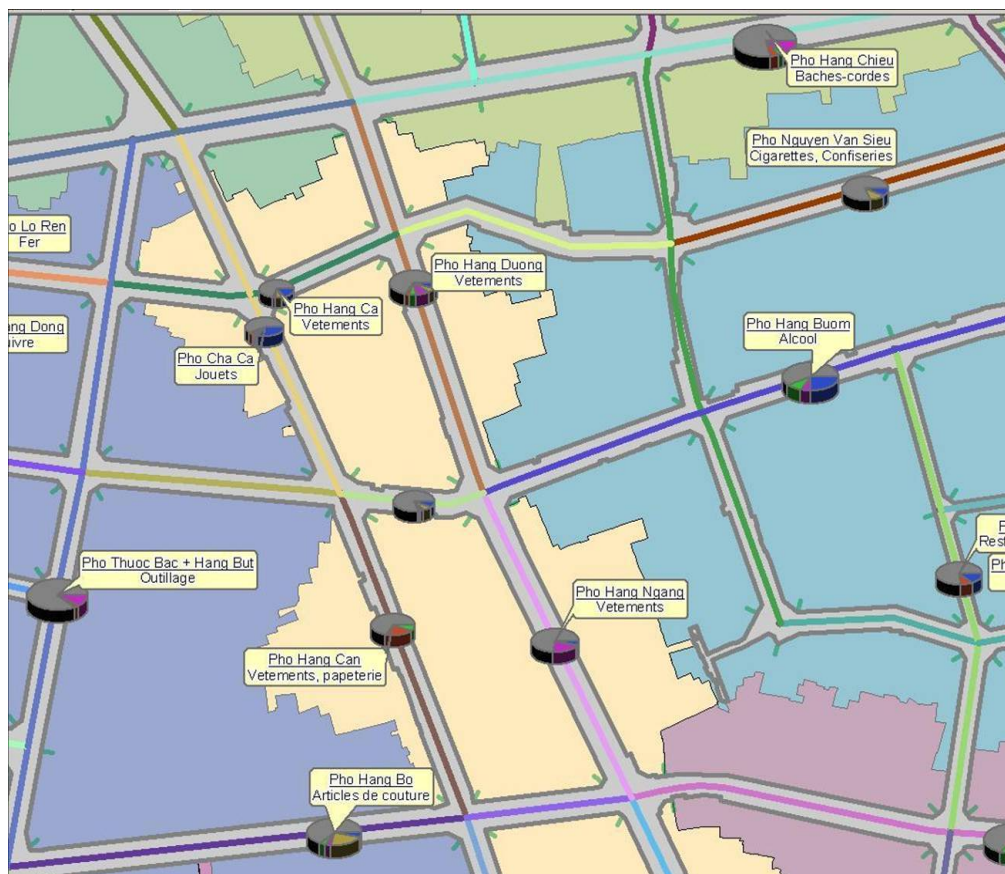
Thanks to the efforts spent during the first year of the project, as regards the conceptualization of a solution, adapted to the data and the available means (but nevertheless useful and effective for the needs for the project), thanks to the various technological exchanges and to the trainings, the results could be collected and the missions in Brussels and in HANOI of the second year of the project made it possible to lead to the creation of an operational GIS for the Old Quarter of Hanoi.

The various objects of the GIS (except for the parcels) were all identified and codified to allow various levels of relation and representation.

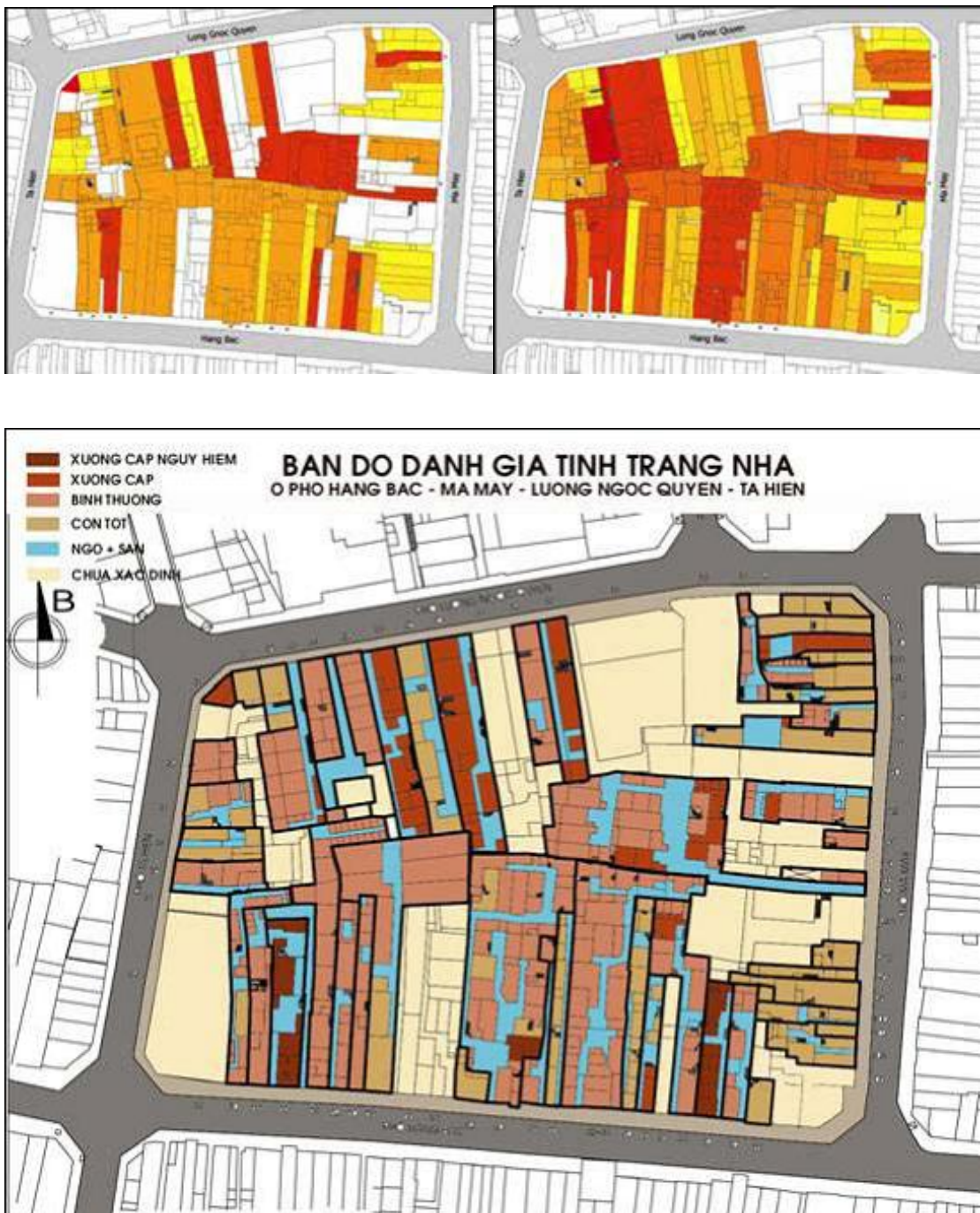
The basic great principle, it is to use standardized addresses based on the codes of street (PHO) which are numbered by quarter (PHUONG) and district (QUAN).

Statistics can then be calculated by faces of street (MAT TIEM) and be used in various ways, either collecting for an axe of street (TRUC PHO) the data of the 2 faces of this street, or collecting for a block (O PHO) the data of the faces of street of its contour. The data by block can in their turn being gathered by quarter (PHUONG).

Because of its simplification, the GIS does not allow an automatic join between an address and a point of the map or a parcel. One can nevertheless create a point (DIEM) by visually locating the address and/or the parcel or the building on the map and hang information there (coloured point or symbol, with or without text).



In addition, the integration of the Ma May block in the GIS was executed in a detailed way, like the Hang Be block in first project ASIA REHAB. All the objects Parcels (Thua), Houses (Nha) and Courtyard (San) were represented and identified.



### 3.3.4 Applications

The GIS of the Old Quarter was developed as a tool of follow-up and piloting. It allows the DONRE and the Office of Management of the Old Quarter of Hanoi the following operations:

- Inventory of the buildings classified by types: communal houses, houses of great value, historic buildings, unhealthy buildings, dangerous buildings, houses without architectural value, etc... On the GIS of the Old Quarter, the symbol points can be attached to the faces of street representing these various categories of building. It is also possible to attach information to it, like detailed forms of inventory, data of the social survey, etc
- Creation of statistics: With the creation of a very detailed database including/understanding the inventory of the buildings and the streets, of the social and economic situation, the statistical analysis of these data and the thematic representation becomes possible by assembling the individual data by address on the level of the streets.



Today the Old Quarter of Hanoi is equipped with a very effective tool for city planning and with a team of experts trained on this tool during their trainings in Brussels and Hanoi. In addition, data-processing equipment to meet the needs for the project was provided to the two services in charge of the follow-up of the GIS.

#### **4. 2006-2009 : TRANSITION PHASE**

##### **4.1 Training and assistance in GIS**

###### **4.1.1 Missions in Hanoi and in Brussels**

During this period, collaboration between the General Administration of the Patrimonial Documentation (GAPD) of the Ministry of Finances of Belgium and the Belgo-Vietnamese Development Co-operation made it possible to finance Belgian missions of experts of the GAPD in Hanoi and of Vietnamese experts of the Department for Natural Resources and Environment (DONRE) and the Office of Management of the Old Quarter (OMOQ) in Brussels.

###### **4.1.2 Maintenance and reinforcement of HANOI 2010 results**

Since 2006, with the sporadic assistance of the Belgian experts, the experts of the Office of Management of the Old Quarter continued the use of the GIS and the collection of information necessary to their mission.

This work made it possible to maintain and reinforce the results of project HANOI 2010.

The OMOQ is now ready to climb to the next level, by an extension of the concept of very detailed cartography to the whole of the Old Quarter. It will be an ideal pilot zone for the global project URBIS HANOI in preparation.

###### **4.1.3 Exchanges between Belgian and Vietnamese experts**

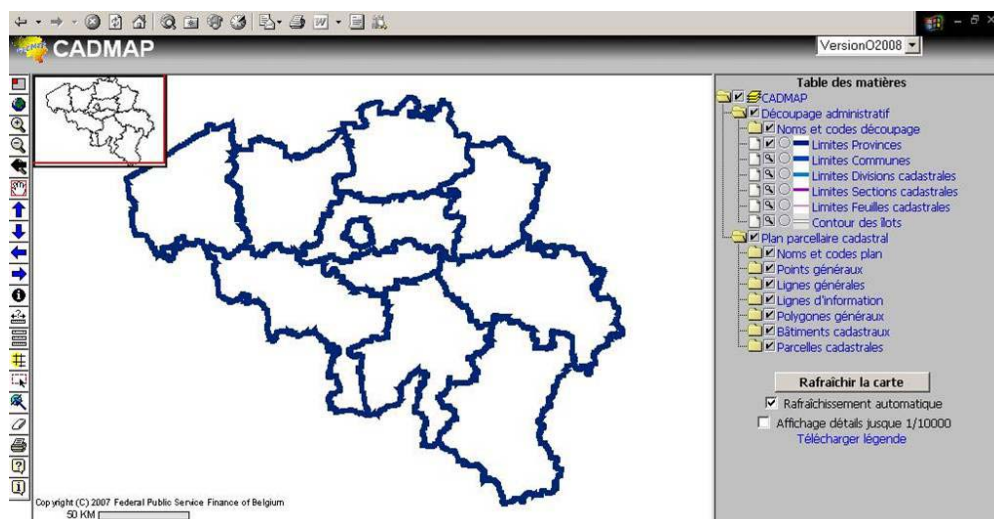
Analysis of the GIS of the Brussels Region, Brussels UrbIS (Urban Information System) which I directed the realization from 1986 to 2003 gave the opportunity to show, on real and functional examples, the contribution of such a GIS for the management of a city.

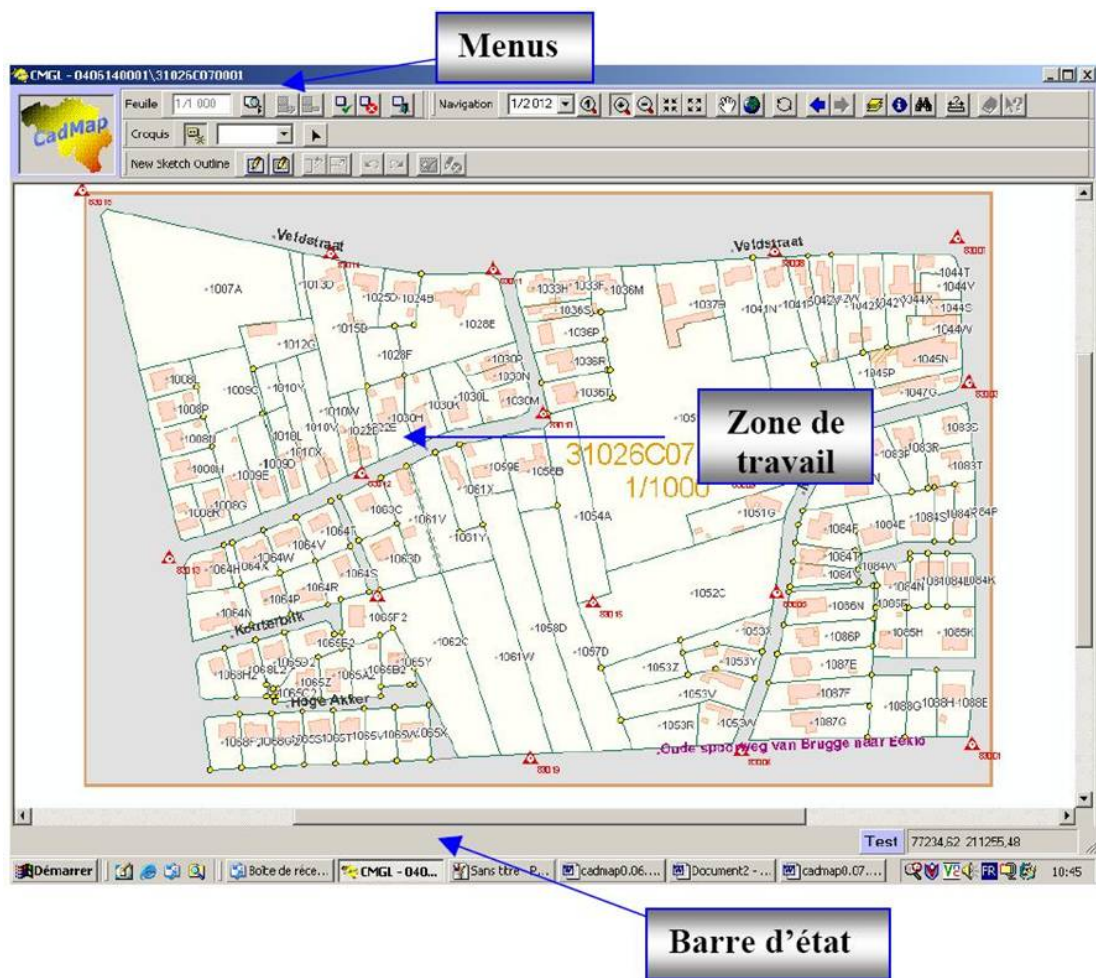
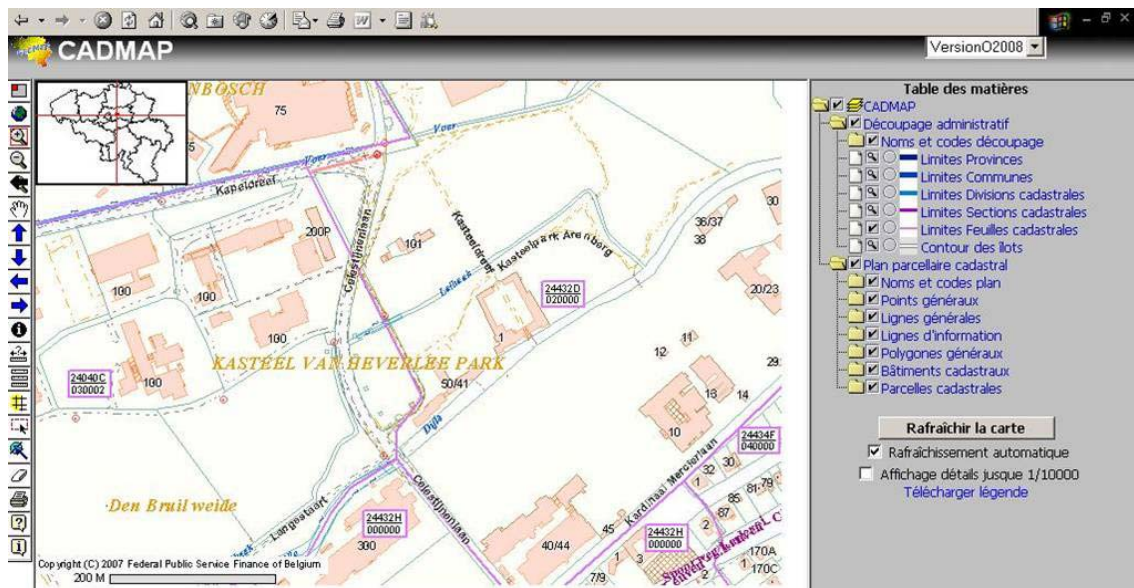
There are strong similarities at the conceptual level between project URBIS HANOI and what was carried out in Brussels. It is what pushed the Vietnamese authorities to choose this name.

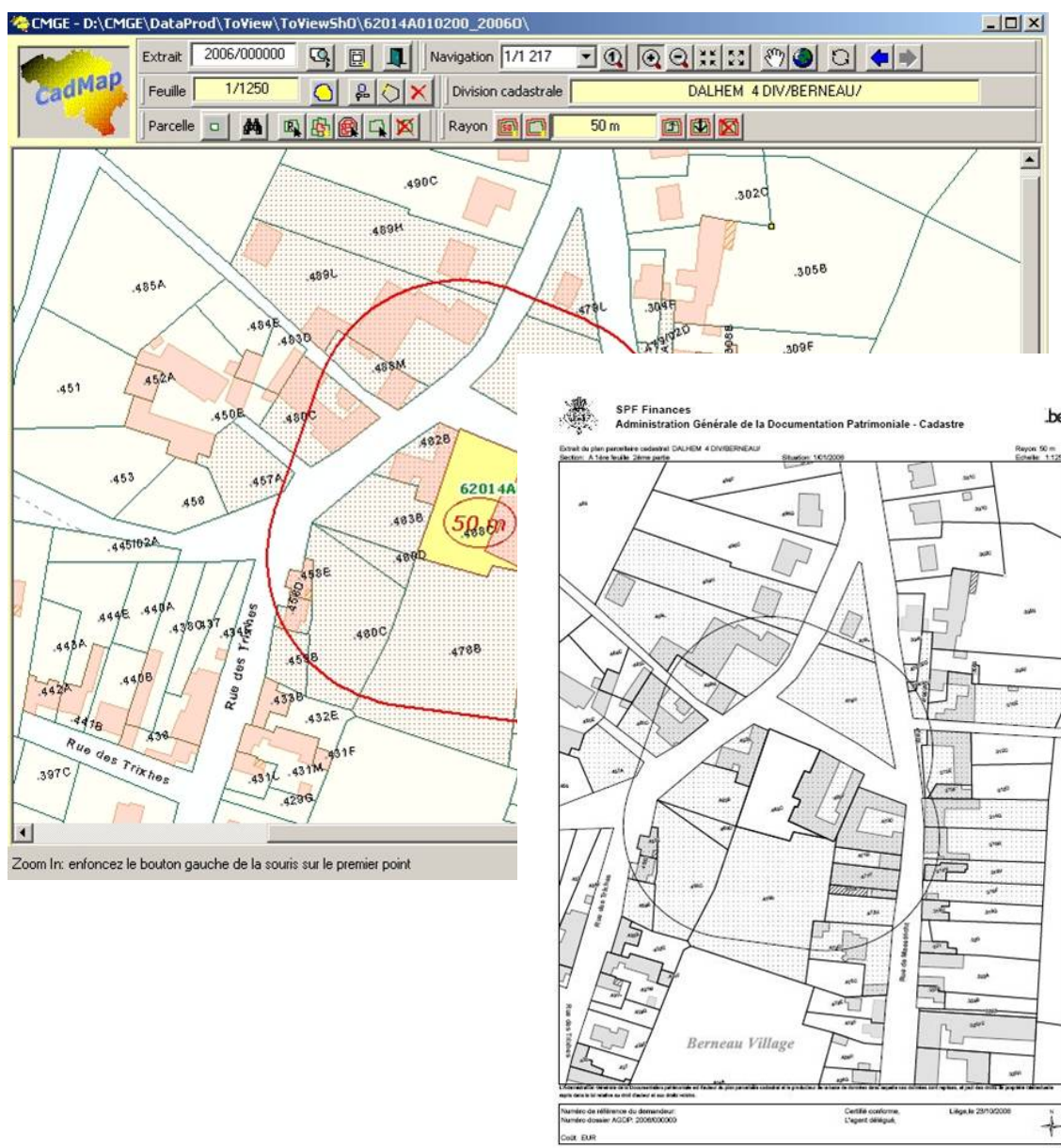


In 2003, I had joined the Belgian federal level to take the direction of the project of digitalization and numerical update of the cadastral map of all Belgium. All is operational since 2006 within the GAPD and the following phase of modernization and integration of the patrimonial data with a cadastral GIS is in under way.

This work in progress made it possible to document in a rather precise way the Vietnamese experts who work in a similar concept of integration.







## 4.2 Preparation of URBIS HANOI

It is during this transition phase that the concept of UrbIS HANOI was elaborate to set up a GIS for the whole area of the Province of Hanoi in close cooperation with the Vietnamese Authorities and the Belgian Cooperation.

During this period, the Administration of the Town of Hanoi has been organized and prepared according to facing this new challenge. In particular, a specific service has been created within the DONRE and young specialists have been recruited and new equipment installed. For several years, the evolution of the Vietnamese legislation has also contributed to reinforce competences of the DONRE, which will allow a better coherence of patrimonial and urban management.

## **5. 2009-2010 : URBIS HANOI 2010 PROJECT**

### **5.1 Extension of the GIS to all the province**

Projects ASIA REHAB and HANOI 2010 and the phase of transition allowed the Department of Natural Resources and Environment of HANOI to implement new technologies and to develop a concept of integrated management tools for Hanoi. Also the Popular Committee of the City decided to base itself on these new competences to charge this service with the generalization of the pilot project carried out in the Old District for the whole of the territory of the City, in order to carry out a global GIS which would be the support of a multisector management system and information.

### **5.2 Strategy**

The two strategic main axes are the management of the urban areas by the authorities of HANOI and the supply of information to the population. This information is very diverse; it relates to the environment, the land, the urban development, the investment plans, the infrastructures, the networks of services (universities, hospital, tourism, culture...).

The new project URBIS HANOI 2010 with which the Department of Natural Resources and Environment of HANOI (DONRE) is in charge, aims at the installation of a multisector strategy of urban management and information by effectively integrating the localisable data managed by administrations of HANOI at every different levels (City - Districts - Districts) in order to bring an answer to the problems consecutive to the accelerated development of the country and city.

The project is based on a GIS information system for urban management in order to strengthen urban management and policy-making capacity for Hanoi's DONRE and other related agencies.

### **5.3 Objectives**

The overall aim is to contribute to the public administrative reform in Hanoi through strengthening the policy-making capacity for the City's state management agencies, and enhancing transparency in administrative procedures and efficiency of public service delivery in the domain of urban management in Hanoi.

The particular objectives are:

- To enhance the management capacity in public administration in Hanoi. Especially, the inter-link of information amongst departments and sectors will improve their performance in urban management and development, thus enabling the municipal authorities to develop timely and proper solutions.

The project is expected to run in two phases:

- The first phase of the project will focus on the application of GIS in macro-level management, such as planning of land use, planning for sectorial development, environmental protection, development of water resources, planning for consistent urban development, etc.
- The second phase (URBIS 2) will aim to build a specialized information system regarding urban management in two pilot districts, including management of housing and land, determination of land prices, environmental observation, exploitation of underground water, public transport, urban residents, etc. Through this facility, the project will provide residents, organizations and businesses in the two pilot districts with necessary information regarding land and housing, living environmental conditions, and services of public administration, to enhance the efficiency of the administrative reform of government agencies at the district level. The possibility of applying a pilot model in Hanoi and other cities across the country has also been proposed.

#### **5.4 Feasibility study**

A feasibility study of the URBIS HANOI project is under way and will give the opportunity to the City of Hanoi to conduct the realization from 2010.

## **CONTACTS**

Ir Michel Van Acker  
 Advisor of the General Administrator of the Patrimonial Documentation  
 Finances - AGDP (Tower B, 12th)  
 Boulevard du Roi Albert II, 33 bte 50  
 1030 Bruxelles  
 BELGIUM  
 Tel. +32.257.620.49  
 Email: michel.vanacker@minfin.fed.be