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E-SCAPE New tools and new opportunities for the localization of Expo 2015 general interest services along the Canale Cavour, a backbone of the Milan-Turin urban region

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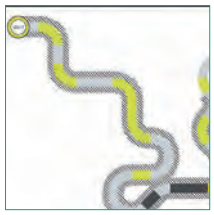

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ASP projects 7

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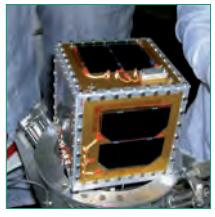

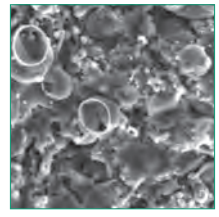

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Multidisciplinarity and innovation

ASP projects 7

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Summary

Creating Innovation Leaders 16
White Paper - The 2012 Como Summit Group

ASP Alumni – Overview 23

DeCoSe 30
Designing Collaborative Services to boost social innovation in Smart Cities

TocToc Movement 32

&CO 36
Use everything, waste nothing

SME 2.0 42
"Software as a service" as a breakthrough change for Small and Medium Enterprises

SME 2.0 44
"Software as a service" as a breakthrough change for Small and Medium Enterprises

FUSE 50
Future Scenarios in Banking: new Services and sustainability

CoSpaR 58
Components for Space Robotics

Exoskeleton for Extra Vehicular Activities 60

Soft solutions for hard problems 64

NEST 70
NEw Services for Teaching and learning

NEST 72
NEw Services for Teaching and learning

SustHealth 78
Sustainable High Quality Healthcare

Making Operative Hospitals Sustainable 80

Designing Sustainable Hospitals 84

ARAM-AOCS 90
Development of innovative attitude and orbit control for low-cost and low-mass spacecrafts

ARAM-AOCS Hardware 92

ARAM-AOCS Software 96

Spider Silk 102
Inspired super-tough nanoarmours

MoDe 104
Model & Design

SaFe 108
Safety & Feasibility

TSC4 MiTo 114
The Social Computer for Milano and Torino

IMPARAR 122
Improving access to resources at reduced risk for urban areas with strong informal settlements: towards sustainable growth for the town of Guayaquil and major social inclusion of citizens

Housing Policy and Planning 124

Resource Management and Natural Hazards 128

Community Information System and living conditions 132

E-SCAPE 138
New tools and new opportunities for the localization of Expo 2015 general interest services along the Canale Cavour, a backbone of the Milan–Turin urban region

[e]-scApp 140

[e]X-cape 144
EXploring the landsCAPE

Green Move 150
Design and testing of an innovative transport system for vehicle sharing

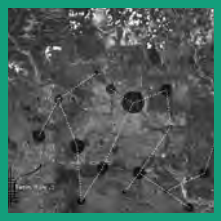
The technology behind a car sharing 152

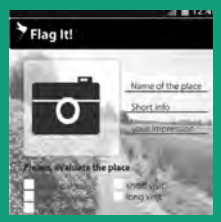
The service idea 156

Proper 162
Future perspectives of joint prostheses

SSP 170
Switched Positive Dynamical Systems for Cloud Computing Load Balancing

Cloud Computing Load Balancing: a model-based approach through Switched Positive Dynamical Systems 172

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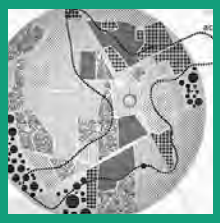

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E-SCAPE

NEW TOOLS AND NEW OPPORTUNITIES FOR THE LOCALIZATION OF EXPO 2015 GENERAL INTEREST SERVICES ALONG THE CANALE CAVOUR, A BACKBONE OF THE MILAN–TURIN URBAN REGION

project 11

E-SCAPE

New tools and new opportunities for the localization of Expo 2015 general interest services along the Canale Cavour, a backbone of the Milan–Turin urban region

E-SCAPE: Telecom provided services to transform the Milano-Torino territories crossed by Canale Cavour into a Smart Region for Expo 2015

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PROJECT DESCRIPTION

THE CHALLENGE

The recent completion of the high speed railway in the north west of Italy is producing significant changes in the entire territorial system, establishing a difference between the nodes of Milan and Turin, positively connected to the "long" (and fast) networks of mobility, and the intermediate places that suffer from disadvantages due to their location on the pre existing "short" (and slow) networks.
Innovative uses of communication technologies and of personal mobile devices can contribute to re-balancing the territory, providing new services especially addressed to permanent and temporary users of the in-between territories, which could in this way regain advantage from the fact of being characterized by high spatial quality and positively slow life style.
The cities and the territories related to the rice fields along the Canale Cavour, particularly in the area around the city of Novara, have therefore been chosen as a physical and symbolic case in order to study the problems of a unique agricultural landscape, perfect context to experiment the role of innovative services to enhance the relationship between people and places, according to the theme of the Expo 2015 event "feeding the planet, energy for life".
Within this framework, the E-scape project studied possible solutions to verify how interfaces (such as NFC devices and other sensors) located in significant places in the territory can provide useful information and promote a better relationship between people and places, provide new opportunities for work and leisure, in particular in medium-size cities (Ivrea, Vercelli, Biella, Novara and others) and therefore produce an effective complementary integration with the main centers (Milan and Turin).

The project therefore aims to understand and manage two main issues:

- Define a number of significant sites located along the Canale Cavour, with a view to enhancing the relationship between people and landscape, also developing slow mobility paths and nodes that can play a role as services of general interest. The general aim is to work on the "slow" territories related to the Canale, in order to connect them to the sites and networks that are the subject of Expo 2015, following the idea of a diffused event based on the direct experience of places.
- Explore how the use of innovative technologies could produce new behaviors, support and (possibly) even drive physical territorial change, in a vision where the sites (and the people) located along and somehow attached to the geographic "backbone" of the Canal can play an active role.

THE TEAMS

The project was developed by two teams, who worked in close cooperation while focusing their work on two distinct issues:

- Team A "EscApp"
  Design an application for mobile terminals that can re-elaborate the idea of interface between people and places, using an innovative idea of a map that is adaptable to user needs and can be implemented by the users themselves, also by recording (according to a bottom-up process) new places of interests and tracks corresponding to new and unexpected routes.
- Team B "Excape"
  Propose an innovative approach to mapping (on a top-down basis) to allow and enhance interaction between people and places, considering that people are moving in a changing landscape, with specific characteristics which vary according to internal (i.e. presence of water in the rice fields) and external (i.e. weather conditions and visibility) factors, also using sensors and information provided by users.

THE RESULTS

The result is a service, consisting of an innovative mapping procedure to be used as an interface for personal mobile terminals and which enables, in this actual case, the production of customized information, adapting the data related to a changing landscape to the personal needs of mobile users. A secondary but not less important result is the attempt to use ICT as a tool that can contribute to reestablishing the value of direct experience (and exploration) of places that might be left of the beaten track of the main directions of development.

CONTRIBUTIONS

Andrea Bragagnini of Telecom supported the students of both teams in understanding the use of Near Field Communication devices, their interaction with mobile communication terminals and the issues related to smartphone application design.

Ana and Cesare Tromellini of Cascina San Maiolo in Novara provided most useful information about their Cascina, its relationship with the urban and agricultural landscape and the essential role that such places and activities could play, in particular considering the experience of the Expo 2015 themes.

Claudia Baratti of Consorzio di Irrigazione Est Sesia, supported the project with in-depth knowledge on the Canale Cavour and the complexity of the rice field landscape.

Albano Marcarini and Ippolito Ostellino contributed with seminars on the development of the project.

An important input for the project was provided by a study tour to the Ruhr region and to the Netherlands, where we had the opportunity to meet actors from important institutions:
Gerhard Seltmann of GSE Prokject - Flechtingen, Michael Schwarze-Rodrian of RVR-Regionalverband Ruhrgebiet - Essen, Martina Berends of WMR-Wirtschaftsförderung metropoleruhr - Mülheim an der Ruhr, Bert Tjhie of Tekton Architekten - Amsterdam, Tom Kuhlman of LEI - Den Haag.

[e]-scApp

ABSTRACT

Is a Mi-To smart region worth talking about or indeed possible today ?

Our [e]-scApp project aims to offer new kinds of location-based services in order to develop and connect the diverse, broad and unbalanced territory between Milan and Turin.

To reach our goal we consider the significant event of Expo 2015, with its worldwide impact, as a possible link to enhance and re-elaborate connections in the area between Milan and Turin, characterized by a productive-agricultural landscape. Indeed this event is an ideal opportunity to exploit the intense influx of people, to promote new services both for tourists and local inhabitants and thus participate in the smart-region process.

The service deals with data and information flows and is based on two main elements: on the one hand, enhancement of places in the landscape and on the other user participation in collecting data.

Furthermore the service is built on a sociological approach in order to understand and interpret user interests, giving them the opportunity to play an active role in enhancement of the territory, through a participative (bottom-up) approach.

After considering these issues, our team developed an app for mobile devices and smartphones that allows users to have POIs recommended on the basis of the interests of the avatar and created by users themselves. The app then provides a navigation phase through a geo-referred mapping system (provided by team B) to reach the specific (of each user avatar) point-place of interest.

Finally, we define that users can upload information only if they are physically at the point of interest (through NFC technology) to verify the truthfulness of the information provided and to obtain effective feedback on the territory.

In conclusion, the E-scape project aims to address the contemporary trend of user estrangement from physical space due to the use of ICT and to offer a new kind of interactive experience with the territory by using technologies in a new and innovative manner.

TASKS & SKILLS

Giovanni Castaldo dealt with exploration of the current state of the art. He was also involved in determining user requirements by analyzing survey results.

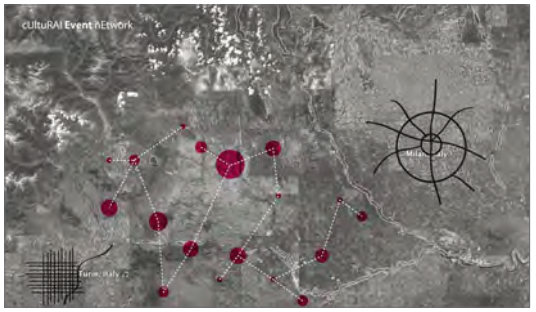
Tijana Djordjevic working on research related to technology in urban context within the Telecom Innovation Lab. She studied several solutions and developed the project concept.

Benedetta Giudice analyzed different aspects of the territory in order to understand how to enhance its opportunities; she developed the reward system of the app.

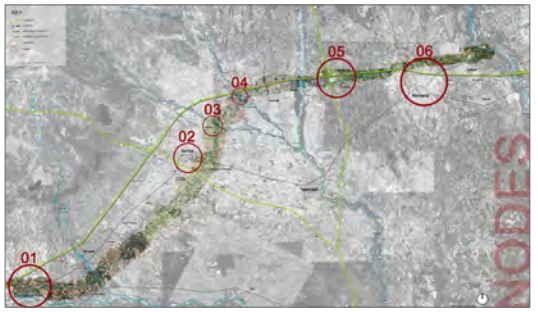
Michele Giusto developed the technical implementations by introducing the current state of the art and describing the possible technical solutions for the project.

Davide Mezzino analyzed the strategic dynamics of the territory in relation to the possible stakeholders who could be involved in the project and developed the user requirements section.

Cristiana Oggero dealt with exploring the planning and project opportunities and defined territorial marketing; she developed the reward system of the app.

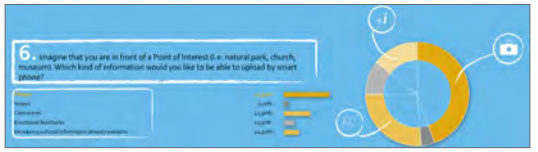


1 *The territory in between Milano – Torino*



2 *Main nodes along Canale Cavour*

3 *Landscape along Canale Cavour*



4 *Example of one of the on line survey's questions*

UNDERSTANDING THE PROBLEM

[e]-scApp is a project designed to identify certain marginalization problems and offer a number of solutions, based on social and territorial analysis. This includes how new technologies can interact with the territory and users at the same time. Our study area is the territory between Turin and Milan, characterized by a flat rural landscape which owes its international importance to its role as the highest producer of rice in Europe.

This is partly due to an impressive water system, made up of natural rivers and artificial canals. In particular, the presence of the Canale Cavour, the most famous canal connecting Piedmont to Lombardy, was considered to be the symbolic and physical backbone of this complex territory due to its 'linear' characteristic, in addition to its historical, territorial and social features.

However, this area is also characterized by a complex infrastructural system including both long/fast connections (high-speed railways and highways) between the main centers of Turin and Milan and short/slow connections between the minor towns (Chivasso, Santhià, Biella, Vercelli and Novara), based on old railways and secondary roads. Thus, this unbalanced infrastructure has produced a strong bipolar system across the study area leading to the marginalization of intermediate territories. Nowadays this isolation is also underlined by the current trend of using innovative communication technologies (ICT's) which generally tend to isolate people from the territory.

Another issue is the possibility to exploit the Expo 2015 project, whose main theme is "Feeding the planet, Energy for life", a topic that is strictly connected to the agricultural characteristics of our territory.

EXPLORING THE OPPORTUNITIES

Having seen that the main issue was the lack of services capable of connecting territories and users, we wanted to create an innovative service which could fill this gap. To this end, we carried out many analyses of existing state of the art smartphone apps. Starting with user requirements, we identified 3 main categories:

- social community: virtual platforms where people can interact by adding status, comments, photos and providing opinions on specific topics;
- accessibility/navigation: smartphone apps concerning different means of transport, sometimes with the possibility for users to add information;

5 *Flag in concept inside our app. App is allowing to avatars to be part of social game. With flagging a new suggestion of interest on the territory users are collecting points for the prizing that will come at the end of the app cycle*

6 *Virtual instant community (automatically done by touching the tag) avatar is allowed to upload some information. Recognized forms of upload are diverse: additional information, suggestions and comments, photos and videos*

- territorial opportunities: services, mobile apps and projects related to the relationship between users and territories even though they do not promote enjoyable visit experiences within the territory.

Although most of them are well organized, they share common problems: they offer more or less the same kind of services, are focused on just one topic and sometimes have privacy problems. An important element is also the fact that users are not always able or allowed to add new information and data to that already provided.

Bearing past experiences in mind, [e]-scApp aims to exploit the opportunities provided by new technologies (we consider them as drivers of urbanization processes) and the important Expo 2015 event, extending its vision and boundaries to the surroundings which offer important products, such as rice.

Of all the technologies considered, the most suitable were proximity devices, since they encourage interaction between users and physical places. In particular, we analyzed in-depth Near Field Communication (NFC) technology as a best practice in this field, since it allows data flow while preserving privacy and security.

How to verify our ideas?

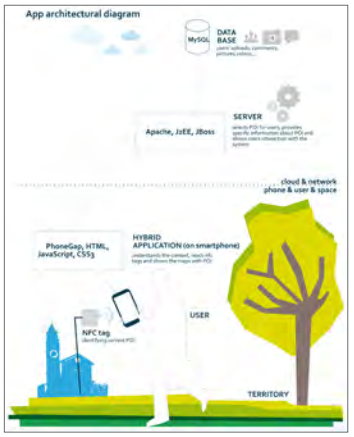
We conducted an on-line survey to investigate possible user needs in terms of preferences, interests and habits when exploring new places, in order to provide them with the most efficient solution. The results also pointed to the necessity to increase physical experiences in the context of immaterial services.

GENERATING A SOLUTION

Bearing in mind the needs pointed out in the previous section, the [e]-scApp smart-phone app is designed to provide users with various experiences of the territory and allow them to discover all its opportunities in a smart way. The app has two main features. The first connects users with the territorial offer for a personalized experience. The second opportunity allows users to contribute to the territorial intelligence system by suggesting new areas that they believe to be relevant. This interaction enables the creation of a bottom-up system, based on a smart social community, focused on user perception of the territory.

A fundamental aspect of the app is its exclusively location-based character, requiring a user to be in the territory to be able to entirely benefit from the app functions. Accordingly, the approach chosen is that of increasing the relevance of the physical space and contributing to its enhancement, through the use of proximity technologies.

7 *App rewarding system. To accomplish the prize the avatar is obliged to full the evaluation of the space -state if they like/ dislike the space and check the table with predefined general criteria for spaces. After compilation of evaluation form, coupon file will be automatically opened and downloaded to phone memory, also explaining the instructions to be used in the neighborhood according to categories (shopping/service/leisure discounts)*



8 *App architectural diagram*

The possibility of downloading the app would be facilitated also through various app stores/web sites, but only entirely accessible when a user certifies his/her presence in the territory by checking in through the various NFC tags. Furthermore, tags are divided into two categories (both managed by team B). The first is located at busy "hubs" (train stations, airports, etc.) and is the starting point for the system. At these points, the user can discover the app, install it and create his virtual character-avatar, according to personal parameters (interests, transportation mode, exploration time available, etc.). Instantly, the avatar receives suggestions on POI he might want to explore and how to reach them. Once the POI is reached, the app will require presence confirmation, thus triggering the second type of NFC check-in tag. This action provides certain information on the POI and in addition instant community status is enabled for the avatar. This community status enables posting of reviews, comments, photos, videos and the display of previously inserted information. At any time during navigation or territorial exploration, the avatar is allowed to flag a new POI suggestion (active mode). Following positive comments by others, eXcape (Team B) can recognize it as a new POI and assign a new NFC tag. It is also possible to discover new POI by analyzing GPS tracks of users moving around the territory (passive mode); also in this case, Team B provides the NFC tag. User interaction in the form of suggestions, comments or pictures plays a crucial role in the cartography process. Finally, avatars could interact among themselves, viewing the location status, profiles, interests and previously visited places of other avatars. [e]-scApp enables participation in temporary social games, such as treasure hunts or bicycle races. Evaluation of avatar participation is based on the level of user interaction with the system. The higher the participation, the higher the avatar's virtual status. As he/she becomes more important, he/she also wins prizes in the form of discounts for local products or events.

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[e]X-cape
EXploring the landsCAPE

ABSTRACT

The project consists of the enhancement of innovative proximity technologies through the use of smartphone applications with the aim of promoting the development of a smart region in the territory between Milan and Turin. The huge presence of infrastructures, the Canale Cavour and the water-infrastructures with a strong historical value and the particular character of the territory due to the presence of rice fields generate a potential the project aims to explore, taking advantage of the Expo 2015 event and of the huge influx of people. Use of the above-mentioned tools is believed to be able to generate new behaviors and to support territorial changes, making places and people play an active role.

Innovative communication technologies are the pivot of the project: NFC - Near Field Communication tags are distributed along the backbone of the Canale Cavour where users will start their active exploration of the territory with the guidance of the smartphone application. The latter is implemented through the integration of two different approaches: top-down and bottom-up.

The sub-project deals with the top-down characteristics of the application: a set of pre-determined information is offered to users with a complete array of smart maps showing details of the territory according to the kind of user and his position, the means of transport and the climatic conditions and seasons.

The choice of using NFC to access the app is necessary to verify that the user is present in the territory he is exploring, necessary condition to actively add new data through the bottom-up approach. In this way, maps and information become dynamic, being constantly updated and improved, also through GPS tracing of users and highlighting which highly explored places should be given new NFCs.

Adaptation to individual users will be possible by exploiting the data provided by team A that will integrate and populate this system with the information uploaded by users on new places of interest.

TASKS & SKILLS

Federica Bonavero contributed to the problem-setting phase and to the solution proposal developing the "buffer map" concept and carrying out the feasibility evaluation.

Doaa Salah Eldin contributed in conducting preliminary research, gathering information on the territorial context and related theoretical concepts.

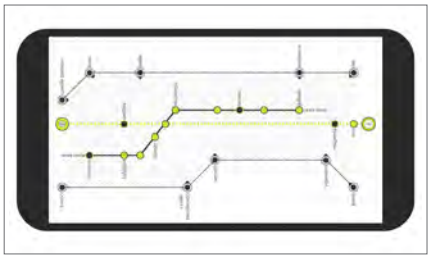
Lucia D'Amato contributed to the definition of the final proposal, focusing attention on the interface and on territorial heritage.

Federica Remondi contributed to the state-of-the-art analysis, mainly dealing with the aspects related to water management.

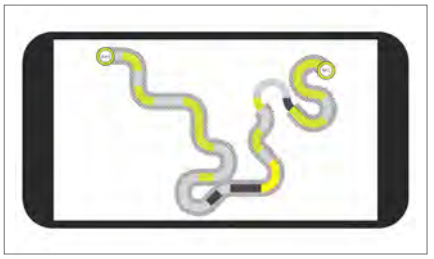
Bogdan Stojanovic contributed to the final project output and to development of the mobile application graphic interface and visual output of the maps.

Simona Valenti contributed to the problem-setting phase and to the solution design, matching users needs with map requirements.

1 *Title of the subproject*



2 *Schematic map of metropolitan region of MI-TO with the NFC's position*



3 *The GPS map that guides the user to the nearest NFC*

4 *The BUFFER MAP, that activates when user reaches the NFC point, showing accessibility and visibility [ex. cyclist on a sunny day]*

UNDERSTANDING THE PROBLEM

The project refers to a territory offering an interesting challenge due to the presence of the corridor that is naturally generated by the huge network of infrastructures connecting the two cities of Milan and Turin.

In general, the presence of large infrastructural elements, i.e. highways and high speed railways, rarely brings beneficial effects to the territory, since they create ambiguous situations between the main metropolitan areas and the secondary territories travelled through and divided by the huge traffic flows. On the other hand, the Canale Cavour could lead to positive externalities from being the central element of the corridor in the Mi-To region, that can be identified as urban development and regional cohesion. To date, however, only negative aspects have emerged due to the isolation of this area and overlapping of the above mentioned infrastructures that have caused disorderly urbanization and congestion. Moreover the territories travelled through suffer from isolation due to the natural tendency to consider these places as transit landscapes and to naturally go toward the macroscopic metropolitan areas.

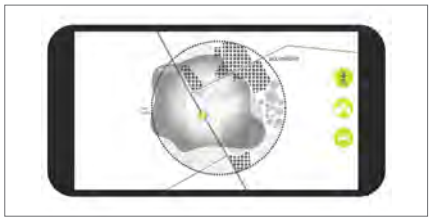
Therefore, the problem is to plan strategic actions for these in-between territories in order to limit the tunnel effect by increasing their attractiveness by attracting economies and functions that would naturally tend to be located in the metropolitan areas. Expo 2015 is a clear example of this tendency: it is located in the city of Milan, somehow excluding the surrounding territories from its 'attraction effect'.

This project's aim is to exploit the universal exposition event, in order to distribute the positive fallout on the areas along the Canale Cavour, by enhancing the potential of this territory as an element to be explored rather than a simple means of connection.

EXPLORING THE OPPORTUNITIES

Given these premises, the [e]-Xcape project focused its attention on the opportunity to leverage on the little known and underestimated values of the Canale Cavour surroundings. Considering it as the ideal backbone of the MI-TO region, we started to investigate the opportunity of exploiting its linear path as the privileged starting point for promoting the in-between territories.

An artificial canal built just after proclamation of the Italian Kingdom, the Canale Cavour and its tributaries have historically played the role of "landscape creation elements". The extensive network of irrigation infrastructures, the slow mobility routes that run alongside them, the chromatic effects related to



5 *The BUFFER MAP, that activates when user reaches the NFC point, showing accessibility and visibility [ex. pedestrian on a foggy day]*

6 *The metropolitan map of the MI-TO region with 3 levels of NFC's*

7 *The logo of the TEAM B, will be used as well like the NFC marker*

8 *View of the cascina San Maiolo during a sunny day, showing information through augmented reality*

the changing seasons, the sight offered by small rural centers emerging from flooded lands, etc., constitute assets well worth not only maintaining and protecting from the anthropogenic pressures which have been discussed in the paragraph above, but also promoting from a touristic point of view.

A particular feature of our study area, the rice fields represent a productive landscape whose uniqueness is internationally renowned and which could greatly benefit from inclusion in the Expo 2015 calendar (even more so given the theme *Feeding the planet, Energy for life*).

At the moment, however, the temporary nature of their flooding makes it complicated to enjoy an effective experience of this extraordinary event. Thanks to the combination of data coming from Coutenza Canale Cavour water management sensors with innovative communication technologies under development by Telecom Italia labs (both external stakeholders in the E-Scape project), the opportunity to overcome this issue is just around the corner.

GENERATING A SOLUTION

Our proposal consists of the creation of a dynamic map constituting the interface of a smartphone application with the aim of enhancing landscape exploration practices. The sub-project title, "E-Xcape", highlights our willingness to motivate users to experience the Canale Cavour region, empowering their personal awareness of the value of the in-between territories and their relation with the physical space. Through the design of an innovative digital device interface, we seek to provide a new location-based service able to display real-time information for the benefit of mobile customers surrounded by changing contextual conditions.

In this regard, the core of our vision is an original way of conceiving map representation. During the state-of-the-art analysis, we discovered that the traditional cartographic model is affected by a series of shortcomings that are not taken into proper consideration even by some of the latest smartphone applications. For example, conventional maps are static and non-interactive, sometimes they are thematic but certainly not user-defined and, moreover, the updating and upgrading process of hard copies is too demanding to be undertaken at reasonable time intervals.

Exploiting the possibilities offered by Web 2.0 and in the attempt to overcome the above mentioned issues, a multi-dimensional, incremental and dynamic map has been developed:

- **multi-dimensional**, since it combines time and space into a single representation of small and big "localized" events;
- **incremental**, since it is based on an NFC tag network that grows and consolidates over time, thanks to the integration of [e]-scApp (team A) *tracks* and *flags*;

9 *View of the cascina San Maiolo during a foggy day: the application helps you to find the place of interest through augmented reality*

10 *The BUFFER MAPS in different seasons showing landscape's changes. Rice fields, for example, change the perception and the relation between users and territory*

11 *View of the agricultural landscape with the NFC point*

12 *View of the Canal Cavour with incorporated NFC in the bridge*

- **dynamic**, since it is constantly updated with real-time information coming from cloud resources, official databases, sensors, etc.

The proposed system is actually designed to work as a sort of "spatial filter" which selects and combines ready-to-use data in an innovative manner.

According to our concept, it will be based on the two different kinds of NFC "touchpoints". The first includes those tags that are located in certain strategic nodes and that may represent important "gateways" to the region. In these places, users can discover the app and select the nearest NFC point to be guided to in order to receive useful information to start the exploration. The second, instead, provides a general interest service, such as the opportunity to be a sort of map dispenser: when users tap them with an NFC-enabled smartphone or hold it in close proximity (approximately 5 cm or less), their physical presence in the territory will be certified and what has been called the "buffer map" launched.

Starting from this moment, two virtual radii will be superimposed on the base map and the customer will be able to access a tailored environment where in-depth information on what is literally happening around him is provided. Usually, maps are downloaded in order to know where you are and how you could reach your final destination: the [e]-Xcape map, on the other hand, tries to build a stronger relationship between users and the physical landscape, showing its changes and its POI - Places of Interests in a customized manner.

Thanks to a mix of pre-defined parameters and instant data, the surrounding landscape will in fact be represented according to two different variables: visibility and accessibility. Far from being perfect circles, these shapes will become isochronous curves whose borders expand and shrink depending, the former, on weather conditions and, the latter, on the chosen means of transport (with particular emphasis on sustainable mobility). Finally, the possible ease of integration of Team A bottom-up tracks and flags will then offer the opportunity to improve the initial map and detect which are the most appreciated and visited places, where future NFC tags would be placed to enlarge the area of relevance of the application.

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