

Scientific Report

Reference	CyberParks ECOST-STSM-TU1306-35475		
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STSM Topic	Apply a methodology of collecting and organizing data using classical and digital approach, managing the collected information from the planners' point of view.		
Period	from	30-10-2016	to 19-11-2016
Host institution	University College Cork, Cork - Ireland,		

ABSTRACT

The aim of the mission is to analyse Fitzgerald Park in Cork, as a potential Smart Public Open Space. For the data collection process, we proposed to use traditional method (like direct interview) and the digital method (for instance by using the available Digital Tool WAY CyberParks).

The purpose of using two methods for collecting information from the visitors is having the possibility to compare the results and answer the questions: "What people think that they are doing in Public Open Space and what they are really doing there?" The idea is to understand how good the digital approach is for catching the individual emotion and if the digital approach is representing the insights of the people who experience a public space.

This STSM took place in the Department of Geography of the University College Cork, Ireland. It was a practical testing of the methodology that I am developing during my PhD research. It focused on the evolution of park as a system of three elements (Nature, Culture, Geist). This has been achieved through the use of the ICT (Information and Communication Technologies), for data collection purposes, as a bridge that connects these three systems. According to this approach, the data analysis will represent the starting point for planning Smart Public Open Space (we can refer to these areas as cyberparks space).

Fitzgerald Park has been chosen because of its location in the heart of the city and its availability to the public all over the year.

It covers an area that includes different elements of Public Open Space (museum, university, river, sport, green and etc.) and it has a good potential to become a cyberpark in the future.

The public can be categorized into different types of users: tourist, students, citizen, workers and others. Some areas of the Park has been renovated, becoming more interesting and attractive for the users, but for the urban planning point of the city as well.

The objective of the STSM is studying how the Planner can develop and unlock the hidden potential of the spaces using both ICT (digital) and traditional (classical) approaches.

1 - PURPOSE OF THE STSM

1.1 – Theoretical approach

The work carried out during the STSM, described in this report, was aimed at analysing Public Open Spaces (POS) from the point of view of the Planner, by using different methods that will be described in these pages. The starting point of this work is a literature research over the Methods that are currently in use by the experts to understand the dynamics of a public space.

In fact, in recent years, the issue of how people use POS is becoming particularly urgent; specifically, the research community is wondering about the impact of modern technologies on human behaviour in the urban environment. At the same time POS are evolving, since they are not only a physical space but they embrace different dimensions into the same system. This concept has been suggested by Stanley Milgram [1], who said that the "Space" is made not only by physical characteristics, but it has also a mental "image" that lives in human mind.

Moreover, considering the POS as a product of different cultures, it can be described as a model of the ternary system [2] consisting of three components: Nature, Culture and Geist.

Nature: the environment without or with low human interferences.

Culture: the fruits of human activity. They can be tangible and intangible.

Geist: the teleological creativity, the human creative source: The "spirit" that defines human goals, objectives and lines of an action to change the nature guided by culture. [9]

One of the most crucial and compelling tasks is how we, planners, can analyse this phenomenon of the "spirit" of the place. In 1974 Lynch introduce the concept of cognitive mapping: each citizen has its own mental projection of the space [4].

According to this, we have to introduce the concept of a cognitive approach as explained by Roger M. Downs: *The individual receive information for a complex, uncertain, changing and unpredictable source via a series of imperfect sensory modalities, [...] From such diversity the individual must aggregate information to form a comprehensive representation of the environment. This process of acquisition, amalgamation and storage is cognitive mapping, and product of this process at any point of time can be considered a cognitive map. [...] We view cognitive mapping as a basic component in human adaptation, and the cognitive map as a requisite both for human survival and for everyday environmental behaviour. It's a coping mechanism through which the individual answers two basic questions quickly and efficiently: where certain value things are, and how to get to where they are from where he is. [3]*

In 1960 Kevin Lynch, in his book "*The Image of the City*", introduced the *sketch mapping technique* consisting in making the subjects to sketch maps to represent the mental models of their local cities. He found out that sketch maps are more accurate when used for topological rather than metric analysis. [4] Topological knowledge is generally more important than metric knowledge for effective navigation. [11]

However, caution must be used and sketches not over analysed: the disadvantage of sketch maps in fact includes trying to represent a three-dimensional cognitive map in two dimensions: distances can be consistently underestimated and angle evaluation can produce extremely varying results. [12]

This method (that is only qualitative) is mainly used for understanding how people perceive the space, their impression of the place and their feelings. Every subject sketches a new and unique map and it allows the Planner to get the emotional picture of reality. Summarising, we can say that CM is a process composed of a series of psychological transformations by which an individual acquires, stores, recalls, and decodes information about the relative locations and attributes of the phenomena in his everyday spatial environment.

Nowadays, it is mandatory to consider also different instruments of analysis.

The necessity of understanding spaces is reflected in human activities, strictly related on the use of new types of devices in everyday life. Information and Communication Technologies (briefly known as ICTs) have the twofold capability of providing contextual services to the visitors, but they also represent a strong basis for the design of new public spaces: they amplify and redevelop existing interactions among people and space according to behaviour and users' needs; summarizing, they have not just a functional task, but they also are a useful source of *data for understanding the human dynamics*. [6]

Many studies have been conducted in order to understand how ICT influence the behaviour of people, after the ICT's increasing popularity in everyday life [5].

The European COST Action Project CyberPark provides a forum for cross-sector working among researchers, urban designers and developers, ICT experts, urban anthropologists and sociologists, creative industries experts, coming from 29 countries. They have studied how the new approaches may change the future development of digital service and the life of people in the OPS [12].

More now than in the past, spaces are becoming complex and can be identified as self-developing systems and so the Planner has to evolve his skills, needing new experiences and instruments that specialists do not apply in traditional technique. [9]

Georg Simmel, in his Sociology studies, was making a research of spatial human behaviour [10] and human daily activities, considering them as dynamic processes. The Planner has a motivation for creating and this impulse has a rational character. The Russian philosopher Stepin developed the idea of types of scientific rationality: *classic*, *non-classic* and *post non-classic*. The *classical rationality* is very direct and based on understanding system as simply mechanical ones. Secondly, the *non-classical* perceives objects like an organism: the Planner is still isolated from the system but the dialog and interaction became a part of the planning process. In the third type the Planner himself becomes part of the system, adding his own humanity and individual perceptions to the compound. The POS system acquires a human dimension scale, where the Planner develops a synergetic awareness. Stepin's classification is not directly linked with urban/landscape planning but it can be useful for analysing POS with ICT. [8] [9]

The POS with ICT, according to CyberParks project, can be seen as *synergistic urban landscapes*.

In this sense, as synergistic methodology for CyberParks reflects personal decisions, relevancies and preferences of the people involved. On the other hand, the reflection helps us to understand the possibilities of the use of such *hybrid spaces on spatial experience*. [7]

In this case the environment becomes an "area" of available space that is influenced and developed by human beings and the design of the POS focuses on providing a variety of scenario.

It is also important to consider the people's psychological needs, taking into account the specific of human's spatial behaviour, identifying it as *spatial experience*.

In some way I conducted an analysis on parallel with one of the questions well described in the article "The Lure of the CyberPark": *Is it possible for applications running in smartphones and tablets contribute to a stronger social engagement [...]?* *How ICT can help us to improve public spaces by focusing on its participators and sending back useful information for the planning process?* [7]

Given the above, the main purpose of the mission was to compare both methods of the data collecting processes (by Cognitive Mapping and Digital Tools) in order to understand the potential and the differences between them. Another question arose from this approach: Can ICTs be used as a tool to improve the Cognitive Mapping method? If so, are they able to capture the physical "Geist" of the place?

1.2 - Work Plan

The Fitzgerald Park, highly rated by people from Cork, is a good model of modern urban park. Our study will be a good starting point for future researches and analysis based on this method.

The analysis of the data, collected during the mission, was processed into a Geographical Information System (GIS) and produced a comparison between both methods.

We took into consideration the following steps, realized in three phases: 1 – Gathering from the Park, 2 – Data collection with Digital Tool WAY CyberParks, 3 – Data analysis. (Table 1)

Task 1	Gathering from the Park
1.1	Analysis of available material (maps, plans) Point Of Interests
1.2	On site inspection of the place
	Preparing questions for users, literature study in laboratory of Cork College
1.3	Collecting data from users by visual method
1.4	Preliminary analysis of the collected data
Task 2	Data collection with Digital Tool WAY CyberParks
2.1	Population web server with information and Point Of Interests in the Park
2.2	Provide users with Digital Tool WAY CyberParks
2.3	Collecting data from users by digital method
2.4	Preliminary analyze of the collected data
Task 3	Data analysis
3.1	Visualize of the results (with GIS)
3.2	Synthesis
3.3	Comparison of the results, rewrite report based on the result

Table 1 - Work plan of the activities

According to the work plan the idea was to dedicate the first week to: a personal inspection of the place and observing the human being in the Park; identification of Points of Interests (POI) based on attractive potential of the elements; the preparation of the questionnaire to present to the subjects; interviewing visitors on the place and collecting sketches; preliminary evaluation of the results and setting up for the next phase. In the second week I planned to: starting to use the ICTs tools for data collecting and sharing information with visitors about the availability of Digital Tool WAY CyberParks (WAY CyberParks); providing information about the POI; collecting the user's feedbacks about the Park. At the final stage it was planned to: synthesizing and organizing the results; interfacing and visualizing the feedbacks with Geographic Information System (GIS) and other software; comparing the results obtained through the two different approaches; composing and producing the report with outcomes and conclusions.

2.2 - Data Collection and data processing using Cognitive mapping

The aspect of main interest of the questionnaire, from Cognitive Mapping (CM) point of view, was obviously the sketch made by users.

The subjects were asked to draw, in a paper map, the main visual attractors and the functional elements in the Park. On the form there was a schematic representation of the Park with the presence of only few elements (the border of the Park, the entrances and some more) for an easier orientation. Even so, the process of orientation took a while in every subject taken into consideration. The visitors drew the mental “image” of their tracks and behaviour in the Park from their point of view.

The aim was to visualize the different scenarios of people behaviour in the Park. In this phase of work I collected more than 30 plans, each one with favourite places (attractions) and preferred walking tracks. Some examples of these maps are reported in Figure 1.

It is possible to see the “story” that the subject is “telling” us through their sketches. After completing their digitalization most of non-verbal information were lost: the most important elements of the Geist, like emotions and experiences, still cannot be clearly recorded by these technologies. This problem will be clearer in the next chapter of the report where the two methods I used will be compared.

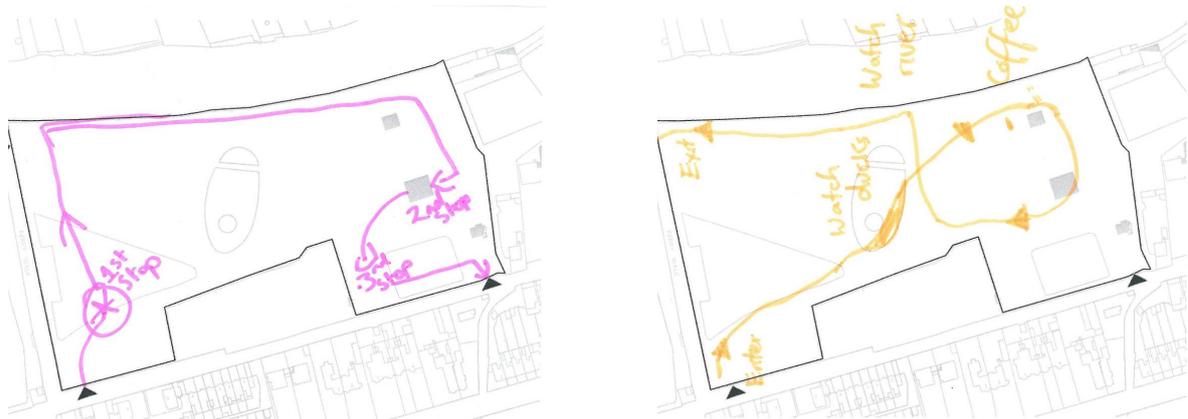


Figure 1 - Examples of maps sketched by the visitors

2.3 - Data Collection and data processing using ICT tools

Before proceeding with the second phase of the work plan, I performed a prior analysis of the Park with app EthnoAlly. It is an application capable of collecting a variety of audio-visual, geolocate and textual materials; information can be stored, visualized, organized and analysed at any time. It functions as a unique support for innovative participatory practise with immense possibilities for professionals and researchers in many fields. It was developed by Pablo Fernandez Muga. [13]

I created my personal digital diary of paths and activities in the Park, in which I placed notes and pictures and kept track of my research. The application also helps to implement the idea that users collect data by themselves and that the Planner can use this tool as an instrument for data collection. The data about my activities in the Park were collected in the application, as shown in Figure 2.

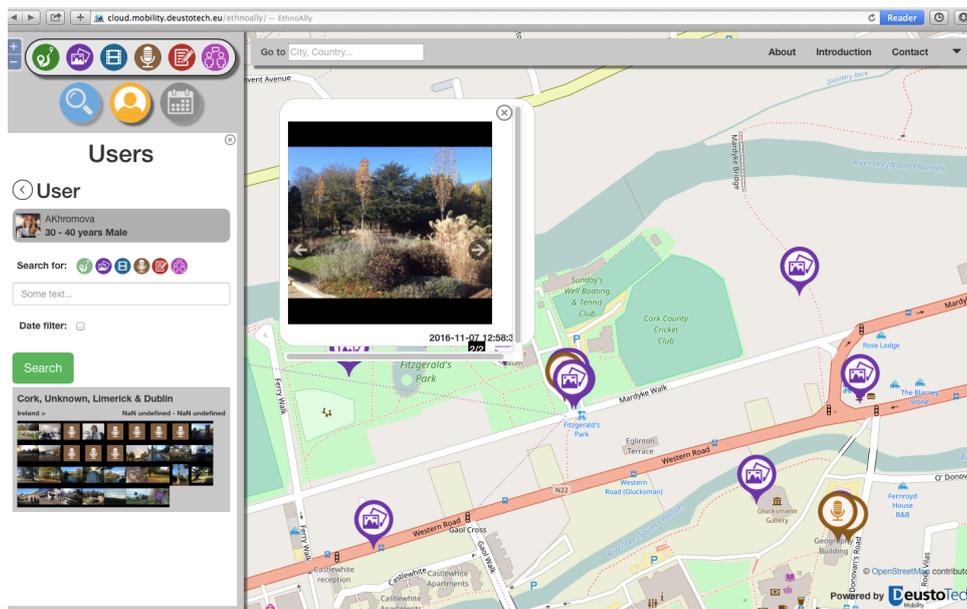


Figure 2 - The study of the park performed by means of the EthnoAlly digital tool

In this virtual space users were asked to imprint their experiences taken from the real places by uploading pictures, videos, audios, comments, tracks. In this way they were able to compare their *spatial experiences* with others. The meaning of spaces, previously driven by individual participation, becomes now a mosaic of personalised digital material showing different sensory experiences.

Our contemporary outdoor life could be now considered as a net of interactive sensorial relationships between our moments of perception and others. It is not a linear chain of isolated moments anymore. (source: Smaniotto et al. 2014, Barcelona, Digital Tool WAY CyberParks).

2.4 - Digital Tool WAY CyberParks

The Digital Tool WAY CyberParks is a public open spaces monitoring tool, consisting of a smartphone application and a web service. On one hand, the Digital Tool WAY CyberParks tracks the way people use the space, allowing them to get contextual information, to send suggestions or complains, or to answer questions. On the other hand, the web monitors the way people use the space in real time allowing the Planner to visualize people suggestions, answers, or path filtered by gender, age, occupation, or reason for visiting the space among other locations. [14]

The app allows the user to interact with space through augmented reality, granting an experience at a deeper level.

From the Planner point of view this app can be seen as an instrument of interaction with users in real time and as a creation-tool of different scenarios for users to discover.

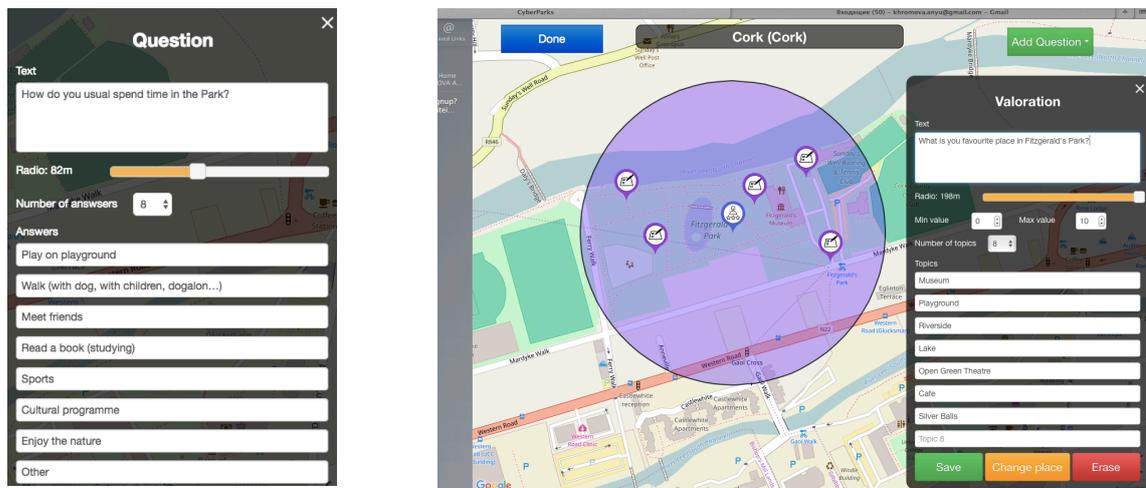


Figure 3 - Implementation of the Point of Interest and of some questions to be submit to the visitors of the Park

According to the observations I made in the first phase of the research, I choose some points of interest (POI) in the Park and I created my scenarios using the Digital Tool WAY CyberParks. I placed them in the digital map of Fitzgerald Park (Figure 3) and I also manually put the information about the POI and some questions about the Park. Moreover, the Digital Tool WAY CyberParks automatically collected the personal data from users during the registration.

At this stage, the Digital Tool WAY CyberParks was also able to save the same type of data that I manually collected from the users in the first phase of the work: name, age, tourist\student\citizen, how you use the park and etc. I set up the Digital Tool WAY CyberParks with questions and POI before sharing it with users. (Figure 3)

The idea was that the users had to download and install the application during their visit. Unfortunately, in the Park a free Wi-Fi service was missing. Because of that, I had to prepare a flyer with all the information about the project and the application. The flyer had to persuade visitors to take part in my research and, following the instruction on the flyer, to download the app outside the Park. (Figure 4)

App WAY-CyberParks

Have you ever heard of CyberParks?

Would you like to improve your experience in the park?

Everyone can help us to increase the knowledge between spaces and users. CyberParks is a European research project that studies the relationship between Information and Communication Technologies (ICT) and Public Spaces.

Do you want to help us?

Download the App WAY-Cyberparks from Google Play and start! You will be able to get information about the park and discover things you didn't know about! The App will change your walk in the park showing you "points of interest" where you can stop and learn new things!

The mobile app also collects data about your itinerary! That data provides researchers with real-time information and therefore increase our knowledge on the interaction between you and the park!

The app is available for IOS and Android!



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Thank you for your time.
 Your cooperation is very important for the research.
 All information is confidential and will be used for the research project only.

Figure 4 - The information paper

The success of the data collection process by digital method is depending on how much people are motivated in the use of the application. In my case, I collected an insufficient number of data compared to the initial estimates, because each sample taken by Digital Tool WAY CyberParks was brought by personal motivation in helping the research and me. In my opinion, the user should be more motivated offering “something” to him/her: experience, information, gift and so on.

On the other hand, the data collected by Digital Tool are more detailed and help us to understand the real behaviour of each person in the place. It provided information about the time, trajectory, location and more. Each user has his/her own personal information linked to the track that he/she covered. The data collected in this case have quantitative characteristics and they can be used for future researches, analysis and comparisons, but the qualitative-mental dimension is completely missing.

Digital Tool WAY CyberParks’s web service visualization allows the Planner to check users tracks and some personal information about them. (Figure 5)

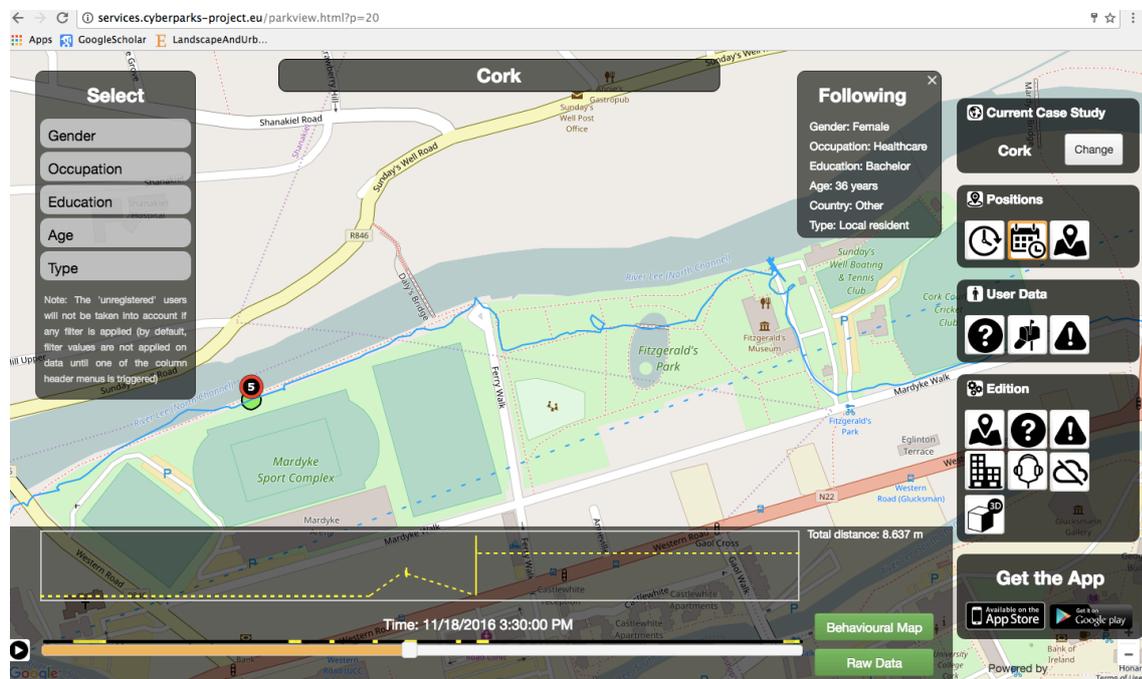


Figure 5 – The map from the platform of Digital Tool WAY CyberParks

The collected data with the Digital Tool WAY CyberParks were not adequate in number, so it was not worth to report the digital tracks of the users.

3 – DATA VISUALIZATION AND DATA PROCESSING

3.1 – preparation of data with CAD

In the third phase of my research, all the cognitive maps designed by the visitors have been digitized and put into a CAD environment. I created a different layer for each sample, with its personal tag number. I recovered the satellite image of the Park with geolocated coordinates; using the right scale I linked it with the tracks, obtaining in this way all the actual metric dimensions. A clarification of this process is reported in Figure 6.

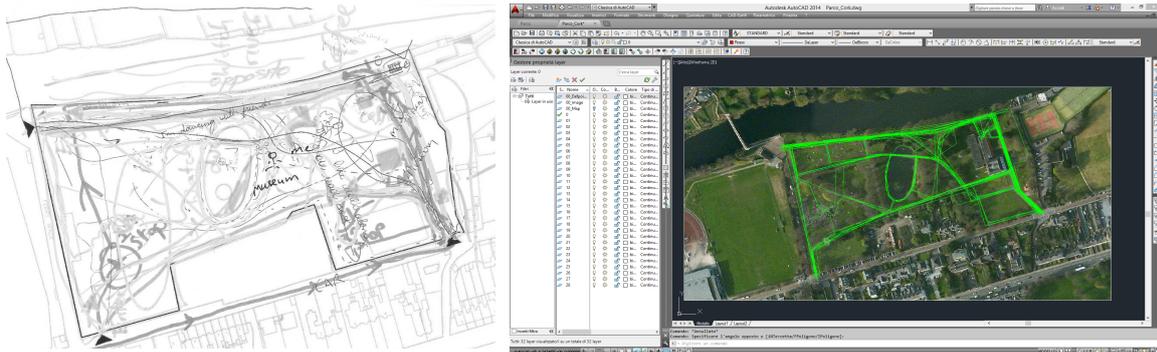


Figure 6 - Overlap of all the user's tracks and their visualization with in background orthoimage of the Park in CAD.

I also produced a table (Figure 7) containing all the information I obtained from the questionnaires, related to each single track with the corresponding tag of the users. This table will be useful in the successive GIS visualization.

general info										about the place									
LAYER	name	contacts	gender	age	education	type	occupation	Park	get to by foot	how often	spend time in	how spend time	season	time	place				
1	David Courts		M	41-50	Primary Education	Local resident	construction		5-5-10 min	every day	> 45 min	Thinking	all	8:30-11:30	riverside				
2	Anna Giulia	giulia.manzione@hotmail.it	F	20-30	Master	Local worker	Humanities		4-5 min	few times a week	5-10 min	walk along; meet friends	all	14:30-17:30	riverside				
3	Miett		M	20-30	Master	Foreign student	Science		3-5-10 min	weekends	< 5 min	walk along	autumn	8:30-11:30	riverside				
4	Miscal		M	51-60	Primary Education	Local resident	Art		5-5-10 min	weekends	> 45 min	walk along	all	8:30-11:30	riverside				
5	Silvia		F	31-40	Upper secondary education	Foreign student	Design		5-5-10 min	every day	5-10 min	walk with dog; café	summer	all	riverside				
6	Alex		M	31-40	Master	Foreign student	Business and financial		5-5-10 min	every day	< 5 min; 25-45 min	walk along; meet friends	summer	22:00	lake				
7	Patrick		M	41-50	Master	Local resident	Engineering		5-20 min	weekends	> 45 min	Playgrouping with children	autumn	14:30-17:30	playground; riverside				
8	David Barry	barrydavid98@gmail.com	M	< 20	Third level education	Local student	Business and financial		5-15-20 min	few times a week	> 45 min	read books; meet friends	all	11:30-14:30	riverside bench				
9	Aidan Quinn		M	41-50	Doctoral	Local resident	Science		5-20 min	Less then once a month	> 45 min	Playgrouping with children; café	all	11:30-14:30	sky garden				
10	Iain O'Callaghan		M	20-30	Master	Local resident	Engineering		5-5 min	weekends	10-25 min	walk along	all	11:30-14:30	riverside bench				
11	Maria Butler		F	20-30	Master	Local resident	Researcher		5-5 min	few times a week	< 5 min; 10-25 min	walk along	all	22:00	riverside				
12	Jessica		F	20-30	Bachelor	Foreign worker	Sport		5-15-20 min	weekends	10-25 min	walk along; meet friends; read book	autumn	11:30-14:30	lake				
13	Will		M	20-30	Doctoral	Local resident	Science		5-20 min	Less then once a month	> 45 min	meet friends; photography	all	14:30-17:30	riverside				
14	Piotr		M	31-40	Bachelor	Local worker	Design		5-5-10 min	few times a week	25-45 min	walk with children; walk along	all	11:30-14:30	playground				
15	Betty		F	70+	None	Local resident	Pension		5-5-10 min	weekends	25-45 min	café	all	11:30-14:30	Open Green Theater				
16	Aile Barry		M	20-30	Master	Local resident	Journalist		5-20 min	Less then once a month	> 45 min	meet friends	summer	14:30-17:30	riverside				
17	Mairéad Dennehy		F	61-70	Bachelor	Local resident	Healthcare		5-20 min	weekends	25-45 min	walk along; café	all	11:30-14:30	Open Green Theater; café				
18	Cathac Duane		M	20-30	Bachelor	Local resident	Art		5-5-10 min	weekends	5-10 min	sport	all	11:30-14:30	riverside				
19	Aile Niard		F	31-40	Master	Foreign student	Education and training		5-5-10 min	weekends	10-25 min	walk along; sport; cultural program; café	all	11:30-14:30	riverside				
20	Maria Luisa Monzone	marialuisa.manzione@hotmail.it	F	20-30	Master	Local tourist	Another		4-15-20 min	weekends	10-25 min	walk along	autumn	14:30-17:30	Lake				
21	Lorcan Dixon	lorcardixon@gmail.com	M	< 20	Bachelor	Local resident	Humanities		4-20 min	Less then once a month	< 5 min	walk along	all	11:30-14:30	Open Green Theater				
22			F	50-60	PhD student	Foreign student	Design		5-5-10 min	weekends	5-10 min	walk along; read book; cultural program; café	all	14:30-17:30	riverside				

Figure 7 - The table containing all the user answers

3.2 - Visualizing the feedbacks with Geographic Information System (GIS)

The tracks were put into the GIS environment; for this task I used QGIS.

Geographical Information System (GIS) – is a system designed to receive, store, elaborate, analyse, organize and represent geographical data.

Quantum GIS (QGIS) – is an open source software capable of merging data coming from different sources into one unique landscape analysis project.

After importing the CAD tracks into generic environment, it was necessary to link them with the data. For this task I used the excel table I prepared with the users’ personal information that I acquired with the questionnaires (Figure 8). In this way it was very straightforward to get all the information about every single user, in order to understand his/her favourite path and place into the park. (Figure 9)

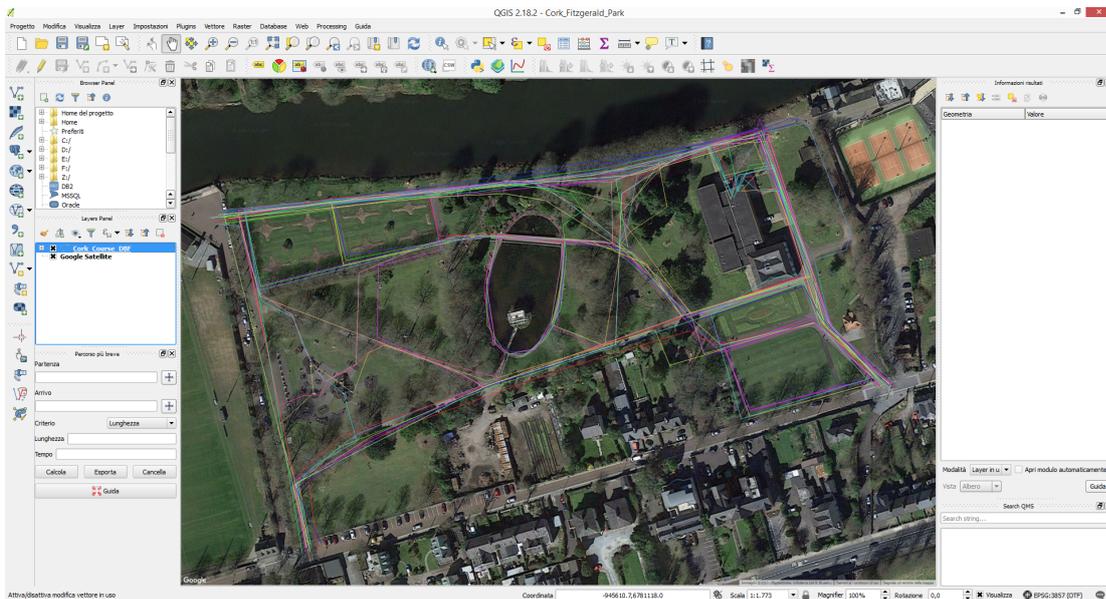


Figure 8 - Tracks into GIS environment

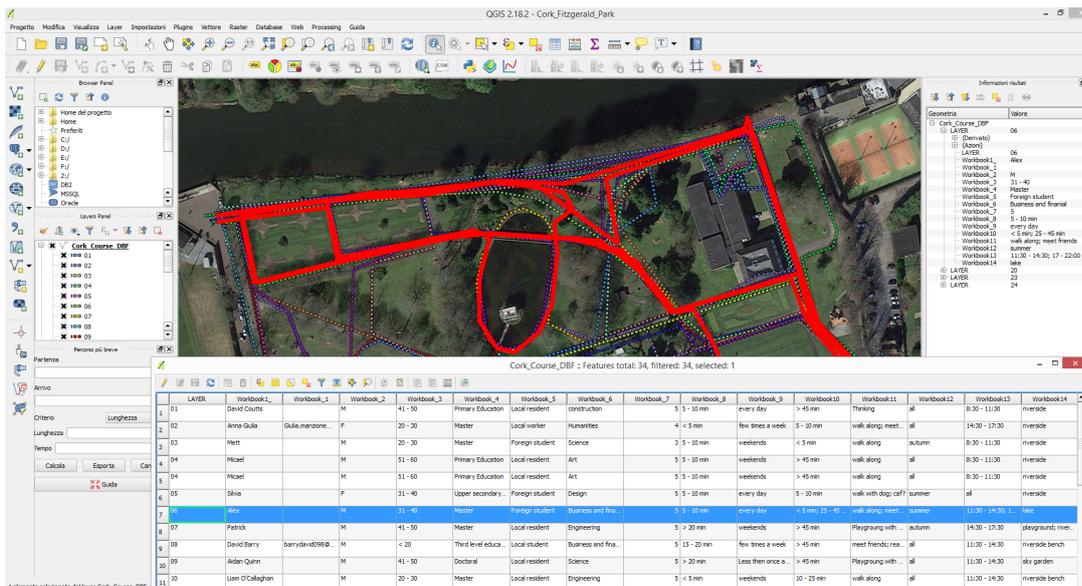


Figure 9 - An example of one track highlighted with the related attributes on the row of the table

4 - DESCRIPTION OF THE MAIN RESULTS OBTAINED

Summarizing the previous steps, I collected data from users in Fitzgerald park, using two methodologies: “manually” with the questionnaire and a human personal approach, digitally with the use of applications, that provide more physical information, but lack the emotional, mental “image” of the place that lives in the human mind.

After that, I organised, analysed and interfaced the data in QGIS.

The following step consisted in the study of the comparison of the data, besides a critical evaluation of their usefulness for the design of the space.

I proceeded with the “synthesis” of the results of the mission.

4.1 - Comparison about the two Methods

Since the objective of the STSM was to study how the Planner can develop and unlock the hidden potential of the spaces using both digital and traditional approaches. The comparison between the two methods is necessary to understand which one is more useful and if there can be a point of contact among them.

The main factors taken into consideration could be:

- 1) improving the design of the space;
- 2) providing users with better services in OPS.

However, it is important to point out that just few subjects used the Digital Tool WAY CyberParks, so the collected data were not adequate in numbers to proceed for a real comparison.

This can be related to the fact that, according to the users’ point of view, there was no sufficient motivation and incentive to use the Digital Tool WAY CyberParks in the Park, since it didn’t provide a reliable support to justify its use in public space.

In order to encourage people to use mobile services, like Digital Tool WAY CyberParks, we will have to deal with technical and psychological aspects: the first involve a stable wi-fi connection, friendly interface, easily accessible etc.; the second concern the necessity to motivate people into using it. This challenge has been faced by the CyberParks project’s team: they moved away from that initial contribution of the WAY platform as a simplistic position and sensory informatics agent towards the more approach of a *synergistic interface*. [7]

However, an attempt to outline some differences between the Methods have been performed:

1 – On the form there was a schematic representation of the Park with the presence of only few elements and borders. The subject logically limited his tracks by the borders of the map, but in real space the Park is a part of the environment. (Figure 5)

The borders are in the mental “image” of the subject, but in reality the limits between spaces are blurry and indistinct;

2 – while collecting data with CM I obtained more un verbal data, more difficult to analyse but carrying more personal and emotional information. The collected data with ICT provides important technical information, but following the computer logic and the way it arranges the data. It transforms persons into numbers, and might ignore other facts that the Planner can capter in the field work;

3 – visitors were more friendly and helpful when I was guiding them in all the steps of the questionnaire, rather than when I just asked them to download the application; but using traditional method, though, can be led by the view or approach of the Planner himself;

4 – we can deduce that the subjects were not enough motivated to use the app; I collected few feedbacks;

5 – the digital method has the potential to collect more data in the same period of time, compared to the manual data collection process.

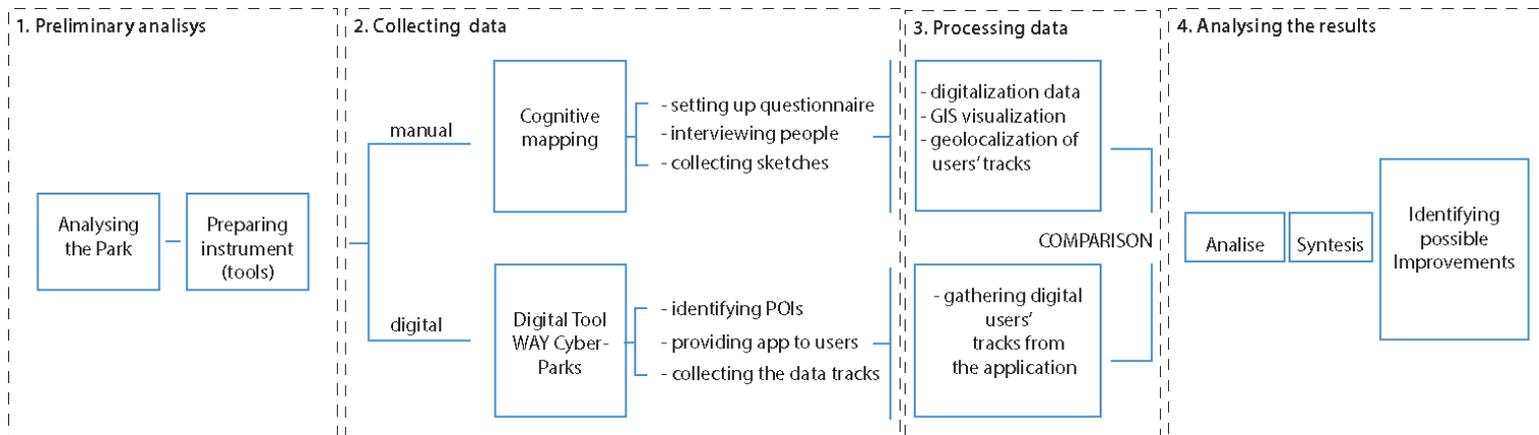


Figure 10 – Schematic view of the process used in the STSM

Follow-ups

The work conducted in Cork, in collaboration with the host institution of the STSM, proved to be a useful approach for the analysis of the park, providing significant information to a planner about the potential of a POS. However, as stated before, the comparison between the two methods was not successful at all, mainly because the users were not stimulated to use the application. Some next steps to improve this methodology could be achieved by collecting more data from the digital tool, task that could be performed during the following meeting in Ancona, in Cardeto Park. It will be the occasion to confirm the usefulness of the mental mapping, and to collect more digital data for a more reliable comparison.

Personnel Benefit and mutual benefits for the Home and Host institutions

The investigations conducted during the STSM have been very useful. From my personal standing point, I gained new skills and faced with problems related with the real efficiency and potential of a digital tool. I'm convinced that bridging the gap between the traditional method of analysis and the ones based on ICT will provide the planners with significant and objective data for planning purposes. I look forward to strengthen the cooperation among our mutual Institutions, in order to build up a chain of data collection for future tests.

Furthermore, this STSM allowed me to work at an international level with the topics related to my Ph.D. research. These data represent the starting point to verify the work carried out until now and to clarify the prospective outlook of this useful experience, paving the way as a benchmark of this methodology. Finally, I had positive and satisfactory feedback from the Host Institution that agreed with all the points stated in the Follow-up section.

Other comments (if any)

I would like to thank the Host Institution for the support provided during my mission, as well as for the professionalism and hospitality reserved. I would like to thank Therese Kenna, who helped me with the preparation for the STSM and encouraged me to participate in this STSM.

This STSM could not be possible without the permission of my Ph.D. supervisor, professor Eva Savina Malinverni, who helps me with suggestions and guide and support me during the mission.

Finally, I would like to give special thanks also to Roberto Pierdicca and Alfonso Bahillo Martinez that supported me in technical part of the research and support me about the applications.

Initiatives like these STSMs, described in this report, are the best way to create a collaborative network of scientists, increasing knowledge and sharing expertise from different domains.

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Confirmation of completion of STSM

I confirm that Anna Khromova, PhD candidate from the Università Politecnica delle Marche Ancona, Italy worked in the Department of Geography, University College Cork, Ireland from 30 October to 19 November 2016. The visit was productive and the results are contained within the report.



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