UC@Mito
Urban Computing for Milano and Torino

UC@MITO is studying the integration of computing, sensing, and actuation technologies into everyday urban settings and lifestyles in collaboration with CEFRIEL

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PROJECT DESCRIPTION

Our cities face many challenges. The Urban Land Institute (www.uli.org) has recently formulated some of the major challenges in the following questions:

- How can we create more choices in housing, accommodating diverse lifestyles and all income levels?
- How can we reduce traffic congestion yet stay connected?
- How can we include citizens in planning their communities rather than limiting input to only those affected by the next project?

Information and Communication Technology (ICT) is playing an increasing role in addressing these challenges. The methodical application of ICT to urban settings has many names. IBM calls its initiatives in this direction "smart cities". SIEMENS calls "sustainable megacities" the result of massive application of ICT to urban settings. In this ASP project, we adopted the more technology-oriented term "Urban Computing", which in 2007 was defined as "*the integration of computing, sensing, and actuation technologies into everyday urban settings and lifestyles*" (IEEE Pervasive Computing special issue on Urban Computing, 2007). The project teams set as goal for this ASP project to (a) conduct a multidisciplinary study of Milan and Turin urban settings placing special attention on the challenges that the cities will face in a large scale events such as the EXPO 2015 in Milan and the 2011 celebrations of 150th anniversary of Italian unification in Turin; (b) to conceive a broad set of innovative applications of Urban Computing for Milan 2015 and Turin 2011; and (c) to select a subset of these services based on their feasibility and present them to relevant stakeholders.

In the beginning the two teams of students collaboratively studied the state of the art and the offer of Urban Computing services currently globally available. Then, the two teams independently faced the challenge of conceiving innovative Urban Computing services for Milan and Turin.

Team A focused on three fields of interest: Mobility, Society and Safety. Their concept, *ConnecTown*, is a modular data mash-up
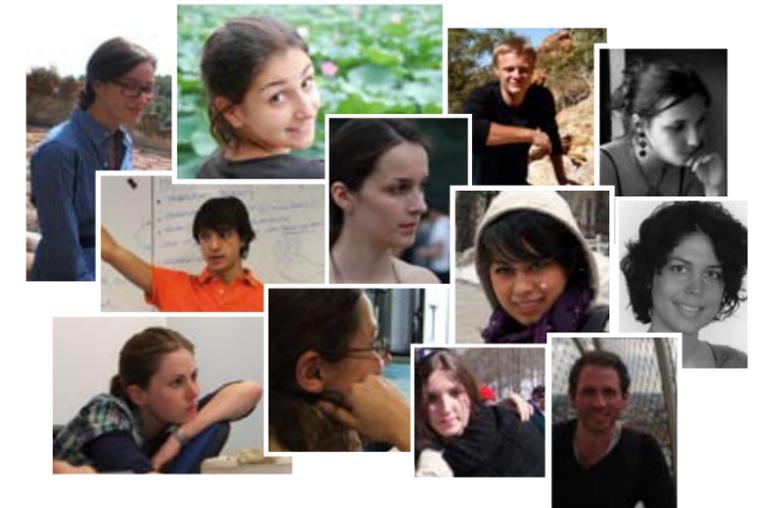
platform which allows citizens, tourists and municipalities to share geolocalized and real time information about mobility, society and safety through a unified and user friendly interface.

Team B proposed *Where A Mi?/Where TO?* envisioning the installation of a series of wireless hotspots that serve as a spatial forum for online word of mouth information exchange. *Where A Mi?/Where TO?* is composed of three parts: a hardware system - a network of WiFi hotspots -, a software system - a live feed platform - and a spatial system - a set of pieces of urban furniture - that together facilitate local information exchange between citizens, businesses, visitors and city governments.

The results were presented to the Chamber of Commerce of Turin and, thanks to their feedback, a feasible pilot project proposal was assembled for "Salone del Gusto 2010". The proposal, namely *ConnecToMi*, has three faces: the provision of free wireless hotspots in "Salone del Gusto" and other important public spaces; the provision in the WiFi connection page of the Web Portal of "Salone del Gusto" together with some information provided by the Chamber of Commerce of Turin (e.g., the gastronomic guide "I maestri del Gusto"); and real time monitoring through the WiFi of the visitors' activity (e.g., who has been visiting whose booth) to be used by "Salone del Gusto" organizers.

ConnecTown...ConnecToMi

project 2A

UC@MITO_URBAN COMPUTING FOR MILANO AND TORINO

TASKS & SKILLS

Volha Anisimava gathered information about the existing solutions and was involved in the definition of user needs and requirements.

Daniele Campobenedetto coordinated the group work organizing the sub-groups and managing the relationship with team B in the initial and in the final phases of the project.

Jelena Crnogorcic analyzed and evaluated the urban impact of the project in its different phases and focused specifically on the privacy issues involved in the project definition.

Adriana Granato studied the output of the concept creating the logo design and the user interface. She contributed to the overall graphic presentation of the project.

Sara Magliacane contributed to defining a technological solution for the final concept analyzing existing technologies and interviewing institutions and data providers.

Federica Nasturzio coordinated the conception process identifying objectives and targets in each phase for each sub-group and managing the integration process for the definition of a main concept.

ABSTRACT

The UC@MITO project originates from the intention to apply and experiment a new analytical approach to the city of Turin and Milan by improving different kinds of social connection through the use of widespread technologies such as Wi-Fi and smartphones.

Analysis of the context, of the state of the art in the Urban Computing field and identification of possible users and related requirements led, in a first phase, to the recognition of three different fields of activity - mobility, safety and society. They represent vital and demanding areas of city management and planning. This "breakdown phase" created the premises for the process of macro-concept generation that dealt with the integration of different services in a multi layered solution.

The elaborated concept, called *ConnecTown*, is a modular platform allowing sharing of information generated and consumed by different players including citizens, event organizers, visitors, tourists, and municipalities. The platform consists of an all-in-one system offering real-time and geo-localized information about mobility and transport, safety and city flows from existing resources and anonymously collected data.

As a further integration phase the two project teams worked jointly to find an appealing solution for a precise stakeholder, the Chamber of Commerce of Turin. The outcome of this step was the creation of *ConnecToMi*, a pilot project proposal that applies the ConnecTown platform to a public wireless infrastructure based on the Where A Mi?/Where TO? Project in the context of the Salone del Gusto fair in Turin.

UNDERSTANDING THE PROBLEM

The reasons behind this research are various: first of all the fact that "human interaction with and through computers is becoming socially integrated and spatially contingent" (Greenfield, 2007); then the importance of the urban environment, meant not only as a real place but also as a virtual space containing interactions and information, even if fragmented and not integrated; last but not least the evolution of the role of citizens as city users in the urban environment.

The main goal of this work is to reuse data and technologies that already exist in a specific urban environment and integrate them with real time information to design an increasingly responsive environment, improving quality of life and attractiveness of a place.

EXPLORING THE OPPORTUNITIES

The implications of ICT in architecture and urbanism alter the way we conceive the space. In order to address these issues, the design process was characterized by several phases and a continuous design pattern.

Firstly, the team performed an analysis of the state-of-the-art of urban computing services. The review of existing projects and studies, such as Citysense (http://www.citysense.com/) or Urban Atmosphere (http://www.urban-atmospheres.net/), allowed a better understanding of the subject and of the potential benefits of the application of ICT to city life. In this phase the team conducted a series of interviews with possible stakeholders (such as Municipalities, Technology Providers, Event organizers) and attended product presentations (e.g., Ghostway) and exhibitions (e.g., ITN Expo).

Subsequently, the initial conceptualization by the group was refined by means of a "needs analysis" that implied the classification of the main stakeholders, players and their requirements (image 1). The needs analysis pointed to the identification of three specific fields of interest: safety, mobility and society. The selection was made by considering the most common problems and difficulties that emerge in the relationship between citizens and urban space.

| Actors	Resources	General objectives	Specific objectives
Municipality	Coordination & data	Make the city competitive (all aspects).	Integration and improvement of existing services (efficiency). Statistical data about city flows.
Technology providers	Technology	Sell products or services.	Opportunity to enter a new market.
Data providers	Data	Provide more effective services and advertise.	Wider use of the service due to integration. Feedback data from the customer.
Event organizers	Coordination	Attract visitors and participant with publicity and effective service.	Higher quality of services due to integration and real time positioning and data.
Sponsors	Financing	Attract customers and investors in order to improve business.	Advertising and meeting customers needs in real-time.

1 *Stakeholders objectives and requirements*
This matrix shows the main stakeholders of ConnecTown underlying the kind of resources they can involve in the project, their principal goals, and why they could be interested in joining the service.

The team developed three micro-concepts that address specific problems: the "safety micro-concept"(EasySOS: image 2) concerns the protection of sensitive categories of people in the city and increase the overall public safety in the city; the "mobility micro-concept" (SmartMove: image 3) focuses on the efficiency of public and private transport in the city and its environmental footprint; the "society micro-concept" (LiveTown: image 4) considers the communication between citizens and the way they "use" the city and its services by tracing fluxes of people.

GENERATING A SOLUTION

Initially, the team planned to select only one sub-problem for further development. However, during the research the team members perceived that the three concepts were complementary and that they could be integrated in one unique concept, able to create the added value of the aggregation: ConnecTown.

ConnecTown is a **modular platform** that simplifies the deployment of applications that require geo-localized and real time data mash-ups. It allows seamless sharing of information generated and consumed by different players in the city, including citizens, event organizers and municipalities (image 5). The
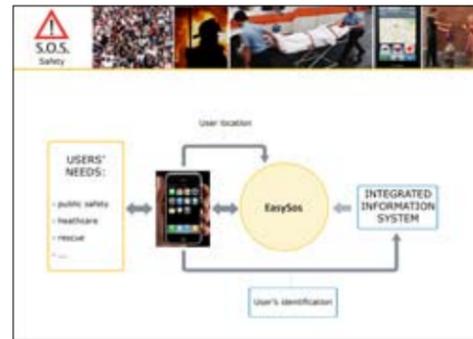
2 *Safety Micro Concept, EasySOS.*
Users in an emergency situation can use EasySOS application to call for help. The rescue team receive from EasySOS the position of the calling person and also his medical situation information.

3 *Mobility Micro Concept, SmatMove.*
SmartMove has access to existing databases, to real time sensors in the city and to user generated information. Through these sources it is able to elaborate answers to the users' needs.

4 *Society Micro Concept, LiveTown.*
LiveTown is a free geo-localization based application offering information about the Expo and the city in real-time, while collecting anonymous information about the flows of people in the city.

platform offers an **all-in-one system** which provides **real-time and geo-localized information** about mobility and transport, safety and city flows by integrating existing resources and anonymously collected data. The concept functioning is summarized in image 6 and image 7.

Users can access ConnecTown from the Web, smart-phones equipped with a GPS or from fixed position devices such as totems located in the city's focal points. We designed the interface (image 8) to be user-friendly and intuitive. Moreover, according to their profile, users have the possibility to access different kind of information.

The real-time geolocalized data is obtained by **tracing the position** of users and vehicles connected to the platform but revealed only to other users which were explicitly authorized by the owner of the data. The **anonymized data** are used only to create statistics to detect unusual concentrations of people or vehicles in one specific place and to follow the behavior of the flows of masses of people and traffic in the city.

ConnecTown provides a **unified analysis of real-time data streams** about the city, facilitating an efficient usage of trans-

port means and supporting the organization of large events as well as assisting everyday urban planning practice. Furthermore the Safety module guarantees effective intervention in case of emergency and need of all those subscribing to this service.

The ConnecTown concept aims at exploiting the **large event vector** to explore solutions which can be applied in the context of the event, but also in everyday life. The extensibility ensured by the modular structure of the platform makes the system versatile to different situations, helping to scale from a small size experiment to a city-wide network.

The ConnecTown business model is based on two sub-models, one involving public and the other involving private players. Public players, for example the municipalities or tourist promotion agencies, finance the infrastructure and offer public data in exchange for real-time information, tourist promotion and dissemination of data useful for the citizenship. On the other side, private companies can reach their clients in a more effective way through "g-local" and personalized advertising. To demonstrate the feasibility of ConnecTown, the team interviewed a number of companies offering similar services. The most inter-

5 *ConnecTown concept moodboard*
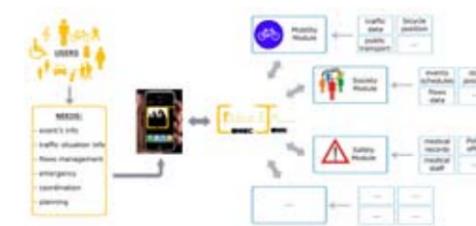
6 *Platform structure.*
Three modules collect data from different institutions and sources (existing databases, real-time anonymous data and user-generated content). These sources are processed by the platform. Users can seamlessly access these resources through a mobile phone application or other devices. The modular structure allows an incremental implementation strategy.
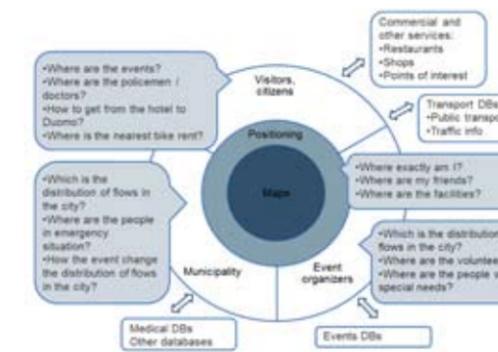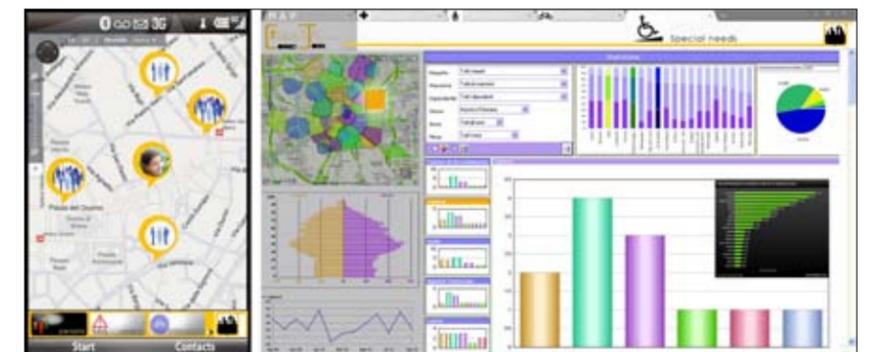
7 *ConnecTown platform layers, main users, specific databases and possible queries.*
The core of the platform is a map system that allows the positioning of users. The different kind of users can obtain answers to their needs from the different kind of data involved and processed by the platform.

8 *ConnecTown interfaces.*
On the left: citizen-visitor's mobile phone interface.
One the right: Municipality's computer interface.

esting ones were *Plasboo* (http://www.plasboo.com/) and *Futur3* (http://www.futur3.it/), which confirmed the sustainability of ConnecTown's business model.

At this point of the process a meeting with the Chamber of Commerce, main stakeholder of the project, suggested a further development: the proposal of a unique project combining the work of team A and team B in order to elaborate a pilot project for the "Salone del Gusto 2010".

The final result of the integration of the concepts is **ConnecToMi**, a pilot project proposal based on the provision of free wireless hotspots in the "Salone del Gusto" and in other strategic areas in the city, and a Web platform accessible through the connection page of the Web Portal of "Salone del Gusto". The users enter the platform giving their consent for personal data processing and from this moment on they can access informa-

tion about events, tourism, services, help and transport. On the other hand, the municipality and event organisers obtain statistical and real-time data about mass flows and traffic as well as feedback concerning urban services.

The ConnecToMi project proposal was sent to the Chamber of Commerce, to the StartCup Milano Lombardia competition and also presented in Shanghai during the Expo. The feedbacks obtained from these institutions were convincing enough to suggest the transition to a future "implementation phase".

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Where A Mi?/Where TO?

project
2B

_UC@MITO_URBAN COMPUTING FOR MILANO AND TORINO

TASKS & SKILLS

Matthew Arancio. Politecnico di Milano/ Urban Planning and Policy Design - Context survey, concept work, document drafting, team controller

Maricica Cozma. Politecnico di Milano/ Computer Engineering - Computer systems consulting, case study analysis

Marc Leyral. Politecnico di Milano/ Architecture and Civil Engineering - Architectural systems consulting, graphic work

Sara Lora. Politecnico di Milano/ Architecture - Concept work, architectural systems consulting, graphic work, documenting drafting

Roberta Musso. Politecnico di Torino/ Architecture - concept work, architectural systems consulting, graphic work

Sanaz Mirzaei. Politecnico di Milano/ Urban Planning and Policy Design - context survey, concept work, document drafting, graphic work

ABSTRACT

Team B of the UC@MITO project responded to the initial Alta Scuola project call with a concept entitled "*Where A Mi?/Where TO?*". *Where A Mi?/Where TO?* envisioned the installation of a series of wireless hotspots that serve as a spatial forum for online word of mouth information exchange. It was the conviction of Team B that spatial and virtual environments needed to be not only superimposed but integrated in one policy and project design that would favor not only citizens of Milan and Turin but similarly promote the legibility and accessibility of these to visitors arriving for upcoming large events like EXPO 2015 and Torino 2011. *Where A Mi?/Where TO?* is both a software and hardware project, complementing online services and virtual information with urban furniture interventions to provide a spatial forum for information sharing. *Where A Mi?/Where TO?* is composed of three parts: a hardware system, a software system and a spatial system. The hardware system refers to the installation of wireless hotspots in Milan and Turin. Software system, instead, refers to the installation of software in hotspots capable of providing user authentication, storing user activity and allowing for the exchange of local, real time information. The final system, the spatial system, consists of the construction of a number of spaces to promote and facilitate Internet connectivity. Such spaces are considered a crucial conjuncture of virtual and spatial information exchange. The project culminated with the presentation of a pilot project in combination with Team A of the UC@MITO project entitled ConnecToMi.

UNDERSTANDING THE PROBLEM

Milan and Turin are both marketing themselves as "large event cities"; as such, both cities need to provide suitable infrastructures to not only **host** and facilitate the movement and interaction of touristsbut also to provide for the **collective good** of the greater metropolitan community through a qualitative increase in services. Taking advantage of the creative energy associated with ongoing events and the upcoming EXPO 2015 and Torino 2011, *Where A Mi?/Where To?* proposes to incrementally modify urban public spaces and open up new forums of information exchange to city users.

The city is thus forum of information exchange. With this assumption, a general identification of four user populations (citizens, businesses, visitors, and government) allowed for further brainstorming about possible information exchange that is currently lacking. Initially brainstorming was then confirmed by a series of interviews and meetings conducted with the Emilia Romagna Regional Telecommunications Project (PITER). Players at both the regional and local level were interviewed and policy solutions ultimately promoted to a combination of regional coordination but local project intervention to promote such information exchange. Stakeholder needs and objectives in the Emilia Romagna context were extrapolated and applied instead to the cases of Milan and Turin. In Turin there is regional coordination under the Piano Strategico adopted in 2006 but no local project initiative for wireless connectivity. In Milan there is currently no overarching regional policy or local project initiative to promote wireless internet connectivity.

In the end Team B identified the need to provide wireless connectivity and online information exchange through a spatial project intervention.
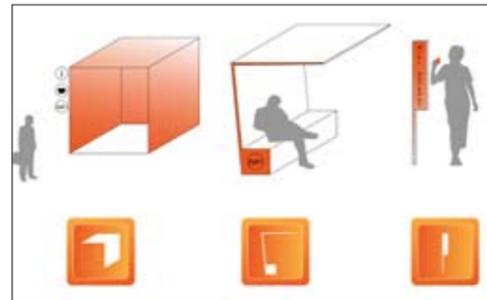
EXPLORING THE OPPORTUNITIES

Case studies in the area of Urban Computing and connectivity were presented in a conference on Urban Computing and policy

1 *A photomontage showing the configuration of a Where A Mi? space at Porta Genova*

innovation entitled Wireless Cities in Bologna on June 17th, 2010. The case studies for the UC@MITO Team B project were chosen as exemplary of the panorama of wireless service provision in urban spaces. They similarly provide ongoing insight into the challenges faced in wireless service provision and will thus serve as a scaffolding to better understand possible project solutions for Team B's UC@MITO project. Three general themes that appear throughout the case studies include:
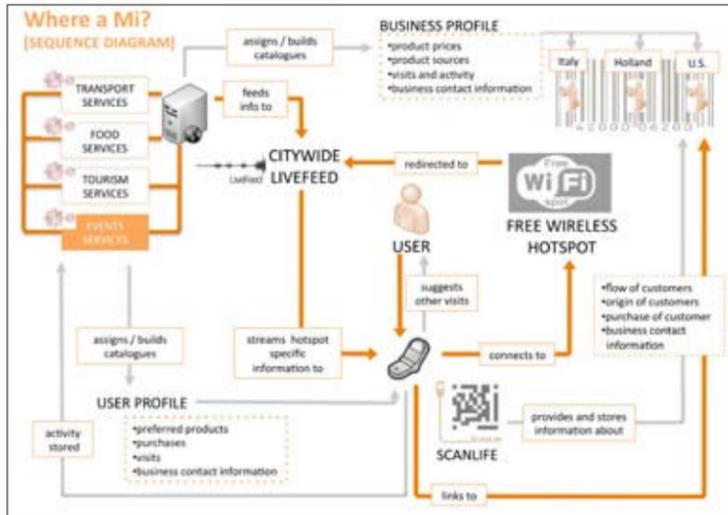
- Wireless service provision and a platform for access to wireless hotspots

seen in a project called LUNA(http://www.futur3.it/rete-luna/), a wireless and online authentication platform strategy currently being implemented in Trento. Luna is composed of a hotspot system and user profile management system that is available to benefit both citizens and visitors to the city.

- Place making through local information software

seen in a project entitled Bologna Smart (http://www.bolognasmart.it/), a smart phone application that allows tourists to access information regarding Bologna's main tourist and shopping attractions. The software also provides GPS services, directing users to specific attractions.

- Online services including profile storage, taste recommendation and local information sharing

exemplified by the websites Stumble Upon (http://www.stumbleupon.com/), Hop Stop (http://www.hopstop.com/) and NYC

MULTIDISCIPLINARITY AND INNOVATION ASP PROJECTS 5

UC@MITO_URBAN COMPUTING FOR MILANO AND TORINO WHERE A MI?/WHERE TO?

2 *An image showing the three Where A Mi? / Where TO? spatial concepts: the cube, the bus stop and the quick stop. These concepts were later translated into a pilot project for the Turin Chamber of Commerce.*

3 *A photomontage showing the hypothetical configuration of a ConnecToMi space in an event setting; such a strategy was suggested for an event space like the Salone di Gusto in Turin.*

4 *The Where A Mi? / Where TO? Software System*

5 *Where TO? Hotspot Concept; the aim is to subtly suggest the comfort of public internet connectivity, generating new activity in already important public social spaces.*

6 *Where TO? Service Distribution Concept. Authentication recognition would be a federation of the city of Turin to provide coverage to citizens, the Chamber of Commerce representing businesses and visitors in the city and finally the university providing for students. The macchia leopardo was proposed because it uses public-private partnerships to diffuse wireless, thus minimizing the cost to the city for wireless provision.*

7 *Where TO? Hypothetical Spatial Distribution in the city of Turin.*

Now (http://www.brooklynnow.com/). Stumble Upon is a website that allows rapid web surfing based on personal preference, storing preferred sites to provide for future recommendations. Hop Stop is a public transit solution website that allows users to chart routes without the use of a car. NYC Now is a local, New York based website that provides up to date, neighborhood specific information for Manhattan and Brooklyn.

GENERATING A SOLUTION

Where A Mi?/Where TO? proposes keeping word of mouth human, creating a spatial dimension for information sharing.

The system itself is composed of three parts: firstly, a hardware system composed of free wireless hotspots distributed across the city in important public spaces. Secondly, a software system composed of a mobile platform generating a user profile accessed either by laptop or Smartphone connections. The software system is also composed of a Livefeed that streams real time information based on the user's location. Finally, the third element of the Where A Mi? / Where TO? project is a spatial

system composed of the creation of a "place" for internet connectivity.

A number of guiding principles shaped the Where A Mi? / Where TO? project concept. These principles are the following:
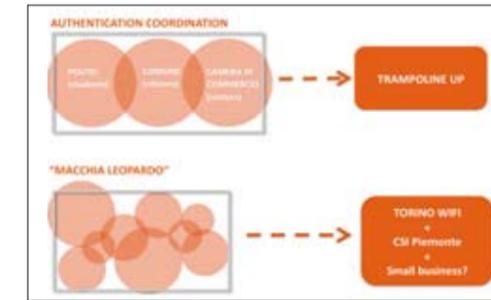
▪ The standardization of data services.
▪ The provision of free forums of information access
▪ Moving beyond the traditional urban experience
▪ Creating new ways for city users to communicate
▪ Rethinking the use of already available technologies

In terms of the hardware system, a public – private partnership approach was implemented, following the strategies of Bologna. This concept, called "macchia di leopardo" (leopard spot) guarantees WiFi in major public spaces. Secondary and tertiary public spaces are instead coordinated by individual store owners that make use of a city negotiated "package" that provides wireless from a selected service provider. (image 6)

The software system is broken down into three parts: an authentication component, a geo-localization system and a Livefeed. A

major component of research for the *Where A Mi?/Where TO?* project in this regard has been exploring and generating software solutions to ensure public wireless provision in accordance with the Legge Pisanu. This law, mandated by the Italian government, requires that all private online activity be traceable. A safe and coherent authentication system was thus identified as a fundamental task in providing and facilitating wireless accessibility and services. (image 4)

The spatial system, finally, is composed of the cube, bus stop and quick stop. These concepts are a series of urban furniture interventions designed to subtly modify existing public spaces. The cube is a form that would appear in central spaces, like main squares and stations. It would be a large presence that would also provide information about registration services, Internet hotspot locations and similarly information about ongoing neighborhood or citywide activities and large events. The bus stop would be a sheltered place to sit and connect to the Internet along major transportation corridors and in secondary squares and pedestrian spaces. The quick stop is a place to quickly access the Internet to check email or figure out geographic location. (images 1, 2, 5, 7)

CONNECTOMI

The fusion of Team A's ConnecTown project and Team B's *Where A Mi?/Where TO?* project is ConnecToMi. The project ConnecToMi was proposed to both the Turin Chamber of Commerce and the Lombardia Start Cup project innovation competition

ConnecToMi has two faces: firstly, the provision of free wireless hotspots in important public spaces and secondly, the compilation of the real time data related to user activity to be used and responded to by city administrations and large event organizers. Such a project superimposes virtual and physical presence of users and administrations in key public spaces, creating a new layer of meaning and activity to already active urban spaces like squares, pedestrian plazas and important transit nodes. Team B contributed to this effort by providing strategies for spatial distribution in the city of Turin, contacting local players involved in wireless service provision to participate in the pilot project and generating architectural models and diagrams for the WiFi hotspots. Composed mainly of architects and urban planners, Team B sought to implement and share its hardware and spatial solutions to wireless connectivity and real time information exchange in the ConnecToMi project. (image 3)