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ICTS AS A TOOL TO INCREASE THE ATTRACTIVENESS OF PUBLIC SPACES

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Abstract. Nowadays, ICTs is one of the major factors influencing urban development. Consequently, public spaces – an important urban subsystem – are shaped by interaction with the new technologies. This paper aims to present the ways, in which different ICT tools can increase the attractiveness and competitiveness of public spaces, in opposition to several approaches stating that technologies can only encourage segregation of individuals. The article is focused on possibilities to open the public realm for functions and activities that are usually regarded as private. The major roles that ICTs can play in the public space are: education, information, art and entertainment. Based on this classification various examples and proposals of ICTs interventions in public spaces are presented and analysed, including the Zaragoza's *Digital Mile*, the *Cloud at Athens* and the concept of *Flux Space*. The specificity of this paper rests on a constant parallel drawn between the interventions around the globe and Romania, aiming to highlight the potential for competitiveness of Romanian public spaces, as a result of using various ICTs tools.

Keywords: public spaces, ICTs, digital, interaction.

Introduction

In the present article, **a public space** is considered to be any open space accessible to all categories of users fostering communication and social interaction. It is often identified as having the form of public square, park and pedestrian area. As Craig Calhoun argues, "one of the most important social characteristics of cities is the provision of public spaces in which relative strangers can interact and observe each other, debate and learn politically, and grow psychologically from diverse contacts" (Calhoun 1986: 341).

An abbreviation often used in the article is ICTs, which stands for Information and Communication Technologies. A wide variety of devices (hardware or software) in the field are presented highlighting their impact on public spaces.

A public space represents an important layer of the city. The development of the first settlement or group of housing units may be considered the birth of the public space, since the inhabitants had to communicate, thus they needed a common ground. Perception, use and features of public spaces changed along with the evolution of human settlements to villages, cities, metropolises or urban systems. However, the fact that the public space allows and supports human interaction, while also satisfying individuals' social and communication needs, has ensured its permanence.

Over time, public spaces have adapted to various trends, ideologies and needs, and it is interesting to analyse the different ways they developed within specific socio-economic and political contexts. Thus, public spaces range from a simple unpaved spot around a campfire to large open spaces completely paved and supervised, and even to semi-closed spaces with artificial climate filled with radio-magnetic waves, and the list goes on.

Diego Hurtado (2004)[1] defines 4 major evolution stages of the public space: (1) the beginning, when the main role of public space was to support interaction and communication between individuals; (2) the transformation into pathways for pedestrian traffic once the boulevard concept was developed (for example Haussmann, Paris, Ringstrasse, Vienna); (3) the Functionalism, when public space was designed for specific "functions" – transportation and recreation; (4) the modern era, when people have lost their interest in the public space in favour to its "new rival" – the Internet – a mutation, which acts as a virtual public space able to completely negate the physical interaction between individuals.

Gernot Riether[2] has a more simple approach, dividing the history of public spaces into two periods: "the pre-internet times" and "the era of digitalisation". Before the advent of digital media, the public space represented the main source of information and politics, and it also hosted various debates. Moreover, the use of public space was encouraged by commercial activities, since markets and

[1] La evolucion arquitectonica: brief history of public space.

[2] Gernot Riether, 2010. *Digital Phantasmagoria: An Urban Space of Intensified Interaction*. Sigradi 2010 conference.

retail shops were the places to go shopping. With the raise of telecommunication technologies, the activities in the public realm started to diminish, as information became easily accessible from home, via Internet. This also enabled online shopping, while talks and debates partially migrated to web-forums.

The above mentioned evolution partially applies to Romania, with a few exceptions related to its socialist background: for over two decades public spaces have lost their characteristics of being "free" and "open", when their design had to enable surveillance and control of the masses. At that time, ICTs tools (even in a rudimental form) were used mostly for "national security", telecommunications were intercepted and public spaces, when considered necessary, were surveyed by cameras. Thus, it was impossible to use the first ICTs tools in Romania in favour of the public space, moreover, they were applied as control instruments.

As shown above, the modern era is characterised by the loss of interest towards a public space, as a consequence of the emergence of Information Technologies. The present paper aims to prove that this situation can be improved by using ITCs tools in order to make public space more attractive for people.

Public Spaces at the Beginning of the Internet Era

The development of ICTs brought a high range of advantages to cities, but how do these advantages reflect on public spaces? It mainly depends on how innovative and updated the city's administration is, how much the local community and stakeholders are involved, committed and understanding the new technologies.

With the development of ICTs, the ratio of location-based versus interest-based communities has changed. Geographical (location-based) communities can be defined as groups of people bound by the common use of a space. Inhabitants of the same dwelling or neighbourhood are considered geographic communities. Interest-based communities, on the other hand, are defined as groups of individuals that share the same interests like: profession, sports, hobbies, etc. Nowadays, due to high accessibility of information and wide variety of communication devices, one is more likely to know most of the people with common interests from the entire region or city than, let's say, the neighbours from the block. Therefore, ICTs determined a major increase of the interest-based communities at the expense of the location-based ones; this doesn't always apply to less developed countries and cities, where geographic communities still prevail.

The Internet has also favoured the raise of a new labour class, the home workers. Most of them are writers, designers, translators, web developers, etc. Their number has shown a rapid growth: in UK (2009), for example, they represent[3] 12.8% (3.7 million people) of the labour force, a 21% increase compared to 2001. The emergence of this new class led to significant decreases in the number of commutes per day or week, contributing to segregation and isolation of urban inhabitants.

The raise of home workers and the increase in travel speed are two of the main reasons for urban sprawl, an "urban disease", mostly present in the U.S.A. and characterized by extended suburbs and large strip malls. This uncontrolled horizontal expansion represents one of the reasons why cities lose their human scale and become less "Cities for people"[4] (Jan Gehl), and more cities for automobiles. Similarly, the emergence of the Internet had a negative impact on the relevance, use and perception of public spaces. It contributes to the decrease of geographic communities by encouraging a large number of public space users to shift to another type of space – a virtual public space – for work and recreation.

Working at home and urban sprawl make public space less accessible and interesting for people. On one hand, if they work at home, they will rarely commute and encounter less of the public space; on the other hand, if they live in the suburbs, they will less likely travel in order to enjoy a walk in the park or other recreational activities.

All these trends (starting from the decrease of geographical communities to the appearance of sprawl) are also manifested in Romania, but at a lower scale and generating a lower impact. The prevention of negative effects depends on the capability of local government and communities to understand these changes.

Various experts, like architecture critic Paul Goldberger (2003-Metropolis magazine), Nicholas Negroponte with *Being Digital* or Lars Lerupin, *Pandemonium*, made comments on the negative effects brought by the development of Internet, broadband and other communication devices over the public space[5]. The question is, will the concurrence between virtual and real-life public spaces evolve or is there a way to make them complement each other for a common good?

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[3] http://www.flexibility.co.uk/flexwork/location/homeworking-statistics-2009.htm

[4] Gehl, J. 2010. *Cities for People.* 1 Edition. Island Press.

[5] Paul Goldberger: "The mobile phone renders a public place less public.". Nicholas Negroponte: "The post-information age will remove the limitations of geography.". Lars Lerup: "The bandwidth has replaced the boulevard."

Wireless Internet as a New Chance for Public Spaces?

Wireless networks were the first piece of innovation that favoured a shift of communication back to the public realm. By transforming internet into a mobile service, public space can now support a wider range of activities.

Wireless Internet is present in the public space in two ways: as a private hotspot accessible for free or for a certain charge, or as a public hotspot generally owned by local administration or public institutions. Most squares or commercial streets with restaurants, cafes or bars are nearly completely covered by wireless networks. This is both a marketing tool for local merchants and an important factor enhancing public space attractiveness by offering new services and satisfying an individuals' need for access to information.

The Cloud at Athens, or *Wireless Athens Georgia* (WAG), developed in 2002 by the University of Georgia together with the local government, was one of the first pilot projects that studied and tested the use of wireless networks in the public realm. The fact that people had free access to information and communication in the public space greatly increased its number of users. By including a beta version of the social media software called 'Friend finder', the project encouraged social interaction within the local community. The website used to access the wireless network was also hosting various advertisements of local companies and promoting local events. Besides all features presented above, the project also managed to attract various ICTs companies interested to study the area in order to develop new technologies. For example, WAG convinced a high number of retail, restaurants and cafe chains to provide wireless Internet to their customers. *Mc Donald's* was maybe the first chain that contacted Scott Shamp, Director of the NMI (New Media Institute), in order to develop the wireless technology in more than 12.000 restaurants.

The availability of internet in cafes, restaurants and bars transformed them into potential work environments for home workers and freelancers. That is how the exodus of home workers to cafes with hotspots started (*Starbucks* is the icon of this movement). Even though cafes are considered semi-public spaces, this represented a significant step forward, allowing individuals to interact, instead of getting isolated. Working in cafes persisted and, nowadays, it has become a habit of freelancers. But, because this category of users was considered rather unprofitable by cafe owners, specific sales policies were adopted to limit the access to internet and raise the consumption[6]. *Breakout!*, a project led by several ICTs experts including Anthony Townsend, equips public spaces in business districts with wireless Internet and electricity in order to attract people to work there. A local social network was also created to facilitate the communication between users and help jumpstart collaboration and sharing. This initiative had a great impact, luring people out of their offices and encouraging them to work in a more open environment. In case of parks and other green spaces, one can even say that it supported a double connection, both with the World Wide Web and with nature.

In case of Romania's experience regarding wireless technologies, a project similar to WAG was developed by the Ministry of Communication and Information Society. The project was meant to provide free wireless Internet access to about 500 important public spaces around the country. Due to various budget restrictions only 211 hotspots were built, and afterwards they have been poorly maintained. At local level, Roman (Piatra Neamt County) and Mangalia (Constanta County) are the first cities completely covered by free wireless networks developed through public-private partnerships between the local authorities and two Internet providers, *Wavion* and *Minisoft*. Taking into consideration the marketing opportunities, private Internet and communication providers like *Orange* and RDS-RCS also developed wireless networks covering important public spaces. For example, *Orange* built a wireless network covering the historical center of Bucharest, a recently restored pedestrian area with generous public spaces and high flows of people.

Although Romanian interventions in the field of wireless networks development are still sporadic, uncoordinated and not always of the best quality, they have shown a rapid evolution over the last years. Starting with the success of WAG, wireless networks are expanding rapidly. Their coverage increased from a few meters radius to a few blocks, to entire quarters, to cities and, in the near future, we may consider the launch of the first regional wireless network.

How Do, Can or Should the ICTs Tools Positively Influence Public Spaces?

Over the last years we have witnessed a boom in the development of mobile technologies, which favoured the emergence of a high amount of new software and hardware tools

[6] This only applies to countries and cities with a high number of freelancers and home workers. It isn't the case in Romania, where the use of wireless internet for work outside the office happens, but hasn't (yet) become a problem.

aiming to increase the quality of urban spaces. Most ICTs tools designed for cities aim to rationalize the use of resources, promote local values and places (for example heritage values, meeting points, etc.) or grant citizens the access to information. Aside from mobile applications (for example shortest route applications), e-guides, digital screens and other products already used in and for the public space, one should consider the high amount of tools that can be adapted from other environments (for example from computer games – augmented reality) in order to bring usual private activities to the public realm.

Anthony Townsend classified the use of digital technologies into the four categories: mobile communications, positioning services, digital displays and urban documentation. This may apply to a wider, more general description of ICTs, but, when talking about a public space, one has to take into consideration not only the possible uses of technology, but also urban functions and possibilities to enhance the public realm. Thus, the ICTs tools for public spaces can be classified according to the following areas: (1) culture and art, (2) education, (3) planning and design, (4) games and entertainment and (5) information transmitters.

(1) Culture and Art

Ever since the Antiquity, public spaces have been acting as open air museums or exhibitions, being decorated with various objects of art, known as public art. Art in public spaces has many roles like: aesthetic, expressing certain ideas or stories, promoting local culture and traditions, education, etc. Using ICTs tools can (and it does) bring new dimensions to public art, encouraging interaction with and between people, enhancing playfulness and enriching urban and cultural experience. Nowadays, artists contradict the old habits when it comes to the relation between audience and object. In this regard, contemporary art tends to forget the "Do not touch" sign and tries to involve the user to interact and, if possible, to shape pieces of art to its own taste. The user can be "transformed by an artist to an artist". In this process, a new role of ICTs emerges, that of a binder between people and art, and the public space becomes the interaction context.

A relevant example for interactive art in public spaces is *21 Balançoires* (*21 swings*), a project by Daily Tous Les Jours, a Canadian design collective. The intervention consists of 21 swings bound to sensors, each swing playing a specific musical note when it is used. Thus, if used by a single person, the effect is reduced to one single note: the more people use it, the more diverse melodies develop. When all 21 swings are used at the same time, they produce various complex tunes. The project was meant to become a binding space between a science centre and new music complex. People using the space were fascinated by the melodies and kept using the swings for hours. The intervention raises awareness on art, and especially musical composition, by letting people act like composers and even like a little orchestra. In addition, the fact that "swinging together" gives more interesting results encourages the interaction between people, one of the main desiderates of public space.

In case of Romania, the city of Sibiu – the European Capital of Culture, 2007 – hosted a wide variety of artistic and cultural events, activities and projects. One of them was the *Ambient Urban* (*Urban Environment*) project, developed by the cultural foundation META. The project included several artistic interventions in the public space, ranging from simple movie projections to interactive sculptures. Most interventions were interactive and used ICTs tools. A good example is the work of Romelo Pervolovici – *Meduze* (*Jellyfishes*), a jellyfish-shaped sculpture which emitted sounds depending on how people related to it (the voice tone, moves underneath/ inside the object). The project brings to discussion the concept of artificial intelligence, but also relates to terms like visual vocabulary and interactive art. People interacting with the object were fascinated by its sounds and enjoyed using it, trying to understand how the sculpture related and answered to their behaviour. The sculpture also had a "brother", an inflatable jellyfish, similar to kites, trying to promote the integration of playfulness into urban life.

Cluj is one of Romania's cities aiming to become a "creative city"[7]. In this sense, several cultural projects were initiated within its development strategy. *Orasul Vizibil – Arta in Spatiul Public – The Visible City – Art in Public Space* is one of them. It started with a "call for an artist" in order to get several proposals that fit into specific intervention categories. One of these categories was related to ICTs technologies (Video loop, MPEG-4, H.264, 1070×720), namely looking for public art proposals relying on audio-video technologies. One of the proposals, *Voie Buna FM* (*Good vibes*), by M.A.M.A.[8], gathers sounds and pictures from quiet rural areas. The images and sounds are then broadcasted in bus stations in order to help travellers relax and escape for a few minutes from the daily rush. Another project, *Shattered Light Show* by Octavian Fedorovici, consists of a video projector transmitting images on a window. The video presents very colourful, bright and contrasting

[7] Florida, R. 2002. *The Rise of the Creative Class: and How It's Transforming Work, Leisure, Community and Everyday Life*. 1st Edition. Basic Books.

[8] http://www.altart.org/orasulvizibil/?p=668

images in order to shock people. The project aimed to raise awareness on the disturbance caused by large digital screens used for advertisements.

Digital projections are popular when it comes to art in public space. There is a high diversity of interventions in this area, ranging from showcasing wireless networks' routes in the shape of digital walls to artificial stars made out of small light bulbs hung to trees using nylon threads.

French artist Clement Briend used digital projections on trees in Cambodia showcasing "godlike" figures from the local religious culture (Fig. 1).

Artistic ways of expression are unlimited, and so are the possibilities to involve ICTs tools in public art. Most importantly, these tools are very useful when it comes to present imaginary scenes (mostly in the shape of projections) and play a catalytic role in the interaction with and between people.

Civic initiatives also started using ICTs to advocate for their causes. For example, Times Square Alliance[9] is working towards opening the large advertising digital screens to art. They developed the project called *Times Square Arts*, aiming to buy the permission to showcase art on all digital screens around Times Square in New York, one of the most famous public spaces in the world. This initiative results in two main benefits: first, it represents a resource for cultural education, and, secondly, helps promoting various artists and their work. Generally, the race between art and publicity is won by the later one, as the billboard owners are looking for clear, tangible, short term financial benefits that can only be provided by private companies paying for advertisements. However, education, in general, and cultural education, in particular, is one of the most important attributes of the public space, and ICTs can help developing it.

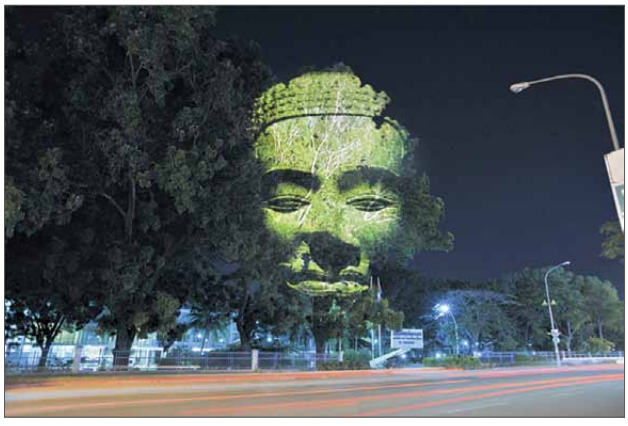

Fig. 1. Digital projection on a tree by Clement Briend.
Source: http://www.thisiscolossal.com/wp-content/uploads/2012/11/cam-1.jpg

In case of Romania, the relation art – public space – ICTs is rather new, a trend that has developed over the last decades, simultaneously with the evolution of civic society and rebirth of the interest towards culture and art. Various NGOs and public bodies try to promote culture and art, especially in relation with public spaces. Sibiu's cultural capital award was certainly one of the factors that led to the revaluation of art and culture in Romania.

(2) Education

As mentioned above, one of the main roles of public space is to educate communities, and art is a useful tool in this sense. Also, the use of digital screens can help showcasing general knowledge or location-related information. For example, in Bucharest's subway stations digital screens are used to entertain travellers while waiting. A dedicated channel runs on the screens, presenting news, incoming events, advertisement and general information on topics like history, traditions, geography, tourism, etc. The money raised from advertisements is used to maintain the screens working, while other broadcasts keep people updated and provide relevant knowledge. One of the central stations (*Victoriei*) started a new experiment in autumn 2012: walls were painted with products' images, namely flowers and books, with QR codes attached. Scanning the code links to an online store where the product can be ordered. Based on this technology, *Tesco*[10] changed its marketing strategy in Korea, switching to *Home Plus* – basically an online shop with a quick home delivery service. By placing large posters with shelves full of products and correspondent QR codes in metro stations, the company made shopping much easier and more efficient for Korean commuters.

QR codes represent new ways to disseminate information, therefore to support education. They represent simple, square-shaped images, consisting of multiple little squares that transmit a code to mobile devices. Using, for example, a mobile phone or tablet, one can scan the code that usually links to a website. QR codes are often attached to advertisements and billboards, in order to provide more details about the information presented. This tool is also suitable for education: for example, QR codes can be attached to historical buildings and link people to websites where relevant information is provided. This also applies to public art works, urban routes, touristic attractions or civic campaigns. Basically, QR codes can serve as detailed information transmitters attached to any relevant object from the public space.

[9] http://www.timessquarenyc.org/index.aspx

[10] Tesco is a large retail market chaine

Interactive displays are some of the most commonly used ICT tools to "broadcast" knowledge and information. They are often used in relation with touristic activities and attractions, in order to transmit information regarding local history and culture. From interactive maps indicating the position of various points of interest and their description to simple broadcasting tools, the interactive displays have a wide range of utilities when it comes to education in public space.

Generally, it is advisable to use educational ICTs tools in places where people relax, wait and/or meet other people, circumstances that ensure a more receptive audience. In order to deliver the information effectively, the process has to be subtle, and the message has to be easy to understand and non-intrusive. This is why digital screens designed for educational purposes should not be too large, too bright or to have sound volume.

All the examples above include subtle ways to disseminate information and messages, therefore educating the audience. However, education in public spaces can also be achieved by offering people the opportunity to access knowledge and information. In terms of the Internet access, one can indentify two major issues[11]: (1) physical access, namely the lack of wireless networks in a specific area and (2) the lack of knowledge regarding the use of new technologies. These matters can be tackled, for example, by introducing IT tools in community centers – public or semi-public spaces meant to increase the interaction between the community members.

For example, neighbourhood community centers are very popular structures in Germany and offer several services for communities depending on their needs. I myself had the first contact with the Internet in such a center in 1998. Education is one of the main purposes of these centers, being provided through seminars or classes. Some of the classes aim to acquaint people, especially older generations, with the use of Internet and ICTs tools. Thus, community members learn for free new communication and technical skills, on the one hand, and get to use and enjoy ICTs in public spaces, on the other.

In conclusion, one can use a diverse toolbox for education in public space: digital screens for showcasing general knowledge, interactive screens for information and location regarding specific objects and points of interest, QR-codes as shortcuts to information and educational resources.

(3) Planning and Design

The quality of planning and design has always represented one of the key factors of success or failure of public spaces. Nowadays, ICTs tools allow us to easier model architectural proposals, undertake better and more diverse analysis of the urban context and, last but not least, better communicate with communities and users of public spaces. A large amount of software products allow modelling concepts and can show virtual prototypes in a very realistic form. Drawing, sketching and graphic representations are made much easier, while the complexity of the generated models is increasing. Parametric architecture is one of the new computer-related trends already influencing the design of public spaces. New software products, as well as the development of 3D printing, support this trend.

In Romania, students and graduates of the Ion Mincu Architecture and Urban Planning University started organizing workshops and undertaking parametric architecture projects.

For example, the workshop *Questionable Traditions – Parametric Design and 1:1 Digital Fabrication Methods*, organized by T_A_I research group and the Students' Association resulted in a built object with both aesthetical and functional purpose. It was showcased in the public space during *Street Delivery* – an event promoting urban culture and cultural use of urban space (Fig. 2). The object drew the attention of people passing by, but unfortunately few of them understood its utility – people could sit and lie on it or even hide inside it. The object was mainly used by children.

In terms of planning, new technologies allow us to better analyze the urban context, the use of urban (public) space and, in some cases, to predict its development (through simulations). New and more complex analysis extends the plan-

Fig. 2. Hexigloo – parametric architecture in a public space at the Street Delivery event Bucharest. *Source:* http://tailab.files.wordpress.com/2011/10/img_1991.jpg

[11] In some countries censorship is also an issue

ning process, on the one hand, and significantly contributes to the improvement of public spaces' quality and management, on the other. William H. Whyte's *The Social Life of Small Urban Spaces* was one of the first documentaries studying in detail the way U.S public spaces were used. Considering the project was developed in the early 1970's, the technologies involved were quite simple and consisted primarily of surveillance cameras. The study analyzed behaviours in public spaces and identified the places people enjoyed mostly, the activities they chose to undertake in a public space, the way they related to each other and even the way climate influences the use of public space. In this context, surveillance cameras seem a good tool for analysis. However, they often raise complaints from citizens who feel their privacy is being threatened. Therefore, when it comes to public space, the use of cameras is limited to crime prevention and ensuring public safety. Another example of new analysis tools for public spaces was developed by UCL in collaboration with *Space Syntax*[12]. It consists of software for the in-depth analysis of accessibility and movement intensity in urban spaces, used for studying the routes people choose within the city. The software is used in various cities all over the globe, in order to better develop the public spaces network. *Space Syntax* is also present in Romania, where it carried out several research projects, such as *The Common Characteristics of Romanian Public Spaces*, using their specific analysis tools in order to evaluate the quality, usability, similarities and differences of several public spaces across the country.

Flux Space is a concept based on a 3D rendering of the surrounding space. It was first tested in a New York art gallery, and, afterwards, extended to the public realm. Through video projections, the rendering overlaps the real space it copied, and sensors help transforming the rendering depending on how people interact with the real space. Every movement transforms the surrounding layout, creating either visual or sound effects. The idea was to raise awareness on the fact that each action one undertakes influences the urban environment. The high amount of information generated by the sensors can also be used to analyze human behaviour within the space. *Flux Space* can be considered another experimental ICTs project with a potentially significant impact on the future development of complex analysis of human behaviour and interactive installations.

One more ICTs tools category addresses communication between professionals, local administration and local communities. A new, innovative approach in this sense is crowdsourcing. In 2008, Daren C. Brabham defines the concept of Crowdsourcing as 'an online, distributed problem-solving and production model'[13]. In the context of urban systems, crowdsourcing can be translated as mapping of issues, values, ideas and resources. It involves an interactive online environment, where community members help decision makers, financial bodies and project developers to tackle urban issues by locating them on a map, by expressing opinions, wishes and expectations. Ushahidi is such an example, using various layers to showcase urban issues – for example, interactive crime maps, natural disaster maps, etc. *Fix my Street* has a similar approach, using crowdsourcing to map and report, for example, damaged sidewalks, in order to inform the local administration on the matters of its competence (Fig. 3).

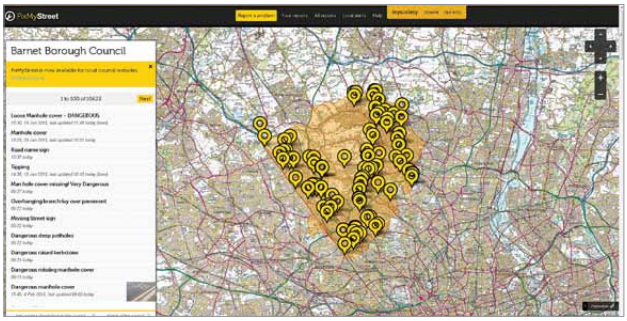

Fig. 3. *Fix my Street* in Barnet Borough Council.
Source: http://www.fixmystreet.com/reports/Barnet

This rather simple tool has a great impact on community and fosters the community's involvement in urban matters and development of public spaces.

By encouraging people to simply report and maybe solve problems of public spaces they become more responsible, and, ideally, attached to the public space. This process has shown positive results regarding both community involvement in maintaining public spaces and the dialogue between citizens and administration.

(4) Games and Entertainment

Playfulness is an important criterion that many public spaces miss. The necessity for entertainment is always present and new technologies can be used in order to creatively fulfil it. In this case, the most commonly used tools are sensors, projections and sound devices. The *21 Swings* project presented above is a good example, but it is not the only one. Also playfulness in public spaces is described as a new urban trend of 2012 with high potential for further evolution, by the famous blog *Popupcity*[14].

[12] http://www.spacesyntax.com/

[13] Brabham, Daren. 2008.. Crowdsourcing as a Model for Problem Solving: An Introduction and Cases.

[14] http://popupcity.net/

An example of creative sensors use, *Sonic Waterfalls*, designed and built by Yitzhak Simon, is based on a concept already implemented around the globe: a waterfall that stops whenever people try to touch it or cross it. The reaction is obtained by using a motion sensor in order to stop the water flow. A similar object was created in the *Digital Mile* project in Zaragoza, which will be described further below.

In case of Romania, one can find several interactive fountains. For example, the one in Sibiu's central square, a simple installation generating vertical jets of water on a random timer, is highly appreciated, especially by children. The randomness with which the water jets spawn increases the installation's fun factor (Fig. 4).

Fig. 4. Interactive fountain in Piața Mare-Sibiu. *Source:* http://www.calatoriilasingular.ro/wp-content/uploads/2012/08/Sibiu-Piata-Mare-fantani.jpg

Projections on buildings, pavement or specific objects raise attention by changing the area's image – colours, dynamics, etc. and can be used to generate interactive games in public spaces. Such temporary interventions can be seen in Bucharest's metro stations or malls (Fig. 5).

Popular games like soccer or hockey are transposed into interactive digital games by projecting an interactive ball or puck on the ground, over a painted or projected game field. Similarly to most playful installations in public spaces, children are the ones who enjoy and use them the most.

Playfulness can also be achieved through merging sensors and lightning. Even though this combination is mostly used for street lightning, it can be adjusted in order to obtain interactive installations. They can consist of pieces of pavement that lightens when one steps on them, illuminated pieces of urban furniture that change their colour based on specific ways people use them, etc. For example, new media artist Maria Stukoff used digital screens in order to create a unique Bluetooth game system: a large digital screen reacts to Bluetooth devices around it by displaying a flower for each device. When two or more people with an active Bluetooth connection meet and interact, the flowers on the digital screen grow; if people just pass by, their flowers simply fade away. It is a simple playful intervention reminding people about the beauty of nature and encouraging human interaction. Similarly, sound devices can also make playful public spaces when combined with the use of sensors. They can generate specific notes or sounds when sensors are activated, as shown by the *21 Swing* project.

Fig. 5. Interactive game "Universitate" in a metro station, Bucharest[15]. *Source:* http://metropotam.ro/La-zi/Sotron-muzical-si-colaborativ-in-Pasajul-de-la-Universitate-art7258325741/

In conclusion, playfulness is an important quality of public spaces, attracting people to the public realm and encouraging them to use it, on the one hand, and to interact to each other, on the other.

Playfulness can also be achieved through merging sensors and lightning. Even though this combination is mostly used for street lightning, it can be adjusted in order to obtain interactive installations. They can consist of pieces of pavement that lightens when one steps on them, illuminated pieces of urban furniture that change their colour based on specific ways people use them, etc. For example, new media artist Maria Stukoff used digital screens in order to create a unique Bluetooth game system: a large digital screen reacts to Bluetooth devices around it by displaying a flower for each device. When two or more people with an active Bluetooth connection meet and interact, the flowers on the digital screen grow; if people just pass by, their flowers simply fade away. It is a simple playful intervention reminding people about the beauty of nature and encouraging human interaction. Similarly, sound devices can also make playful public spaces when combined with the use of

[15] The projection represents a romanian traditional game called "șotron". By using kinect virtual hit boxes the gamefield was conected with sound generators. In this regard specific sounds resonate whenever someone steps on the gamefield, if more people are using it at the same time the sound gets more complex.

sensors. They can generate specific notes or sounds when sensors are activated, as shown by the *21 Swing* project. In conclusion, playfulness is an important quality of public spaces, attracting people to the public realm and encouraging them to use it, on the one hand, and to interact to each other, on the other.

(5) Information and Communication

A major reason for using public spaces throughout history was the opportunity to get updated with the latest news, interact and communicate with others. Nowadays, public spaces offer a wide range of information, from schedules of public transportation lines to daily news. Most commonly, the information refers to: events, news, urban mobility and advertisement. In case of urban mobility, ICTs tools are often used in order to provide location services, to keep passengers informed and to make traffic flows more efficient. For example, location and numbers of free parking places are presented on digital screens, same as bus or metro schedules, intermodality information and sharing opportunities (bike or car). Events and news can be either transmitted by digital screens or made available to users throughout wireless networks.

Communication is a key activity of every public space, but it has changed dramatically, especially over the last years, in relation to emergence of social media platforms. The most important negative effect of the new ICTs tools, especially smart phones and tablets, on public space and communities is related to an individual's isolation. People using these devices in public spaces are focused on the little screens, losing touch with the surrounding environment and people. How often did you see people stumbling while reading something on their smart phone? This type of behaviour also discourages human interaction in the physical environment. However, the virtual public space (Internet) and GPS-based technologies offer alternatives and foster online interaction. Social media platforms like Facebook and Foursquare, in particular, are often used in order to show their user location. For example, Foursquare allows one to look for friends or acquaintances nearby. Also, certain wireless networks are programmed to announce users if there are any friends or people they might know in the neighbourhood (Fig. 6).

Although the location-based applications are becoming more and more successful, this is just the beginning of the development of a virtual georeferenced environment fostering interaction. Important steps are still to be made, mainly because at the moment data protection issues impose some limits. For example, Foursquare cannot present complete data about the friends' location, as they first have to

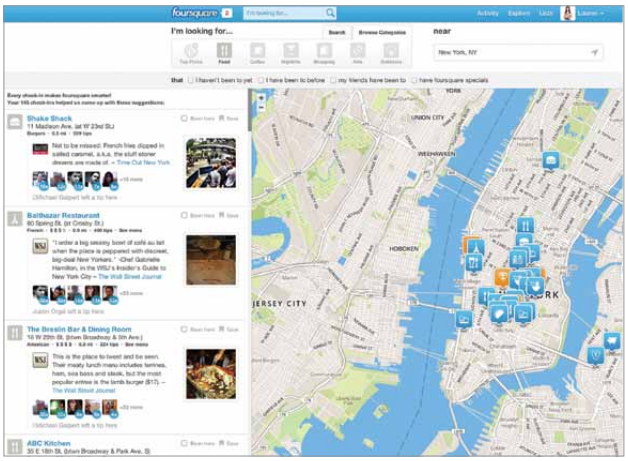

Fig. 6. Example of Foursquare application.
Source: http://allthingsd.com/files/2012/09/FoursquarePic4.jpg

accept to be "seen" and to share their location. However, social media plays an important role in the general perception of public spaces (and not only), offering users not only the possibility to tag themselves at specific locations, but also to select favourites and post comments providing feedback and impressions. Therefore, when it comes to a public space, social networks work like an independent advertisement system for places, based on community feedback.

To conclude, public space's abilities to provide information and foster communication represent key factors for its success and, nevertheless, they can be significantly improved by the use of ICTs.

Is Augmented Reality a New Way of Perceiving Public Space?

Augmented reality (AR) represents a new trend in ICTs. It basically consists of the possibility of digital devices to modify the perception of reality. In AR, the view over surroundings is filtered by a digital device, allowing the user to adjust the way the reality is perceived. This interactive operating model allows people to customize public spaces according to their own preferences. Specific head-worn devices, eyeglasses, contact lenses, virtual retinal displays or handheld displays (smart phones or tablets) are the tools used to render augmented reality.

Shadow City is a relevant example of a video game using augmented reality (AR). It is a smart phone application, giving the user a mystical role and allowing him (or her) to perform spells and interact with virtual creatures while strolling through the city. The spells and creatures are overlapping the real background.

Layar is one of the first companies that support programmers to develop augmented reality mobile applications based on their own software (*Layar*). The

Fig. 7. *Layar* application demo for Animest Bucharest 2011. *Source:* http://www.youtube.com/watch?v=PcIkhP2Zs5E

Anim'est, famous annual international animation film festival held in Bucharest, used a layer in the *Layar* in order to engage fans in a competition. The mission was to find a certain number of sheep (the festival's emblem) spread throughout the city. By using the application, the user could see a radar-like screen showing the sheep's locations. This kind of games encourages users to perceive and explore the city in a different way, while also keeping them entertained (Fig. 7).

Artvertiser is an AR application designed to replace large advertising screens in cities with artworks. It is designed to recognize advertisements and to immediately replace them on the smartphone's screen with selected artworks. The idea is to raise questions regarding the contradiction between advertising and art in public spaces, as Julian Oliver states: 'What can and cannot be written on the surface of our cities'. A similar initiative takes place in Germany, where artists (generally graffiti artists) replace QR codes of advertisements with the new QRs linking to their websites or portfolios. Virtually rebuilding cities or showcasing history is also an area under development using AR technologies. For example, historic buildings, events or environments can be positioned on an AR layer, creating the opportunity for people to experience the cities and public spaces like they were many years ago.

All these examples show that AR has a high potential to enhance the attractiveness of public spaces, to foster new activities, as well as social interaction. However, it is still a new technology and its impact on public space and community life has not yet been tested.

The Integrated Use of ICTs in Urban Projects

ICTs are already considered a part of future urban planning, and there are various new projects and developments integrating them from the very beginning. So-called smart cities aim to become more efficient, transparent and sustainable by using new technologies.

Cities like Toronto, London or Berlin included ICTs at the core of their development strategies. On the other hand, several new cities were built from the scratch, using smart cities principles[16] and high-tech technologies (Masdar, Songdo). To some extent, the way these cities will function and develop will shape the future relationship between a city and ICTs.

Several smaller-scale experiments are being developed in the field, such as Zaragoza's *Digital Mile* project (Fig. 8). Thanks to the building of a new high speed rail, the commuting time to Barcelona and Madrid greatly decreased, which increased Zaragoza's attractiveness for new investments. A new railway station was built in the western part of the city and the rails connecting it with the old city station were relocated in the underground. In order to valorize the newly achieved development potential and land resources of the city, the City Council decided to start an urban regeneration project based on intelligent technologies. Project called the *Digital Mile* consists of a new pedestrian area, surrounded by real estate developments, connecting the two railway stations (old and new). Various ICTs tools were used in order to make the public space more interactive, attractive and livable. All five above-mentioned categories of ICTs tools and interventions were included.

Fig. 8. The Water Wall at Zaragoza's *Digital Mile.* *Source:* http://www.milladigital.es/ingles/09_urbanDigital.php

[16] Smart Cities use ICTs as tools to rationalize resources, raise access to various information and generally increase the quality of life. Mostly Smart Cities apply ICT tools in 6 areas: economy, living, mobility, environment, people and governance. (http://en.wikipedia.org/wiki/Smart_city)

Playfulness is illustrated by *The Water Wall*, an elevated water pipe that crosses the pedestrian area and generates a waterfall. Sensors allow the interaction between people and installation, with valves closing when someone tries to pass the wall. Trough fast opening and closing processes, the valves can even generate images on the water wall. The pavement is designed to take advantage of the different levels of the leaking water, changing its appearance.

Sensors in the pavement, together with video cameras, track the way people move within the public space and collect valuable data that can be analyzed and used for further interventions and maintenance. For example, every time someone steps on a piece of pavement, this will emit more light. Thus, the highlighted areas are those that support more movement. Smart bus stations act as information points, providing information on urban mobility, (busses' location, schedule, etc.) and allowing travellers to calculate the shortest route to their destination. People can also use the walls of the stations as digital drawing boards, enhancing their creativity.

Similarly to WAG, the *Digital Mile* Zaragoza can be considered a pioneer project in terms of using new technologies within the public realm, and has the potential to generate a significant impact on urban planning theories and principles. It will also change citizens' views on ICTs and promote their use on a larger scale. However, the new urban interventions based on ICTs still have to generate and provide enough data to prove their benefit for the development of urban environment.

Conclusions

Starting with the name – the Information and Communication Technologies – the subject's relevance to the public space is clearly understandable. Information and communication are two essential factors of interest and attraction specific to urban environments, and, at the same time, they represent key-factors for the progress of the city, as bringing people together and supporting exchange of ideas generate development (Edward Glaeser, "Triumph of the city"). This also applies to the public space, which represents nothing more than a platform (environment and context) for social contact and information flows.

Nowadays, ICTs represent a part of everyday life, helping people to receive the latest news, to keep track of their friends and relatives and to make informed decisions. A wide range of networks, applications, software and hardware support the daily routine, and, each second, a huge amount of data is transformed to relevant information. The creation of hotspots providing wireless Internet access encouraged the return to the public space, for both work and recreation. In addition, social media has a high potential for encouraging social interaction, in virtual, as well as real-life public spaces, thus connecting them.

The use of ICTs (wireless networks, software and hardware products) can significantly enhance public space, by creating access points to information and supporting education. In this sense, augmented reality can complete the toolbox, playing a significant role in engaging users and personalizing the urban experience.

The development of ICTs tools and the mobility of modern devices also bring new demands regarding urban design and the way public spaces are being planned. Namely, public spaces have to provide resources for proper functioning of gadgets (for example, electricity, plugs, etc.), they have to be easily adjustable in order to accommodate different activities, and have to encourage the shift of more and more activities from indoors to outdoors. Apart from the physical infrastructure, in order to successfully integrate ICTs in the urban life, the community has to be trained and prepared to embrace the change.

In case of Romania, the increase in the number of employees in ICTs and the liberalization of communication markets were the catalysts that prompted the development of a large amount of hardware and software products. Nowadays[17] Romania ranks the 2nd in the world when it comes to the Internet speed (download speed). It also benefits from high quality IT products and technologies aiming to improve the quality, efficiency and sustainability of cities. This translates into the public realm, where several ICTs interventions were initiated. Romanian cities can be considered relatively up to date as far as the use of ICTs is concerned, but there still is a large gap between the tech-savvy (usually young) users and people refusing the contact with new technologies. Therefore, similarly to any other field, education will represent the main factor deciding the success or failure of ICTs as part of the urban life and space.

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IKT KAIP VIEŠŲJŲ ERDVIŲ PATRAUKLUMO DIDINIMO PRIEMONĖ

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Santrauka

Pastaruoju metu IKT (informacijos ir komunikavimo technologijos) yra vienas pagrindinių miestų vystymui įtaką darančių veiksnių. Todėl viešosios erdvės – svarbus miestų posistemis – formuojamos veikiant naujosioms technologijoms. Šiame straipsnyje siekiama pristatyti būdus, kaip įvairiomis IKT priemonėmis pakelti viešųjų erdvių patrauklumą ir konkurencingumą, prieštaraujant požiūriams, teigiantiems, kad naujosios technologijos skatina žmonių atsiskyrimą. Pagrindinis dėmesys skiriamas galimybėms atverti į viešumą veiklas, įprastai laikomas privačiomis. Viešosiose erdvėse IKT priemonės daugiausia galėtų būti išnaudojamos lavinimui, informavimui, meninei veiklai ir pramogoms. Remiantis šiuo skirstymu analizuojami ir pristatomi įvairūs IKT naudojimo viešosiose erdvėse pavyzdžiai ir siūlymai: „Skaitmeninė mylia" Saragosoje, „Debesys" Atėnuose, „Flux erdvė" ir kiti. Straipsnyje nuolat lyginamas patyrimas Rumunijoje ir patyrimas pasauliniu mastu, siekiant pabrėžti viešųjų erdvių Rumunijoje konkurencingumo potencialą, naudojant įvairias IKT priemones.

Reikšminiai žodžiai: viešosios erdvės, IKT (informacijos ir komunikavimo technologijos), skaitmeniniai įrankiai, sąveika.