Social research for WAND and new media adoption on a local scale

Arianna Bassoli, Irene Quinn, Mark Agius, Andrew Moran, Valentina Nisi and Paolo Dini
Dynamic Interactions Group
Media Lab Europe
arianna@mle.media.mit.edu, paolo@mle.media.mit.edu

Christina Quinlan
School of Communications
Dublin City University

ABSTRACT
The WAND (Wireless Ad hoc Network for Dublin) project represents an attempt to understand how new ICT, Information and Communication Technologies, and applications can be optimised according to the socio-economic and cultural characteristics of the local area in which they are introduced. The idea is to use social research methods during the innovation process in order to understand and to involve future users from the initial phase of the technology development. We believe that the user space, regarded here as a local population formed by different communities, can play an important role in the innovation process, especially through socio-cultural emergent phenomena. The paper presents these ideas at the level of a conceptual model, and then reports on the social research we conducted in the Summer of 2002 in Dublin to inform the application development process for the WAND network.

Keywords
Wireless, ad hoc, 802.11b, ethnography

INTRODUCTION
The WAND project, started in February 2002, is a collaboration between the Dynamic Interactions group at Media Lab Europe and the Distributed Systems Group, Computer Science Department, Trinity College Dublin. WAND intends to research from many perspectives an ad hoc wireless communication system based on the IEEE 802.11b Standard. The network, in the process of being implemented, will cover part of the city centre of Dublin, from Thomas St, where the Digital Hub and Media Lab Europe are located, to Trinity College Dublin, passing through Dame St. The technology used, 802.11b, is a medium-range standard for networking devices wirelessly. It allows handhelds, laptops, PCs and other wireless-enabled devices exchange information at up to 11-megabits per second and at distances of few hundred meters. "An *ad hoc* network is a collection of wireless mobile hosts forming a temporary network without the aid of any established infrastructure or centralized administration" [1]. Due to the short range of each mobile host's wireless transmission, a certain density of nodes is needed in order for the messages to be delivered. Since today 802.11b wireless devices are not very common, especially on mobile devices (i.e. laptops/ PDAs), it is not easy to test ad hoc applications in the real world and a dedicated testbed had to be constructed. In order to be able to test distributed applications on a meaningful scale (at least 20 nodes), we decided to base the WAND network on both fixed and mobile nodes since the fixed nodes would provide a minimum density of hosts to facilitate connectivity. We are fully aware that other ad hoc networks have been set up elsewhere [2]. The innovative aspect of our research is not so much in the technology but, rather, in the investigation of its coupling to socio-cultural and economic dynamics through social research and applications research. This paper addresses the social research part of our work.

It would be limiting to consider WAND as a small-scale test-bed for a well-defined number of applications. It is better to regard its development as completely unpredictable and driven, in the future, by the market and by political and economic decisions. WAND could in fact be integrated with other wireless networks based on 802.11b, currently in the process of being installed in Dublin by various companies and institutions. It could become a fully operating meta-network, which covers the whole city and in which all kinds of applications are developed. These may include information for tourists, e-commerce, entertainment, instant messaging and other common applications targeted to specific social groups. A possible mistake could be to consider these wireless networks as competitive to the existing ones or to other kinds of wireless networks. The future will probably see an integration of all of them, used for various purposes in different times of the day. The challenge in this context will be to find a suitable integration model.

WAND AND ITS THEORETICAL FRAMEWORK
Innovation and user space
We decided to investigate a relatively new technology, broadband wireless 802.11b, because we believe it has potential for development, and because at the present stage this development is still to be defined. We are working toward an *incremental innovation phase*:

> "Innovation can take many forms, ranging from radical innovation that creates wholly new products, processes and services to incremental innovations that improve upon existing offerings in a more modest way. Although attention often focuses on the initial production of new products, processes or services, incremental innovation and technology diffusion […] provide equally important economic benefits over the long term." [3]

We chose to focus of 802.11b also because it is a technology that implies the use of computer-based devices, which allow the implementation of a wide range of multimedia applications, and because it is suitable for the creation of local networks. The focus of our research is to explore how successful digital media adoption could happen on a local scale. We believe that a good starting point to reach this goal is to include the *user space* in the innovation process. Our approach toward the concept of innovation takes into consideration recent trends in the literature concerning the topic, which highlight:

- The successful interdependence of economic, political, and cultural factors at a regional level [4]
- The importance of cooperation and the creation of networks among the actors involved in the innovation [5]
- The importance of knowledge (explicit and tacit) and of social capital [6]
- The relevance of digital media and ICT networks. [7]

Even though in the literature the collaboration among different actors, together with the creation of networks, is regarded as valuable for improving the innovation process, we believe that in the digital media field this is not sufficient. What we call the *user space* is rarely considered as an important actor in the innovation process, while we think this is an important condition to obtain a successful adoption of new media. To involve the *user space* means both to understand more the socio-cultural characteristics of a society while designing or introducing new media and applications, and to give the possibility to the future users to contribute to this process directly or indirectly. We believe that this could lead to the creation of technologies and applications more adapted to the actual needs and problems of a population, which would then benefit more from the use of the digital media. Socio-cultural phenomena, which already happen at a community level, could then be amplified and gain visibility through digital media, and become a new driving force for future innovations. An important issue is the necessity to include all the social spheres in the technology adoption, in order to have them all represented during the innovation process.

Through the WAND project, therefore, we are trying to develop a methodology for new media adoption, using social research as a way to involve the user space in the process of introducing a relatively new technology and designing new applications for it.

Social research for new media adoption

Social research has only recently been considered relevant to understand how technology adoption could happen inside a specific society, and how industry could design new products that are really relevant for social needs. So far social research in the communication field has studied the usage of media by people, and the way in which media have contributed to socio-cultural changes [8]. Our intention is to use social research also during the innovation process. In particular, we are interested in applying a qualitative approach; that is, a set of methods used to understand in-depth the social issues defined by the research. We believe that the use of qualitative methods provides:

- The development of a better understanding of the socio-cultural dynamics of the area considered for the technological introduction.
- The identification of social spheres that could become excluded, in the future, from the benefits of innovation.
- The opportunity to involve indirectly the *user space* in the innovation process.
- The creation of a communication channel between *industry* and *user space*, which can lead to the development of appropriate applications.

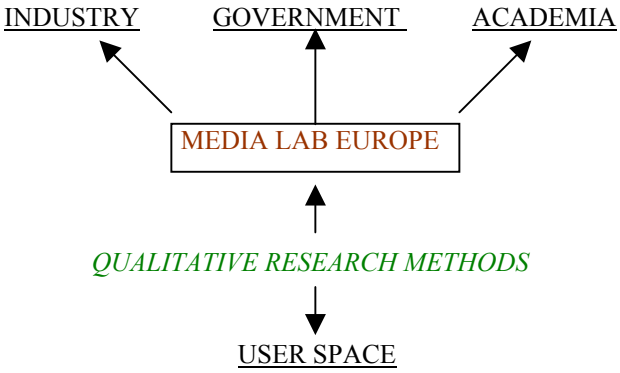
The relevance of social research during the innovation process emerged during the OECD workshop on "Re-inventing the Social Sciences", held in Tokyo from the 29 Nov-2 Dec 2000. "The discussion in the working group started from the assumption that the social sciences were faced with the challenge of strengthening society's capacity to generate, absorb and implement innovative processes. The following major observations came out of the discussion:

- The social sciences play an important role in increasing the understanding of the social practices and economic realities, which underlie innovation processes.
- The social sciences have a role in making innovation processes understood by those who are most affected—the users.
- The social sciences can reduce the uncertainties related to innovation processes.
- The challenge faced by the social sciences is to ensure that their research becomes interactive and multidisciplinary, and that it focuses on "what drives people".
- The gap between socio-economic and technological research has to be bridged. Social scientists must have the courage to intervene. Joint research agendas might be established.
- Communication at all levels has to be improved.
- Multidisciplinarity is required " [9]

The focus of our research is the user space; with this concept we mean the sum of all the *physical* communities existing in a specific place. The concept of *user* is used for convenience, in relation to the fact that we are studying people who will adopt and use in the future the technology that is developed through the innovation process. However it is the concept of community that is more relevant in terms of social research.

Media Lab Europe provides an opportunity to create a bridge between the private and the public/community sector and, in terms of research, between industry and

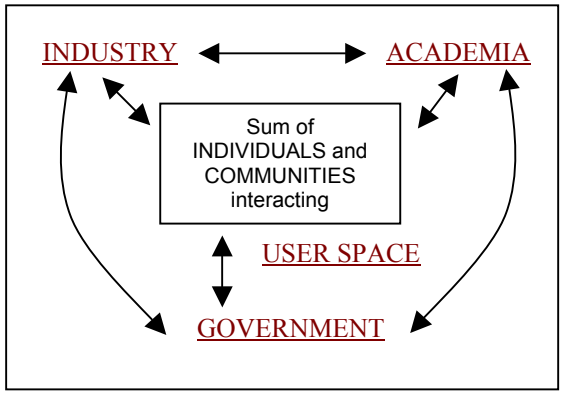
academia. This brings important insights, such as the possibility to integrate in a single project both a theoretical and abstract analysis of the subject analysed and its practical applications.



While the model that we are proposing could be applied by industry and other research centres, the results of each research effort, given the qualitative nature of the research, are specific to the area considered and cannot be generalised. A fundamental element of our research is our endeavour to translate the findings of the social research in terms of potential products or applications. The link is not yet obvious or easy to create.

Positive feedback and relevance of the local scale

If the methodology we are proposing is successful and digital media adoption is optimised, future innovation processes could also be improved through the acknowledgement of the importance of user space and the use of digital media to support the communication and information/knowledge flow among all the actors of innovation. This ideal situation can be summarised as follows:



LOCAL SCALE

↔ *Bi-directional communication and information/knowledge flow among the actors involved in the innovation process at a local level. It can refer to face-to-face interactions as well as to mediated interactions. The role of Digital Media is to optimise the mediated interactions.*

In this model all the actors can have an active role in the innovation processes, depending on their own social function and potential. If this situation is reached, the role of social research in the innovation process could be minimised. It is important to underscore some issues related to this model:

- It can refer not only to innovation, but in general to the role a successful adoption of new technologies plays in supporting communication among different social spheres.
- This model highlights the fact that the user space is included in the innovation process.
- Digital media are not considered as a solution to socio-economic dysfunctions, but as tools for enhanced performance on specific issues (communication, political participation, productivity, knowledge flow, personal self-esteem, creation of communities etc).
- Universality of access is a fundamental condition for this model to work.
- Computer literacy is an important aspect.
- ICT networks may result from the integration of different technologies, both wired and wireless.
- This model does not focus, for the moment, on the creation and maintenance of ICT networks.
- An important component missing is, at this stage, the relationship between the local and the global dimension, and the external influences involved in the innovation processes.
- Communication and information/knowledge flow happening between different actors takes different forms, needs different applications, and often requires various levels of *translation.*

The optimisation of digital media does not imply, in fact, that the actors involved will be able to communicate directly and easily. They all have different priorities, schedules, interests and communication modalities; this means that the interpretation of trends, behaviours and meanings has to be carried on in parallel and in different ways by all the actors. Industry, for example, will still have to interpret social and cultural trends happening at the user space level in order to create suitable and successful new products. This process would nevertheless become easier as the user space itself will be able to express and make more visible these trends through digital media. In the same way the optimisation of communication channels between the government and the citizens won't be able to solve radical political problems, but could make politicians more aware of certain social needs or dysfunctions.

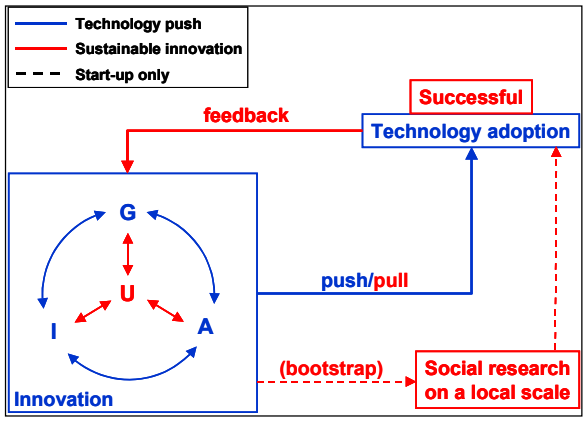
An important focus of the methodology we are proposing is the concentration of the research effort at a local scale. The importance that recent innovation theories give to the concept of *local proximity* and *regional clusters* has already been mentioned. Also in terms of media adoption some empirical evidence shows:

- The success of web-based initiatives at a local level [10]
- The success of localised strategies in mass media penetration [11]

- The support that space-limited broadband connections provide for to the creation and maintenance of social networks [12]

In light of these trends, we believe that one of the possible ways to optimise the role of new media in a specific society, and foster improved innovation processes, is to implement a localised, and possibly closed, ICT network. In such a network ad hoc applications, services and communication tools would be developed in accordance with the characteristics of a specific socio-economic and cultural context. This should not to be considered as an alternative to the Internet, but complementary to it.

The following figure summarises all the ideas discussed above.



SOCIAL RESEARCH FOR WAND [13]

The theoretical framework described is a very abstract simplification of a set of complex processes that in reality involve many different variables. To test in part the feasibility of this model, we decided to design a project which could include the various phases of the methodology. As a first step, we used social research as an attempt to see how far we can go in designing new applications more adapted to a local reality in order to foster a successful digital media adoption.

The aim of the social research is to study the communities of Thomas St and Dame St, from Guinness's Brewery to Trinity College Dublin, with a view to exploring how they could use different types of wireless LAN networks. The idea is to bring in parallel an ethnographic study and the analysis of the technical aspects of a relatively new technology, which will probably develop during the next five to ten years. The research has four different objectives:

- To develop a knowledge of the area of the study
- To understand the level of technological penetration and usage patterns within the area
- To develop some understanding of how people experience the area and their technologies
- From this information to develop ideas for applications suitable for the WAND technology

The study is not meant to provide a comprehensive understanding of all the social dynamics of the area. The limited time we could devote to the social research (4 months) nonetheless allowed us to identify the main socio-cultural characteristics of the area studied and its communities. The results of this research constitute a starting point for the development of new applications, and are meant as well to stimulate further analysis of the trends we discovered.

Methodology

The social research on the WAND project was developed using an ethnographic methodology. The project is, in study of the physical space the wireless network will be implemented in. The study has been going on during the summer months of 2002, between June and October. Five researchers have been working on different aspects of the research.

We believe that ethnography is appropriate for this study because it goes beyond the analysis of the existing data about the place considered, and tries to describe the social dynamics underneath them. Qualitative research requires a personal involvement of the researchers in the social context analysed. Ethnographer examine the typologies of people who frequent a particular community or locale, the activities they accomplish there, the way they communicate, and the meanings they ascribe to the things they do [14]. The assumption behind the qualitative approach is that the population studied has an active role in defining the research by helping the researchers understand aspects and issues involved in the reality they try to describe. Another important assumption concerns the social reality itself, which is impossible to describe in objective terms but can only be analysed in terms of the meanings people give to it. This subjective view of reality supports the necessity for the immersion of the researchers in it, and highlights the importance of their personal interpretation of it. What is fixed in this research process is only the focus of the project itself and the objectives of it, which constitute the guidelines for the empirical data collection.

The ongoing feedback loop between researchers and the various communities analysed is perceived as an opportunity to develop interesting theories about the desirable technological development. The researcher has to bring to the level of abstraction the main concepts that come out from the conversations with people, and organise them in a coherent view related to the aim of the project. The presence here of a big and important community as the Liberties neighbourhood makes this study even more interesting in terms of findings, considering the richness of its history and the strength of its identity.

For the visual mapping of the area we used photography as a tool that allowed us to analyse some aspects that couldn't be perceived only through personal observation. Photography is sometimes used in social research as it is a powerful way to describe reality and to analyse the spatial environment in a more detached and analytical way [15].

A focus group was then organised in order to discuss with experts ideas for applications, starting from the findings of the ethnographic study. The focus group, often used in commercial market research, represented in this social research project an ancillary method that, integrated with the methodology described, provided an interpretative aid for the findings obtained [16]. The focus group here didn't mean to replicate the analysis conducted through the mapping and the in-depth interviews, but constituted an opportunity to bring forward the research on the side of the application development.

Methods

In order to develop a comprehensive understanding of the locale a triangulated approach was adopted to the collection of data. This triangulated approach facilitated the study of the locale and its communities from more than one perspective. The methods used were mapping, statistical, visual and technological, including a small survey; ethnographic interviewing, where groups within the locale which emerged from the mapping were interviewed and finally a focus group. The focus group was used to bring stakeholders in the technology and the project together in order to focus on the integration of the technology with the community, in terms of applications.

Visual mapping

The visual mapping consisted of drawing maps of the area and integrating them with images of significant occasions happening, of people frequenting different parts of the locale, and of the shops and businesses there. Through spending time in the area, we defined places of interest and categorised them according to the typology of people frequenting them. Photography, as mentioned, has been used as a research tool.

Statistical mapping

The statistical mapping consisted of analysing some of the existing data specific of the considered area. Concerning the local population demographic, the main source of the data was specifically gathered by the Dublin Inner City Partnership from their Baseline Data Report, collected from the 1996 Census of Population. We focused on the information specifically related to the Inner City of Dublin only.

Technological mapping

Data collected from the previous mentioned sources were compared to a survey we conducted. A total of 202 questionnaires were distributed to the target groups identified: teenagers (skaters), tourists, business people and people from the Liberties Market. Part of the survey was conducted inside the AIB Dame St branch, which constitutes a local "hub" of common interest.

Ethnographic interviews

As a result of the observation and the visual, statistical mapping, we defined five target groups for a series of non-directed ethnographic interviews: young people (skaters and students), commuters, people working in the area (and shop owners), tourists and representatives of Community Organisations. People were interviewed in different contexts, while performing their everyday activities, and were engaged in long conversations. During these conversations the researchers broadly guided the interviewees toward themes developed in the planning stage of the research and deemed to be central to the research.

Focus group

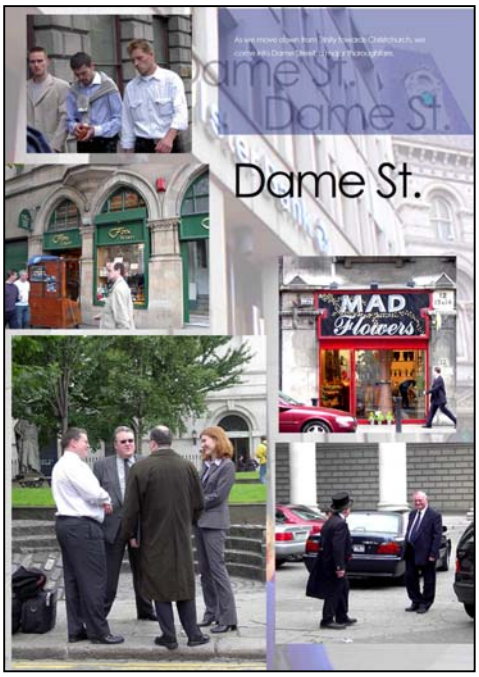
We organised one focus group for this project, inviting people able to give us insight about potential applications. Drawing on the expertise of the participants we wanted to explore the interaction and the interdependence between community and technology, with the aim of developing ideas for new applications.

Results

In this section part of the results of the social research for WAND will be presented. Unfortunately it is not possible here to summarise all the findings [13].

Visual mapping

The outcome of this research phase is a description of the area through maps and images. The images have been grouped in terms of the key places that we identified as related to specific communities. Dame St and Thomas St constitute for example two different images, and this helps to explain the demarcation between the two areas. Other sessions include: Central bank Square, Christ Church, and Dublin Corporation Amphitheatre. A detailed map of the area was then created, in which all the businesses of the area have been listed in relation to their physical presence. Graphics regarding pedestrian and vehicle traffic along the corridor have also been collated to the map.



Statistical mapping

Existing national and local statistics on technological penetration have been collected in this research phase

(computer/Internet/mobile phones penetration, e-commerce trends, existing operators and internet providers, etc.). Other demographic indexes have been taken into consideration, even though not directly related to technology. The process of understanding which demographic indexes could be relevant for the development of useful applications has continued through all the different phases of the research. Concerning the corridor analysed the following have been considered: population, age profile, social class (males and females), economic status, household structure, total population at work, nature of work, deprivation score, level of education. To give an example, preliminary population statistics taken from the Central Statistics Office for 2002 indicate that the population in the area immediately surrounding the Meath Street market, part of the Liberties community had grown 46.7% from 1996 to 2002. Statistics regarding the population density of the South-West Inner City Area show that there is a density of 17,067 per square mile, which is remarkable when compared to the national average of 135 people per square mile [17]. This confirms the importance of including the Liberties community in the technology adoption process. Other statistics considered concern tourism; data from the office of Tourism Dublin indicates that the number of tourists visiting Dublin has been increasing steadily at a average growth rate of 268,000 each year from 1995-1999, with the majority of those tourists coming from Britain.

Technological mapping

Together with the collection of existing statistical data about technological penetration in Ireland and in Dublin, we decided to conduct a small survey specific for the area covered by the WAND network. This was done for two principal reasons: to assess the degree of technological penetration and understanding of the people who inhabited these spaces, and to attempt to identify specific groups for further in-depth research.

The technological and statistical mapping portion of the project focused on a distinct corridor of activity which began at St. James' Gate on Thomas Street, then ran along Cornmarket High Street, Christchurch Place, Lord Edward Street, Dame Street, College Green, and finally ending at Trinity College.

The first group that we observed comprised of the young people who gather in and around the Central Bank area immediately off Dame St, known as a "skater" community. We conducted our surveys in two central locations just off Dame Street: one was in front of the Central Bank of Ireland and the second was in the Irish Film Centre square immediately behind the ARK Centre. A total of 22 questionnaires were completed on two separate days in July 2002.

The second group were tourists we met along the whole network corridor from Trinity College to the Guinness Brewery. The survey targeted at tourists was conducted immediately outside the entrance to Trinity College. We received a total of 25 complete questionnaires based on one day of surveying participants in front of Trinity College. We also surveyed the areas people were spending their time in while in Dublin, in order to ascertain the "hotspots" of local tourism. We chose four primary tourist attractions that ran along the path of the network: Trinity College, Dublin Castle, Christ Church Cathedral, and the Guinness Brewery. Our results showed a characteristic of polarizing tourist activity at either end of the geographic network space. The areas in between around Christ Church were sparsely populated with tourist activity.

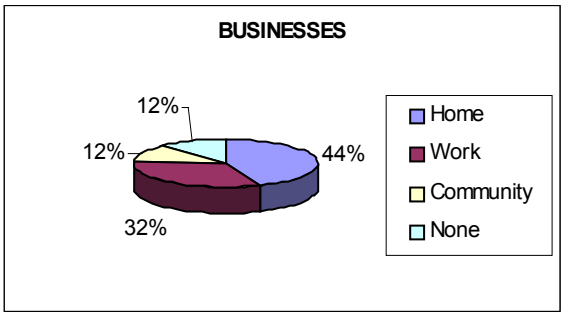
The third group was people in the Liberties Market area on Meath Street, which runs directly south just off Thomas Street. This group comprised of people who were shopping in stalls and shops in the market, as well as the shops and stalls owners themselves. Having a presence, and visible contact, with the community was important not only for the collection of valuable local data, but also for the greater mandate of the Digital Hub and of Media Lab Europe, which hopes to act as a cornerstone of technological development in the area. Thus, local acceptance is very important. A total of 26 questionnaires were compiled.

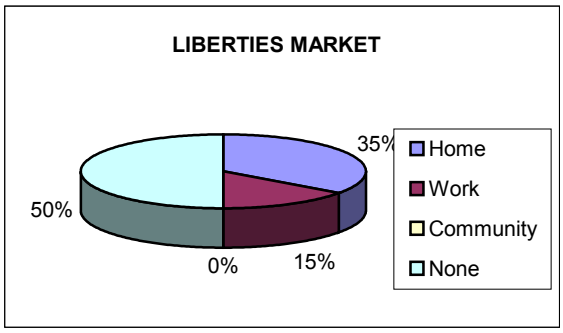
The survey conducted in one of the biggest branches of the AIB Bank, in Dame St., involved 70 questionnaires.

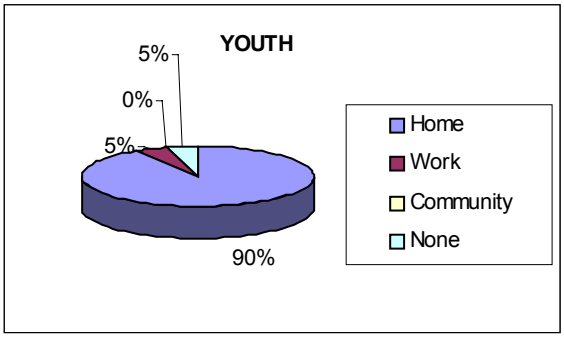
Finally, the fourth and largest group was taken from the businesses that line Thomas and Dame Streets, from employees and owners of the shops and businesses that run the entire length of the network area from the Guinness Brewery east to Trinity College. Part of the rationale for studying the local contexts of the area that the WAND will cover is to try and reach an understanding of the impact a wireless network like WAND could have on local community infrastructure development alongside economic application development. An interesting aspect of the separation between the two distinct areas is the nature of the businesses. Many of the businesses on Dame St are major corporations such as banks or government agencies like the British Tourist Board, or larger businesses that were involved in tourism such as Jury's Hotel. The businesses found on Thomas St are much smaller and target the local shopper. A total of 59 completed questionnaires were compiled over the period of June 25th through July 1st.

The questionnaires had some common questions (access to computer, Internet usage, access to mobile phone, knowledge about PDA, computer training received, and frequentation of the area); some specific questions were then added for each group considered (computer-based games played by the skaters, frequentation of the market for the Liberties). Concerning tourists, questions relative to technology usage were asked mainly in relation to their presence abroad (willingness to use Computers, Internet and mobile phones while travelling). We will show here part of the results of the survey.

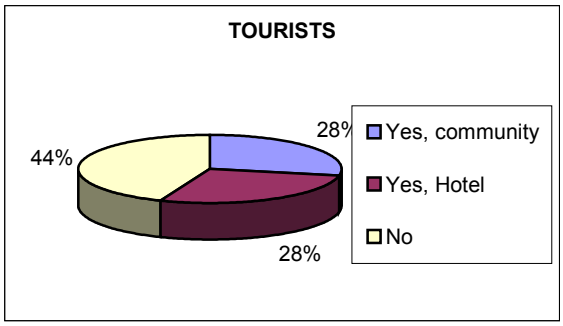
- I have access to a computer: Businesses: (88%); Youth (95.5%); Liberties Market (50%)



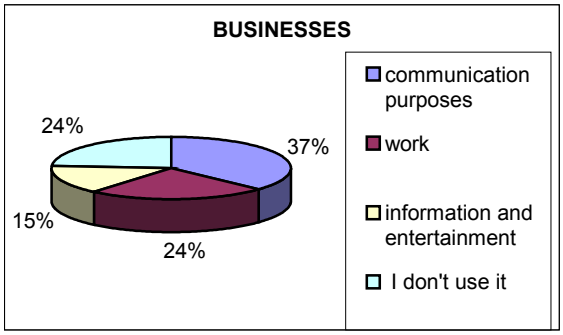


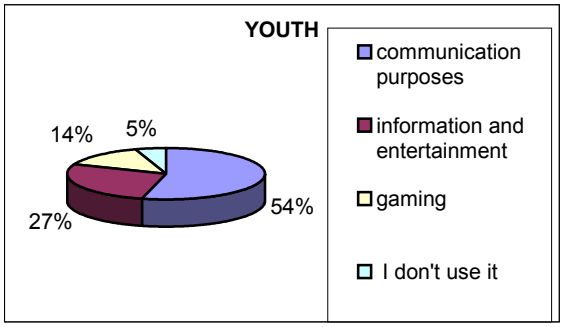


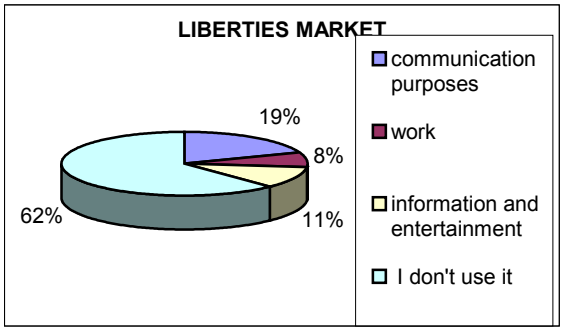
- I would like to use a computer while travelling:

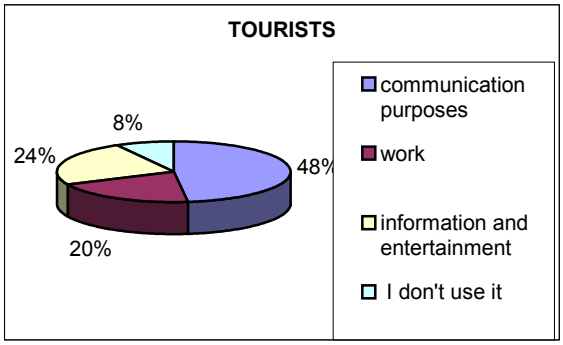


- I use the Internet: Businesses (76%); Youth (95%); Liberties Market (38%); Tourists (92%)









- I know what a PDA is: Businesses (12%); Youth (59%); Liberties Market (12%); Tourists (32%)

- I have received computer training: Businesses (59%); Youth (83%); Liberties Market (23%); Tourists (72%)

Ethnographic interviews

A total of 40 in-depth interviews were conducted among the target groups that were highlighted as more involved in the everyday life of the area: commuters (6), students (3), skaters (5), employees (8), shop owners (2), community organisations (6), indigenous (3), and tourists (7). People were engaged in conversation in their environment, and directed toward three main issues

identified as relevant for the research: technology usage (especially concerning computer/Internet and mobile phones), perception of the area/community, general problems and needs.

Through observation and mapping, the previous stages of the research, we identified the mentioned groups as the most important communities populating the area, considering the concept of community as "a group of people living together in one place" and "the condition of sharing or having certain attitudes and interests in common" [18]. An important assumption was anyway made regarding the fact that in all these groups interactions among the people are not necessarily happening, and that there are different degrees of community identity.

Youth

Skaters can be recognised as a tight and self-conscious community whose members meet on purpose, interact, and share not only interests but a life attitude. What emerged from the interviews is that there are norms and behavioural codes in this community; for example a certain way to dress. Skaters have also a strong sense of ownership of the place in which they meet (Central Bank Square), a particular slang and categories of people that they consider as "enemies". Most of them say in fact to have friction with the local Garda, and demonstrate negative feeling toward the so-called "skangers" [19]. Most of them are very confident with technologies, using especially mobile phone and computer-based games. Email and text messages appear to be the most used communication tools, even though their interaction is mostly based on face-to-face communication. They say that they often go to Central Bank Square even though they are not sure whom they might find there. They seem to be a good example of a "physical" community who use media in a functional way to maintain and sustain the community itself. An interesting element is the fact that they created their community in the downtown area even though most of them are not residents of the area. This draws on current research into virtual and online communities that people are drawn into communities not necessarily because of physical proximity, but rather through shared interests.

Students are also an important component of the "youth" frequenting the area, mainly because of the presence of two of the main colleges of the city, Trinity College Dublin and the national College of Art and Design. The students interviewed consider college as an "extended" community formed by a set of sub-groups. They use computers and the Internet mainly at college and for study purposes, but also for communication, through email and instant messengers. An interesting fact is the existence of institutionalised communities that meet inside the college and perform certain activities. In Trinity College, the most popular one seems to be "Netsoc", which requires a registration fee and often makes use of computers, especially for gaming purposes. This is again an example of a "physical" community in which the role of media is relevant and necessary for its maintenance. Students are frequently on Dame St., especially during lunch breaks, when they meet in the numerous sandwich places of the area or in the green spots whenever the weather is fine.

Community organisations and indigenous

Considering the presence in the area of one of the biggest and oldest communities in Dublin, the Liberties, some representatives of community organisations and stakeholders of local hubs (such as churches) were interviewed. Most of them are also living in the area, so they are highly involved in the future development of the area itself, also in terms of technological development. Their expertise concerning the problems and the needs of the Liberties community made them be not only important for our research, but useful sources of information in terms of further data gathering. In terms of statistics, their assessments help us define an index highlighting the problems and issues of the area. Most of the interviewees for example agree that drug was a massive issue, as were poverty and unemployment. Security is also considered a problem that could be addressed by innovative technological applications. The concern was for the safety not only of the people living in the area but also of those frequenting it. Urban planning is becoming a big issue as well, as the re-arrangement of flat complexes is redefining the nature of the proximity-based social networks, causing an increasing sense of isolation. The integration of The Digital Hub in the area, a public initiative of technological development, is also contributing to relevant changes in terms of urban planning. Even though one of the aims of this initiative is to help the development of the area, it is not often considered, at the moment, as positive by its inhabitants.

Community organisation representatives consider digital media as a potential solution to the communication problems that are rising, mainly due to the urban changes. They say there are still not enough public initiatives that address this problem, and that investment in technology penetration is still very low. Communication has to be improved not only among people living in the community, but also between the community itself and other categories of people frequenting the area. As history is an important component of the Liberties, community organisations are often thinking about applications that can make it relevant also for tourist; this could contribute to the economic development of the area. Computers are also seen as potentially useful in terms of education and a more equal access to employment. The community informants suggested using the confidence teenagers have with games and mobile phones to create computer-based learning applications.

Employees and shop owners

Businesses constitute an important component of the area analysed, mainly because the profoundly Dame St is an important street for the commercial city centre activity as much as Thomas St is for the Liberties community, and for the tourists visiting the Guinness Storehouse. The profoundly different nature of the businesses on Dame St compared to the ones on Thomas St has already been highlighted. This fact has emerged also from the

interviews where, in terms of technology usage and perception of the area, workers and shop owners responded in extremely different ways. In Dame St the presence of numerous offices and bank branches implies a massive use of computers and Internet-base applications. This is reflected in the fact that all of the employees interviewed (8), working on Dame St., use these technologies almost every day, especially for work purposes. They have very good relationships with computer-based technologies and mobile phones, even though their Internet usage seems to be mostly dictated by their profession.

On the contrary, the shop owners interviewed in Thomas St (2) don't use computers at all and they don't like using mobile phones. Computers are not necessary for their work, and they don't perceive any value in learning how to use them. There appeared to be prejudices behind this bad relationship with technologies, stories about the dangers children face using Internet (paedophilia, pornography, etc.), and a common belief about the difficulty of computer usage fed these prejudices.

Also in terms of perception of the area in which they work, people interviewed demonstrated different feelings and approaches between Dame St and Thomas St. Employees working in the city centre share a positive vision toward this area. Being or not from Dublin, they all like the city centre, especially the fact that it is not big and everything can be reached by walking.

On the other hand, shop owners on Thomas St have a very complex relationship with the Liberties community. Many of them were not from Dublin and few of them lived in the area. They are concerned about the numerous problems: unemployment, drug problems, alcoholism, and security. They all acknowledge that their business are maintained mostly thank to tourism, even though they have a good relationship with almost everyone living in the area. There is a justaxposition between the fact that they complain about the area, and the fact that they strongly feel at the same time part of it and linked to it.

An interesting finding is the fact that all the employees and owners interviewed agree that Dublin has changed during the last few years, and not in a positive way. People have become colder, they say, the city is becoming dangerous and rough, and there are increasing housing problems and income gaps.

Tourist and commuters

Both the categories of tourists and commuters fall in the previously mentioned definition of "community", but they clearly do not imply any interaction among people; neither do they imply the presence of implicit or explicit norms, codes, a shared vision or a sense of identity. This was highlighted in the in-depth interviews among each group, which presented very different responses to the three main issues being asked. Tourists come from various countries, and from different socio-cultural backgrounds, and these cultural experiences drive the way they perceive Ireland and Dublin in particular and their expectations of their trip. What they seem to share is the openness to new kinds of local information about the town, including non-conventional and non-official information, such as messages and comment left by other tourists. This necessity of counter-information seems to rise from a general perception of the unreliability of tourist information on the Internet.

Dame St, and partly also Thomas St, are busy streets in terms of public transport, especially near Trinity College, there is often a high concentration and flow of people. We assumed that among these people some are commuters, using public transport regularly to reach their workplaces. Through the interviews, we noticed that many commuters travel alone, and they enjoy the trip because it's usually a way for them to relax. As the tourists, the commuters don't form a "proper" community, and they don't interact with each other; their use of technology varies and so do their problems and needs. They constitute nevertheless a very important target for new applications, especially concerning the improvement of the information about public transport, and file sharing during the trip.

Focus group

One focus group was organised in order to discuss with experts applications for the WAND network. The findings of the research to date were presented to representatives from Universities (TCD, Computer Science Department and DCU, Communication Science Department), Government (Department of Transport) and Industry (BBC, Intel, Ericsson, Interxion). Participants were asked to suggest ideas for applications based on their personal perspective and expertise. An interesting and challenging discussion resulted from such a variety of backgrounds, areas of expertise, and points of views. Starting from a focus on the technology being used in WAND, the conversation veered to the content side of applications. The importance of the optimisation of information sharing and communication flow inside and among communities was often highlighted. A decentralised and context-based diffusion of relevant local information (tourist, commercial, cultural, etc.) was considered as a possible model for the WAND network. The role of multimedia and of voice-based applications was also emphasised, as well as the importance of applications that may combine the "physical" and the "virtual" aspects of old and new communities. On the community side, the potentialities of multimedia and wireless in terms of education-based applications was often highlighted, together with the necessity to raise the level of computer literacy in disadvantaged communities in order to allow everyone benefit from the technological development. Potentialities for user profiling and personalisation of content were discussed in parallel with the acknowledgment of the related issues of privacy and anonymity. The ideal freedom of use that the technology involved in the project may imply, especially in terms of personal information disclosure and file sharing, was contrasted with the possible misuses and exploitation of this freedom itself, carried out especially by commercial entities and hackers.

Despite the variety of perspectives, most of the participants agreed on application ideas that have being described so far in general terms: relevance of local information and services, possibly context-related; necessity for applications directed to specific communities, in order to improve some of their existing problems and/or take care of existing needs (e.g. communication, education, etc.); as well as the importance of the exploitation of the multimedia potential of computer-based technologies and of wireless broadband connections.

CONCLUSIONS

The social research for WAND, part of whose findings we have presented here, provides a research methodology the aim of which is to improve the success of digital media adoption and the performance of future innovation processes. We included the user space directly in the process of designing new applications for a relatively new wireless technology, 802.11b and ad hoc networks, using an ethnographic approach. Through this social research we have been able to identify the communities involved in the area covered by the network, and to understand some of their dynamics.

The pronounced demarcation between Dame St. and Thomas St., in terms of communities, businesses, technological penetration and economic status suggested to us that, while the most interesting applications could be developed in the Thomas St area, the city centre is the best candidate for successful short-term applications. Being able to analyse the way in which communities already use digital media gave us insights about how to combine the physical and virtual presence of communities in general. The lack of computer/Internet penetration in the Liberties, and the perception in both communities of the important role played by digital media to partly solve some problems of the area, were fundamental to the integration of the WAND technology in the area and they provided us ideas in terms of publicly funded research.

Our research is mostly directed to companies and institutions interested in participating in the WAND project in the application development side. The success of the methodology that we are proposing is mostly in the hand of these actors, who need to interpret the findings of the social research and translate them into applications. In this project we tried to make the social research understandable and relevant to industry and institutions that are collaborating with us on WAND in order to create a new interdisciplinary method of research. This project could therefore be considered a "prototype" or a "demo" of how the inclusion of the user space in the innovation process will hopefully lead to a proper adoption of the wireless technology that we have decided to use for WAND.

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