



Places and Technologies 2015

# KEEPING UP WITH TECHNOLOGIES TO MAKE HEALTHY PLACES

Nova Gorica, Slovenia, 18.–19.6.2015

# PT2015

## BOOK OF CONFERENCE PROCEEDINGS

*A healthy city is one that is continually creating and improving those physical and social environments and expanding those community resources which enable people to mutually support each other in performing all the functions of life and developing to their maximum potential.  
Health Promotion Glossary (1998)*

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**Places and Technologies 2015**

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**Editors:**

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Nova Gorica, Slovenia



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## **OPEN PUBLIC SPACES FOR HEALTHIER CITIES**

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### **ABSTRACT**

*Public spaces represent essential elements of healthy, functional, eco and smart cities. Being attractive, safe, comfortable, active and inclusive they play the main role in revitalizing communities, supporting their sense of identity and culture and triggering their economic development. The process of globalization, facilitated by the increasing number of ICT networks, imposes a number of new trends which should be followed by professionals. Their aim is to provide an updated setting for public life, which nowadays encompasses both private and public realms, material and virtual reality. Unfortunately, the contemporary lifestyle has caused numerous mental and physical health problems, including chronic diseases, toxic exposure and injuries resulting from uncontrolled violence. Therefore, well-conceived and managed public spaces can influence the health of citizens because their performances could encourage an intensive use of outdoor facilities. Public spaces where users feel safe to play and relax can relieve stress, especially when people live in multi-family apartments or in crowded parts of a city.*

*Considering all these trends and demands, the role of ICT becomes more important in the process of design and use of public spaces. This paper will present and analyse the connection which is established and intensified between users and open spaces via information networks. The emphasis will be on two main groups of applications aiming at (1) citizen participation (e.g. 'crowdsourcing' or 'participatory sensing' applications related to mapping and monitoring of pollution, health risks and patterns) or (2) individuals' health consciousness (e.g. applications enabling surveillance of urban spaces and personal life habits).*

**Keywords:** *open public spaces, ICT, health.*



## **INTRODUCTION**

Open public spaces represent focal points of community life, linking nodes of activities and events, simulating experiences and memories and responding to various expectations of users (Crouch, 1998; Crawford, 2000). Providing a spatial framework for different kinds of gathering and multileveled interaction, open spaces nowadays also include virtual flows, stimulating merging of physical and digital reality. The importance of data-exchange is increasing and its intensity becomes a significant characteristic of urban environment (Vidler, 1992) and its 'visibility'. Pervading all aspects of contemporary life, information networks influence our behaviour, modify urban form, activities and habits, and create hybridized landscapes with blurred boundaries (Souza e Silva, 2006). Simultaneously, the performances of digital networks could create a special kind of virtual freedom and safety, within preferred 'groups' and their established confines.

Due to continuous technological improvements, the diversity and speed of information flows are increasing enabling better perception of environment, providing higher efficiency of urban systems and facilitating all levels and scales of communication and movement. Although digital networks certainly support more advanced comprehension of reality, urban processes and their consequences, they challenge traditional definition of 'belonging' - both in spatial and social sense. Therefore, the overlapping of material and digital features also influences modelling of open public spaces, which - more than ever - have to provide a safe and secure environment for spontaneous manifestations of social life (Rossi, 1982). They should support integration of users, while preventing possible uncontrolled violence.

Another important problem, which should be considered during the design processes of open public spaces, is related to numerous environmental threats which have been generated by the carbon-intensive life in cities and the phenomenon of global warming. In this case, the role of ICT could be recognized on two levels - as a tool for sensing the environment and users' needs (by detecting, mapping and monitoring) and a channel for increasing the environmental and health consciousness (via knowledge exchange and promotion of healthy and environmentally friendly habits).

## **TOWARDS A HEALTHY LIFE: URBAN CHALLENGES**

The process of globalization is followed by an unprecedented pace of urbanisation which reflects on the general condition of the environment, saturated by artificial features. At the same time, the level of biodiversity is decreasing, challenging sustainability of newly created or modified areas and causing a number of negative effects on space(s) and people. However, the latest environmental trends, instigated by the fear of climate change and its already visible effects, promote ecologically



conscious behaviour and impose new demands for management and development of urban spaces targeting higher environmental quality.

The successful planning and design of open urban spaces and their complementing urban systems not only improve overall quality of life and increase attractiveness of spaces, but also act as possible tools for integrated approach toward prevention of weather extremes, disastrous situations or environmental hazards - high temperatures/heat islands, floods, storms, rains or other environmental accidents. Their role in reducing climate changes and GHG emissions is also emphasized, because their green elements, especially trees, provide the greatest airborne particulate sequestration.

The other aspect, frequently tackled in remodelling of open public spaces, is related to the social dimension of sustainability, particularly in sensitive urban contexts facing general poverty, inequality or different kinds of segregation. Healthy and safe environment in this case has a two-fold role - as a trigger for economic development and as a focal point of community integration which also reflects newly established identity. The necessity of physical activities has been recognized in both cases due to increased number of mental and physical problems (including obesity and different chronic diseases) caused by the contemporary (passive) life styles. The important element also represents the accessibility of open public spaces, especially in the case of potentially vulnerable groups - children, older people or urban poor living in distant areas with limited number of recreational facilities. Therefore, one of essential features of new/remodeled public spaces is related to physical activities which should be adjusted to various groups of users.

The link between a higher percentage of total park area, a number of recreational facilities and the increased physical activity within a community has been confirmed by some studies (Li et al., 2005; Rosenberger et al., 2005), as well as the relationship between active involvement of users and the esthetical appearance of open spaces/parks (Active Living Research, 2015). Furthermore, open spaces are more successful if a part of their activities is organized, allowing higher level of (directed) interaction among people. Living in a green environment or having an easy access to nature certainly has numerous benefits for health and our stressful everyday life, reducing aggression or anxiety (Grahn and Stigsdotter, 2003; Kaplan, 1995; Stilgoe, 2001). However, some authors underline that indicators relating the use of green spaces and health are better for less educated people (de Vries et al., 2003), although, in general, stress reduction is achieved in all groups of users (Grahn and Stigsdotter, 2003).

In spite of numerous benefits, the use of open public spaces has some limitations caused by the level of safety and the fear of crime, which is especially noticeable in sensitive and potentially conflicting environments with low security. Additionally, some authors (Lyman, 2000; Steingraber, 2002) also argue on



negative effects of certain fertilizers and GHG emissions originating from mechanisation used for maintenance of green surfaces (lawns).

### **OPEN PUBLIC SPACE VS. TECHNOLOGY**

The application of new technologies constantly redefines our perception of space and its tangible three-dimensional realm. Nowadays, it is enriched and pervaded by multiplying ICT flows, augmented and overlapped with increasing number of information layers which upgrade our experiences and interaction - both with other people and with the surrounding (Aurigi and De Cindio, 2008; Brewer, Dourish, 2008; Graham at al., 2012). The generated flexible spatiality (Liao and Humphreys, 2014) also influences human behaviour, creating a new level of expression and empowerment via different interfaces which allow us to virtually modify, change and emphasise certain elements in urban space. The possibility of active participation is increasing, while technology becomes a vital ingredient of urban culture and urban spaces. The established interaction between city, society and technology also stimulates urban and technological innovations, which are later implemented in different spheres of our urban(ized) life. Therefore, it could be said that new technologies have an important role in connecting social, technological and natural systems by different media, tracing the path toward smarter cities with low carbon economy and healthier life.

The merging of ICT and urban environment is very important for open public spaces, because they represent nodes of social life which are nowadays blending digital and material spheres of interaction. Currently, the role of ICT flows and networks could be recognized in a number of applications dealing with the main challenges of the anticipated climate-friendly development and a general improvement of the environmental conditions. Therefore, they are mostly focused on activities related to changes of human behaviour and ecological awareness, which could be achieved spontaneously/individually, or through organized programs and projects.

The ICT networks have also an important role in detecting and collecting environmental data and increasing their visibility. The link between environment and users is usually established through personal and public interfaces providing easy access to information related to places, processes and activities which could be used for moderation of our life styles and consumption patterns, management of resources, or as a notification/alarm related to social, ecological or health issues. This type of information networks can also include real-time interaction with users enabling their active participation in detecting urban problems.

For example, the concept of Cyber Parks clearly demonstrates all the benefits and problems generated by the integration of ICT into process of design and use of open spaces and their public facilities. It represents an open public space covered with ICT networks where people spend their free time and have a possibility of



participating in numerous social interactions. However, although it provides a new mode of interactive landscape, which is 'responsive' to users' needs, it should simultaneously encourage active use of the environment and its 'green' features, as well as a social networking in real space and time. As a result, the intelligent environment provided by Cyber parks should be designed as a space in which sensors and computers are seamlessly embedded to enhance ordinary park activities, and where the landscape itself might respond to people moving through it. The installation Hylozoic Ground (by Philip Beesley) represents one of these examples in which an interactive environment, based on artificial intelligence, synthetic biology and interactive technology, moves and breathes around its viewers.

### **DIGITAL UPGRADING VS. PUBLIC HEALTH**

The intensive merging of material and digital flows, as well as the increased speed of information exchange, definitely redefine our (re)action to accumulating environmental challenges and health risks. Although it improves urban performances by efficiently detecting, collecting, analyzing and processing different kinds of data, total digitalization cannot replace comprehensive actions in real space and time, especially in areas without sufficient technological support. Currently, we can identify two major trends targeting overlapping of open public spaces, their users and information networks which should have a direct impact on environmental quality and the health of urban population. The first one is focused on stimulation of citizen participation via technological upgrading enabled by crowdsourcing or participatory sensing, while the second one triggers the individuals' health consciousness via emerging applications which provide efficient surveillance of urban spaces and personal life habits.

For example, recent studies reveal numerous possibilities developed by the intensified use of Sensor Web, citizen sensing and 'human-in-the-loop sensing', as well as the new approaches brought by Semantic Web technology or 3-D visualisation of surveillance, which could have a significant role in a domain of environmental and public health (Kamel Boulos et al., 2011). Furthermore, there is an increasing number of commercial applications developed for smartphones and tablets which enable monitoring and verification of health indicators and related data (e.g. detecting heartbeat, body temperature, calculating calories, number of kilometres run etc.). These information could be used during everyday activities - as a record, reminder, instant check up or simply for comparison (for personalized use), or for collecting health data within programs launched by special monitoring groups or government. Therefore, it could be noticed that application of ICT in open public spaces runs on informal and formal level, merging individual and public information networks. However, in spite of their obvious benefits for medical and health promotion and general improvement of the environmental situation and health condition of citizens, there are some moral and ethical issues





related to the privacy of information, the level of surveillance or the approach toward promotion of certain habits (Lupton, 2012).

## CONCLUSION

The contemporary city and its open public spaces have been exposed to numerous environmental challenges which influence the condition of environment (both built and natural) and general public health. However, the latest trends of technological upgrading have introduced numerous possibilities for detecting environmental and health data (via sensors), making them immediately available (via networks) and efficiently responding to identified problems. Due to the emerging trends of Open Network Environment, Internet of Things (IoT), Cloud Computing, Open Data and Big Data concepts the overlapping and interlinking of physical and digital environment is provided, stimulating adjustment of our perception, actions and decisions toward new life styles and behavioural changes.

The uneven development of technological support, as well as numerous ethical and moral doubts which follow its use, influence further integration of ICT into physical space. However, the introduction of simple, affordable and user-friendly platforms and applications should be stimulated, allowing a higher level of privacy, while simultaneously providing an adequate selection of information. The attention of professionals (architects, designers and engineers) should be also focused on benefits of horizontal communication since it enables immediacy and accuracy of information within a user group. Ensuring the flexibility of content and the highest possible level of accessibility, it will be gradually adjusted to the technological competence of users.

Although digital flows could certainly upgrade performances and intensify use of open public space, its genuine role in a community life should not be forgotten. Therefore, a proper balance of material and virtual elements, nodes and flows should be achieved in order to stimulate active participation of users which will increase their connection with the surrounding. It will provide better understanding of natural and social processes, but, above all, it will reinforce the transition of our habits toward healthier life based on the sustainable consumption of our individual and global resources.

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## REFERENCES

- Active Living Research. 2015. Accessed April 13, 2015. <http://activelivingresearch.org/>
- Aurigi, A., and De Cindio, F. (eds.). 2008. *Augmented Urban Spaces*. London: Ashgate.
- Brewer, J., and Dourish, P.. 2008. "Storied spaces: cultural accounts of mobility, technology and environmental knowing". *International Journal of Human-Computer Studies* 66(12): 963-76.
- Crawford, M., 1992. "The World in a Shopping Mall", In *Variations on a Theme Park: The New American City and the End of Public Space*, edited by Michael Sorkin, 3-30. New York: Hill and Wang.
- Crouch, D. 1998. "The Street in the Making of Popular Geographical Knowledge", In *Images of the Streets*, edited by Nicholas R. Fyfe, 160-175. London and New York: Routledge.
- De Souza e Silva, A. 2006. "From cyber to hybrid: Mobile technologies as interface of hybrid spaces". *Space and Culture* 9(3): 261-79.
- De Vries, S., R. Verheij, Groenewegen, H., Spreeuwenberg, P. 2003. "Natural Environments — Healthy Environments? An Exploratory Analysis of the Relationship between Green Space and Health". *Environment and Planning* 35(10): 1717–31.
- Google. 2012. "Privacy Policy." *Google Policies & Principles*. Last modified July 27. Accessed January 3, 2013. <http://www.google.com/policies/privacy/>.
- Graham, M., Zook, M., Boulton, A. 2012. "Augmented reality in urban places: contested content and the duplicity of code". *Transactions of the Institute of British Geographers*, 38 (3): 464-479.
- Grahn, Patrik, and Ulrika Stigsdotter. 2003. "Landscape Planning and Stress". *Urban Forestry and Urban Greening* 2: 1–18.
- Kamel Boulos, M. N, Resch, B., Crowley, D. N. 2011. "Crowdsourcing, citizen sensing and sensor web technologies for public and environmental health surveillance and crisis management: trends, OGC standards and application examples." *International Journal of Health Geographics*, 10 (67): 1-29.
- Kaplan, S. 1995. "The Restorative Benefits of Nature: Toward an Integrative Framework". *Journal of Environmental Psychology* 15: 169–82.
- Li, F., Fisher, J., Brownson, R. et al. 2005. "Multilevel Modeling of Built Environment Characteristics Related to Neighborhood Walking Activity in Older Adults". *Journal of Epidemiology and Community Health*, 59: 558–64.



- Liao, T. and Humphreys, L. 2014. "Layer-ed places: Using mobile augmented reality to tactically reengage, reproduce and reappropriate public space". *New Media and Society*, 2014: 1-18.
- Lupton, D. 2012. "M-health and health promotion: The digital cyborg and surveillance society." *Social Theory & Health*, 10 (2): 229–44.
- Lyman, F. 2000. *Smog Engulfs Downtown Los Angeles*. MSNBC Report, 23 May.
- Rosenberger, R.S., Y. Sneh, T. Phipps, and R. Gurvitch. 2005. "A Spatial Analysis of Linkages between Health Care Expenditures, Physical Inactivity, Obesity and Recreation Supply". *Journal of Leisure Research* 37(2): 216–35.
- Rossi, A. 1982. *The Architecture of the City*, Cambridge, MA: MIT Press.
- Steingraber, S. 2002. "Exquisite Communion: the body, landscape and toxic exposures". In *Ecology and Design: Frameworks for Learning*, edited by Johnson, B.R. and K. Hill, 192-202. Washington D.C.: Island Press.
- Stilgoe, J R. 2001. "Gone Barefoot Lately?" *American Journal of Preventive Medicine* 20: 243–44.
- Vidler, A. 1992. *The architectural uncanny: Essays in the modern unhomely*, Cambridge, MA: MIT Press.