

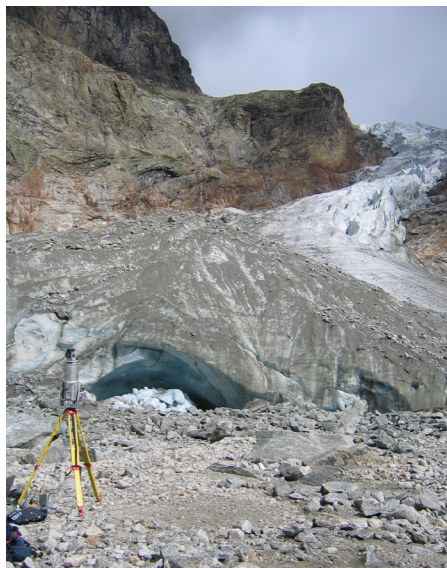
## PROJECTS



## SAFETY



## SUSTAINABILITY



## TERRITORY

## SOCIETY



## RESEARCH

The *Urban Sustainability & Security Laboratory for Social Challenges* is the new structure of the Politecnico di Torino created to meet the growing need for interdisciplinary research as a key element for the progress of science and technology not only at local but also at national and European level.

The departments:

**DIST | DAUIN | DENERG | DIATI | DISMA**

- 2 S3+Lab
- 3 organization
- 4 projects in progress
- 7 project in preparation
- 8 contacts



**POLITECNICO  
DI TORINO**

[www.s3lab.polito.it](http://www.s3lab.polito.it)

The S3+Lab aims to integrate and put together the different personal skills, tools and equipment which are already present and operating within the different departments of the Politecnico involved in the project, so that the new S3+Lab will be able to fully respond to the social challenges coming from socio-economic development, regional competitiveness and security issues.

## RESEARCH ACTIVITIES

The main activities that the S3+Lab intends to achieve are:

- measure, through quantitative methods, the quality of life and its perception by the citizens from the perspective of the “post-carbon” society;
- monitor the effects (in terms of environmental quality, the landscape and the social and economic aspects...) of the present, existing plans and future projects;
- direct the processes of territorial planning and design towards socio-ecological models characterised by sustainability and resilience;
- assess the resilience and security of the environment, the landscape and the city (and its specific fields) both “ex ante”, “in itinere” and “ex post” taking into account the plans and projects and an efficient use of the resources. This assessment will also take into account sustainable urban management, the quality of the landscape and the architecture, the use of innovative energy solutions, the integration of transport systems, the management of waste and the awareness and participation of citizens;
- support the processes of planning and design of the territory, landscape and the city from the institutional, social and economic points of view, also with mathematical and predictive models;
- develop a qualitative analysis and computational phenomena related to the above topics through deterministic and stochastic models, also through their numerical and statistic implementation;
- support the research and application of new technologies to improve the security of citizens (concerning health, food, etc.), infrastructures and services (communications, transport, etc.), also in the case of natural events and disasters.

## DEPARTMENTS INVOLVED

- DIST - Interuniversity Department of Regional and Urban Studies and Planning (proponent and coordinator)
- DAUIN - Department of Control and Computer Engineering
- DENERG - Department of Energy
- DIATI - Department of Environment, Land and Infrastructure Engineering
- DISMA - Department of Mathematical Sciences

## LABORATORIES AND RESEARCH CENTRES

- LARTU - Laboratory of Territorial and Urban Research (DIST)
- GEOMATICA - Topographic Laboratory (DIATI)
- Laboratory of Photogrammetry and Geomatics (DIATI)
- LABINF - Laboratory of Advanced Computer Science (DAUIN)
- HPC@POLITO - Academic Computing Center (DAUIN)
- CED (DISMA)
- CED-PPN - European Documentation Centre on Nature Park Planning (DIST)
- OCS - Observatory on Sustainable Cities (DIST)

## SCIENTIFIC COMMITTEE

- Patrizia Lombardi (DIST) - Scientific Coordinator
- Fabio Armao (DIST)
- Piero Boccardo (DIST)
- Alberto Cina (DIATI)
- Elena De Angelis (DISMA)
- Roberta Ingaramo (DIST)
- Andrea Lingua (DIATI)
- Maurizio Rebaudengo (DAUIN)
- Vittorio Verda (DENERG)
- Angioletta Voghera (DIST)

## WORKING GROUP

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# ORGANIZZAZIONE

The workflow is organized into five interrelated work packages (WP) (in parallel or in serial mode) based on the following activities.

## Workpackage 1

### Data acquisition

This activity is for monitoring the resilience and security of territories using high-performance systems such as Mobile Mapping System (MMS), Light Detection and Ranging System (Lidar) and others. All the information will be georeferenced using Global and Inertial Navigation Satellite System (GNSS) and Inertial Measurement Unit (IMU).

## Workpackage 2

### Data processing and creation of models

Data processing (data integration and post processing) and creation of models. Before using all acquired data (digital images, code measures between sats and receivers, accelerations and angular velocities from accelerometers and gyroscopes and so on) it is also necessary to:

- determine the position of sensors and their settings
- georeference images
- perform a photogrammetric restitution of details captured from images using advanced tools and softwares

From digital images it is also possible to extract selected objects and classify them in a spatial geodatabase

## Workpackage 3

### Data publication and sharing

Unlike previous WPs, which represent the operational level (Data Layer), WP3 is the most delicate phase (Layer Management), in which our Team have to report all the crucial information about the dynamics of urban or territorial asset, energy, environment and mobility to decision-makers (local and regional governments, planners, resource managers and so on)”. WP3 is pivotal to a correct interpretation and display of data to support the planning, design and definition of urban and territorial policies.

## Workpackage 4

### Development of customized outputs

This WP will define the research output according to the needs of the users. A sample list may be the following one:

- The production of analyses and spatial

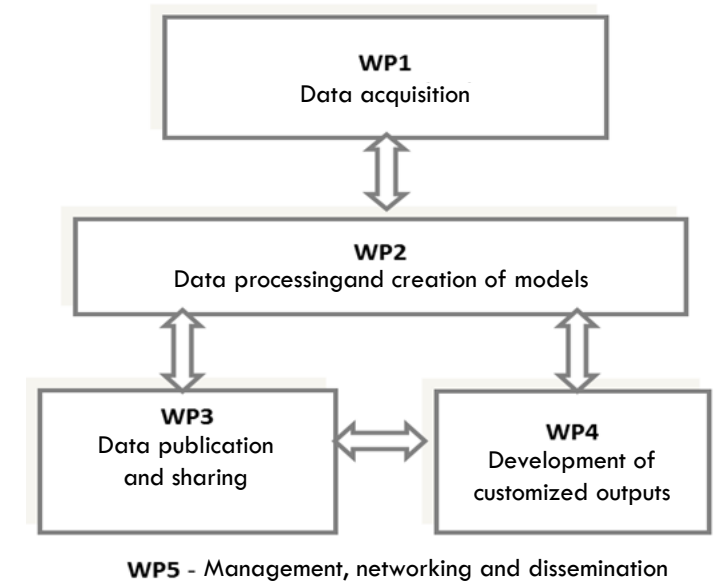
representations able to interpret - through quantitative and empiric models - the landscape, social and territorial quality and all the interrelationships between its various parts;

- The definition of cross-scalar metrics, that relate urban form (morphology) and consumption / production of energy and are able to adequately inform citizens and decision-makers in the field of sustainability and security;
- The development of high-quality studies to investigate the methodological problems and possible troubleshooting scenarios in the treatment of crime, violence, pollution and perception of urban quality
- The land monitoring with attention to its variations and the conditions of vulnerability and risk to prevent situations of emergency
- The evaluation of the quality and impact of interventions of urban regeneration ex ante, during the work and ex-post;
- The production of interpretative frameworks and methodological support for public and private entities in scientific research, design, evaluation and systematization of prevention programs and planning.

## Workpackage 5

### Management, networking and dissemination

This WP is related to the activity of management, continuous networking and promotion of the products of research, starting with those already in place.



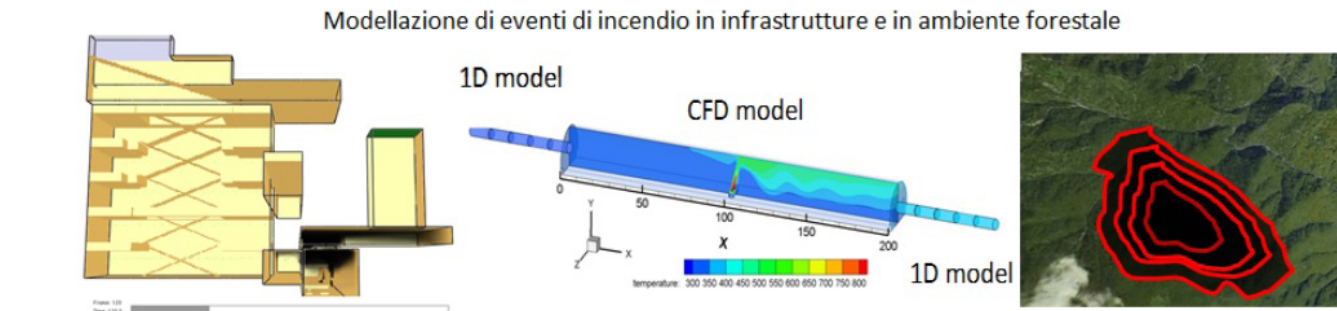


AF3 – Advanced Forest Fire Fighting

In recent years, the frequency of large wildfires has been increasing significantly due to a number of factors, including the effects of climate change, urbanization, mismanagement of the countryside and malicious acts. The project Advanced Forest Fire Fighting (AF3) intends to add a significant contribution to the current fire-fighting operations and to the protection of human lives, the environment and infrastructure through the development of innovative technologies and means to ensure a high level of integration between existing and new systems. The project partners are: Selex Galileo, Elbit Systems, EFPC, Fraunhofer- Gesellschaft Zur Foerderung Angewandten Der Forschung, Intracom SA Telecom Solutions, Demokritos, Skytek,

Politecnico di Torino, Centrum Badan Kosmicznych Polskiej Akademii Nauk, Pyro Fire Extinction, The University Of Westminster, EADS - Construcciones Aeronauticas, Ministry Of National Defence Greece, FAASA Aviación, Universitat Politecnica de Valencia, SA De transformación Agriculture, Linkopings Universitet, ARIA Technologies, Israeli Ministry of Public Security. The Politecnico di Torino participates with the departments of Energy, Engineering of the Environment, Land and Infrastructure, Management and Production Engineering, Mechanical and Aerospace Engineering and The Interuniversity Department of Regional and Urban Studies and Planning.

[www.iit.demokritos.gr/project/af3](http://www.iit.demokritos.gr/project/af3)

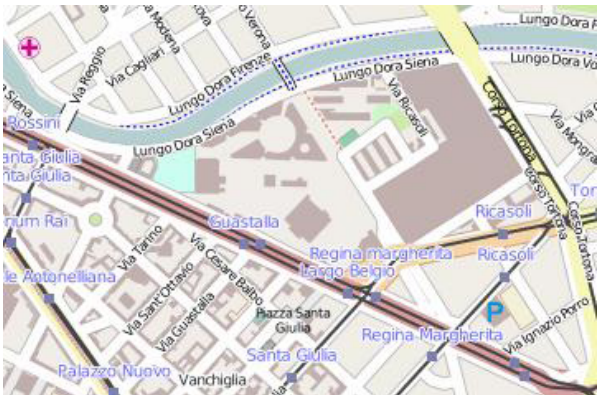


Participatory Mapping and Crowdmapping

The project "Participatory Mapping and Crowdmapping - A collaborative experimentation" - is a collaboration between the LARTU (Laboratory of Urban and Regional Analysis and Representations) of Interuniversity Department of Regional and Urban Studies and Planning (DIST) of the Politecnico di Torino and the Courses "Policies of the territory" and "Geography of Development" by Prof. E. Dansero, (Università di Torino). The aim of the project is to "photograph" the reality that surrounds the new "Luigi Einaudi" University Campus (CLE), offering written evidence of the elements that express the evolution of the new identity of a portion of the urban area during the last, significant transformations.

The data collection was made with "Walking-Paper" (which is a small printed "atlas", that limits the area of interest to one square for each group, based on the participatory mapping of OpenStreetMap). After this phase, the information was normalized, coded and transposed into a GIS platform using an Open Source Software Quantum GIS.

[www.s3lab.polito.it/progetti/progetti\\_in\\_corso/cartografia\\_partecipativa\\_e\\_crowdmapping](http://www.s3lab.polito.it/progetti/progetti_in_corso/cartografia_partecipativa_e_crowdmapping)



DIMMER – District Information Modeling and Management for Energy Reduction

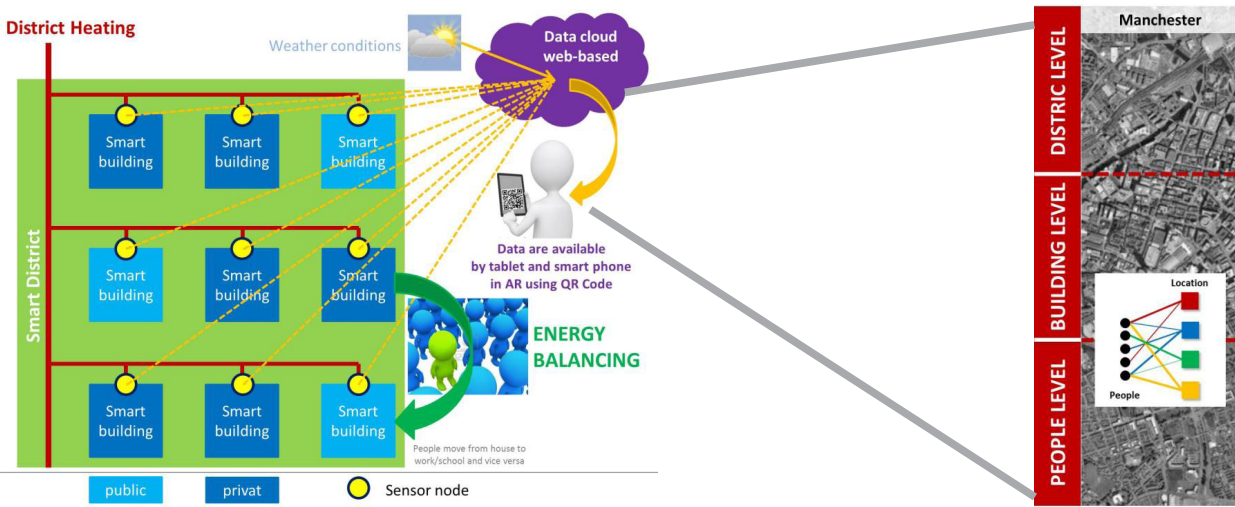
Dimmer (District Information Modeling and Management for Energy Reduction): Webservice oriented, open platform with capabilities of real-time district level data processing and visualization. ICT is recognized as being a key player against climate change: Pervasive sensors and actuators can efficiently control the whole energy chain (Smart Thermal/Electricity Grid). On the other side, advances on 3D modeling, visualization and interaction technologies enable user profiling and real-time feedback to promote energy efficient behaviors. To unlock the potentiality of these technologies, the DIMMER project focuses on:

- Interoperability of district energy production/consumption, environmental conditions and user feedback data;

- Exploitation of effective visual and web-based interfaces to provide pervasive and real-time feedback about energy impact of user behaviors;
- Enabling new business models for energy traders and prosumers exploiting user energy profiling;
- Integration of Building Information Models (BIM) with real-time data and their extension at the district level.

The Departments involved are: the Departement of Control and Computer Engineering (DAUIN), Interuniversity Department of Regional and Urban Studies and Planning (DIST), Department of Structural, Geotechnical and Building Engineering (DISEG), Department of Energy (ENERG).

<http://dimmer.polito.it/home>



DIRECT – Disaster REcovery Team

The DIRECT project (Disaster REcovery Team) aims to operate on all Disaster Management (DM), from environmental vulnerability to an immediate response to emergencies, to post-disaster relief, passing through the Capacity Building (CB) to train the operators for a direct participation. This initiative aims to contribute actively to the protection of the territory, of the architectural heritage and environmental, architectural and archaeological assets, during environmental

emergencies or in the case of goods subjected to dangers of even an ordinary, continuous type. The project involves student teams based on issues relating to Geomatic Engineering and Professors from the departments of Environment, Land and Infrastructure (DIATI) and Architecture and Design (DAD) and Inter-University Department of Science, Planning and Land Policy (DIST).

[www.s3lab.polito.it/progetti/progetti\\_in\\_corso/direct](http://www.s3lab.polito.it/progetti/progetti_in_corso/direct)





## MILESECURE-2050

MILESECURE-2050 - Multidimensional Impact of Low-carbon European Strategy on Energy Security, and Socio-Economic Dimension up to 2050 perspective - project aims to understand and overcome the political, economical and behavioural traits and trends that led Europe to its difficulties in reducing fossil fuel consumption, and in diversifying its energy balance at rates which guarantee European energy security in the next years (more specifically at the horizon 2050), reduce the threat of climate change, and diminish the risk of an energy gap in the coming decades.

[www.milesecure2050.eu](http://www.milesecure2050.eu)



## POCACITO – POst-CARbon Clties of TOMorrow

The project POst-CARbon Clties of TOMorrow (POCACITO) - foresight for sustainable pathways towards liveable, affordable and prospering cities in a world context - will develop an evidence-based 2050 roadmap for EU post-carbon cities. POCACITO facilitates the transition of EU cities to a forecasted sustainable or “post-carbon” economic model. The project focuses on towns, cities, megacities, metropolitan areas and urban clusters larger than 1 million people as well as small and medium-sized cities. POCACITO’s approach uses participatory scenario development as a mutual learning and living lab environment strategy.

<http://pocacito.eu/>



## POLICYCLE – POLItecnico for a suitable CYCLing Environment

The project is focused on bicycle mobility through the use of 3D techniques, remote sensing, data capture and acquisition from mobile platforms (GPS device, cameras, inertial platforms, accelerometers, etc.).

All this information will be useful for:

- building bicycle paths that can be shared and published using both a WebGIS system or on a Mobile App;
- monitoring bicycle mobility using a collaborative environment (Crowdsourcing).

The assumption of this project is that sustainable mobility is an essential value and to promote it means:

- reaching “zero environmental impact”;
- maintaining a high level of physical activity of humans that helps the lowering of all those diseases associated with the heavy use of classic mobility means (ie, breathing disorders, stress and high accident rates).

The project involves student teams based on issues relating to Geomatic Engineering and Professors from the departments of Environment, Land and Infrastructure (DIATI) and Architecture and Design (DAD) and Inter-University Department of Science, Planning and Land Policy (DIST).

[www.s3lab.polito.it/progetti/progetti\\_in\\_corso/policycycle](http://www.s3lab.polito.it/progetti/progetti_in_corso/policycycle)



# PROJECTS

IN PREPARATION

## HORIZON 2020

The European programme Horizon 2020 highlights how smart investments, particularly in multidisciplinary research and innovation, are essential to maintain a high standard of living and meet the great challenges of society. Research and innovation help create jobs, increase prosperity, improve the quality of life and promote global public goods through the creation of innovative products and services and the improvement in quality of life and safety.

The S3+Lab intends to participate in European competitions related to EU Secure Societies, focusing on the protection of citizens, civil society and economy, ensuring prosperity and well-being in the long run.

The aim is to strengthen the capacity of our society to respond to

both natural and manmade disasters, thanks to the development of new tools for crisis management, integration of communications and the development of innovative solutions, together with the involvement of citizens.

In particular:

- **FCT-10-2014 - Urban security topic 1:** Innovative solutions to counter security challenges connected with large urban environment,
- **DRS9-2014-2015 - Disaster Resilience & Climate Change topic 1:** Science and innovation for adaptation to climate change: from assessing costs, risks and opportunities to demonstration of options and practice.

<http://ec.europa.eu/programmes/horizon2020/en>

## Regional Call to support projects of industrial research and/or experimental development of integrated and innovative applications in the field of Internet data - IoD

This initiative comes from the Regional Operational Programme of the European Regional Development Fund (ERDF ROP): Axis I - Innovation and Production Transition. The Piedmont Region aims to strengthen the competitiveness of the regional system by increasing its ability to produce research, innovation and technology transfer also on unexplored issues and on environmental innovation and development of the Information Society.

The S3 + Lab aims to participate by proposing two projects based on two topics: “Environment” and “Smart Communities”:

- Environment: “**Life care: new methods and technologies for environmental sustainability**”. The preservation and environmental sustainability are topics on the agenda because there are increasingly more frequent cases of environmental disasters such as pollution, flood and/or hydrogeological problems. In this context, the idea is to develop an integrated network of sensors that enable innovative, careful and accurate monitoring of the environment, focusing on air quality as well

as on the territorial control of instability event (subsidence movements and ground deformation).

- Smart Communities: “**Smartnet: social network for urban quality**”. Today, thanks to a smartphone or a tablet, each of us, can be connected to the internet and is able to exchange information and data with the rest of the community. In addition to this network of “active” users there is the vast flow of data coming from various sources that live and move within the smart city (public transport, road users, cameras, wi-fi networks, and more). The project aims to put this information and data into the system in order to assess the safety, environmental quality and livability of urban areas, with parameters that are quantitatively measurable and subjective (perception).

## Heritage Plus

Heritage Plus is an Era-Net plus action which will support the JPICH by proposing concrete solutions for pooling national expertise and resources and establishing closer and robust collaboration among the participating States in the field of cultural heritage.

The Heritage Plus action will improve the coordination of national research and policies in the domain of cultural heritage research.

[www.jpi-culturalheritage.eu/heritage-plus](http://www.jpi-culturalheritage.eu/heritage-plus)

S3+Lab will participate at the LET's conference that will be held in Bologna (Italy) from September 29th to October 1st 2014 with the aim of discussing the role of the Key Enabling Technologies pinpointed by Horizon 2020, the European Union Framework Programme for Research and Innovation.

LET'S 2014 is an international Conference organised in the context of the Italian Presidency of the Council of the European Union, with the Patronage of the Ministry of Education, University and Research, the Ministry of Economic Development and the Ministry of Foreign Affairs, and supported by European Union Funding for Research and Innovation.

[www.lets2014.eu](http://www.lets2014.eu)



## Newsletter N. 0 | June 2014

### DISSEMINATION

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