Neighbourhood Environment and Its Association with Place Based Ubiquitous Technologies : A Case Study of Queensland, Australia

Jung Hoon Han* Jonathan Corcoran** Sang Ho Lee***

Abstract Place based intervention has become an important strategy for the ubiquitous city initiative. However, the role of the ubiquitous built environment in determining urban quality of life has not investigated fully. Using place as a relational space where people access u-infrastructure, u-health and u-services, this paper examines the relationship between spatial variations in the provision of ICTs and the spatial reconfiguration of quality of life operating at different geographical scales across Australia. Based on a case study of the state of Queensland in Australia, we emphasize the need for a place based approach to ubiquitous technologies and infrastructure provision in different socio economic hierarchies of space and place.

Keywords : U-City, Neighbourhood Environment, Quality of Life, Internet, Place Based, ICTs, Spatial Variation, Australia

1. Introduction

The rising cost of urban infrastructure provision and management have become one of the major urban policy issues in many countries. In Australia the cost of urban infrastructure provision(public transport, housing, telecommunications network and health services etc.) is likely to significantly increase over the next few decades. In particular, Information and Communication Technologies (ICTs) such as wired /wireless broadband connections and its infrastructure provision have become a focus of government policy in Australia [2]. The Australian government has commitment to a national broadband network costing AUD$4.7 billion and servicing 98% of the homes and businesses across Australia. In addition the Australian Broadband Guarantee(ABG) funding program of AUD$270.7 million over the next four years currently provides the basis for this improvement [27]. Along with reduced broadband costs and new plans that offer alternatives to hefty overage charges, the capabilities of the telecommunications service have heightened the already strong interest in Australia and New Zealand [16]. The Australian Government's plans for urban development have also been extended along with ICTs move from systems based on wired technology to wireless digital network systems [12]. This high speed National Broadband Network was designed to primarily promote health, education, and emergency services in rural and remote communities(cf. Digital Regions Initiative). U-health(generally referred to e health in Australia), for example, will support inclusive health systems by enabling regional health workers to provide real time health

†This research was supported by a grant (code 08U-Eco A03-1) from U-Eco City Center Program funded by Ministry of Land, Transport and Maritime Affairs of Korean government.

* Dr Jung Hoon Han, Urban Research Program School of Environment, Griffith University Nathan, h.han@griffith.edu.au
** Dr Jonathan Corcoran, School of Geography, Planning and Environmental Management, The University of Queensland, jj.corcoran@uq.edu.au
*** Prof. Sang Ho Lee, Department of Urban Engineering, Hanbat National University, Lshsw@hanbat.ac.kr(Corresponding Author)

information and diagnoses in rural and remote areas such as remote data collection and monitoring [10].

Studies examining the relationship between neighbourhood environment, socioeconomic status and quality of life in a specific geographic area have become increasingly common [25, 30], but its association with ICTs has not been fully investigated. Curtin highlighted this "digital divide" between populations located within urban conurbations have improved level of connectivity in comparison to their regional and remote counterparts [9].

However, Curtin also demonstrates that while this division is present, socio economic factors are also important in explaining the spatial patterns of internet connectivity[9]. ICTs networks are rapidly evolving and in the near future are likely to transform into a network supported by convergence technologies that facilitates urban management [34]. Wieman pointed out how localised hightech economic activity, supported by early examples of technology convergence(such as a business call or media centre) has the effect as to increase the demand for telecommunications infrastructure[33]. In a more recent study, Han investigated the evolution of the ICTs development in Korea, a country which is experiencing rapid change in ubiquitous computing technologies[15]. Han argued that technologies convergence supported rather than degraded the quality of life in a U-City setting where personal mobile phones have been integrated with various urban services including public transport, u-government, u-learning , and u-health services[15]. It is largely attributed to the effect of the technologies convergence has been to improve access to urban services and utilities, for example, by providing mobile phones with other communication technologies such as SMS, G3, MP3, GPS, smart card and digital camera.

Despite these significant telecommunications infrastructure advancements, the question of how the new ubiquitous computing technologies (for example, Wi Fi, WiBro, WiMax and 4G[1]) will interweave with existing place based services and the physical infrastructure, and how these places provide quality of life outcomes remain unanswered. The aim of this paper is to review the needs of a placed based u-technology implications in association with ire neighbourhood environment and quality of life, which often neglected in U-City planning. This paper is not designed to provide a new definition of u-service or charcterized u-service, but emphasize a place based approach to linking u-services to the local neighbourhood environments and physical infrastructure in order to enhance the quality of life. The outcomes of this paper will help bridge this current research gap by examining the relationship between ICTs infrastructure provision and quality of life using the case study of the Queensland Australia.

2. A Place Based Approach to U-City: Neighbourhood Effects

Recent research in a number of disciplines has begun to highlight the interrelationships between a place, the people living there and neighbourhood environments [25, 6]. In particular, it has been noted that the underlying spatial inequalities can be hidden by national and population level data and that the focus on the effects that place has on spatial inequalities is an important consideration. Bernard et al.,[6] conceptualised the nature of neighbourhoods as they contribute to the local production of spatial inequalities in everyday life. This paper argued that neighbourhoods essentially involve the availability of resources and are characterized by accessibility to resources in a geographically defined area such as U-City.

Research in 'place based ubiquitous technologies' vary greatly from the existing studies which deal with exclusive participant networks or

1) A mobile phone technical standard provided with Internet protocol based voice, video, and data connections

isolated individuals rather than broad networked learning communities[11]. These studies typically measure technological impact for cities: The 'cybergeography' [1]; 'automatic production of space' [29]; or 'architecture and pervasive computing' [26]. A limited amount of research has investigated the potential of ubiquitous built environments to alleviate the negative consequences of social determinants of quality of life [24]. Chaudhry, et al., [7] asserted that published evidence of the information needed to make informed decisions about acquiring and implementing ICTs in community settings in nearly nonexistent.

The proliferation of wireless services, devices, and products recomposes shape shifting urban spaces they inhabit [24]. A place based approach assumes that the social determinants of quality of life are spatially oriented: i.e. constantly determined in reference to a specific geographical area and lived reality. Lloyd and Bill [23] demonstrated that socio-economic factors such as income, health, education, family composition and indigenous status also affect the likelihood of having access to ICTs. For instance, the 'wiring' of cities with the latest fibre optic networks is also extremely uneven. On that point Graham [13] writes: "...It is characterised by a dynamic of dualisation. On the one hand, seamless and powerful global local connections are being constructed within and between highly valued spaces, based on the physical construction of tailored networks to the doorsteps of institutions. On the other hand, intervening spaces - even those which may geographically be cheek-by-jowel with the favoured zones within the same city - seem, at the same time, to be largely ignored by investment plans for the most sophisticated telecommunications networks. Such spaces threaten to emerge as 'Network ghettos', places of low telecommunications access and concentrated social disadvantage" (p.929).

In terms of social implications of telecommunications network Hanafizadeh et al. [14] highlight the digital divide as one of the key issues to be dealt with in telecommunication infrastructure provision. The digital divide is the differences between individuals, households, companies, or regions related to the access to and use of ICTs [31]. The various factors may cause the divide such as the historical, socio-economic, geographic, educational, behavioural, generation factors, or the physical incapability of individuals [9]. Whitacre and Mills[32] argue as residential internet access shifts toward high-speed connections, a gap emerges in rural high-speed access relative to urban high-speed access, and the potential causes of this high-speed 'digital divide' include rural - urban differences in people, place, and infrastructure.

Although it is widely acknowledged that in Australia's rural and remote communities potentially stand to gain the most from ubiquitous technologies applications, there are place specific determinants of its effectiveness that may not be addressed. Perhaps the most simple argument that geographical place still defines an effectiveness is that spatial variations in internet accessibility between Australian cities and towns and between socio economic areas drastically affect access to digital platforms. The proposed place based approach to U-City are significant and innovative in which it investigates U-City platforms as an intervention focused on broad urban quality of life in a geographically defined place. The place based approach is based on a multi layered model of the U-City [21] including built and mobile ubiquitous computing environment such as broadband wireless communications infrastructure, through to broad environmental and social factors such as socio economic status, and social support. This approach to place based ubiquitous technologies accord with contemporary shifts in public policy and funding toward settings based approaches to U-City [20].

To demonstrate the place based approach to ubiquitous computing technologies, we provide a case study of internet accessibility, socioeconomic status and neighbourhood proximity to urban in-

frastructure in Queensland, Australia. This case study highlights spatial inequalities across the region in terms of physical accessibility to urban infrastructure, internet services and the effect of socio economic status. The spatial inequalities associated with the neighbourhood environment based on this case study lead a reasonable argument to promote the need for placed based approach to U-City.

3. Spatial Variation in ICTs and Internet Accessibility in Australia

With the advance in technology comes the ability for technological convergence which Rheingold believes alters the 'social side effects' in that 'the virtual, social and physical world are colliding, merging and coordinating' [28]. The use of the Internet as a means by which communication, access to health information and the capacity to undertake health education has significantly increased in the last decade. Australia's has experienced substantial change in the number of people who have access to the internet in their home over recent years. The Australian Bureau of Statistics (ABS) has reported that between 2001 and 2006 there was a 28% increase in dwellings with internet connections, rising from 35% in 2001 to 63% in 2006(ABS 2006a). However, the spatial distribution of internet access was found to be highly skewed with the major cities having much higher access (66%) in comparison to remote regions(42%) (ABS 2006a) - see figure 1 showing Australia and its classification degree of remoteness.

The greatest numbers of dwellings that have an internet connection were located in the Australia Capital Territory(75%), of which 53% are broadband. In comparison, Queensland also has relatively high levels of connectivity(64% in 2006 of which 41% were broadband connections), a rise of 30% since 2001 - However, a closer inspection of the spatial patterns of connectivity at a finer geographical scale in Queensland, (i.e. at the sub-urb level) reveal large difference across the State (figure 2). To some extent these reflect the changing levels of remoteness shown in figure 1 in which dwellings located in more remote areas (e.g. the regions classified in figure 1 as "remote Australia" and "very remote Australia") are less likely to have an internet connection. This is also supported by a regression analysis that highlighted that dwellings located in the "regional" and "remote" categories are 40% less likely to have broadband connections when compared to those dwellings located in the "major cities" class [2].

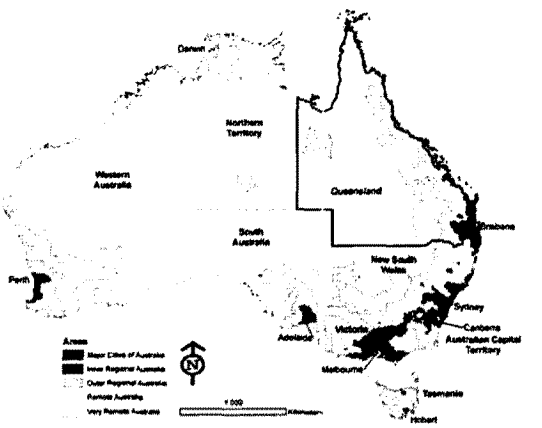

Fig. 1. Australia by remoteness class

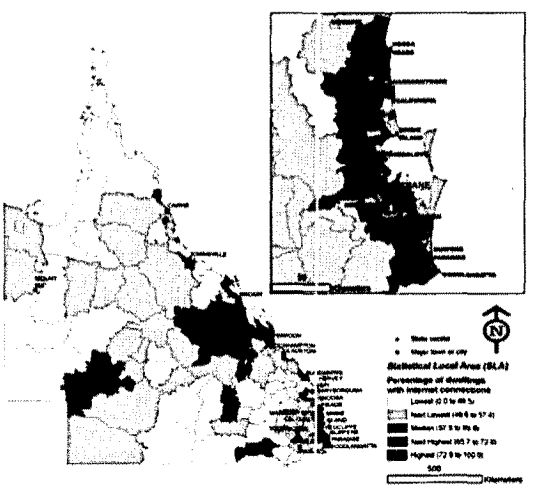

Fig. 2. Internet access in Queensland

There is duplicated access to advanced fibre optic telecommunications in many metropolitan areas, but gaps in infrastructure provision to most outlying and more remote areas. Fibre optic cable is still considered to be the optimal technology to provide the next generation broadband. However, other technologies, such as asymmetric digital subscriber line(ADSL) and wireless technology, will also be used in particular situations to satisfy quality health care service, particularly in regional and remote areas [27].

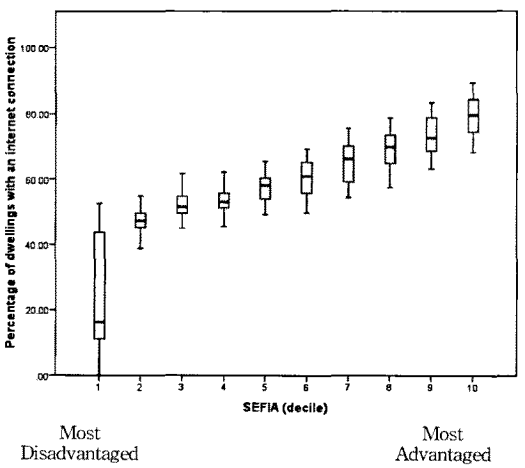

Fig. 3. The relationship between socio-economic and internet access

Here we use two data sources the Australia Bureau of Statistics(ABS) Census and Socio Economic Indexes for Areas (SEIFA). The Census of Population and Housing is collected nationwide every five years and includes a question regarding the presence and characteristics of an individual dwelling's internet connection. The SEIFA classification is a set of ABS indexes that measure the socio economic well being of areas across Australia [3]. In this paper, we used the SEIFA index of relative advantage and disadvantage - this particular index represents advantage and disadvantage as a continuum using a number of census variables describing both advantage and disadvantage, for example households with low income and people with a tertiary education [3].

Using the SEFIA index for Statistical Local Areas (that approximate equate to suburbs in metropolitan areas) across Queensland, figure 3 demonstrates the effect of socio economic status on the percentage of dwellings possessing an internet connection. The boxplots in figure 3 show the distributions of the percent of internet connections on the ten scores of the SEFIA index. The boxplot method represents the distribution of the SEFIA index. Each box represents the major portion of the distribution and the extensions (e.g. whiskers) to the extreme points of the distribution. This method is simple but is useful in making comparison of the different socio economic groups by the ICTs accessibility. Here, a strong trend can be observed with those dwellings located within more disadvantaged neighbourhoods are less likely to have an internet connection than dwellings in more advantaged suburbs.

4. Neighbourhood Environment and Ubiquitous Computing Technologies

There are a number of studies that have examined the complex relationship between place and quality of life [5, 8]. These studies have primarily focused on neighbourhood socio economic characteristics, however here we extend this analysis to include accessibility of public transport, schools and shopping centres, and the proximity of employment and public parks across the study region. Through this analysis we are able to demonstrate the degree to which spatial inequalities exist in the access to urban infrastructure and use this as the basis to justify the need for a place based approach to ubiquitous technologies.

Within the ubiquitous built environment it is critical to know what actions could be undertaken to address the spatial inequalities in such disadvantaged areas(for example, those areas that are long distance away from schools and shopping centres). Each of the maps in Figure 4 shows the

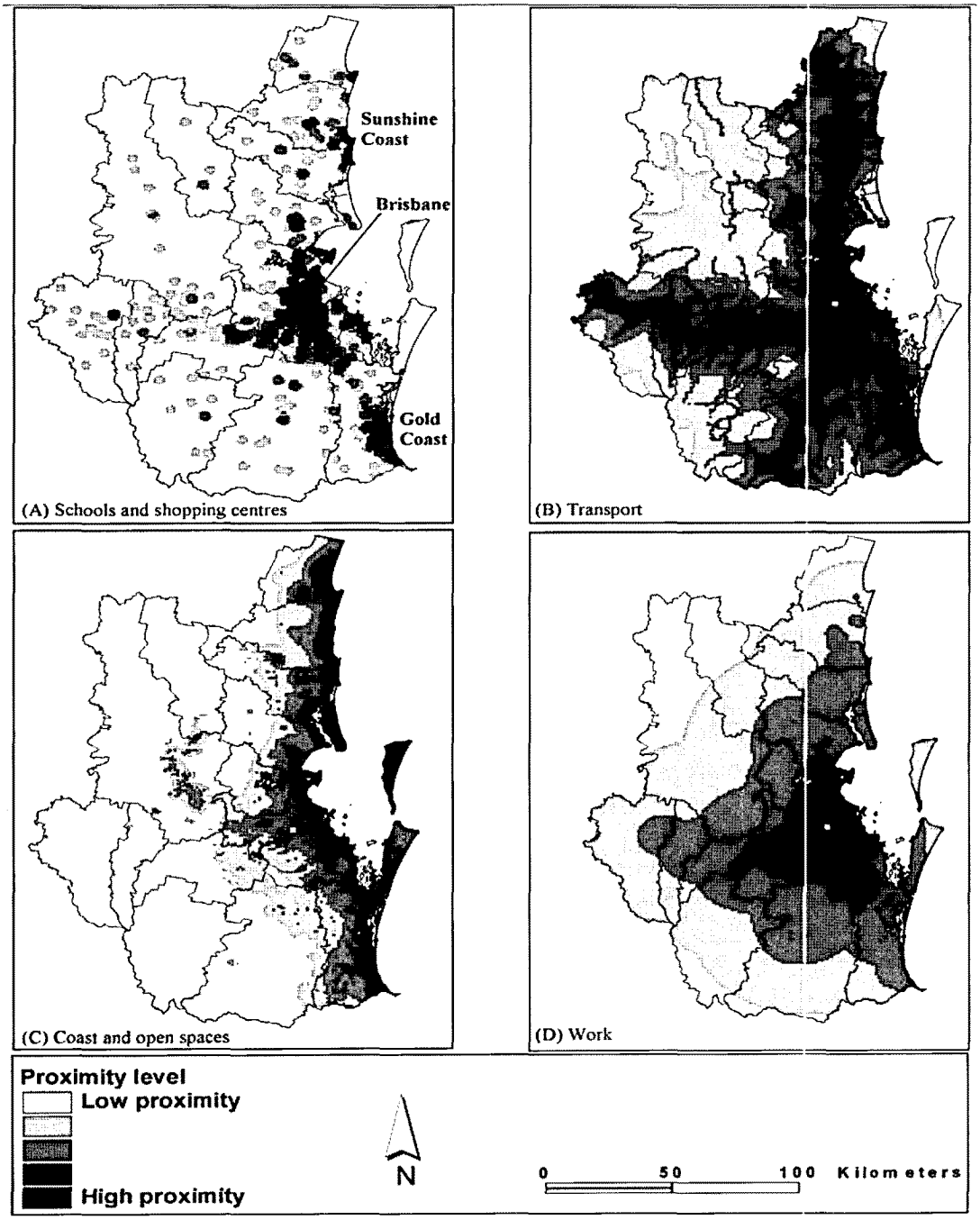

Fig. 4. The relationship between socio-economic and internet access

availability of, and accessibility to, neighbourhood resources such as transport, shopping centre, schools and public or recreational parks across cities and towns in the South East Queensland (SEQ), a region that accounts for 75% of Queensland's population growth (and is Australia's fastest growing region including the state's capital Brisbane and the metropolitan regions of the Gold and Sunshine coasts). Figure 4 highlights that within the SEQ region there are a number of dis-

advantaged areas in terms of access to resources particularly within the peri urban or hinterland areas. This outcome is largely evident across each of the resource dimensions shown. A place based approach to U-City may bridge these gaps by providing the ubiquitous technologies in which interventions must be designed to embed with the pre existing neighbourhood resources.

The U-service concept creates environments in cities where residents can enjoy access to high speed networks and enhanced information services at anytime regardless of location through a ubiquitous computing network [34]. Kirkwood [19] pointed out the significance of the U-City is to generate a larger service market for next generation communication technologies as well as establishing a range of cities of 'good life and happiness' for citizens. In line with this the u-service market in those remote areas of Australia can be significantly enhanced by the provision of the wireless telecommunication technologies such as wireless internet network technologies(WiMAX), 3G network, global positioning system(GPS), voice over IP (VoIP) and with 'Bluetooth' technologies(VoWiFi).

Some advanced telecommunications can be advantageous, particularly, to remote areas, although not necessarily for use directly by business. The major applications of the place based ubiquitous technologies are likely to deliver a higher quality education, transport and health services as to the need of neighbourhoods. Opportunities to use new ICTs to extend one's social and economic actions across space are thus being configured highly unevenly within and between the material geographies of U-Cities.

5. Conclusion

The place based approach in this paper assumed that the social determinants of quality of life are spatially oriented and the ubiquitous computing technologies embedded in this place could improve its urban quality of life. The case study of internet connections across Queensland, Australia has provided a useful insight into the rapid increased usage of ICTs and the role of socio economics in explaining the lack of spatial uniformity in these increases. Unlike Korea and Japan the ubiquitous computing technologies have yet to be investigated in many countries. In particular many western developed countries have used 'e' concept such as e Health (US & Canada), e commerce (Europe) and e government (Australia) while recently Korea and Japan launched u concept. We found that the US led e concept that has been evolved and developed for the past decade is quite similar to the key elements of u concept (anytime and anywhere). There is no such clear definition we can clearly differentiate between 'e' and 'u' because of its vague and complex concept. While the Korea led U-City development is unique and innovative, many cities in the world also have been developed their own planning strategy based on an innovative approach, for instance, eco city, healthy city, creative city, tele city and smart city. The case study of Australia has yet to use the 'u' concept but there is a reasonably good chance to adapt the U-City concept in the years to come. In particular the remoteness of the Australian towns most seeks such technologies. In this paper we argued the need of place based technology to the segments of urban physical elements(shopping centre, transport, school and park etc.) and existing neighbourhood environment (quality of life and human capitals) between/within U-Cities.

However, of greatest concern is the fact that existing spatial inequalities in socio economically disadvantaged areas may actually be exacerbated by inequitable distributions of ICT use. U- City planning strategies need to be formulated to respond to the specific target population, reflecting the changing demography and neighbourhood socioeconomic characteristics. In the cities and towns of Australia like other developed countries, Canada, Norway and Sweden with a higher standard qual-

ity of life, it was evident that the quality of life is closely related to the use of, or accessibility to the urban telecommunications infrastructure within the urban system. In particular the ubiquitous computing technologies with a seamless digital network have been embedded in the existing urban built environments such as schools, shopping centres, public transport and public parks, and therefore create a newly characterised place with a certain degree of the quality of life. For example, in the area of health service provision, u-health technologies such as home monitoring services, rapid diagnostic testing, clinical outreach, and health coaching help improve individuals' health and wellbeing. On the other hand localised ubiquitous computing technologies could improve the overall quality of life for those socio-economically disadvantaged people such as low-income or disability providing equally accessible telecommunication services or information technologies in the disadvantaged area. The ubiquitous technologies need to be incorporated to the spatial variation in the accessibility of ICTs, neighbourhood socio-economic characteristics and community resources available. There is little doubt that those spatial determinants are likely to have significant implications for how, where, and when u-services should be delivered in future. This study has provided a brief and useful insight into the need for a place-based approach to the U-City development that drives a high standard of quality of life in future. Further investigation is now needed to address the question of whether the ubiquitous computing technologies change could result in a high quality of life in neighbouring suburbs using a geographically weighted regression.

References

[1] Aoyama, Y. and Sheppard, E., 2003, Guest editorial: The dialectics of geographic and virtual space, Environment and Planning A No.5, pp. 1151-1156.

[2] Australian Bureau of Statistics Patterns of internet access in Australia, 2006a. Cat. No. 8146.0.55.001. Canberra: ABS..

[3] Australian Bureau of Statistics Socio Economic Indexes for Areas (SEIFA), 2006b. Technical Paper. Cat. No. 2039.0.55.001. Canberra: ABS..

[4] Baum, S., Mitchell, W. and Han, J. H., 2008, 'Socio economy performance across Australia's non metropolitan region functional labour market regions, Australian Journal of Regional Science Vol. 14, No. 3, pp.215-249.

[5] Baum, S., van Gallcum, Y. Haynes, M. and Han, J. H., 2006, 'Advantage and Disadvantage across Australia's Extended Metropolitan Regions: A Typology of Socio Economic Outcomes', Urban Studies (SSCI: 0042 0980) Vol 43, No. 9, pp.1549-1579.

[6] Bernard, P., Charafeddine, R. Frohlich, K. L., Daniel, M., Kestens, Y., and Potvin, L., 2007, Health inequalities and place: A theoretical conception of neighbourhood. Social Science & Medicine 65, pp.1839 - 1852.

[7] Chaudhry, B. Wang, J. Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S. and Shekelle, P., 2006, Systematic review: Impact of health information technology on quality, efficiency, and costs of medical care, Annals of Internal Medicine 144, pp.742-752.

[8] Chhetri, P., Han, J. H. and Corcoran. J., 2009, 'Modelling Spatial Fragmentation of the Brisbane Housing Market, Urban Policy and Research Vil. 27, No. 1, pp.73-89.

[9] Curtin, J., A digital divide in rural and regional Australia?, 2001. Current issues brief 1, Information and Research Services, Department of the Parliament Library, Australia.

[10] Dearne, K. 2009, E-health vital to rural areas: AMA, The Australian [online] 22 July 2009:5 Available: http://www.theaustralian.com.au(2001)/news/e-health vital to rural areas ama/story-0-1225753204649, Accessed 26 November,

[11] Dodge, M. and Kitchin, R., Software, 2009, ob-

jects, and home space, Environment and Planning A Vol. 41, pp.1344-1365.

[12] Dourish, P., 2004, What we talk about when we talk about context. Personal and Ubiquitous Computing 8, Vol.1, pp.19-30.

[13] Graham, S., 1999, Global grids of glass: on global cities, telecommunications and planetary urban networks. Urban Studies Vol. 36, pp.929-949.

[14] Hanafizadeh, M., Saghaei, A., and Hanafizadeh, P., 2009, An index for cross country analysis of ICT infrastructure and access. Telecommunications Policy Vol. 33, No. 1, pp.385-405.

[15] Han, J. H., 2009, U city Philosophy, Demand and Vision, Lee, S. H. (Eds), Ubiquitous City, Hanbat National University Press, Daejeon, Korea.

[16] Johnson, L., Levine, A., Smith, R., and Smythe, T., 2009, The 2009 Horizon Report: K 12 Edition. Austin, Texas: The New Media Consortium.

[17] Kim, Eun Hyung, 2009, "The conceptual information model for sensor-based urban facilities management-focused on urban ground and underground facilities-", The Journal of GIS Association of Korea, Vol. 17, No. 1, pp. 79-87.

[18] Kim, Junghoon and Yi, Misook, 2007, "A Study on Current Issues for the Realization of U-City", The Journal of GIS Association of Korea, Vol. 15, No 1, pp. 1-14.

[19] Kirkwood, N.. 2008, Research on U Eco City. Final consultancy report. Centre for Technology and Environment, Harvard University, Boston, MA.

[20] Lee, S. H., 2009, Introduction to Ubiquitous City, Ubiquitous City, Hanbat National University Press, Daejeon, Korea.

[21] Lee, S. H. and Leem, Y. T., 2009, U-City planning characteristics, Journal of Korea Planners Association Vol. 43, No. 5, pp.179-190.

[22] Lee, S. H., Yigitcanlar, T. Han, J. H. and Leem, Y. T., 2008, Ubiquitous urban Infrastructure: Infrastructure Planning and Development in Korea, Innovation: Management, Policy & Practice Vol. 10, No. 3, pp.282-292.

[23] Lloyd, R. and Bill, A, 2004,. Australia Online: How Australians are using computers and the Internet 2001, A joint publication by the ABS and NATSEM, Australian Census analytic. Canberra.

[24] Mackenzie, A., 2009, Intensive movement in wireless digital signal processing: from calculation to envelopment, Environment and Planning A Vol. 41, pp.1294-1308.

[25] Macintyre S., Ellaway, A., and Cummins, S., 2002, Place effects on health: how can we conceptualise, operationalise and measure them?. Social Science & Medicine Vol. 55, pp.125-139.

[26] McCullough, M. 2004, Digital ground: architecture, pervasive computing, and environmental knowing, MIT Press, Cambridge MA.

[27] Queensland Government, 2009, South East Queensland Regional Plan 2009-2031. Department of Infrastructure and Planning. Brisbane.

[28] Rheingold, H., 2000, Smart Mobs: the next social revolution, Perseus, Cambridge, Massachusetts.

[29] Thrift, N. and French, S., 2002, The automatic production of space, Transactions of the Institute of British Geographers, New Series Vol. 27, pp.309-335.

[30] Travaglia, J., Harris, E., Masden, L., Sainsbury, P., McDonald , J. and Gill, B., 2006, Locational Disadvantage: Focusing on Place to Improve Health, Sydney: CHETRE.

[31] Vehovar, V., Sicherl, P., Husing, T., and Dolnicar, V. 2006, Methodological challenges of digital divide measurements. The Information Society Vol. 22, No. 5, pp. 2279 - 290.

[32] Whitacre, B. and Mills, B., 2007, Infrastructure and the rural - urban divide in high speed residential internet access. International Regional Science Review Vol. 30, No. 3, pp.249-273.

[33] Wieman, C., 1998, The high tech transition: technology and the prospects for improving infrastructure performance, Journal of Urban

Technology Vol. 5, No.2, pp.21-46.
[34] Yigitcanlar, T. and Han, J. H., 2007, Technology, Infrastructure and Management Systems for Ubiquitous Eco Cities. In ICTs for Mobile and Ubiquitous Urban Infrastructures: Surveillance, Locative Media and Global Networks. Firmino R., Duarte F. and Ultramari C. (Ed.). Hersey, PA: Information Science Reference.

Manuscript received : 2009.12.06
Revised : 2010.02.06
Accepted : 2010.02.22

Jung Hoon Han

1998 Dept. of Geographical Science and Planning, University of Queensland, Australia (G.D)
2000 School of Geography, Planning and Architecture, University of Queensland, Australia (M.P)
2004 School of Geography, Planning and Architecture, University of Queensland, Australia (PhD)
2004~2008 Post-doc of the Australian Housing and Urban Research Institute (AHURI), Australia
2008~Present Lecturer (equivalent to Assistant Professor) of Griffith University, Brisbane, Australia
2009~Present Editorial board member, Journal of City, Culture and Society (ISSN: 1877-9166), published by ELSEVIER.
2010 Guest editors for the special issue (2010), International Journal of Knowledge-based Development(ISSN: 2040-4476), published by IGI Global.
Research Expertise
- Ubiquitous Planning and Applications
- Creative Cities
- u-Health and Place based Initiative
- Spatial and Longitudinal Data Analysis

Jonathan Corcoran

1994~1997 Geographical Science, University of Portsmouth, UK.(BS)
1997~1998 Geographical Information Systems, University of Portsmouth, UK.(M.S.)
1998~1999 System Developer, Ordnance Survey, Southampton, UK.
1999~2003 PhD Research and Part-Time Lecturer, School of Computing, University of Glamorgan, UK.(Ph.D.)
2003~2005 Post-Doctoral Research Fellow, School of Computing, University of Glamorgan, UK.
2005~2008 Research Fellow, University of Queensland Social Research Centre (UQSRC) in ISSR at The University of Queensland, Australia.
2008~Present: Senior Lecturer (equivalent to Associate Professor), Geography, Planning and Environmental Management (GPEM), The University of Queensland, Australia.
Research Expertise
- Spatial analysis and modeling
- Geo-visualisation
- Human spatial behaviour and circular statistics
- Urban modelling

Sang Ho Lee

1986 Dept. of Architecture, Yonsei University(B.S.)
1989 Dept. of Architecture, Yonsei University(M.S.)
1993 Dept. of Architecture, Yonsei University(Ph.D.)
1993~1995 Samsung Economic Research Institute, Senior Research Fellow
1995~Prresent Hanbat National University, Professor
2003~2004 Dept. of Environmental Studies, Louisiana State University Visiting Professor, Supported by Korea Research Foundation, KRF
2008.06~Present Presidential Committee on Balanced National Development Member
2008~2010 U-City Vision and Strategy(code 08U-Eco A03-1), Research Director, U-Eco City Center Program funded by Ministry of Land, Transport and Maritime Affairs of Korean government
2010~Present Editorial board member, International

Journal of Knowledge-based Development (ISSN: 2040-4476), published by IGI Global

2010 Guest editors for the special issue (2010), International Journal of Knowledge-based Development (ISSN: 2040-4476), published by IGI Global.

Research Expertise

- Urban Planning and Management, Urban Land Use Planning and Sustainable Development
- Urban Quantitative Econometric Methodology
- Experimental Urban Planning and Simulation, Spatial Decision Support System
- Game Theory and Its Application
- Real Estate, Risk Management, and Feasibility Study
- Future City and Ubiquitous City Planning