

SOME THEORETICAL REFLECTIONS ON THE DIGITAL CITIES, LBS AND GRID

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ABSTRACT

In this paper, some theoretical problems are discussed on digital Cities, LBS and GRID. First, the author anatomy the digital cities from the perspective of the urban system. the character and the self adapt theory of the digital cities is put forward and the role of the location based services in the urban system and digital cities is also discussed. The characteristic of the digital city and its relationship with the urban system is discussed from the perspective of the evolution of the urban system. Secondly, the author discussed the adapted system of the digital cities and the location based services in the urban system and urban life and point out that location based services is the most fundament services in the urban life. Finally, the author anatomy the relationship between the digital cities and Grid

KEY WORDS: Digital cities LBS*location based services GRID

1. INTRODUCTION

Urban system is a representative huge complex system(Zhou ,G.C2002 ,which t made of by the flow of the energy, the flow of the logistics ,the flow of information .the stakeholder of the urban system is the citizen ,government and enterprise. digital cities ,which is the virtual reflection of the real urban system .is also a self adapted huge complex system. But what are the characteristics of the digital cities systems? it is necessary to study the digital cities from the perspective of the urban system .location based services is one of the most fundamental services in the urban services with a long history ,especially in recent years, with the development of the computer technology the wireless technology the location technology make the location based services more available and more conveniently .What is relationship among urban system ,digital cities and location based services and what role the location based services playing in the construction of the digital cities is deserve thinking and studying. In addition, grid, as a new idea and emerging technology can be served as an infrastructure in new age, and but what is the similitude and difference between GRID and digital cities is also deserve reflection.

In this paper, the author try to make the reader understanding the relationships among LBS, digital cities and GRID and draw a blue print of the digital cities on the LBS platform and GRID .first, the author discussed that location based services is the most fundament services in urban life and anatomy the relationship between the digital cities and location based services from the history of the man perceive the

spatial and the theory of the cyberspace. then the author try to put forward the relationships between the digital cities and GRID ,.finally, based on the reflections above, the author try to draw a blueprint of the Digital Cities with the aid of the LBS and the grid.

2. Urban system

Based on the generalization some complex systems, The concept of the “Open complex giant system” was put forward .(Qian X.S 1990).he hold the idea that the difference between the “open complex giant system” and other system is that there are the intense interactions among the subsystems and the interactions between the whole system and the environment in the former. There are substance, energy and information exchange between the complex giant and its outside environment, such as the organism system, brain system, geography system, social system and galaxy system, and so on.

The urban system is a respective open complex giant system (Zhou,G.C 2002) he argued that urban and region is a special open complex system and suggest that the definition of the urban is different with the different research areas in that the urban is a open complex giant system and each expert try to understand and interpret the urban from the perspective of their research domain.

We define and summarize the urban system based on the human settlement theory in which the structure of the urban and region area is by Daoksans(1940) Daoksas hold the view that urban is one kind of the human settlement which is make up by 5 elements that is the nature ,human, society, architecture and support network .this theory is introduced to china and ameliorated on the experience of urban planning in practice.

The urban system we understanding and put forward are illustrated in figure 1 The Anatomy of urban system and digital city system in the following of the part are based on it. From the figure1, we can know that:

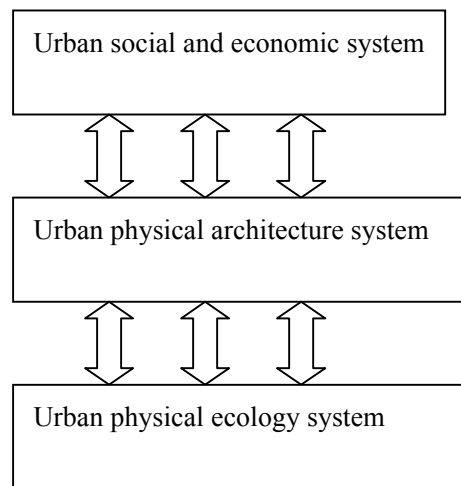


Figure 1: the framework of the urban system

. The Anatomy of urban system and digital city system in the following of the part are based on it

From the figure1, we can know that:

- (1) The urban system is made up by urban social-economic system, urban ecology system and man-made physics system. There are substance, energy and information interchange among these systems.
- (2) The man-made urban physics system is based on the urban physical environment one while the urban social-economic system is established on the man-made and the physic one.
- (3) The three systems are interacted and make the whole urban system.

As the representative “Open complex giant system”, the urban system is also a self-adapt and self organization system. Urban system is a self-origination system which only got the enough minus entropy from the outside ,the entropy of the system are remain the lower level ,the urban system will appear the characteristic of the dissipation system ,as can be proved by the history of the urban development.

Base on the rule of urban evolution which can be see from the urban development history and role of the evolution of the open complex giant system, we can summarize the rule of the self-adapt of the urban system.

(1)The evolution of the urban system is a self-adapt process and this process is from simple to complicate one and from order to out-of order.

(2) The evolution of the urban system is a process which is the outcome of the common evolution of the subsystems and their interactions. And the social-economic subsystem is developed most quickly than the other two.

(3) The evolution of the urban is based on the evolution of the social-economic one ,the social-economic is the basis of the evolution of the urban system ,man-made system is the physic support and embodiment of the social-economic system and have the affect on the natural environment system.

(4) Each great transformation of the urban form and structure is go with that of the social-economic system. three great developments of the urban are the outcome of minus entropy of social-economic system .from the table 1 we can conclude that the minus entropy which affect the urban system are the development of industry ,traffic and information technology.

(5) Information and communication technology are the minus entropy of the urban system and spur the development of urban system form un-order to order system.

Urban Characteristic	agriculture society	Industry society	Information society
Main industry	agriculture electric power manufacture shipping	car petrification industry large-style manufacture	Computer Information communication
Linkage network	canal railway road	cable highway airline	digital communication network satellite
system	Static urban	Dynamic	Complex and dynamic
Organization	Urbanization	Accelerate urbanization	Anti-urbanization
Main problem	Habitation and health	rise of the city	Sustainable development
economic	urban	region	global
structure	network of human	transportation	many nodes
function	power	制造业 manufacture	services
urbanization	slowly	exponential	Anti rise

table1 source: stylvie occelli (1999) fathy T.a (1987) adopted

3. Digital city and urban system

Digital city is the understanding of the city in the information age. Many researchers have envisioned digital city form the perspective of their own research fields. Few people study the digital city in view of the evolution and self-adapt of the urban system. Based on the above discussion and our understanding of the digital city, we can conclude that the digital city is the self-adaption of the urban system in the information age. The relationship between the digital city and the physical city are illustrated in the figure 2

The system characteristics of the digital cities can be summarize as following

- (1) Digital city is a special subsystem of the urban system.
- (2) Digital city is a apical system of urban system which is the outcome of development of the self-adapt of the urban system.
- (3) Digital urban planning is one part of the urban planning and a powerful platform and tool to the physical urban planning.
- (4) Digital city dominate the physical city to some extent on the spatial structure,

industry structure and social structure and this domination can have the feedback to the construction of the digital city.

(5) Just as the development of the urban system, the digital city system is a self-adapted system.

(6) The evolution of the digital city is dominated by the development of the urban system and the technology of information and communication.

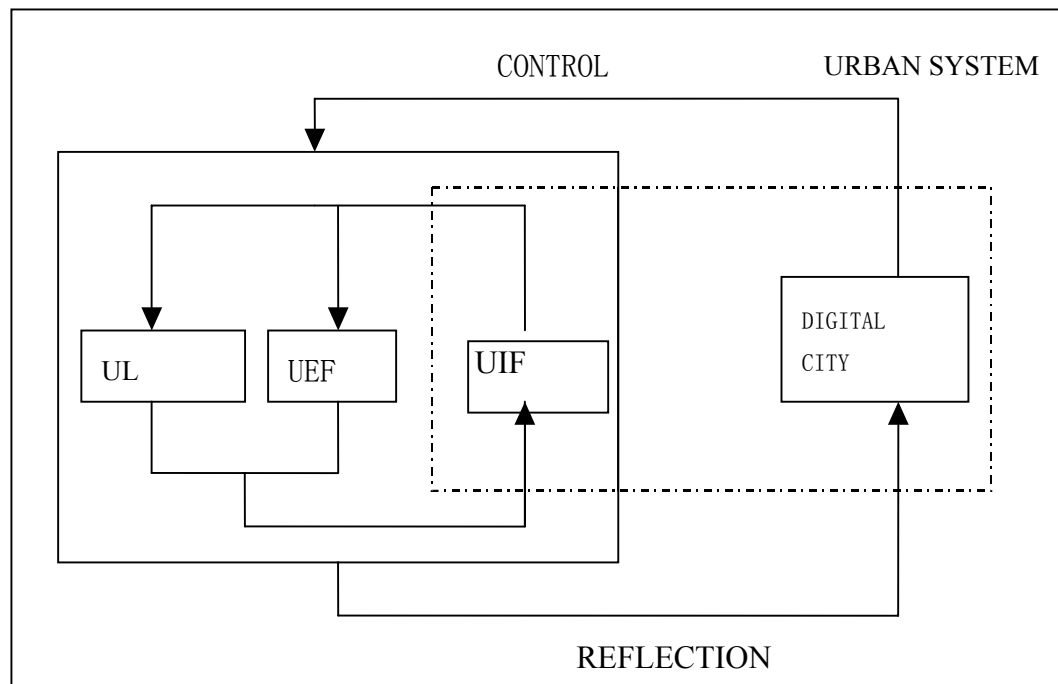


Figure 2 the relationship between digital city and urban system

UL: urban logistics UEF urban energy flow UIF urban information flow

The rule of the self-adapt of the digital city can be concluded as following:

(1) The self-adapt of the digital city is a process from simple to complicate, from disorder to order. a case in point is that the function of the digital city in the beginning mainly is the query of the city information and based on the single computer ,while the currently function of the digital city is multifunction and begin to offer some services in place of the function of the physical city to some extent.

(2) Information and the communication technology is the minus entropy to the development of the digital city system. The development of information and the communication technology, the concept of the digital city is evolved according to the understanding of the city in the information city which is at the mercy of the development of the information and communication technology. The envisioned digital city supported by the single computer is different from the one with based on the network, and the digital city supported by the grid and webservices technology. The structure of the digital city will become more and more complicate while the function of the digital city will become more and more powerful and the mutual

compensation to the function of the physical one will become more and more obvious.

(3) The evolution of the current digital city can be divided into four phrases .the beginning of the digital city is envisioned and based on the single computer, the second phrase is based on the network, and the third phrase is based on the web technology and the fourth phrase is based on the grid related technologies.

(4) With the evolution of the digital city ,the combination and linkage of the digital city and the physical one will become more and more intensively .the service of the digital city application will become Ubiquitous, we will use and get the services from the digital city in every day urban life .We can not and need to discern that which is offered by the digital city and which by the physical one.

4. Location, LBS and digital city

Location is the most important element in the urban life. there are about 80%of the information in our city life are related to directly or not directly with the location .it has been proven that the location is the most effective way to organize the events although it is not the only one .we can offer the services based on the current location of the citizen in the urban life that is so called the location based services from the literal which is broadly that the definition of the LBS in the industry

From the discussion above we can know that the subsystem of the urban system are mutual related .natural and the man-made substance in the urban system have the obvious location and not changed usually .we can got the visual simulation in the digital city system .the social and economic system is more complicated than the others because the social economic in urban system are the relationship of person to person in microcosmic point of view and the person are always move, that is to say the location of the person are always changed ,that make the location based services become necessary and important .

From the figure that illustrated the relationship of the physical city and the digital city, we can know that affect the digital city to the social economic is achieved by the control which is usually obtained by the logistics in the real city life. it is well know that the logistics and related economic activities are heavily location related. The location based services can play an important role in the logistics which is a linkage of the digital city and the real city ,so we can say that the location is the bond of the real city life and the digital one and the location based services are the basic services which offered by the digital cities.

Location based services is the bond of the real urban life and the digital one and play an important role on the development of the urban system. We can get the information and services from the LBS based on our currently location in the real urban life .all the relationship in the urban life can be sum up as the services which almost all related to the location and the main body of the services are on the move, so all the services in the urban can be integrated into the LBS which link the real urban with digital city by the location. So we can say that LBS is the basic services of the digital cities and link the physical space to the cyberspace by the location.

We can know from the above we can know that digital city is mainly make up by two related parts that is the vision representation and simulation of the real physical

city and services which collective offered by the digital city and the real physical one .the services which offered by the digital city is the complement to the real city one and these two services are intensive interlinked by the LBS.

5. Grid and digital city

In the part, we will briefly discuss the relationship between the grid and digital city. Detailed discussion is on the way and will be published soon.

"Grid" computing has emerged as an important new field, distinguished from conventional distributed computing by its focus on large-scale resource sharing, innovative applications, and in some cases, high -performance orientation. The aim of the grid is to make us to use the powerful computing as conveniently as using the power grid."(Ian Foster 2001)

The concept of the "SIG" (spatial information grid) which was put forward based on the grid computing, is the fundamental plan and useful tool to construct the "digital city". SIG is an intelligent information platform which is built based on the current spatial information infrastructure and spatial information network protocol specification and from which the user can obtain the common spatial information services conveniently. The procession of the spatial information in this platform is distributing collaborated and intelligent in this platform and user can visit all spatial information use the common protocol and do not need to goggle the information he needed from million website from internet. The aim of the SIG is to realize the SOD(service on demand) of Spatial information and services. The essential of the SIG can be treated as the spatial information services infrastructure which lies on the layer of the grid application

Digital earth can be envisioned as a global spatial information grid to some extent based on the current definition and grid technologies. Digital city, which is the most important part of the digital earth, is the node of the digital earth and can be envisioned as the node of the global spatial information grid from this point of view .but the digital city has more geography meaning and application meaning than the SIG and grid computing .we deem that the digital city can be seen as a interesting application of SIG and grid computing and has the more broad meaning than them. The essential of application services of digital city is urban spatial information (USIG) and the upper application and DDS layers which based on it. It is necessary and impossible to envision the digital city in with the idea of "grid "and "grid servies" and construct the digital city framework based on the grid technology. Grid and related technologies is a powerful tool to construction of the digital city play an important role on the development of evolution of the digital city which will become the organic integration of a lot of grid.

Just as the distributing related technologies which spur the share of the urban information, the grid and grid technologies will play an revolutionary role on the construct of the digital city and make the function of digital city evolve to urban spatial information grid and urban location based services .The grid related technologies and LBS will transform the spatial and temporal cogitation and perception of people in the usually urban life and will change the spatial structure of

the whole city .Currently, the design of digital city application service platform should based on the urban spatial grid(USIG)and its offer the urban location based services(ULBS).

6. Conclusion

In this paper, some theoretical problems are discussed on digital Cities, LBS and GRID. We can conclude that author anatomy the digital cities from the perspective of the urban system is very useful to make us have a deeper understanding the digital city and which can have a constructive role to the study and deploy the digital city project in practice. Location based services is the bond of the real urban life and the digital one and play an important role on the development of the urban system. Digital city is a typical grid application which based on the USID and USDI.

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