

POLITO INNOVATION DESIGN LAB: THE CASE STUDY OF INNOVATION DESIGN FOR FOOD

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SUSTAINABLE BUILT ENVIRONMENT TOWARDS POST-CARBON CITIES

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Supporters



Volume 1

A BRIEF INTRODUCTION TO THE SBE CONFERENCE SERIES

Nils Larsson

SBE16 TORINO. BRINGING TOGETHER RESEARCH AND URBAN
STAKEHOLDERS

Andrea Moro

SBE16 TORINO: TOWARDS POST CARBON CITIES. AN INTRODUCTION

Patrizia Lombardi

URBAN SYMBIOSIS, A NEW PARADIGM IN THE SHIFT TOWARDS POST-
CARBON CITIES

Karel Mulder

INTEGRATED APPROACH TO SUSTAINABLE BUILDING DESIGN
PROGRAMMING

Marianna Nigra, Mario Grosso, Giacomo Chiesa

NATURE-BASED URBAN SPACE TRANSFORMATION

Kristin Barbey

GROWING OR STEADY CITIES? ACCOUNTING THE URBAN METABOLISM OF
ITALIAN CITIES

Osman Arrobbio, Dario Padovan

POLITO INNOVATION DESIGN LAB: THE CASE STUDY OF INNOVATION
DESIGN FOR FOOD

Andrea Gaiardo, Chiara L. Remondino, Barbara Stabellini, Paolo Tamborrini

TOWARDS A MICROFOUNDATION OF URBAN METABOLISM

Dario Padovan, Alessandro Sciuillo

SMART AND SUSTAINABLE TRANSPORT THROUGH UNIVERSITY CAMPUS

Codrin Cuciurean, Mihai Florea, Valerian Croitorescu

BESPOKE APPROACH FOR MAINTENANCE MANAGEMENT OF FACILITIES AT
NIGERIAN PUBLIC UNIVERSITIES

Anita Adamu, Winston Shakantu

ENERGY EFFICIENCY IN A LARGE UNIVERSITY: THE UNITO EXPERIENCE

Dario Cottafava, Paolo Gambino, Marcello Baricco, Andrea Tartaglino

SUSTAINABILITY MANAGEMENT IN UNIVERSITY CAMPUSES: THE ROAD
FROM SCATTERED GOOD PRACTICES TO SYSTEMIC TRANSFORMATIONS

Giulia Sonetti, Patrizia Lombardi, Yolanda Mendoza

**Systematic Approaches
to Sustainability**

**Sustainable University
Campuses**

Assessment Methods and Tools

ENVIRONMENTAL ASSESSMENT METHOD FOR DECARBONISED URBAN RENEWAL

Barbara Gherri

SUSTAINABLE NEIGHBOURHOODS RETROFITTING. APPLYING FASUDIR INDICATORS TO ASSESS THE SUSTAINABILITY PERFORMANCE OF A RESIDENTIAL NEIGHBOURHOOD IN WOLFRATHAUSEN, BAVARIA

Ahmed Khoja, Paul Mittermeier, Natalie Essig

UNDERSTANDING VARIATION IN BUILDING ENERGY ANALYSES: USING EXTANT LITERATURE TO EXPLAIN POLICY OUTCOMES

JC Martel

SMART AND SUSTAINABLE NEIGHBOURHOOD ASSESSMENT: INVESTIGATING THE HUMAN PERSPECTIVE OF SMART NEIGHBOURHOODS

Réka Tóth, András Reith

Sustainable Urban Districts Retrofitting

BIPV SOLUTIONS IN RESIDENTIAL RENOVATIONS TOWARDS NEARLY ZERO ENERGY DISTRICTS

David Martín, Elena Rico, Isabel Sánchez, Cristina Fernández, Teodosio Del Caño

CULTIVATING A VILLAGE IMPULSE IN THE MIDST OF WARSAW, THE JAZDÓW SETTLEMENT OF FINNISH HOUSES

Dariusz Śmiechowski

INTERCONNECTION OF OPEN AND CLOSED PUBLIC SPACES IN HISTORIC CITY CENTERS IN RUSSIA

Mariya Komarova

BUILDINGS BUILT WITH INDUSTRIALIZED TECHNOLOGY. TOWARDS NEARLY ZERO-ENERGY BUILDINGS IN CENTRAL EUROPE

Attila Talamon, Viktória Sugár

THE ROLE OF PRODUCTION SPACES IN A POST-CARBON VISION

Emanuele Protti

THE RUHR, VIRTUOUS MODEL OF UPGRADING?

Chiara Cordopatri

Policies & Regulations for a Sustainable Built Environment

A NATIONAL RESEARCH AGENDA FOR INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT

Sarah Isabella Chiodi, Matteo Tabasso

LOCAL SUSTAINABILITY PROFILES A NEW APPROACH TO URBAN SUSTAINABILITY STRATEGIES

Peter Ulrich, Edgar Goell

ENERGY SECURITY SCENARIOS OF FUTURE EUROPE. UPSCALING PIONEER EXPERIENCES IN A LOW CARBON CONTEXT

Christophe Cassen, Meriem Hamdi-Chérif, Jean-Charles Hourcade, Giancarlo Cotella, Jacopo Toniolo, Patrizia Lombardi

THE BERLIN WATER CONSUMER STOCK OWNERSHIP PLAN. MAINTAINING A CLEAN SPREE

Jens Lowitzsch

Volume 2

THE 2012 LONDON GAMES: CAN OLYMPIC LEGACIES BE SUSTAINABLE?

Simona Azzali

ISTANBUL METRO: A POSSIBLE EXAMPLE OF ENERGY GEOSTRUCTURE

Luca Soldo, Antonio Dematteis, Fabio Furno, Marco Barla

COST BENEFIT ANALYSIS AND SMART GRIDS PROJECTS

Cristina Becchio, Stefano Paolo Corgnati, Federico Dell'anna, Marta Carla Bottero

AN OVERVIEW OF AERIAL ROPEWAY TRANSIT AND ITS POTENTIAL IN URBAN ENVIRONMENTS

Fanny Carlet

ECOSYSTEM SERVICES AND URBAN PLANNING. TOOLS, METHODS AND EXPERIENCES FOR AN INTEGRATED AND SUSTAINABLE TERRITORIAL GOVERNMENT

Carolina Giaimo, Dafne Regis, Stefano Salata

TAILORING THE NEXT GENERATION ENERGY MANAGEMENT TOOL FOR SMART CITIES

Sergio Jurado, Alberto Fernandez, Narcís Avellana, Michael Oates, Guenter Müller, Tatjana Perše

SUSTAINABLE NEIGHBORHOOD REGENERATION: HOLISTIC DECISION SUPPORT METHODOLOGY SUPPORTED BY A SOFTWARE TOOL

Paul Mittermeier, Natalie Essig, Ahmed Khoja

INTERACTIVE VISUALIZATION TOOL (INVITO): A WEB VISUAL TOOL FOR SHARING INFORMATION IN TERRITORIAL DECISION-MAKING PROCESSES

Stefano Pensa, Elena Masala, Francesca Abastante, Riccardo Gagliarducci

BIM-GIS MODELLING FOR SUSTAINABLE URBAN DEVELOPMENT

Sara Torabi Moghadam, Patrizia Lombardi, Francesca M. Ugliotti, Anna Osello, Guglielmina Mutani

TOWARDS SUSTAINABLE SMART URBAN DISTRICT: A MACBETH APPROACH

Francesca Abastante, Isabella M. Lami, Patrizia Lombardi, Jacopo Toniolo

Urban Infrastructure for Post-Carbon Cities

Decision Making Methods and Tools at Urban Scale

INTERACTIONS OF SHOPPING CENTRES WITH LOCAL ENERGY GRIDS

Matthias Haase, Kristian Skeie, Javier Antolín, Ana Quijano,
Jesús Samaniego, Luis Ángel Bujedo, Federico Noris, Annamaria Belleri

POST-CARBON CITY PLANNING. BACKCASTING METHODS IN ASSESSING
LONG-TERM URBAN SOLUTIONS

Manila De Iuliis

THE BREAK-EVEN POINT. IMPACT OF URBAN DENSITIES ON VALUE
CREATION, INFRASTRUCTURE COSTS AND EMBODIED ENERGY

Serge Salat

MANAGEMENT STRATEGIES FOR THE ENERGY SAVING OF PUBLIC
BUILDINGS THROUGH A DECISION SUPPORT SYSTEM

Alfonso Capozzoli, Vincenzo Corrado, Alice Gorrino, Marco Savino Piscitelli,
Leandro Madrazo, Álvaro Sicilia

**Sustainable Districts:
Case Studies**

SUSTAINABILITY OF SPORTS FACILITIES. CRITERIA AND CASE STUDIES

Simone Magdolen, Natalie Eßig

GREEN DISTRICT. CASE STUDY IN REGGIO CALABRIA

Domenico Enrico Massimo, Cinzia Fragomeni, Alessandro Malerba,
Mariangela Musolino

VALENCIA CITY COUNCIL EDUCATIONAL CENTRES FOR CLIMATE CHANGE
AND ENVIRONMENT

Josep Santacatalina, Paula Llobet

FROM POST-INDUSTRIAL WASTELAND TO ECO SUCCESS: THE INNOVATIVE
RENEWAL OF HAMMARBY SJÖSTAD

Alys Solly

THE RISE OF HUMAN FACTOR IN THE CHANGE OF ENERGY SYSTEMS: THE
CASE OF 20 SUSTAINABLE DISTRICTS IN EUROPE

Giovanni Caiati, Gabriele Quinti

CONCERTO AL PIANO: A SUSTAINABLE URBAN DEMONSTRATION PROJECT

Roberto Pagani, Corrado Carbonaro, Lorenzo Savio

**Buildings for
Post-Carbon Cities**

A PRAGMATIC APPROACH FOR EMBODIED CARBON ESTIMATING IN
BUILDINGS

Michele Victoria, Srinath Perera, Alan Davies

NATURAL VENTILATION AND THE EFFECT ON THERMAL COMFORT AS
SUSTAINABLE STRATEGIES IN DRY HOT ARID CLIMATE. A CASE STUDY IN
DAMASCUS

Kindah Mousli, Giovanni Semprini

METHOD AND TOOLS FOR ASSESSMENT OF ENERGY PERFORMANCE OF
BUILDINGS. CASE STUDY

Henri Obara, Marc Azar, Francesco Curci

FEASIBILITY ANALYSIS OF AN INTEGRATED BUILDING ENERGY SYSTEM

Maria Brucoli, Alessandro Grieco, Michele Antonio Trovato

THE ROLE OF HOTELS IN SHAPING A SUSTAINABLE BUILT ENVIRONMENT

Tiziana Buso, Marina Carbone, Stefano Paolo Corgnati

LINKED ENERGY DATA, ENABLING MONITORING AND DECISION SUPPORT FOR IMPROVED ENERGY MANAGEMENT

Michel Böhms, Theo Rieswijk

ENERGY CONSUMPTION REDUCTION IN URBAN AREAS. THE ROME AND MANCHESTER ODYSSEUS CASES AND WAYS FORWARD FOR A REPLICATION IN OTHER CITIES

Roberto Santoro, Alessandro Braccini

ODYSSEUS - OPEN DYNAMIC SYSTEM FOR HOLYSTIC ENERGY MANAGEMENT. A CASE PILOT FROM THE VIII MUNICIPALITY OF ROME

Cristina Fantini, Claudio Vecchi

ODYSSEUS: MANCHESTER PILOT STUDY

Stephen Curwell, Martine Tommis

THE ODYSSEUS MONITORING AND DSS (DECISION SUPPORT SYSTEM) SOLUTIONS

Bruno Fies, Alberto García, Manuel Ramiro

Special Session

ODYSSEUS
project results

A BRIEF INTRODUCTION TO THE SBE CONFERENCE SERIES

The Torino SBE16 conference was part of a series of conferences that focus on sustainable building and construction. The series was launched in 2000 and includes four international organizations as co-owners:

- *International Council for Research and Innovation in Building and Construction* (CIB, www.cibworld.nl)
- *International Initiative for a Sustainable Built Environment* (iiSBE, www.iisbe.org)
- *Division of Technology, Industry and Economics* (DTIE) of the *United Nations Environment Programme* (UNEP-SBCI, Sustainable Building and Climate Initiative, www.unep.org/sbci/)
- *International Federation of Consulting Engineers*, www.fidic.org

The SBE conference series is now considered to be the pre-eminent international conference series on sustainable building and construction. The series is held on a three-year cycle with planning and preparation in year 1, national/regional conferences held in year 2 (2016 In this cycle), and a single global event to be held in year 3. Later this year, a proposal call will request expressions of interest for participation in the 2019-20 cycle.

The series places a core emphasis on peer-reviewed papers, presentations of regional policy papers, displays of pre-evaluated projects and a small number of high-quality commercial exhibits. These events also provide fast-track inclusion of the best technical papers from national/regional conferences into the global event, as well as registration policies designed to encourage the attendance of students and delegates from developing countries.

Twenty national/regional conferences are confirmed for 2016 and Hong Kong has been selected as the site of the World SBE17 conference, to be held in early June 2017.

In all of these conferences, one or more local research-based organizations have taken financial and organizational responsibility while iiSBE, CIB and UNEP-SBCI, as the international series owners, have given organizational advice and have used their networks to help ensure a large multi-disciplinary audience for the events.

The increasingly high reputation of the series has resulted in other research groups and organizations holding events concurrently with these events, thereby maximizing the benefit for delegates. In short, the SB-series of conferences provides delegates with an unparalleled view into national, regional and international sustainable building issues every three years, while providing host organizations with increased visibility and effectiveness in their own regions.

The series continues to evolve. Up to and including 2013 the series was titled the "SB" or *Sustainable Building* conference series, but the series partners have now changed the series name to "SBE", standing for *Sustainable Built Environment* series, to more clearly indicate the inclusion of issues related to local urban areas and supporting infrastructure. There is also an increasing emphasis on continuity, reflected by the establishment of a Panel of Advisors, consisting of global conference organizers going back to 2000, and an increased emphasis on having the World SBE conference organizers participate in the national/regional SBE events.

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SBE16 TORINO BRINGING TOGETHER RESEARCH AND URBAN STAKEHOLDERS

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Today more people live in urban areas than in rural areas (54%). In 1950, only 30 % of the world's population was urban. By 2050, 66 % of the world's population is projected to be urban. 90 % of the increase by 2050 will be concentrated in Asia and Africa. The consequence is that sustainable development challenges and issues will be concentrated in cities, particularly in the lower-middle- income countries where urbanization processes are more relevant. In the same time in Europe the construction sector represents around 42% of final energy consumption and 36% of CO₂ emissions and is a major consumer of intermediate products (raw materials, chemicals, electrical and electronic equipment, etc.). The main reason for the huge impact of the European building sector on the environment is the low energy efficiency of the existing building stock that for more than the 70% was built before the first energy crisis (1970's decade). It has been estimated that 3% of the total EU building stock would need to be deep-renovated each year for the next 40 years to meet EU 2020 and 2050 energy, carbon and economic goals. To improve the sustainability of the built environment, it is clear that the building scale is not the more appropriate. The issue has to be managed at urban scale where it is possible to profit for potential synergies between buildings and other possible contributions. The role of cities in reducing the impact of the building sector is of fundamental importance. The SBE16 Torino conference addressed this issue from the point of view of policies, decision making processes, assessment tools, methodologies, case studies with a particular attention on the results of the most innovative research projects in the field of urban sustainability.

The event involved more than 10 European Research projects at urban scale from different programs (Interreg - territorial cooperation, H2020 - innovation and PPP partnership, etc.). A networking event has been organized between the projects in cooperation with CESBA (Common European Sustainable Built Environment Assessment), the European initiative for the harmonization of sustainability assessment standards. The concept of an International Sustainability Passport for cities and neighbourhoods has been discussed as the possibility to define common metrics and indicators to measure the performance of urban areas. In particular, the EU FP7 project FASUDIR (Friendly and Affordable Sustainable Urban Districts Retrofitting), one of the promoters of the conference, showed how indicators and assessment tools could be the core of efficient decision making processes to improve the sustainability of cities and districts. A session has been also devoted to policies, as a main driver to start the change. The conference has been organized with the support of the City of Torino and it has involved several other public organizations. Possible policies based on incentives and new business models have been discussed and specific recommendations for policy makers drafted.

Only with a system action involving all the stakeholders of the building sector, the users and the communities in particular, will allow to reach a real improvement. This has been the spirit of the SBE 16 Torino: to actively involve all the participants with different backgrounds in exchanging views and visions and to identify synergic actions for post carbon cities.

**SBE16 TORINO
TOWARDS POST CARBON CITIES
AN INTRODUCTION**

Cities are today recognized for their key role in the fight against climate change, at the international level (Vidalenc et al., 2014). In particular, cities are becoming the focal point of climate change mitigation strategies because they are able to respond to disturbances in their external environments in addition to internal environments (Evans 2008). Cities are here understood not only as local authorities but as complex, adaptive, social-ecological systems, including local ecosystem of inhabitants, companies, public utilities and local governments.

Furthermore, urban population growth creates pressure on the environment (resource consumption, especially energy and land use) and the urban economic (financing of infrastructures, financing of public services) and social (health impacts, air pollution, noise pollution; employment; social integration, quality of life) systems. This pressure is likely to increase, producing a strong impact on urban metabolism. Cities currently consume 75% of energy and are responsible for the production of about 80% GHG (Greenhouse gas) emissions globally (IEA, 2008; UNEP, 2012; IPCC, 2014). This large consumption of environmental and energy resources is often accompanied by strong social inequalities (ESPON, 2010).

In recent years, the “Post-Carbon City” has emerged as a concept as it emphasises the process of transformation, a shift in paradigm, which is necessary in order to respond to the multiple challenges of climate change, ecosystem degradation, social equity and economic pressures. According to the EU POCACITO project – POCACITO – POCACITO – POCACITO: foresight for sustainable pathways towards liveable, affordable and prospering cities in a world context (SSH.2013.7.1-1), this concept has emerged from a rupture in the carbon-dependent urban system that has led to high levels of anthropogenic greenhouse gases. More specifically, the term “post-carbon” emphasizes the process of transformation, a shift in paradigm, which is necessary to respond to the multiple challenges of climate change, ecosystem degradation, social equity and economic pressures. Post carbon cities must reach a massive reduction of greenhouse gas emissions (GHG) to reach the targets posed by the European Commission in 2011, launching the Energy Roadmap - “Roadmap for moving to a competitive low-carbon economy in 2050” (COM 2011, 112). This involves a cut in the EU greenhouse emissions by 80 % by 2050 (compared with 1990 levels) entirely through measures taken within Europe. To achieve this, intermediate GHG cuts of 25% by 2020, 40% by 2030 and 60 % by 2040 would be needed. This policy has been reinforced at international level at the Conference of Parties, COP21, in Paris, last December 2015. This implies the establishment of new types of cities that are zero-carbon as well as environmentally, socially and economically sustainable.

According to Loorbach (2014), the process towards post carbon city can be understood as the aggregation of a number of underlying transitions and incremental processes of experimentation, breakthrough, institutionalization, behavioural and cultural change (he talks of a “socio-economic revolution”). All these processes are mainly driven, in our Western democracies, by distributed control, renewable resources and systemic innovation, representing

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a “fundamental power shift away from powerful elites controlling resources, money and power towards diverse and distributed forms of collaboration between professionals and citizens”.

The EU MILESECURE-2050 project, “Multidimensional Impact of the Low-carbon European Strategy on Energy Security, and Socio-Economic Dimension up to 2050 perspective” (SSH.2012.2.2-2) has revealed that policy-makers may be ignoring the “human factor” in energy transition to the detriment of rapid and significant change across Europe. This implies significantly less emphasis on technology and on top-down planning and more emphasis on the enabling of both individuals and social groups to articulate themselves and participate in the energy transformation.

In short, the human factor becomes the driver of energy transition in at least three distinct levels: i) the set-up of energy production and consumption becomes more visible and closer to citizens; ii) the energy issue becomes a direct interest of citizens who actively participate in the regulation, orientation, management (also in economic terms) and monitoring of measures and policies of energy transition; iii) there is a strong personal effort on the energy transition through an intense emotional involvement.

In conclusion, the transition toward “post-carbon city” requires that citizens and all private consumers are more aware, active, energy sufficient, as well as being a prosumer producing energy for their own consumption, where this is possible.

At the same time, this transition imposes new paradigms in the policy makers agenda. It requires a burst in the carbon-dependency of our urban systems, which has led to current high levels of greenhouse gases. Hence, to tackle sustainability challenge towards post-carbon cities, urban planning policies must be identified that not only look at technology-related issues (“smart city” paradigm), but also at citizens behavior and to how they respond to building performances and available urban services. For instance, when the urban community is well self-organised, and can rely on traditional knowledge about coping with changes without external help, resilience increases and disaster/emergency response gives better outcomes. Management can destroy or build resilience, depending on how the social-ecological system organises itself in response to management actions (Folke et al, 2002; Ernstson et al, 2010). Thus, resilience, for social-ecological systems, can be defined as the capacity of a system to cope with change, either through persistence, adaptation or transformation (Korhonen & Seager, 2008). The study of the transition towards future production and consumption systems involve not only a more efficient usage resources but also a resilience building among communities. In this context, innovative case studies are those related to sustainable university campuses. The concept of “Living Lab” takes students, teachers and administrative staff as “citizens” of a portion of the city. In addition, the vast partnerships among universities and among academia and its environment lead many universities to assume a highly ambitious role of collaborating with diverse social actors to create societal transformations in the goal of sustainability.

Unfortunately, the available literature in the field tend to be either engineering-led without understanding socio-economic complexities of both the building market and the urban forms, or simply qualitative based on small surveys and case studies. This gap influences negatively sustainable urban planning policies.

In the current transition, new uncertainties and vulnerabilities of cities are emerging, that require an holistic evaluation approach and new integrated collaborative methods and tools with the aim at assisting urban planners, built environment stakeholders and policy makers in their efforts to plan, design and manage post-carbon cities.

The papers presented at the Sustainable Building Conference 2016 in Turin last February 2016 has revealed new research directions and scientific outputs in the above topics, reflecting on all the followings:

1. Systematic Approaches to Sustainability
2. Sustainable University Campuses
3. Assessment Methods and Tools
4. Sustainable Urban Districts Retrofitting
5. Policies & Regulations for a Sustainable Built Environment
6. Urban Infrastructure for Post-Carbon Cities
7. Decision Making Methods and Tools at Urban Scale
8. Sustainable Districts: Case Studies
9. Buildings for Post-Carbon Cities

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Systematic Approaches to Sustainability

Abstract

The Polito Innovation Design Lab is a University laboratory created to research and promotes initiatives that help to reach innovative project and broaden the culture of sustainable innovation. The mission of the lab is to manage, coordinate and carry out research projects about products, services or models able to meet real needs of people with a regards to territorial potential perspectives of technology, environment, economics, culture and social sciences. In this paper is presented the Innovation Design For Food (IDF) case study. The innovation challenges faced in this project aimed to redefine, reshape and produce social, economic and environment impacts and effects with a sustainable perspective in the different district of the city using the food as an enabling factor. The final scope of the project was to train and experiment the ability of sustainable design process to enhance a special context or territory, starting from the resources currently present in it. The paper presented is divided in two sections, the first go through an introduction and an explanation of the methodology and the design process adopted to achieve the results presented in the second section of the paper.

1_ Introduction

The design role inside the company and the society is radically changing in recent years. If the design has become an essential asset in any product or service delivered in the market, other indicators suggest an increasingly importance of the role of design as a strategic tool in the vast landscape of innovation, as suggest Tim Brown (Cicoria. 2013). In fact if the innovation is a multifunctional force that must continually refine his form method and his meaning to be able to reply to new outcome issues (Tamborrini. 2014), the multidisciplinary nature of design fits in a natural way into the needs, managing in a proper manner these aspects. In addition, we are witnessing in every social and market field context, a speed and unpredictability that have dealt a blow to the old systems and established “modus operandi”. The result is a growing complexity and a lack of predictability that affect industries, corporate and institutions that every day are looking to the right way to navigate into this fog (Josiassen & Rosted. 2014).

This scenario became even worst if we pair these kind of issues with the growing demand of sustainability in the society, economic and environment factors. All these aspects are the precondition why nowadays there are more attention into the research for tools able to handle the increasingly complex and apparent chaotic contexts of today. On this line and with the trend that opening up to the “golden age of design” (Walker, 2014), the research team of the Department of Architecture and Design is moving to study, to map, to re-define and to experiment a methodology capable to answer at new meanings and emerging needs for those who create innovation in order to progress and prosper (enterprise) and for those who need it to improve their quality of life (the user/subject) with a sustainable perspective. In order to give a structured response it was created the Innovation Design Lab. In the laboratory researcher and student are challenge in innovative sustainable initiatives

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with the goal to research and learn how to manage, coordinate and carry out design projects able to meet real needs of people with regards to territorial potential perspectives of technology, environment, economics, culture and social sciences.

2_Sustainable Innovation Design

Sustainable innovation is nowadays not more a feature on the innovation eco-system but is an essential component of the innovation itself (De Biase. 2015) enabling green and growth to go hand by hand, and design (Walker. 2014) has gained the multidisciplinary expertise to drive it in the right way. Design with a sustainable perspective means to create new opportunities as new economic model, new social engagement and lifestyle improvements with a reduced input into the original context of introduction.

Sustainable endeavors are changing the vision of how and why we are designed. The context, the focus on reduction and reuse, or the smart allocation of resources, the delivery of better and more suitable product/service to users, the creation of new partnerships with the actors involved in the system, they are all pieces of the innovation system that has to be taken into account to make additional revenues or create new lines of business, solving at the same time social issues such as unemployment, social exclusion, health enhancement, education and so on. But when it comes the necessity to design a innovative project, with a sustainable approach, theory and practices are different aspects that have to work together. The theory is setting the perspective and the guidelines of the innovation project while the practice has to set up the tool able to answer to the challenges identified.

To manage this process we need clear and stable methodology. For that reason the Innovation Design Lab continuously research and study the various innovation theories and design methods come out in this area. But not only the first set of the research was to define very clear the scope of this methodology so the research team, following the studies of Larry Keely (2013) and Roberto Verganti (2009), set its own definition on sustainable innovation. Design as that the practice of creating a new viable value/benefits sustainable proposition (Gaiardo & Tamborrini 2015). In this definition, the aim of the innovation is focusing on delivering new, viable and concrete sustainable result activities with a tangible value/benefit for all the actors involved. Equally the design methodology adopted to guide the stage of product/service design innovation derives from the Systemic Design approach used and taught in design courses at the Architecture and Design Department (Bistagnino. 2009) and the well-know design Industrial process.

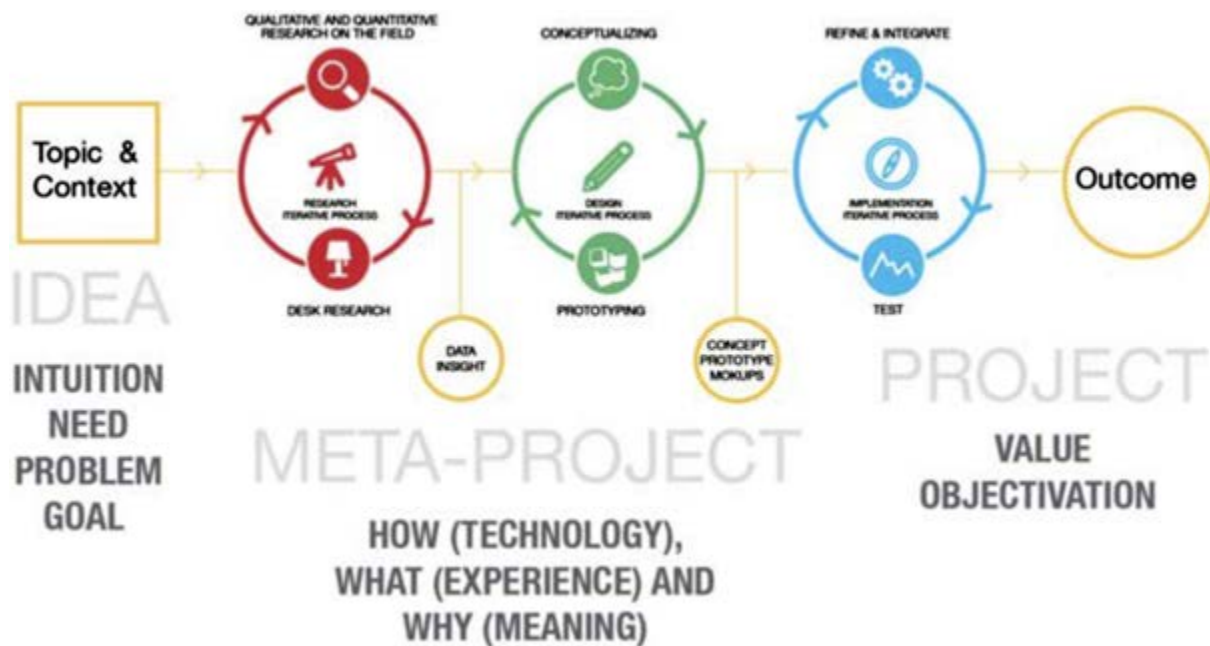
3_Design Methodology Process

The Systemic Design approach is not amenable to simple recipes or toolkits because of his complexity and his multi-faceted process, but it is the right approach to drive with awareness the achievement of the best possible result. The aim of this approach is to unlock and exploit the innate value of the context as a starting point. For that reason all the project have to start with a deep and careful analysis of the complex relationship between different

actors (individuals, society, enterprise, culture, territory, etc.) and the related cultural, economic and community area or territory.

Data and context are the two core of this approach. Nowadays more than ever the new information and communication technologies and in particular the ability to gather, analyze and disseminate large swaths of data and connect large number of people over broad areas have enabled a greater understanding of what surround us. This approach is a strategic way to face the design innovation activity to better meet the real need of a context.

Figure 1. Design Process Schema.



The design process come out, described in general view in the picture (fig. 1), goes through in all the stage of the innovation design process. The preliminary step is the definition of the goal's project with the description of the topic and context action boundaries. The set up of these boundaries derives from what we would like to achieve and is drive by an intuition, an idea or an issue to solve. The meta-design phase, or rather the design expectations that will provide indications without the specific solutions to implement the project (Germak & Celaschi. 2008), starts and ends with two iterative processes: the research and the design step. In this phase, the assignment of the designer is to answer why he is adopting a solution, what is the solution and how the solution adopted will work.

The research step begins with the exploration and collection of broad and tangential information in order to examine the vast array of issues, features and relationship surrounding the topic. The analysis of this overall picture drives into a deep understand of the topic, outlining the real role of all the actors involved within their scope, their development and their relations in their operational context. The amounts of data generate the design analysis/data documentation. This output is the fundamental under layer leading into the second stage where it starts the iterative process of design. At this step, the designer have to develop guidelines and propose solutions in according to the research step, described before. The result of this stage as to be a functional prototype or mockup of the concept outcomes. The intent of this outcome is

to communicate and explain how the concept works and how it answers to the goal's project.

The last phase is the implementation of the concept with his development and the launch test phase where, with iterative tests, it is still possible to correct the problem occurred before to deliver the project over.

4_Innovation Design for Food

Innovation Design for Food (IDF) was born from an academic experience within the innovation master course of the Politecnico di Torino. The aim of it was focused on studying different districts of Turin and, starting from their problem and resources, introducing a sustainable innovation able to improve the social or the economic or both aspects with the use of food (supply chain and related things) as an enabling factor. In fact, the heart of the project was to transform the existing resources in the food sector, then it was necessary to know in deep all the infrastructure, the economic relationship, the human value and the cultural assets involved in this system before studying and conceiving any sort of improvement. The students were challenged in the creation of social and environmental innovations within specific areas of the city of Turin. In particular, the activity involved food as a symbolic element of identity, communication and information, in order to put in relation different cultures and enable initiatives on the socio-economic development. The experience was divided in two different phases: the research phase and the design one.

The research phase was structured to provide a large amount of material and details: first of all, the project team performed a complete mapping of the food business in the area (related to sale, consumption and distribution), which allowed us to understand the economic and commercial site. In this collection of data it was added a careful analysis on the livability, the everyday life and the perception of the area: these aspects, crossed with sociology, made an important contribution for the knowledge of the neighborhood's social reality. During this phase it was fundamental the continuous research and conversation with merchants and activities related to food. Therefore projects were created thanks to a wide-ranging vision that involved the actual capacities and the possibilities of future development. The selected projects meet all the requirements of environmental, social and economic; they aim to improve the quality of life using a mix of communication, productive and interactive skills.

4.1_Research phase

In order to find out the values of the territories, the different teams analyzed different types of qualitative and quantitative information as a quality of natural and built environment, together with identity elements and cultural living conditions, and the economic settlements of the neighborhoods around the city centre. In particular, this type of research was conducted with a research carried out to investigate the overall context of action in three main fields: environment, socioeconomics and the specific food field. Regarding the first and the second aspects, the project used traditional ethnographic

methods to analyze the environment field (natural heritage, infrastructure, public spaces, mobility system, garbage system and quality perceived by residents) and the socioeconomic field (history, economic identity, quality of life, target of residents, culture, events, associations and economic fabric). The tools used in this phase ranged from interviews, empathy explorations, qualitative and quantitative data analysis, contextual maps, case history and value network maps.

The food field analysis was conducted instead with the collaboration of LARTU (Laboratory of Analysis and Territorial and Urban Representations) through an experiment for testing a digital mapping process. The data acquisition was entirely performed on the ground, using a laptop and a smartphone app that allowed users to use, create and share data maps, thanks to the link to a collaborative cloud-based platform.

The data collected were divided into four main categories: production (urban garden, social garden,...), distribution (street food, retail store, lorry owner, ...), sale (store, market, supermarket, ...) and consumption (coffee shop, restaurant, take-away, ...). For each category was made a distinction based on the nature of the food in terms of regional, national, ethnic, biological, vegan food, and so on. All the data were put into a map to analyze the distinction and the distribution of the different actors involved inside the food system in the city and in each district. The experiment produced useful data on the chain of production, distribution, sale and consumption of food. It encouraged students to reflect on the objectives of the design proposal, with extensive reflections on methods and times of living in the same city. In this way, it was possible to reconnect food to some aspects, among which:

- food as a source of well-being and health for different populations target, both inhabitants (elderly people, youth, children, foreigners-natives) and city users (employees, visitors);
- food as a testimony of culture and traditions rooted in the territory;
- food as a source of innovation in the agroindustrial chain;
- food as a vehicle for interaction and exchange among different ethnic groups and cultures;
- food as a urban polarity and “attractor”, even against new emerging polarities (universities);
- food as a symbolic element of socio-cultural identity.

4.2_Design phase

After the research phase, students knew the characteristics of their district of interest. Therefore, it was possible to pass at the second step: the design phase. In this phase each team proposed design concepts able to introduce a social improvement in their neighborhoods. This was possible passing from the resulting data, of the previous step, into the formalization of guidelines for enhance one territorial aspect, mitigating or solving a problem, or implementing a project that could bring a benefit. In this case, the systemic approach led the students to formulate design concepts with a general perspective on cause and effect with elements that can support their choices.

Figure 2. Cibogramma.



4.3_Project

The study of the field of intervention has driven the iterative phase of idea generation that has resulted in different concepts and prototypes. Here we present the most significant outcomes that exploit the full potential of innovation in food at local level.

4.3.1_Cibogramma

The aim of Cibogramma is to relate the different ethnic groups that reside and live the neighborhood Aurora Rossini. The multicultural aspect characterizes the area, but often it represents a barrier; using food as an instrument for the expression of customs and traditions of a community, the project want to show the potential of the multiethnic aspect, for stimulating relations and knowledge.

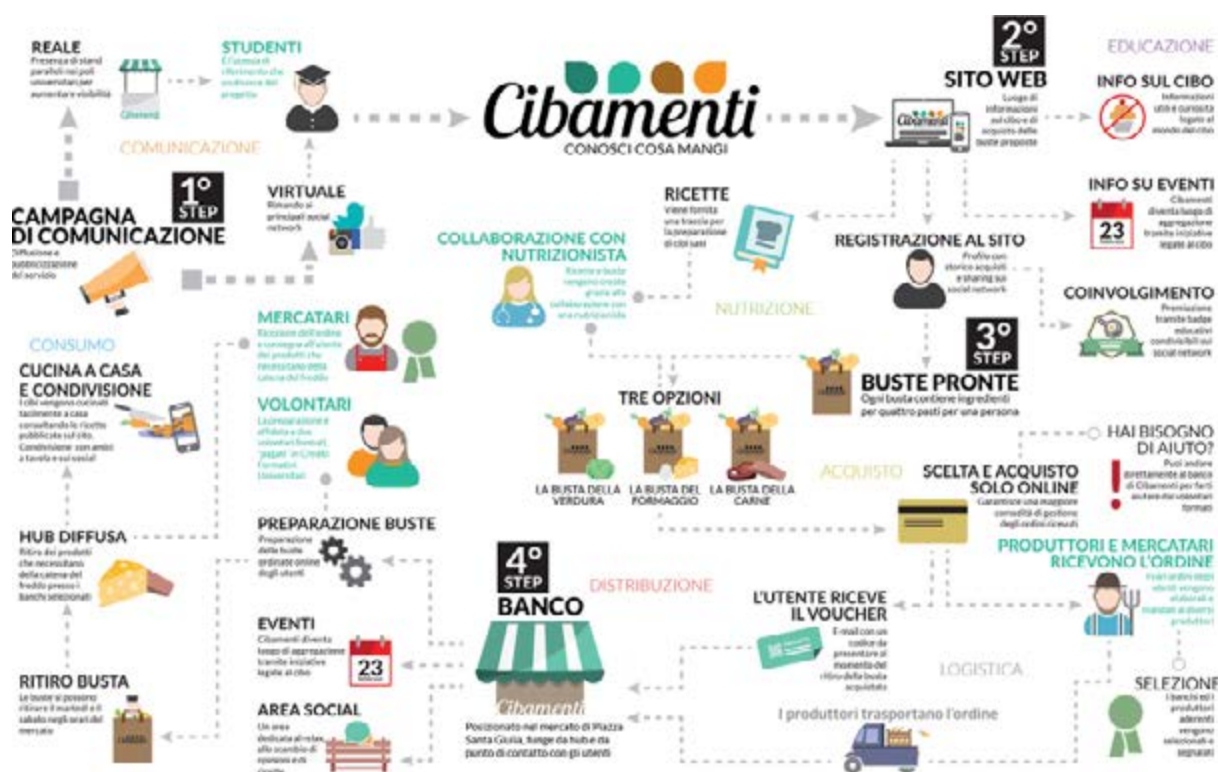
Students gave special attention to the research of a communication form that allows each one to interact; this has brought to design postcards, placemats, recipe books, app and website, that illustrate the different recipes using an iconographic language. The Italian language is used to explain ingredients, offering to foreign people the possibility to learn some new words. By the design of some events (workshops, theme meals, games and labs) integration and relation are facilitated. In fact, the events allowed the comparison among people and they fostered the diffusion of the different cultures.

Cibogramma (fig. 2) was designed by Fabio Conte, Stefano Lattanzio, Chiara Lorenza Remondino, Barbara Stabellini.

4.3.2_Cibamenti

Cibamenti is a new way to experience the local market, in order to introduce young people to a targeted and nutritionally correct purchase: it means to educate to quality and sustainable food, through the buying of pre-impostate bags of food on the online platform, and their distribution through a new stand at the market.

The project aims to convey the users towards sustainable eating habits, made of healthy and local food, because it is selected and quantified, based on criteria supported by certifications and by the opinion of experts. In particular, the project is designed for the target of students, so it responds to their needs, re-evaluating territorial relations between the university campus and the near market placed in Vanchiglia; the intention is to inform and



educate users, to simplify the recognition and the purchase of products, to provide simple and healthy recipes to cook them. Cibamenti (fig.3) was designed by Elisa Cravotto, Sara Gomez Gomez, Eric Lindqvist, Luca Magnani, Mauro Sorrentino, Maurizio Vrenna.

Figure 3. Cibamenti.

4.3.3_BiCibo

BiCibo aims to promote the quality of food, discovering the retail district of San Salvario in Turin. The main purposes of the project are to inform and educate the consumption of healthy food and to facilitate the re-evaluation of the activities involved.

The products of these stores can be tasted by people through a “street food truck” that stop in strategic points of the district, reported with a specific communication. This activity takes place 2 or 3 times a week, proposing snacks from the stores involved; each event has a different theme. Users can



Figure 4. BiCibo.

5_Conclusions

Contribute, inspire and advocate to the on-going evolution on innovation process design and innovation-related tool-making in a ceaselessly changing world with a sustainable horizon is one of the core scope of the Innovation Design Lab.

For that reason the aspiration of our research and laboratory is to experiment and continuously redefine the best methodology and approach to support the transformation of sustainable initiatives and ideas in a tangible outcome able to improve and progress the human quality conditions.

Through the application of these practices on innovation purposes, and with the creation of new visions capable of going beyond the mere commercial and technological aspect, we strong believe, as the first our results confirm it, the sustainable design process can affect territorial value systems by creating new businesses and by leading the society towards a new equation: Innovation=Sustainability.

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