

REPAiR: REsource Management in Peri-urban AREas: Going Beyond Urban Metabolism
D 5.1: PULLs Handbook

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REPAIR

REsource Management in Peri-urban AREas: Going Beyond Urban Metabolism

D 5.1: PULLs Handbook

Version 1.11

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Acronyms and Abbreviations

CA	Consortium Agreement
CE	Circular Economy
CFS	Certificate on the Financial Statement
DMP	Data Management Plan
DoA	Description of Action
EB	Executive Board
EC	European Commission
ECA	European Court of Auditors
ECAS	European Commission Authentication Service
EIS	Eco Innovative Solution
EU	European Union
FSIGN	Project Financial Signatory
GA	Grant Agreement
GDSE	Geo-design Decision Support Environment
GF	Guarantee Fund
LL	Living Labs
LEAR	Legal Entity Appointed Representative
LSIGN	Project Legal Signatory
OLAF	European Anti-Fraud Office
PaCo	Participant Contact
PM	Person Month
PO	Project Officer
PULL	Peri-Urban Living Lab
SC	Steering Committee
SP	SharePoint
UB	User Board
UoR	Use of Resources
WP	Work Package

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Publishable Summary

REPAiR will provide local and regional authorities with an innovative transdisciplinary open source Geodesign Decision Support Environment (GDSE) developed and implemented in Living Labs (LLs) context, in six metropolitan areas namely Naples, Ghent, Hamburg, Pécs, Łódź and Amsterdam.

LLs are physical and virtual environments, in which public-private-people partnerships experiment an iterative method to develop innovations, that include the involvement of end users. In LLs different areas of expertise from diverse partners are needed for a good development of the activities, with the aim to meet the need of the stakeholders by innovation.

The innovation concept here is used in the sense of a difference between an existing entity (a product, a policy, a service, etc.) and customers' expectations. The elements of innovation can be technological factors, better working conditions or methods of entity delivery, etc., because to innovate means to be creative, learning from mistakes. This means also to learn and share information about what went wrong, in order to use it in upcoming phases.

LLs are approaches and instruments, at the same time, to improve the innovation capabilities and competitiveness of territories. Thanks to the LL approach, policy makers can face the many socio-economic challenges of their territories, improving social inclusion. Typically useful for the interpretation of complex real life environments, LLs are recognized as users-friendly instruments and processes to promote open innovation in several European regions. In this way complex solutions⁸ are identified, tested and transformed into prototypes (Innovation Alcotra, 2013).

In other words, an LL is a “user-driven open innovation ecosystem” (EC, 2009) that utilizes the fruitful participation of business, citizens and governments in the research process; this approach is helpful in order to better define the current behaviors and user patterns.

Co-creation, one of the main and transversal components of an LL, is the process that produces a product or a service as a result of a cooperation between the collaboration of end-users and other stakeholders that work in the common environment of LL (Innovation Alcotra, 2013). Cities as complex systems, characterized by Urban Metabolism and increasing challenges, demand co-creation (Gemeente Rotterdam, IABR, FABRIC, JCFO, & TNO, 2014).

LLs identify sustainable activities that are coherent with the territory and competitive in some ways if compared with global economies, and put them in contact with the ones that already exist in the same area.

In REPAiR, Living Labs are organized in six peri-urban areas across Europe, as stated above, as decision support environments where representatives of universities, governance, corporations, local communities and, in addition, individuals make decisions that are based on their role and expertise. In this framework, design

professionals, information technologists and scientists give contributions and support the decision-making process related to what to do and how to do that in each case study area. In order to make a decision that must be site specific, it is necessary to identify and compare several opportunities and alternatives that should be developed in the Peri-Urban Living Labs (PULLs), after the knowledge and evaluation of the current situation of the place. The different disciplines involved in the PULL have different methods that can interact, to imagine and select change models that work at different scales simultaneously.

1 Introduction to the Horizon2020 Project “REPAiR”

1.1 Horizon 2020 Project REPAiR

The H2020 Research & Innovation Action project REPAiR (REsource Management in Peri-urban Areas: Going Beyond Urban Metabolism) is developing and implementing a tool that helps local and regional authorities reduce waste flows in peri-urban areas.

A shift towards a more circular economy (CE) is crucial to achieve more sustainable and inclusive growth. The REPAiR project will provide a Geodesign Decision Support Environment (GDSE). This environment will assist local and regional authorities in reducing waste flows by helping them to create integrated spatial development strategies that are both specific for the place at hand, transdisciplinary and eco-innovative. The GDSE will be developed and implemented in 'Living Labs' (LLs) activated in six metropolitan areas, namely Naples, Ghent, Hamburg, Pécs, Łódź and Amsterdam.

REPAiR is also connected to and supported by the joint TU Delft, Wageningen UR and Boston MIT initiative in Amsterdam, the AMS Institute. The AMS Institute in particular focuses on the research theme 'Circular City'.

1.2 Methodological Guidelines for PULLs as an innovative planning tool

Across Europe, Living Labs (LLs) have been recognized as successful instruments for speeding up the innovation process, co-creating and improving innovative ideas,¹⁰ investigating and creating business opportunities for different case study areas.

After the shift from a model of economy based on products towards a kind of service economy, LLs are taking place as effective tools to promote open service innovations. The services provided by LLs are generally always open source and available on-line, and furthermore interactive.

As previously stated, innovation in an LL overcomes the technological factor and is referring to the generation and test of new ideas and solutions that, in the case of REPAiR, flow into Eco-Innovative strategies, developed in co-creation with multiple stakeholders, considering the human dimension as an essential component. The human (user, citizen) is recognized as a source of innovation and not just as a user or consumer in a narrow sense, as being an object for R&D activities (Higgins & Klein, 2011). This is why working with innovation means to take the risk of a more dissipative process, in terms of costs and time, deriving also from the coordination of the different actors.

There is a twofold definition for LLs that REPAiR takes into consideration: they are both environments (physical and virtual), and a methodology for innovation (Ståhlbröst & Holst, 2012).

Literature about LLs is extensive; however, it is not sufficient only to explore literature to understand the dynamics of such laboratories; many aspects are learned by doing during the process of the Living Lab, where planning and design interplay (Concilio & Rizzo, 2016), including several and different stakeholders.

2 The Living Lab Methodology

2.1 LL approach through Theory and Literature review

2.1.1 Living Lab methodology across Europe

A Living Lab (LL) is not a completely new methodology to use for innovative planning processes. In fact, already in 2006 ENOLL, the European Network of Living Labs (Fig. 1), was founded to establish a network of active LLs, today with a total number of 170 worldwide. It represents a platform for best practice exchange, sharing, learning and support, offering to the members an international recognition (ENoLL, 2016).



Figure 1: Map of Living Labs in Europe

Source: ENOLL website, (ENoLL, 2016)

LLs are physical and virtual environments, in which public-private-people partnerships experiment with an iterative method to develop innovations that include the involvement of end users. In LLs different areas of expertise from diverse partners are needed for a good development of the activities, with the aim to meet the needs of the stakeholders by innovation.

LLs are instruments that can be used to improve the innovation capabilities and competitiveness of territories. Thanks to the LL approach, policy makers can face the many socio-economic challenges of their territories, improving social inclusion. Typically useful for the interpretation of complex real life environments, LLs are recognized as instruments to promote open innovation in several European regions,

guided by researchers and experts. In this way, complex solutions are identified, tested and transformed into prototypes (Innovation Alcotra, 2013).

A comparison between research approaches (Table 1) can be useful to identify the

LAB RESEARCH (User labs)	ACTION RESEARCH	LIVING LAB
Controlled environment	Real world setting, yet typically confined to an organisation or department	Real world setting, involving multiple stakeholders from multiple organizations and their interaction
Limited, clearly assigned role of users	Not specific about user role	Active role of users as co-innovators; exposing technology to the creative & destructive energies of the users; facilitating dynamics of collective action
Designed for replicability	Active (social and political) role of researcher in the research setting	Multi-disciplinary research teams actively involved in the research settings, confronted with the technical, social and political dynamics of innovation, at times even driving the agenda
Design for observation of outcome	The research observe and take part in the creation an outcome	Joint collaboration to create a desired outcome

main characteristics of an LL one.

Table 1: Comparison of research approaches

Source: Higgins & Klein (2011)

In other words, an LL is a “user-driven open innovation ecosystem” (EC, 2009) that utilizes the fruitful participation and involvement of business, citizens and governments in the research process; this approach is helpful in order to better define the current behaviors and user patterns.

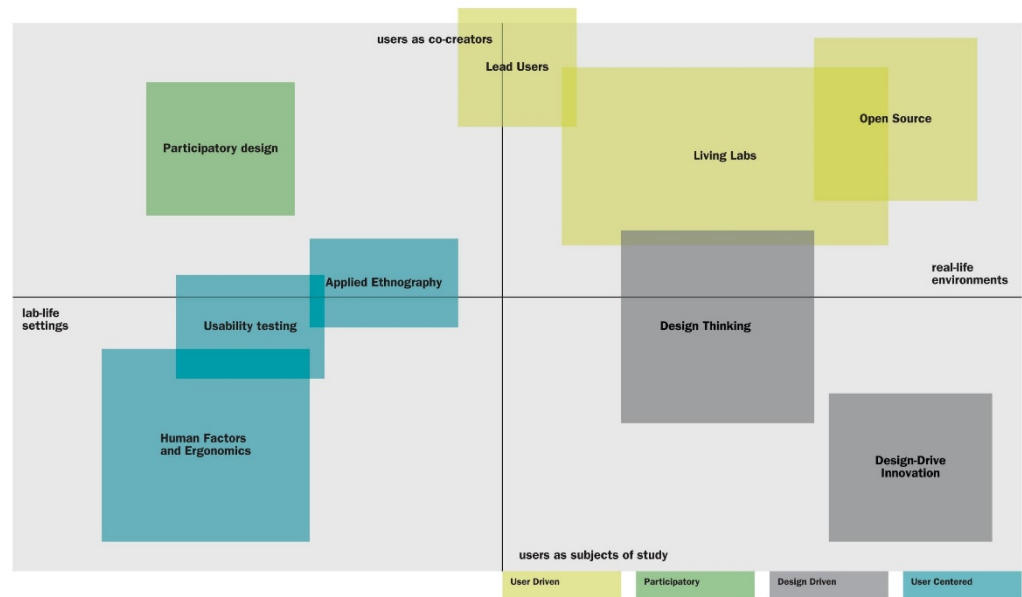


Figure 2: Living Labs in decision contexts

Source: Cerreta & Fusco Girard (2017)

Indeed, the active role of users as co-creators or co-innovators recognizes that users working in real world environments, and are actively solicited in order to inform technology development and innovation. In these cases, living labs have been positioned as platforms for user-driven innovation. However, as the numbers of users and organizations involved expanded to larger social entities, such as local or regional communities, they became more open-ended as more stakeholders became involved. It is thus important to distinguish between those who are centrally involved as users, developers, or beneficiaries, and those who show interest but are peripheral to the innovation process (Higgins & Klein, 2011).¹³

The type of participant that is driving the innovation activities can be used to categorize living labs into utilizer-driven, enabler-driven, provider-driven, and user-driven (or user-community-driven) LLs (Leminen & Westerlund, 2012). The characteristics of each type are shown in Table 2.

CHARACTERISTIC	TYPE OF LIVING LABS			
	Utilizer-driven	Enabler-driven	Provider-driven	User-driven
Purpose	Strategic R&D activity with preset objectives	Strategy development through action	Operation development through increased knowledge	Problem solving by collaborative accomplishments
Organization	Network forms around an utilize, who organizes action for rapid knowledge results	Network forms around a region (regional development) or a funded project (e.g., public funding)	Networks forms around a provider organization(s)	Network initiated by users lacks formal coordinator mechanisms
Action	Utilizer guiders information collection from the users and promoters knowledge creation that supports the achievement of preset goals	Information is collected and used together and knowledge is co-created in the network	Information is collected for immediate or postponed use; new knowledge is based on the information that provider gets from the others	Information is not collected formally and builds upon users' interests; knowledge is utilized in the network to help the user community
Outcomes	New knowledge for product and business development	Guided strategy change into a preferred direction	New knowledge supporting operations development	Solutions to users' everyday life problems
Lifespan	Short	Short/medium , long	Short/medium , long	Long

Table 2: Types of Living Labs

Source: Leminen (2015)

According to Leminen (2015), the LL approach offers benefits to companies, users, developers, and public financiers. Companies benefit through cost-efficient access to end-user data and user experiences. They also save money by being able to make changes to a product much earlier in the development process based on user feedback. Over the long term, LL activities also tie customers to a company and its activities. Users gain opportunities to influence the development of products. They also benefit from the solutions that are developed, which in many cases are solving problems that affect their everyday lives and which may have been otherwise unsolvable. Users also may perceive the new, user-driven products to be more functional because of the co-creative development process. LLs also contribute to the core activities of developers; the living labs brings opportunities and resources, and the developers bring their capabilities to develop real-world solutions to the users' problems. In addition, public financiers benefit from activities and outcomes that support their objectives. In addition to the benefits to participants, LLs also provide advantages over other types of innovation activities. Table 3 presents the advantages of an LL approach.

AREA	ADVANTAGE
Innovation	• Enhance learning (Abowd, 1999, Bajgier et al., 1991) • Trackle complex real-life problems (Bajgier et al., 1991; Mulder et al., 2008) • Foster vertical integration (Eriksson et al., 2005) • Enhance dialogue between different stakeholders (Schaffers & Kulkki, 2007) • Share experiences (Schaffers & Kulkki, 2007) • Enhance SME incubation (Van Rensburg et al., 2007) • Filter problems (Shuurman & Marez, 2009) • Enable open collaboration between actors (Bergvall-Kareborn et al., 2009) • Enhance multi-organizational collaboration (Kviselius et al., 2009) • Act as a focal point for multi-organizational collaboration (Kviselius et al., 2009) • Engage all key actors for innovation (Mulder & Stappers, 2009) • Understand innovation (Mulder & Stappers, 2009) • Enable unique knowledge (Dutilleul et al., 2010) • Access real interaction data and real application contexts (Azzopardi & Balog, 2011) • Motivate users (Stahlbrost & Bergvall - Kareborn, 2011) • Enhance sustainable solution development (Liedtke et al., 2012)
Context	• Can be use in different contexts (Eriksson et al., 2005) • Provide an environment to study richness of complex user behavior and use of technology in home (Intille et al., 2005, 2006) • Integrate multi-contextual sphere, i.e, regional and cultural diversity (Feurstein et al., 2008) • Catalyze rural and regional system of innovation (Staffers & Kulkki, 2007) • Integrate fundamental and applied research (Mulder & Stappers, 2009) • Empower rural communities in developing countries (Mutanga et al., 2011) • Advance smart city operations (Ballon et al., 2011) • Upscale urban development (Ballon et al., 2011) • Provide assets for the innovation environment (Schaffers et al., 2011)
Business Opportunities	• Create new business opportunities (Kviselius et al., 2009; Niitamo et al., 2012) • Localize products (Feurstein et al., 2008) • Lead to unexpect market opportunities (Mavridis et al., 2009)

*Table 3: Advantages of LL approach**Source: Leminen (2015)*

However, applying an LL methodology is challenging from several points of view. Indeed, LLs generally work across different national borders, involving users since the beginning of the process; therefore, their logistic organization present objective difficulties, for example the organization of physical meetings between the different partners to discuss and test the solutions that have been identified cannot happen anytime; problems in communication and coordination, and language barriers could be found too. In addition, partnerships in cross-border LLs are based on trust and needs long time to be built and to last over time (Ståhlbröst & Holst, 2012).

2.1.2 Living Lab: some definitions

The explorative literature review about LLs is an essential requirement for understanding the method and applying it to the research project. Through the literature review a series of definitions is provided to define the scope of the LLs as innovative tools for planning (ENoLL & World Bank, 2015).

An LL is a real-life test and experimentation environment where users and producers co-create innovations. LLs have been characterized by the European Commission as Public-Private-People Partnerships (PPPP) for user-driven open innovation (CoreLabs, 2008).

An LL is a “functional region” where stakeholders formed a Public-Private-Partnership¹⁷ (PPP) of industries, SMEs, public agencies, universities, institutes and people collaborate for creation, prototyping, validating and testing of new services, products and systems in real-life contexts. Such contexts are cities, villages and rural areas as well as industrial plants (Eriksson et al., 2005).

An user-centric research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real-life context (Ballon et al., 2005).

An experimentation environment in which technology is given shape in real-life context and in which (end) users are considered co-producers (Feurstein et al., 2008).

LLs are collaborations of public-private-people partnerships in which stakeholders co-create new products, services, businesses and technologies in real-life environments and virtual networks in multi-contextual spheres (Bergvall-Kåreborn, et al., 2009).

An LL is a user-centric innovation milieu built on everyday practice and research, with an approach that facilitates user influence in open and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values (Westerlund and Leminen, 2011).

Experimentation environments: the LL areas are physical regions or virtual realities where stakeholders can form public-private-people partnerships (4Ps) of firms, public

agencies, universities, institutes, and users all collaborating for creation, prototyping, validating, and testing of new technologies services, products and systems in real life (Jie, 2016).

An LL is a systematic approach that integrates research and innovation by collaborating with multiple stakeholders (public-private-civic partnerships) to co-create, develop and validate new products, services, businesses and technologies for sustainable value in territorial ecosystems in which the user is actively involved (Concilio, 2016).

The sum of previous definitions identifies an LL as a real-life testing environment, where Public-Private-People Partnerships (and among them researchers and experts) interact.

One of the specific innovations, in comparison to other forms of participatory processes, is to put these PPPP into real contexts, and giving them space to co-production/co-creation activities. Whereas other forms of collaborative planning stop at the turning point of public consultation, an LL can be defined as a real context of collective capacitation.

Co-creation, in particular, refers to a paradigm of mutual help and competences sharing, where anyone can be the conveyor of its own knowledge, its own experiences (they are the *users*). The innovation of the methodology starts from this user-centric ensemble, putting together expectations (as in past participatory processes), but also turning the users themselves in future co-creators.

The process itself is aimed at establishing innovative ideas and productive¹⁸ methodologies, designing and implementing cooperative and joint experimental—activities, that result in collective learning and in shared understanding.

An LL is a kind of practice-based innovation environment, able to create cross-boundary arenas where different actors interact in a context for new models of urban activism.

2.1.3 How REPAiR builds on the literature review for the setting of the Living Labs

REPAiR considers several common points from the literature definitions stated above.

An LL is a method that leads to an innovative research product, and is based on:

- co-creation by all involved stakeholders (public-private-people);
- collaboration between industries, SMEs, public agencies, universities, institutes and people;
- multi-user-centered approach;
- interdisciplinary approach;
- real-life design.

REPAiR implements LLs for six European Peri-Urban Areas: the Peri-Urban Living Labs (PULLs); in these physical and virtual environments, key actors and stakeholders,

representatives of regions, municipalities, corporations, people, citizens and individuals, design professionals, information technologists, scientists, students, etc., collaboratively generate new ideas, creative innovation and strategies for the development of CE, in co-creation sessions. The PULLs extend the LL concept by integrating the terms above and incorporating Geodesign and the application to the field of waste and resource management.

These pilot cases presents a preliminary structure that is constituted by iterations of design studios coinciding with GDSE testing, knowledge transfer and stakeholder participation workshops, where the results of student work and research activities of the other consortium members are integrated.

The aim of the overall process, in terms of collaborative planning and co-creation, is establishing a methodology that leads to the change of mind-sets and current behaviour with reference to inadequate models of waste management and urban metabolism. The additional point of REPAiR LLs will be the process of empowerment itself, in addition to the co-creation activity, that will eventually result in one or more eco-innovative solutions (see dedicated chapters).

Empowering participants of the LL means to create a collaborative context of co-creation that will survive the duration of the project. Furthermore, ideas and strategies developed in the LL will be correctly exploited only if there is a contemporaneous learning process in the stakeholders involved.

Technical diversified competences are inside the Labs, at each level (people, leaders, politics, students, etc.) in order assure that the eco-innovative solutions (see further chapters) are developed in co-creation instead of leading processes. In this way, they¹⁹ help to stimulate the creation of new services, not only projects, in order to (re)activate locally economic processes, overcoming not only physical and environmental, but also economic and social vulnerability.

Exploring the spatial organization of the waste flows systems, and of the geography of wasted landscapes in the case studies, LLs will result in innovative methods of acting, connected to resilience in human behaviours, changing life cycles, in deep relation with the principles of Circular Urban Metabolism - CUM (Allen et al. 2012; Girardet 2000).

The co-creation builds on these multidimensional and multicontextual strength of LLs. Furthermore, the innovative methodology will continue in the co-evaluation of physical and socio-economical results, in a multidimensional way: physical asset, environmental and socio-economic impact, economic and financial feasibility, etc.

Testing the solutions means to build in each phase on the interaction among all the stakeholders, to stress out the issues of each model, in a co-evaluation process. The developed impact and decision models allow the validation of alternative design scenarios and therefore promote sustainable urban developments.

2.2 Co-creation as one of the main components of Living Lab Environments

Co-creation is the process that leads to a product or a service as well as to ideas, concepts and strategies, as the result of a cooperation between end-users and other relevant stakeholders that work in the common environment of LLs (Innovation Alcotra, 2013). Cities as complex systems, characterized by Urban Metabolism and increasing challenges, demand co-creation (Gemeente Rotterdam, IABR, FABRIC, JCFO, & TNO, 2014).

LLs identify sustainable activities that are coherent with the territory and competitive in some ways if compared with global economies, and put them in contact with the ones that already exist in the same area.

LLs are defined as flexible ecosystems (EC, 2009) in which a real-time collaboration between different actors exists.

Soile Juujarvi and Kaija Pessa explain the actor roles in an Urban Living Lab starting from the experience of Suurpelto in Finland (Juujärvi & Pessa, 2013). They point out that the involvement of citizens and other LL actors in the process of planning is increasing; this with the aim to meet the needs of citizens, avoid social problems and co-creating value. In addition, they show that urban areas can be considered as technology-assisted research environments and natural places in which to develop LLs; therefore, urban areas in which there are active LLs, developing innovative solutions are more attractive for inhabitants that consider them as added value for the area. Juujarvi and Pessa define an urban LL as a multi-actor network for innovation in²⁰ which ordinary people, from different sectors but with common aims, want to solve their real-life problems, learning by doing. LLs are especially suitable to solve problems in environments of “organized complexity” (Juujärvi & Pessa, 2013) composed by several organizations that work with a top-down approach for planning that need to be combined with the bottom-up solutions and innovation processes. Other crucial actors in LLs are the university students that are seen as innovators that are able to develop surprising new ideas and solutions. In LLs citizens are the core actors that can develop urban innovations (Eskelinen, Garcia Robles, Lindy, Marsh, & Munte-Kunigami, 2015). They will design their own solutions, feeling the ownership for their own ideas.

Example of co-creation Actors in the Naples case

In the Naples case, the core actors involved in the co-creation process are selected among public entities and waste management companies representatives, among professionals and experts, among local associations of citizens related to waste cycle and wasted landscapes issues.

Example of co-creation Actors in the Amsterdam case

In the Amsterdam case, the citizens involved in the LL are chosen among professionals and experts (e.g. people from the waste management companies); moreover citizens are represented in the LL by the university students involved in the research from TU Delft and the AMS Institute.

Generally, LLs seem to be very suitable for facing wicked problems, and situations in which solutions are more difficult to be found because of complex networks of stakeholders (Eskelinen et al., 2015).

In LLs complex problems are unpacked into small but feasible issues that can be addressed to make significant steps forwards (Eskelinen et al., 2015).

An LL can be understood as a planning tool that boosts innovation, being articulated in different aspects:

- LL as technology-driven research environment;
- LL as testing environment for know-how and tools;
- LL as an arena for self-organizing groups.

Each of these aspects can interact with others and help to activating a process able to find a win-win-win strategy, that implements the principles of circular economy.

2.3 Applied methodology in REPAiR research project

In REPAiR, LLs are organized in six peri-urban areas across Europe as decision support environments where representative of universities, governance, corporations and in addition individuals make decisions that depend on their role and expertise. In this framework, design professionals, information technologists and scientists give contributions to decide what to do and how to do that in each case study area. In order to make a decision, that must be site-specific, it is necessary to identify several opportunities and compare different alternatives that should be developed in the Peri-Urban Living Labs (PULLs), after the evaluation of the current situation of the place. Each discipline involved in the PULLs has different methods to imagine change models that can work at different spatial scales simultaneously.

Diversities in the approaches are seen as a greatest strength to be kept within the PULLs. Each PULL needs to coordinate the different approaches coming from the different actors and different disciplines involved in the case study areas towards shared alternative solutions and strategies; this point is a tricky one for each PULL and, therefore, should be well addressed through an effective coordination.

According to the Geodesign approach (Steinitz, 2012) that REPAiR applies, PULLs will be organized as collaborative environments in which experts will work together with the people in order to develop shared solutions for change related to the improvement of the waste and resources management sector and to the recycling of Wasted Landscapes within the case study area.

Each participant of the PULLs must be able to contribute to the design process identifying how the different contexts should be changed; in other words, imagining

how the future of the places will look like and will be developed, working with the purpose of improving the current conditions and the quality of life in the selected peri-urban areas.

The involvement of university education in the PULLs should aim to make the students available to identify specific problems related to the case-study areas, with the support of a multidisciplinary research team (Fig.3).

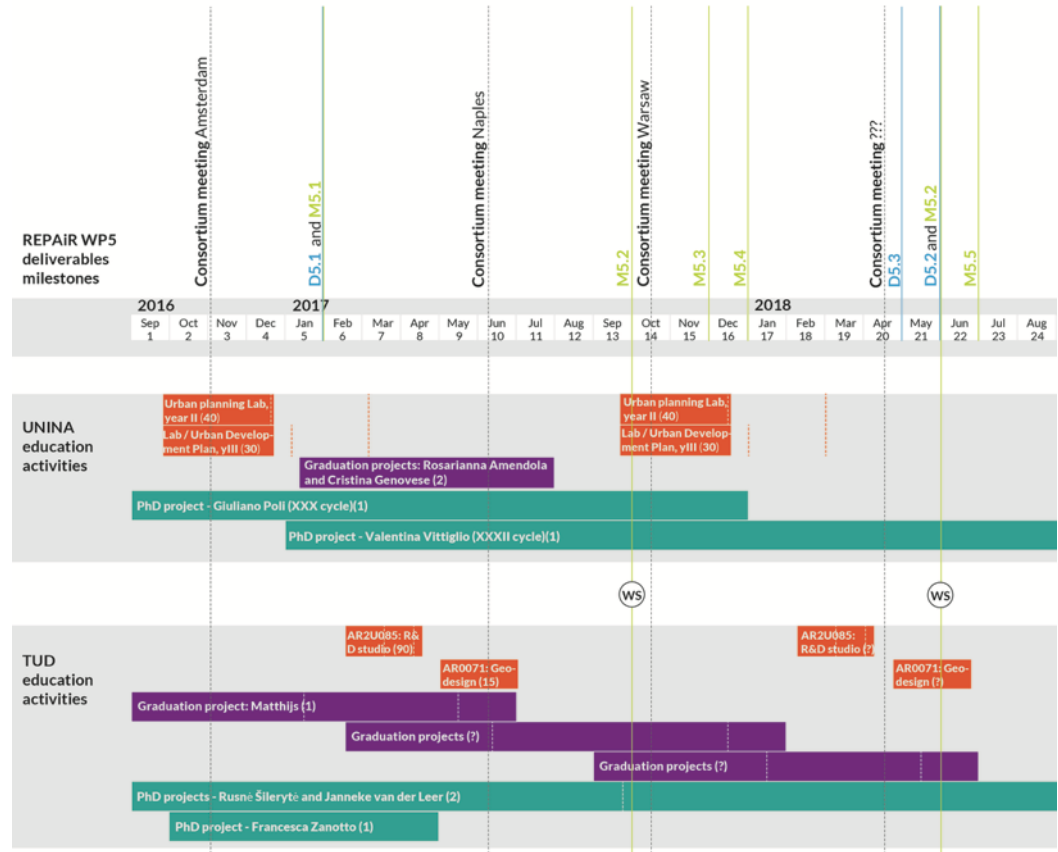


Figure 3: Timeline PULLs Naples and Delft (overview of the first two years)

Source: Elaboration Janneke van der Leer

Education activities:

BSc and MSc courses/studios/labs: (expected) number of students involved in brackets

MSc graduation/thesis: (expected) number of students involved in brackets

PhD projects: (expected) number of students involved in brackets

Deliverables and milestones:

D5.1 - Methodological guidelines (Handbook) for the PULLs

M5.1 - Definitive location, organizational settings and educational outline for two pilot PULLs. Amsterdam and Naples ready

M5.2 - International student workshop bringing together the multidisciplinary teams from both pilot cases

M5.3 - First set of solutions for a selection of challenges in pilot cases ready to be integrated into the GDSE ready

- M5.4 - Definitive location and organizational settings of PULLs for follow-up studies ready
 D5.3 - Handbook: How to run a PULLs
 D5.2 - Catalogue of solutions and strategies for AMS and MAN
 M5.5 - Final presentation and evaluation of student work of the follow-up PULLs.

The Management Board (MB) of the PULLs leads the Labs and is responsible for concluding and reporting the results. For the actual participation process, different materials and methods will be developed and used, using the GDSE open-source platform, organizing workshops, consisting of site visits, thematic mapping, gaming, etc., to assure the sufficient inputs of these parties in the PULLs.

2.4 Some selected examples of Living Labs on waste

In addition to the literature review presented earlier in this handbook, we propose a review of cases of successful Living Labs on waste topics, in order to define a close link to the REPAiR activities and overall aims.

The following selected cases identify virtuous processes that involve and affect the behavior of the users involved.

Case 1: Portland Sustainability Campus

WALL-E (Waste Audit Living Lab Experience)

The goal of WALL-E is to gather valuable campus waste data while providing students with opportunities to make connections between their own behaviors and the campus²³ waste stream and fostering partnerships across the PSU campus community regarding waste management practices. About 2.2 tons of landfill-bound waste has been sorted, weighed, and leveraged to improve the campus waste system.

Flow(s): Solid Garbage, Compost, Special

Scale: From Campus to Portland State

Stakeholders: Academic students, University, PSU staff

Case 2: WEENMODELS Living Lab

WEENMODELS project aims to define and implement a new model of WEEE reverse logistics, which will achieve several goals in the experimentation area:

1) networking; 2) increasing the collection of WEEE amount; 3) improvement of small WEEE collection: to triple, by 2016, the actual rate of small WEEE collected per inhabitant; 4) pollution reduction; 5) control increase; 6) system efficiency increase; 7) waste reduction; 8) eco-business development.

Flow(s): WEEE (Waste Electrical and Electronic Equipment)

Scale: Urban

Stakeholders: Genova Municipality, Citizens, SME

Case 3: Harvard University Living Lab

Harvard University is bringing its students, faculty, and staff together to use the campus and the surrounding community as a test bed to incubate exciting ideas and to pilot promising new solutions to real-world challenges to inform the University's implementation of Sustainability Plan.

WASTE (but not only): Harvard is focused on operating an efficient campus that develops incentivizes and reuses and minimizes the amount of waste.

Flow(s): Compost, E-waste, etc.

Scale: Different scales starting from Harvard Campus

3 REPAiR Living Lab: a collaborative service-oriented planning

3.1 Towards the REPAiR LL methodology

The methodological approach to implement in REPAiR LLs requires the identification of the stages, content and tools able to meet the needs of LLs and interact with the steps and tools of the Geodesign process. The LL co-design approach has grown and developed through a range of variations in different settings, applied in universities²⁴ (to promote student engagement), rural community action groups (to strengthen local development with technology innovation) and, more recently, as a tool for local and regional policy. This latter model, often referred to as a Territorial Living Lab (TLL), aims to promote territorial innovation as a shared objective in the public interest, capable of generating initiatives that both increase the yield on territorial capital and increase citizen well being and quality of life as a result of engaging all stakeholders in co-designed innovation processes of value creation (Concilio & De Bonis, 2012). At the same time, the Urban Living Labs (ULLs) are configured as an opportunity for creating communities of active citizenship, promoting the co-creativity and representing the micro-centrality able to innovate and support already existing territorial centrality or put new ones. ULLs have emerged as an approach to experimentation in real-life city settings. They can be defined as sites (buildings, streets, and districts) devised to design, test and learn from social and technical innovation in real time. An ULL can be understood as a particular type of regional innovation network that puts the emphasis on the residents and their communities.

One of the first LL methodology is the FormIT (Ståhlbröst & Holst, 2012), developed to suit and support LL activities. Three theoretical streams inspire it:

- Soft Systems Thinking;
- Appreciative Inquiry;

- Need Finding.

FormIT enables a focus on possibilities and strengths in the situation under study; which is fundamentally different from traditional problem-solving approaches. FormIT strongly stresses the importance of the first phase in the concept design cycle, usually referred to as analyses or requirements engineering. Since this phase creates the foundation for the rest of the process, errors here become very hard and expensive to correct in later stages.

This also is the phase in which users can make the strongest contributions by actually setting the direction for the design. Since users' needs and requirements can change as users gain more knowledge and insights into possible solutions, it is important to re-examine their needs continually and make sure they correlate to given requirements.

The FormIT method is iterative and interaction with users is an understood prerequisite, considering that knowledge increases through iterative interactions between phases and people with diverse competences and perspectives. Cross-functional interaction enables the processes of taking knowledge from one field to another to gain fresh insights, which then facilitates innovative ideas.

The FormIT process can be seen as a "spiral" (Fig. 4), in which the focus and shape of the design becomes clearer, while the attention of the evaluation broadens from a focus on concepts and usability aspects to a holistic view on the use of the system.

In the FormIT process there are three main iterative cycles:

- Concept design cycle;
- Prototype design cycle;
- Innovation design cycle.

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In each cycle there are three phases: Appreciate Opportunities; Design; Evaluate. At the same time, three aspects are within each phase: Use; Business; and Technology.

Before and after these three cycles, two additional cycles are included in the process:

- Planning;
- Commercialisation.

The FormIT process is oriented to activate LLs able to enable the cooperation among four main stakeholders (companies, users, public organisations, and researchers) and the service is the final result to commercialise.

According to the definition of Ståhlbröst & Holst (2012, p. 3), the concept of "service" is central for an LL process: «A service can be an activity, a performance, or an object. A product may include a service, and a service is produced and consumed at the same time». Indeed, the difference between products and services is recognizable, but can be difficult to grasp. A service is always available: it is on-line, intelligent and cooperative, interactive and offers possibilities to correct and influence the performance of it. A good service is mobile, always in the background and ready to be activated when it is needed. The LL model emerges as an operational framework for

the governance of territorial innovation processes, having itself undergone a significant transformation (De Bonis et al., 2014).

Since the FormIT methodology, the Living Lab approach has been developed in urban and regional scale, developing open innovation ecosystems and involving different types of users (citizen, resident, student, visitor, etc.). A specific user, recipient of innovations, co-create, experiment and test ideas, products and services. The solutions are designed to develop new forms of productivity and competitiveness as well as to elicit behavior change towards sustainable one.

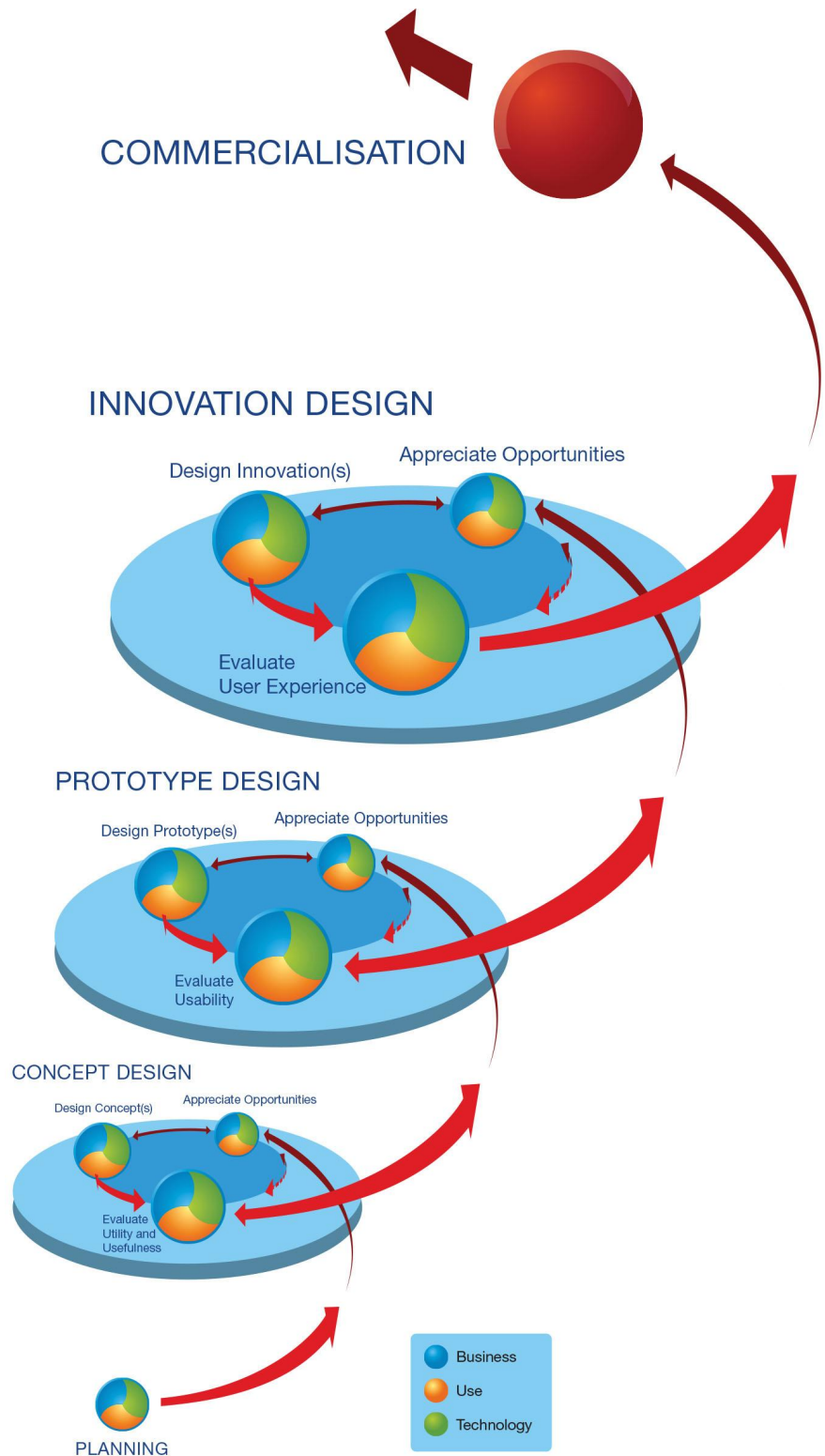


Figure 4: FormIT methodology
Source: Ståhlbröst & Holst, 2012

An evolution of FormIT methodology, combined with the 4Co model (CoDesign, CoDecide, CoProduce, CoEvaluate) (Pollitt et al., 2006), for implementation in ULL and TLL (Panaro, 2015), is a hybrid methodological proposal able to integrate innovation in public administrations for local co-governance processes, open and inclusive. The methodology has been tested in some experiences of LLs (Cerreta & Fusco Girard, 2017) and considers the FormIT methodology as conceptual framework with cycles of progressive development and relative phases, and the 4Co model provides the objectives and the nomenclature of cycles oriented to the definition of a local co-governance model (Fig.5).

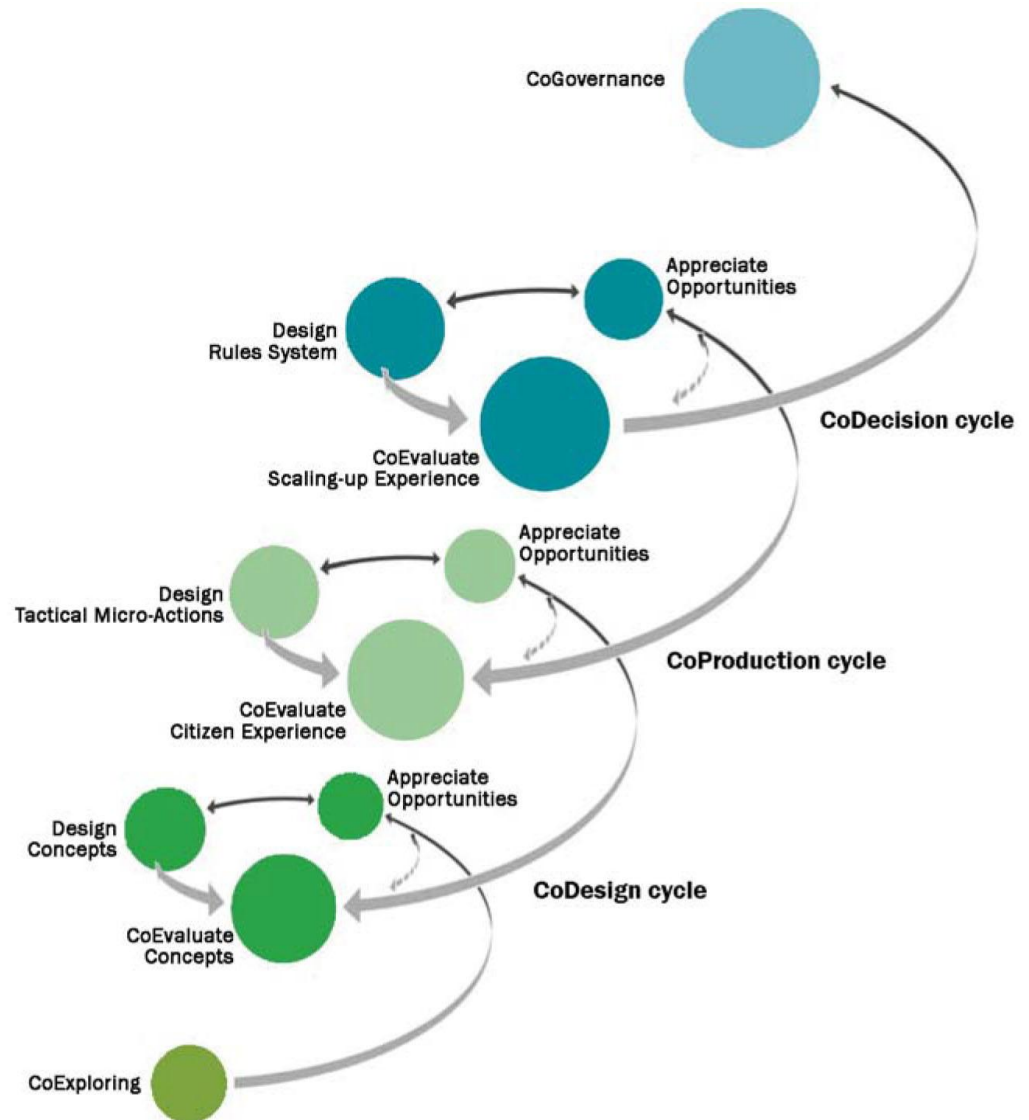


Figure 5: Hybrid methodology for LL

Source: Panaro, 2015

The methodological approach to implement in REPAiR LLs starts from the above hybrid methodology taking into account the Geodesign framework and the related phases (figg 6, 7).

Indeed, Geodesign is a design method, and can be considered a set of techniques and enabling technologies for planning built and natural environments in an integrated process, including project conceptualization, analysis, design specification, stakeholder participation and collaboration, design creation, simulation, and evaluation. The LL and the Geodesign approaches can be considered as two parallel processes in which it is possible to recognize the different interactions between the various phases and the possible feedbacks (fig. 8).

According to the above considerations, in REPAiR LLs the main iterative cycles are:

- CoDesign cycle;
- CoProduction cycle;
- CoDecision cycle.

In each cycle there are three phases: Appreciate Opportunities; Design; CoEvaluate.

In CoDesign cycle, the specific sub-phases are: Appreciate Opportunities, Design Concepts, CoEvaluate Concepts.

In CoProduction cycle, the specific sub-phases are: Appreciate Opportunities, Design Tactical Micro-Actions / Eco-solutions, CoEvaluate Citizen Experience.

In CoDecision cycle, the specific sub-phases are: Appreciate Opportunities, Design Rules System, CoEvaluate Scaling-up Experience.

Before and after the three main cycles, two additional cycles are included in the process:

- CoExploring;
- CoGovernance.

In LL hybrid methodology CoCreation is a transversal concept that passes through and supports the spiral in its different cycles. Indeed, in REPAiR methodological proposal LL and Geodesign interaction has a CoCreation context as common framework (fig. 8).

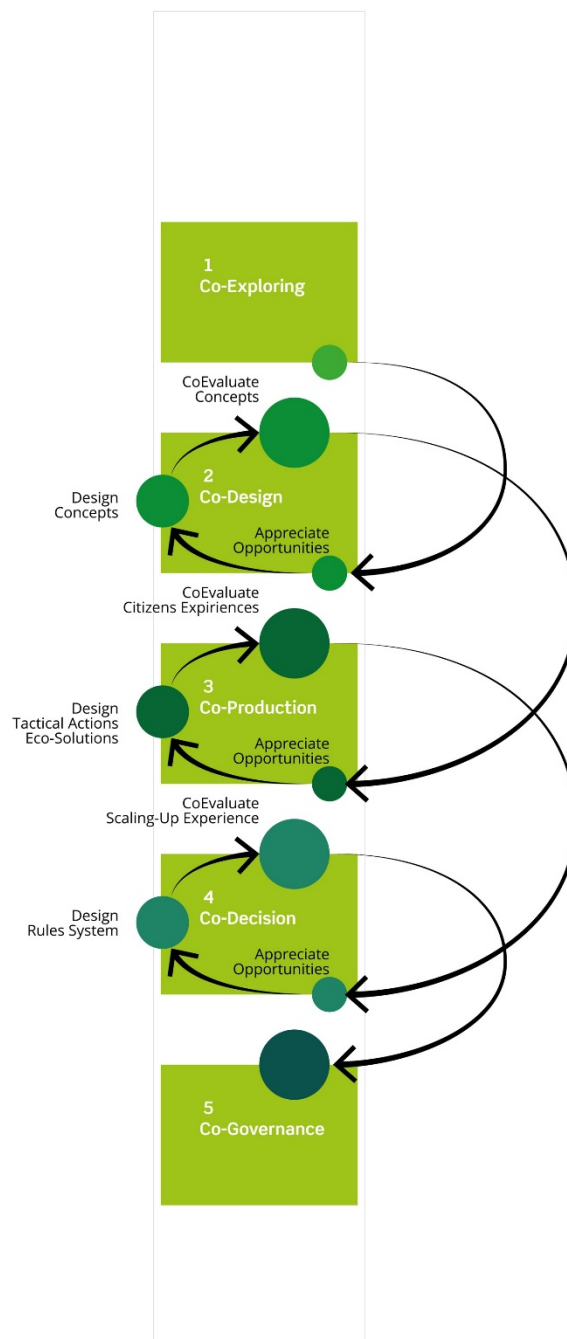


Figure 6: LL hybrid methodology

Source: UNINA team (Cerreto, Inglese, Panaro, Poli)

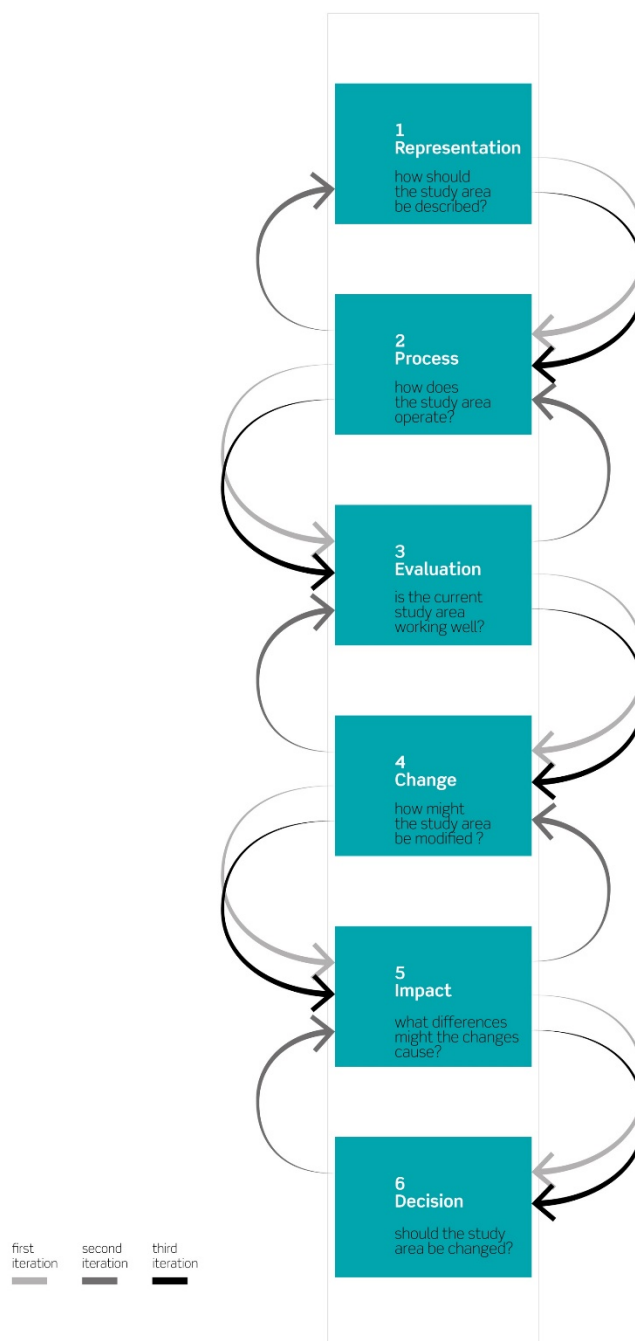


Figure 7: Geodesign methodology

Source: UNINA team (Cerreto, Inglese, Panaro, Poli)

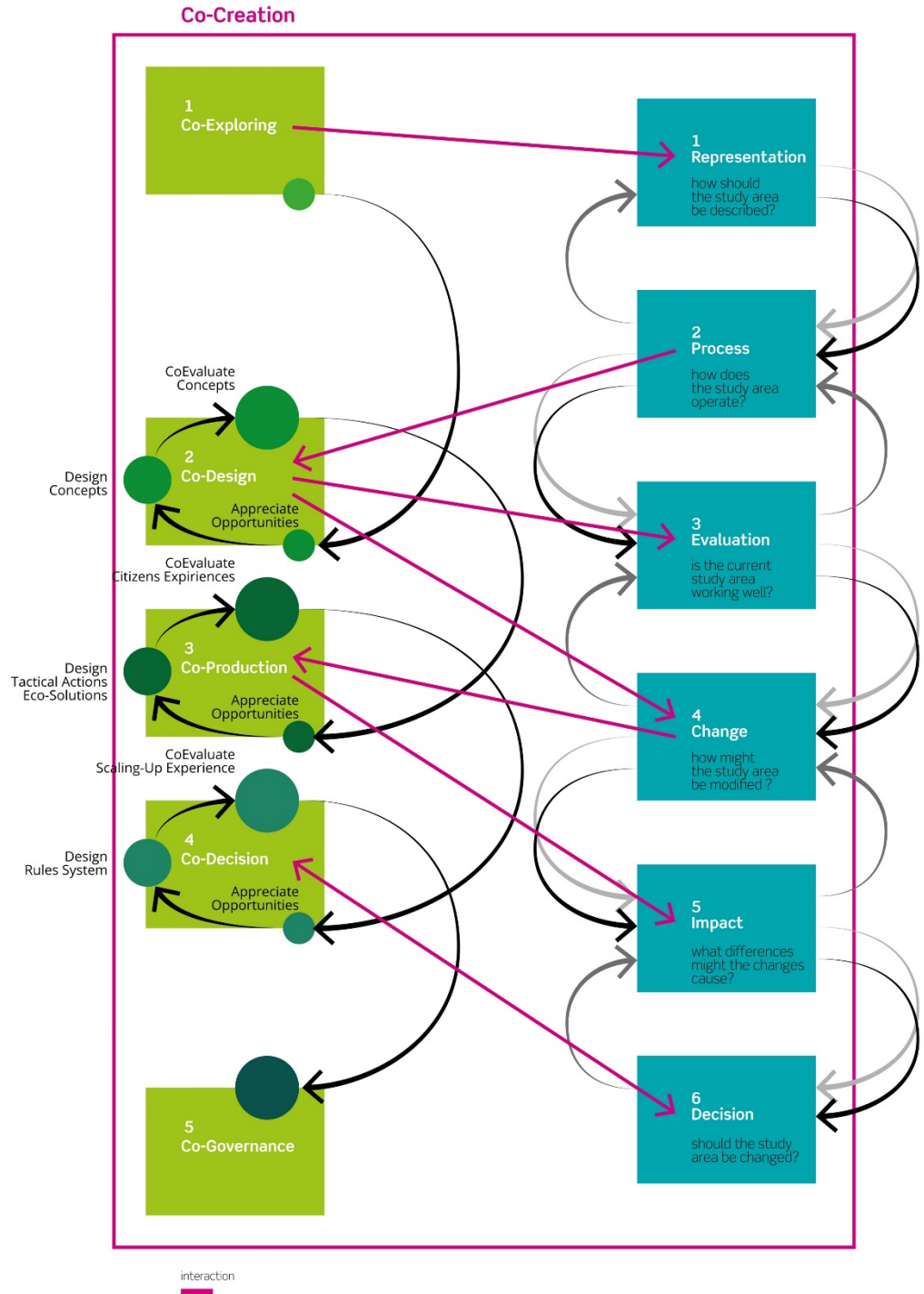


Figure 8: LL & Geodesign interaction: REPAiR methodological proposal

Source: UNINA team (Cerreto, Inglese, Panaro, Poli)

3.2 Co-exploring

3.2.1 A Pre-Lab Phase

The Pre-Lab Phase is very important to build a structure as strong as possible for the future duration of the project. It is important to mix different competences in the definition of the group, of the stakeholders and the case study area. Thus, it is important to understand the overall process in a continuous and communicative approach, where flexibility in the definition of core matters is a key to learn from the process itself.

In order to build trust and confidence between the initial stakeholders, the Pre-Lab Phase can consist of one event or more interactions, as Local Kick-Off Meetings.

3.2.2 How to set a location

In the planning phase, it is important to build a welcoming environment, where mixed competencies can be stimulated to knowledge sharing.

Having a physical location does not only coincide with logistic requirements: establishing a place to meet, multiple workstations, documents archives, etc.; it also implies to define a protected environment, full of symbolic meanings, recognizable as the birth point for LL ideas and activities, where the LL core team can be reached and all the stakeholders are welcomed.

The physical location may not consist of just one room, but can be divided into multiple³³ location settings, referring to a singular, recognizable structure (meeting rooms, student rooms, workspaces, etc.).

For the participants comfort, it is essential to think of the logistics aspects of all these spaces, such as good lighting, closeness to open spaces and to a place for a coffee break and refreshments.

In order to make the stakeholders involved more responsible and to raise commitment, it is possible to organize meetings in different locations, in such a way that the actors involved are host institution in turn (Satellite Offices).

Example from Naples

The leading partner for the Naples Living Lab, UNINA has decided to set up the Lab in a room of one of the main buildings of the University of Naples.

This choice has been driven by several reasons:

- first of all, the coincidence between the main responsible for the Lab and the location, is used to point out the commitment of the partner itself;
- secondly, the University is located in a central area of Naples, easily accessible from the highway (Naples Fast Road “Tangenziale”), from the subway station

(“Toledo” or “Dante” station), and in connection with the regional and national railways main station “Garibaldi” station;

- thirdly, the case study area has its core in the municipality of Naples itself, as the main administrative entity within the Metropolitan Area;
- finally, the university building has a full history and clear recognizability among all invited stakeholders.

Example from Amsterdam

The leading partner for the AMA Living Lab, TU Delft has decided to set up the main location of the Lab in the spaces of the buildings of Delft University of Technology.

The project area for TU Delft is in Amsterdam and therefore the choice is made to also use rooms in the AMS (Amsterdam Institute of advanced Metropolitan Solutions) as well as in the Valley, a circular hot bed in Haarlemmermeer, as satellite offices, closer to the case study area.

This choice has been driven by several reasons:

- first of all, the co-location of the main responsible for the Lab and the location, is used to point out the commitment of the partner itself;
- secondly, Delft University of Technology is located in an easily accessible location from the railway (from the whole Netherlands and abroad to Delft Station), and by bus from Rotterdam; choosing TU Delft location is key for the involvement of the students in the research;
- thirdly, the Amsterdam Institute of advanced Metropolitan Solutions is a ³⁴ representative location for the meetings with stakeholders;
- finally, the satellite office in the Valley is located within the boundaries of the peri-urban area object of the study.

How to set a location: short tips

Choose a location that fulfills the following criteria:

- good logistic;
- accessibility;
- relevance;
- recognizability;
- satellite offices.

3.2.3 How to define internal roles (Living Lab Research Group)

A Living Lab Research Group has a clear structure, that may be composed by sub-groups in order to better define internal roles and competences. The following is a suggested sub-division:

CORE GROUP: a smaller group, composed of a maximum of 30 persons, which remains stable for the duration of the entire project and allows to maintain control of the group, to clearly assign responsibility and focus on completing project deliverables. Within the CORE GROUP Each partner has designated a person responsible for the management of the Living Lab: the LOCAL COORDINATOR. The Local Coordinator is the "reference person" of the group locally, and at the consortium level: each coordinator has its counterpart in the other partner cities. The Local Coordinator is responsible for the creation of a welcoming environment and for keeping the LL Group on the right track. Some stakeholders may not have prior experience of participatory processes and the coordinator should ensure that all members are feeling at ease and that their views are valid and respected. The Local Coordinator can designate one or more PROJECT COORDINATORS. Project Coordinators, among university researchers, are responsible for the content wise operation and process management of the LL Group. They guarantee on both ends between the LL Group and the consortium the transnational network activity, and provide concrete outputs for the definition of the deliverables. Other important roles in the Core Group can be: reporting responsible, logistics responsible, communication manager. They can refer to one or more people at a time.

Example from Naples

The Local Coordinator of the LL in Naples is prof. Michelangelo Russo.

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Example from Amsterdam

The Local Coordinator of the LL in Amsterdam is prof. Hilde Remoy.

OPEN GROUP: a much larger group, composed of all the stakeholders, able to be adapted along the way. According to the needs, the open group allows to increase the participation of new relevant stakeholders that can perform ad hoc interventions on a specific topic or activity, at any time during the project.

For the same purpose, **THEMATIC SUB-GROUPS** can be created. They can be defined on the basis of a main theme and several secondary issues. This organization based on thematic subgroups may be more interesting for stakeholders and allows a check evolution of each group.

The scheme below shows the internal roles, relationships and hypothetical thematic sub groups (Fig. 9):



Figure 9: Internal roles within LLs

Source: UNINA Team

How to define internal roles: short tips

For every Living Lab, the following roles could be defined:

- local coordinator;
- project coordinator(s);
- core group;
- flexible open group;
- thematic sub-groups.

3.2.4 How to Choose Case study areas

Each case study area definition is unique, in terms of the local context, the subject matter and coverage (thematic and spatial).

There is no default model to follow.

As part of the LL method, the process of choosing the case study area is as important as the result of the LL.

To comply with this philosophy, the definition should be developed based on the following key principles:

- The selection of the case study area is not a formality to fulfill for the consortium. It can be used by local authorities, to provide an answer to urban issues in terms of waste management aimed at the development of models of circular economy. This is why the area must show clear relations to waste cycles and urban metabolism issues and it has to be as exemplary as possible for the entire Metropolitan Area flows management (scalability and transferability of the process at local level);
- the knowledge generated through the activities of transnational exchange networks should be implemented in the defined area. In this way, the selection of the case study area has to be scalable and transferable to other European cases, with due differences (scalability and transferability of the process at consortium level);
- the defined area should deal with the different dimensions of the problem, e.g. the environmental one, the physical one, the economic one and the social one, considering the various territorial levels relevant for the solutions to be implemented;
- the choice of the area is the result of a pre-Lab participatory process, developed together with the first stakeholders involved. Testing and monitoring the process means that the area can be better defined during the³⁷ duration of the LL, due to the addition of new stakeholders that can help in specifying the implementation area for the project.

Example from Naples:

The definition of the area in the Naples case study has been carried out in a pre-Lab process, led by UNINA and in collaboration with the User Board Members.

Following the above-mentioned key principles, the defined area is an environmental, physical and socio-economic sample for the matter of waste and resource management. Two site-specific principles are relevant:

- the sample area is not where the issues of waste management are at their most critical point, in order to avoid a manipulation of the project;
- in some municipalities of the Metropolitan Area of Naples, there are already local groups, involved in other European networks and participatory process. Considering this, UNINA chose not to duplicate or create an additional group, but, after an examination of the existing structure, to implement it by incorporating it.

Below is a map of the chosen area, consisting of eight municipalities, and a picture of an open-air activity from one of the LLs in the area, coordinated by UNINA.

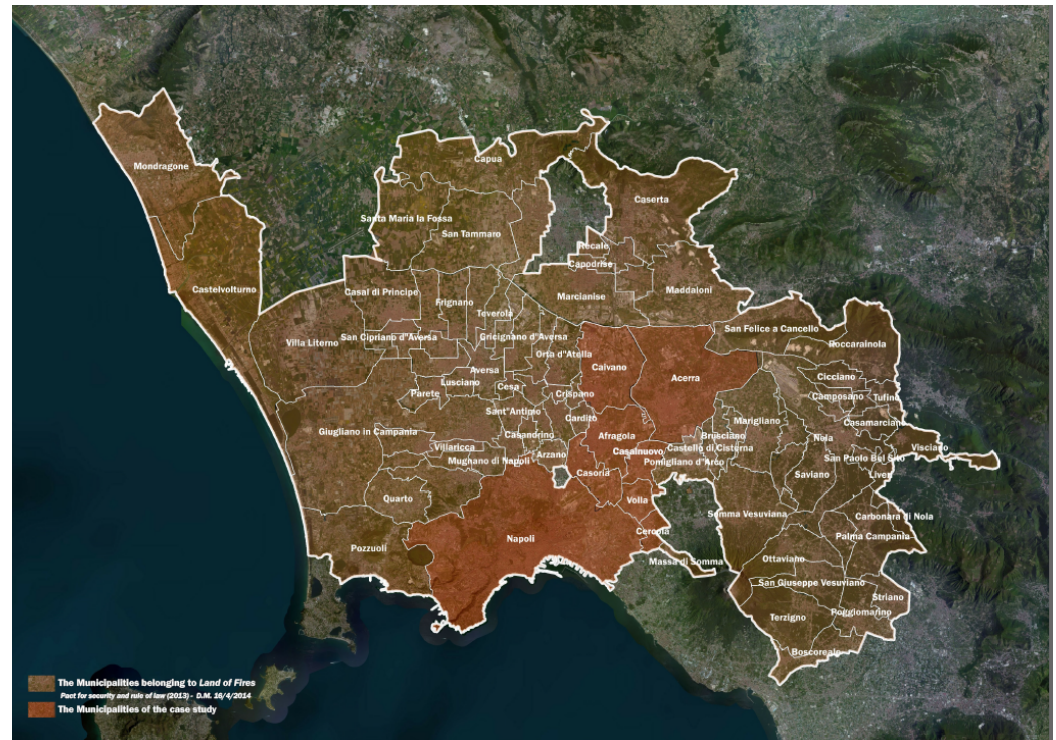


Figure 10: the selected area within the Metropolitan Area of Naples
(Land of Fires borders in brown and Case Study Municipalities for REPAiR in red)

Source: UNINA Team (Poli)



Figure 11: Recovering the wastescapes

Social Gardening activity in a former military area in

Naples Metropolitan Area (Municipality of Casoria)

Source: picture by Alessandro Capozzoli

Example from Amsterdam:

The first definition of the Amsterdam case study area has been done in a pre-Lab participatory process, led by the TU Delft and in collaboration with other local partners and User Board Members.

Regional level: the Amsterdam Metropolitan Area (AMA) was chosen as relevant regional entity to start the selection of the peri urban scale. MFA and LCA will use this area.

The Amsterdam Metropolitan Area (*Metropoolregio Amsterdam*) is located in the North Wing of the larger polycentric Randstad region and spans across the boundaries of two provinces (North-Holland and Flevoland) and encompasses the city of Amsterdam and 36 municipalities. The total population is about 2.4 million. The region is responsible for a range of policies, including economic development, transport, and aspects of spatial planning related to urbanisation, landscape management, and sustainability.

Peri-urban area: we mapped the peri-urban areas on the basis of population density, land use and intermingling of built and unbuilt features. In summary, the spatial selection method can be described in the following four steps:

1. dividing the area into 500m x 500m grid cells;
2. selecting those grid cells with a population between 38 and 1,250 inhabitants per 500m x 500m;
3. adding grid cells, with a rural density of maximum population density that overlap with areas of the CORINE land cover classes industrial or commercial units, port areas, airports, mineral extraction sites, waste sites, port and leisure facilities, and all major roads and railway tracks and associated land;
4. subtracting all cells that are classified continuous urban fabric according to the CORINE land cover classification.

The resulting map for the AMA is presented in Figure 12.

Intra (peri-)urban system: Based on workshops with key stakeholders, as well as a preliminary spatial analysis, we selected the area starting from the analysis of the key challenges for developing a more circular economy in peri-urban areas in the region and the analysis of the key flows of resources. On that basis, we decided to delimit the intra peri-urban system on the basis of the three 'main ports' to the area: from the Amsterdam docklands towards North-West and IJmuiden (key areas with wasted landscapes and the port); South from there to include the Schiphol area (airport and the location of the Valley circular economy initiative); and finally South-East where the greenport is located (agricultural production in greenhouses and flower trading).⁴⁰ Those areas are also relevant from the perspective of the flows that are key for the above-mentioned challenges, such as construction and demolition waste (e.g. housing challenges in Haarlemmermeer or regeneration of docklands in Amsterdam), biowaste (e.g. related to the airport and greenport challenges), municipal solid waste (e.g. while municipal solid waste is a challenge across the metropolitan region, in the airport area there is a specific challenge of waste from the catering for airplanes, etc.). While this delimitation is functional and spans across municipal boundaries, for data we have to rely on municipal data. Within this intra peri-urban systems, specific focus areas for proposed interventions will be determined at a later stage (in PULLs). Figure X presents the final selection of the intra-peri-urban scale used for the AMA.

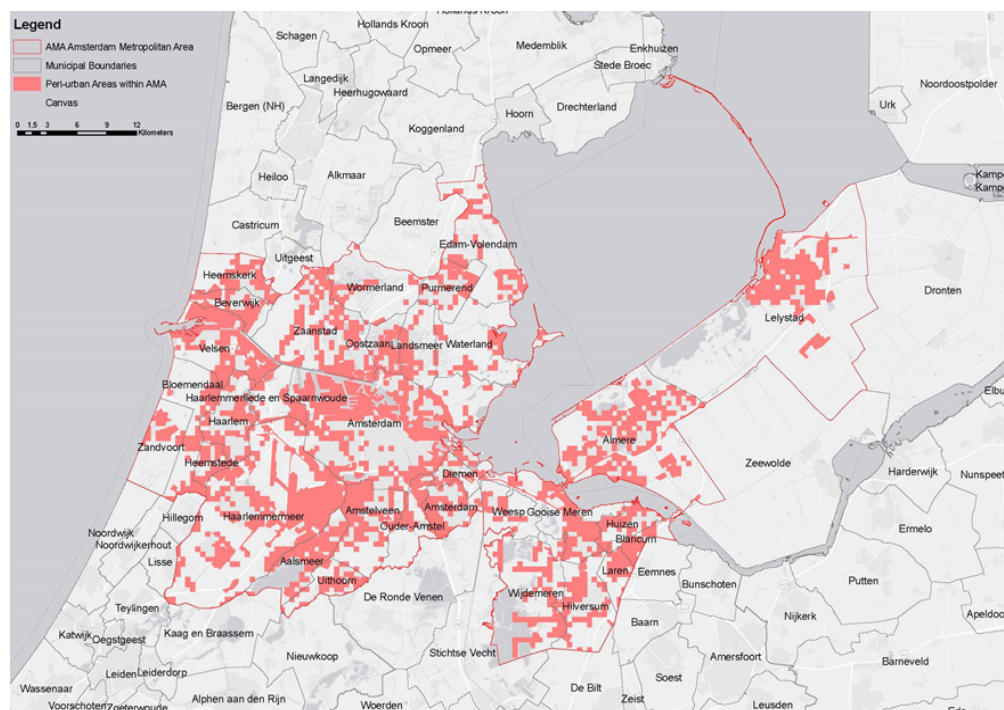


Figure 12: The peri-urban area within the AMA

Source: TU Delft Team

Hereby we add some of the pictures from the first field trip in the project area in the Amsterdam Metropolitan Area (AMA) (Fig. 14).



Figure 14: First field trip in the project area in the Amsterdam Metropolitan Area

Source: photos by Libera Amenta

Focus area: In Amsterdam the choice of the focus area has been driven also by the presence of initiatives related to CE in the project area that are already ongoing. We list some of them below as the result of the first meeting with the Dutch Stakeholders on the 31st August 2016.

Amsterdam CE Initiatives:

- Park 2020
- STP
- AEB + partners, waternet

- Buiksloterham
- Waarderpolder
- Arena
- Zuidas
- Miskantus
- Pro Dock
- Schiphol
- Meerlanden
- Park 21
- Wildeman / Tuinen van West
- Composteren
- Almere, Floriade
- Flora Holland
- Greenport Aalsmeer
- Heineken Brewery
- Algae farming
- Regeneration Haarlemmermeer
- Cruqius
- ICL fertilizer
- Green Energy Hub
- Valley
- Temporary flax / hemp producer
- Tuin van Bret
- Stadshout
- Amstel kwartier hotel
- Wooden hotel (to come)
- ReGen

In conclusion, after the first field trip a discussion among the TU Delft researchers is needed about the necessity of selecting and taking into consideration only some of the CE initiatives present in the project area.

It is agreed to take into consideration the Valley as one of the CE initiatives to be studied, but the selection of the other initiatives needs to be defined. Within the LL the focus area and the initiatives are determined by a collaboration of students, researchers and local stakeholders.

In depth analysis: see attached Spatial Analysis Glossary

How to choose case study areas: short tips

To choose the case study location, consider the following aspects:

- sample (Consortium level and local level);
- building on existing conditions (or groups);
- stakeholders involvement.

3.2.5 How to engage with stakeholders: initial steps

A different mix of stakeholders involved in the LL Group distinguishes each PULL. In the initial phase, the partner of Repair must identify the stakeholders who have an interest in the project issues.

As it is defined in the Work Package 6 (Task 6.1), the development of a list of stakeholders might start from the key stakeholders in the cases: who are the stakeholders involved in the waste and resource management, who are the stakeholders linked to the focus areas? Later in the project, other stakeholders can be added. The objective is to have an extensive stakeholder network in order to define the decision making and governance structure (See the forthcoming Deliverable D6.1).

It is recommended that groups include representatives from several fields and between public and private exponents. Nevertheless, the choice of stakeholders can be determined from the specific challenges defined in the focus area.

A possible, initial list of stakeholders, can include (where applicable):

- Regional or County Authority of the Metropolitan Area;
- local administrative entities within the Metropolitan Area;
- other public authorities, like universities and research centres, in particular, those studying disciplines that can be used in the Lab;
- final beneficiaries, e.g. youth, the elderly, migrants, etc., end-users;
- public and private sector actors involved in Waste Treatment and Waste Disposal, in particular, those who represent the interests of groups specific or providing public services that can be used in the Lab;
- third Sector, NGOs, social enterprises, in particular, those who represent the interests of groups specific or providing public services, related to waste topics, that can be used in the Lab.

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Overall, the group should represent the entire community of beneficiaries. It is essential to identify the stakeholders correctly, selecting them and inviting them to participate in the Open Group, in a flexible way, and adaptable during the duration of the project.

A shared Stakeholders Mapping Process between the Consortium Member and the stakeholders themselves is a good way to determine who should be invited to participate and why, what contribution is expected from whom and how each stakeholder may contribute.

Maintaining and supporting the motivation of all stakeholders during the entire project requires good communication, concerning both the number of meetings, their duration, frequency, etc. Keeping open communication channels allows stakeholders to provide inputs on a formal and informal basis. While considering the huge potential offered by innovations for online and remote collaboration, direct bilateral contacts to help keep people informed should not be forgotten.

Here, we provide a non-exhaustive list of communication tools, from traditional to newer ones: teleconference, email, files sharing, website, newsletter, social media, phone calls, events, etc.

It is important to adjust communication channels to the relevance and closeness of the stakeholder and, of course, to their technological capacity and means.

Example from Naples:

During the pre-Lab phase, UNINA has carried on individual meetings with a first small group of actors, involving some Consortium and User Board Members (Campania Region Authority, Municipality of Naples) and representatives from local administrative entities, with whom UNINA already had on-going collaborations on other European projects, in order to develop an initial stakeholders analysis.

This will help for the invitation of stakeholders to the LL. Above all, it provided a first agreement on the definition of the area (see previous paragraph).

An actual exercise of Stakeholders Mapping will be repeated during the duration of the project, in order to define the other stakeholders and members that can add⁴⁵ relevance and consistency to the structure of the group, adapting the group composition and the area definition.

Example from Amsterdam:

During the pre-lab phase TU Delft organized a first Dutch Stakeholder Group meeting in the AMS Institute on the 31st August 2016. The Dutch Stakeholders that were recognised as important stakeholders at the meeting were:

- Metabolic
- AMS Institute
- Waterboards
- Rijksoverheid
- Transportation companies – specifically KLM
- Copper 8
- In Stock
- Alliander
- Energy companies

- Amsterdam economic board
- MRA
- Amsterdam Smart City
- IBM
- Accenture

The reasons for choosing them were related to the expertise on the waste management topic of the experts selected and related to the high level of knowledge of the project area and of the knowledge and the involvement in the key initiatives related to CE in the AMA.



Figure 15: First Dutch Stakeholder meeting

Image Source: Photo by Hilde Remoy

3.2.6 How to engage with Stakeholders: short tips

To define the stakeholder to engage with, the following aspects should be considered:

- building on existing conditions (or groups);
- developing an initial key-stakeholders list based on developments in the area;
- making the stakeholders mapping exercise.

How to engage with Stakeholders: timeline tips

To get the Living Lab going, take the following into consideration:

- organizing stakeholders kick-off meeting;

- meeting on a regular basis;
- involving stakeholders in education activities (seminars, field trips, juries, etc.).

3.3 Cycles: CoDesign, CoProduction, CoDecision

3.3.1 The Product of REPAiR: Eco-Innovative Strategies towards a more circular economy

The main aim of the PULLs is to develop strategies for a more circular economy by first generating input for the development of the six cases that build the GDSE as well as test the GDSE itself.

The PULLs are the main place and time of transdisciplinary integration within REPAiR. REPAiR integrates activities of ongoing teaching activities at the participating universities and AMS with research conducted in the WPs by consortium partners.

As previously stated, innovation comes from gaps between an existing entity (ideas, products, services, policies, etc.) and users expectations. Eco-Innovation refers, in particular, to all forms of innovation – technological and non-technological – that create business opportunities and benefit the environment by preventing or reducing their impact, or by optimizing the use of resources.

Other than products, if we speak about services, they cannot be seen, tasted, touched, or smelled; a service can be an activity, a performance, or an object; it can be included in a product.

Eco-innovative strategies:

- provides customer and business value, as new services within old processes,⁴⁸ significantly decrease environmental impacts;
- may/intend to produce 3 kinds of changing: technological, social and institutional, within the spatial dimension;
- should also bring greater social and cultural acceptance, more confidence in the future;
- is closely linked to the way we use our natural resources, to how we produce and consume and to the concepts of eco-efficiency and eco-industries.

Eco-Innovative Solutions:

- are influenced by the site specificities
- depend on policies/resources (managerial, economic/financial, administrative capacity, etc.)
- depend on stakeholders: different people, queries, communities, economies are involved in eco-innovation process
- do not have a single scale, they cross multiple scales, different dimension, grain and scale of the territories of innovation.

The combination of eco-innovative solutions produce integrated strategies: mixable instruments and solutions for new systemic relations.

Eco-innovative strategies are contextual, adaptive and flexible. They use several kinds of Eco-Innovative Solutions, depending on space and designed over time.

Instead of using a fixed catalogue of solutions, the purpose is to interpret the specificities of the case study and generate innovation in response to specific questions and potentials.

The following paragraphs define these solutions through the already mentioned CoCreation process: a spiral in which it is possible to gradually adjust and evaluate the design of solutions (see 3.1).

From the Co-exploring, the Lab is gradually starting to address the CoDesign cycle and its specific sub-phases: Appreciate Opportunities, Design Concepts, CoEvaluate Concepts.

3.3.2 Appreciating Opportunities

Each cycle has to start with an analytical moment, useful to assess existing knowledges and capabilities as well as decision needs. After the first cycle, it can be combined with the evaluation phase.

The proposed methodology will comprise focus-group interviews and related activities of data-collection. This set of different activities calls for the involvement of different stakeholders.

Some questions are central and can be reiterated at the start of each cycle:

- What is your general challenge and related objectives? What do you want to achieve in the process?
- Who are the target user-groups that need to be involved in this process? How should they be involved? What are the users expected to contribute with?
- Which needs, requirements and preferences do the users have or express related to the topic of the project?
- In which physical, social, technical and organizational context is the process going to be implemented?
- Which kind of bottlenecks or opportunities can you already foresee for the project, considering the existing conditions?

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Example from Naples

In NAPLES, the main challenges are:

- Challenge 1 > to improve multilevel governance among decision makers and to build inter-institutional partnerships among public actors
- Challenge 2 > to plan common visions among decision makers and to share these visions with local communities
- Challenge 3 > to attract investments in agriculture, fito-remediation, etc
- Challenge 4 > to promote innovative know-how in agriculture, fito-remediation, etc.

- Challenge 5 > to influence community behaviours through participatory processes, co-design, shared practices, incentives to alternative economies and so on.

Each one of the challenges refers to a multiple set of issues, characteristic of the condition of the Metropolitan Area of Naples, contemporarily involving environmental, social and economic vulnerabilities of the territories. That is why the overcome of the present condition implies a multi-sectoral approach, able to integrate dimensions and to involve institutions and communities.

Furthermore, restrictions exist that hinder to overcome these challenges: bureaucracy in administration (i.e, the contrary of creativity and possibility); rigidity of territorial government, rules and laws; spatial restrictions due to environmental vulnerability, building density, physical boundaries, etc.; financial and socio-economical issues, cultural perception, etc.

Following the key principles of Living Lab theory, an integrated challenge call for integrated groups of public/private + people.

Example from Amsterdam

In AMSTERDAM the first foreseen key obstacle and hindrances towards the development of CE that REPAiR could help to overcome, have been listed during the 1st meeting with the Dutch stakeholders and are the followings:

- Distrust/lack of trust
- Business Model/Finance > true cost
- CO2 pricing
- “Simplistic” Economic models
- Path dependency
- World open market
- Various definitions of CE
- Exchange of data
- Data: Availability, compatibility, integration, quality, amount,...
- Human nature
- Existing CAPEX (CAPital EXpenditure)
- Data for decision making
- Complexity
- Inadequate governance
- Established ways of working
- Greed
- Ignorance
- Political short term thinking
- Time (long/short term)
- Lack of collaboration (ego’s)
- Understanding Waste Geography

- Rules
- Different scales to work with
- Mismatch between learning (time) and speed up realizing houses
- Traditional working in spatial planning

3.3.3 Designing Concept

The aim of the second step is to co-develop concepts or rough prototypes of ideas, products, services, policies, etc. based on the constructed framework of needs, in each cycle coming from the previous phase. The concepts need to be detailed enough for the user to experience what they are co-producing.

A good methodology is planning for real by temporary uses (see next chapter).

Some questions are central and can be reiterated at the start of each cycle:

- What is the overall purpose of the EIS to be designed?
- Which are key user requirements that can be identified?
- Which hardware should the innovation be designed for? (e.g. mobile phone, PC, surf pads, or other gadgets)

3.3.4 CoEvaluating Concepts

The last phase will be based on the encouragement of sharing users thoughts and attitudes towards the concepts developed in the previous phases. After the first cycle,⁵¹ it can be combined with the aim to identify any unexplored needs or needs that are modified in some way during the duration of the cycles.

A good methodology is co-monitoring the change after temporary uses (see next chapter).

Some questions are central and can be reiterated at the start of each cycle:

- What are the main question that still needs to be answered by the proposed EIS, considering users needs and requirements?
- Who are the expected future users? How can they be enlarged?
- How can we encourage and stimulate users to use the EIS during the test period and get back to the Lab?

3.4 Co-producing and testing the service: techniques and methods

3.4.1 Collecting data methods

Data collection for appreciating opportunities phase might be accomplished be through different methods, as the following ones:

- Data collection from city, regional or national statistical sources and archives;
- Surveys among (a relevant sample of) the users/stakeholders can provide data on critical points and needs;
- Interviews and focus groups with representatives of the users/stakeholders can help tracing experiences and perceptions; the groups have to be composed by people of different age, gender and ethnic profiles to find out needs and even to measure the EIS results.
- Storytelling, case studies and anecdotal evidence provide additional context information that can be used in evaluations phase too.

3.4.2 Tree of Problems and Objectives

The Tree of Problems and the Tree of Objectives is an established technique for work on problems in groups. It is a simple graphical representation of the problems, their causes and their effects, that can be easily made using with a blank template and post-its.

This are the peculiar phases:

- List all the problems that come correlated to the main theme. Problems must be clearly identified; they must be current and not possible, imagined or future. The problem is a negative, existing situation, not the absence of a solution;
- Identify the “fundamental problem” in the tree. Some attempt and errors can be made to arrive to focusing on the right problem;
- Determine which problems are “Causes” (the roots of the tree) and which are ⁵² “Effects” (the branches of the tree);
- Arrange in hierarchy both Causes and Effects, as the causes are linked to each other in cause / effect relationships.
- Once completed the Problem Tree, it is possible to use another blank template to move from problems to solutions and build the Objectives Tree. Following the same principle, rephrase all elements in positive affirmations, transforming the problems into solutions (the trunk of the tree), the effects of changes into expected results (the branches of the tree), and the causes into actions (the roots of the tree).

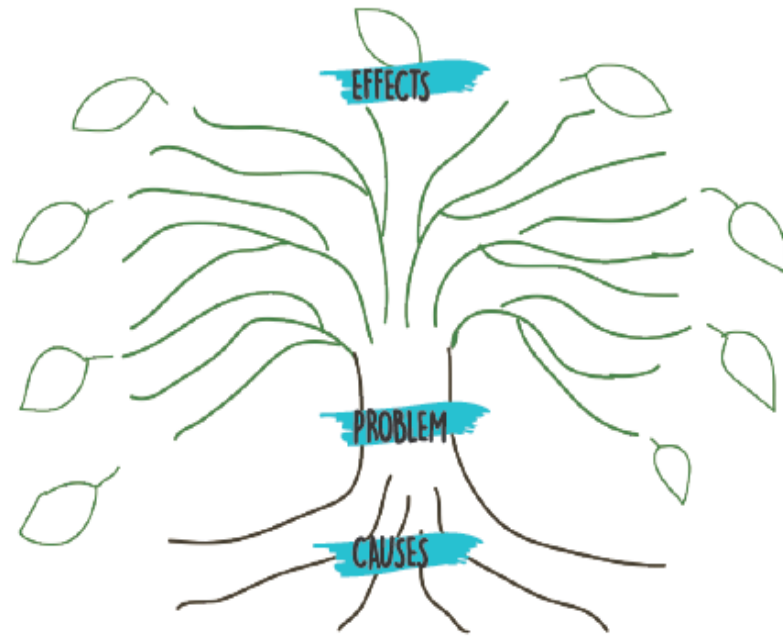


Figure 16: The Problem Tree

Source: Learning Kit – Urbact Summer University 2016

3.4.3 Stakeholder Mapping / Influence Matrix

The Stakeholders Mapping Exercise can be started through an analytical table used to identify the interests and motivations of the stakeholders, as well as possible actions consistent with the different interests expressed by the Lab.

The table is composed by 3 columns (see image below):

- The first column on the left lists all categories of actors who may have an interest and can be divided into two groups: Key Stakeholders (those directly interested in the topic discussed, positively or negatively); Secondary stakeholders (individuals with a role as an intermediary, including the distribution agencies and local political representatives and support agencies such as the operators social).
- The following three columns describe the role and involvement of stakeholders: the first should sum up the current situation and how each stakeholder is affected by the problem to be addressed, the second should note the potential role and the desire to change, while the third should focus on how the project can meet their needs.

This exercise can be useful during the duration of the project to include missing stakeholders and co-monitor the relevance of the people involved.

Stakeholders	Interests and influences	Roles and motivations	Possible Actions
Key Stakeholders	...	...	...
	...	...	...
Secondary stakeholders	...	...	...
	...	...	...

Table 4: Influence and importance level

Source: UNINA team simulation

In addition to this table, another important exercise is the development of an Influence Matrix, aimed at the definition of the priority among stakeholders, as well as to think about the right approach to have with each one of them.

This matrix can be created through a role-playing game as in a Trialectic Football Game (as in the work of the Danish Situationist Asger Jorn).

The stakeholders defined in the previous table can be inserted in the matrix, following the criteria of Influence and Importance:

- A) High importance, Low influence: It consists of important stakeholders in relation 54
To the identified problems, but with low influence in the process. However, if they are upset, they can gain influence and try to resist to the proposed change.
- B) High importance, High influence: These stakeholders may be impacted by the proposed change and can contribute, both supporting and opposing the proposed actions.
- C) Low importance, Low influence: These stakeholders deserve a relative priority that may however require a limited monitoring or at least be kept informed during the process because their status could evolve over time.
- D) Lower importance, High influence: These are the stakeholders with high influence, which may affect the outcome of the proposed actions, but whose interests are not in the target of the action.

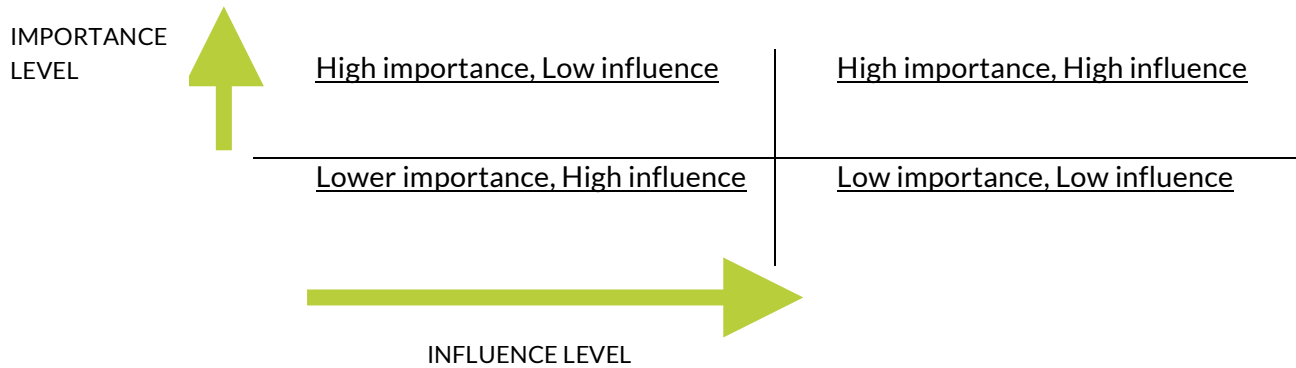


Figure 17: Influence and importance level

Source: UNINA team simulation

3.4.4 Temporary uses: take actions!

In order to multiply the immediate effects on people's lives, the implementation of the project goes through phases and temporary uses of spaces and buildings within the case study area.

The participation to real activities in this sense can become a fundamental shift for the construction of a sharing strategy, between institutions, community and associations, operating in the area, culminating, then, with the extension of the use.

It is possible to create a continuous path for the project, where temporary uses are ⁵⁵ moments of co-design stimulation and co-evaluation.

Starting points can be:

- Planning for real: Method of involvement of the local community in which small groups make plans for the future, using maps or flexible cardboard models.
- Interactive visualizations: Visual Presentations that allow people to participate with contributions and / or changes.

These activities are at the core of GDSE interface with people and stakeholders. Looking at Deliverable D2.1: "stakeholders are asked to work together on a common interface using computer-based geodesign tools linked to a touch-enabled interface [...] The main rationale within a PULL workshop is that specific tools fulfilling specific roles, can be used jointly by the stakeholders using a common information platform linked to an interactive touch-enabled hardware instrument. Major roles include communication and visualisation of information, discussion support, and design and assessment of alternative waste management solutions and eco-innovative approaches".

Building on these accomplishments, it is possible to build actual events, carefully structured as collaborative moments, in which all stakeholders work closely with

specialists from different disciplines to create actions for the future of the community or treat certain aspects of it.

What is crucial is not to alter the existing condition through uses not connected to an overall strategy: temporaneity is a catalyst for the project, a pilot case within the long-term implementation.

3.4.5 Co-Monitoring the change

Monitoring is the regular, systematic collection of data about the implementation of the project. Co-monitoring means using the monitoring as a tool for change roadmap, while the drive is still on, to adjust solutions in a collaborative way.

This will typically include information about the progress of activities and the delivery of outputs, in order to share ownership of success, obstacles and amendments to the project, as well as learning for all.

The frequency of monitoring and reporting will depend on the duration and nature of the Eco Innovative Solutions.

3.4.6 Testing and implementing Eco-Innovative Solutions in a GDSE - Geo Design Support Environment

From Deliverable D2.1:

- “Step 1: A starting set of maps and visualised data is displayed to the stakeholders on the touch enabled interface including at least: a brief description of the business-as-usual-state in terms of flows, stocks and ⁵⁶ impacts; a starting set of solutions to specific problems arisen from the analysis of the business-as-usual-state.
- Step 2: The stakeholders assess the displayed data
- Step 3: The stakeholders discuss the currently displayed setting and: give further information on the business-as-usual-state; describe requirements for solutions and strategies; discuss and further develop the suggested solutions; combine solutions to their preferred strategy
- Step 4: The solutions and strategies modified by the stakeholder’s co-designing process are sent to the GDSE column I model version through the touch-enabled interface. Input from stakeholders can be expressed in the form of parameter setting and modification, multiple choice, drawing of simple shapes (i.e., points, lines or polygons). These tools are interactive and intended for workshop-settings, which means that tool users are allowed to provide input and generate output in real time through easy-to-use multi-user interfaces.
- Step 5: The GDSE column I model version recalculates flows, stocks and impacts caused by the modified “design” (= solutions and strategies”). [...]
- Step 6: The recalculated maps and charts are displayed on the touch enabled interface

- Step 7: The stakeholders reassess the displayed data and flows, stocks and impacts caused by their “design” (= solutions and strategies”) using their local expertise.
- Step 8: The stakeholders continue their discussion and optimization (thus, loop back to Step 2)
- Step “X”: Within the visualisation component, final solutions and strategies (combination of solutions) and impact assessments are communicated to all stakeholders as maps, flow diagrams and bar charts showing quantitative assessments and rankings.”

4 Making the most of transnational exchanges

4.1 International meetings as tools for Living Labs

The exchange within the REPAiR Consortium equals a bridge that facilitates the interaction between local and transnational levels. Each LL provides relevant input and quality for transnational events. In return, they will acquire the knowledge produced during the transnational meetings, which enrich the discussion at the local level, by improving capabilities of the stakeholders.

Most of the partner cities will have the opportunity to host a transnational event. Such an event could have the form of a field trip, seminar, a conference, a bilateral visit, etc.

Hosting colleagues and experts from partner cities allows the Consortium to share local experiences and the progress made on the topic addressed by the project. Members of the local Living Lab have the opportunity to present themselves to their counterparts in other cities to show the solutions and the results achieved.

The members of the local Living Lab also have the option to participate in events organized by other partner cities, to see how they are addressing similar problems, in order to find specific solutions, adapting the experiences of others to their own local context.

Example from Naples:

Within the 1st Consortium Meeting, REPAiR Kick-off Meeting in Amsterdam/Delft,⁵⁸ Naples has organized a Market Place activity around the topic of Eco Innovative Solutions. This experience has produced vibrant ideas and initial designs, core of the first Book of Ideas produced by the Consortium.

The 2nd Consortium Meeting will be organized by UNINA research group in the location of the University of Naples Federico II in June 2017.

Example from Amsterdam:

So far, TU Delft organized the 1st Consortium Meeting, REPAiR Kick-off Meeting in Amsterdam/Delft that took place in November 2016 in the Netherlands.

It was a wonderful opportunity to share knowledge and experience methods of mutual understanding. This type of event helped members feel part of a dynamic group, allowing them to make a useful exchange of ideas and opinions.

In depth analysis: for more on the 1st Consortium meeting and/or Market Place, see the attached Book of Ideas.

4.2 University education and Teaching activities

4.2.1 How to carry out the mapping exercise with the students

For the students involved in the LL, participation brings the advantage of working in multidisciplinary teams on real life projects on the interface of research and design, and therefore learn skills that will be crucial for their future employability and professional success (and entrepreneurial skills).

The initial exercise for students coincides with the actual mapping to define borders and cases, following waste and Wasted Landscapes (better defined in the attached Spatial Analysis Glossary as “wastescapes”) life cycles.

In the research project, institutional boundaries cannot be considered as the only relevant boundaries for spatial or flows analysis: therefore, the research needs to define case study areas going beyond the city boundaries, crossing provincial boundaries and going beyond any predefined definition of functional urban area (FUA).

Case studies should be defined following a multi-sectoral approach, able to integrate dimensions and to involve institutions and communities expectations.

National and local policies regulate the legal management of waste by shaping peri-urban areas through “operational landscapes of waste” (see the definition in the attached Spatial Analysis Glossary) which are made of incinerators, landfills, waste-recycling plants, waste-water processing plants and even former industrial areas waiting for reclamation by the State. At the same time, for analysing the overall waste⁵⁹ metabolism, we have also to consider the Wasted Landscapes, including: stretches of agricultural land housing; illegal constructions; portions of abandoned historical heritage; housing or productive facilities confiscated by the state; abandoned or soon to be abandoned factories and shopping malls; surfaces, areas and infrastructures designed to host marginal lives.

In depth analysis: for more on wastescapes, see attached Spatial Analysis Glossary.

Example from Naples:

In the pre-lab phase, UNINA team has carried out an initial Mapping Exercise with two courses of students, to define the case study areas at the various scales. The course are:

- Third year Urban Planning Course (Urban and Spatial Planning Bachelor Degree) – 25 students;
- Fifth year Urban Planning Course (Architecture Master Degree) – 50 students;
- Thesis dissertation (Architecture Master Degree) – 2 students;
- PhD 1st and 2nd year (Urban and Spatial Planning) – 2 students.

In particular, there is a proposition of a 2.5x2.5 Square Kms grid, crossing sectorial, administrative borders within the Metropolitan Area of Naples. Within the grid, the exercise has seen the research of peculiar conditions, contemporarily involving environmental, social and economic vulnerabilities of the peri-urban territories, declined through the interpretative lens of waste and Wasted Landscapes.



Figure 18: Metropolitan Area of Naples example grid: peri-urban territories into the metropolitan area. We focus on this sub-region because of the relevant presence of several topics related to REPAiR topics: the presence of a lot of wasted landscapes but also the importance of big waste treating and disposal plants.

Source: Enrico Formato elaboration

INQUADRAMENTO TERRITORIALE



ITALIA



CAMPANIA



NAPOLI



CASORIA E VOLLTA



VOLLTA

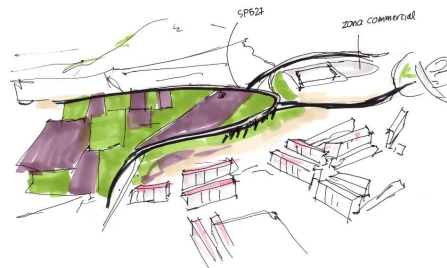


CASORIA



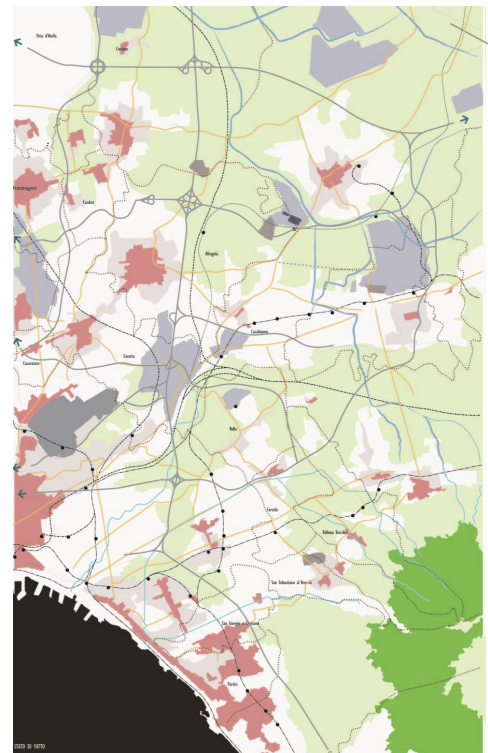
INQUADRAMENTO

Stato di fatto



STATO DI FATTO

- Centri storici
- Insediamenti compatti
- Insediamenti diffusi
- Insediamenti urbani per attività produttive
- Aeroporto
- Aree boscate
- Aree agricole
- Canali
- Strade romane
- Centurie romane
- Autostrade
- Linea 2 - Regionale
- Circumfreggia
- Linea Fs
- Confini comunali



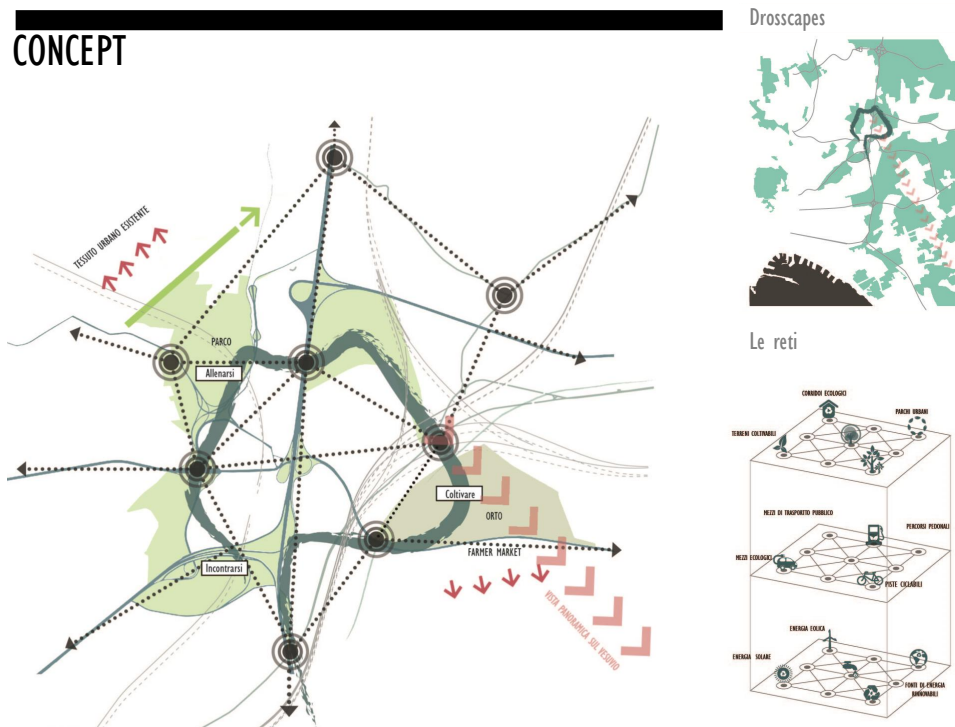


Figure 19: First example of students' exercise on the project area at UNINA

Source: UNINA students

4.2.2 Testing Eco-Innovative Solutions in Architecture and Urban Planning Courses

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Groups of students working on the study areas over several years (4 in the case of REPAiR), not only help to conduct the basic research activities, but moreover they can help in testing actual sets of Eco-Innovative Solutions.

Following the Market Place technique, used in the first Consortium Meeting, students are divided in groups, aimed at Eco-Innovative Solutions design.

The groups can be made within one singular teaching course or, in a workshop, mixing students from various disciplines (architecture and planning, as concerns TU Delft and UNINA). The mixing of competences and abilities, even from students of different ages, can be fruitful in developing EIS.

But the real element of opportunity stands in the EIS testing: since users requirements can change as the problem develops into possible solutions, it is important to re-examine initial needs, making sure they correlate to updated requirements, eventually coming up with new solutions.

Therefore, the EIS testing with students has to be iterative, following the idea that the implementation of solutions goes through iterative interactions between students competences and perspectives.

In depth analysis: for more on Market Place, see attached Book Of Ideas

4.2.3 International workshops and international exchanges

Naples and Amsterdam students activities take place simultaneously. Below there is a scheme from REPAiR proposal presenting a preliminary structure of the pilot PULLs, where results of student work and research activities are integrated.

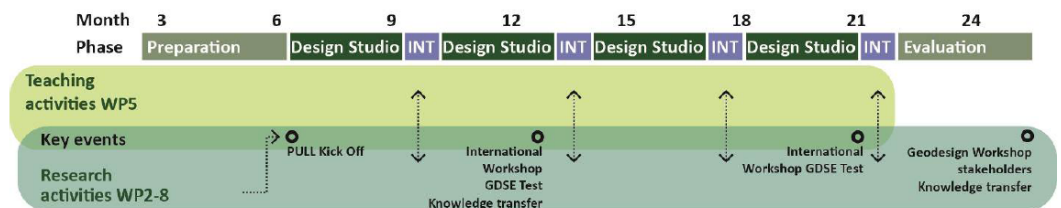


Figure 20: Living Labs and teaching activities

Source: REPAiR project proposal, elaboration Libera Amenta

In addition to the already planned International Workshop GDSE Test and Knowledge Transfer (due in June 2017), the aim of the project is to enhance exchanges among university students within the consortium.

In the initial phase, exchanges will happen between TU Delft and Unina students and they will consist in one-week long trip to the other university, aimed at field trips and seminars. The specific education details will be decided on an actual basis, but the ⁶³ overall idea is to get the opportunity for the students to visit foreign schools of Architecture and Planning and work on comparable case studies.

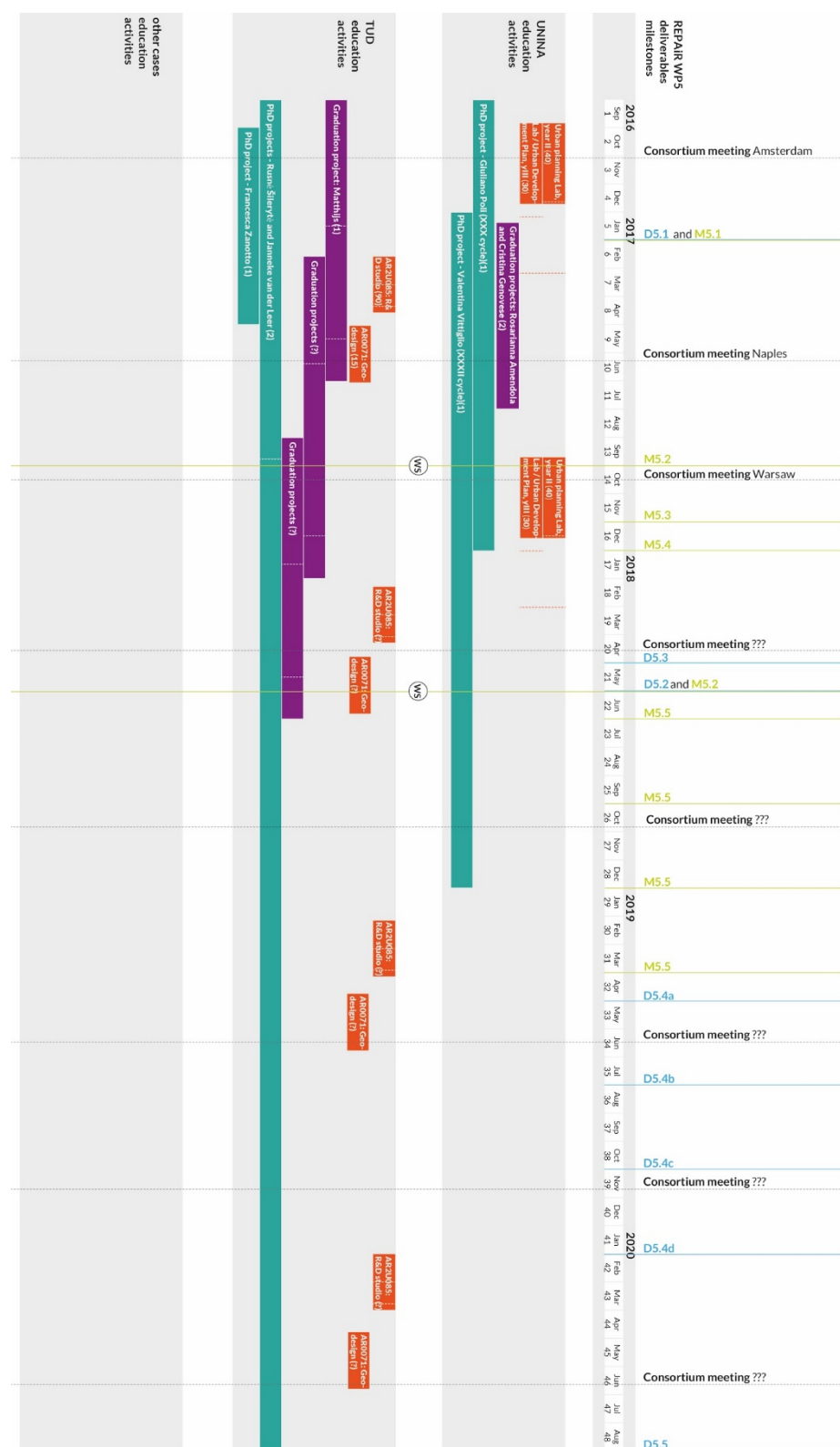


Figure 21: Preliminary timeline for all PULLs - 4 years

Source: Elaboration Janneke van der Leer

Education activities:

BSc and MSc courses/studios/labs: (expected) number of students involved in brackets

MSc graduation/thesis: (expected) number of students involved in brackets

PhD projects: (expected) number of students involved in brackets

Deliverables and milestones:

D5.1 - Methodological guidelines (Handbook) for the PULLs

M5.1 - Definitive location, organizational settings and educational outline for two pilot PULLs. Amsterdam and Naples ready

M5.2 - International student workshop bringing together the multidisciplinary teams from both pilot cases

M5.3 - First set of solutions for a selection of challenges in pilot cases ready to be integrated into the GDSE ready

M5.4 - Definitive location and organizational settings of PULLs for follow-up studies ready

D5.3 - Handbook: How to run a PULLs

D5.2 - Catalogue of solutions and strategies for AMS and MAN

M5.5 - Final presentation and evaluation of student work of the follow-up PULLs

D5.4a to d - Catalogue of solutions and strategies for follow up cases

D5.5 - Updated handbook: how to run a PULLs for dissemination purposes

5 The role of knowledge transfer in PULLs

5.1 Knowledge transfer in REPAiR

Transfer of knowledge or transfer, exchange of good/best practices is a widely used phenomenon in European and international development policies at all levels (local, regional or national), between individuals and organisations across boundaries. Knowledge transfer is especially frequent between the economically “leading” and “lagging” territories. There are substantial differences among EU member states in governance, in administrative cultures, in knowledge in use in everyday life, in technology in use, in composition of stakeholders, in objectives and focus, in motivation, in behavioural and socio-cultural aspects etc. (Duan et al. 2010, Stead 2012), making such transfer an exercise riddled with complexity and uncertainty about the ‘transferability’ of practices across different territorial settings. In fact, the research on policy transfer and transfer of best practice in planning (see e.g. Dolowitz & Marsh, 2000; Stead, 2012) stresses the pitfalls of transfer of practices and solutions without considering their applicability to the local context, which tends to produce disappointing, if not downright damaging results. The challenge lies in the appropriately prepared list of conditions to make a successful transfer and a distinction between the practices that are widely transferable across different contexts and practices which are context-dependent and thus with limited scope for applying elsewhere.

One crucial aspect of knowledge transfer in collaborative modelling-based geodesign research is the capability of the models to include, (next to the evidence-based⁶⁶ knowledge) as much knowledge from key stakeholders (private, academic, institutional) as possible that participate in the LLs. The GDSE to be developed for and by REPAiR will be strongly based on modelling, which will in turn require knowledge (in the form of data, parameters, layers, models, etc.) to be fed from the the internal research of the REPAiR team.

Peri-urban Living Labs – including teaching and workshop activities – constitute a tool that enables the relevant industries and stakeholders to present, test and assess newly developed technologies in a “real world” environment and in “real time”. (The feedback loops that will occur when the GDSE is implemented (via “what-if” tools) in the workshops of the PULLs will also act as knowledge transfer tools: iteratively, from users to the models and into the designs of the solutions.) The eco-innovative waste management solutions and strategies generated in PULLs will be selectively and strategically transferred to other case study areas. Hence, from the viewpoint of knowledge transfer LL is not only a tool to be transferred but it is a tool for learning and knowledge transfer itself.

5.2 Knowledge transfer events as part of the Living Lab workshops

The plan is to organise six knowledge transfer events (workshops) bringing together the relevant stakeholders as part of the living labs in six case study areas. Local REPAiR (project) partners (organisers of the specific workshops) will be asked to invite the relevant local stakeholders (from the peri-urban area) to participate in the workshops. The purpose of these events is to demonstrate transferable solutions, discuss the scope for their adoption elsewhere, as well as to gather feedback from the participants that will be used to refine the methodology of knowledge transfer (T 7.4) and to elaborate the online handbook of knowledge transfer (T 7.5).

5.3 Guidelines for the contribution and participation of WP7 to LLs

The “knowledge transfer events” as part of the LLs in the six peri-urban areas would entail the following.

Key non-academic partners – related to the relevant LLs (where the event takes place) – will be asked to give short presentations on how relevant is learning from other areas for them and how this learning takes places in practice. (At the kick-off meeting, from each peri-urban areas, a representative was asked to present a challenge and its solution, based on a given guideline). Using the updated guidelines, we aim to ask other key stakeholders to give short presentation about their challenges and solutions, their learning processes.

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In LLs workshops for knowledge transfer will be organised. Workshops will contain group work on knowledge transfer in order to reveal facilitators and barriers and key channels for learning. We are planning mixed groups with different stakeholders from different countries. Practices identified in the different areas will be discussed from the point of view of their suitability to other contexts. (A test workshop was planned at the kick-off meeting.)

The events will also be an opportunity to present first ideas on knowledge transfer, getting feedback on the draft transfer methodology (T 7.4.) by the WP leaders of knowledge transfer.

After the workshop day a report listing good examples and (positive and negative) factors affecting learning/knowledge will be prepared and feed into T 7.4.

Participants will also be asked to fill out a very short questionnaire about learning.

Focus group interviews will be carried out as part of the LLs with a group of students participating in LLs. The aim is to reveal the potential and the role of LLs as a knowledge transfer tool.

In order to understand better the LLs as a knowledge transfer channel, a separate survey will be carried out at the beginning and at the end of the LLs in the six peri-urban areas (PUAs). The main goal of these surveys is to detect the expectations (at

the beginning of the LLs) and the perceptions of participants in different PUAs (with different social-cultural background) and to compare these expectations and perceptions from the viewpoint of knowledge transfer.

6 Next steps

The present deliverable D 5.1 is the first of WP 5, which develops the Methodological Guidelines for the Peri-Urban Living Labs in REPAiR. The next steps on its way to implementation within the project have to involve the follow-up cases and therefore enlarge the discussion towards the PULL leaders of all the cases. With respect to this context, Table 5 lists the key actions during the next months of the project that will define and concretise the Living Labs more in detail.

Deliverable /Milestone	Key Tasks in relation to WP 5	Key Responsible Partners	Time
MS20 First set of solutions for pilot cases	T5.2	UNINA	15
MS21 Organizational settings of Pulls for follow up	T5.3	UNINA	15
D5.2 Eco-innovative solutions Amsterdam	T5.2	TUD	21
D5.3 Eco-innovative solutions Naples	T5.2	UNINA	21
MS19 International students workshop	T5.2	TUD	13-21
D5.4 Handbook: How to run a PULL	T5.3	UNINA	21
MS22 Student presentation follow up Pulls	T5.4	UNINA	22-25-28-31
D5.5 Eco-innovative solutions Ghent	T5.4	UGENT	32
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D5.9 Final Updated Handbook: How to run a PULL for dissemination purposes	T5.5	UNINA	48

Table 5: Next milestones and deliverables which further define and concretise the Living Labs

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Attachments

A Book of Ideas

Spatial Analysis Glossary



A book of Ideas

FIRST CONSORTIUM MEETING
03 AND 04 NOVEMBER 2016

Amsterdam & Delft



31 January 2017, Naples, Italy & Delft, The Netherlands

Authors of the book:

Michelangelo Russo, Libera Amenta, Anna Attademo, Enrico Formato,
Alexander Wandl, Rusné Šileryté, Janneke van der Leer, Carolin
Bellstedt

with contributions of all the members of REPAiR project.

Designed by: Libera Amenta

Content

1 | Intro

1st Consortium Meeting
Program of the event
Group picture

2 | Day 1 - Amsterdam

3 | Day 2 - Delft

Repository of the Eco-innovative solutions

4 | We are what we eat

Why vegan?

5 | The “Dopper” story



1st Consortium Meeting REPAIR @ Amsterdam Institute For Advanced Metropolitan Solutions | Photo by Ni Yan

1| Intro 1st Consortium Meeting

03 and 04 November 2016
Amsterdam & Delft

Horizon 2020 Project REPAiR

REPAiR is developing and implementing a tool that helps local and regional authorities reduce waste flows in peri-urban areas. A shift towards a more circular economy is crucial to achieve more sustainable and inclusive growth. The REPAiR project will provide a geodesign decision support environment (GDSE). This environment will assist local and regional authorities in reducing waste flows by helping them create integrated spatial development strategies that are both specific for the place at hand, transdisciplinary and eco-innovative. The GDSE will be developed and implemented in 'Living Labs' in six metropolitan areas, namely Naples, Ghent, Hamburg, Pécs, Łódź and Amsterdam.

The 1st consortium meeting

The first REPAiR consortium meeting took place in Amsterdam and Delft in November 2016. More than 60 people joined, including members of all partner organisation as well as the majority of the User Board.

The two days meeting was divided into four thematic Blocks:

- Developing a joint initial vision for the GDSE in order to frame the joined expectations of the final product of REPAiR, as well as starting to develop a joined language within the interdisciplinary consortium;
- Introduction of the six cases and a first collection of key challenges towards the development of a more circular economy within the cases.
- An eco-innovative solutions workshop and market place, in order to start facilitating a co-creation process as well as setting the scope for possible solutions.
- An intensive discussion on life cycle assessment and a related set of indicators to be able to start building the assessment framework of eco-innovative solutions

What is a book of Ideas?

This Book of Ideas is collecting all the inspirational ideas that came from the 1st consortium meeting that took place in Amsterdam and Delft on the 03 and 04 November 2016. On the one hand it aims to report the experience and all the co-created ideas; on the other hand to stimulate further developments of them.

Program

THURSDAY NOVEMBER 03

- 09:30 Open doors with coffee
- 10:00 **Welcome and Introduction of Participants**
by the Scientific Director of AMS Arjan van Timmeren
- 10:15 **What is a GDSE and what do we expect it to provide?**
Presentation and Demo
- 11:30 **Developing a Common Approach for REPAIR**
- 12:00 **LUNCH** at the AMS Rotonde
- 13:00 **Bus transfer to the Circular Expo in Haarlemmermeer**
- 13:30 **Presentation and visit Circular Expo**
Welcome by Olaf J. Blaauw Senior Strategic Consultant
Delta Development Group
- 14:30 **Pilot Case Studies: Understanding the Main Challenges**
- 15:45 **Coffee break**
- 16:15 **Exploring the Scope for Knowledge Transfer Between the Cases**
- 17:15 **Bus Transfer to Delft and Check in Hotels**
- 19:30 **DINNER** at Restaurant de Waag

Resource Management in Fert-urban Areas: Going Beyond Urban Metabolism



Program of the event



Program

FRIDAY NOVEMBER 04

08:45 Open doors with coffee

09:00 **Welcome**
by Peter Russel the Dean of BK

09:15 Eco Innovative Solutions Workshop

11:00 Coffee break

11:15 Eco Innovative Solutions Marketplace

12:00 Address of Dr. Béla Atzél Project Advisor of the EC

12:30 Group Photo

12:45 Lunch

13:30 Sustainability Indicators and Modelling

15:15 Coffee break

15:30 **Parallel Work Package and User Board Sessions**
User Board - Berlage Room 2
GDSE Session: Room 01 West 290
Governance Session: BG West 290
Communication and Dissemination Procedures: Berlage Room 1
others to be added

16:15 Report of WP Leaders Towards Plenum

17:00 Goodbye Drinks

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All the members of REPAiR project @TU Delft. Photo by: Hans Kruse



1st Consortium Meeting REPAIR @ Amsterdam Institute For Advanced Metropolitan Solutions | Photo by Ni Yan

2| Day 1 Amsterdam

03 November 2016
Amsterdam





1st Consortium Meeting REPAiR @ Delft University of Technology | Photo by Ni Yan

3| Day 2 **Delft**

04 November 2016
Delft University of Technology



CIRCULAR VILLAGE

INNOVATIVE SOLUTIONS

Train, Bus, Car

DELFT

ELIO / DARTAN / VIKTOR

1 / Rk1

more challenges from the screen)

current in low density settlements
to bio-waste

more in dairy production

in urban context)

with agricultural landscape

DE-HANURE → CIRCULAR VILLAGE

SECOND PHASE - REFINED SOLUTION
DESCRIPTION → ADD FERMENTATION PLANT TO IMPROVE BIOGAS PRODUCTION AND REDUCE WASTEWATERS/DISCHARGES
SCALE/FLOWS → WASTE LEADS FOR FERMENTATION
REQUIREMENTS
POSSIBLE BENEFITS/DRAWBACKS
STAKEHOLDERS

European Commission

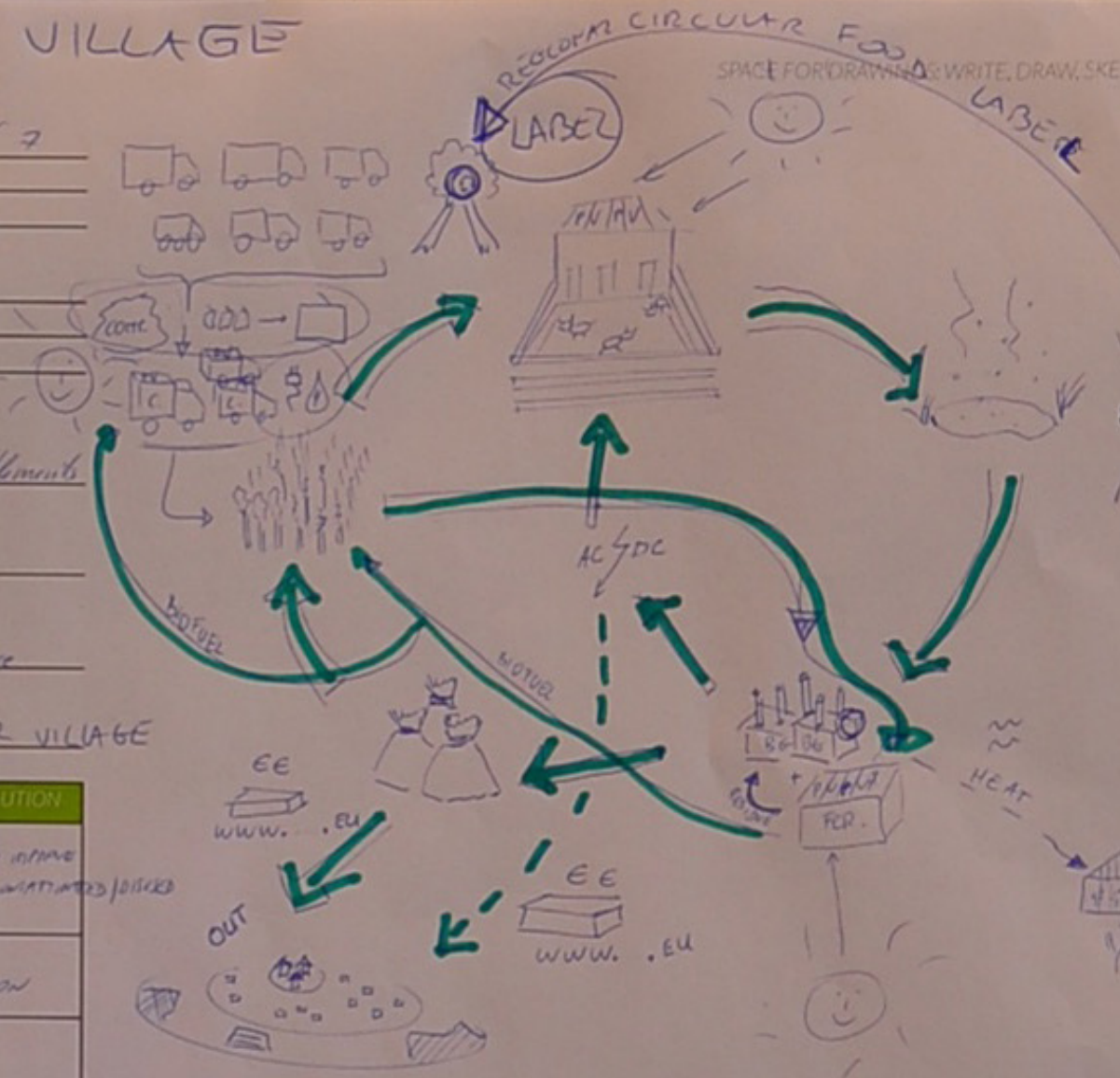
Horizon 2020
European Union funding
for Research & Innovation

R GRID

FF-GRID ~~SYSTEM~~
SYSTEM

S

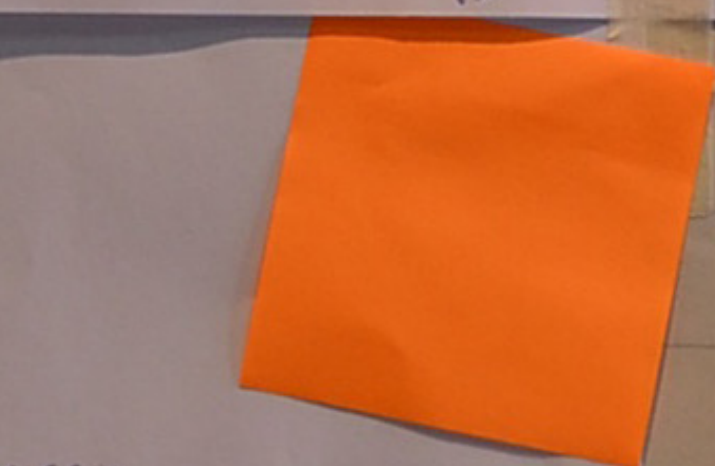
15



LOCAL /
REGIONAL PACT
ON CIRCULARITY

PLACE
BRANDING

THE
CONCEPT!



Repository of the Eco-innovative solutions

04 November 2016
Delft University of Technology

The Market Place

Market places are generally real or metaphorical place where the exchanges take place, buying and selling a product or a service. In the participation process, Market Place can result in a role-play where groups of researchers can jointly develop and then propose ideas in an “open market”, composed by other researchers. The final aim of the process is to evaluate the proposed ideas by assigning scores, eventually refinishing them according to new emerged requirements.

Rules set within the Market Place Workshop:

- 1. Preparation:** Create groups of 2-3 people from same organization. Spend 20 minutes in developing one to three Eco-Innovative Solutions (using a prepared format);
- 2. Co-Design:** Make enlarged groups by matching two groups at a time; discuss and refine solutions for 10 minutes (use prepared format). Use 5 minutes to choose 3 from the joint refined solutions and stick them onto the wall;
- 3. Market place phase:** use 20 minutes to buy and/or sell solutions (buy them by putting colored post-it onto the solution);
- 4. Presentation:** Present the proposed solutions by each group (25 minutes).

Rules can change during the process itself, according to the groups composition and to keep everything on time.

GROUP 1

Victor + Marcin

WORKSHOP ECO-INNOVATIVE SOLUTIONS

GROUP COMPOSITION
Name (1st phase): Isabel Droscher
Name (1st phase): Victor Vasil, Zoltan Granhut +
Affiliation: RKI + Bloem
Name (2nd phase): Marcin, Ewa, Ruse
Name (2nd phase):
Affiliation: TU DELFT

CHALLENGE (choose 1 or more challenges from the screen)
EIS per Waste management in low density settlement

Problem (issue addressed)

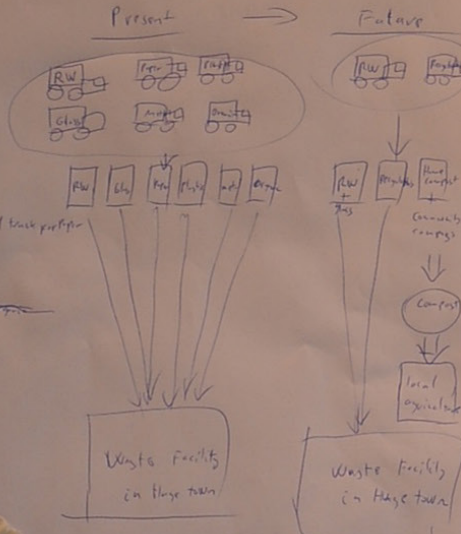
Collection truck need to consume much fuel if it goes

Context (short description of the urban context)

Small town with distant settlements per person

Solution (give a name)

Reorganize waste transport pattern



FIRST PHASE - DRAFT	SECOND PHASE - REFINED SOLUTION
DESCRIPTION If transport is reorganized and biomass is used locally per person	DESCRIPTION
SCALE/FLOWS Personal waste - biomass	SCALE/FLOWS
REQUIREMENTS Biomass production on local level	REQUIREMENTS
POSSIBLE BENEFITS/DRAWBACKS Less fuel consumption, less waste to agriculture	POSSIBLE BENEFITS/DRAWBACKS
STAKEHOLDERS Waste management company, local community	STAKEHOLDERS

CIRCULAR VILLAGE

WORKSHOP ECO-INNOVATIVE SOLUTIONS

GROUP COMPOSITION
Name (1st phase): Marcin, Ewa, Ruse (7)
Name (1st phase):
Affiliation: TU DELFT
Name (2nd phase): JASTO (JASTAN) VIKTOR
Name (2nd phase):
Affiliation: BLOOM, RKI

CHALLENGE (choose 1 or more challenges from the screen)
EIS for waste management in low density settlement

Problem (issue addressed)

Overproduction of waste in dairy production

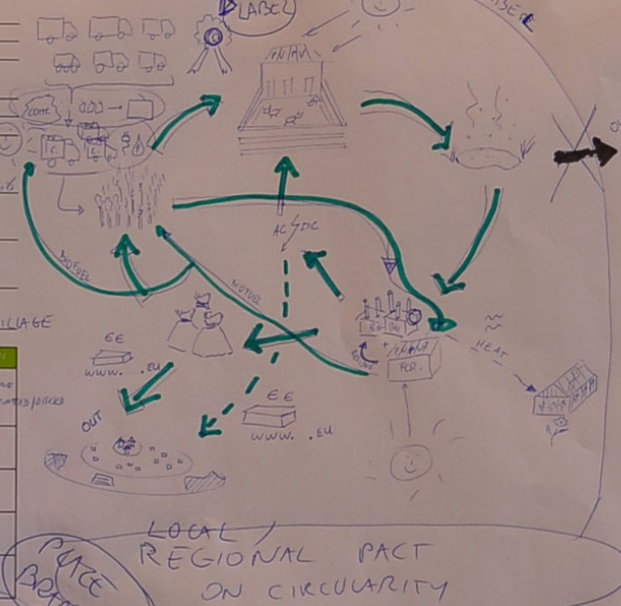
Context (short description of the urban context)

Low density settlement with agricultural landscape

Solution (give a name)

2E-HANURE -> CIRCULAR VILLAGE

FIRST PHASE - DRAFT	SECOND PHASE - REFINED SOLUTION
DESCRIPTION Addition of waste management and energy production to existing dairy production and waste management	DESCRIPTION Addition of waste management and energy production to existing dairy production and waste management
SCALE/FLOWS Dairy production - waste management - energy production	SCALE/FLOWS Dairy production - waste management - energy production
REQUIREMENTS Dairy production - waste management - energy production	REQUIREMENTS Dairy production - waste management - energy production
POSSIBLE BENEFITS/DRAWBACKS Less waste to landfills, less energy consumption	POSSIBLE BENEFITS/DRAWBACKS Less waste to landfills, less energy consumption
STAKEHOLDERS Dairy production - waste management - energy production	STAKEHOLDERS Dairy production - waste management - energy production



WORKSHOP ECO-INNOVATIVE SOLUTIONS

GROUP COMPOSITION
Name (1st phase): Zoltan Granhut, Isabel Droscher (4)
Name (1st phase): Victor Vasil
Affiliation: RKI + Bloem (HUN)
Name (2nd phase): Marcin, Ewa, Ruse (7)
Name (2nd phase):
Affiliation: TU DELFT

CHALLENGE (choose 1 or more challenges from the screen)
CHALLENGE NO.2

Problem (issue addressed)

Waste landscape only, thin soil on the surface - no potential for agric. use

Context (short description of the urban context)

Separated area from the urban landscape

Solution (give a name)

PHOTOVOLTAIC & POWER PLANT

FIRST PHASE - DRAFT	SECOND PHASE - REFINED SOLUTION
DESCRIPTION Waste landscape only, thin soil on the surface - no potential for agric. use	DESCRIPTION
SCALE/FLOWS Photovoltaic - power plant	SCALE/FLOWS
REQUIREMENTS Photovoltaic - power plant	REQUIREMENTS
POSSIBLE BENEFITS/DRAWBACKS Less waste to landfills, less energy consumption	POSSIBLE BENEFITS/DRAWBACKS Less waste to landfills, less energy consumption
STAKEHOLDERS Photovoltaic - power plant	STAKEHOLDERS

ELECTRICITY IS NOT FOR GRID BUT PRODUCED IN OFF-GRID SYSTEM
ENERGY USE FOR LOCAL PUBLIC PURPOSES
E.G. CHARGING BATTERIES
FOR LOCAL ELECTRIC RUGBY & ELECTRIC WASTE TRUCKS



GROUP 1.a Land cover with PV system

Zoltán Grünhut (RKI)
László Drescher (BIOKOM)
Viktor Varjú (RKI)

Challenge 2 > Recover damaged areas to create new balances in the regional ecology

Problem:

A wasted landscape with thin soil which cannot be used for agricultural purposes. The surface is suitable only for non-arboreal vegetation.

Context:

Huge area in the middle of two parts of the city, however, landscape does not appear as visual pollution. It is only an unused area in the urban texture.

Short description of the solution:

There is a wasted landscape that cannot be used for agricultural purposes. A solution of the use is to settle a photovoltaic energy power plant onto the surface.

On which scale and which resource/waste flows:

Peri-urban
wasted landscape, renewable energy use

Requirements:

- Fund for the investment
- Deal between the owner of the land and the local government
- Deal with the electricity provider to load and sell the electricity into the grid

Possible benefits/drawbacks:

- Renewable energy
- The area is still out of an integrated urban texture

Involved stakeholders:

- Local government
- PV investors
- Owner of the wasted landscape

GROUP 1.b Re-manure: circular village

Marcin Dąbrowski (TUD)
Rusné Šileryté (TUD)
Erwin Heurkens (TUD)
Zoltán Grünhut (RKI)
László Drescher (BIOKOM)
Viktor Varjú (RKI)

Challenge:

Challenge 3 > Innovative knowledge for integration models of governance

Challenge 7 > EIS to encourage behavioral change of citizen

Challenge 8 > EIS in relation to bio-waste

Problem:

Overproduction of cow manure in the peri-urban and areas of the Amsterdam Metropolitan Region entails wasted opportunity to use the manure locally as a resource for building a circular economy.

Context:

There is a significant dairy sector in the region, which produce high amounts of cow manure. At present, there is not enough capacity to use the manure for fertilising land used for growing crops. The manure is thus exported abroad, which generates considerable carbon footprint.

Short description of the solution:

Dairy farms are encouraged to install small biogas plants on the farms to directly use the manure produced to generate electricity. Electricity is then used at the farm and the surplus being fed into the grid to be used by local households and companies. Residual heat produced is then used to heat the local greenhouses producing flowers and fruit and vegetables. Another byproduct of energy production is fertiliser that can be sold to local farmers and possibly beyond the region via online retail platform. Biogas plants would be supplemented by fermentation plants that would ferment waste crops from the local farms and produce biofuel and residue. Biofuel can be sold locally to farmers to use for tractors, and to the local waste company for waste collection trucks, while residue could be used as a further resource in the biogas plants. A key element of the solution is a regional circular food label to promote the food produced as produced on the basis of 'circular' flows. Furthermore, to make the scheme work a regional

circularity pact would bring the different stakeholders (dairy and crop farmers, local and regional governments, waste companies, providers of machinery and maintenance services for the biogas and fermentation plants) together to commit to it. The local and regional governments could use the scheme also for 'place-marketing' and 'place-branding' as a 'circular' municipality/region and seek to 'export' this approach to other places. The scheme would require subsidies from the local/regional governments. A possible extension to the scheme could entail installing PV panels on the roofs of dairy farms, biogas and fermentation plants to increase energy production and experimentation with hybrid (solar/biofuel) waste collection trucks (using locally produced electricity and biofuel).

Requirements:

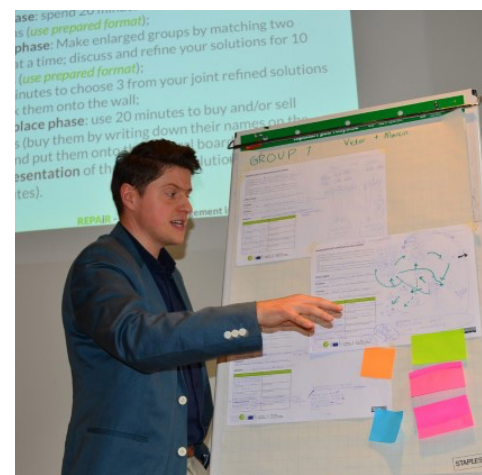
- Presence of dairy and crop farms
- Collaboration platform on the regional scale
- Local / regional budget for subsidies for biogas and fermentation plants (+ PV panels)

Possible benefits/drawbacks:

- Reusing biowaste locally
- Connecting various agendas and waste flows (manure, waste crops, electricity, biofuel, heat)
- Opportunity to build a local coalition / pact for circularity
- Opportunities for farmers to generate extra profits from new activities and products that can be reinvested locally
- Opportunity to develop a regional circular food brand to boost local agri-food industry and create jobs
- Opportunity for place-branding as a circular region/municipality/village
- Drawback: requires subsidies

Involved stakeholders:

- Farmers: dairy, greenhouse (horticulture, etc.), crops (grown on open land)
- Waste company
- Municipalities
- Grid operators
- Householders



GROUP 2

Andrea + Calligaris

WORKSHOP ECO-INNOVATIVE SOLUTIONS

Group Convention:
Name (first/last): Calligaris Andrea
Name (first/last): Andrea
Affiliation: University of Naples

CHALLENGE (Choose 1 or more challenges from the screen)
Challenge 1

Problem: Urban waste management

Context: Urban waste management is a complex issue that requires a multi-stakeholder approach. The challenge is to find a sustainable solution that is both effective and equitable.

Solution:

DESCRIPTION	DESCRIPTION
SCALE-UP	SCALE-UP
REQUIREMENTS	REQUIREMENTS
POSSIBLE BENEFITS/CHALLENGES	POSSIBLE BENEFITS/CHALLENGES
STAKEHOLDERS	STAKEHOLDERS

European Commission Horizon 2020 European Union Funding for Research & Innovation

WORKSHOP ECO-INNOVATIVE SOLUTIONS

Group Convention:
Name (first/last): Calligaris Andrea
Name (first/last): Andrea
Affiliation: University of Naples

CHALLENGE (Choose 1 or more challenges from the screen)
Challenge 1

Problem: Urban waste management

Context: Urban waste management is a complex issue that requires a multi-stakeholder approach. The challenge is to find a sustainable solution that is both effective and equitable.

Solution:

DESCRIPTION	DESCRIPTION
SCALE-UP	SCALE-UP
REQUIREMENTS	REQUIREMENTS
POSSIBLE BENEFITS/CHALLENGES	POSSIBLE BENEFITS/CHALLENGES
STAKEHOLDERS	STAKEHOLDERS

European Commission Horizon 2020 European Union Funding for Research & Innovation

WORKSHOP ECO-INNOVATIVE SOLUTIONS

Group Convention:
Name (first/last): Calligaris Andrea
Name (first/last): Andrea
Affiliation: University of Naples

CHALLENGE (Choose 1 or more challenges from the screen)
Challenge 1

Problem: Urban waste management

Context: Urban waste management is a complex issue that requires a multi-stakeholder approach. The challenge is to find a sustainable solution that is both effective and equitable.

Solution:

DESCRIPTION	DESCRIPTION
SCALE-UP	SCALE-UP
REQUIREMENTS	REQUIREMENTS

WORKSHOP ECO-INNOVATIVE SOLUTIONS

Group Convention:
Name (first/last): Calligaris Andrea
Name (first/last): Andrea
Affiliation: University of Naples

CHALLENGE (Choose 1 or more challenges from the screen)
Challenge 1

Problem: Urban waste management

Context: Urban waste management is a complex issue that requires a multi-stakeholder approach. The challenge is to find a sustainable solution that is both effective and equitable.

Solution:

DESCRIPTION	DESCRIPTION
SCALE-UP	SCALE-UP
REQUIREMENTS	REQUIREMENTS

1. Urban waste management
2. Urban waste management
3. Urban waste management
4. Urban waste management

GROUP 2.a

Agricultural village & green belt

Donata Vizzino (Campania Region Authority)
Antonella Calligaris (Campania Region Authority)
Nicolina de Angelis (Campania Region Authority)
Carlo De Paolis (Campania Region Authority)
Maurizio Russo (Campania Region Authority)

Challenge:

- Challenge 1 > Recover the wastescapes as a network of new public spaces and facilities
- Challenge 2 > Recover damaged areas to create new balances in the regional ecology
- Challenge 4 > Innovative waste management for changing behaviors through participatory processes

Problem:

Lack of usable green areas, degrade and fragmentation of peri-urban areas, abandoned agricultural areas, lack of employment.

Context:

Naples suburban areas

Short description of the solution:

At first our solution is to identify a pilot area and organize there many meetings with concerned municipalities in order to get a behavioural change about recycle.

To organize different environmental clean-up days of the pilot area involving citizens, students, owners of private areas, young couples and young people under 35.

The target is to retrieve a harmonious balance between agriculture and residential attitude building a green belt. The Agricultural Village idea provides for land-sharing through the creation of “social cooperative” farming, the common life of the producers and their families, food, energy and communication self-sufficiency. The Agricultural Village is a kind of rural district in cycling distance from an urban center, accommodating 200-250 people, devoted not only to plantation but also to all other compatible activities that can be developed: breeding farms, production of renewable energy, sale zero kilometer, holiday farms, etc.

On public areas to provide a grant of administration to young people under 35 interested in living in an Agricultural Village and starting farming/urban gardens, sale of local products and catering activities in peri-urban areas.

To consider areas of constructed wetlands and composting in the target areas.

On which scale and which resource/waste flows:

Peri-urban and waste, degraded areas to be enhanced.

Requirements:

- Abandoned areas
- Public areas
- Private areas which are available for local products sale and for creation of small catering activities.

Possible benefits/drawbacks:

- Clean-up areas
- Environmental education
- Fruition and recover of degraded landscapes
- Launching local economies
- More employment for young couple and young people under 35
- Creation of young agricultural communities in the shape of agricultural village

Disadvantages:

- Lack of participation

Involved stakeholders:

- Municipalities
- Citizens
- Students
- Areas owners
- Young couple and young people under 35
- Associations operating in the area

GROUP 2.b

Campaigns to follow the path of plastic waste

Tibor Schwarcz (Government Office of Baranya County)
Cecilia Mezei (RKI)
Andrea Suvak (RKI)
Donata Vizzino (Campania Region Authority)
Antonella Calligaris (Campania Region Authority)
Nicolina de Angelis (Campania Region Authority)
Carlo De Paolis (Campania Region Authority)
Maurizio Russo (Campania Region Authority)

Challenge:

- Challenge 4 > Innovative waste management for changing behaviors through participatory processes

Problem:

Lack of trust of citizens that the selectively collected waste will really be processed. Lack of knowledge about the rules of selective waste collection

Context:

People do not really have knowledge about the life of separately collected waste after they had been collected.

Short description of the solution:

Citizens should be informed about the whole post-waste life of plastics. Excursions for schoolchildren and other groups of citizens to the selective waste processing plant (open days in the plant) where they can see how they are treated and also learn about the hows and whys of selective collection in their homes. Information about the quantities of plastic waste collected, processed, sold and reused and a showcase of objects that are produced from this waste can increase trust. It is important that not only alternative uses of waste (e.g. waste-art) are exhibited but technologically sophisticated and impressive pieces for industrial or consumer use.

On which scale and which resource/waste flows:

Urban scale,
Plastic flow.

Requirements:

Good promotion to make the events trendy
Actual reuse of the plastics that can be shown

Possible benefits/drawbacks:

People will be aware of the rules of separated collection because they have real life impressions about the process and outcomes.
Increase of trust

Involved stakeholders:

Waste processing company
Members of the value chain of plastic reuse
NGO to organize the campaign
Schools, other education centers



photo by Ni Yan

GROUP 2.c

Quality improvement programs for tap water

Tibor Schwarcz (Government Office of Baranya County)
Cecilia Mezei (RKI)
Andrea Suvak (RKI)
Donata Vizzino (Campania Region Authority)
Antonella Calligaris (Campania Region Authority)
Nicolina de Angelis (Campania Region Authority)
Carlo De Paolis (Campania Region Authority)
Maurizio Russo (Campania Region Authority)

Challenge:

- Challenge 7 > EIS to encourage behavioral change of citizen

Problem:

Citizens choose bottled water instead of tap water.

Context:

The quality of tap water in Pécs is quite bad, it is often smelly and contains clorines, the colour is also whiteish sometimes. Besides, the reputation of tap water is also not the best, there are rumours that the water that actually comes from the Danube river contains hormones and industrial, agricultural and household waste that had been discharged into the river upstream.

Title of the eco-innovative solution:

Quality improvement programs for tap water, to increase trust and improve quality

Short description of the solution (max. 200 words):

Visible quality improvement programs for tap water to increase trust and in fact improve the quality and purity of the water. More public wells in the city that are characteristic in their appearance with an emphasis that they are for the whole community to increase emotional affection. Educational programs about tap water.

On which scale and which resource/waste flows:

Urban scale,
Resource: water (potable)

Requirements:

The water company is owned by the city (in Pécs), so it would need a decision and money to improve the quality of the water.

Possible benefits/drawbacks:

People would drink more in general which is good for the health.
Much less plastic waste would be generated in the city.
If the quality cannot be improved significantly, it would make citizens disappointed and trust even less in the good quality of tap water.

Involved stakeholders:

City government, water company, external quality control and improvement company

Citizens that are well known and reputable - if they take part and check the outcomes of quality improvement, later they can spread the word and increase trust.



GROUP 3.a

Integrated resilience of the building stock

Hilde Remoy (TUD)
Bob Geldermans (TUD)
Arie Romein (TUD)

Challenge:

- Challenge 6 > EIS in relation to energy efficient buildings (insulation)

Problem:

Changing housing demand (more + better), and current focus largely on energetic performance. Embodied energy not included in equation, too little focus on material use.

Context:

Outdated existing stock: growing number of households & changing demand of housing quality

Title of the eco-innovative solution:

Integrated resilience of the building stock

Short description of the solution:

Buildings comprise of functional layers with different performance spans, think of the structure (long performance span) and HVAC services (shorter performance spans) for example. Differentiated building material and product turnover rates can thus be anticipated in design, construction, deconstruction and regeneration routes. Regarding the latter, there is a hierarchy as well: from maintenance (low energy/work input) to recycling (high energy/work input) for example. Combined, these two 'perspectives' form a matrix (see figure 1) that reveals a planning scheme for building, building component and material conversion processes, involving various scale levels. Through anticipation and management of such processes a circular economy around specific materials can emerge. In this proposition there are multiple links with other essential resource flows, such as water and energy. Moreover, currently redundant buildings could be defined as (part of) wasted landscapes. Each intervention becomes a moment for reflection on the performance of the building, but also on that of the context it is part of. For instance: local ecosystem services and

climatic conditions can be improved by applying green wall and roof materials. Moreover, local sourcing of existing buildings and materials gradually strengthens a circular economy rooted in distinctive local features. Upgrades of existing buildings through Plug & Play components/interventions thus helps to create resilient living environments that constantly 'learn'.

GROUP (turnover rate)	SUB CATEGORY EXAMPLES	PART	Bio-cascades	Bio-feedstock	Maintenance	Redistribution	Refurbishment	Remanufacturing	Recycling
STUFF (8x)	...	COMPONENT, MATERIAL							
SERVICE SYSTEM (4x)	Piping & wiring HVAC units Sanitary equipment ...	COMPONENT, MATERIAL							
SETTING (3x)	Partitioning walls Connections Insulation ...	COMPONENT, MATERIAL							
SKIN (2x)	Façade frame Glass panels Roof surface ...	COMPONENT, PRODUCT, MATERIAL							
STRUCTURE (1x)	...	COMPONENT, MATERIAL							
SITE (0x)	...	COMPONENT, MATERIAL							

Figure 1: Matrix of functional building layers, with their average turnover rates, and resource regeneration routes

On which scale and which resource/waste flows:

Building – Regional scale

Building materials and associated waste flows

Requirements:

Local/Regional material production and/or material conversion facilities

Alignment of supply, demand, adjust and storage processes

Governmental commitment

Possible benefits/drawbacks:

Business models change: from short term transactions to long term performance & value

Limited data availability or accessibility

Governmental reality (slow processes, compromises, short political periods...)

Involved stakeholders:

Governmental bodies

Building sector

Waste/Resource logistics & management companies

Users

Developers & Corporations (Housing Associations)

GROUP 3.b

Participational budget to encourage behavioral change

Maciej S.Kowalczyk (PHH)

Margaret Grodzicka - Kowalczyk (PHH)

Damian Mazurek (IGiPZ)

Michał Konopski (IGiPZ)

Challenge:

- Challenge 1 > Recover the wastescapes as a network of new public spaces and facilities
- Challenge 7 > EIS to encourage behavioral change of citizen

Problem:

Extensive (approximately 25 ha) post-industrial area also used for railway purposes. Currently degraded, only some warehouses and minor workshops still operate. This area, at the end of the 19th century located at the outskirts is now located almost at the town center. It has no public function, cannot be accessed by citizens and moreover it separates two parts of the town from each other. Local community is characterized by stagnation and lack of active involvement. Thus, as no grassroots (bottom-up initiative) is expected to occur concerning recovery of this area there must be an intervention from the outside in order to activate the local community. Such activation will potentially encourage the behavioral change and finally the citizens will be more confident in active participation concerning the future of their neighbourhood and town.

Context:

The town of Zduńska Wola, Łódzkie Province, Poland.

Short description of the solution:

The citizens should decide themselves what would be the future of this degraded area. We propose a series of meetings with local community and authorities showing them possible solutions how to revitalize and restructure this area. The intention is to transfer knowledge and experience gained in the past concerning similar problem areas. Finally, citizens will be encouraged to propose their own solutions. Eventually, one project will be chosen via voting. If this solution succeeds a new public space will be established integrating the local community. The project will hopefully meet local community's needs and expectations towards the destiny of this area. A successful solution might act as a role model for other parts of the town.

On which scale and which resource/waste flows:

Neighborhood scale

Requirements:

Survey conducted among local community to find out their needs and expectation towards redefining this area.

A series of meetings/workshops with the most active citizens including presentation of possible solutions for revitalizing this area.

Voting for the best project

Possible benefits/drawbacks:

Local community will be activated to participate in rearranging their neighborhood according to their own needs.

New public space will be established integrating local community and merging two parts of the town previously separated by this degraded area.

Drawback: it will be challenging to activate the local community, persuasive and inspiring examples for the possible future of this area must be shown. Local community needs to be convinced that active participation fosters better living in their neighborhood.

Involved stakeholders:

Local community

Local authorities

Investors



GROUP 4.a

Plan-Mobil

Sabine Hilfert (Senate Chancellery of the Free and Hanseatic City of Hamburg)
Andreas Obersteg (HCU)

Challenge:

- Challenge 1 > Recover the wastescapes as a network of new public spaces and facilities
- Challenge 3 > Innovative knowledge for integration models of governance
- Challenge 4 > Innovative waste management for changing behaviors through participatory processes
- Challenge 7 > EIS to encourage behavioral change of citizen

Problem:

In order to recover wastescapes (ch1) it is necessary to have knowledge about the areas that should be improved. A cartography and reliable data is needed. Especially a mapping of the citizens' requirements is necessary: what do people want and where?

Context:

The solution can be used on variable scales due to the problematic (small, medium, large scale)

Short description of the solution:

An online and offline tool should be created to invite citizens to participate in the analysis of the areas as well as in proposals for change.

In Hamburg such an online tool on the City's website exists where citizens can enter their critics, wishes and ideas into a map of city. It is possible to zoom into the map on a very local level.

As many citizens are used to work online such a tool can reach a large part of the population.

But such an instrument needs publicity and there are as well many especially elderly citizens who are not able or willing to use an online tool.

Therefore the Plan-Mobil is an offline solution to bring participation to the people.

The Plan-Mobil is a van with an interactive planning tool (like a GDSE) and other non-technical participation tools like maps, boards etc.

It can go to different areas, especially to neighborhoods, quarters where developments are planned or areas that are deprived and

need to be improved.

The Plan-Mobil can foster participation by going to the people instead of waiting for them to come to the administration.

In Hamburg we do not have a real Plan-Mobil, but there are several examples of on spot information and participation centers in areas where developments are planned or changes of the area occur (e.g. Kesselhaus HafenCity, IBA Info Center, Info Center Neue Mitte Altona, Planbude Sankt Pauli).

On which scale and which resource/waste flows:

It is flexible, but the best scale is a neighborhood or quarter.

It is variable with regard to resources and waste flows.

Requirements:

Large car, Van

GDSE or other interactive tool

Further classical participation material

Staff to support citizens in the process

Possible benefits/drawbacks:

Benefit: information from citizens living in or using the area...

Involved stakeholders:

Departments of city administration: planning, environment, waste management

NGO's, initiative in the neighborhoods, quarters

Citizens

GROUP 5.a

Circle box

Max Bohnet (GGR)
Jens-Martin Gutsche (GGR)

Challenge:

- Challenge 5 > EIS for waste management in low density settlements
- Challenge 7 > EIS to encourage behavioral change of citizen
- Challenge 8 > EIS in relation to bio-waste

Problem:

Low recycle rates
Not enough space at home for many different recycling bins
Bio waste stinks and attracts bugs – especially in warmer regions and seasons

Context:

People going shopping, but not recycling much due to the many different recycling systems (glass, plastic, refund bottles, paper ...)

Short description of the solution:

The circle box is a rectangular plastic box with a flip-top lid. The size is about 50cm x 80cm x 30 cm. The circle box replaces the upper part of the shopping carts in supermarkets. The clients grab one of these shopping carts when entering the market and does his shopping the normal way putting all the products he wants to buy in the shopping cart's circle box.

After paying he detaches the circle box from the cart and takes it home with his new bought products. There are three main way to get the box home: It fits perfectly in the back of a car, the main mode of transportation in low density areas. The box also has little wheels and an extendable handle (just like many modern suitcases), so the customers can also pull it home behind him. Third option: delivery by the shop – made easy thanks to the standardized size of the circle box – which, by the way, comes in three sizes to fit the needs of different household types and shopping volumes.

At home the box changes its purpose and becomes the all-in-one recycling bin. Therefore it contains flappable compartments inside (which can also be used for keeping the different parts of the shopping in place). The compartments are marked for the different recycle segments (plastic, glass, refund bottles, bio-waste, etc.). The flip-top lid closes tightly to prevent odor and the attracting of

flies.

Next time the customer goes shopping, he takes the circle box – now filled with recycling stuff – back to the store, where he puts it into a machine at the entrance of the store which automatically empties the compartments, cleans the box and bills the refund. While that is happening, the customer grabs a new and clean circle box attached to a shopping cart and starts with his normal shopping. When he arrives at the cashier, the refund amount has already been transferred from the machine at the entrance to the cashier, where it is deducted from his newly shopped product's prices.

On which scale and which resource/waste flows:

Supermarket-chains and households, peri-urban (but also rural or urban)

Requirements:

The circle box has to be introduced and managed by bigger shopping chains or by a cooperation of different chains. Alternatively it could be made obligatory by law.

Possible benefits/drawbacks:

Benefits: Advertising by the supermarket chains on the boxes. "Circle" can attract customers closer to one market or chain.

Involved stakeholders:

Super market chains

Organization of grocery markets

Government (if made obligatory by law or subsidies during a starting phase)



GROUP 5.b

Need for Reed

Alex Wandl (TUD)
Carolin Bellstedt (TUD)

Challenge:

- Challenge 6 > EIS in relation to energy efficient buildings (insulation)

Problem:

Large stock of housing requires thermal insulation, which are usually non-renewable materials.

Context:

Residential buildings: on urban and peri-urban level

Short description of the solution:

Reed (and/or similar plants) are planted in economically unproductive areas or public spaces to produce bio-based cellulose insulation material for (residential) buildings.

On which scale and which resource/waste flows:

Households and storage facilities. Reed, reed in cellulose bio-based building material, used reed (=organic waste).

Requirements:

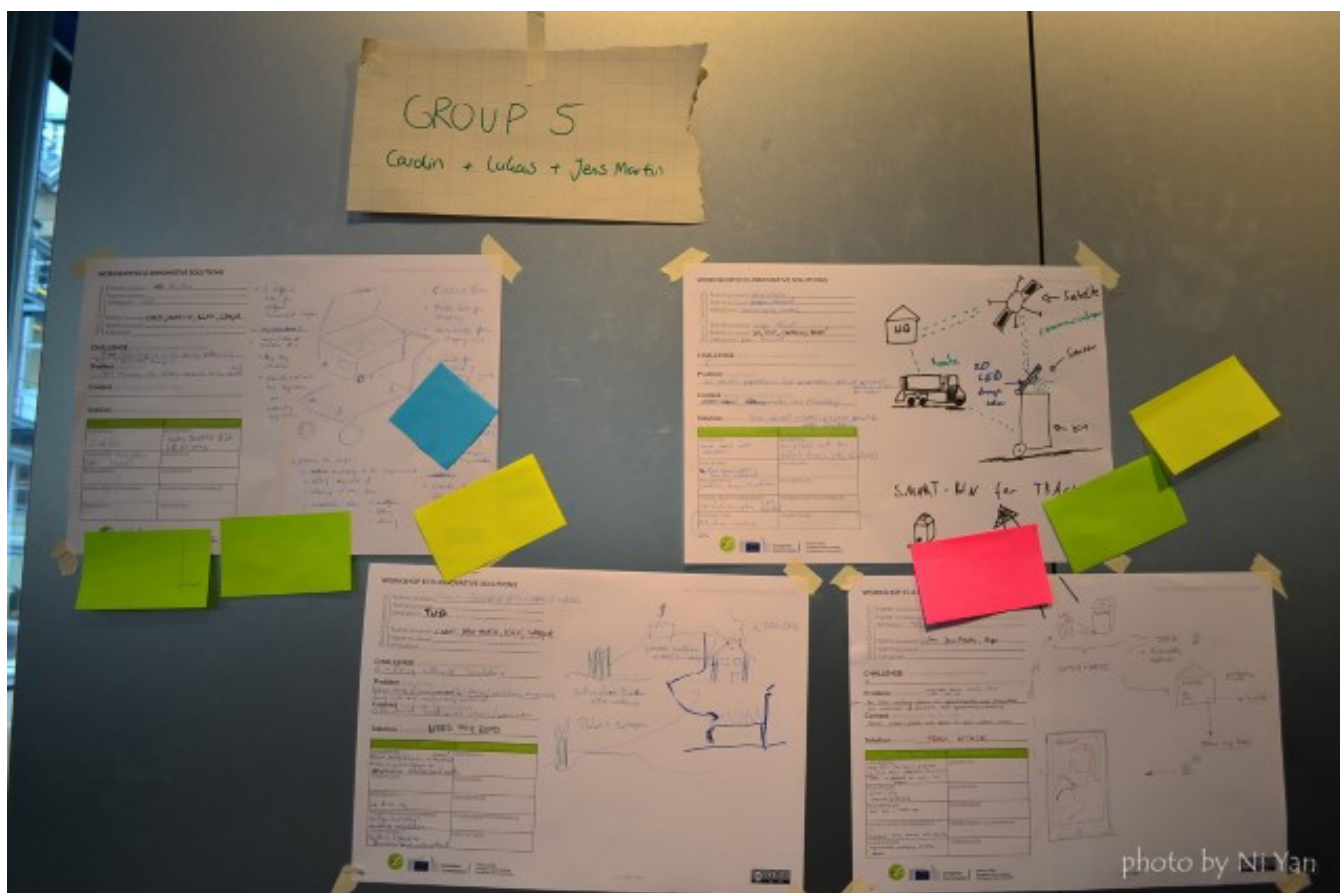
Wetlands, also those that are damaged (e.g. brownfields) or with salinization problem, public spaces
Cellulose extraction and insulation manufacturing plant
Need for insulation, testing of reed cellulose as feasible insulation material (fire resistance etc.) and willingness of target group to use it

Possible benefits/drawbacks:

Benefit: positive externalities, site remediation, combat salinization problem, circular solution: reed insulation can come back to fields or similar as organic waste fertilizer
Drawback: there could be a potential leaching out of gases or involvement of heavy metals if reed is planted in polluted sites. (Possible solution: reed insulation is first used in warehouses to off-gas for a few years before installed in houses); building regulation

Involved stakeholders:

Building industry
Farmer, manufacturer



GROUP 5.c

Sensor-based waste collection

Lukas Schäfer (SRH)

Gregor Schmid (Bauer Umwelt)

Challenge:

- Challenge 5 > EIS for waste management in low density settlements

Problem:

High waste collection costs in areas with low population density

Context:

Bins are collected at a regular fixed times, no data is available if the bins are actually already full at the time of collection.

Short description of the solution :

Sensors which measure how full a bin is, report via mobile networks to headquarters how full they are, if a certain volume is reached a pick-up could be automatically scheduled.

On which scale and which resource/waste flows:

This approach could be applied for individual waste generators, like businesses, schools, etc. But also in neighborhoods in an area with low density. Cultural change would be required, because now residents “put out” their bin on a specific day (e.g. every Monday). With this approach they would have to put the bin out based on a message (via App, Email, SMS) from the collection organization, which give it an individual date for the next collection. If this is feasible and practical needs to be discussed.

The approach could be applied to any kind of municipal solid waste streams.

Requirements:

Cultural or organizational changes for waste collection at changing times and not fixed dates

Based on payment scheme a new approach to let waste generators pay only for how much and what waste they generated

Cheap sensors with mobile network access on every bin

Possible benefits/drawbacks:

Benefits

Less transport emissions

Pay-as-you-throw in practice

Drawbacks

New collection system has to be installed and accepted by staff, city, and residents

Involved stakeholders:

Responsible Waste Authority
Residents
Waste companies and workers
Manufacturer of Sensors
IT network companies

GROUP 5.d

Track Attack

Alex Wandl (TUD)
Carolin Bellstedt (TUD)

Challenge:

- Challenge 4 > Innovative waste management for changing behaviors through participatory processes

Problem:

People have misconceptions or no knowledge about the path their waste takes and ends up.

Context:

Dense urban places and flats in peri-urban areas.

Short description of the solution:

Using GPS or another tag (e.g. NFC) on products / their packaging to track them through the supply chain to the customer and from there to the place where it ends up. The tagged product facilitates self-checkouts in supermarkets (automatic cashier) and collects data of the customers' purchasing habits. This is where the money is generated for the supermarket (data + savings through automatic cashier). Once the customer throws the packaging into the communal recycling collection bin, the tag gets activated. This doesn't happen when it ends up in the waste, which hopefully encourages the customer to recycle. The person is then able to track their packaging and is provided with information on what happens with waste. The tag is then extracted in the recycling process and reused in new packaging, making it a circular tag.

On which scale and which resource/waste flows:

Scale: households to global potentially. Products, packaging (waste).

Requirements:

NFC tags and scanning and enabling (mobile) app

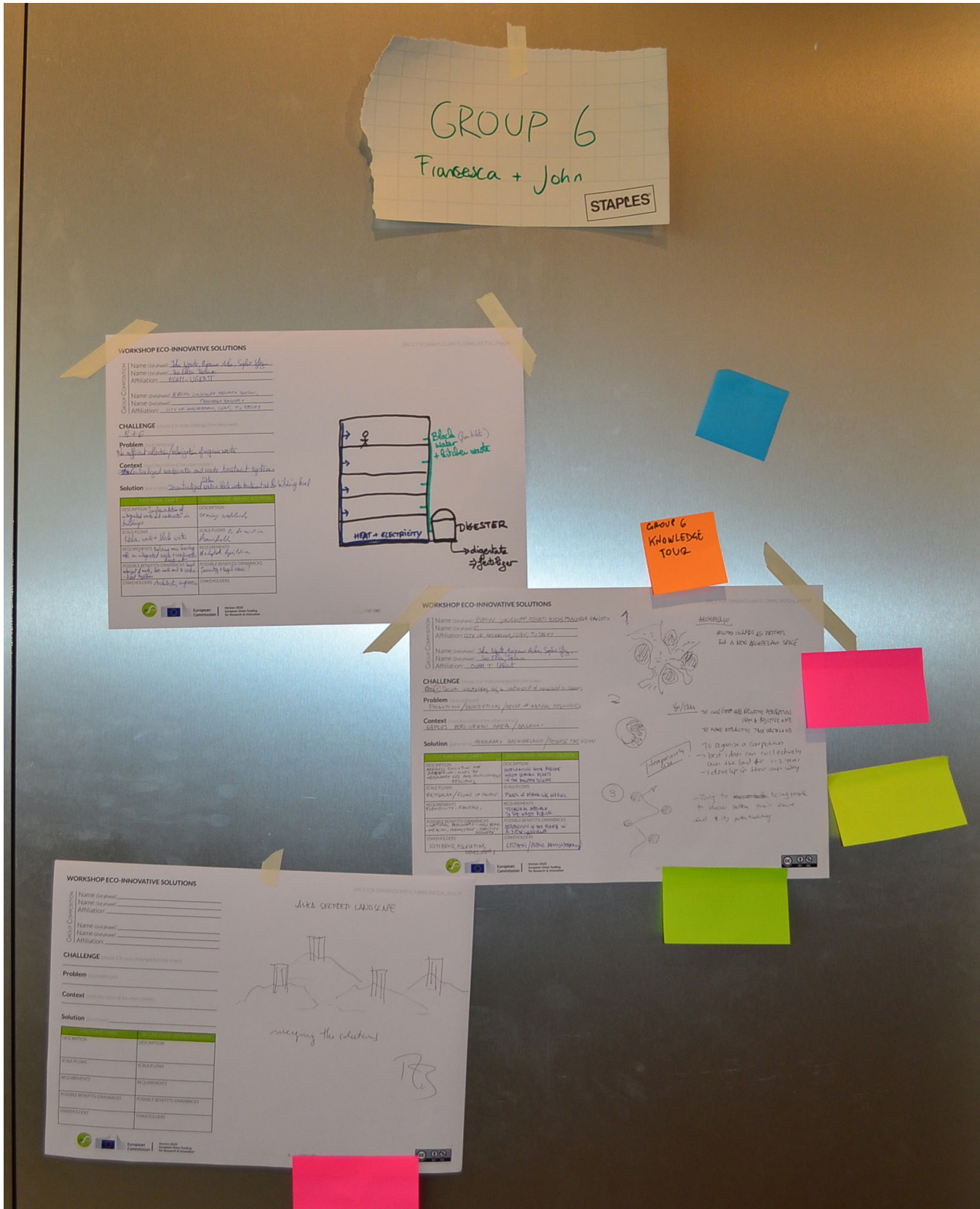
Possible benefits/drawbacks:

Benefit: creates knowledge and awareness for consumers and possibly also a behavioural change in consumption in that people might switch to other packaging that can be reused or recycled in closer proximity for example

Drawback: extra material (NFC tag), tag recovery might be difficult; data security

Involved stakeholders:

Supermarkets
Packaging industry
people



GROUP 6.a

“Alka Seltzer” Landscapes

Arianne Acke (OVAM)
Renato Bocchi (IUAV)
Eveline Jonkhoff (City of Amsterdam)
Sophie Sfez (UGhent)
Sue Ellen Taelman (UGhent)
Francesca Zanotto (TUD)
John Wante (OVAM)

Challenge:

- Challenge 1 > Recover the wastescapes as a network of new public spaces and facilities
- Challenge 8 > EIS in relation to bio-waste

Problem:

Polluted landscapes recovery implemented with small scale solutions

Context:

Napoli peri-urban area

Short description of the solution:

A large scale system (Temporary Archipelago) to naturally recover scattered, polluted patches in landscapes is integrated with a small, building-scale strategy. Polluted areas are fenced and made inaccessible, to let natural recovery (through phytoremediation plants where needed) take place. On these areas, temporary facilities are set up – accessible compatibly with ground remediation – to process locally collected organic waste into the surrounding residential areas, helping them to ‘digest’ waste as an Alka Seltzer would do. The organic waste collected can both come from solid waste streams (such as food waste, gardening waste) or black waste water (sanitary water) and be processed locally to generate biogas, to be used locally as source of energy, and nutrients (recovery of phosphates). Alternatively, the biowaste processing can be limited to solid biowaste via composting producing soil fertilizer, maybe in combination with biogas production (precomposting in combination with anaerobic digestion). The long span required by passive natural recovery of polluted landscapes is optimized by employing these areas as temporary active waste processing stations, doubling the ameliorative impact on the intervention areas.

On which scale and which resource/waste flows:

Multiscalar: peri-urban system made of small/building scale

episodes
(Flows of people) - Wasted landscapes
Organic waste

Requirements:

Flexibility
Temporary building

Possible benefits/drawbacks:

Natural recovery
Well being, health
Local treatment of waste flows, less waste sent to centralized systems
Production of soil improver to be used locally
Production of energy to be used locally

Involved stakeholders:

Citizens
Associations
Developers
Architects
Engineers



GROUP 6.b

Temporary Archipelago

Renato Bocchi (IUAV)
Eveline Jonkhoff (City of Amsterdam)
Francesca Zanotto (TUD)

Challenge:

- Challenge 1 > Recover the wastescapes as a network of new public spaces and facilities

Problem:

Pollution, perception, reuse of natural resources

Context:

Napoli peri-urban area - Bagnoli

Short description of the solution :

The Temporary Archipelago aims to address pollution issues in Neapolitan peri-urban area wasted landscapes, working on natural recovery and local communities' perception at the same time. 'Polluted islands' are patches in a new archipelago space: they are fenced and made inaccessible, to let natural recovery (through phytoremediation plants where needed) take place. During the remediation phase, guided tours are organized for local communities and other stakeholders to know better these lands, their history, their potentialities after remediation. Guided tours are the first step to work on local communities' acceptance of these wasted landscapes, to positively affect their perception of them and foster a reinforcement of territorial identity. After recovery, some of the polluted islands can be temporary entrusted to local organizations or private citizens after a competition: they would own the land for one or two years, developing it in their own way. These different strategies act according to yin/yang concept: they act to convert the negative perception into a positive one and to make wastelands attractive.

On which scale and which resource/waste flows:

Multiscalar: peri-urban system made of small/neighborhood scale episodes
(Flows of people) - Wasted landscapes

Requirements:

Flexibility
Fantasy

Possible benefits/drawbacks:

Natural recovery

Knowledge, identity recovery
Well being, health

Involved stakeholders:

Citizens
Associations
Developers







Why vegan?

We like to practice what we preach and in REPAiR we preach about sustainability, right? Although there is no legal definition of what is “sustainable food”, we believe that eating vegan helps to reduce our food-print. We have made a few quick calculations to support our beliefs:

For our Consortium Meeting we have prepared 60 plant-based portions of 2 lunches, 5 coffee breaks (yes, even the milk was vegan) and a fancy dinner. Therefore, compared to the average Dutch diet, we have:

- cut our 2-day carbon footprint by 50%,
- saved 360 000 liters of fresh water,
- consumed 10.9 times less land,
- produced no farm waste,
- and cannot be held responsible for by-killing any innocent marine species.

And finally, we have demonstrated that vegan food can also be healthy, nutritious, mouth-watering and really delicious!





Because of our REPAiR Dopper bottles

We saved

6

500ml PET bottles per person

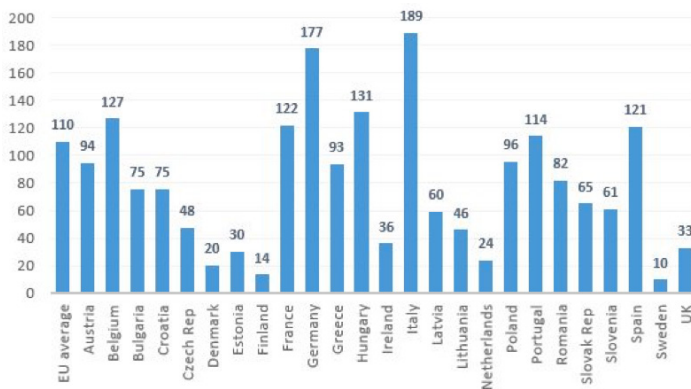
We saved in total

360

500ml PET bottles per person

When drinking the recommended 1.5 litre water per person per day (Voedingscentrum, <http://www.voedingscentrum.nl/encyclopedie/trefwoord/vocht.aspx>)

Consumption of bottled water per capita in the European Union in 2015 in litres (Canadean, 2015)



When we keep using our REPAiR Dopper bottles

Per year we can save

13,200

500ml PET bottles

And during the 4 years of REPAiR we can save

52,800

500ml PET bottles

Using the average consumption of bottled water in Europe (110 litres per capita per year)

The Dopper story

Saving 360 PET bottles during two days

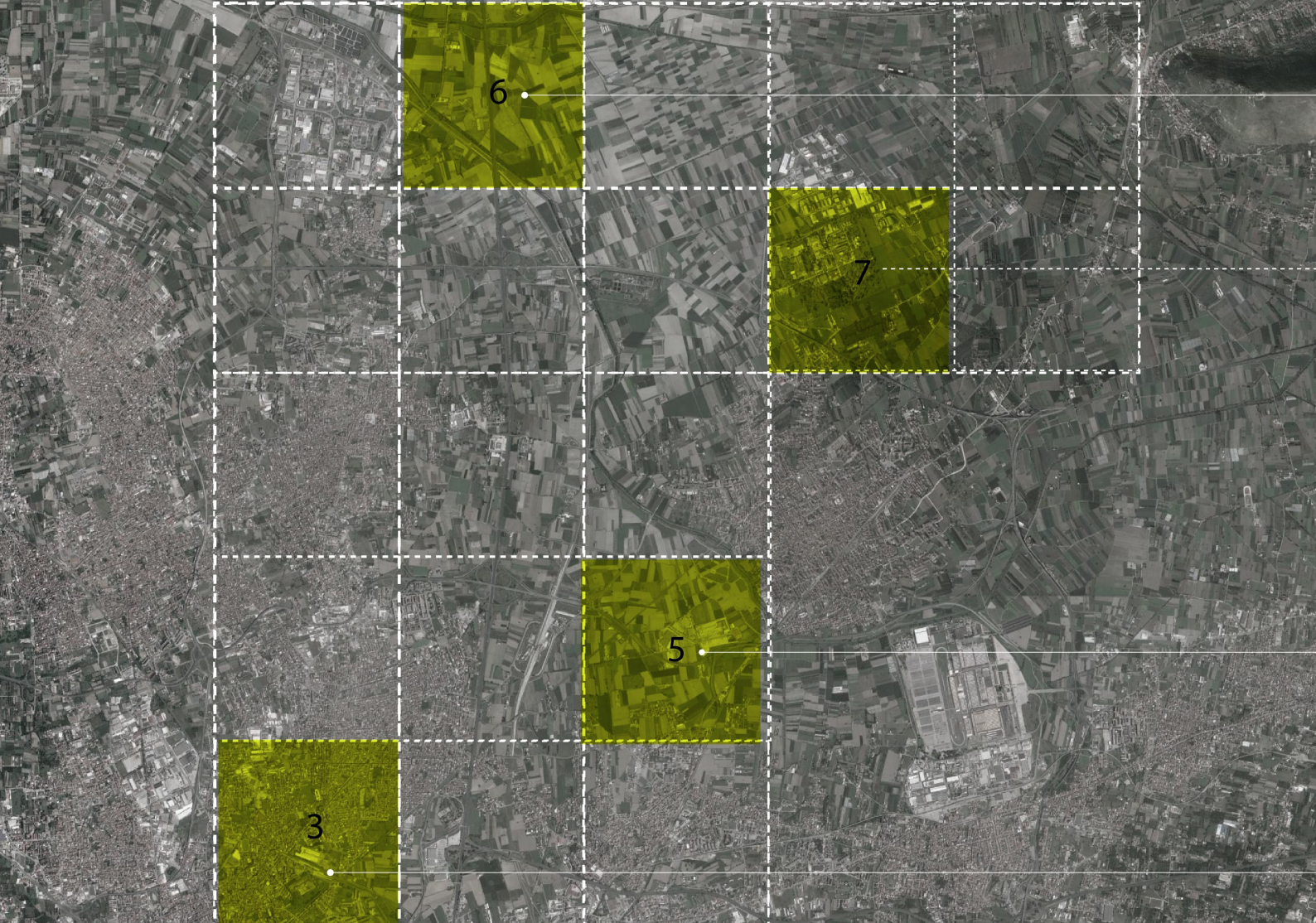
All members of the REPAiR project got a personal REPAiR Dopper to use as a drinking bottle during the Consortium meeting in Amsterdam and Delft and afterwards. By using Doppers we reduce our plastic waste during the four years of the project and we promote a more circular economy.

About Dopper

Dopper wants to live in a world where people are aware of the environment, where we actively reduce the amount of single-use plastic waste, and where everyone, close to home and far away, has access to safe drinking water. The wide use of PET bottles worldwide causes a huge waste stream in the oceans, the so-called 'plastic soup'. With the reusable bottle design of high quality plastic and steel, Dopper contributes to the reduction of these environmental problems. Furthermore, Dopper encourages the use of tap water as a cheap and environmentally friendlier alternative to bottled water.

For more information about the use and background of Dopper, please visit their website: <https://dopper.com>





Spatial Analysis

GLOSSARY



20 December 2016, Naples, Italy&Delft, The Netherlands

Authors of the book:

Michelangelo Russo, Maria Federica Palestino, Maria Cerreta, Enrico Formato, Anna Attademo, Libera Amenta, Giuseppe Guida, Marica Castigliano, Valentina Vittiglio, Bob Geldermans, Alexander Wandl

With contributions of all the members of REPAiR project.

Designed by:

Marica Castigliano, Valentina Vittiglio.

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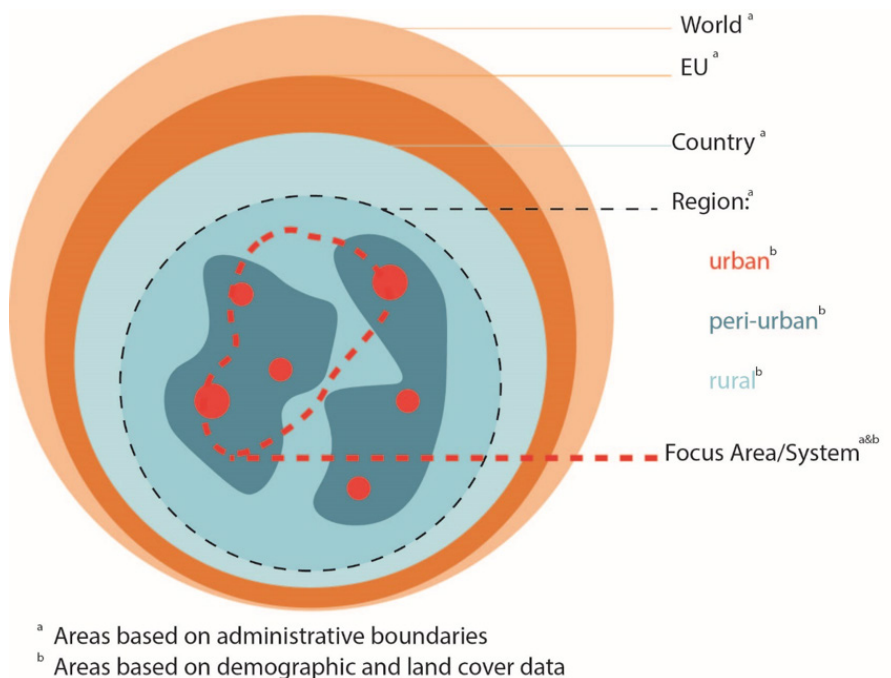
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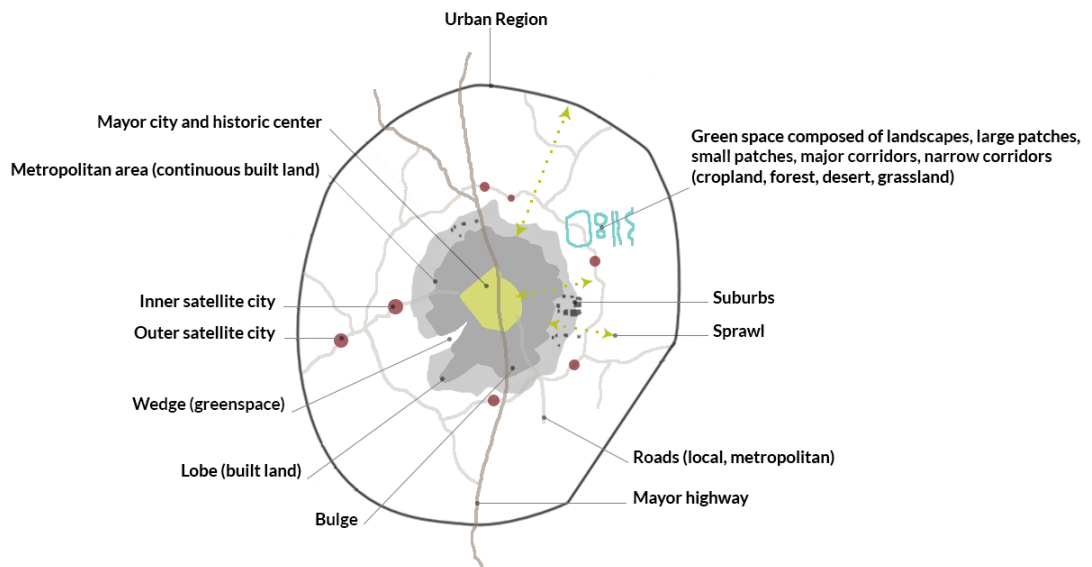
The six scales used in REPAiR project (Source to January, 2017, TU)

The Region is the main scale at which REPAiR looks at the effect of circularity and its boundary is the key defining spatial and system boundary for the material flow analysis (the 'input' of the system). It may or may not coincide with the administrative region of relevance; in this sense, we refer to it as URBAN REGION, in order to point out that its boundaries and characteristics may differ from the administrative entity.

1| Urban Region and its boundaries

Urban Region

Is a functional area in which a significant share of the residents commute into the city. In *Urban Regions. Ecology and Planning Beyond the City* (2008), the geographer Richard Forman defines the urban region as «the area of active interactions between a city and its surroundings» (p. 6). This model is equivalent to the Eurostat definition of larger urban zone (LUZ), intended as «a city and its commuting zone». From a spatial point of view, urban regions are composed by: built areas, infrastructures, open spaces. A built area is land with «continuous closely spaced buildings, as on small properties or (p)lots» (Forman, p.7). Open spaces, included in the urban region boundaries, often have no built structures, but may contain a small number of relatively scattered structures and non-agricultural uses (sport playgrounds, public green parks, unbuilt depots, etc.).



Designed by Giuseppe Guida, Valentina Vittiglio.

In a **traditional model**, urban regions have a city-centre nucleus (city is a relatively large or important municipality) and are generally round. The core of this round region is the metropolitan area, a nearly continuously built area composed by the city and its suburbs. The metropolitan area is in turn surrounded by the urban region ring, a mosaic of unbuilt types of land interwoven with infrastructures (main highways, railroads, powerline, etc.) and fragmented built areas. Open spaces, included in the urban region boundaries, often have no built structures, but may contain a small number of relatively scattered structures and non-agricultural uses (sport playgrounds, public green parks, unbuilt depots, etc.). Towns, villages, and satellite-cities are distributed over the urban-region ring. Suburbs are mainly residential built areas, with low population densities; they are often planned settlements strongly commuting with inner cities and downtowns. Suburbs are located both into the metropolitan area and into the urban region ring.

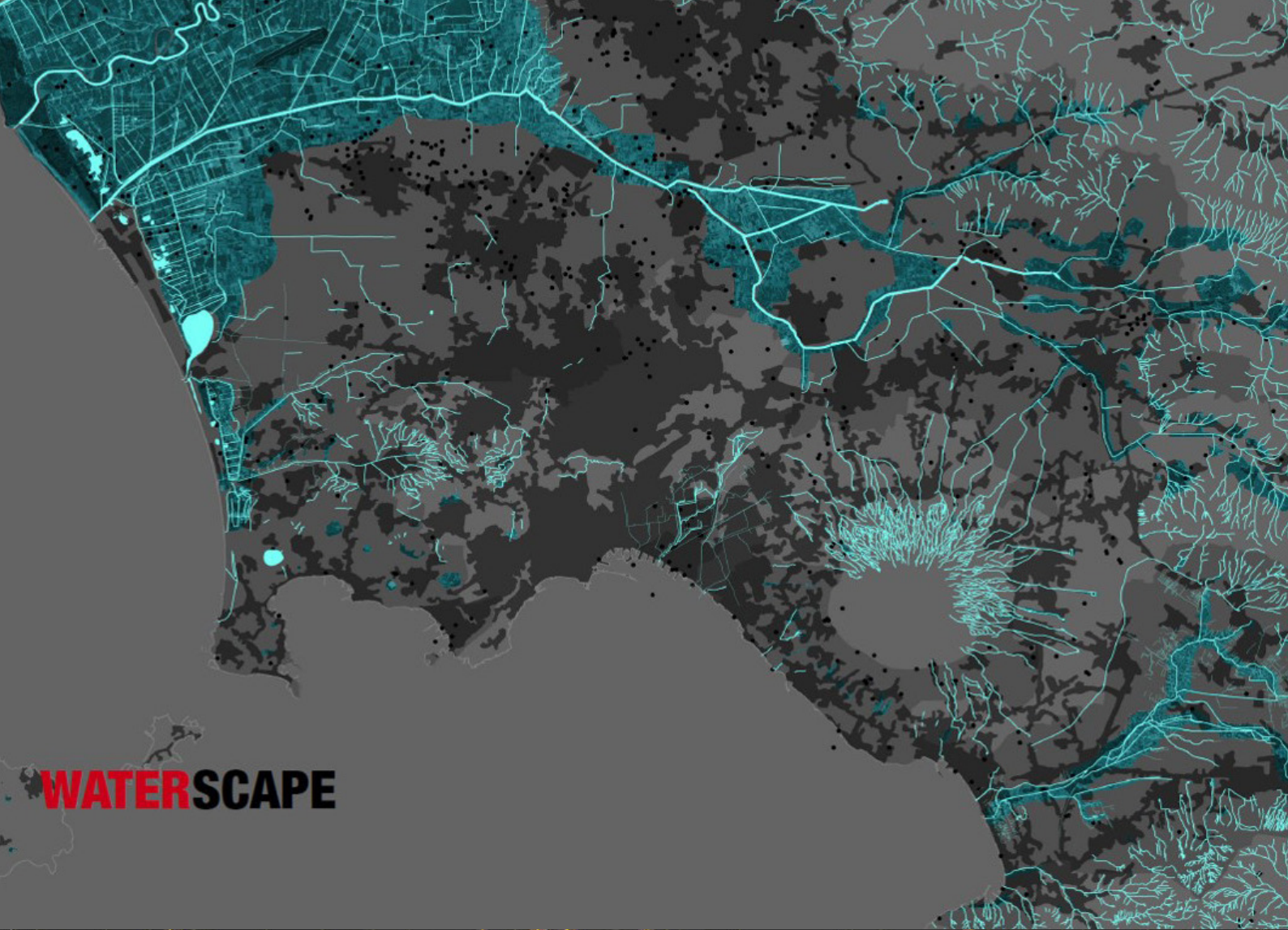




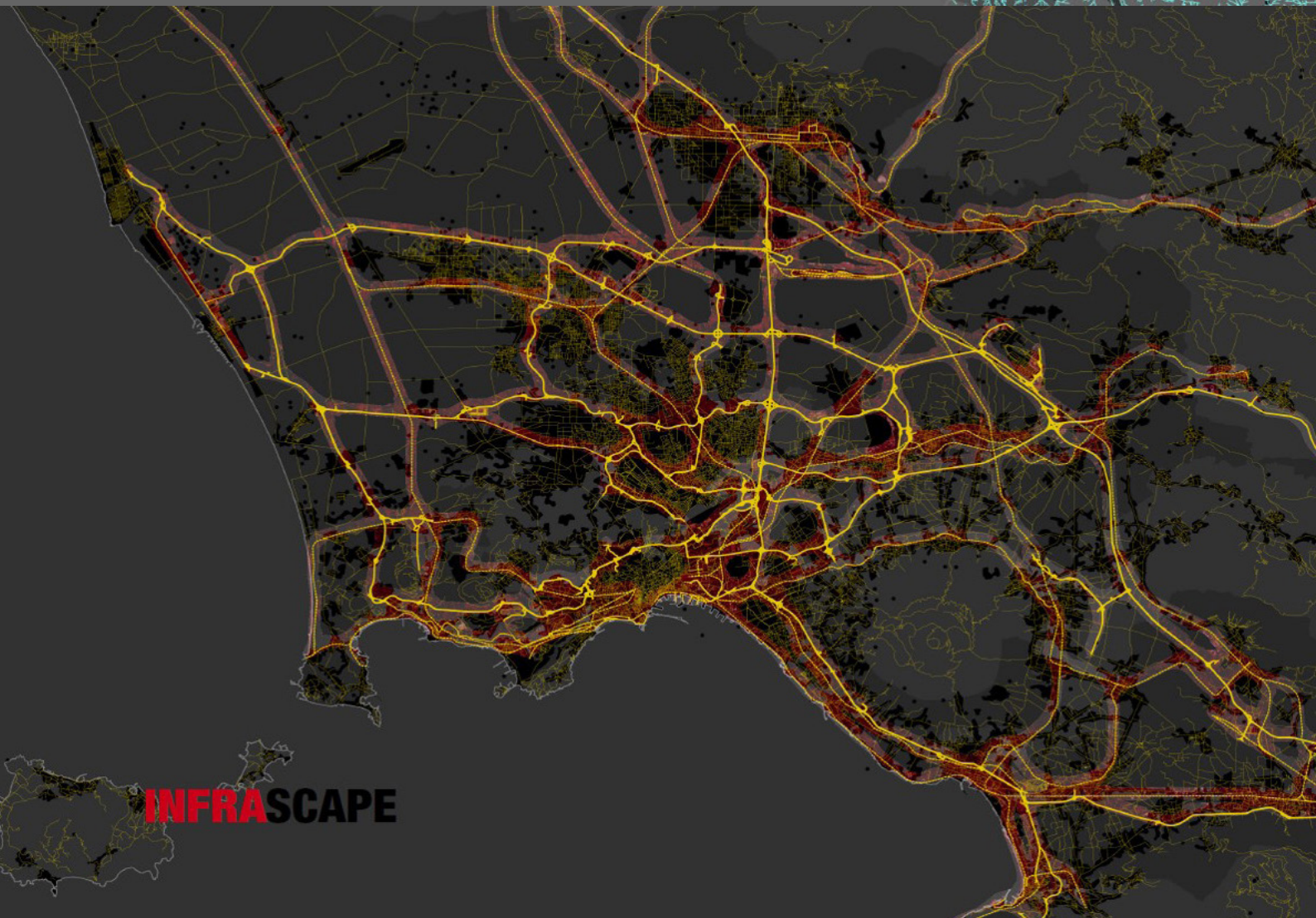
Designed by Giuseppe Guida, Valentina Vittiglio.

In a **post-metropolitan model**, according to the geographer Edward Soja, the urban region is not clearly round nor city-commuted: it is characterized by new density gradients (of population and uses), transforming the relationships between outer areas and metropolitan cores as «an accelerated re-organization and restructuring of the geography of movements that define the spatiality of human societies» (Soja, 2004, p. 176). The regional post-metropolitan model derives from the convergent density phenomena, because generally outer areas in the urban region are becoming increasingly dense and demographically as well as functionally differentiated: a new expansive, polynucleated, densely networked, information-intensive city region is coming up. Where this process is more advanced, the traditional dialectic between inner areas and outer ones is going down and new spatial and functional layouts are emerging.

Source: L. Fatigati, E. Formato, *Campania Felix. Ricerche, proposte, nuovi paesaggi 2002 - 2012*, Aracne editrice, 2012.



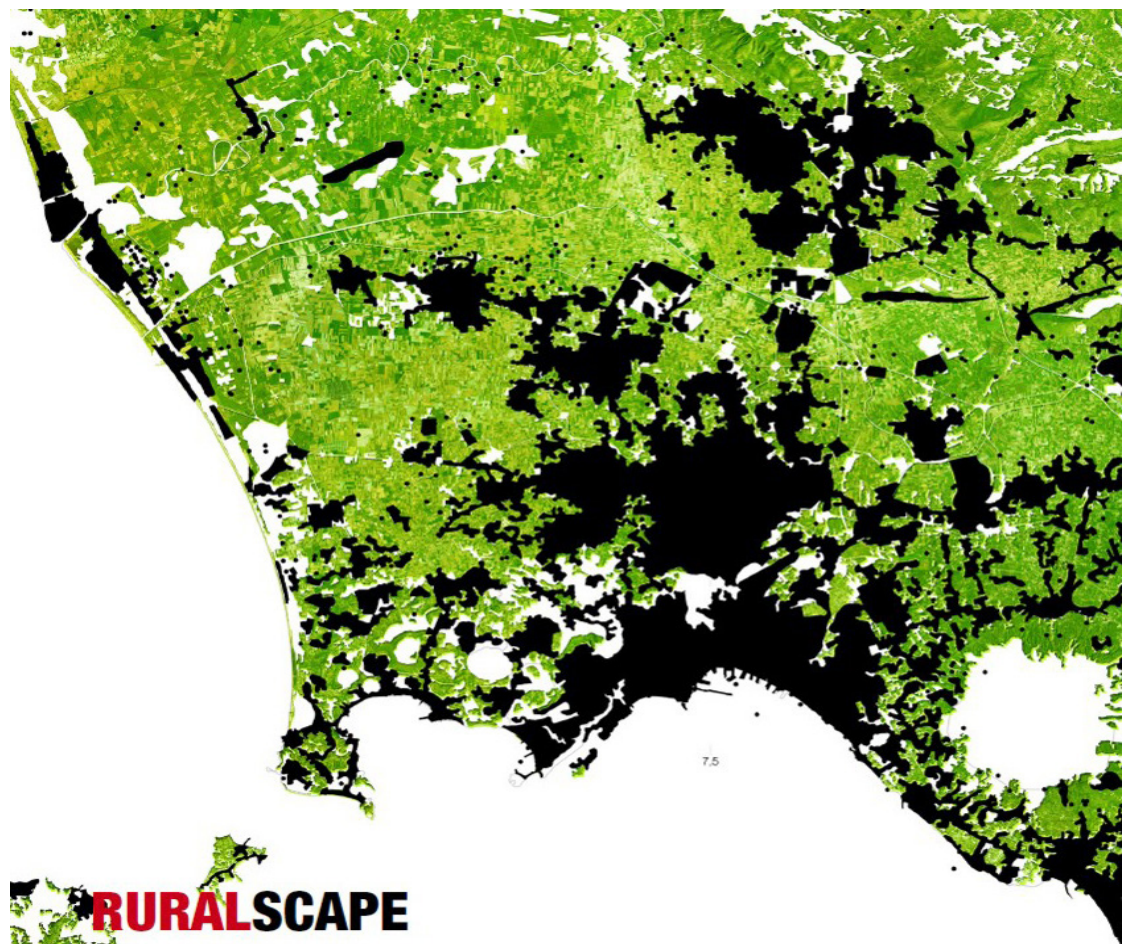
WATERSCAPE



INFRASCAPE

Boundaries

In the urban region areas, both metropolitan and post-metropolitan ones, it is not easy to define **BOUNDARIES**: from the eye of a satellite, the boundaries delineating the end of the city region and the internal difference between green and built areas, are normally highly confused. Moreover, the dynamism of the urban region fringes makes fluid the shape of built settlements, the functional mixing and the local hierarchy of urban elements. Rarely, boundaries are coinciding with administrative borders. In some cases, they match with geographical or morphological difference (the presence of river, mountains, the difference between historical settlement and contemporary ones, etc.). At other times, boundaries coincide with main infrastructural paths (railroads, highways, etc.), as well as with build precincts and dikes (walls, fences, etc.).



Source: Italian National Research Project (Prin) "Re-cycle Italy"



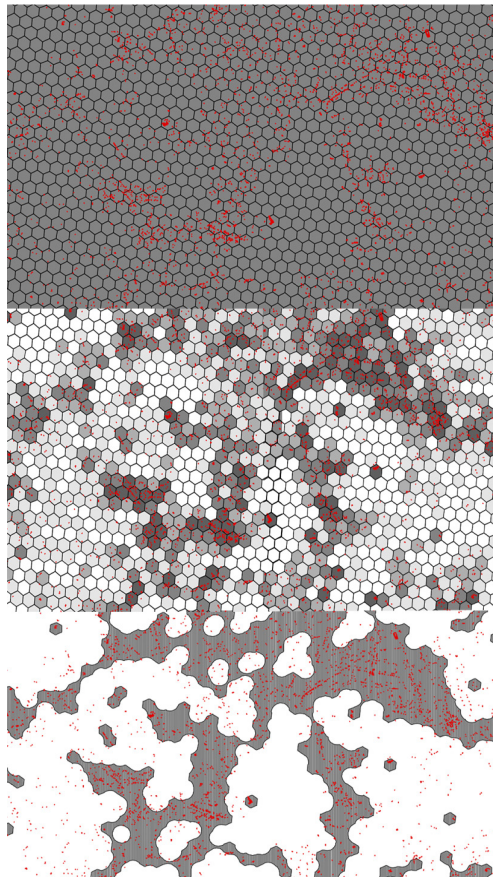
2| Peri- urban

Is the area of urban region where built and unbuilt patterns intermix. Periurban area have not the features of urban compact city nor the suburban village ones; their features, often unprecedented, are in turn defined as: urban sprawl, dispersed urban development, wide-spread city (città diffusa), territories in-between, etc. These are “areas where new functions, uses and lifestyles arise as a result of the on-going interaction of urban and rural elements. They cannot solely be explained as an intensification of urban functions in the rural environment, but have specific spatial and programmatic features that set them apart” (Wandl et al., 2014). Moreover, because of (former-round, wide-spread, increasingly polynucleated) structure of contemporary urban regions, periurban area is not matching with the intermediate area around the city. Then, periurban is a specific condition of contemporary settlements in the urban regions; it has a wide-spread and scattered nature and can be recognized both by landscape readings both by quantitative analysis. The landscape-reading shows territories characterized by high fragmentation, lack of urban and ecologic continuity, hybrid (not-rural, nor-urban) condition, dispersion of sense of places caused by continuous overlapping of sectorial elements and flows. That is a not-isotropic spatial structure; it is determined by iterations, rips, spatial accumulations of scattered uses and buildings.

From a quantitative point of view, periurban settlements can be recognized by way of several indicators: someone depending on physical features (number of buildings and surface they cover, built-up volume, parcel fragmentation, etc); other ones deriving from the way in which target areas are used (inhabitants, workers, infrastructures and their uses).

Source: Photo by Paolo De Stefano

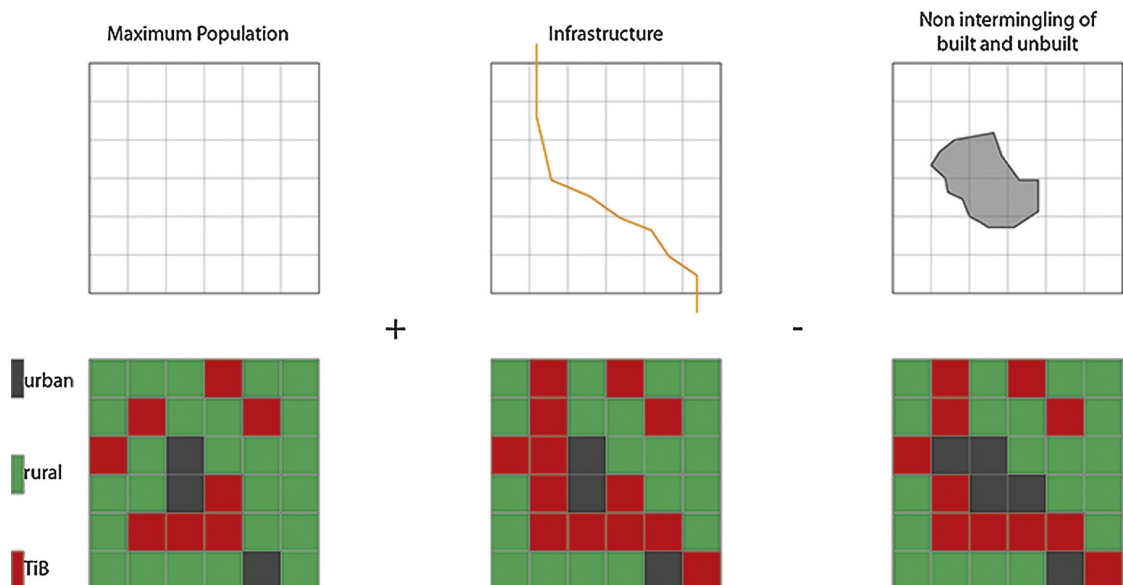




P. Viganò, *Territori della nuova modernità*, Electa, Napoli 2001.

A first approach is based on cartographic modeling and analysis; a second one starts from statistical indicators. That is not an 'either/or' methodology, as physical and statistical indicators are not contradictory, but complement each other. Both of them are operated by GIS support systems.

Paola Viganò and Bernardo Secchi have boned up periurban area in several European regions. The following is the methodology they have used to define the periurban areas in the Salento region (2001). Phase 1: subdivision of the area in hexagons of around 250 m in diameter and extraction of zone E (rural areas for Italian Urban Planning Law) from buildings layer of the technical map of the Province of Lecce. Secondly, extract from the same map the "general buildings" (which are not related to manufacturing or agriculture or other and that are most probably dwellings). Phase 2: calculating the percentage of surface covered for each hexagon. Phase 3: extraction of the hexagons with more than 1% of covered surface (which for one storey buildings is equivalent to a territorial rate of 0.03 cu m/ sq m, or that is for Italian Law the maximum volume/area admitted in agricultural areas). The area with a covered surface of over 1% having a surface equivalent at 14.3% of the total one of the Province of Lecce: 39.604 hectares corresponding to a coverage of 6.732.680 sq m (or 65.685 dwellings located in not-urban nor rural areas).



A. Wandl, V. Nadina, W. Zonneveldb, R. Rooija, Beyond urban–rural classifications: Characterising and mapping territories-in-between across Europe, in *Landscape and Urban Planning*, 130 (2014) 50–63 proposed a methodology partially different from that proposed by Secchi and Viganò. That is based on the "maximum population density" statistical indicator that includes the working population as an additional demographic indicator, together with the resident population. The procedure is based on four steps: Phase 1. Dividing the area of interest into 500 m × 500 m grid cells. Phase 2. selecting those grid cells with a maximum population density that is characteristic for periurban settlements ; Phase 3. Adding those grid cells with a maximum rural population that spatially overlap with typical infrastructures (railroads, motorway, etc.) and services (harbours, big open depots, logistic areas, etc.); Phase 4. Subtracting those grid cells with a periurban area corresponding maximum population that are not characterized by the intermingling of built and open landscape pattern .

¹ The lower limit of territories-in-between to rural was defined with a maximum population density of 150 persons/km², which is equal to a maximum population density of 37.5 persons in a 500 m × 500 m.

² Grid cells that are primarily covered with continuous urban fabric (>80% impervious land cover) following the CORINE land cover classification, need to be excluded from the selection to give a result.

Source: E. Formato, *Terre comuni. Il progetto dello spazio aperto nella città contemporanea*, Clean edizioni, 2012.



1



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4



5



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3| Waste-scapes

Periurban territories are pointed by what we define WASTE-SCAPES, patches of landscape related to waste-cycle both by functional relations and also because they are “wasted-lands”, areas not included in the periurban development scenarios, becoming neglected spaces. Therefore, with the term waste-scapes we refer to peri-urban elements of urban regions known both as DROSSCAPES and OPERATIONAL INFRASTRUCTURE OF WASTE.

According to Berger (2006) we define drosscape as accumulation “in the wake of the socio – and spatio – economic processes of deindustrialization, post-Fordism and technological innovation. [They] are located in the declining, neglected and deindustrializing areas of cities”.

The notion of drosscape emphasizes the opportunity to reuse the material scrapes of the city, as in-between areas and abandoned spaces, going beyond the mere spatial reference of soils and fields and embracing the wider and multidisciplinary field of landscape.

In the research focus, the waste-scapes involve also the spaces, which enable the urban system to be efficient. According to Brenner (2013) the *operational landscapes*, like mines and infrastructures, are not perceived as part of the city because of the lack of relations with the urban settlements and the gap with the human dimension. Nevertheless, these new geographies of the urbanization phenomena are the working engines of the system and should be considered as urban spaces involved in the urban policies and strategies. What we call “operational infra of waste” are areas related to waste management function as incinerators, landfills, big waste treatment and waste disposal plants, waste-recycling plants, waste-water processing plants and even former industrial areas waiting for reclamation by the State. Territories in-between belonging to our case study host these infrastructures for waste-disposal, which shaped peri-urban areas and are managed by national and local policies.

According to the Italian National Research *Re-cycle Italy*, drosscapes in Europe may be:

1. Polluted and/or abandoned soils and parcels; 2. Polluted water and compromised water canals and basins; 3. Illegal, confiscated, abandoned, neglected buildings; 4. Derelict infrastructures and their interstitial spaces; Abandoned public facilities. 5. Abandoned buildings and/or Settlements; 6. Desertified soils, Quarry and unused Landfills. In some cases, like in Campania region, drosscapes are the product of illegal cycle of buildings (illegal settlements) and illegal management of urban and industrial waste.

Source: Italian National Research Project (Prin) “Re-cycle Italy”

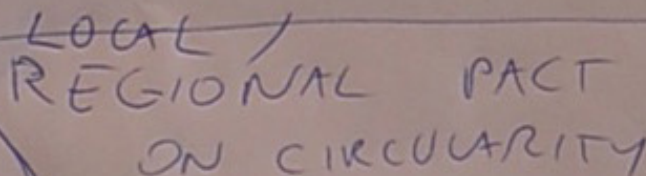


4| Socio-ecological vulnerability

Vulnerability of periurban areas is mainly referred to environmental issues and risk mapping (the vulnerability for earthquakes, or flooding and other climate change related issues). Moreover vulnerability is referred also to the intermingling with social critical conditions as illegal settlements, unemployment, presence of refugees and migrants, etc. The hypothesis is based on the connection between wasted landscapes and fragile communities. The scientific literature usually defines vulnerability as a function of exposure, sensitivity and adaptive capacity. Exposure describes the mode by which a system goes through internal or external disturbances. Sensitivity is defined as the degree to which a system is affected by those disturbances. Adaptive indicators measure the quality of a system to adjust itself in order to heighten its ability to deal with external stress. Vulnerability maps help to identify those areas most susceptible to harm at a particular point in time, allowing target policies and investments that both mitigate current challenges and reduce future risks. The attempt is to turn vulnerable spaces into spaces of opportunities (i.e. for new social integrations and environmental sustainability).

Source: Photo by Luigi Centola

DE-MANURE $\rightarrow$ CIRCULAR VILLAGE



PRICE
BROD/N

THE SELF
CONCEPT

5| Living Lab

LIVING LABs are physical and virtual environments, in which public-private+people partnerships experiment an iterative method to develop innovations that include the involvement of end users. In LLs different expertise by diverse partners are needed for a good development of the activities, with the aim to meet the need of the stakeholders by innovation. LLs are instruments to improve the innovation capabilities and competitiveness of territories. Thanks to the LL approach, policy makers can face socio-ecological vulnerability of their territories, improving social inclusion. Typically useful for the interpretation of complex real life environments, LLs are recognized as instruments to promote open innovation in several European regions, in a user-centred environment. In this way complex solutions are identified, tested and transformed into prototypes (Innovation Alcotra, 2013). In other words, an LL is a “user-driven open innovation ecosystem” (EC, 2009) that utilizes the fruitful participation of business, citizens and governments in the research process; this approach is helpful in order to better define the current behaviors and user patterns. Co-creation, one of the main component of a Living Lab, is the process that produce a product or a service as a result of a cooperation between the collaboration of end-users and other stakeholders that work in the common environment of LL (Innovation Alcotra, 2013). Cities as complex systems, characterized by Urban Metabolism and increasingly challenges, demand co-creation (GeementeRotterdam, IABR, FABRIC, JCFO, & TNO, 2014). LLs identify sustainable activities that are coherent with the territory and competitive in some ways if compared with global economies, and put them in contact with the ones that already exist in the same area. In REPAiR Living Labs are organized in six peri-urban areas across Europe, as stated above, as decision support environments where representative of universities, governance, corporations and in addition individuals make decisions that depend on their role and expertise. In this framework, design professionals, information technologist and scientists give contributions to decide what to do and how to do that in each case study area. In order to make a decision, that must be site specific, it is necessary to compare several opportunities and alternatives that should be developed in the Peri-Urban Living Labs (PULLs), after the evaluation of the current situation of the place. In the elaboration of the diverse alternatives and eco-innovative solutions, scale and size are fundamental. The different disciplines involved in the PULL have different methods to imagine change models that work at different scales simultaneously.

Source: Photo by Ni Yan

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