Chapter 8.4
Planning for Knowledge Cities in Ubiquitous Technology Spaces:
Opportunities and Challenges

Tschangho John Kim
University of Illinois at Urbana-Champaign, USA

ABSTRACT

Ubiquitous cities, or U-cities, are defined as places where public and private services can be delivered and received anywhere and at anytime. The goal of this chapter is to identify the challenges and opportunities that arise in the development of strategic plans and policies that address the problems associated with rapid global urban population growth. This chapter focuses on the potential of recently developed information and communication technologies and on the utilization of these technologies in conjunction with emerging pervasive ubiquitous geographic information techniques. It also discusses the challenges existing cities face in striving for intelligent and sustainable development as they move toward becoming ubiquitous cities.

INTRODUCTION

According to the United Nations Secretariat (United Nations, 2006), the world population will reach 8.2 billion by 2020 with 60.8% of this total expected to live in urban areas, requiring approximately 5,000 metropolitan areas with a population size of one million each. Currently, about 400 metropolitan areas with varying populations accommodate the equivalent of about 1,400 urban areas with a population of one million each. Therefore, the world will need to build the equivalent of more than 3,500 metropolises with one million residents over the next 15 years or expand the existing metropolitan areas to accommodate the 3.5 billion additional urban residents. Under these circumstances, strategic planning for sustainable and intelligent cities maximizing scarce urban resources will be a crucial task for urban scientists and planners. In the U.S. alone,

the Census Bureau estimates that 80 million more people will need to be housed in urban areas between now and the year 2050.

Can an urban area be sustainable? In an absolute sense, all urban activities are unsustainable since they consume resources. In this chapter, it is postulated that urban sustainability is a concept that refers to an acceptable level of social costs associated with the daily activities and physical movement of people or goods to accomplish these activities. The key social costs that burden the economy at large are related to the use/misuse of scarce urban land, a decay of environmental quality, traffic accidents, and traffic congestion. In this context, the important question is how public policy can and should operate to achieve sustainable urban areas. Are technologies such as information and communication technologies (ICTs) and ubiquitous geographic information (UBGI) the keys to unlock knowledge that will help us achieve a sustainable global urban system in a ubiquitous space?

This chapter examines the opportunities and challenges to develop strategic plans and policies to plan knowledge cities in a ubiquitous technology space. The chapter focuses on utilization of the emergence of pervasive ICTs to identify ways for existing cities to grow in more sustainable and intelligent ways. Ubiquitous cities or U-Cities are defined here as knowledge cities where high-quality and affordable ICT services are universally available, and public and private services are delivered and received anywhere and anytime.

BACKGROUND

Interconnectedness of Cities and ICTs

Cities have long been the foci of social, economic, and technological innovations while consuming their own resources as well as the resources of their hinterlands (Coutard, Hanley, & Zimmerman, 2005). Modern cities have been increasingly dependent upon the smooth functioning of ICTs. For example, most civil infrastructure systems—transportation, energy, water supply, etc.—are highly dependent upon ICTs for reliable operations and management. Moreover, previous work shows that ICTs have influences on the structures and dynamics of urban systems in both spatial and socio-economic contexts.

There have been a multitude of works assessing the impact of ICTs on urban form in the socio-economic context: informational cities (Castells, 1989); technoburbs (Fishman, 1990); edge cities (Garreau, 1991); megalopolises (Gottman, 1991); global cities (Sassen, 1991); networked cities (Clark & Kuijpers-Linde, 1994; Batten, 1995; Townsend, 2001); postsuburbia (Kling, Olin, & Poster, 1995); and postindustrial cities (Hall, 1997). These studies are distinguished by their view of the interplay of ICTs in recognizing the centripetal and centrifugal effects on urban structure through de-concentration and restructuring (Frey, 1993; Elliot, 1995; Clark & Kuijpers-Linde, 1994; Audirac & Fitzgerald, 2003). The de-concentration side posits that residential preferences for low-density living combined with rising affluence and advances in ICTs and transportation technology vastly increase the range of choice where to locate themselves within and outside a metropolitan area (Audirac, 2005). On the other hand, the restructuring theorists argue that the change of modern urban structure relies on economic and spatial restructuring resulting from technological change and the role of the state in shaping the conditions for economic growth (Sassen, 1994).

Previous work on spatial synergies among ICTs, transportation, organizational change, and economic development in the urban environment suggests that emerging urban forms will be more intricately connected globally, territorially more loose and fragmented, and morphologically more polycentric and complex, with fast dispersing rou-

Related Content

XAC Project: Towards a Middleware for Open Wireless Sensor Networks
Kenji Tei, Shunichiro Suenaga, Yoshiyuki Nakamura, Yuichi Sei, Hikotoshi Nakazato, Yoichi Kaneki,
Nobukazu Yoshioka, Yoshiaki Fukazawaand Shinichi Honiden (2010). *Designing Solutions-Based
Ubiquitous and Pervasive Computing: New Issues and Trends (pp. 214-231).*
www.irma-international.org/chapter/xac-project-towards-middleware-open/42511

Security and Privacy in RFID Based Wireless Networks
Denis Trcek (2010). *Ubiquitous and Pervasive Computing: Concepts, Methodologies, Tools, and
Applications (pp. 1386-1395).*
www.irma-international.org/chapter/security-privacy-rfid-based-wireless/37857

Intention Prediction Mechanism in an Intentional Pervasive Information System
Salma Najar, Manuele Kirsch Pinheiro, Yves Vanrompay, Luiz Angelo Steffeneland Carine Souveyet
(2013). *Intelligent Technologies and Techniques for Pervasive Computing (pp. 251-275).*
www.irma-international.org/chapter/intention-prediction-mechanism-intentional-pervasive/76792

Design and Development of Member Platform of Public Platform for Service Outsourcing
Association
Ran Gaoand Liu Ye (2018). *International Journal of Advanced Pervasive and Ubiquitous Computing (pp. 1-
22).*
www.irma-international.org/article/design-and-development-of-member-platform-of-public-platform-for-service-
outsourcing-association/199773

Research on the Application of Data Mining Algorithms in Intelligent Transportation
Weifang Zhai, Yiran Jiangand Song Ji (2019). *International Journal of Advanced Pervasive and Ubiquitous
Computing (pp. 1-10).*
www.irma-international.org/article/research-on-the-application-of-data-mining-algorithms-in-intelligent-
transportation/228097