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TECNICA URBANISTICA I

RECYCLING THE CITY

A SUSTAINABLE PLANNING FRAMEWORK TO REDUCE, REUSE AND RECYCLE URBAN RESIDUAL SPACES

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Abstract (ENG) 10-2014

Cities are key locations where Sustainability needs to be addressed at all levels, as land is a finite resource. However, not all urban spaces are exploited at best, and land developers often evaluate unused, misused, or bad-designed urban portions as impracticable constraints. Further, public authorities are losing the challenge to enable and turn these urban spaces into valuable opportunities where sustainable development may flourish.

Arguing that these spatial elements are at the centre of Sustainable Urban Development, the present paper elaborates a prototype in the form of a conceptual strategic planning framework, committed to a more effective recycling of the city spaces using a flexible and multidisciplinary approach.

Firstly, the research focuses upon a broad review of Sustainability and Planning literature, highlighting widely established principles, guidelines and best practices, to build a sound theoretical base for the new concept. Hence, it is possible to investigate origins, identify and congruently suggest a definition, characterisation and classification for urban “R-Spaces”.

Secondly, formal, informal and temporary fitting functions are qualitatively analysed and inserted into an *ad hoc* portfolio meant to enhance the prototype’s adaptability and enlarge the choices for the on-site interventions. Thirdly, the study outlines ideal quality requirements for a sustainable planning process. The findings are then condensed in the actual presentation of the theoretical proposal, which is articulated in the individuation of tools, actors, plans, processes and possible strategies.

Afterwards, the prototype is tested upon case studies: the Solar Community (Casalecchio di Reno, Bologna) and the Hyllie Sustainable City Project, the latter further developed thanks to an international workshop (Aalto Camp for Societal Innovation, Malmö, Sweden). In particular, the qualitative results suggest, *inter alia*, the need to right-size spatial interventions, separate structural and operative actors, involve synergies’ multipliers and intermediaries (e.g. entrepreneurial HUBs, innovation agencies, cluster organisations…), maintain stakeholders’ diversity and quantity and eventually create a circular process open at multiple levels for new participants to join.

Finally, just before the conclusions, the paper speculates upon a transferral of the Swedish case study to Italy and indicates desirable future researches to favour the prototype fine-tuning and implementation.

Abstract (ITA) 10-2014

Le città sono luoghi chiave dove dare risposte di Sostenibilità a tutto campo, poiché il territorio è una risorsa esauribile. Non tutto lo spazio urbano è sfruttato al meglio e i costruttori spesso considerano certi ritagli di territorio non utilizzati, mal dimensionati o mal progettati come handicap da evitare. L'amministrazione pubblica può poi avere difficoltà nell'attivare e trasformare questi spazi in preziose opportunità dove un effettivo sviluppo sostenibile possa avvenire con successo.

Sostenendo che questi elementi spaziali sono al centro dello sviluppo urbano sostenibile, questo documento presenta un quadro teorico (framework) per la pianificazione territoriale strategica, mirando a un più sistematico ed efficiente riciclo del territorio urbano usando un approccio più flessibile e multidisciplinare.

La ricerca si concentra prima su un ampio stato dell'arte della sostenibilità ambientale e della pianificazione, individuando principi, linee guida e buone norme ampiamente riconosciute, in modo da creare una solida base teorica per il modello. E' così possibile indagare le origini, identificare e coerentemente definire, caratterizzare e classificare gli "R-Spaces" urbani.

In secondo luogo, usi formali, non-formali e temporanei sono qualitativamente analizzati e inseriti in un portafoglio-funzioni per aumentare l'adattabilità del modello e ampliare la scelta degli interventi. In terzo luogo, lo studio individua le qualità ideali di un processo di pianificazione sostenibile. I risultati sono poi concentrati ed esposti nella proposta progettuale illustrandone strumenti, soggetti, piani, processi e possibili scelte strategiche.

In seguito si analizzano due casi studio: la Comunità Solare (Casalecchio di Reno) e il Progetto Hyllie Città Sostenibile, sviluppato grazie a un workshop internazionale (Aalto Camp for Societal Innovation, Malmö, Svezia). I risultati qualitativi indicano, tra l'altro, il bisogno di dimensionare adeguatamente gli interventi, separare soggetti istituzionali e operativi, sfruttare intermediari e moltiplicatori di sinergie (centri per l'imprenditorialità, agenzie per l'innovazione, aggregatori, incubatori…), mantenere numero e diversità negli stakeholder, e creare un processo circolare e aperto a più livelli per nuovi partecipanti.

In ultimo, la tesi specula sull'ipotetico trasferimento del caso studio svedese in Italia e suggerisce auspicabili future ricerche per favorire il perfezionamento e l'implementazione del framework.

Keywords

Sustainable Urban Development

R-Spaces

Urban Resilience

Participatory Planning

Strategic Planning

Spatial Framework

Temporary Uses Planning

Open Innovation

Interdisciplinary Problem Solving

Placemaking

Green Infrastructures

Urban Agriculture

Shrinking City

Brownfields Redevelopment

Land Consumption

Circular Economy

Smart City

Urban Sprawl

Foreword

The development of this thesis started thanks to an Erasmus exchange period from the University of Bologna, Emilia-Romagna, (Italy) to the University of Bradford, West Yorkshire (United Kingdom) in autumn 2012. The research was performed with the support of the Bradford Centre for Sustainable Environments (BCSE), part of the School of Engineering, Design and Technology (EDT).

First, by using a comprehensive and interdisciplinary approach, the present document explores Environmental Sustainability in the urban environments, aiming to deliver innovative tools and ideas with a high potential of applicability. Indeed, it should be noticed how these features were part of the outlined requirements since the first phase of the selection procedures for the scholarship attribution made by Professor Massimo Garai.

At that time Professor Alberto Corlaita kindly agreed to become the home institution supervisor, while title, developments and goals of the project were outlined together with the foreign supervisor, MSA MPhil Nicola Tollin.

Overall, the document received contributions from three different countries: UK, Italy and eventually in Sweden. Indeed, the Aalto Camp for Societal Innovation in Malmö offered an opportunity to match the thesis conceptual framework with a real case and enlarge the panorama of future possible applications.

Finally, it is important to add that, following the retirement of Mr Corlaita, the role of main supervisor was kindly assumed by Professor Giovanni Virgilio, whose precious insights improved the formal consistency of the final work.

Abbreviations and Acronyms

DMC – Domestic Material Consumption
EN – Ecological Network
ESS – Ecosystem Services
EU – European Union
FW – Framework
FP – Functions Plan
GDP – Gross Domestic Product
GHG – Greenhouse Gas
GIs – Green Infrastructures
GIS – Geographic Information System
KFW – Knowledge Framework
MFA – Material Flow Account
OECD – Organisation for Economic Cooperation and Development
OI – Open Innovation
PoF – Portfolio of Functions
PSS – Planning Support System
RSs – R-Spaces
SUD – Sustainable Urban Development
SUDS – Sustainable Urban Drainage System
TDR – Transferable Development Right
TMC – Total Material Consumption
ToR – Transfer of Development Right
TUP – Temporary Uses Plan
UNDP – United Nations Development Programme
UNEP – United Nations Environment Programme
UN HABITAT – United Nations Human Settlements Programme
WSUD – Water Sensitive Urban Design

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Introduction

At the United Nations, in 1987, a groundbreaking concept was officially presented to the world: “the Sustainable Development”. It was there defined as:

> “…[a] *development that meets the needs of the present without compromising the ability of future generations to meet their own needs*”
>
> (Brundtland, 1987)

Henceforth, the word Sustainability seems to have permeated not only environmental subjects, but also a larger part of science and disciplines in general. Urban and landscape planners, environmental engineers, architects and many other professionals are nowadays engaged in the so-called sustainable management of the territory, aiming to reach a balance that may support long-term prosperity. In these terms, it could be reminded the milestone event of the introduction of Sustainable Development principles into the EU planning processes via the SEA, Strategic Environmental Assessment Directive (European Union, 2001).

Nevertheless, the day-by-day enforcement of these principles and targets is still controversial, as the sustainability of how the urban environments are actually managed appears to be quite debatable sometimes. For example, reading the EU Commission’s reports, it is possible to notice how land take trends tend to exceed population growth in many EU countries, also after the introduction of the SEA Directive (European Union, 2001). On the other hand, it should be recognised the difficulty associated with the so-called Transition (to Sustainability), as different stakeholders operate in complex environments trying to obtain land development agreements which may please their individual priorities.

Hence, the physical space can be accounted as a highly disputed and sensitive matter. In fact, dealing with space, especially in urban environments, often implies facing property-related issues, politics, economics and many other subjects. Arguably, almost everything that exists in a society is involved in issues with the territory simply because everything stands on the territory itself.

Furthermore, it is observable how the urban fabrics may turn into scattered agglomerate of juxtaposed parcels, some of them functioning at certain levels of urban efficiency, some other just idling. In particular, land

processes and activities can leave urban spaces abandoned, unused, vacant, bad-designed, derelict or merely wasted: this paper puts a special focus on just these urban spaces and the related phenomena, in the attempt to offer further viable solutions to deal with the issue.

Therefore, the dissertation presents a wide analysis of Sustainable Development and environmental questions, redefines the values around the use of urban spaces eventually proposes a theoretical Strategic Planning Framework with hands-on approach.

In order to do so, the document illustrate its own conceptualisation about how public and private actors should cooperate and manage the urban space in a more effective and sustainable way for everyone. Thus, this research considers the urban space a precious, strategic and finite resource that ought to be kept continuously active in each and every square meter, while fitting functions should be suggested to exploit it at its best.

The present paper has been organised in the following way: the next pages report a methodology section, which describes steps and techniques followed for the research. It could be noticed how the methodology is supported by a Statement Process (Rocco, 2011b), that structures the problem and helps to generate the research question which founds the document. Afterwards, a literature review closes the introductory part in the state-of-the-art section, reporting cutting-edge knowledge about the available tools for the analysed problem.

Further, the knowledge basis needed for the framework is identified and built up in the first four chapters, anticipating the fifth and last chapter that synthesises the developed theories into the proposed prototype.

Firstly, chapter one starts by laying out the socio-cultural issues associated with the production of space, following the evolution of urban dynamics from their origins to the present time. Further, chapter two presents an analysis about how it might be possible to identify, characterise and classify the studied spaces. Furthermore, chapter three examines and gives examples of compatible functions, discussing how to organise them in a practical portfolio according to their features and benefits. Afterwards, the fourth chapter faces the problem of compatibility, making assumptions about ideal characteristics the general planning system should have to successfully integrate the proposed framework. Just in this chapter, it should be also

noticed how each paragraph has a subsection that further illustrates relevant guidelines and best practices to facilitate the application of the prototype.

At last, chapter five represents the core part of the whole study, where the concepts are fine-tuned and translated into a Strategic Planning Framework. Moreover, this chapter introduces the main Strategic Planning elements of the prototype (targets, plans, actors, processes, strategies…), discusses them critically and gives an insight of potential applications using two case studies, one of which was developed thanks to a study camp in the City of Malmö (Sweden).

Eventually, the paper compares starting aims and final results in the "Conclusions", while a "What is Next" section is added in order to individuate further quantitative researches and steps supporting the implementation of the prototype in the future.

Methodology

Format and Structure

Firstly, it should be reported how the formal structure of this thesis is defined in collaboration with the expertise from the University of Bradford (UK) and tend to refer to the standards of the English academic system.

Secondly, as this document is conceptual and based on data and results elaborated during a qualitative research, the illustrated questions and findings are to be considered statistically non-representative. Nevertheless, adopting an interdisciplinary approach, the output of this investigation guarantees the coverage of a large spectrum of subjects related to Sustainable Urban Development, with more than 120 references used for the writings and plentiful diverse sources analysed.

Besides, this research has exploratory characteristics and intends to offer a theoretical framework that may stimulate a change in the management of the city's spaces while kick-starting successive quantitative researches and practical applications.

In addition, the study adopts a Statement Elaboration process, which helps to structure the document from the problem individuation to the formulation of the research question, steering the research towards its formal aims.

The next paragraphs illustrate the various steps followed for the preparation of the document.

Researching

From the very beginning of the research the paper intended to deepen knowledge and dynamics related to urban spaces with interstitial characteristics, informal functions or loitering in derelict conditions.

The first step was a broad and free enquiry on environmental issues, without any further indication from the supervisors, performed essentially via Internet and using the digital database of didactic material of the University of Bologna, namely AMS Campus.

First Literature Review

Afterwards, following a list of 30 references provided by the supervisors, a first literature review was performed to introduce some basic social, ethical, economic and ecological aspects of the problem. The review included a balanced mix of documents *inter alia* official UN and EU reports, international conferences final reports, EU projects descriptions, articles and essays about Environmental Sustainability and Sustainable Urban Development.

Keywords Search via Scientific Journals

The successive and central part of the researching phase implied the use of online databases to investigate scientific e-journals. At first, Science Direct database has been preferred, whilst Web of Knowledge database has been kept for further refining in case results were not satisfactory. In fact, the articles selection has been done in compliance with the following criteria:

1. Relevance with the chosen set of keywords
2. Main focus on the European context (and secondly on the North-American one)
3. Organic vision and interdisciplinary approach towards urban environments (more than one subject akin to environmental engineering, ecology, architecture, sociology and economy)
4. Peer review and number of citations from other authors.

As referred in point four, in certain cases it was necessary to understand the level of academic prestige of the articles. Via Web of Knowledge and ProQuest it was actually possible to run a quick peer review and check the number of citations.

Besides, depending on the abundance and relevance of the results per desired topic, some researches were further deepened via specific e-journals. Eventually, Landscape and Urban Planning resulted to be the most relevant

journal for the thesis, providing nearly half of the finally selected articles. The whole group of journals exploited in the research is hereby listed.

1. Landscape and Urban Planning	2. Environmental Impact Assessment Review
3. Land Use Policy	4. Journal of American Planning Association
5. Ecosystem Services	6. ICE Proceedings
7. Town Planning Review	8. GeoJournal
9. Cities	10. Energy Procedia
11. Ecological Indicators	12. Progress in Planning
13. Environmental Monitoring and Assessment	14. Built Environment

Further, notice that the keywords submitted were ex-ante formulated and based on the findings of the first literature review. In particular, single keywords later evolved in articulated sets of two to five words, as a single input often provided poor results. The sets of keywords used for the first research via scientific databases are listed as follows:

1. Urban Green Infrastructures
2. Multifunctional Urban Areas
3. Brownfields Sustainable Smart Ecological Renewal
4. ESS Budget Planning
5. Urban Biodiversity Planning
6. GIS Green Infrastructures
7. Green Infrastructures and Greenbelts
8. Shrinking Smart
9. Stakeholder Participation Land Conflicts
10. Water WSUD SUDS
11. Transfer of Development Rights
12. Residuals Urban Infill

After a first screening of the results it was decided to select the best two to four articles for each keywords set, therefore collecting a first group of articles that helped to build up knowledge and underpin the dissertation development.

Nevertheless, as new specific issues emerged during the document's development, further research and materials were needed. Owing to the contemporariness of certain topics, it was necessary to extend the research to supplementary resources, adopting the mentioned criteria and selection methods. For these reasons, a parallel investigation into later emerged keywords and topics was performed by means of think tanks, specialised

blogs, publications produced by experts, websites of planning institutions and other similar resources.

Furthermore, examples of keywords and issues emerged in the second phase of the research are Resilience, Transition, Residual Planning, Planning Vacant Spaces, Smart Integrated Planning, Temporary Planning, Walkable, Urban Cycling and Urban Agriculture.

For what it may concern the best practices and flag projects presented in the paper, they were evaluated using the same criteria applied to the scientific article selection. Thus, note that the main part of these examples reported in the research take place in cities that adopted long-term plans widely recognised as benchmarks for Sustainability (e.g. Aalborg Commitments, Agenda 21 or even unique and more ambitious plans). In fact, Copenhagen, Malmö, Stockholm, Barcelona, Leipzig and Amsterdam are covered by this research because they chose advanced form of Spatial Planning and/or tend to integrate effective Sustainability principles in their urban managements.

Workshop

After the background research was developed and a general version of the model was developed, it has been possible to compare the findings with real cases during the Aalto Camp 2013 in the City of Malmö. For this occasion the general version of the prototype was tailored to match a real project. In particular, it was customised a special version of the framework by merging Spatial Planning and Open Innovation (par. 5.7.2).

Statement Elaboration

As previously introduced, a statement elaboration process was adopted to formally structure the thesis and steer the research effectively towards its target. This scheme is a personal customisation of the original one exemplified by Roberto Rocco, assistant professor at the Chair of Spatial Planning and Strategy of the Delft University of Technology.

Next, the outcome of this method is the formal individuation of the core problems, research and sub-research questions and therefore the declaration of the research aims.

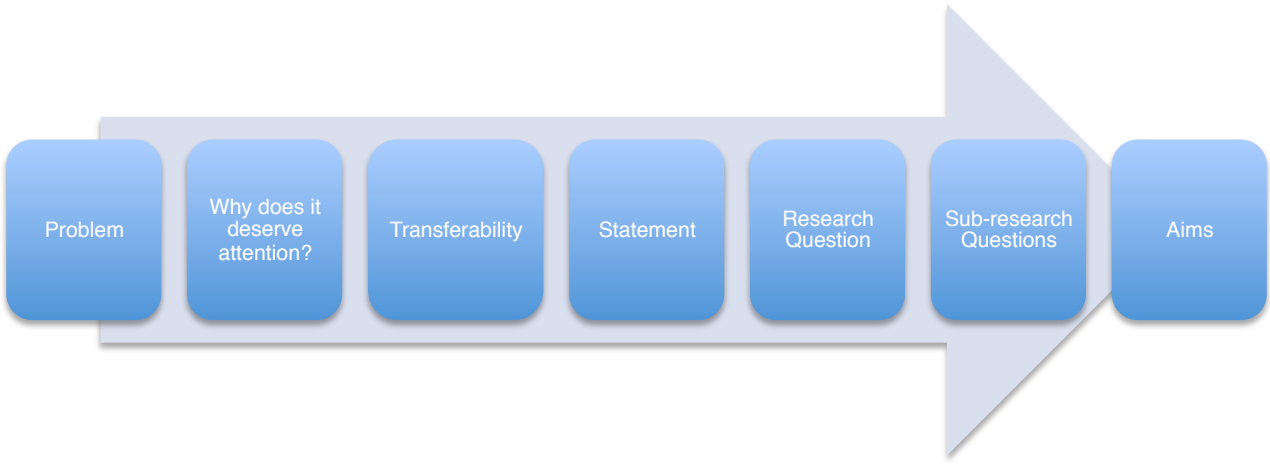


Fig. 0.1 – The Statement Elaboration process adopted.

Problem

At first, observing and exploring most of the world's urban environments, it might be possible to encounter certain misused, unused or bad-designed spaces. Often regarded as symbols of poor urban quality, these elements might also testify lacks of active and structural plans for the reduction, alternative reuse or recycling the urban space itself.

In fact, the key question is that land is a finite resource and this may require the development of smarter techniques in order to manage it more efficiently and cope with the high pressures it faces.

Despite several best practices available in pioneering cities, the solutions adopted are arguably partial, not systematic and generally too slow to react against complex environments, whether are they in financial crisis or too rapidly evolving. Hence, the Transition towards more resilient cities appears to be as distant from reality as the actual implementation of Sustainable Urban Development (SUD) may be.

Why Does It Deserve Attention?

Traditional urbanisation models are highly demanding in terms of natural resources, tend to transfer part of their functioning costs upon the ecosystems and, indirectly, they impact liveability and quality of life. Hence, in a situation were the many environments are endangered and natural resources limited, all spaces generated in the urbanisation process represent a massive opportunity notwithstanding their conditions.

In particular, as it is may be difficult to attract investments, the attention of political decision-makers should shift to the activation of new models for

the city, as these might deliver diffuse economic, social and environmental advantages.

In this perspective, enabling hidden urban resources such as idling spaces may provide a boost for municipalities in order to be compliant with Sustainability goals, e.g. EU's growth strategy Europe 2020.

Transferability

Arguably, as trends in land take controversially depend on the traditional urbanisation model and are similar in many countries (European Commission, 2012), the questions underlying this document can be deemed as inextricably related to a large number of EU cities. At the same time, new solutions in terms of policies and operative tools shall need to be as flexible as possible in order to allow local context tailoring (regional laws, site characteristics…) while steering the process towards the desired scenario.

Statement

Firstly, territorial processes have seldom taken into consideration land as a finite resource, therefore causing scattered urban fringes, vacancies in the centres, as well as neighbour towns indistinctively merge the one into the other. In parallel, it has been possible to notice how part of the population tend to escape from city centres and resettle on the outskirts, where a higher standard of living is perceived as more attainable. However, produced by either bad planning or isolation from the pulsing city, a decline has often occurred just in the liveability of the new settlements, craving further urban expansions and expenditure for the general public. Hence, traditional attitudes towards urban sprawl and other related phenomena deserve a structural review, questioning their long term Sustainability.

Secondly, it could be observed that Sustainability principles struggle to be top-down applied with the same level of commitment everywhere, as there are often serious obstacles to reach internationally binding agreements (as the experience of Climate Change conferences testifies).

Thirdly, as some contemporary cities change at high pace, urban management should set up quickly adaptable tools to cope with that, or be ready to left significant economic opportunities behind. In the worst case, urban spaces may go or stay unexploited, possibly owing to the lack of these tools and their integration with the urban development framework.

Finally, in order to interrupt this downward spiral, obtain abatements in land consumption, complete the Ecological Networks and emphasise the urban context both socially and economically, a new approach appears to be no longer postponable. Indeed, long-sighted planners may be called to elaborate a set of new fitting functions to target urban areas with. Moreover, public servants should not be the alone to support these changes: citizens and private actors are fully entitled to take part and develop a sort of complementary 2.0 urban planning from the grassroots.

To sum up, this interdisciplinary line of action might lead to several positive effects in terms of urban greening, biodiversity, pressures on the greenfields, resilience against *inter alia* Climate Change and, eventually, more compact and liveable urban fabrics.

The Research Question

Following the statements presented so far, the formulation of a central question emerges almost spontaneously:

"Is it possible to reduce, reuse and recycle those urban spaces left abandoned, derelict, poorly designed or misused, and outline a new urban paradigm to enhance cities global resilience and achieve targets of Sustainability at the same time?"

Sub-Research Questions

Furthermore, aiming to utterly answer the research question, it might be possible to narrow down and articulate four sub-research questions to be addressed in this document:

1. How to identify and characterise wasteful and waste of urban space and their development dynamics?
2. Which functions would fit these spaces?
3. Which kind of strategic and spatial planning can support this transition?
4. How to facilitate this transition process for its full implementation?

Aims

Afterwards, in order to respond to the established research question, it is possible to individuate the aims of this the paper and give a more specific direction to the research.

1 **ANALYSIS**	Provide an interdisciplinary vision of the mechanisms that traditionally drive urban modifications and eventually generate unsustainable urbanisation. Introduce a definition, characterisation and classification for those spaces considered to represent urban Sustainability drawbacks, and analyse their hidden potential.
2 **ELABORATION**	Elaborate a set of fitting functions, which can modify the lifecycle of urban spaces and activate new resources to *inter alia* tackle urban sprawl, enhance urban Ecological Networks and facilitate the transition towards resilience.
3 **COMPARISON**	Apply recognised principles of Sustainability and synthesise guidelines to propose an urban planning system featured with a logic of circularity and a renewed approach towards the evolution of urban spaces. Report existing best practices to compare and support the suggested guidelines.
4 **DELIVERY**	Present a conceptual Strategic Spatial Planning Framework intended to be flexible, participatory and easy to be integrated in mainstream planning or used by private actors to get quick improvements of the urban environment. Open for further tailoring in order to guarantee feasibility and results in the short and medium-term. Apply the concept to case studies and critically analyse the developments.

State-of-the-art

A vast and multidisciplinary literature review was necessary in order to address the specific aims of this paper. However, the research of scientific and technical material highlighted the lack of similar studies or best practices having e.g. similar approaches, aims, goals and, in particular, expected output.

Firstly, the potential reactivation of the urban fabric has actually been studied since the post-industrial age, and misused urban spaces have been defined by using partial cross-sectional concept. Specifically, significant contributions came from the work of authors such as De Solà-Morales Rubio, Koolhaas and Alan Berger with the multifaceted concepts of “terrain vague”, “junkspace” and “drosscape” respectively. However, even though important, these works are mainly limited to a narrative level of analysis, and do not outline any sequel as for methodology, guidelines, tools or frameworks.

Secondly, literature offers also a myriad of specific adjectives (most famous being e.g. marginal, interstitial, residual, derelict and vacant) concerning peculiar characteristics of the spaces, such as their topology, temporality, functionality, adequacy and conditions. Nonetheless, these single adjectives do not represent all-inclusive definitions for the scope of this investigation, with certain complex spaces engaging more than one meaning at the same time.

Thirdly, the operative concepts of “temporary planning” and “residual planning” or “urban infill” (CUDC et al., 2009) are valuable, up-to-date and close to the proposals of this dissertation, but still limited both in the range of adopted functions and in the scalability of the interventions.

Moreover, the most popular studies sharing topics with the present paper tend to be strictly specialised. It is possible to roughly classify them in the following thematic groups:

1.	**Brownfields evaluation and redevelopment**
	Focusing upon land recycling i.e. in need of remediation for contamination reasons. Generally not extended to other subjects. May be limited to investigations on a single site or only urban areas classified as brownfields.
2.	**Urban Green Spaces enhancement and evaluation**
	Concentrated on a spatially vast and organic urban area, but only considering a limited range of functions (e.g. parks, Urban Greening or Urban Agriculture) to fill or recycle urban spaces.
3.	**Climate Change and Resilience studies**
	Examining environmental performances, and risk patterns of cities. Tend to overlook single urban spaces. Less engaged with Urban Planning questions and more specifically interested in the reduction of GHGs emissions.
4.	**Green Infrastructures and accountability of ESSs**
	Focusing on benefit-cost analysis to economically justify the introduction of GIs. Suggesting a limited set of functions. Not structurally taking into account existing misused grey infrastructures, such as unused paved areas and temporary vacant lots, oversized or non-derelict buildings and other public and private open spaces.

In addition, a wide amount of environmentally related literature can be found in top publications concerning widely analysed environmental themes, such as Biodiversity, Ecological Networks, , land consumption, Green Infrastructures, Strategic Spatial Planning and stakeholders’ participation. However, the explored documentation does not tend to outline hands-on solutions or spatial planning frameworks, so it has been mainly used to provide knowledge base for the first phase analysis.

For these reasons, the present study could be considered a first investigation intending to fill the highlighted gaps with a Strategic Spatial Planning Framework that has not known models to be actually compared to.

In addition, due to the particular circumstances, notice that it was preferred to further present the state-of-the-art organised and explained via synoptic tables, whence it is possible to better illustrate tools or frameworks

that were useful to build a basis for the dissertation. The main categories are as follows:

To conclude, owing to the fast developing knowledge around the subjects, also alternative, online and non-academic resources have been consulted (e.g. online magazines, think tanks, non-profit associations…): this appears essential in order to investigate potential innovations around the urban debate.

Literature Review Sources	Main Outputs
UN System	Policies, Principles, Statistics, Indicators and Indexes
Global Organisations	Statistics, Indicators, International Agreements
EU Policy and Directives	Legal Frameworks, Principles, Policies, In-Depth Reports
EU Funded Projects	Innovative and Useful Tools, Guidelines, Best Practices
Scientific Literature (E-Journals*, Books, Essay, Manuals…)	Methods, Theoretical Frameworks, Techniques, Samples
Others**	News and Trends, Best Practices

*Web of Knowledge, Science Direct, ProQuest, Compendex
**Professionals, Theses, Newspapers, Specialised Online Magazines or Think Tanks (e.g. Planetizen, MIT-CoLab, Nordic Urban Design Association NUDA, Projects for Public Spaces PPS)

Tab. 0.1 – Sources and research fields for the state-of-the-art.

Global Actors Involved in Sustainable Development (Economics and Management)	
WORLD BANK	The World Bank Group
OECD	Organisation for Economic Cooperation and Development
WTO	World Trade Organisation
FAO	Food and Agriculture Organisation
IMF	International Monetary Fund
UNDP	United Nations Development Programme
Global Actors Involved in Sustainable Urban Environments (Policy Developers and Operators)	
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
UN HABITAT	United Nations Human Settlements Programme (formerly UNCHS)
ICLEI	International Council for Local Environmental Initiatives

Tab. 0.2 – Global actors engaged in Sustainable Urban Development.

Sustainability Fundamental Principles - International charts and partnerships	Content	Outcome
Brundtland Report - "Our Common Future", 1987.	Report and analysis of the world's development by World Commission on Environment and Development.	Global official appearance of the sustainable development principle. Laid the groundwork for the Earth Summit in Rio de Janeiro.
Agenda 21, Rio de Janeiro Earth Summit 1992.	Political commitment at high level on development and environment cooperation.	Participation and collaboration on sustainable development, e.g. Agenda 21 Local Action Plans. ("Think global, act local").
Aalborg Chart (1994) and Aalborg +10 Commitments (2004).	Chart containing sustainable development commitments signed and co-shared by local authorities (municipalities and regions).	Implementation of Agenda 21 and sustainability principles at local level. Improvement in governance transparency and participation and more.
Leipzig Charter on Sustainable European Cities, 2007.	Agreement of EU' Ministers responsible for Urban Development about urban sustainability principles.	Commitments at national levels for an integrated urban development and sustainable urban environments.

Tab. 0.3 – International charts and agreements concerning Sustainable Urban Planning.

EU Action and Policies for Sustainable Development and Environment	
Environmental Action Programme	5th and 6th EAP
Research and Technological Development Framework Programme	5th, 6th and 7th RTD FP
EU Directives	Water Framework Directive
	Flood Risk Management Directive
	Environmental Impact Assessment Directive
	Strategic Environmental Assessment Directive
	Habitats and Birds Directive
European Funds	European Regional Development Fund (ERDF)
	European Social Fund (ESF)
	Cohesion Fund (CF)

Tab. 0.4 – Relevant EU policy and initiatives for sustainable environments.

International projects collections and reports developing Guidelines and Best practices	Main promoters/funds	Involved Countries	Contents and Outputs
LAB - Local Action for Biodiversity	UNEP, ICLEI, IUCN.	-	Pilot project of 21pioneer cities around the world. Collection of best practices for biodiversity conservation and enhancement.
VALUE - Valuing Attractive Landscapes in the Urban Economy	INTERREG IVB	Sweden, Germany, France, Belgium, the Netherlands and UK.	European project aiming to demonstrate the economic value of GIs.
VOTES - Valuation Of Terrestrial Ecosystem Services in peri-urban space	INTERREG IVB	Belgium	Quantification of the importance of ESSs and their modifications under different scenarios. Case study in Belgium.
TURAS - Transitioning towards Urban Resilience and Sustainability	EU 7th (RTD) Framework Programme	-	Improve EU cities resilience and sustainability using enhanced webGIS solution and models for use/re-use of unused buildings and SLOAPs (Spaces Left Over After Planning).
European Capitals of Biodiversity	EU 7th (RTD) Framework Programme LIFE+, ICLEI, IUCN.	Germany, Spain, France, Slovakia, Hungary (521 municipalities in 2011).	Promotion of biodiversity on a local level and in different governance aspects via a contest. Reports with best practices.
DG Environment Report - The Multifunctionality of Green Infrastructure	European Commission's Directorate-General Environment (DG)	-	"...describes the different functions that the Green Infrastructure seeks to execute, and explores the scientific evidence behind its ability to perform these functions, using case studies where available".
DG Environment Report - Overview of best practices for limiting soil sealing or mitigating its effects in EU-27	European Commission's Directorate-General Environment (DG)	-	"The document contains relevant information on soil sealing, its drivers, impacts, available options, and good practices across the Member States". It recommend the methodology Limit –Mitigate – Compensate.

Tab. 0.5 – International projects and collections of best practices on sustainable environments.

Theoretical or Legal Frameworks	Technical Meaning or Content	Purpose	Theme
Strategic Environmental Assessment Directive (2001/42/EC)	Environmental evaluation of plans, programmes and projects. Specifically mandatory for land-use plans. Incorporation of sustainability's principles in the planning process.	Create a framework for an environmentally sustainable development of the territory. Ensure that environmental consequences of certain plans and programmes are identified and assessed ex-ante, before their adoption, and ex-post, using monitoring and evaluation as an optimisation tool.	Sustainable Planning Processes
Emilia-Romagna Region Planning Act - Regional Law n°20, 24 March 2000	General legal framework on territory use and conservation, anticipating but incorporating EU SEA Directive.	Introduce the new environmentally sustainable planning process, its tools and methods, inter alia disarticulating structural and operational characteristics on two parallel but different plans. Successively integrated and expanded, inter alia its participation characteristics, in 2009.	Sustainable Planning Processes
Green Infrastructures: Smart Conservation for the 21st Century	Momentous document introducing principles, and best practice for planning green infrastructures, by Benedict and McMahon (2002)	Introduce principles and best practices to make the best use of green infrastructures while planning.	Green Infrastructures Development
Drivers Pressures States Impacts Framework	Framework for the interactions of GIs by ten Brink et al. (2011) applied to the Natura 2000 Network.	Evaluate the role multifunctionality of GIs and delivered ESSs, relations and influences in the system. Basis to rise awareness and consideration for the benefits provided by GIs.	Green Infrastructures Development
GIs, ESSs and Human Health Conceptual Framework	Multidisciplinary "meeting point" illustrating reciprocal influences between urban green space, ecosystem and human health (Tzoulas et al., 2007).	To help organise existing and new insights, formulating new research questions regarding ecosystem and human health. Stimulating debate on integrating urban GIs components and planning in public health promotion.	Green Infrastructures Development

Tab. 0.6 – Frameworks and guidelines for sustainable environments.

Tools	Technical Meaning or Content	Purpose	Theme
GRaBS Assessment Tool	Green and Blue space adaptation in urban areas	Assess current vulnerability of urban areas to climate change impacts and patterns of spatial risk.	Adaptation and Climate Change
CBI	City Biodiversity Index or Singapore Index	Self assessment tool to assist cities in benchmarking monitor their biodiversity efforts and ecological footprints.	Biodiversity and Ecological Networks
Ecological Network Approach	Decision-making approach with integrated Ecological Networks (ENs) conservation and development.	Promote Urban ENs and Urban Biodiversity by eco-corridors, stepping stones, buffer zones and linkages to connect Biodiversity Core Areas, enhance bio-permeability.	Biodiversity and Ecological Networks
Natura 2000	Territorial Network of 17% EU territory and more than 160 000 marine km2 environmental valuable areas designated for conservation.	Assure long-term survival to Europe's most valuable and threatened species and habitats.	Biodiversity and Ecological Networks
Orloci Chord Index	Resemblance (similarity, distance and dissimilarity) Index applied to areas, typically protected Natura 2000 areas and unprotected areas.	Assess the integrity of ecological networks between urban and rural areas and the effectiveness of urban green infrastructures in promoting biodiversity.	Biodiversity and Ecological Networks
Leipzig Creative Intervention in a dynamic city (Rall & Haase method)	Evaluation of Interim Use Strategy applied to brownfield sites in Leipzig	Neighbourhood revitalisation. Correlation of users impressions of interim use sites with city-defined sustainability goals and socio-environmental considerations.	Brownfield re-use and Participation
Recycling Derelict Land	Manual for Brownfields Investigation, Reuse and Hazards by George Fleming	Recover contaminated and polluted derelict land, enhance city land patrimony and compact form. Protect from environmental risks.	Brownfield re-use and Participation
Chicago CNT's Green Value Calculator	Storm-water management tool by Chicago Centre for Neighbourhood Technology	Compare costs, benefits and performances of green infrastructures	Greening Urban Environment and Green Infrastructures
ICC (URGE-Project under 5th FP)	Interdisciplinary Catalogue of Criteria	Evaluate and develop urban green spaces. Deliver indicators encompassing ecological, economic, sociological and planning criteria. Best practices.	Greening Urban Environment and Green Infrastructures

Tab. 0.7a – Tools for an interdisciplinary approach to urban spaces.

Tools	Technical Meaning or Content	Purpose	Theme
Soil Bio-Engineering (Former Naturalistic Bio-Technique)	Green technique that uses autochthon live plants as construction material, together with inert materials either traditional or not (G. Sauli)	Erosion control and consolidation interventions, re-naturalization, creation of appropriate environments for species and vegetal and/or animal communities, reconstruction of natural-like ecosystems, development of biodiversity.	Greening Urban Environment and Green Infrastructures
SUDs	Sustainable Drainage Systems, natural-like systems that use cost-effective solutions with low environmental impact.	Drain away dirty and surface water runoff through collection, storage and cleaning before allowing it to be released slowly back into the environment.	Greening Urban Environment and Green Infrastructures
TEV Approach to GIs	Total Economic Value framework (ten Brink et al. 2011)	Estimate the economic value of the overall benefits of the Natura 2000 network, ESSs and green infrastructures.	Accountability of Ecosystem Services (ESSs)
CLC2000	Corine (CooRdinate Information on the Environment) Land Cover 2000 database of land cover and use.	Provide information on land cover and fragmentation pattern of natural and semi natural areas at the pan-European level	Territorial analysis
IFI	Infrastructural Fragmentation Index	Measure and monitor land fragmentation and induced variation of biodiversity	Territorial analysis
GIS and webGIS	Geographic Information System that acquires, keeps, updates, analyses and represents geographically referenced data.	Support tool to decision-makers and site knowledge. Realise compared and trans-disciplinary analysis of the territory.	Territorial analysis
White Book on Land Conflicts and Transportation Infrastructures (Libro Bianco su Conflitti Territoriali e infrastrutture di Trasporto)	Manual containing proceedings, international best practices, recommendations.	Enhance inclusion, participation, site knowledge, optimise resources, achieve targets.	Participatory Urban Planning
Aarhus Convention	International Commitment on Citizens Participation and Access to Information.	Improve urban planning participation, awareness, inclusion aspects, diffuse sites knowledge and environmental justice.	Participatory Urban Planning
CUDC Pop-Up City	Cleveland Urban Design Collaborative, Kent University and Berlin's professional manual for temporary use of city idling areas. Residual Planning.	Enhance citizens participation and involvement in the city. Recover and use abandoned sites. Increase social life and city resources.	Participatory Urban Planning

Tab. 0.7b – Tools for an interdisciplinary approach to urban spaces.

Summing-up a Message of Sustainability

It should be observed the important contribution given by UN HABITAT publications named “State of The World’s Cities”. Notwithstanding the traditional specialisation of this UN agency in peace studies, the series actually provides insights, diverse sets of data, global trends, guidelines and best practices useful to better understand Sustainable Urban Development.

Moreover, this series tends to promote an organic, integrated, inclusive and multidisciplinary approach concerning urban matters. A significant example is constituted by a paragraph that deserves to be reported in full and synthesises various recommendations fully in line with the aims of the present document.

> *[It would be beneficial to] “**Increase population density to sustainable levels:** More intense land occupation and activities result in sustainable population densities which contain or reduce urban sprawl and depletion of limited resources. Greater proximity will, in turn, facilitate supply and distribution of goods and services. An efficient layout (together with adequate land legislation and policies) can reduce the cost of infrastructure. On top of suburban densification and sprawl remediation, land use can be intensified through area redevelopment, planning for new areas with higher densities, ‘brownfield’ development (i.e., decontaminating and developing land previously used for industrial or certain commercial purposes), building conversions, and transit-oriented developments”.*
>
> Extract from State of the World’s Cities 2012-13, p.113 – (UN-HABITAT et al., 2012).

In the next chapter, this paper uses a multidisciplinary approach to examine social issues concerning production and exploitation of the space, and then analyse the dynamics involving urban environments.

Paragraph	Cited Authors	Main Concepts	Shared Influences: Capitalism	Waste Reduction	ICT&Technologies	Globalisation	Local Communities & Participation	R-Spaces (RSs)	Limitedness of Resources Spaceship Earth Concept
1.2 Mass Culture and Consumer Society	Barthes	Modern Mass Culture	•						
	Baudrillard	Fashion, Consumerism	•						
1.3 Production of Space, Waste and Wasted Spaces	Lefebvre	Production of Spaces from Societal Features	•				•		
	Lynch	Production of Waste and Wasted Places		•				•	
1.4 ICT, Globalisation and the Current Urban Spaces	Castells	Network Society, Cities and Spatial Modifications			•	•	•		
	Sassen	Participation of Local Actors in the Global Contexts			•	•	•		
1.5 Placemaking vs. Spaces of the Globalisation	Nel•lo	Values of the Communities in Producing Places				•	•		
	Augé	Meaning of Places				•	•	•	
	Project for Public Spaces	Placemaking, Revitalisation, Vibrant Environments					•	•	
1.6 From Linear to Circular	Boulding	Integration Humanity - Earth cycles	•						•
	EMAF Circular Economy team	Circular Economy		•	•				•
1.7 The Growth Reviewed	Meadows	Limits to Growth, Sustainable Development	•		•				•
	Serge Latouche	The Degrowth Movement		•		•			•
1.8 Shrinking City vs. Smart City?	Pallagst	Shrinking Cities				•		•	•
	CUDC	Smart City, Smart Shrinking, Flexibility and Resilience			•		•	•	•

Fig. 1.1 – A travel through the socio-cultural aspects of urban spaces.

1. Evolution, Complexity and Waste of Urban Spaces

Considering the relevance and inextricability of the social dynamics on the modern urban space and planning, from industrialisation to the current debate on Sustainable Urban Development and Smart Cities.

1.1 Planning Cities in Transition towards Complexity

Modern urbanism and urban planning appear to have developed in a complex way, characterised by multidisciplinary aspects that involves an extended span of sciences such as economics, statistics, mathematics, environmental sciences, Information and Communications Technologies (ICTs), politics and law among others. However, this may not have been an issue at the time the debate on urban issues vigorously began in the 19th century. In this sense, it may be important to recall the origin of modern urban planning and the advent of the Industrial Revolution. As the sudden densification of human settlements unveiled serious hygiene complications, efforts to cope with the critical situation were made: a new discipline was recognised as effective in improving life conditions and create more liveable cities (Benevolo, 1967).

Further, the concept of liveable city evolved to present times and assumed various connotations. Either on the regional or international scale, settlements of different size apparently compete in order to attract more investors and citizens.

Afterwards, today' stakeholders interests and needs may probably go beyond the basic efficiency of the sewer system. In particular, various factors can contribute to both liveable and attractive cities of the 21st century: job opportunities, infrastructures development, universities, research and innovation centres, natural environment, housing opportunities and so forth.

Moreover, a prosperous urban scene expected to be culturally vibrant is supposed to carefully plan public spaces, so that local communities can express themselves and develop pluralism (UN-HABITAT et al., 2012).

Thus, in order to better understand city dynamics, it might be helpful to investigate the main connections between the communities' social characteristics and the way urban space is managed. A viable option is to examine those mechanisms that drove inhabitants to give different values

and uses to the territories throughout history. During this analysis it may be then outlined a certain idea about why some spaces became ignored and excluded from development.

The diagram in fig. 1.1 reports the multidisciplinary time travel of this document into the urban debate, prepared via key concepts and authors. It starts from the birth of mass culture and consumer society, passes phenomena such as the globalisation, the advent of the ICT, the rise of ecological movements and eventually gets to the nowadays talks.

Besides, it can be notice that cities today experience different situations in terms of demography, which might be connected to economics. In particular, shrinking and growing populations are opposite dynamics, but they can occur at the same time in the same country, just as it happened in the US and in the UK (Martinez-Fernandez et al., 2012). Hence, administrators and decision-makers probably face tough challenges when asked to implement flexible and effective planning strategies that may guarantee resilience towards opposite phenomena. Support may be provided by the use of technological tools into planning practice (e.g. spreadsheets, GIS, PSS, visualisation and multimedia systems, the internet…). Indeed, this integration is considered almost unavoidable today, first because it helps planning practitioners (Klosterman, 2001), second because it can boost citizens' participation (Hanzl, 2007).

Notwithstanding how dramatically tech-tools may improve results, the present document considers that planners nowadays not only need to be skilled in the use of recent technologies, but also need to act in compliance with Sustainability principles and be capable to thrive in the contemporary, open and participative planning processes.

1.2 Mass Culture and Consumer Society

An understanding of the space dynamics could be facilitated through an increased awareness of how the society evolved its approach to material things. Useful considerations to this cause may be brought by an analysis of the mass culture of the 20th century, which saw Roland Barthes as a modern pioneer in sociology and semiology. According to his beliefs, the capitalist society has developed a "fashion system" in order to associate fictitious

values to objects, attract consumers and influence the mass culture towards more manipulable *petit bourgeoisie* positions (Barthes, 1972, 1985).

Together with Barthes, Jean Baudrillard is another French intellectual that articulated his work on the facets of the consumer society, arguing that consumerism has become the foundation of the social order (Baudrillard, 1998). Furthermore, he also presented a dissertation about the materialistic aspects of consumption, specifying that objects support two main functions, "to be put to use and to be possessed", and when the first function is compromised or ignored, the object becomes anyway a part of a collection, although alienated from its original purpose (Baudrillard, 2005, p.86).

In parallel, theories describing materialism and masses' behaviour may possibly be relevant when outlining the approach towards land and urban space. Actually, considering land as a mere consumption or capital good, the study of the approach that different societies have towards objects and other physical resources could help to better understand the use of the urban environment and therefore manage its future changes.

In fact, according to Baudrillard (2005) the consumer society emerged from capitalism: it has modified its consumption habits from the satisfaction of basic life requirements to wish-based and compulsive attitudes. In addition, the French intellectual concludes that the latter emerged behaviour is going to pointless drive the whole system towards an unfavourable end.

Notwithstanding philosophies and political opinions, it might be possible to observe that this kind of attitude towards space, as to all of the finite resources, does not appear particularly sustainable on the long-term.

1.3 Production of Space, Waste and Wasted Places

The next step is the analysis of how the society' habits and the mass-culture may affect the way space and waste are generated, possibly influenced by the economic systems in the way described previously. Further, in order to assess the full picture of these dynamics, it should be noticed that all the abandoned, derelict and misused urban spaces should arguably be considered nothing but one more category of waste.

Indeed, a significant reasoning about these questions can be developed throughout the comparison of the following two important publications:

- The Production of Space (1974), by Henri Lefebvre
- Wasting Away (1990), by Kevin Lynch

Thus, in the mentioned papers it is possible to identify a parallel path of some important reflections that could be at this point summarised as follows:

1. Society's cultural characteristics are fundamental in the production of places (Lefebvre) and waste (Lynch).
2. A strict connection joins people' bodies to spaces and waste.
3. A real modification of the current dynamics of space and waste production can only occur via a real change from the "grassroots", where the majority of citizens are committed and involved themselves, representing the main part of the solution.

Next, the two following paragraphs expose, compare and sum up the authors' ideas, with special attention to the mutual aspects that influences the various component of the society, i.e. institutions, economy, knowledge and so on.

1.3.1 Lefebvre

Analysing the theories expressed in "The Production of Space", an essential idea appears to outline the whole work:

"Every society produces a space, its own space"

(Lefebvre, 1991, p.31)

For this reason, Lefebvre identifies the materialistic influences of the consumer society as determinant in the dynamics that generate different kind of spaces, as the urban sprawl, which he considered to be driven by an inducted dream of the family's single villa.

In addition, the author also extends his observations and explains how the production of urban spaces in the pre-industrial town was managed according to a very local-specific code. Specifically, the crucial feature of this code was to be political, architectural, cultural and urbanism-related at the same time, enabling to both *read* and *construct* the city space.

Later on, the advent of epoch-making phenomena such as the Industrial Revolution, the capitalism and the globalisation gradually modified these old urban codes and, in the aftermath, the production of space happened to operate in three separated directions:

1. **Spatial practice**
   It is the space physically lived by the society and actually built by the interaction of institutions and stakeholders, who concretise their interests via the infrastructures located on the territory.
2. **Representations of spaces**
   They are the plans and projects in two or three dimensions that intend to shape and design the urban space. They are produced by experts and professionals such as urban and landscape planners, architects and engineers.
3. **Representational spaces**
   They are non-physical aspects that characterise the urban environment. They are commonly perceived by means of myths or images that give an iconic representation of a certain place. The shapes of a church, of a house or a square, as well as the presence of a certain monument are aspects that retrieve this special property.

In the attempt to underline a link from the work of Lefebvre to the nowadays planning, it should be further reminded one of his valuable pronouncements appearing in the book:

"Authentic knowledge of space must address the question of its production"
(Lefebvre, 1991, p.388).

Firstly, this concept implies a direct link to the theory that back actual sound spatial planning. An approach based on site knowledge would eventually produce deeper ex-ante studies and a sufficient amount of data capable to multiply options in the rest of the decision-making process.

Nevertheless, a complete report about social, economic, transport and environmental systems is just a part of the information currently needed to aid decision-makers, as various modern planning acts rule for their "knowledge framework" (Emilia-Romagna Region, 2000, art. 4 *Quadro Conoscitivo*).

Subsequently, it might be argued that the requirement for deeper knowledge is also a first hint of a needed multidisciplinary approach in planning that should be enlarged to all the institutions that has an influential role on the territory. Hence, ideal conditions and features to sustain this concept of an extended, integrated and symbiotic planning, which individuates a shared vision for the society, are going to be further discussed in chapter four.

1.3.2 Lynch

Notwithstanding their different professions, Lefebvre and Lynch shared some common views about the society and its way to affect the urban space. Kevin Lynch spent a lifetime observing cities and in “Wasting Away” (1990) he focuses first on the societies misuse, and then formulates conclusions about how the space can be considered just another ordinary kind of waste. In particular, the latter concept brings tremendous innovation in enlarging the span of the environmental studies and the long-term views of scientific studies. It might be further useful to remind that Lynch approach was not a quantitative/positivist one, which is by some alleged to be limited in its organic vision and long-term view.

Besides, it might be now possible to go deeper in a report of the three main and original points expressed by Lynch in his book:

- ✓ ***A Vision of Waste***
- ✓ ***Recycling***
- ✓ ***Decline, Growth and Space of Flows (a link with Castells)***

A Vision of Waste – It emerges a persuasive thought that the society should rethink and redirect its habits towards waste: the relationship between people and waste is controversial and deserve a change in the dynamics of waste production and treatment.

In order to underline the importance of this change, generate questions and raise awareness about the problem, two paradoxical and opposite images are presented by the author:

- ✓ A society that wastes indefinitely to the extreme, without any regards to reduce or treat its waste, and to the point of being seized by it.
- ✓ An opposed vision of a perfect and clean world, free from any kind of waste, where everybody lives a sterilised life that appears as perfect as schizophrenic.

Arguably, none of these “cacotopias” are considered to be desirable solutions, and the author observes that the society should learn how to positively cohabit with wastes, possibly rethinking its role towards circular ways. Next, even if not explicitly expressed, the aware reader might perceive a primal idea of environmental sustainability that accompanies the reading. Moreover, Lynch gives a definition for “dereliction”, relating it somehow with the capitalistic market and the consumerism:

"If it pays, it is not derelict. If it does not pay, due to some human devilment, and once did pay, then it is derelict".

(Lynch and Southworth, 1990)

Recycling – In the chapter "Waste well" Lynch describes how societies should not totally refuse waste, but find ways to coexist with it by reducing the needs for disposal and using an approach that is nowadays famous as "The three R's: Reduce, Reuse and Recycle" (e.g. US EPA, 2012). Lately, these principle evolved and included also the design phase, concerning the entire life of the product, foreseeing and considering the impacts of the goods along its whole life: the origin of the Life Cycle Assessment (LCA) may be *de facto* reckoned as the fourth "R", to Re-think.

Further, in the end of the 2000's, the R's number increased to eight (Latouche, 2009), as a result of the "degrowth movement", formally in contrast with theories of absolute growth in the economic systems. Apropos of the degrowth, notwithstanding the appreciations for the concept of a closed-loop system, Lynch is in contrast with the idea of planning for the shrinking of the economic systems: the authors augurs to find sustainable ways for a development framed into a scenario of economic growth.

Besides, fast growing cities suddenly fallen into decline clarifies some principles that should be considered for the creation of resilient urban context: a vast portfolio of economic activities provides cities with more flexible mechanisms to handle external impacts. The author argues about a town characterised by a single strong specialisation in a certain economic activity, whose weight is major in the city revenues. It is discussed how, even thought a large and fast coming revenues may bring success and lift up the condition of the city, the urban environment stays fragile and more likely to face a catastrophic downturn as the specialised economic sector falls in a downsizing or face a relocation.

Apart from being a frequent generator of derelict spaces, this phenomenon also caused many cities in northern England to see their prosperity decline dramatically. As one of these cases, Bradford built up its golden period via a major specialisation in the textile sector, but as the crisis and the competition from the east rose, the city left many jobless people and empty mills behind. Arguably, it could be consequently observed how these events condition the urban patterns for many years to come.

Finally, to sum up the destiny of a derelict space in a positive way, it could be reported the following thought, which describes an innate foresight that Lynch had: a good attitude to see opportunities in disguise.

> "However derelict they may seem, they are likely to be important to someone or some form of life and may be essential to future adaptability"
>
> (Lynch and Southworth, 1990, p.9)

Decline, Growth and Space of Flows – The publication by Lynch present a third main issue. While the production and management of the space are supposedly considered to be essential to cope with the decline, the author points that certain lower hierarchical level policies might be limited in their effects, as the growth dynamics have changed in an unprecedented way. Indeed, an argument that it is supposedly shared with other authors (Castells) is that the range of variables that is determinant to growth and decline today is wider: information, knowledge and private capitals.

Moreover, the heart of growth has shifted from the "space of place" to the "space of flows" (Castells, 2002) and it will be essential for growth manager and policy makers to concentrate their efforts on the latter, since they represent the larger slice of the available growth for the time being.

The space of flows is a hybrid space featured by an aggregation of either scattered or generally non-adjacent territories (each one with a background in its local geographic district), which may be located at distance but have the distinguishing characteristic of being electronically connected, creating a sort of augmented space, finding in this interconnection their functions and meanings (Castells, 1989). The media, financial and international production networks may be considered typical examples of the mentioned spaces (Castells, 2002).

Hence, the spaces of flows could actually have a role in the modification of the physical spaces and it is arguable that some changes in the urban management might be requested. In fact, as conventional urban planning, zoning or environmental regulation might be inadequate against these powerful processes, and an effective regulation could be found through decisions at the highest levels via deregulation on financial institution, global free trade agreement and so on (Neuman, 1992).

To sum up, an extensive enlargement of closed-loop logics for goods and services production systems may arguably be considered a favourable strategy to adopt. At this point, the "Circular Economy" and the cradle-to-

cradle approach, even if they might appear a utopia, are probably something that the today's society should at least aim at. The path is illustrated by a set of several practical best practices and case studies of waste reduction realised in the industry sector (EMF et al., 2012), depicting a system able to make the best use of the world's resources via the organisation, design and a long-term view of their way to generate value.

Auspiciously, as spaces and objects are not going to be the exclusive part of the economy, the expectation for Sustainability might be facilitated by the shift towards more immaterial goods and services. However, despite the rise of new technologies, changes in the consumer's demand and increasing raw material prices, a key role is still played by governments that can promote frameworks and regulation for the reuse of all resources.

In these terms, one of these desiderata should arguably be a new and shared land recycling framework that could ease and deflect unsustainable commercial interests that seize the territory.

1.4 ICT, Globalisation and the Current Urban Spaces

In the second half of the 20th century, the appearances of ICT and globalisation phenomena have rearranged the structure of the current society (in economy, culture, politics and the communication media).

Indeed, these modifications occurred in all the dimensions of the system (economic, political and cultural) and intrinsically conditioned the production and management of the physical space (Castells, 2010). The interaction of the mentioned phenomena led to the rise of a "Network Society", which have a main feature in the networking of its own components (Castells, 2002).

In addition, Castells (2002) suggests that the cities are shaped by a struggling competition between the preservation of their local identities (prioritisation of the spaces of places) and the affirmation on the global network (commitments in the spaces of flows). Notwithstanding the familiar and territorial dimension in which citizens live the most of their life, the author deems the latter option as unavoidable, as the major results in economy and technology come as a consequence of being important in the global network.

Although the indispensable role covered by ICTs, the pursuit of a right balance between local and global dimensions should be considered a

desirable goal: it can be observed how global programmes as Agenda 21 (United Nations, 1992) developed Local Actions Plan, for example.

Nevertheless, either urban sprawl or discarded spaces could be probably considered classic examples of unbalance and waste of territory by the most ecologists, but also new opportunities in disguise. For example, in a fragmented urban space, distinguished by alienation and destabilised by different kind of pressures, a decisive solution to regain urban vitality could be a policy for preservation, restoration and construction of public spaces (Ingersoll, 2006). Indeed, the chance to have common spaces to share seems to be an unexceptionable key to repopulate a place, because it is essential to people's interaction and social peace (Castells, 2002).

In addition, a review of planners' duties and opportunities via new land management policy may possibly result in ameliorations for all citizens, further participation and restoration of polarities or neighbourhoods (e.g. also via a review of the representational spaces).

Gradually, the role of planning specialists has recently changed, as some authorities are leaving traditional planning behind. In fact, those almighty figures of the past are now becoming careful listeners, articulators of spatial visions and mediators of interests that have the duty to suggest a sustainable and fair future for all (Rocco, 2011c). Hence, it is arguable that governments have the decisive responsibility to implement adequate urban policies and maintain them up-to-date, in order to cope with the pace of contemporary changes.

Besides, it should be reported that ICT and globalisation do not originate only alienation and destabilisation, whereas they also have some positive outcomes. The enhanced openness, the fall of barriers and the participation opportunities offered by the new technological media on a global level have consequences also at the local level, as Agenda 21 would recommend to have (United Nations, 1992). In particular, these means give citizens increased chance of participation in the local governments and boost the local political activities and debates (Sassen, 2004).

In addition, the augmented political interaction have to thank the public access to the Internet: additional stakeholders, previously isolated in peripheral areas, are now enabled to participate to the debate in the civil society, bringing this politics of places on the global network (Sassen, 2004).

Consequently, it is arguable that the increase of participants may lead to a multiplication of the available knowledge about the urban spaces. For this reason, further knowledge might also be expected over misused urban and peri-urban spaces, which can be favourably recovered or turned into public space advantaging a large community.

1.5 Placemaking vs. Spaces of the Globalisation

Valorisation of public places in the urban pattern is gaining momentum, and various professionals discuss how to create or restore the sense of local community and engage citizens at the same time. Thus, urban planners should also confront themselves to cutting-edge best practices and operate according to the so-called "placemaking", a set of principles and methods to uplift and improve neighbourhoods via context sensitive approaches.

In particular, the Metropolitan Planning Council of Chicago (US) suggests the following definition:

> "Placemaking is both an overarching idea and a hands-on tool for improving a neighbourhood, city or region. It has the potential to be one of the most transformative ideas of this century."
>
> (PPS and MPC, 2008)

Firstly, the attempt to modify or create a public space should be carefully thought and planned, with regard to the different components of the population that *de facto* are expected to attend the place and its surroundings.

Hence, a deep analysis of the cultural values that the local community shares would be recommended, e.g. through surveys and direct participation in workshops. Observe that the mentioned premises have to be considered necessary in order to create a shared and pleasant place instead of the worst scenario: one more wasted place (PPS, 2012a).

Secondly, some of the consequences brought by the globalisation on these issues should be approached. According to Oriol Nel•lo (2012), the risk to design and create inadequate public places, not shaped on the local cultural values should be evaluated. In particular, the Catalan expert affirms that the advent of the globalisation detached landscape and placemaking

from community values, and that is why *territorial branding* should be introduced critically, analysing the local identities pattern.

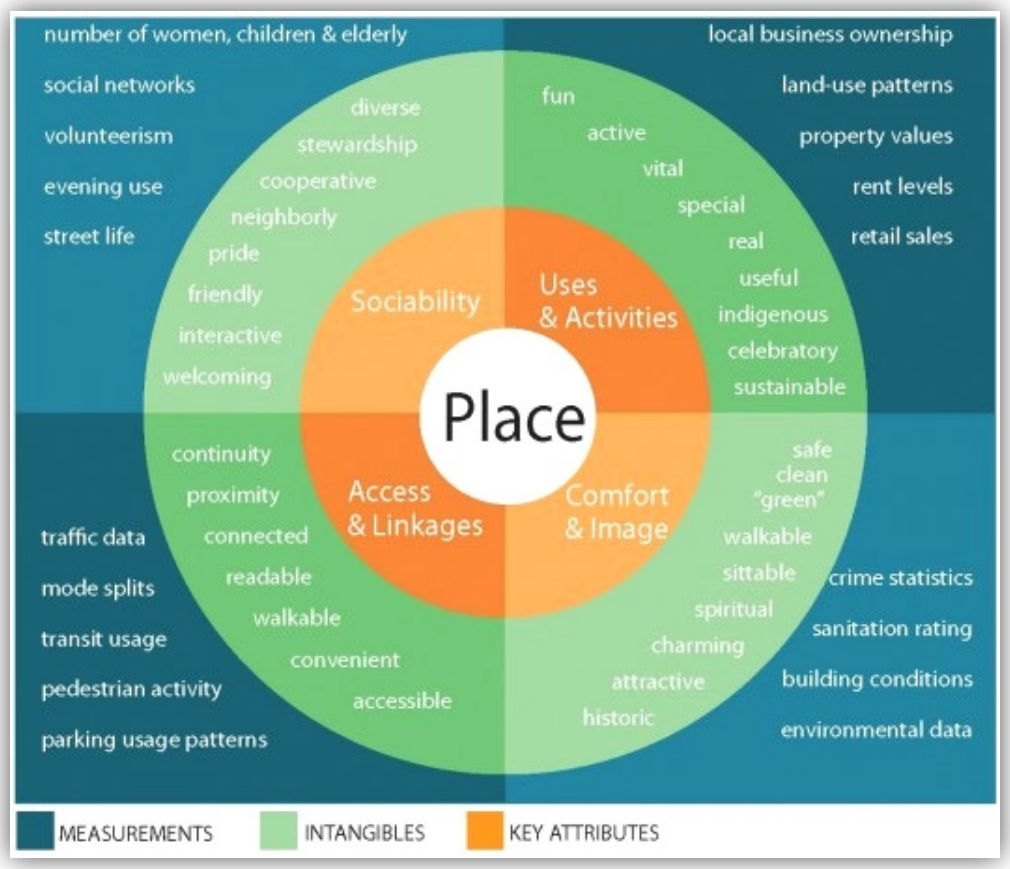


Fig. 1.2 – The Place Diagram designed by Project for Public Spaces (PPS, 2012b).

To summarise, it could be concluded that sociability has an important role in public placemaking and also in profiling a certain space as a real community place. However, to attain high degrees of success, sociability should be accompanied by other key attributes such as accessibility, activities management and image, as described in the "Place Diagram" (fig. 1.2). Indeed, the diagram represents an interesting tool that could be used to improve the design of public spaces and highlight the necessary intangible characteristics (linked to their relative measurable indicators) that may contribute to the final success.

Nevertheless, the reverberations of the globalisation and the evolution of the transport systems may influence contemporary places under other points of view. The borderless industrialisation and the subsequent proliferation of its infrastructures led to the appearance of spaces with similar features regardless of the local place in any country around the world.

In addiction, these structures or places can be either open areas or indoor spaces of any dimension, built after similar construction techniques, with the same final function and, for these reasons, with an embedded lack of local context connotation. Arguably, this a-territoriality may alienate and make visitors believe to find themselves anywhere in the world, possibly leaving a certain sense of temporariness and disengaging the space perception from the actual location. Typical examples of these spaces are highways, underground stations, supermarkets and larger commercial infrastructures, parking garages and so on.

Moreover, the mentioned questions are developed into a theory that describes the meaning within the places. Augé (1995), a pioneering urban anthropologist, recognises some characteristics as coming from the globalisation and underlines a contrast between what he defines “places” and “non-places”.

According to Augé, a non-place is:

“a space which can not be defined as relational, or historical, or concerned with identity”…

…so that it is incapable to establish relationships with the local communities. On the contrary, Augé intends the place as a peculiar location, which relates with identity and whose characteristics allow visitors to exchange experience with it.

Afterwards, this is arguably the sense in which the influence of modernity should be considered in placemaking, avoiding the standardisation of the public space, and mitigating it as much as possible through shared visions and high locally-related features.

1.6 From Linear to Circular

One of the first hints of environmental sustainability in modern time can be found in the 19th century, following the abstraction “The Spaceship Earth” that through a similitude compares planet Earth to a spacecraft travelling in the universe. The role of the spaceship crew, the human race, is to live on-board in peace and harmony and steer the spaceship towards the common good, using the available but limited resources in a responsible way.

The concept has been later reconsidered and amplified by K. Boulding in the 20th century (more precisely in 1966). The author underlines the

necessity to go beyond the so-called linear economy, and aim at closed-loop life cycles, wishing the mankind to integrate itself with the natural environment (Boulding et al., 1970).

On the one hand, a linear (or open-cycle) economy is intended as a process that takes pristine resources, exploits them to perform services or deliver goods and eventually disposes its waste into landfills. On the other hand, a closed-loop production model, or "circular economy", considers recycling, and has a form of feedback-input of former cycle's waste as a new resource in the production process (fig. 1.3).

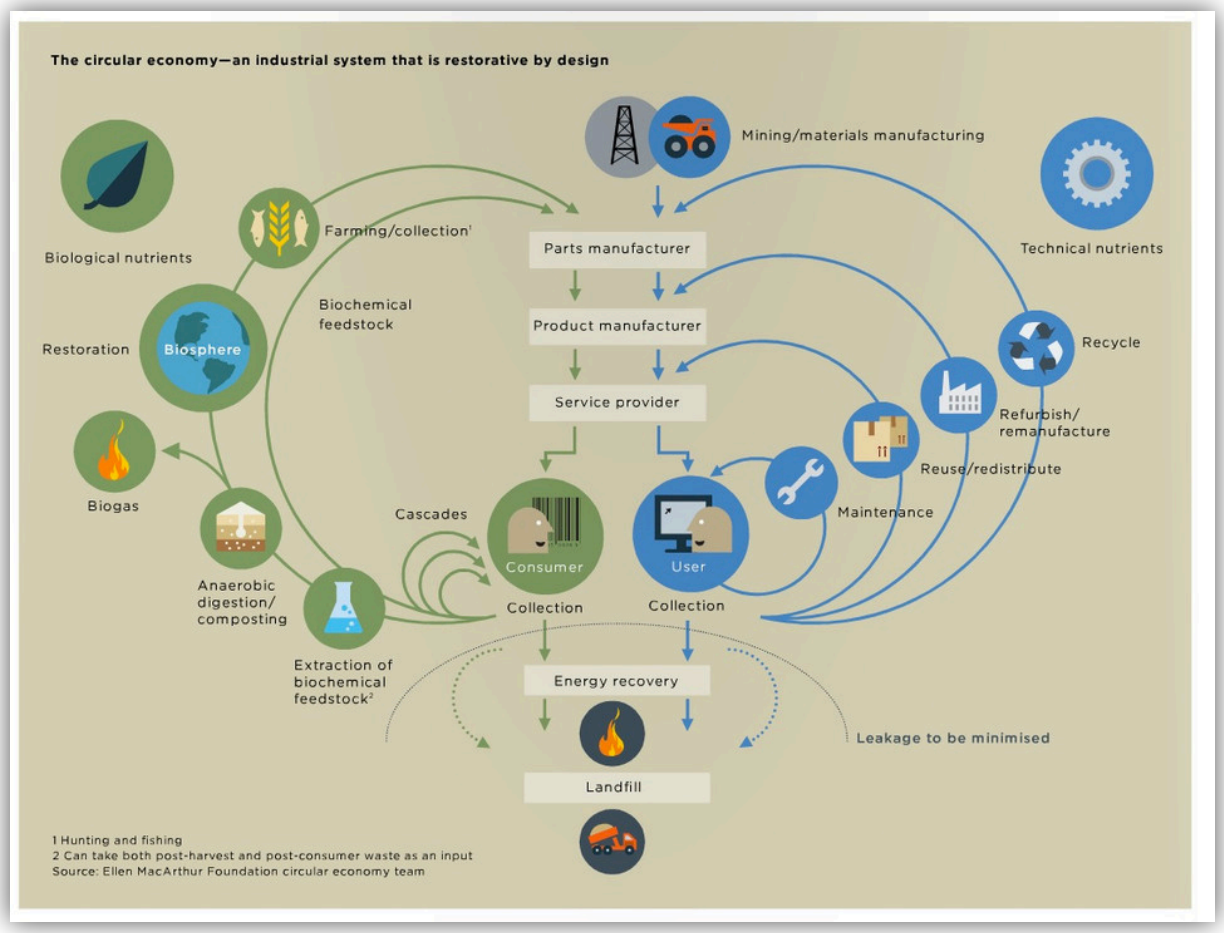


Fig. 1.3 – The Circular Economy (EMF et al., 2012).

Indeed, the theory of this model seems to resemble the natural and cyclical living of the Earth itself, and the prescription for humans to live accordingly to that in order to reach long-term prosperity.

The circular economy would hypothetically operate by following three structural visions or axes for action:

1. **Design-out waste:** aim to design products that can be completely disassembled and reused, thereby gradually extinguishing waste production and disposal.
2. **Consumable and durable:** products in the circular economy are designed considering the origins of their component materials, and separated processes are individuated for consumable products ("biological nutrients") that can be returned to the biosphere and for durable materials ("technical nutrients") such as plastics and minerals, which are meant to be reused.
3. **Renewable energy:** for an augmented resilience against scarcity of fuels and reduced dependence from natural resources, all the processes are powered by renewable forms of energy.

(EMF et al., 2012).

Although this vision of no-waste system may resemble Lynch paradoxical "cacotopias", several business companies have already started to apply circular economy principles into their current production system. Depending on the effectiveness and extent of the results, the circular economy could arguably represent a crucial contribution in the effort to reduce the level of dependency from non-renewable materials.

Notwithstanding the need to progressively minimise leakages, a long-term target for these models would allegedly be to restore a global ecological footprint of just one planet Earth (versus the circa two planets used today).

Besides, considering these theories from the point of view of land consumption, favourable outcomes for the urban spaces could possibly come out of the construction and demolition sector (C&D). If a circular system would be implemented, the waste derived from building demolition would have an augmented economic value and represent an input source for C&D or other activities. Therefore, residual materials and abandoned constructions may represent a new resource in the production process, favouring the demolition and recovery of derelict or abandoned spaces. Afterwards, if correctly regulated, it would probably give added values to brownfields in the competition with greenfields as target for the urbanisation, therefore tackling land consumption and urban sprawl.

1.7 The Growth Reviewed

In the previous paragraphs, the discussions regarding the social aspects that concern the modification of the urban space and its wastes, have apparently underlined a certain inextricability of social, political and economic systems.

As it was pointed out talking about the Spaceship Earth concept, the debate on which economic system should be preferred is rooted in the 19th century, when alternative thinkers expressed their critics and formulated different considerations about the expected infinite economic growth. In fact, intellectuals such as Malthus and Ricardo were just the pioneers of those critical thinking that had reflections all the way until the 21st century (Padalkina, 2012), and passed by milestones such as the 1972's "Limits to Growth". The latter was published just in the period of the first oil crisis, the 1968's social revolts and the global rising of the environmental movements, which had the concept of the finiteness of resources in common.

The book, financed by the Club of Rome, contains a provisional long-term study, the first in its genre, that analyses the world's economic, environmental and demographic prospects in a finite resources scenario by means of a computerised assessment model (Meadows et al., 1972).

In addition, Limits to Growth expressed the opportunity to maintain economic growth together with environmental sustainability and affirmed that the society should abandon the physical expansion in favour of a qualitative development, avoiding a zero-growth horizon, though.

Later, other intellectuals developed more radical positions. For example, additionally magnified by the 2008 financial crisis, the degrowth movement emerged and gained a certain public attention, particularly through the publications of Serge Latouche (Padalkina, 2012).

Despite the fact that it could not be wholly considered an economic theory, the degrowth concept reached popularity via Latouche political suggestions for the "8 R's" degrowth principles:

1. Re-evaluation of human goals
2. Reconceptualisation of wealth, poverty, value, scarcity and abundance
3. Restructure of the production and social relations
4. Redistribution of wealth and access to natural resources
5. Re-localisation of savings, financing, production and consumption

6. Reduction of production and consumption, especially for goods and services with little use value but high environmental impact
7. Re-use products
8. Recycle waste.

In addition, it must be said that the author himself considers a utopia the development of a "community-based society" in the present situation (Latouche, 2009), because of the current economic system. Next, it should be noticed a fundamental difference between the degrowth movement principles and The Club of Rome publication "Limits to Growth". In fact, the degrowth concept argues that an eco-capitalism that would contemplate both growth and sustainable development is utopic because the economic corporation that dominates the world's economy would never agree on regulations that would reduce the human ecological footprint (Latouche, 2006). Nevertheless, the degrowth has been defined in 2008 by several environmental economists as:

"A voluntary transition towards a just, participatory, and ecologically sustainable society" [that would] "meet basic human needs and ensure a high quality of life, while reducing the ecological impact of the global economy to a sustainable level, equitably distributed between nations".

First Conference on Economic De-growth, Paris (Schneider and Flipo, 2008)

It could be observed how this definition reminds the one given for sustainable development in the Brundtland Report, with specific reference to the satisfaction of human needs. However, it does not give any practical indication about the methods that would lead to achieve the mentioned goals (Padalkina, 2012). The next paragraph is intended to deepen this confrontation between contrasting global theories at the scale of the city and its urban spaces.

1.8 Shrinking City vs. Smart City?

1.8.1 Towards Urban Resilience and Sustainability

Arguably, the contraposition of economic growth and degrowth ideas, characterised or not by sustainability principles, have their reflections in urban dynamics, strategies adopted and *vice versa*. In fact, the downsizing of a production site or a commercial building, rather than a residential

neighbourhood facing a *hollowing out*, could be the final results of either a planned degrowing economy or an unwanted economic crisis.

On the other hand, a growing economy (especially a fast growing one) is allegedly considered to generate expansion of the abovementioned urban spaces (e.g. in most of China's larger cities). However, it should be noticed that shrinkages in urban areas could occur for reasons not directly related to economic crisis, such as migration and demography changes. In these terms, Germany has experienced a strong hollowing out in the former DDR cities during the years that followed the reunification, both because of migration and reduction in the birth rates (Pallagst, 2010).

In the current planning debate, it is still not clear what *city shrinkage* does really mean, and especially how should urban planning cope with it (Blanco et al., 2009). However, as explicatory concept, the Shrinking City could be intended as a densely urban area that has undergone a significant population loss, together with a transformation in the economy that possibly have structural reasons (Pallagst, 2008).

Besides, it should be brought to attention that the adjective "smart", which today is particularly popular in the media, accompanies various terms in a multitude of sciences and applications, to the extent that it may be necessary to specify the sense that holds in the urban context. If it were true that "smart growth" is a kind of development acting in compliance with the principles of sustainability, it may also be possible to consider the Smart City as that urban area modelled in compliance with the same principles. Indeed, if that would be broadly accepted, then those popular and diffuse association of the adjective "smart" with the mere high technology plants (to be dedicated to the urban environment management) would be just one of the several and subordinate meanings that constitute the wider actual concept. Consequently, a Smart City may be described as an entity where inhabitants, business sector and politics participate together in the development of six underlying desired features detailed in the synoptic tab. 1.1.

This six-axes-based concept is connected with traditional regional theories of urban growth and represents an interesting background for theoretical frameworks where the Smart City goes well beyond the mere ICT concept (Caragliu et al., 2009). It is therefore arguable that a certain city may have the necessity to reach significant results in all of the abovementioned six features to be properly considered smart.

Moreover, when it comes to the urban dimension, notwithstanding theories that put in contrast shrinking and smart growing economy, it is possible to observe a smart growing city and a Shrinking City cohabiting in the same economic region. Examples can be found in the US where, due to a growth in the population, because of immigration, some redevelopment projects in shrinking areas and growth oriented planning processes are carried out at the same time (Pallagst, 2008).

Axis	Characteristics	Main Factors (selection of)
Smart Economy	*Competitiveness*	*Ability to transform* *Innovation* *Productivity*
Smart People	*Social and Human Capital*	*Level of education* *Life Long Learning* *Social and ethnic plurality* *Creativity* *Open-mindedness* *Social participation*
Smart Governance	*Participation*	*…in decision-making* *Transparency* *Public and social services* *Shared strategies and visions*
Smart Mobility	*Transport and ICT*	*Accessibility* *ICT infrastructures* *Sustainable transport systems*
Smart Environment	*Natural resources*	*Sustainable resource management* *Environmental protection* *Pollution contrast* *Nature's attractivity*
Smart Living	*Quality of life*	*Education and culture* *Health and safety* *Housing quality*

Tab. 1.1 – Structure and features of a Smart City (Giffinger and Pichler-Milanović, 2007).

As these situations occur in times of contrasting dynamics, a favourable option for cities could simply be to choose neither a smart growth nor a shrinking oriented planning, but stay flexible and develop adaptability to changes (Wiechmann, 2008), in other words, resilience.

1.8.2 Decoupling and Dematerialisation of the Economy

It could be questioned how a Smart City might be actually planned and managed to achieve one of its final purposes: save resources. Theoretically, this could be possible by the application of sustainability principles and the aid of the latest available technologies. On the contrary, a system that applies smart growth concepts may lead to an overall increase in resources consumption, therefore presenting a possible paradox about its approach towards natural resources (a system featured by a growth as smart as possible, but by growth though).

A solution, suggested by several actors such as the United Nations Industrial Development Organisation (UNIDO) and UNEP, may come from the "decoupling", otherwise the interruption of the direct correlation between economic growth and resources consumption growth (Dittrich et al., 2012). Moreover, decoupling represents a tool to realise the so-called "dematerialisation" of the economy, a progressive modification of consumption patterns and economic systems: the increase of services and the decrease of goods and physical commodities (Cogoy, 2004).

Moreover, at least in the European countries and partly in the US, the whole system is apparently moving forward to a post-production phase, shifting from a goods-based economy towards a services economy, which would be more centred on intangibles (Pine and Gilmore, 1998).

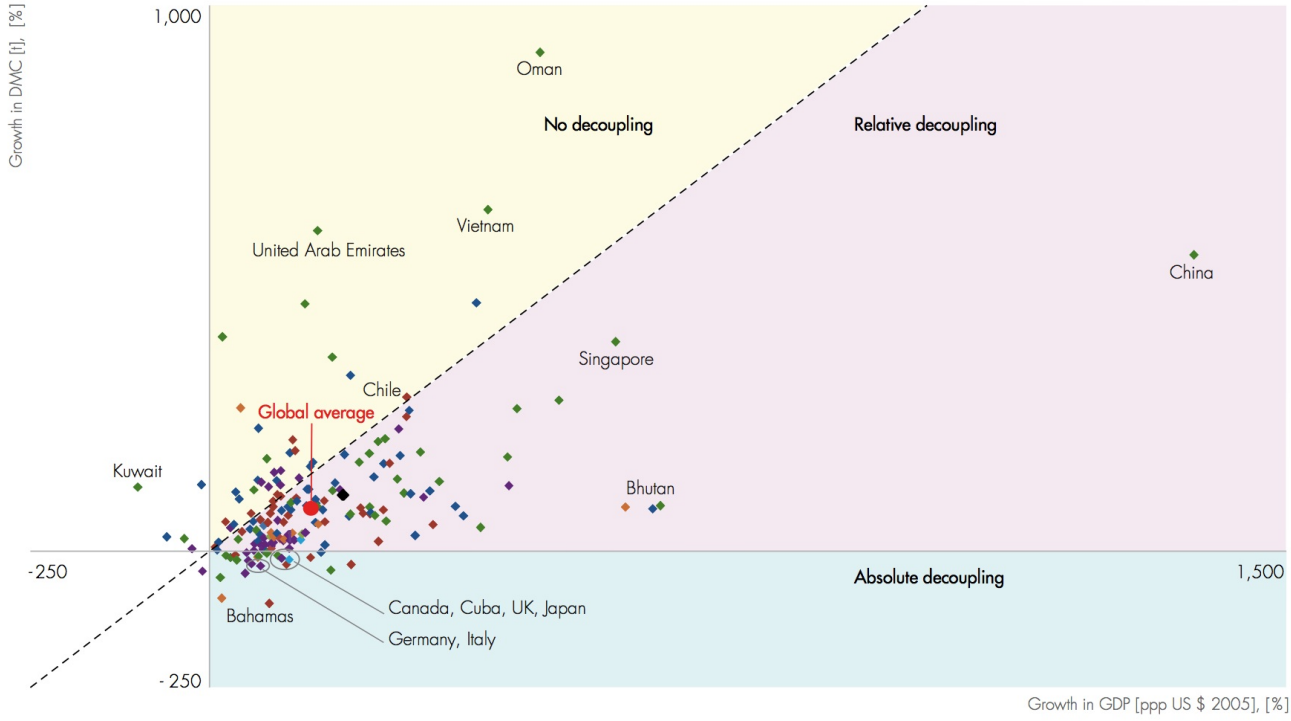


Fig. 1.4 – World trends in GDP and DMC growth 1980-2008 (Dittrich et al., 2012).

Hence, the repair and maintenance services on goods may be expected to acquire increasing importance in the dematerialising economy (Cogoy, 2004). Viewing land as a commodity then, it could be interesting to consider the parallel with rare raw materials increasing prices, and observe how the reuse and recovery of urban spaces is going to assume similar dynamics and importance.

Nevertheless, measuring the usage of resources via Domestic Material Consumption (DMC), it is possible to notice that, while the global DMC grows slower than global GDP (i.e. relative decoupling), some countries reached an absolute decoupling (fig. 1.4) with DMC diminishing in absolute terms (Dittrich et al., 2012). In particular, several authors strongly support the idea that only absolute decoupling will be able to decrease environmental impacts and lead to environmental sustainability even in the condition of a growing economy (Giljum et al., 2005, Cogoy, 2004).

In the spirit of this epoch-making change, the introduction of the Smart City model, its valorisation of intangibles and reduction of commodities, could be suggested by some as a top tool to attain sustainability and, in theory, tackle land consumption. However, it is arguable that a deeper analysis of these models and their impacts in the current globalised economy might be necessary to guarantee the effective contribute to Sustainable Urban Development.

1.8.3 Outsourcing and Externalisation of Impacts

Notwithstanding the good intentions of the Smart City model, its actual role in assisting dematerialisation, decoupling and therefore sustainability should be questioned. In fact, the discriminant appears to be where the positive effects of the model are going to be seen once established and what the Smart City misses to account in its flows.

Firstly, it should be considered that the world's total population and its dependency on non-renewable resources have been incessantly growing until today and are still estimated to grow in the future (Martinez-Fernandez et al., 2012). In particular, studies report that during the period 1980-2008 the global consumption of materials rose by 80%, comparably with its share of non-renewables (fossil fuels, metal ores, industrial and construction materials) that scored a +70%, giving no sign of a long-term trend inversion (SERI, 2012).

Secondly, notwithstanding a global registered enhancement of the efficiency in the use of materials, the decoupling of global GDP from total resource extraction remain "relative" (fig. 1.4), with the latter increasing in absolute terms, although at a lower rate (SERI, 2011).

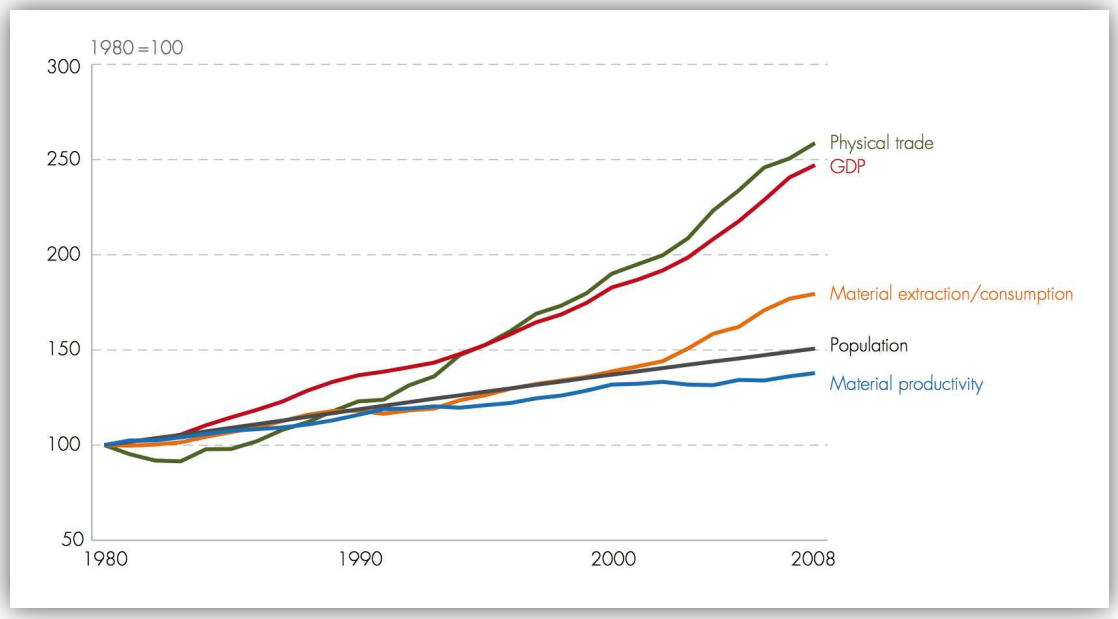


Fig. 1.4 – Indexed form of global trends in GDP, population and material use 1980-2008 (Dittrich et al., 2012).

Thirdly, analysing the resources extraction by world's region (fig. 1.5), it is possible to observe a easing importance of North America and Europe, and the transferral of their previous quotas to mainly Asia, which enlarged its share and presumably imported further regional environmental impacts too.

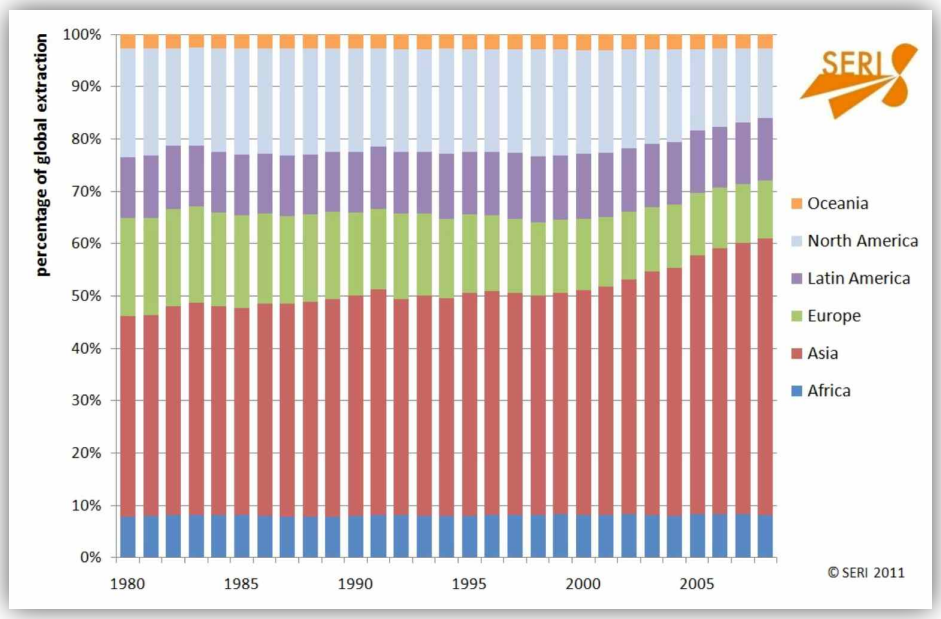


Fig. 1.5 – Shares of global resource extraction by world's region 1980-2008 (SERI, 2011).

In respect of the current situation, it might be important to deeper investigate the origins and destinations of the global material and energy flows that are going to guarantee the livelihood of the future Smart Cities, otherwise known as Material Flows Account (MFA). In fact, considering the consumption trends and their distribution, it might be possible to outline the uneven balance of the material trade among world's continents (fig. 1.6).

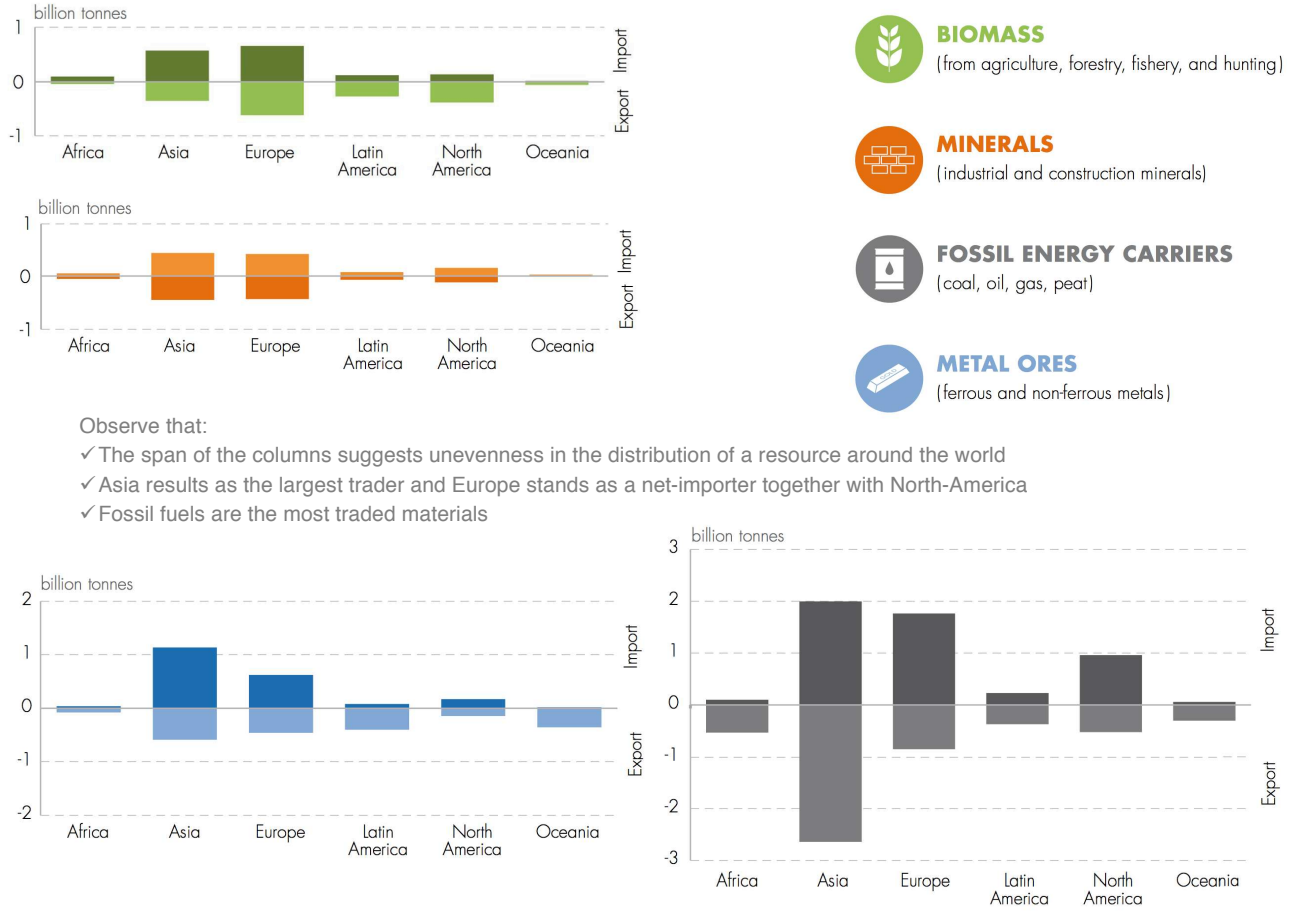


Fig. 1.6. – Material trade by types and world's region in 2008 (Dittrich et al., 2012).

In terms of technology levels, innovation and commitments for material productivity, it should be reminded how the developed countries (such as most of Europe's and OECD countries in general) are also home for the most significant Smart City initiatives and investments (Cohen, 2012, 2thinknow, 2011).

In parallel, the flows seem to suggest that exactly these developed countries have been led by globalisation towards an externalisation of some intensive productions and extraction of materials (outsourcing), with the following outcomes:

- ✓ Higher local material productivity
- ✓ Absolute decoupling in some countries (e.g. Canada, Germany, Italy, Japan, UK…)
- ✓ Export dependencies and resilience issues
- ✓ Increased production and material extraction abroad…and consequently…
- ✓ Externalisation of impacts (social and ecological conflicts).

(Dittrich et al., 2012)

Arguably, it is possible to notice additive costs and relative impacts overlooked in the accounting process. As the analysis indicates, the Domestic Material Consumption may not lead to a correct decoupling assessment, since it does not consider the materials embodied in trade.

On the other hand, the Total Material Consumption (TMC) is considered to be the most suitable indicator to comprehensively measure the consumption of materials (Giljum et al., 2005), because it would also consider the energy and materials spent abroad in order to produce the imported goods, that is the "ecological rucksack" of a product. Further specifics can be found in a methodological guide about MFA and indicators provided by EUROSTAT (2001). Arguably, it can be observed that the ways environmental impacts of goods and services are evaluated (e.g. with or without ecological rucksack accounting) are determinant to establish if countries rather than cities are on the right path towards sustainability.

1.8.4 Europe and Embodied Land

An interesting way to assess the impact of goods and services is to translate them into the amount of raw resources used or extracted to complete their production (water, energy, raw materials…). According to this point of view, each and every product or service exchanged in the economy has a so-called "embodied" or "virtual" cost that is directly connected to the original natural environment. In particular, if considering land as the raw resource and Europe as the area of study, it may be interesting to analyse the level reached in land outsourcing.

Moreover, it is possible to define the European "land footprint" as the total sum of agricultural land used for crops and animal breeding, needed to satisfy the European total products demand (Lutter et al., 2013).

Besides, the data gathered in the report "Hidden Impacts" about embodied impacts, and specifically on agricultural and non-agricultural land

import-export (fig. 1.7), showed some crucial conclusions in terms of global dynamics:

- ✓ Largest net importers of agricultural land: Japan, Germany and UK
- ✓ Largest net exporters: China, Brazil and Argentina
- ✓ Europe imports six times more embodied agricultural land than it exports
- ✓ 40% of Europe's land footprint outsourced around the world
- ✓ 1.2 M sq. km of agricultural land is needed outside Europe (equals Peru's surface)
- ✓ Europe also imports significant non-agricultural land
- ✓ Land footprint of the EU-27 would more than double if embodied impacts were included.

(Lutter et al., 2013)

[million hectares]	Oceania	Asia	North America	Latin America	Europe	Africa	Total
Crop products	1	12	7	14	92	11	137
Animal products	2	3	2	12	74	3	96
Wood products	0	0	0	0	0	0	1
Manufactured products	0	13	1	1	4	1	21
Construction	0	3	0	1	3	1	8
Service	1	11	4	8	35	5	64
Clothing	1	17	1	2	2	2	25
Total	6	59	15	38	211	23	352

Fig. 1.7 – Depiction of geographical location of land used to satisfy European consumption in 2007 (Lutter et al., 2013)

To sum up, Europe is not simply world's number one net importer, but the data suggest two core consequences of these facts:

a. Europeans' high living standard is partly based on resources from other continents, therefore increasing the risk for external dependency

b. Europe affects other regions, exporting social and ecological conflicts.

(SERI, 2012, Lutter et al., 2013)

In this paragraph it emerged that Europe is featured by a high land demand, partly outsourced. In parallel, the demand for new land has also its domestic reflection in the actual EU growth of land take for artificial uses,

which has been growing further than the EU population since the 1950's (Prokop, 2011), far from an absolute decoupling with the latter.

Nowadays, observing the land trends in and outside EU, it can be possible to outline a paradox, between some cities that shrinks, with urban land going in disuse, and other cities that grows, with further local and outsourced land consumption. Hence, the importance to recycle urban spaces in both shrinking and growing cities appears evident, as the described dynamics boost land footprint both in EU and worldwide.

1.9 Guidelines and Strategies for the Transition

In the current and uncertain debate between growth, smart growth and degrowth, as well for the discussion between Smart City and Shrinking City, the issues targeting actual sustainability appear to be sometimes confusing. In fact, in the meantime, the world environmental sustainability maintains a negative outlook at least until 2030 (OECD, 2008).

Nevertheless, independently from the favourite economic theories and political opinions, a certain question about the Earth is that natural resources are not limitless, therefore governments could probably start introducing this vision in their planning: a structural reduction in the use of resources.

Based on the analysis developed so far, tab. 1.2 sums up feasible strategies that may lead to the unavoidable target of lessening pressures on land and other finite resources. Arguably, since investments and results expected from these strategies are strictly interrelated, national governments ought to be committed on all fronts of the development: economic, social and environmental.

1.10 Chapter's Conclusions

Social sciences have been inescapably relevant to urban studies, and this multidisciplinary excursus aimed to suggest how vast their implications in urban planning may be. Only formally detached from mere land planning, social issues have been a factor in attributing different roles and values to the space throughout times. In some world's regions, the concept of space is nowadays subjected to further modifications, particularly after sustainable development and environmental principles rose onto the global scene at the end of the 20th century.

1. Absolute decoupling and dematerialisation

- Although some authors might consider absolute decoupling on its way in some countries, it is arguable that further efforts should be done at a larger level. In fact, data present a dematerialisation of the economy quite uneven in its spread, seeming to represent a reality only for high-income and developed countries. Indeed, it could be arguable that absolute decoupling is not going to stand sustainable development unless it is going to be widely reached at global level.
- In particular for what it may concern land management, the absolute decoupling of GDP from resource extraction seems to possibly resemble the necessity to achieve absolute decoupling also between population and land take for artificial uses.

2. Hidden impacts and new assessments for trades and consumptions

- More detailed information on the use of resources and material flows analysis should be included in sustainability assessments and ecological footprints (namely water footprint, carbon footprint, land footprint…).
- In addition, the hidden impacts related with outsourcing ought to be included in the evaluations as well, gathering more data and developing adequate indicators. Otherwise the risk is to simply move the problems from the urban to the rural environments (or better, from a country to another one), with the urban areas living on the shoulders of the rural ones, until the resources are going to reach critical levels.

3. Efficiency, technology and smart cities

- Technology may have the role to multiply the efficiency of all the machines used for the production of goods and the satisfaction of services. Notwithstanding the application of smart solutions to increase energy efficiency, it might possibly be necessary to progressively reduce the non-renewable share of energy consumption per-capita in absolute terms, as that has a direct weight on Earth's resources.

4. Consumption patterns, consume less and local

- It is largely suggested that an actual dematerialisation of the economy could be largely favoured by significant changes in the average life styles, such as consumers' behaviours in term of consumptions. Consume less might be considered a must, but it may not suffice if the weight of embodied resources into imported products and services are high and unbalanced at global level. For these reasons it could be necessary to promote local consumptions, also as a way to promote self-sufficiency and therefore resilience.

5. Rethink the production system

- It could be suggested to redesign as deeply as possible the production system, trying to exploit recycle, symbiosis between the different elements of the production chain and start the transition from the linear to the circular economy.

  The redesign might be asked to reprogram and prolong goods' obsolescence, produce with less energy, favour recyclable materials as new resources and redesign products with less quantities of materials, especially non-recyclable ones.

6. Education and public opinion

- Initiative to support behavioural changes are also some of the most urgent measures that policy makers are requested to adopt (Barr et al., 2011). Therefore, the strategy to raise awareness in the public opinion and promote good consumer behaviours should be utterly followed, also exploiting the fact that the richest and largest consumers in the world belong to democratic countries, where there is freedom of speech and, in theory, the general public should steer. Effective campaigns and school education ought to be widely supported by politics with ad hoc investments and acts for the increase of environmental ethics.

7. Politics, local and global agreements

- Despite some relative results from the international conferences on environment until today, it might be an important strategy to keep on insisting in international diplomacy to reach agreements among the largest number of countries that is possible.
- Politicians may possibly favour long-term and wide spread commitments on a global scale but, if no agreement is reached, it could be possible to operate at minor levels, regionally or even locally.

8. Planning policies and tools

- In the debate between shrinking economies and smart growing economies, or between smart cities and shrinking cities, it is increasingly hard to find a common model to apply independently from the local context. Arguably, the least developed countries may have a certain right to lift their condition up to a decent level of quality of life, see their livelihood and safety guaranteed, and thereby economically grow and consume in a sustainable way, though.
- The result is that economic and planning models ought to be tailored at the local level, with educated planners and politicians that should never forget to consider and assess the impacts of their initiatives also globally.
- The main guideline or general indication that could be considered and shared for the development of all the future cities is to stay resilient, have tools to act in time and be as flexible as possible.

Tab. 1.2 – Possible Strategies to lessen pressures on land and other finite resources.

Nevertheless, owing to its property implications, the space is strictly related to the political systems, whose different characteristics (e.g. the role of law) may affect the way that the space is managed. Moreover, the mutually influential spheres of politics, economy and society have an impact over the environment, and open many questions about the most favourable economic and urban models to adopt (*inter alia* the Smart City model).

Above all, controversies may rise about the possible ways to combine successful environmental sustainability and smart economic growth. In particular, urban and peri-urban spaces may often be used and disposed just as common consumption goods in the traditional economic systems, with little regard of their scarcity and possible alternative uses.

The analysis of scarcity and limitedness of the natural resources brought various studies to urge a rethinking of the GDP logics, and to exhort a dematerialisation of the economy via a decoupling between GDP and resource extraction. Furthermore, such a result may probably help the decoupling between population growth and land consumption too. Afterwards, these issues may actually concern the crucial role that cities play locally, whether smart growing, non-smart growing or shrinking economies will involve them.

For the exposed reasons, the larger framework for change may include a vast political commitment for sustainability and a radical rethinking of the production system towards circular logics and intangibles, as well as a strong advocacy for behavioural modifications by citizens when it comes to the purchase of goods and the consumption of non-renewable resources.

However, in order to attain actual sustainability, it is arguable that a very special attention should be put onto overlooked environmental impacts embodied in the externalised flows of resources. In particular, better calculation of the global impacts needed to guarantee the urban livelihoods may help to understand the real opportunities for sustainable development and enhanced resilience that the Smart City model might offer.

Indeed, as the data analysis underlines a role of net-importer for Europe, it emerges a certain risk to overlook the real global impact related to its outsourcing, for instance in terms of embodied agricultural and non-agricultural land. Hence, structural schemes for the reduction, reuse and recycling of local urban spaces may become part of the solution to stand for global sustainability and increase local resilience.

For these reasons, this paper will broadly discuss solutions for a pivotal role of forgotten, interstitial, abandoned, derelict, temporarily unused and bad-designed spaces in everyday strategic spatial planning, aiming to improve the average approach of urban land management.

The next chapter is going to analyse the abovementioned urban spaces, suggest a possible definition, illustrate their properties and introduce the first operative tools.

2. Define, Identify and Organise

Defining *R-Spaces* (RSs), illustrating essential characteristics, proposing a classification and a method to collect the spatial information, the RSs Knowledge Framework.

2.1 A Myriad of Unsustainable Urban Spaces

The path of this thesis started from a sustainability investigation concerning urban environments, deepening the relationships between economic-productive system and urban growth, and observing the outcomes on the city space. This broad and multidisciplinary analysis underlined a vast and variegated group of spaces, that past and current urbanisation can be accounted for.

It is a huge panorama of diversity that can be only partially represented reporting the myriad of adjectives defining the space and its characteristics. Some of them are recurrent in literature and describe peculiar conditions or critical problems within the urban fabric. Some of the most popular are:

Junkspace	Poorly/bad-planned	Marginal
Terrain Vague	Poorly/bad-maintained	Derelict
Dross/Drosscape	Misused	Damaged
Leftovers	Disconnected	Overlooked
Residual	Discarded	Disregarded
Interstitial	Abandoned	Forgotten
Liminal	Uncultivated	Incomplete
Unused	Neglected	Loose
In-between	Vacant	Contaminated
Waste of space	Empty	Not Entangled
Wasted spaces	Voids	SLOAPs
Poorly/bad-designed	Fragmented	Uninteresting

Although the very starting point of this research was to investigate only residual, interstitial and liminal spaces, it appears quite clear at this point that the issues regarding the latters is the same of the larger group collected here above.

Arguably, all these spaces have some dynamics in common and are identifiable under the same umbrella of a cross-sectioning concept of urban misuse and unsustainability. This long list of different urban spaces may appear complex and disconnected at first, so this paper intends to give a

potential interpretation pointing out five main themes that would group them, through specific characteristics or qualities.

1st Theme: **Topology**
Variables: Position, Role, Interconnection, Centrality and Accessibility
Definition: Spaces complementary or secondary to others, trimmed off, in-between or borderline to other well defined and recognised functions.
Fragmented – Disconnected – Marginal - In-between - Liminal - Interstitial – Loose

2nd Theme: **Temporality**
Variables: Level of use and condition in the urbanisation process
Definition: Spaces that left (or never entered) the productive cycle of urban and/or industrial development
Abandoned – Uncultivated – Vacant – Empty – Voids – Unused – Leftovers - Residual

3rd Theme: **Function, Value and Perception**
Variables: Presence of an established function/use, value, visibility
Definition: Non-interesting spaces, simply ignored by the urban development process
Not Entangled – Disregarded – Uninteresting – Overlooked – Forgotten – Neglected - Discarded

4th Theme: **Design and Adequacy**
Variable: Urban Quality and Functionality, Over/Undersizing, Adequacy to local needs
Definition: spaces with established and assigned function, but not in line with liveability and urban quality criteria.
Poorly/bad-designed, Poorly/bad-planned, SLOAPs, Incomplete, Wasteful, Misused

5th Theme: **Pollution, Safety, Usability, Dereliction**
Variables: Contamination level, Maintenance level, Wear level
Definition: Spaces inaccessible because of high level of pollution, structural or poor level of conservation and needing professional remediation/intervention.
Contaminated – Derelict – Damaged - Poorly/bad maintained

It is possible to identify some key questions about these spaces. First, the high level of complexity, given by the fact that each urban environment is almost unique, spaces tend to vary the one from the other and it is hard to identify standards. Second, these spaces are not univocal and can actually have more than one characteristic, for instance being marginal but also derelict and overlooked at the same time, depending on the point of view they are analysed with. This fact would feature spaces with more than one of the mentioned adjectives and virtually fold them in multiple categories at the same time. It can be further reported the existence of cross-sectional concepts such as Drosscape (Berger), Junkspace (Koolhaas) and Terrain Vague (De Morales) that have been given to partly cover multiple themes such as dereliction, waste and abandonment.

2.2 The Choice of the Adequate Planning Tool

Considered these urban spaces altogether, their dynamics and their differences, this paper seems to underline a certain controversy in trying to build a classic, indicator-based, systematic, top-down Planning Support System (PSS) as a univocal and only tool to steer planning decisions.

Even if based on relevant indicators and good practices, statistical and computational enclosed models may run the risk to overlook core matters such as local needs, community values and other non-easily quantifiable entities. On the other hand, these models have been more proficiently used when applied to a specific range of issues and more homogeneous spaces, such as for urban greening or brownfield remediation.

Hence, this thesis is not going to consider quantitative design supportive tool as an answer for the decision-making about the mentioned urban spaces. It would not only be extremely ambitious for the scope of this document, but probably also controversial in general when considered that urban practice is steering towards a more community-focused, human-based, participatory and transparent way of planning.

Thus, it is possible to give another kind of solution: a framework. This paper purpose is basically a new paradigm for urban planning that is henceforth described along its processes, plans and actors involved. It is basically a networking and participatory model of strategic planning, applied upon the targeted spaces (or analogue groups of them), intending to suggest fitting uses and functions, with short to medium-term horizon. One of the aims

is to operate on a wide and diverse panorama of situations, on a deeply variable scale and coping with the quick evolution of urban systems.

It could be interpreted as a 2.0 urban planning, lighter, less formal and secondary to the official one (and surely not a substitute), participatory, but also based on Sustainability principles, capable to involve local communities as well as innovators.

Before generating such a framework, it is necessary to go through an analysis process of the target spaces that shall be functional to it and help to keep it structured and compliant. Therefore, three steps are now mandatory:

1. Identify and give a **definition** of the targeted urban spaces
2. **Characterise** them and collect data upon them
3. Chose and explain a principle for their **classification**

2.3 Definition

In order to obtain an organic definition of these highly variegated and troubled urban spaces, it should be observed a cross characteristic: the poor level of urban functionality and social, environmental and economic sustainability. As a consequence, they clearly have a potential that could (and should) be made available to the city.

Considering the environmental concept of the “R’s” (Re-evaluate, Re-conceptualize, Restructure, Redistribute, Re-localize, Reduce, Re-use, Recycle), and playing around the English pronunciation, it might be possible to state that: “Despite everything, they R (*are*) Spaces!”. So, beside this humorous way-to-say, this dissertation defines “R-Spaces” (RSs) as:

Fragments of urban territory with poor or no level of functionality, which do not contribute to increase the level of environmental, economic and social sustainability, but have a significant development potential that can be put into use for the society and the surrounding environment.

As an example, fig. 2.1 report a limited portfolio of representative RSs, while further characterisation is developed in the subsequent paragraphs.

Observing the mentioned examples, it could be possible to observe how the processes that generate RSs involve almost all the macro-systems of the society. This could be predictable because, as Lefebvre would probably consider (par. 1.3.1), it is possible to say something about social aspects of a community via the observation of its spaces and *vice versa*.

Fig 2.2 – Examples of R-Spaces.

1. Abandoned or uncultivated urban green spaces
2. Brownfields and former industrial lots (contaminated or not)
3. Former military areas or transport infrastructures
4. Vacant buildings
5. Linear spaces along linear infrastructures
6. Spaces left over by planning (SLOAPs)
7. Oversized and superfluous areas (e.g. parking lots)
8. Oversized roads and in-between spaces
9. Areas and driveways unnecessarily paved
10. Neglected pavements and poor street design

In addiction, it is auspiciously intended by this paper that a definition based on Sustainability may help decision-makers to think more circularly and consequentially about urban patterns, individuating more synergies in the development process of the city.

To conclude, the R-Space definition should be used as a large umbrella of spaces, highlighting the condition they can fall or have fallen into, but not excluding spaces because of their diverse origin or different potential for redevelopment.

2.4 Characterisation

Once the definition is given, it is arguably important to gather as much information as possible to depict R-Spaces. The characteristics that need to systematically observed and collected are:

- ✓ **How** – Physical characteristics, extension, soil sealing condition and land cover, shape, flatness, fragmentation, full/void relation, urban fabric
- ✓ **Where** – Location, networking potential, urban role (centrality and proximities)
- ✓ **Local Environment and human perception** – Natural features, environmental conditions, local urban landscape and aesthetics, architectural pattern and building
- ✓ **Users and Uses** - Ownership, population density, formal and actual land uses, temporary and permanent activities, economic climate and pressure, diversity
- ✓ **Infrastructures and services** - Utilities, plants, transport and mobility, services
- ✓ **Unique qualities** (urban, natural, cultural, social, archaeological or possible landmarks).

The next lines report examples and considerations, deepening some of the mentioned and observable characteristics of R-Spaces.

2.4.1 How

The R-Spaces have a vast panorama of shapes and dimensions as well as a large collection of possible urban elements that is possible to find located there. Indeed, they can present a gradually variable level of occupancy from the unbuilt case (e.g. an abandoned open ground with vegetation, an empty area or some adjacencies to a brownfields) to the fully built space (e.g. an abandoned mill in a compact urban pattern).

Hence, R-Spaces may present a wide range in architectural quality and conservation state of the built environment. This might be central because in order to be recycled soil sealed areas cannot easily host unpaved green functions, and contaminated areas clearly require remediation. In fact, a decisive factor for certain environmental functions (par. 3.4.1) is the unpaved condition and the presence of the original topsoil (typically contaminated in brownfields), which provides the most of the ecosystem services, but has a significant replacement cost (European Commission, 2012). Therefore, it is possible to suppose that these considerations shall drive the evaluation process of the fitting function and how the R-Spaces are going to look like.

In addition, it may occur that service plants and other infrastructures limit the extension and functionality of R-Spaces by cutting through or partly occupy them both at ground and underground level (electric ducts, street cabinets, water and natural gas ducts, the sewer system). The sense of this is that coordination and cooperation over projects among public authorities and contractors may play a role to obtain better design, functionality and recover of the urban spaces.

For example, a refurbished underground cable duct system can lead to win-win solutions, because it may implies a drastic decrease in maintenance costs for municipalities (Ruijs, 2012). In particular, it might be possible to designate R-Spaces for prevalent green functions, reorganise grey infrastructure for reduced spatial impact or even concentrate them in area designated for prevalent grey functions.

2.4.2 Where

The normal observation of the contemporary urban environments may suggest that there is no typical location for the creation of wasted spaces. It might be possible to find RSs even in the compact patterns of city centres that have been consolidated for centuries: an unused or damaged historical building, a bankrupt company that occupied a central skyscraper, an abandoned warehouse, an obsolete harbour structure, or a small neglected garden.

Fig. 2.2 - R-Space by poor design (SLOAPs) in the historical centre of Bologna, informal (and forbidden) use.

Besides, according to classical theories, the economic value of land is inversely related with its distance from the city centre, lessening while approaching the outer boundaries (von Thünen, 1966, Lösch, 1954). A natural consequence of this reasoning would be to encounter higher pressures for redevelopments and sporadic presence of R-Spaces in the city centres.

However, in nowadays diversely polarised cities, the economic value could not be the only variable that determines the probability to find R-Spaces, also because its spatial distribution may not have follow linear trend. Further, the economic value of land might not be the one and only

determinant to impede or favour the waste of space: its exploitability (e.g. for housing) is also a factor, and consequently it is the space size. Probably this is the reason why smaller spaces end up poorly designed or ignored even in central locations (fig. 2.2).

Hence, exceptions to the classic rules are day-by-day realities, both for the presence of R-Spaces in the middle of the cities as for high development interests located away from their hearts, for example on the fringes.

Further, as briefly cited, a wide set of RSs are associated with transport infrastructures in general and may be founded in their proximities. Typical locations are the buffer zones of roads, railways and highways, in-between spaces of a roundabout, empty spaces under the bridges, or rather marginal areas of train stations, airports, harbours and highway intersections (e.g. a cloverleaf type).

In addition, further examples may abound in the infrastructures related with the non-places (par. 1.5), i.e. outlet villages, shopping malls and industrial sites among others. These sites are often related to R-Spaces that can have one main spatial dimension, e.g. longer than larger or deeper, rectangular, oblong or longish, and they are sometimes called “liminal”. Not only pertaining to linear structures, the adjective is used when the R-Space represent a transition area between two different entities (or uses) and where the space assume the shape of a threshold (e.g. urban-rural border on the fringes, public areas-private areas boundaries, and so on).

2.4.3 Local Environment and Urban Perception

The positive influence of the “green and blue areas” and the importance of the ESSs for human health and psychology has already been analysed in several studies (Tzoulas et al., 2007), and it is thereby possible to underline the importance of the perception of space and its aesthetic factors.

However, even though it might be natural to theorise “the greener, the best”-concept as the most diffuse feeling in the community, a certain degree of appreciation towards derelict or former industrial sites is gaining popularity, discovering new aesthetic parameters (Kamvasinou, 2011). Afterwards, the following question might be to attribute utility and functionality also to the derelict, misused and inaccessible grey spaces.

2.4.4 Users, Activities and Roles

A diverse panorama of members from various communities might be expected to attend RSs, depending on the context where the space is located (industrial, residential, brownfield areas, uncultivated green spaces...) and its accessibility (secluded or densely vegetated, contaminated or not, fenced or open, plain or rough, built, paved or natural).

In addition, the users may also have a certain influence on the kind of activity that mainly occurs in R-Spaces, namely formal or informal, legal or illegal, temporary or permanent. A surveyed R-Space, located in an accessible and highly frequented area, is more likely to be involved in legal activities rather than illegal ones. On the other hand, officially planned areas are more likely to host formal activities rather than informal ones. Thus, notice that informal activities can be defined as the ones carried out spontaneously by users, even if no specialised facilities are available on site to serve their original intendments (CUDC et al., 2009).

Furthermore, the quantity of people representing the urban basin of a R-Space, passing by regularly or living within a short range, might be decisive to establish the hierarchical level and therefore the role of the space in the whole urban fabric (par. 1.5).

Afterwards, it could be observed that the determination of the role will be important to set priorities in the reactivation and the individuation of the most fitting functions while, for instance, evaluating placemaking initiatives on a public space.

Finally, if accessibility and connections with the most vital parts of the city are determinant for the role of an R-Space, further synergies and positive outcomes may be offered by its position relatively to other RSs already activated in a form of network.

2.4.5 Ownership and Networking

Although property issues are not to be deepened at this point, it is important to underline the possible contrasts between the publicly owned and privately owned spaces. Once again, there is no univocal or typical form of ownership for an R-Space, and they can actually belong to either different private owners (industrial premises, land allotments, buildings, gardens, fields and open areas…) or the general public (public land, public bodies buildings and sites, transport infrastructures premises and margins…).

Arguably, further appropriate tools are needed in order to let private and public environments interact on the urban pattern. Towards this direction may also point the scarcity of own financial resources that affect public bodies in certain EU countries: initiatives to attract private investments for space reactivation may represent the only chance for development.

In addition, if R-Spaces appear to be irregularly spread over the city and detached from one another, the programs should help to reconnect them beyond property boundaries. Indeed, there are several examples where local authorities have already been implementing a mixture of tools to overcome property separations and create new networks of, for example, accessible green spaces in and around town (Bologna, Ravenna, Vitoria-Gasteiz, New York…).

Thus, the guidelines should arguably indicate to maximise accessibility of urban spaces and the reconnection of the disconnected, a similar concept used when the Natura 2000 Ecological Network was proposed (European Union, 1992) for the natural environments. Hence, in order to facilitate biodiversity flows in the urban environment, but also sociality and economic opportunities, it may be necessary to pay attention to R-Spaces as either spots or corridors of this new “ownership-crossing” network.

2.5 Data building: the R-Spaces Knowledge Framework

Firstly, the characterisation of RSs may be a determinant phase for collecting information useful to assist sound urban planning. As accurate and comprehensive as possible, these data should constitute a reliable basis that constitute a ground for future decisions, i.e. the choice of the most suitable panorama of functions that may fit an R-Space.

Moreover, it is necessary to say that the data building and update operation cannot be considered a once-in-a-lifetime task. Monitoring, collection, analysis and report of spatial data ought to constitute an integrated part of the planning process that should arguably be structural, operate systematically and report periodically.

Thus, by editing and updating a Knowledge Framework or any equivalent urban data report, an important feedback upon the city status and performances could be accessible to a larger panorama of users and stakeholders, as well as being functional to the following planning phases.

The adoption of a rational methodology for the composition of the KFW could help to reflect the main urban systems: economic, social and environmental. Thus, as it may represent a first base for the city monitoring, it shall gather data and indicators that are at the same time comprehensive, relevant and as easily measurable as possible.

4-Classes Systems (Piacenza, Cesena, Reggio Emilia, Rimini and others)	**9-Classes Systems** (Bologna)
Economic and Social System Demographic data, production and economic activities, employment rate, economic sectors…	**Population** Residents, foreigners, migration balance, aging, families' numbers and components…
Natural and Environmental System Morphology, resources, flora and fauna, surface and underground water system, energy, noise-air-electromagnetic pollution, pristine and protected areas, hydrogeological hazard and environmental risk management…	**Economic System** GDP pro capita, companies, workers, unemployment and employment rates, culture, tourism, urban poles and economic landmarks…
Territorial System Housing system, infrastructure and mobility system, rural areas system, public services…	**Public services to citizens** Urban green areas and greenfields, public infrastructures, neighbourhood retail trade...
Planning System Relations and compatibilities with overruling plans, prescriptions, restrictions, limitations and residual prescriptions from previous planning.	**Urban Dimension** Urbanised land, Land to be urbanised, transformation of urbanised land…
	Housing Patrimony Habitations, average housing surface, planned housing offer, housing values, existing and planned social housing…
	Environment Air, noise, water, soils and underground, energy, waste, electromagnetism…
	Landscape Protected areas, ecological network…
	Mobility Journeys, cars, traffic, public transport, bicycle lanes, car parking, pedestrian areas, linkages with urban poles…
	Governance Inter-institutional cooperation, citizens participation, design competitions…

Tab. 2.3 – Possible ways to organise a knowledge frame: examples from the Emilia-Romagna Region.

For example, in order to attain these results, the Emilia-Romagna Region Planning Act indicates what information shall be considered in the KFWs of its municipalities (Emilia-Romagna Region, 2000, art. 4):

- ✓ Processes and dynamics of social and economic development
- ✓ Physical and morphological aspects
- ✓ Landscape, cultural and natural values

- ✓ Environmental, infrastructural and housing systems
- ✓ Land use and planning system status
- ✓ Law prescriptions, regulations and land restrictions

However, even if the law may prescribe the representation of this information, local administrations (or consortia of municipalities) are anyway free to collect and present data according to their favourite scheme or thematic systems.

For instance, in order to search for an optimum, tab. 2.3 compares different schemes for a KFW in Emilia-Romagna, showing a 4-classes system, rather general and closer to a regional spatial planning style, and a 9-classes system, which is interpreted more specifically by the region's capital. Indeed, the City of Bologna chose to divide its knowledge framework into "context indicators", which are no directly influenced by the plan adoption and reflect the city status, and "actuating indicators", which are directly affected by the action of the urban plan. These sets of indicators are all going to be monitored during the validity time of the plan, representing the parameters and measurement base for the initial time of the monitoring process (Emilia-Romagna Region, 2000, art. 4).

However, owing to the current lack of harmonisation in the EU, local prescriptions about what has to be included in KWFs and plans can dramatically vary in each country and hierarchical planning level. For instance, it is possible to notice that Sweden and Denmark do not suggest macro-systems for classification or representation of data, but give guidelines that allegedly allow local authorities to operate even more flexibly.

In Sweden, regional planning exists only in Stockholm and Göteborg (COMMIN Project Team, 2007), representing a coordination framework for the determinant and comprehensive municipal plan ("Översiktsplan") and detailed municipal plan ("Detaljplan"). Next, Swedish legislation outlines that comprehensive municipal plans shall contain clear indication and information on the five main points expressed in the second column of tab. 2.4. Moreover, the Danish Planning Act is slightly more specific than the Swedish one and further defines contents, as summarised in the first column of tab. 2.4.

Besides, it is possible to notice how indications for regional planning in Denmark are quite general (tab. 2.4 top-right), somehow outlining a similitude with the 4-systems way chosen by many municipalities in Emilia-Romagna.

Denmark Municipal Plan (MIM, 2007, Contents and guidelines, Part 4, Section 11a)
1. Urban growth and summer cottage areas
2. Location of various urban functions
3. The structure of retail trade
4. Transport installations
5. Technical installations
6. Polluting enterprises requiring special siting
7. Projects requiring environmental impact assessment
8. Noise protection
9. Recreational facilities and allotment gardens
10. Especially valuable agricultural areas
11. Afforestation areas
12. Wetlands
13. Nature protection areas
14. Valuable cultural environments
15. Valuable landscapes
16. Valuable geological assets
17. Use of watercourses, lakes and coastal waters
18. Coastal zone
19. Implementation of national planning directives

Denmark Regional spatial planning: contents MIM, 2007, Part 3, Section 10a, Subsection 3
1. Environment and recreational purposes
2. Business, including tourism
3. Employment
4. Education and training;
5. Culture

Sweden Comprehensive Municipal Plan Recommendations on contents; Planning and Building Act No. 900 year 2010, Ch. 3, Section 5, (SFS, 2010)
1. Use for land and water areas
2. Use, development and conservation of the built environment
3. Solution to accomplish national interests and legally binding standards of environmental quality
4. Coordination with national plans, regional plans and sustainable development plans
5. Development and planning of coastal rural areas in respect of the Environmental Code ("Miljöbalken")

Tab. 2.4 – Recommendations about contents to be reported in municipal and regional planning in Denmark and Sweden.

In addition to this, it may be also useful to briefly report how data has been gathered in specific assessment studies (from journal articles) regarding the reuse of brownfields, a typical case of R-Space. In one of these cases, Rall and Haase (2011) analyse spaces using data and indicators that are classified as:

- ✓ **Economic** – *Economic development*
- ✓ **Environmental** – *Local climate, soil protection, water protection, nature protection*
- ✓ **Social** – *Accessibility, safety and order, recreational interest, use.*

However, even if a rational categorisation is given, it should be noticed that the aim of Rall and Haase study is to focus mainly on environmental and social impacts, considering just two indicators for the economic matters. Specifically, the article outlines a quite general classification that could

logically be adequate for smaller spaces and resemble the large classification of the regional studies. However, variables that consider networking relationships among the brownfields are not considered.

Nevertheless, as this paper pursues a comprehensive analysis of the potentials of R-Spaces, a wider spectrum of systems and linkages are to be considered. In these terms, graphics and mapping may ease the treatment of these issues and knowledge frameworks could be favourably enriched with spatial analyses of RSs networks. In particular, deficiencies in linkages between spots of the future RSs network might be represented via maps and spatial elaborations, similarly to the presentations of green urban spaces and public spaces networks that are often available in municipal plans or annexed to specific studies (fig. 2.2).

Fig. 2.3 – Spatial analysis and networking of the green spaces in the proposed Ecological Network for Malmö (Malmö Stad, 2003).

Besides, in order to keep a certain consistency and ease the integration during the whole planning process, it might be recommended to standardise

as much as possible the information treated (parameters, indexes, indicators…) by the different actors. In fact, compatibility may favour cooperation among public (but also private) bodies or departments and avoid the duplication of works and analyses.

Moreover, analysing the state-of-the-art about data organisation, it could be argued how the most important feature for RSs interpretation is probably their network logics and their capability to draw connections among thematics (economic, environmental and socio-cultural) at the different hierarchical levels of the analysis (national, regional, urban, local…).

Thus, probably because of the rapidly evolving urban environment, an entire class of analysis is overlooked in the standard knowledge frameworks and general planning documents: a specific set of information concerning R-Spaces. It might be auspiciously individuated one day as a new "thematic system" required in the official documentation of the planning authorities, hereby defined as the RSs Knowledge Framework.

Following the logic exposed in the cited examples, this paper suggest a KFW organising information on RSs in these categories:

1. **Operative and Development Data – Attitudinal Classification of RSs**
    a. Environment, Nature and Landscape
    b. Infrastructures & Built Space
    c. Sociality and Culture
    d. Mobility
    e. Economic Activities
2. **Structural Data – Complementary Characterisation of RSs**
    a. Planning and Law (land uses, ownership, urban plans, restrictions…)
    b. Physical characteristics and location (area, shape, difference in altitude...)
    c. Networking (role, linkages analysis, weak points, opportunities…)

Firstly, the data analysis should be performed at both city/consortium of cities and neighbourhood level in order to enhance networking opportunities among RSs. Afterwards, deeper analysis might be developed at site level, depending on the hierarchy and significance of the single space.

Secondly, the collected data supplies the two described main sub-groups of information in the following way: the first group aims to depict the actual main and natural predisposition of the RS, whilst the second group

completes the data set with structural and physical information and determines the network intensity of the space. In brief, the first part collects more of functional and qualitative data while the second collects more of structural and quantitative data, useful to understand the actual functional limits.

Moreover, the operative and development data, at point no.1, *de facto* represents an operative set of information to support the speculations over functions adaptable to the spaces. Indeed, it might be recalled how this genre of elaborations has been performed via semi-quantitative analysis, customising and applying methods exposed in literature e.g. the Interdisciplinary Catalogue of Criteria – ICC (URGE-Team, 2004).

However, as said in par. 2.2, the framework and its tools are intended to serve a participatory process, and not a systematic quantitative decision-making one. For these reasons all data and possible indexes built cannot give any definitive conclusion about the most fitting use of the RSs, but can only represent a supportive knowledge base to take widely shared decision among the actors.

2.6 Classification

The classification of R-Spaces is the second key step of this analysis, and it is needed to guarantee compatibility between RSs and potential uses. It might be in general helpful to eventually obtain a sort of ID card for the spaces out of the KFW, which may report, for example, the results of certain calculated indexes in five (or more) classes. This indexes-option could be chosen just if a certain further elaborated classification is desired for the spaces, as the nature of the urban environment is absolutely complex, and personalised classifications are designable depending on the final result that the city management would like to achieve.

However, this paper bases its classification choice upon an environmental characteristic, in order to better understand and manage the impacts of the future uses, and respect the finiteness of land at the same time. Hence, RSs are classified in 5 different groups depending on the prevalent **local land cover** conditions. Determinants for the classification are characteristics such as soil sealing, urban green and vegetation, waterbodies (and blue areas), pollution level, grey infrastructures and built elements.

Class	Elements
Green	Mostly covered with grass or other sort of vegetation (shrubs, trees…) and not seriously contaminated (professional remediation not required).
Blue	Proximity or presence of waterbodies or catchments (rivers, lakes, channels, underground rivers, ponds…).
Brown	Brownfields. Allegedly contaminated or polluted spaces that require environmental remediation. Scarce natural qualities, minor vegetation, removed or seriously deteriorated topsoil.
Grey	Grey infrastructures, not flat. Mostly or completely built environment and surfaces. Presence of buildings and/or other grey infrastructures.
Black	Paved, flat areas. Mostly or completely sealed soils with neither significant building nor infrastructure.

Tab. 2.5 – Classification for RSs based on land characteristics.

This classification intends to be respectful of the initial situation, tending to adapt functions to the current soil status and developing functions without thorough changes of the urban topsoil availability. For instance, this classification gives the opportunity (par. 3.4.1) not to choose to convert a "green RS" into a "black RS".

Further, qualitative analyses could be proficiently used in several part of the process. In fact, a useful tool to be added in the RSs Knowledge Framework is arguably the Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis. As Rall and Haase (2011) applied it to their study on brownfields, the SWOT analysis might be a qualitative method to feature also single RSs, as it may serve at either single site or city/consortium level. Besides, it could be stated that the creation of a rational and effective classification can be an important step to eventually succeed in the activation of R-Spaces. In that perspective, further investments should be made in the monitoring structure and infrastructures, as that would serve the KFWs and the evaluation process in general.

In conclusion, the Knowledge Framework contains the classification data and should be digitalised and represented where possible with GIS tools, producing RS-thematic maps to be combined with the classic thematic layers, therefore facilitating the integration with current planning. Indeed, a list of tools and sources could be exploited to enhance and complete the database of information:

- ✓ GIS and webGIS data
- ✓ Aerial photos
- ✓ Natura2000
- ✓ Data and information from authorities at different levels
- ✓ Buildings and population censuses
- ✓ Corine Land Cover

- ✓ Thematic plans (logistics, transport and mobility, commerce, industry, energy, water management, earth resources plans…)
- ✓ Previous urban plans
- ✓ Professionals and private consultant

2.7 Qualifying a Planning: the Adoption of Strategies

Strategies tend to be the product of visions derived by elected politicians, and it may be an advantage when they find flexible planning systems. The adoption of Strategic Planning techniques in territorial planning generally allows a smooth meeting point between politics and planning, following the urban processes over time. In fact, as a basic principle in spatial planning, observe that the important factor at this stage is to ensure flexibility and transferability of the process, allowing strategies assessment and repositioning over time (Rocco, 2011a). As a consequence, all the planning tools that aim to be integrated in a strategic planning process should probably be required to operate according to the same strategic way of planning. Moreover, contrasts between politicians and planners may arise: a prior mission for a planner should be to reduce unbalances (Corlaita, 2010), whilst a politician may have a different *ratio decidendi*, determined by its political mandate.

However, thanks to the endorsement of sustainable development principles and strategic planning methods into official planning frameworks (e.g. EU SEA Directive, 2001), politics and land planning are probably more integrated and able to converge than before. A mix of popular urban visions, principles and strategies that could be hypothetically adopted and developed is hereby summarised (Stockholms Stad, 2011, Sustainia et al., 2012).

From Stockholm

1. Multi urban poles city
2. An exciting, world-class events host
3. A unique role of the water
4. A world-class business climate
5. Endless work and education opportunities
6. An environmentally sustainable city
7. Smoothly running transport
8. A close-knit city
9. Wide variety of housing solutions
10. Democracy and safety

From Copenhagen

1. Attain sustainability via education of citizens
2. The first carbon-neutral capital city in the world
3. Half of the citizens commute by bicycle
4. Citizens live 5-10 minute walk from green areas
5. Citizens access fresh food and clean water
6. The city works to improve energy efficiency in existing buildings
7. New buildings meet energy efficiency standards (e.g. LEED, BREEAM…)
8. Citizens have in-between attractive spaces to interact in the built environment
9. Walking anywhere in the city is easy and safe
10. Public transport is easy and efficient
11. Educational opportunities ensure a young a vibrant atmosphere

Notwithstanding individually developed plans for sustainability, an alternative to qualify a city in these matters might be to join protocols, agreements and guidelines at various levels (global, national, local…). For example, various EU cities in the recent years have pursued a mixed balance of the mentioned strategies and signed agreements such as the Aalborg Chart (1994) and the Aalborg Commitments (2004).

Finally, it is quite arguable that the strategies and the visions of Sustainability that cities decide to develop are going to qualify their work on the urban space, and therefore define the way they identify, characterise and classify R-Spaces.

2.8 Chapter's Conclusions

The definition chosen for R-Spaces attempt to link their features to the processes that left them misused, unused or not adequate to fit Sustainability goals. Considered a negative phenomenon, because they generally imply a waste of a limited resource, they may occur in any point of the city, without any typical location. Neither R-Spaces have any typical form of ownership, but the general public plays a key role for their connection and networking effect throughout the control of the open public space. Further, one of the determinants for an R-Space development is their land cover condition of its surface and terrain (paved/unpaved, built/unbuilt, contaminated or not), which is the pivotal variable upon which this paper decided to classify them.

Besides, municipalities usually adopt a shared vision that may be consistent to their ethics or political mandates. Afterwards, planners and experts have the duty to derive consistent strategies from the endorsed visions, and translate them into feasible urban plans that should auspiciously lead them to the desired future scenarios.

In these schemes, one of these strategies may be a systematic intervention on R-Spaces, which could be inserted as a new integrated part of the municipality actual spatial planning. The first document of the suggested scheme for RSs is the production of a RSs Knowledge Framework, generated by territorial analysis and data gathering from databanks, communities and the expertise among others. The successive task of this paper is to describe functions (and relative benefits) that may favourably fit R-Spaces, improving the city in terms of sustainability, resilience and flexibility.

3. Fitting Functions for Resilient Environments

Deepening multi-functional roles for RSs, analysing formality and time span of activities, presenting fitting functions, featuring their compatibility and their potential benefits.

3.1 The Planned vs. the Unplanned: Formality and Creativity

Notwithstanding the effectiveness of formal masterplanning, phenomena of self-appropriation of the city' spaces by citizens may occur anyway. It is the case of the so-called "informal activities" such as playing games, going for walks, having barbecues or parties in areas with different or no formal functions at all (par. 2.4.4).

Besides, informal activities appear to be crucial to gain the status of "creative city", as significant experiences in Manchester (the "Cool Manchester") and Berlin ("das Neue Berlin") would suggest. Also other similar movements pro-creativity and against gentrification occurred in e.g. Hamburg (Novy and Colomb, 2013) and Leipzig. Indeed, these phenomena may attract people from the so-called "creative class", which happened to be reckoned as very interesting by companies seeking for well-educated employees (Popp, 2012). A most interesting opportunity that emerges from this question is how culture and research for creativity might revitalise and boost urban environments, acting as driver for sustainable development. However, the increased popularity of a certain area could also declare the end of its alternative uses, since it may becomes interesting to investors (CUDC et al., 2009).

Furthermore, formal or "primary" functions are commonly intended those land uses that are familiar with traditional urban planning and development, detailed in their typologies and stakeholders into official documents (Lehtovuori and Ruoppila, 2012). Next, as a primary function misses to be developed or is delayed for several reasons, "secondary" or other informal activities may take place, more or less spontaneously, in idling urban spaces. It could be argued that certain approaches of so-called "loose" or "weak planning", a form of flexible planning with lower degree of regulation for certain areas or functions, may help RSs through a second life and support cities in the enhancement of creativity and attractivity.

However, within the span of informality, the boundaries that separate desirable/legal (e.g. from unwanted/illegal (e.g. drugs dealing, slums…) activities may be very hard to define and probably need to be at least slightly managed or supervised in order to succeed. In fact, according to this idea, a myriad of words is nowadays used to describe new forms of "interventionist urbanism":

- ✓ Spontaneous
- ✓ Provisional
- ✓ Informal
- ✓ Guerrilla
- ✓ Insurgent
- ✓ Do It Yourself (DIY)
- ✓ Hands-on
- ✓ Informal
- ✓ Unsolicited
- ✓ Unplanned
- ✓ Participatory
- ✓ Tactical
- ✓ Micro
- ✓ Open-source

(Spontaneous Interventions, 2012)

Arguably, the question is how to oversee and drive these interventions towards useful outcomes for the community as a whole, without interfering excessively with the spontaneity and creativity of the actions.

Further, probably in contradiction to its own meaning of freedom, a certain openness to informal activities may be recognised by urban plans in the spirit of weak or loose planning, which opposes itself to less flexible masterplanning styles (Andres, 2013).

Moreover, local authorities or associations of professionals developed several guidelines, manuals and case studies' collections about how to deal with informal activities, and some interesting ones are listed hereby:

Location	Project	Actors
Calgary	Victoria Park Pop Up Strategies	Victoria Park Business Revitalisation Zone (BRZ) and City of Calgary
San Francisco	Parklet Manual	City of San Francisco
Cleveland	Urban INFILL - Pop Up City	CUDC
Chicago	Lighter Quicker Cheaper (LQC)	PPS
Venice, 13th Biennale	Spontaneous Interventions	US Pavilion

In particular, notice that the approach of the LQC interventions appears to fit forgotten or declining places with no incoming development plans or, in

addition, to enhance the creativity and the participation of local communities to vitalise and express themselves starting from the grassroots (PPS, 2013).

3.2 Filling the Residual Time: Temporary Uses Planning

The tables reporting the Portfolios of Functions (par. 3.4) present also a special indication for each suggested activity about its flexibility, namely the possibility to activate it under a limited period of time, generally shorter than the final and primary use defined in official master plans. Indeed, the space it is not the only dimension to work upon. Urban design is leaning from a three- to a four-dimensional operative strategy, planning both the temporal and the physical (Bishop and Williams, 2012).

3.2.1 Defining Temporary Uses

Firstly, the term “temporary use” may be defined as the activation of unused or misused spaces that have no immediate development demand; in theory, all those uses different from the planned ones, occurring for a limited time in a certain place are temporary, and often considered “secondary” functions (Lehtovuori and Ruoppila, 2012).

Fig. 3.1 – Temporary event in a now demolished structure, Berlin 2004 (CUDC et al., 2009).

Secondly, temporary uses might feature RSs for a previously agreed length of time, exploiting that “waiting period” between idling and taking action of a new primary function. Indeed, the length of temporary uses may span from fractions of a day until some years of time, with the option to restore ex-ante condition afterwards.

Thirdly, depending on the ruling politics, it might be a favourable option to assign these opportunities to third sector operators, namely local volunteering associations, cultural association, NGOs and so on. As funds for the welfare states activities seem to diminish in various countries, formal and informal actors that offer social services could partly compensate the lacks of a public finance that appears to be chronically in crisis or prefers to prioritise other kinds of spending. Moreover, temporary uses may arguably represent a low-cost opportunity to further enrich city creativity, by involving formal and informal beneficiaries that might have been previously excluded from the active participation in the urban society.

3.2.2 Advantages and Kind of Temporality

Possibly, the high level of immediateness and low infrastructures requested may partly favour the use of temporary functions in certain circumstances. However, depending on private properties regulations and environmental restrictions, controversies and hindrance may affect their implementation. For example, local norms on protection from noise pollution could limit some kind of temporary events to take place, as in the case of white nights festivals. Afterwards there may be other hinders determined by peculiarity of the location. For what it may concern brownfields in particular, either the certification or suspect of soil contamination would probably jeopardise the availability of a certain space to host temporary activities before remediation treatments.

Notwithstanding obstacles, local decision-makers might be interested to adopt temporary use plans as a structural, complementary or integrated form of activities generator, in order to attain various advantages (also via agreements with privates):

Advantages for the City

- ✓ Activation of R-Spaces
- ✓ Augmented open space for public use
- ✓ Additional urban green spaces
- ✓ Improved attractivity for private investments (home buyers, office buyers…)
- ✓ Re-balanced attractiveness of the inner cities *versus* city fringes (contrasting hollowing out and urban sprawl)
- ✓ Increased duties for owners to maintain spaces

Advantages for the Owners

- ✓ Financial support for remediation or renewing of derelict and contaminated sites
- ✓ Tax cuts or exemptions for the duration of the temporary uses
- ✓ Abatements in vandalism and maintenance costs
- ✓ Safeguard of final functions and allocation of further building permissions

(Heck and Will, 2007)

Eventually, it might be observed how advantages on both public and private sides should possibly encourage the search for win-win solutions. Nevertheless, temporary uses may be classified according to the features of location and periodicity that activities may have:

Time

- ✓ **Transient** uses – taking place only once and for a limited time
- ✓ **Recurrent** uses – repeating periodically (e.g. Bologna, "Sotto le stelle del cinema", a summer film festival taking place annually in the city central square)

Location

- ✓ **Migrant** – activities change place from one to another, as e.g. the area develops
- ✓ **Fixed** – regularly occur in the same place, e.g. street markets (typically not related to development areas)

(Lehtovuori and Ruoppila, 2012)

Fig. 3.2 – Recurrent temporary uses. Left: Paris Beaches (Marquer, 2009). Right: Bologna Summer Film Festivals (Mo-Net s.r.l., 2014).

3.2.3 Long-Term Effects and Integration with Planning

Next, the improved attractiveness of an area and the enhanced relationship in the communities are among those positive effects that may have consequence on the long-term. In particular, in order to facilitate the introduction of temporary uses as a structural part of the urban management, it is possible to point some action that municipality should consider:

- ✓ Have strategy that conceive and includes temporary uses
- ✓ Have agents responsible for temporary uses
- ✓ Deal, communicate and cooperate with projects initiators
- ✓ Introduce initiators and entrepreneurs to key people in municipality
- ✓ Ensure coordination of different departments
- ✓ Study and esteem possible benefits to be recognised to owners and initiators (tax and fees cuts, reduced rents, building permissions…)

(Killing Architects, 2012)

Further, as specified in par. 3.1, temporary uses may either be formally agreed with the owner of the site or developed informally. Hence, it should be noticed how temporary uses have been historically unplanned, but now they often represent a step in the official planning process (Lehtovuori and Ruoppila, 2012). Moreover, in 2003 the pioneering Urban Catalyst project studied methods to integrate the potential of temporary uses into conventional urban management (CORDIS, 2003, part of the European 5th FP). The results produced a collection of examples, evaluation and possible best practices that have been transferred on manuals (Oswalt et al., 2013) and partly reported online (Deadline and Studio Urban Catalyst, 2003).

As for flexibility and resilience enhancement, local administrations are recommended to consider temporality in planning via the adoption of so-called “temporary use plans”, objects of the “residual planning” as some authors define them (CUDC et al., 2009). Indeed, initiatives for the integration of temporary activities are already available in several European cities.

Firstly, Copenhagen recognised and opened up for temporary events in its municipal plan (The City of Copenhagen, 2011b, p.18). Furthermore, the city has developed temporary uses (areas for events, pocket parks, sport facilities…) in urban areas that are formally planned but not developed yet (The City of Copenhagen, 2011a, p.35). Secondly, Stockholm officially stated the lack of central areas where temporary initiatives ought to be held, and

suggested to use the urban water areas for short-term activities (Stockholms Stad, 2011, p.29).

Finally, Leipzig has further operating instruments, such as temporary uses of certain buildings and a “permission agreement” with private owners leasing their open spaces to the city and the general public (City of Leipzig, 2015). In addition, to facilitate integration of temporary uses in planning and exploit potentials of spaces, local decision-makers should desist from any substantial influence or regulation: the best results are usually obtained via low-cost spaces and exemption of limitations (Lehtovuori and Ruoppila, 2012).

3.3 The Benefits of Green Infrastructures into RSs

The implementation of GIs and the recovery of brownfields are two of the most common issues related to RSs activities that recur in the scientific literature for urban planning and environmental engineering. In this regard, an individuated role for RSs is to operate as urban particle to infill the urban fabric with additional benefits carried by new urban green infrastructures. In tab. 3.1 it is possible to see several benefits especially provided by eventual GIs capable to successfully fit R-Spaces.

As for costs and requirements of the implementable functions, it is generally possible to observe how many of the details for these structures and initiatives are part of the scientific literature or normally assessable by professionals. However, it could be difficult to monetise the entity of benefits by all of the functions. For what it may concern GIs, it has been revealed how, on the long-run, they are more cost effective than their analogous grey structures (Doswald and Osti, 2011), and although having a larger initial cost, they keep on delivering valuable benefits for a longer period of time (Naumann et al., 2011b).

3.4 A Portfolio of Functions Fitting Urban R-Spaces

First of all it might be necessary to examine a series of functions that can fit RSs, and their potential benefits to the surrounding urban environments. Indeed, both uses and initiatives may be classified into groups according to the urban system they prevalently belong to (tab. 3.2).

Provide food, clean air and purified drinking water	Environmental
Improve air quality	
Increase city aesthetic value	
Increase city'adaptivity and resilience	
Increase soil services by augmented soil value (de-sealing)	
Increase the sustainable mobility	
Claim land back from grey to green	
Manage storm water	
Promote a low-carbon city and cope with Climate Change goals	
Increase biodiversity and urban ecological networks	
Increase quality of life and human health	
Recharge the water table	
Reduce hydrogeological hazard	
Reduce land take and soil sealing	
Restore ecosystems and then improve ESSs	
Work as carbon sink	
Work as urban climate mitigator	
Work as water collector	
Increase sense of community and sociality	Social
Increase stakeholders participation	
Promote and educate sustainable life-styles	
Increase the sharing of renewable energies	Economic
Increase value of residential properties and development	
Offer space to smart city applications	
Promote local economy	
Reduce costs for public administrations on the long term	
Reduce expenditure for public health systems	
Support urban infill and smart shrinking cities	

Tab. 3.1 – Benefits from GIs functions to introduce in RSs (McMahon and Benedict, 2001, Bird, 2004, DG Environment et al., 2009, Naumann et al., 2011a)

Env	Environmental
Inf	Infrastructural
Soc	Socio-cultural
Mob	Sustainable Mobility
Eco	Economic

Tab. 3.2 – Legend for the Portfolio of Functions: classes of functions' benefits.

Next, due to the multi-purpose character of the functions that are suggested, it might be controversial to quantify and attribute certain function's benefits to just some urban macro-system in particular. As a consequence, this qualitative analysis relates these positive benefits to the systems that are blatantly affected the most, while secondary contributions are overlooked.

Again, similarly to what happened with RSs classification, it might be observed that the establishment of a proper functions' benefits classification throughout an analysis of relevant indicators would be an interesting opportunity for successive quantitative researches (par. What is next?), as it occur in several GIs researches.

Besides, seeking compatibility and homogeneity, it should be observed that the suggested functions' characterisation intends to follow the proposed RSs classification, and the scheme for the chosen thematic urban systems (tab. 3.2) recall the first part of the RSs knowledge framework (par. 2.5).

	Green	Mostly covered with grass or other sort of vegetation (shrubs, trees…) and not seriously contaminated (professional remediation not required).
	Blue	Proximity or presence of waterbodies or catchments (rivers, lakes, channels, underground rivers, ponds…).
	Brown	Brownfields. Allegedly contaminated spaces that require environmental remediation. Scarce natural qualities, minor vegetation, removed or seriously deteriorated topsoil.
	Grey	Grey infrastructures, not flat. Mostly or completely built environment and surfaces. Presence of buildings and/or other grey infrastructures.
	Black	Paved, flat areas. Mostly or completely sealed soils with neither significant building nor infrastructure.

Tab. 3.3 – Legend for the Portfolio of Functions: RSs land cover classification for suitable functions.

At the same time, it may be possible to make qualitative evaluations on the coupling between function and RS via the simple land cover based classification of RSs (tab. 2.5) in order to emphasise the possible impacts and show the logic of sustainability behind the function selection process. In fact, this categorisation focuses on the impacts that functions have on the urban environment starting from the condition of soils, and seeking the best compatibility. Finally, during the evaluations, current local condition of the urban soils will be crucial to determine the predisposition for a R-Space to host a proposed function.

The next five paragraphs are going to present the suggested functions organised in classes according to their prevalent kind of outcome (tab. 3.2). Observe that the number of functions potentially adaptable to urban space might be extremely vast and this should represent only a way of thinking about how to evaluate, analyse, classify and organise them. Hence, it could be considered that, different urban stakeholders would probably value solutions differently or consider functions that others would not. Thus, note that while all the cited fitting functions intend to enhance urban resilience and Sustainability, only some of them are going to be here discussed.

3.4.1 Environmental

As sustainability should always be remembered during the evaluations, worsening evolutions for urban soils, e.g. grey infrastructure functions on "green" classified RSs, ought to be avoided. In fact, it is a consolidated good practice to divert development on less valuable soil, in order to preserve most of the soil's functions (European Commission, 2012). Indeed, this is the logic that outlines tab. 3.4, and it could be observed how, for example, except from urban parks and waterbodies, other kind of functions ought to be assigned to RSs with no features of greenfields or already green areas.

Function/Action	Main Outputs					Land Cover Suggestions					Temporary
	Env	Inf	Soc	Mob	Eco	Green	Blue	Brown	Grey	Black	Use
Green roofs and brown roofs	•	•			•				•		
Green facades	•				•				•		
Green corridors	•						•	•		•	
Greenways and greenbelts elements	•		•			•	•	•		•	
Urban parks	•		•			•	•	•		•	Possible
Pocket gardens and parklets	•		•					•		•	Possible
Green tramways	•							•		•	
Natural shielding and green walls	•	•						•		•	
Soil bioengineering	•	•						•		•	
Embankments and cut slopes renaturalisation	•	•					•	•		•	
Pavements greening and retrofitting	•		•	•				•		•	
Linkages and ecoducts for defragmentation	•						•	•		•	
GIs for stormwater management	•	•			•	•	•	•		•	
Sustainable Urban Drainage System (SUDS)	•	•	•		•		•	•		•	

Tab. 3.4 – Portfolio of Functions with chiefly environmental outputs.

Among environment-supportive functions, it is also possible to observe urban green infrastructures such as soil bioengineering and low-impact water management solutions (SUDS), which have the capacity to introduce green characteristics over grey spaces.

Fig. 3.3 – Green tramway tracks at Le Hague, The Netherlands (Ruijs, 2012).

In particular, soil bioengineering may find its role accompanying linear infrastructures (Sangiorgi, 2010), while low-impact SUDS may be applied to urban landscapes such as neighbourhoods (e.g. Ekostaden Augustenborg, Malmö) and enhance resilience, water quality and even biodiversity (DG Environment, 2012).

Except from green & brown roofs and green facades, which are to be installed right on buildings, all the remaining functions are actually to be considered suitable for brownfields or paved areas. In particular, it should be remarked that this choice might implicate ex-ante decontamination and topsoil recovery (de-sealing), with benefits such as enhancement of water infiltration and reduced run-off (European Commission, 2012). Moreover, observe that costs for this kind of conversions might be significant and need to be wisely evaluated and managed by specialists (Fleming, 1991) in order not to jeopardise further greener developments.

Further, it should be mentioned the significant contribution of open green and blue spaces to human health (Tzoulas et al., 2007), while the economic benefits deriving from green roofs, green facades are accountable for cost savings, for example, vastly reducing the energy used for cooling (Sheweka and Magdy, 2011). Furthermore, urban GIs and soil bioengineering interventions on blue classes are hereby meant to be riverbank treatments, coastal strengthening or re-naturalisation to be realised in close proximity to waterbodies.

Lastly, it could be noticed that the only temporary function contemplated in this group is the pocket garden (and some parklet with significant green features), expressly suggested for greening limited and paved surfaces in dense urban fabrics.

3.4.2 Infrastructural

Firstly, it might be observed how the collection of function gathered in tab. 3.5 increases the total patrimony of actual urban grey infrastructures, in some cases requiring significant investments and, for these reasons, temporary uses might not be generally contemplated.

Secondly, notwithstanding the environmental benefits that they provide, most functions belonging to this group ought to be targeted on brown, grey and black classified spaces. Indeed, for the abovementioned reasons, this would advantage sustainability together with the promotion of ESSs and,

therefore, tab. 3.5 does not conceive any green classified RSs as final destination. Nevertheless, observe that the listed function “emergency and risk” intend to represent special areas individuated for the location of non-paved and light facilities such as electrical/water/sewer grids for emergency camps, or other open spaces needed in case of natural disasters (e.g. evacuation assembly areas).

Thirdly, it has to be specified that the economic benefits associated with some grey functions are not generally intended as direct profits, but rather cost savings for either the general public (e.g. municipality’s spending for management of urban infrastructures) or the single private owners and citizens.

Function/Action	Main Outputs					Land Cover Suggestions					Temporary
	Env	Inf	Soc	Mob	Eco	Green	Blue	Brown	Grey	Black	Use
Retrofitting of existing and historical buildings	•	•			•				•		
New housing from urban renewal projects	•	•		•	•			•	•	•	
Rainwater storage and harvesting	•	•			•			•		•	Possible
Destination for TDR (ToR)	•	•	•					•	•	•	
Smart City plants	•	•	•	•	•			•	•	•	
Smart grids	•	•			•			•	•	•	
City plants retrofitting (cables and ducts tunnels)		•			•			•	•	•	
Mini renewable energy power plants	•	•			•		•	•	•	•	Possible
Recycling and composting stations/bins	•	•	•		•			•	•	•	Possible
First flush basins and run-off protection	•	•			•			•	•	•	
Emergency areas and environmental risk facilities		•	•			•		•	•	•	
Eco-industrial parks and symbioses	•	•			•			•	•	•	

Tab. 3.5 – Portfolio of Functions with chiefly infrastructural outputs.

However, there might be some functions that could facilitate actual economic growth by direct savings, especially if implemented in green oriented economies: it is the case of eco-industrial symbioses (Potts Carr, 1998). Industrial cycles are here organised in circular systems, following cradle-to-cradle concepts, where the output of a production process (energy or material flows) feed the next one. Innovative example of these industrial symbioses can be found in the Statoil refinery of Kalundborg, Denmark (fig. 3.4) and in Kwinana, Australia (Newman and Jennings, 2012).

Despite the potential role of the local administration as a facilitator to build up territorial conditions and agreements to favour these solutions among private investors, in the Danish case the involved companies developed all the synergies and the agreements autonomously. In particular, possible RSs generated by shrinking of industrial land could leave new opportunities open towards the insertion of complementary industries and the re-design of the

production processes (e.g. a derelict space adjacent to an active industrial site to host cogeneration plants of optimised dimensions).

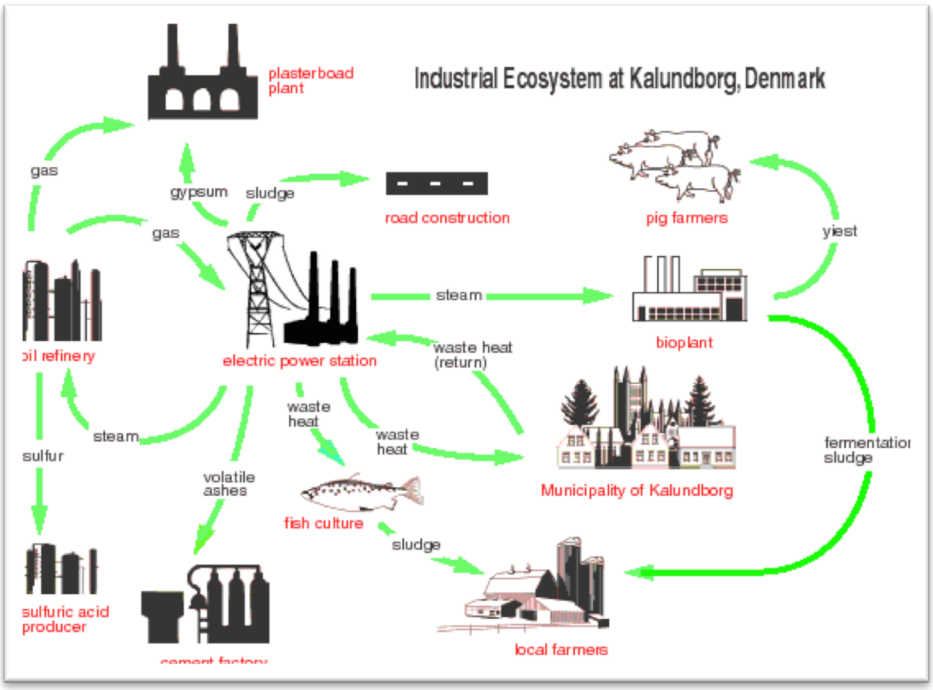


Fig. 3.4 – Kalundborg refinery and Eco-Industrial Symbiosis (Lewis, 2015).

Moreover, an activating factor in the development of these interventions may arguably be a careful assessment of the investments, particularly for what it may concern the cost analysis and the redesign of available spaces and flows.

Besides, renewable energy power plants are here intended in minor sizes, serving autonomous buildings or supplying and support a local energy grid. In fact, wind, water and geothermal mini-plants are favourable options already used in urban environments of cities such as Vancouver (Canada), Christchurch (New Zealand), Masdar City (UAE), North Port Quay (AUS) (UN-HABITAT et al., 2009) and their reduced physical dimensions offer the opportunity to fit a wide range of RSs.

Next, another interesting intervention may be represented by the retrofitting and refurbishment of cables and urban piping networks, possibly functional to the optimisation of the urban plants and the reduction of its maintenance costs (fig. 3.5). Further, the makeover of the underground infrastructures would also aid the reorganisation of urban spaces at ground level, leading to possible enhancement of sustainable mobility (less

infrastructures on pavements) and access to urban plants without e.g. damaging the road paving (Ruijs, 2012).

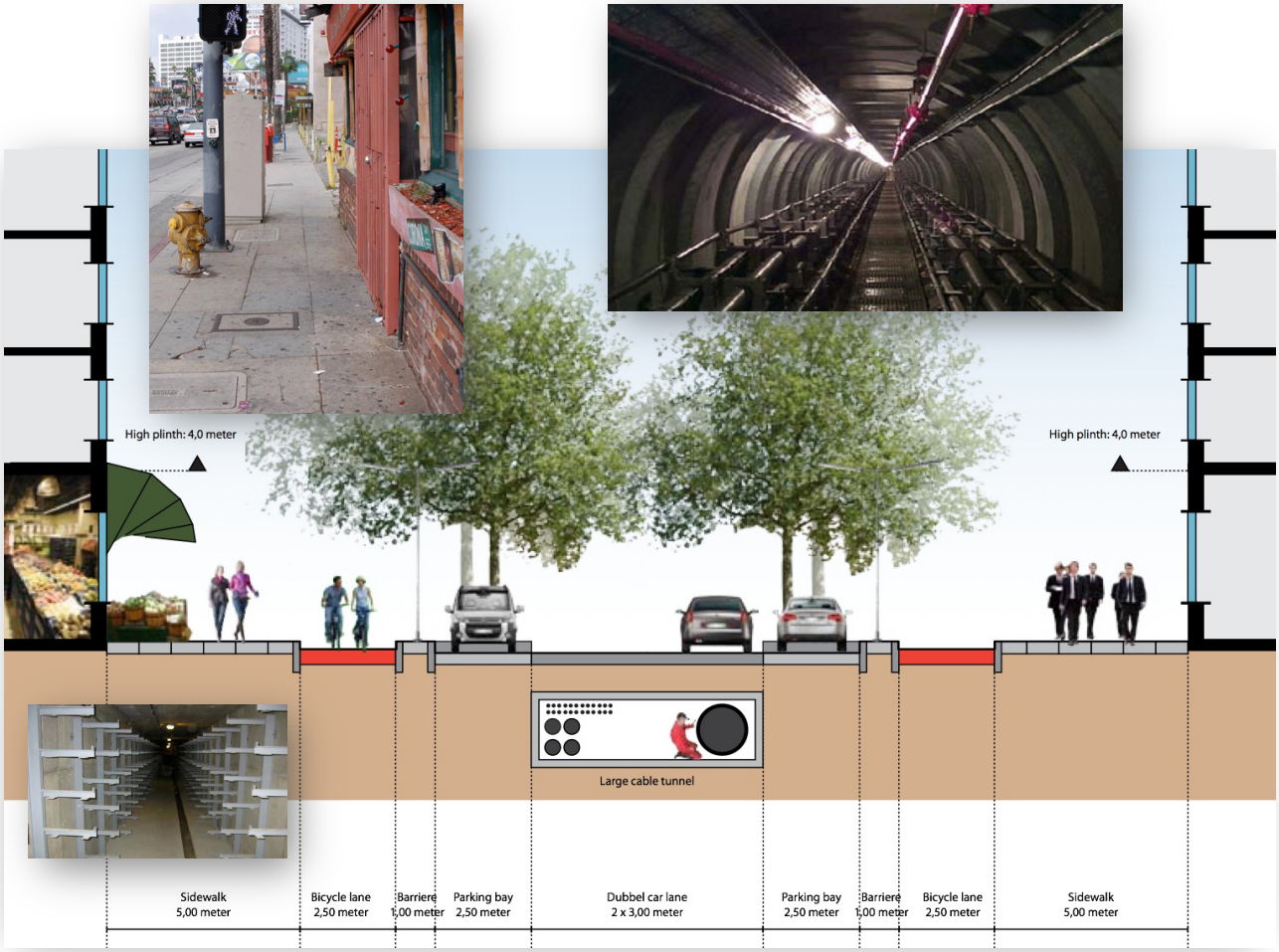


Fig. 3.5 – Street section with underground cables and ducts tunnel. Bottom-left: empty cable tunnel. Top-right: operating tunnel (Ruijs, 2012). Top-left: poor street design sample and space occupied by various plants in Los Angeles (Sheridan, 2009).

In addition to this, as studies in the UK showed that pedestrian zones increases retail sales and sustainable mobility (Hawkes and Sheridan, 2009), refurbishment and redesign of under and aboveground street sections may additionally improve these findings.

Afterwards, some attention should be reserved to the “Destinations for TDR” areas. In land planning literature, ToR is the acronym for the technique known as “Transfer of Development Rights”, together with its object: the “*Transferable* Development Rights” (TDR).

Firstly, a major development of these tools occurred in the US, and its original purpose was “to recapture part of the extra value generated by increased development potential and to use it to compensate for the reduction of development potential elsewhere” (Janssen-Jansen, 2008).

However, a plan containing TDR policies can have further articulated aims mainly based on:

- ✓ Planning equity – to apply similar conditions to owners
- ✓ Efficiency – to acquire privately owned parcels at low price…and…
- ✓ Effectiveness – to achieve planning goals

(Tondelli, 2011)

Secondly, as the interpretation of these techniques varies, planners may decide to apply TDR according to local priorities, characteristics and community needs, instead of following frameworks or guidelines from higher hierarchical levels. In fact, in contrast to the simplicity of the TDR method, the details of its application may be complex and there is no unicity in the techniques adopted in the various countries around the world (Janssen-Jansen, 2008).

Thirdly, the TDR concept is based on the decoupling of the right to develop a certain parcel (sending areas) from the physical parcel itself, giving the opportunity to transfer whole or part of its "right to build" towards other carefully identified areas (receiving areas). Indeed, it could be noticed how a RS might be individuated as receiving area, and contribute to either compact the urban fabric, avoid further urbanisation on greenfields or, however, to achieve other strategic planning goals imprinted with sustainability.

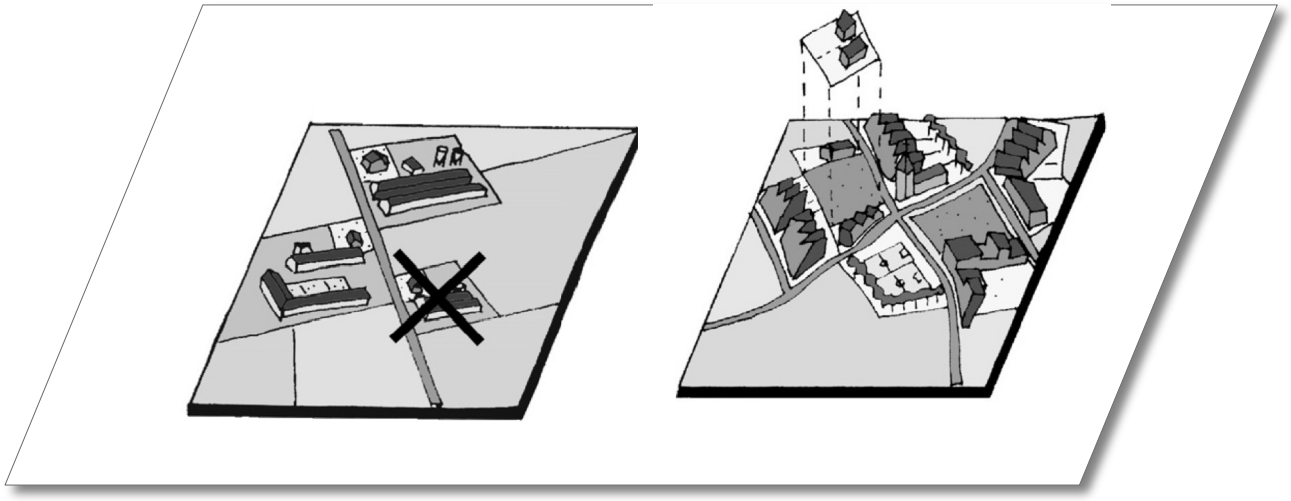


Fig. 3.6 – Left: demolition in an agricultural development area (potential Sending Area). Right: building area in an urbanised context (potential Receiving Area) (Mulders, 2003).

On the other hand, important applications of TDR techniques can be found in the EU (the Netherlands and Italy *inter alia*) demonstrating a certain degree of transferability of the method after local adaptations. In addition,

Pruetz and Standridge (2009), observing features of the most successful TDR cases in the US, identified how some factors in the implementation of the technique are essential, whilst others are just useful rather than good-to-have.

To conclude, it might be argued that successful projects of TDR implementation involving R-Spaces as receiving areas may possibly need local administration to perform a serious assessment of the attractiveness of RSs, and to adapt experienced guidelines from the available best practice and literature. Specifically, the administration ought to create rules and provide information for the market, as well as operate in a way that reduces costs for transactions: the market itself has been proved not to be led by any invisible hand (Micelli, 2002).

3.4.3 Socio-Cultural

Together with the introduction of the most significant functions belonging to the socio-cultural group (tab. 3.6), it might be firstly noticed how their potentials of flexibility allow many of them to be suitable for temporary uses. Possibly, this is due to the fact that these functions are quite adaptable in various contexts without investing large capitals, as it happens for larger grey infrastructures and urban renewal projects.

On the other hand, few of them deliver direct economic profits, for example city farms may monetise their activities by selling crops. In addition, in case of a successful implementation, a new public space shall possibly generate an increase of sales in the retail shops of it proximities.

Although it is sometimes possible to directly profit from these functions, the socio-cultural group arguably aim at other kind of outcomes (enhance creativity and culture in the community, aggregate people…) and most of the economic outcome is secondary or results indirectly.

Function/Action	Main Outputs					Land Cover Suggestions					Temporary
	Env	Inf	Soc	Mob	Eco	Green	Blue	Brown	Grey	Black	Use
Welfare services (Schools, health care…)			•					•	•	•	Possible
Social Housing/Temporary Social Housing (TSH)	•	•	•		•			•	•	•	Possible
Land planning kiosks, labs and workshops	•		•					•	•	•	Possible
Playgrounds and recreation areas	•	•	•			•	•	•	•	•	Possible
Urban art and installations			•			•	•	•	•	•	Possible
Public Placemaking and branding			•	•	•	•	•	•	•	•	Possible
Low-cost lets for third sector companies			•		•			•	•	•	Possible
City farm	•		•		•	•		•	•	•	Possible

Tab. 3.6 – Portfolio of Functions with chiefly socio-cultural outputs.

As this group of function aim to get people together, it is possible that areas in proximity or frequented by a certain critical mass of population should be preferential destinations. Otherwise, some of these solutions may be used to increase the attractivity and the level of attendance of an underrated area.

Next, the cited welfare services (such as school, public libraries or administration offices) may find place in idling buildings or open areas to be built in those neighbourhoods that are in need. The most serious preconditions might be the compatibility of the environmental and sanitary conditions, a displacement close to the community (Gray et al., 2013) and the agreement for a temporary tenancy with the owner of the land. Examples of these interventions may be found both in Haiti (Port-au-Prince), Italy (Fabbrico, RE) following natural disasters, but also in Sweden following an increased number of pupils (Rota, 2013, Rädda Barnen, 2010).

On the same example and requesting similar preconditions, Temporary Social Housing (TSH) might be a cheap solution to be inserted in derelict places, in order to offer a wider choice to citizens or, rather, to have an influence on the housing market (HCA, 2003).

Fig. 3.7 – The Belvedere: art and participation on-site (Brevet, 2011).

Next, urban art installations may also be located in residual or derelict places for a certain period of time. In France, HQAC projects (High Artistic and Cultural Quality) adopted urban art and installation to involve the

population in the modification of the urban environments. Indeed, one of these projects includes the example of “The Belvedere” (fig. 3.7), which allowed citizens to visit the construction site and monitor the developments of the area from the top of the structure (Brevet, 2011).

Besides, it should be observed how the mentioned city farm function (or urban farming at small size) is hereby intended as specifically managed and focused around its educational and social aspects rather than economical and production-supportive ones. City farms are alternative opportunities for the urban spaces in-between, and recognised to be particularly suitable for the young, the old and the deprived (Kamvasinou, 2011). In fact, it could be imagined how temporary and mobile structures may be used to raise awareness and sponsor environment-friendly life styles among citizens, especially the younger ones. For example, installation with limited size, high-mobility and flexibility could give the opportunity to host city farm demonstrations or workshops in a wide range of locations, or touring from school to school.

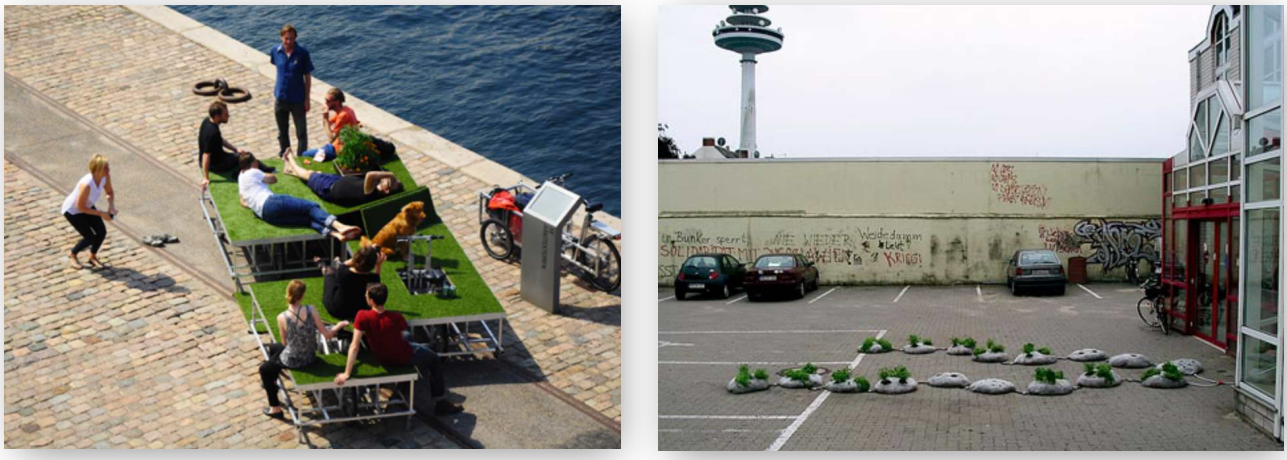


Fig. 3.8 – Demonstrative and flexible tools to aid City Farming. Left: Parkcycle Swarm, Copenhagen (Fontain, 2013). Right: City Farm modules in Bremen (n55.dk, 2003).

In addition, for food production functional to effective subsistence or market, it may be arguable that a minimum surface is needed to be dedicated to cultivations. Hence, the set of activities largely known as urban agriculture, supportive of actual production in both intra- and peri-urban contexts and having a larger umbrella of benefits, is further developed in par. 3.4.5. Notwithstanding the minor production, urban farming actually add value to local communities and smaller dimensions lead to quicker installations,

bypassing permissions and prohibitions needed for larger facilities (HB Lanarc-Golder, 2013).

Nevertheless, different examples ranging from small city farming to structural urban agriculture of different size, intensity and purposes are available from projects such as “Farming The City” by CITIES Foundation (2011), which publishes best practices via magazines, books and blogs.

3.4.4 Sustainable Mobility Supportive

Mobility is a key argument for planning and, introducing functions that help promoting sustainability in transport, it might be possible to reflect about the how deep is the influences that it may have on all the urban systems.

Firstly, the set of functions reported in tab. 3.7 contains mainly soft mobility solutions (i.e. pedestrians and cycling), intending to constitute a part of a larger strategy for sustainability improvements in transport. In fact, a target for sustainable mobility is officially to attain reduction in the number of total vehicles circulating on the roads, while promoting multi-modality, as in the Aalborg Chart (2004, I.9).

Secondly, it may be noticed that pedestrians and cyclists are arguably the weakest and, at the same time, the most sustainable categories of users, with their shares in the transport system that should be significantly increased.

Thirdly, in case of neglected pavements, the operation to redesign and free some streets from parked cars and could arguably recover space for soft mobility and also improve the aesthetic values of the built environments. In particular, a redesign that would improve safety conditions for pedestrians and bicycles may possibly persuade more and more citizens to use cycling and walking infrastructures. New York, for example, following several interventions of road sections redesign, registered *inter alia* increases in retail sales and decreases in accidents and injuries for street that adopted protected cycle lanes (NYC DOT, 2012).

Besides, in order to avoid car occupancy at street level and favour multimodality with public transport, underutilised buildings or other kinds of RSs may be retrofitted as multimodal parking. In this case, it might be observed how the mandatory condition will be to locate the parking on a node of the public transport network, offering significant accessibility from and to

included pedestrian and cycling infrastructures, underground and surface railway system, tramway, bus or bus rapid transit (BRT) as well.

Function/Action	Main Outputs					Land Cover Suggestions					Temporary
	Env	Inf	Soc	Mob	Eco	Green	Blue	Brown	Grey	Black	Use
Pedestrian areas (footpaths, pavements…)	•	•	•	•	•			•	•	•	Possible
Pedestrian and bicycle bridges, stairs, shortcuts…	•	•		•	•			•	•	•	Possible
Cycling - segregated lanes	•	•		•	•			•	•	•	Possible
Cycling - parking racks and depots	•	•		•	•			•	•	•	Possible
Dressing rooms for cyclists	•	•		•	•			•	•	•	Possible
Bicycle repair stations and pumps	•	•		•	•			•	•	•	Possible
Underground and multistorey parking		•		•				•	•		Possible
Multimodal exchanging parking	•	•		•				•	•		Possible

Tab. 3.7 – Portfolio of Functions backing Sustainable Mobility.

Next, the automatised racks for the bike sharing is an example of function that may favourably fit RSs and aid the cycling infrastructure at the same time. In fact, good design and placement of these structures may favour spatial optimisation of pavements and high accessibility for users at the same time.

3.4.5 Economic

In the following set (tab. 3.8), functions are considered to have a predominant economic aspect. It might be noticed that the examples reported use few physical structures and therefore may be suitable for temporary uses.

First, low-cost lets agreements could be adopted to gather landowners, local administrations and single entrepreneurs around win-win solutions aiming at the exploitation of RSs, namely vacant buildings or shrinking industrial areas.

Function/Action	Main Outputs					Land Cover Suggestions					Temporary
	Env	Inf	Soc	Mob	Eco	Green	Blue	Brown	Grey	Black	Use
Farmers' markets (locally produced food)	•		•		•	•		•	•	•	Possible
Urban agriculture and gardening	•		•		•			•	•	•	Possible
Street markets			•		•			•	•	•	Possible
Street events and festivals			•		•	•	•	•	•	•	Possible
Low-cost lets and agreements for start-ups			•		•				•	•	Possible

Tab. 3.8 – Function Portfolio with chiefly economic outputs.

Further, street events can be promoted to socio-culturally revitalise degraded part of a city, as a part of a cultural program, but also to promote commerce for the local businesses. For example, “White Night” festivals are celebrated broadly in cities around the world, and are possibly featured *inter*

alia by artistic shows, live music, cultural events, street fairs and nocturnal opening of shops and museums.

Next, periodic street markets of food or goods could be normally considered to be an economic function suitable for various RSs. In this case, it might be argued that paved or partly paved spaces are needed in order not to penalise users' accessibility.

Besides, it could be noticed that urban agriculture and farmers' markets are the only two suggested functions to express significant environmental outcomes.

Firstly, as for street markets, the local food markets ought to take place in RSs with good overall accessibility in order not to jeopardise the event, and be implemented to promote exclusively organic and local food, produced by the local city farms, diffuse urban agriculture or farmer located within a short distance range (same region or county). In particular, environmental benefits are delivered by shortening the food chain and the support given to organic and sustainable cultivation style (e.g. no chemical pesticides or fertilisers and so forth).

Secondly, urban agriculture presents a well-balanced set of benefits that could have allowed its classification into either socio-cultural or environmental categories. On the one hand, socio-cultural aspects lie in the enhanced sense of local community, individual's commitment and the educational activities that the functions may develop.

On the other hand, economic benefits might be expected as new commercial relations are established on site due to the embedded local markets, and by the indirect savings on environmental impacts due to a shortening of the food supply chain.

In addition, one of the most interesting characteristics of urban agriculture and gardening under an environmental point of view is the opportunity to turn former "grey, black or brown spaces" into greener environments, owing to the high size and shape flexibility offered by its modules. In fact, this aspect may also reflect its suitability for temporary uses, as the disposal of earth and plants in removable containers could permits the relocation elsewhere with relatively low efforts, structures and therefore financing.

All over the world, former transport infrastructures (e.g. gardening and green urban spaces at Hi-Line Park, New York), wastelands (Nomadisch

Grün, 2009), car parks, street corners, neglected roofs and so on, may be adaptable to become proper destinations (fig. 3.9).

Fig. 3.9 – Urban Agriculture and Gardening. Left and centre: Trädgård på Spåret – "Garden on a Track", Stockholm (Nadia Norbom, customised). Top-left: Prinzessinnengärten, Berlin (Clausen, 2013). Top-right: Hi-Line park, New York (Baan, 2011).

Arguably, it could be just for these reasons that urban agriculture is gaining popularity all over the world, and is now considered to be a must-have in advanced urban planning projects, e.g. Malmö Varvsstaden 2030 (Stadsbyggnadskontor, 2011, p.12) rather than spontaneously emerging from citizens own initiatives, e.g. Trädgård på Spåret (2012).

3.5 The Best Fitting One: a RSs Functions Plan

A portfolio of implementable functions and benefits may be useless if not translated into an operative proposal and therefore action with an adequate selection and matchmaking process.

Hence, it is firstly necessary to choose the optimum function that can fit a certain number of R-Spaces, whose information and features may be found in the RSs Knowledge Framework (par. 2.5). Secondly, the logics behind this selection (space-to-functions coupling) may be organised in compliance with the hypothetical process described in fig. 3.10.

Notwithstanding the possible application of different urban strategies (par. 2.7), it should be remarked that the sequential order for the two core selections might be important for the urban impacts. This participatory process shall eventually lead to a further document of the framework that describes the intervention to be implemented in the R-Spaces: the RSs Functions Plan (par 5.4.4).

Besides, this specific plan needs to consider the optimum activities according to site conditions, therefore delivering benefits tailored upon actual neighbourhood (and city) needs. At this point, the participation of citizens and other structural stakeholders might be taken into account in order to analyse lacks, desirables and estimate the actual appreciation of the functions benefits. In addition, the plans illustrating the chosen functions may profile several different scenarios so that decision-makers can have more opportunity work upon their strategies and meet stakeholders interests.

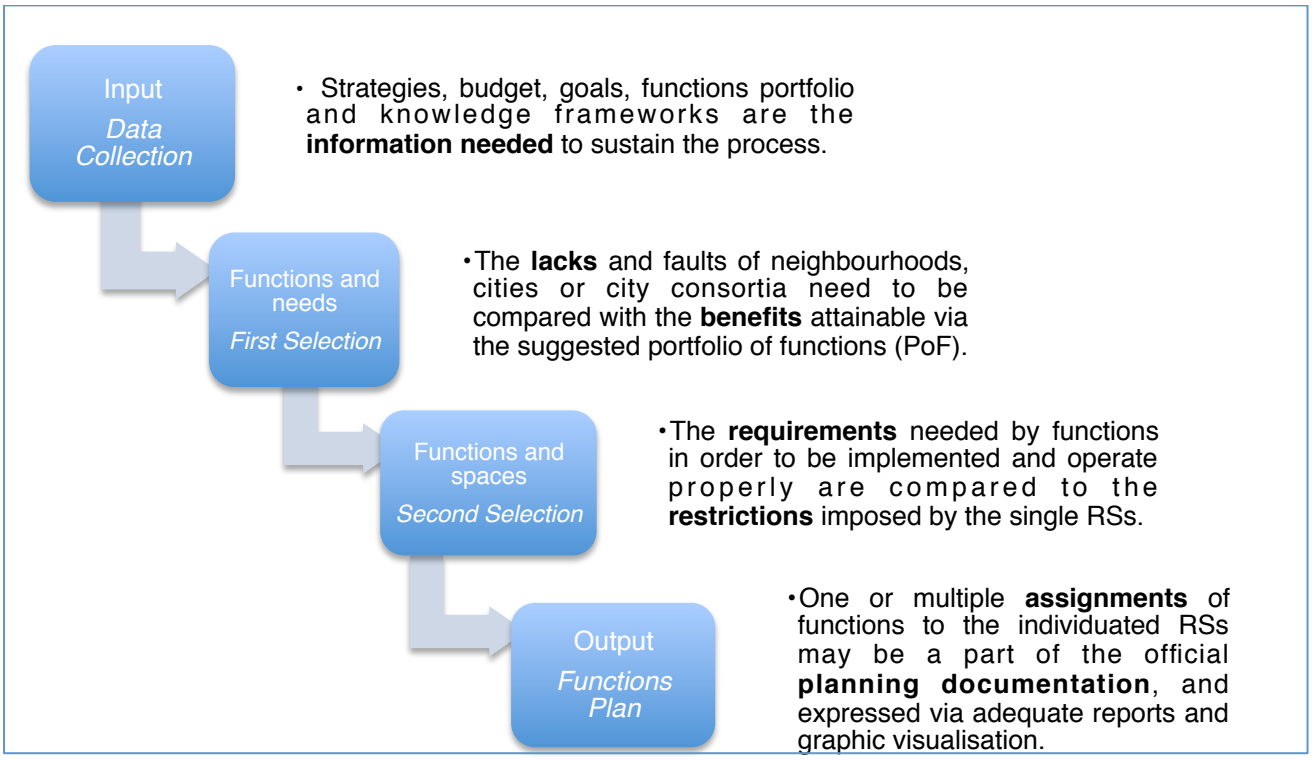


Fig. 3.10 – The logical generation process of a RSs Functions Plan.

3.6 Chapter's Conclusions

The activities that occur in the urban spaces may be formal or informal. In particular, informality can often be an engine for the development of the so-called "creative society", which urban managers seek in order to enhance the innovative characteristics and the attractivity of the city.

Nowadays, urban planning may focus not only upon spatial dimensions, but also on a fourth variable: time. As functions have different planning horizons, temporary uses may be adopted in R-Spaces or, however, in other spaces that have no developments programmed on the short-term. Indeed, temporary uses may eventually lead to favourable and long-lasting effects, such as the involvement of local communities and the increase of attractiveness.

Besides, the functions here presented to possibly fit R-Spaces were divided into five main sets according to the range of benefits brought to major urban systems: environmental, infrastructural, socio-cultural, (sustainable) mobility and economic.

Moreover, a crucial principle of sustainability that drove the analysis of the suggested functions is the compatibility with the actual soil conditions of the studied spaces. The avoidance of new grey constructions on green areas and, on the opposite, the green recovery of paved and built areas is arguably essential to support sustainability. Hence, R-Spaces represent a significant opportunity to introduce and multiply the presence of GIs in the urban environments. Tables and figures analysed and illustrated the mentioned compatibility for each suggested function.

Finally, it was suggested to gather all the analysis about implementable activities in a first operative report about RSs: the Functions Plan. It was presented also a first logic schematisation of the ideas that should lie behind the functions selection process. It may be a first step to generate reasoning based on the current city needs, describe fitting functions, assist the expertise and enlarge participation in the decision making process.

The next chapter is going to describe in details the ideal spatial planning characteristics that would facilitate the integration of R-Spaces in conventional planning and therefore support the recycling of the city.

4. Desirables in the Spatial Planning System

Examine those principles and qualities that are supposed to assist sustainability in current strategic planning systems. Propose solutions for a positive impact on RSs and assess their integration into a strategic process. Provide basic concepts for the RSs theoretical framework. Present some influences of the technological Smart City over planning and R-Spaces.

4.1 A European Planning System Fit for the RSs Concept

During the last 30 years, the promulgation of sustainable development related policies brought some similarities in the planning processes throughout EU countries. Implementation of the SEA Directive led to a mandatory integration of sustainability principles in all those programmes and schemes that imply impacts on the environment.

Besides, other environment related EU Directives (Waste, Water, Habitat and Birds…) introduced standards and regulations for the conservation and sustainable exploitation of natural resources. In addition, several forms of commitments, charts and international agreement on a voluntary base engaged cities, regions and national governments to develop new local managements for sustainability (Aalborg Chart, Leipzig Chart, Kyoto protocol…).

Consequently, it is here proposed that the following policies and charts should inspire a “hosting” urban planning process that would successfully integrate R-Spaces:

- ✓ Aalborg Commitments +10 (Sustainablecities.eu, 2004)
- ✓ TSUE Thematic Strategy on the Urban Environment (European Commission, 2006)
- ✓ Integrated Environmental Management (DG Environment, 2007)
- ✓ SEA Directive (2001)

Further, urban policy designers should take into account some fundamental principles, which are crucial for sustainable planning and have already been adopted throughout several EU Directives:

- ✓ Principle of Sustainability
- ✓ Principle of Precautionary
- ✓ Principle of Subsidiarity

As a result, the kind of planning to be implemented would auspiciously be characterised by the following adjectives:

1. Strategic
2. Participatory
3. Inclusive
4. Transparent
5. Accountable
6. Cooperative
7. Integrated
8. Supply-Driven
9. Multidisciplinary
10. Flexible
11. Effective & Efficient
12. Targeted
13. Time framed
14. Measurable
15. Monitored

Inspired by the abovementioned principles and commitments, the next paragraphs are going to contain an assessment of these qualities applied to planning and the consequences they have for the urban spaces.

4.2 Characteristics for a Spatial Plan Inspired by Sustainability

At this point, the paper intends to list, analyse and possibly criticise fundamental characteristics that may allegedly aid long-term sustainability in a hypothetical strategic planning process.

The following paragraphs describe the effects that an accentuation of the 15 qualities could produce and assess the opportunities that RSs planning may have to fit such a process. The sections *"How to facilitate it…?"* contain hints on how to enhance the single quality, how to facilitate the integration of RSs and how to treat RSs in compliance with the related quality. The information, developments and philosophies produced in this analysis will contribute to shape the actual RSs theoretical framework described in the fifth and final chapter.

4.2.1 Strategic

As the 5th Aalborg Commitment reports (2004), the role of urban planning should be strategic in delivering benefits for all. Arguably it is opportune that the whole adopted planning scheme follows actual strategic techniques of spatial planning in order to put together all the above-listed

characteristics and principles, and not just to intend “strategic” as a general address.

The assumption is to have a shared *vision* among the stakeholders, that is to say a composition of *long-term objectives* that the community aims to achieve. Specifically, by the development of an analysis based on economic, social and environmental variables, several future *scenarios* are produced in order to depict desirable or non-desirable conditions that are likely to happen. Successively, planners ought to outline the *strategies*, that is to say the series of steps that bring to the achievement of shared and most desirable goals, in a time framed and resource limited conditions. Furthermore, while objectives may change along the way, an effective and adaptable strategy can be re-evaluated step after step in order to steer the process towards the most desirable outcomes (Rocco, 2011a).

How to facilitate it…?

Significant contributions to the strategic structural character of planning (even though limited to environmental aspects) were brought by the implementation of the Strategic Environmental Assessment. In this occasion, some governments and regions decided to enforce new planning acts based on strategic planning (e.g. in Emilia Romagna). However, there is no standard mandatory planning framework in EU. Despite strategic planning is strongly advised, vastly adopted and many research projects aim in that direction (e.g. Managing Urban Europe-25 project) EU countries are granted to choose the kind of urban and land planning they prefer.

Nevertheless, a certain degree of change is perceived as urgent. Unfortunately, traditional planning systems in several countries have failed to adequately follow fast changing environments and deal with the wide range of issues brought by sustainability (EEA, 2009).

Besides, compared to the linear and fixed-structure traditional plan, the circular aspect of the strategic process arguably prospects a better integration of a parallel RSs planning. In fact, if strategies and goals are periodically revaluated on both the short and mid-term, opportunities could be left open to permit changes in the functions of those spaces unexpectedly fallen into disarray. Therefore, strategic spatial planning could be the first answer and the basic framework whence adaptability and flexibility can be developed with high consideration of RSs (4.2.10).

4.2.2 Participatory

Firstly, it should be mentioned that a "participatory" planning process could be featured by different levels of stakeholders' contribution to the decision-making phase, according to higher or lower degree of the participation chosen, as suggested in "A Ladder of Citizen Participation" (Arnstein, 1969). Sharing a common vision, express opinions, appeal decisions, promote referendums, intervene and suggest alternative plans are just practicable examples of active participation. The stakeholders of today's civic society that might be involved in the planning process could belong to public sector, private sector or third sector:

- ✓ Local administrations
- ✓ Public bodies, agencies and sectorial authorities (water, waste, energy, habitat, transport, mining)
- ✓ Counties, regions and governments
- ✓ Single citizens
- ✓ No-profit associations
- ✓ Non-governmental organisations (NGOs)
- ✓ Professionals (studios, companies)
- ✓ Capital investors & building companies
- ✓ Corporations (merchants, producers, industrials) and lobbies

These actors can be involved at various levels and with different weights, depending on their singular institutional importance and the form of participation and cooperation specified by the planning regulations. Activating wide participation in the planning process may be time and resource consuming (Sehested, 2009), but it may ensure the sustainability of the policies and underpin their implementation (EEA, 2009).

How to facilitate it…?

Firstly, the adoption of Local Agenda 21 Plans is a must-have to promulgate effective participation and overcome conflicts, as explicitly advised by the Aalborg Commitment no. 2.1 (2004). Public assemblies, workshops, surveys and planning conferences are widely used participatory tools.

Secondly, the ICTs could play an important role to involve every citizen in the territory related issues. It could be possible to create user-friendly websites where any citizen at anytime could locate and describe spaces that are regarded as important to be recovered for the community. Hence, it could be possible to submit ideas for the redevelopment, raising awareness or even

funds for the recycling of a certain place. A similar attempt has been done in the UK, “The Place Station” (Roebuck, 2012), while another initiative oriented to environmental and historical heritage conservation, “I luoghi del Cuore”, takes place every year in Italy collecting more than 1.6 million web votes (FAI, 2014). Afterwards, a similar scheme is promoted in Sweden (Svenska Pärlor), with the purpose to make citizens vote the piece of nature they would like to have protected (WWF Sweden, 2014).

Moreover, site-related design competitions could be held to enhance participation and also bring knowledge, awareness and alternative ideas to the projects. A current example, expressly related to RSs, is Philadelphia’s Urban Voids Design competition (Van Alen Institute, 2014).

Further, a design competition could also be held to offer solution for the retrofitting of shopping centres fallen into disrepair: e.g. in the US many of these have been transformed into mixed-use villages with housing, retail, public schools, libraries, and town halls (Schilling, 2008).

Besides, the local administration could even provide publicly open urban planning office in towns and quarters, auspiciously using a dismissed RS, where citizens could have the opportunity to become acquainted to city projects and actively join the planning process. Firstly, it could enhance the dialogue between public authorities and business sector and secondly it may help a closer monitoring action for a permanent RSs census. A significant example is active in Copenhagen: eight accessible Local Agenda 21 centres and smaller neighbourhood based offices, operating as a foundation financed by the Environmental Protection Agency (EPA), bring participation and transparency closer to citizens and businesses (DG Environment, 2007, p.12).

To sum up, it should be observed that the participation of diverse actors during a planning process could actually lead to different opinions and modifications of the final result: guidelines and techniques are present in literature and can be adopted in order to overcome conflicts, suggesting feasible alternatives, mitigations and compensations. An Italian example of these tools can be considered “The White Book on Land Conflicts and Transportation Infrastructures”; it may be useful to guarantee a certain degree of democratic participation but also avoid possible interruptions in the planning processes or during the construction of impact-bearing infrastructures (Bartolomeo et al., 2009).

Other participation enhancing tools, such as publicly open urban planning workshops, have however exemplified some controversies. These tools may present limits in taking into account the will of those who are not enabled to join the process, e.g. because future residents of a yet undeveloped area (Tondelli, 2011, Laboratorio Bolognina). For these reasons, it should be necessary a continuous control made by local administrators and experts in compliance with the adopted sustainability' principles.

4.2.3 Inclusive

The inclusive character of planning should enable all the various social sectors to be represented in the process, regardless of their characteristics: religion, income, sex, age, occupation or ethnicity should not marginalise or impede any citizen to actively take part.

How to facilitate it…?

A way to enhance inclusivity into the planning process is to develop infrastructures or initiatives involving, for example, highly under-developed areas, e.g. slums. An example can be found in the "Reciclar Ciudad" project, developed in a slum built upon a landfill in Medellìn (Colombia). Exploiting the collaboration of international experts, effective environment recovery know-how was transferred to local inhabitants who directly performed the intervention: the neighbourhood improved from an insane environment to a more liveable place (Morató et al., 2012, Medellìn Case). This could arguably suggest a way to equally share benefits from a territory to all of its own inhabitants. Several other examples on how to improve inclusivity can be found in the annual editions "State of the World's Cities" by UN HABITAT, which focuses on these elements to develop prosperity extensively.

4.2.4 Transparent

The transparency is arguably one of the desirable ingredients for the planning process to be considered democratic. Fundamental are the mere explanation and clear presentation of those policies adopted in the decision-making process and the unrestricted public access to the information.

Thereby, transparency is arguably any unexceptionable condition to permit a serene stakeholders awareness and participation.

How to facilitate it…?

Nowadays, using modern ICTs, online presentation of planning documents and urban policies occur regularly. In fact, various local administrations host urban planning sections on their own websites, where large part of the documentation is available.

Particularly, the most advanced municipalities also offer online interactive services (webGIS tools), whence both common citizens and urban specialists have access to multi-layer maps regarding a wide range of thematics, from cadastral data to environmental information. Hence, it could be arguably proposed to provide these webGIS tools with dedicated RSs layers, as a crucial step towards effective urban land reuse, recovery and recycling. It should be therefore mentioned that the most insightful examples so far could be gathered into two different groups:

1. **Punctual Descriptions** - Localisation of abandoned/derelict structures or parcels, possibly linked or not to further information, interaction or recovery initiatives
   - Guthrie (US) *in its webGIS presents a layer with the location of singular "dilapidated structures" localised among the municipality parcels*
   - Bradford (UK) *presents online accessible profiles of communal spaces/parcels intended for future urban development, listing main features (extension, potential developments, potential land uses, investments amount, etc.…)*
2. **Areal descriptions** - Representation of city parts and spaces subjected or to be involved in urban renewal plans, possibly linked to further documentation about the actual projects
   - Stockholm, Bologna, Copenhagen, Malmö and Leipzig *present specific layers integrated with the rest of their webGIS, where development zones are individuated*

However, webGIS tools are diffused but not mandatory, as well as regulations tend to differ among countries and sometimes even across regions. Nevertheless they seldom offer comprehensive and wholly dedicated layers about urban R-Spaces as intended in paragraph 2.3 (the RSs Knowledge Framework).

For the aforementioned observations, some updated and detailed information about features and localisation of RSs would arguably enlarge transparency and therefore multiply opportunities for the city.

4.2.5 Accountable

For a planning process to be accountable it takes a local administration to be responsible for every development choice, being able to explain and justify every decision, especially in case of objections. Following the ideal purpose, all the disputes about the plans shall be reported, fully answered and then published, becoming integral part of the planning documentation.

How to facilitate it…?

In an open planning process, stakeholders should be offered an adequate time period to examine the projects and possibly submit issues. Afterwards, the local administration elaborates objections and replies to each dispute in a technically justified way.

Besides, the engagement of an external guarantor at national level could be suggested in order to deliver high level of accountability or request rectifications in case disputes are not addressed satisfactorily (Bartolomeo et al., 2009).

In the UK, The Secretary of State from the Department for Communities and Local Government (DCLG), a Member of Parliament appointed by the Prime Minister, holds similar responsibilities. For instance, a certain level-crossing accountability and feedback can be notice as appeals against decisions made by the local administration can be evaluated via the Planning Inspectorate, an executive agency of the DCLG (DCLG, 2015).

Next, another viable improvement for specific RSs planning' accountability could be here suggested as a symbol of further care to these phenomena: the city mayor could appoint one or more professionals from the local planning office to become individually accountable for the publication of a specific résumé about the state of RSs development in town. This engagement would eventually produce a periodic RSs report, a sort of journal, which could be favourably issued and updated on a short-term basis (i.e. monthly).

Specifically, this RSs report shall present a global and qualitative ex-ante/ex-post evaluation of each time period (e.g. developed through a SWAT analysis), also using quantitative data and making comparisons about the developed RSs activities (i.e. before/after data about, for example, available surface for green spaces, recovered spaces dedicated to economic activities and more).

Firstly, the creation of the RS report supplies a new frame of environmental, economic and physical data that can also be functional to monitoring. Secondly, in the effort to give a measurement of the urban fabric, the report would bind decision-makers to their actions, directly enhancing accountability.

Moreover, the essential character of this accountability instrument would arguably be its web accessibility, which could provide faster, open and transparent communication. It would be a developers' commitment to realise a clear-cut and easy-to-use software, ideally embedded in a webGIS tool to easily describe and visualise site's specifications, constraints, interactions and development opportunities.

Besides, all-user interactivity shall be offered in order to either ask for specific on-demand information (to be supplied by administrators in the following issue) or submit development proposals (to be possibly further and openly discussed on a short-term). The abovementioned RS report could be designed as a midway tool between an online magazine and an advanced Internet blog, inspired by the example of discussion platforms such as Liquid Feedback (Interaktive Demokratie, 2012), promoting new ways of participation and, possibly, more direct democracy.

Accountability Aims
Establish a continuative debate about the territory.
Enhance specific accountability and enlarge participation.
Give opportunities to submit specific queries and requests on a short time.
Generate new networks of committed citizens, associations, professionals and public administration.
Open up to feedbacks from stakeholders and generate positive pressures on the planning department.
Receive further data to control and assess planning results (monitoring platform with interactive options).
Provide useful data for appraisal and budgeting operations.

Tab. 4.1 – Possible favourable outcomes of accountability tools.

4.2.6 Cooperative

A cooperative planning process is hereby intended as the product of an open and proficient collaboration among authorities such as municipalities, institutions, agencies and so forth. Different hierarchical levels or relative constituencies should not impede co-working: the cooperative plan would gather information from authorities both horizontally and vertically, free of any

bureaucratic hinder or serious delays that would compromise the success of the whole process.

How to facilitate it…?

Policies can be implemented to enhance communication, interaction and openness among institutions. Once again, ICTs could play an important role: the adoption of document digitalisation techniques and Certified E-mail Systems might be useful to reduce time, costs and bureaucracy.

Furthermore, it may be possible to argue that a basic form of cooperation for urban planning at the local level is constitution of municipalities' consortia. Similar solutions could be considered even more desirable for those countries where the territory is fragmented into a significant number of small municipalities (e.g. Italy), all directly charged of planning responsibilities. On the one hand, a single municipality could claim very poor contractual power against potential private investors and may have scarce resources to dedicate to sound planning. On the other hand, by joining forces into a consortium, administrators would have to deal with slightly different local interests among singular municipalities, but they would share professional and economic resources to better compete on the territory.

In the UK, the City of Bristol has joined a Local Area Agreements (LAAs) programme that will ensure deep collaboration between the city, its partners and the government about environmental themes (Creedy et al., 2007). In the Emilia-Romagna Region "planning conferences" are held at the beginning of the planning process, inviting institutions that have responsibilities on the territory to take part (Emilia-Romagna Region, 2000, art. 14).

4.2.7 Integrated

As a consequence of the urban complexity and the merging of diverse and numerous stakeholders' interests (EEA, 2009), spatial planning should find a way to be integrated into all the other macro-systems, especially for what it may concern the integration of environmental objectives (Creedy et al., 2007).

Hence, spatial planning itself could work as a policy-integrator tool, linking urban development to urban investment programmes (UN-HABITAT et al., 2009). All of the discussions presented in this paper and the suggested RSs planning aspire to be deeply multi-thematic, arguing that the integration

of all the urban drivers in the planning process is a must-have for a competitive city.

How to facilitate it…?

The latest update of the planning system in the UK is dated 2011 and promulgated by the Parliament as the "Localism Act 2011" (UK Government, 2015). Approved along with other decentralisation initiatives, the British regulation promotes an integrated approach, aiming to replace land-use planning with spatial planning. Positive outcomes are:

- ✓ Planning has an important role in the national government
- ✓ Integrated development plans involve public-sector bodies
- ✓ Regional spatial strategies and local development frameworks
- ✓ Introduce spatial dimension into sector strategies

Further, examples such as The Strategic Plan of Riga have been developed as comprehensive key-plans that work to integrate planning among all the other urban disciplines and operate as conceptual guidance for the regulatory documents to be presented (UN-HABITAT et al., 2009).

Nevertheless, as integration in land planning strongly depends on countries' policies and structural organisations, EU governments may follow the indications outlined by the EU regarding Sustainable Urban Management. The TSUE (par. 4.1) led to the development of policies that would assist integrated urban planning and management: the Integrated Environmental Management (DG Environment, 2007) "offers a tool to improve the consistency and coherence between different policies".

Moreover, the TSUE also developed the Liveable City project, which worked on the Sustainable Urban Management Plans (SUMP) to provide guidance for, *inter alia*, a stronger integration and cohesion of the urban policies. Instead of producing "yet another plan", most of the cities participating to this project preferred to perform a deep gap-analysis to identify lacks of consistency in their existing policies (Creedy et al., 2007).

Notwithstanding the good intentions, it is still not clear how the guidance about integration expressed by the TSUE may be linked to the current and mandatory EU framework (EEA, 2009, p. 21).

In fact, similarity and compatibility among the structures of governance and planning authorities would arguably enhance integration and facilitate collaboration. This paper would recommend the adoption of the Aalborg Commitments (2004) as a comprehensive and standard base upon which the

common frame of the urban and landscape management system could be shaped. For this reasons, a helpful idea may be to organise governance at every level according to targets and, just as the Aalborg Commitments are listed, develop ten operative departments/sections for each set of achievements.

Firstly, the common based structure for planning could offer a further boost to the harmonisation process among EU countries, enhancing communication, cooperation and solutions at all levels. Secondly, it may ensure that sustainable management and development in each country does not present any crucial gap by pointing a responsible authority/department for each topic. Thirdly, by integrating all planning components and promote participation of stakeholders, the new frame would possibly increase inclusiveness (another important, planning characteristic mentioned in par. 4.2.3).

For the aforementioned reasons, integration in planning would arguably benefit the multi-functionality opportunity of R-Spaces as intended in this paper. In fact, RSs planning would not operate according to traditional zoning approach, but it is developed throughout networking of urban topics and technical expertise, trying to find a synthesis among a network of spaces and functions. Therefore, the best decision regarding functions to assign to certain spaces might be proficiently made after the contribution of large range know-how and facilitated by managers and stakeholders involved into the process.

4.2.8 Supply-Driven

A desirable spatial planning for the integration of RSs should be supply-driven instead of demand-led, as the European Sustainable Cities project evaluates (Boada et al., 2000). In addition, urban space and other environmental resources have to be allocated according to strong and broad sustainability criteria (Aalborg Commitments, 2004, no. 2.4). For what it may concern one of the most debated questions of the urban development, the total housing displacement should be carefully evaluated in relation to the actual city carrying capacity, which is ought to be calculated in advance by means of sustainability' analysis.

How to facilitate it…?

In compliance with the relative EU Directive, also the 2007 Structural Plan of Bologna (PSC) has been developed in parallel to a SEA process,

producing *inter alia* a fundamental document as the Environmental Report. The SEA process occurs within the planning phase in order to:

- ✓ Offer ex-ante evaluation of possible impacts
- ✓ Organise monitoring of planning effects
- ✓ Reposition strategies and planning objectives depending on midway goals

(Tondelli, 2011)

For what it concerns the environmental impacts of the plan, one of the main parameters to be analysed and discussed is the housing supply determined by the plan. In the example of the Bologna PSC the maximum number of dwellings to be assigned for development during the validity period of the plan (2007-2027) is 12000. Hence, reliable forecast models and correct implementation of the SEA process play a crucial role for a development synchronised with the predicted environmental impacts and to ensure long-term sustainability.

Moreover, a significant supply of resources in terms of urban land might be represented by the R-Spaces, which should be taken into account as a prior destination in order to host dwellings and provide new urban spaces. In fact, assuming the strategic position inside an already urbanised environment and the various redesign opportunities offered, RSs planning may lead to the coexistence of urban development and land take tackling.

4.2.9 Multidisciplinary

As a consequence of the complexity of the urban system, a large team of specialist shall be auspiciously committed to both data management and decision-making process in order to deliver sound land and urban planning.

Nevertheless, it might be assumed that overarching competencies are particularly desirable today, especially if the ability to forecast viable functions and evaluate the best fitting solution for a certain space or area becomes a key factor.

Arguably, the specific planning of RSs might demand even more multidisciplinary skills, together with the capacity to have an organic vision about the dynamics involving the whole urban fabric.

How to facilitate it…?

The set of multidisciplinary competencies owned by the planning body might be amplified by initiatives of know-how building such as:

- ✓ Join smaller municipalities in cities' consortia
- ✓ Enlarge participation to citizens and private professionals
- ✓ Enhance collaboration among specialised public-sector bodies
- ✓ Educate own human resources to cross-sectorial management

Next, RSs planning might apply its multi-functionality skills to the necessity of interaction among the various themes involving the city (economy, green, sociality, mobility…) trying to enhance the networking aspects. Analysis tools, forecast models, up-to-date information on urban dynamics along with a specific planning framework (as suggested in the next chapter) may be put in place to multiply development opportunities.

4.2.10 Flexible

Generally, flexibility in planning is needed in order to cope with rapid changes of the urban dynamics (environmental, economic and social) and trying to realise an unavoidable transition towards more resilient cities.

Firstly, flexibility could facilitate the repositioning of the planning strategies that occur in case of external factors or changes of the goals or the plan. These variations may happen after the achievement of a midway goal, when the strategy is ought to be reassessed and possibly redirected (Rocco, 2011a).

Secondly, features of flexibility within the urban plan grant a certain degree of openness toward companies seeking for adequate settlement opportunities in a new city. In fact, a sufficient stock of lets among the total housing offer guarantees accommodation solutions for the company employees and therefore enriches the city (Corlaita, 2010).

Actually, according to the current and opposite dynamics of growing and Shrinking Cities in the EU (Kabisch and Haase, 2011), the ideas to plan for flexibility may be a preferred hypothesis, especially for those cities that risks to deal with changes in their fundamental parameters during a short period of time (Wiechmann, 2008).

How to facilitate it…?

The first natural option to enhance flexibility may be to revise its own planning system and adopt a spatial planning process that is guidable through its strategy. This degree of flexibility could be obtained by an articulation of the main plan into different levels. Firstly, the backbone of the

planning framework should be a principles-driven, long-term, structural and "directive" plan that contains visions, goals, strategies and all the broad spatial planning intentions (indicated by a broad and not strict or definite design). Secondly, a planning ordinance or act should define characteristics of land uses and building norms, indicating common rules and development rights valid on the subjected area in general, with the exception of those interested by other specific urban projects.

Thirdly, as the last and most executive articulation of the plan, one or more "operative plans" may enable the local administration to deal with the private investors. The operative plan might be use to realise de facto the new development throughout large urban projects that may contain different development restrictions compared to the other areas.

Furthermore, flexibility could be improved by the introduction of mixed-use zoning. An updated form of land use that may dismiss the traditional single-use zoning, has been both advised (Boada et al., 2000) and implemented long since (UN-HABITAT et al., 2009) in order to shape vibrant environments and profits settling commerce, jobs and housing in the very same neighbourhood (Creedy et al., 2007). Arguably, this could produce lively and frequented urban environment, reduce car dependence and improve the city adaptability towards the potential changes of the economic activities.

For what the RSs planning may determine, a mixed-use zoning represents a good opportunity to interface different urban system at short distance, put an accent on the interstitial spaces between the areas and finally increase the chance of networking with the whole urban system.

Besides, one of the carrying ideas of this paper is that an enhanced attention to the RSs planning and its cohesion with the overall planning could increase the flexibility of the city, while making better and quicker recycle of the urban spaces.

In addition, as a part of the R-Spaces planning, the adoption of effective and well-integrated Temporary Use Plans may represent a significant a contribution to urban flexibility. In fact, these planning tools would register, publicise and promote agreements over deals and temporary contracts concerning activities to be held in vacant, derelict, abandoned or simply unused properties (both private and public).

4.2.11 Effective and Efficient

As it may be paraphrased from the definition of effectiveness and then applied here, an ideally effective plan would have the embedded capacity to achieve the agreed goals and contribute to the realisation of the shared vision. On the other hand, the efficient plan would theoretically make the best use of the available resources, but it is then up to planners to establish the principles that judge which is the best way to use resources.

Further, it could be argued that planning effectiveness comprehends the capacity to avoid bureaucratic impediments and juridical complications that could hinder the plan to reach the proposed targets.

How to facilitate it…?

Effectiveness can be measured and therefore improved. Ex-post evaluation, for example, could be performed in order to assess: actual plan implementation, efficient use of resources, achievement of key milestones or the eventual occurrence of possible adverse effects (Creedy et al., 2007).

Further, the abovementioned verification function could be developed applying a classic SWOT analysis to the existing planning policies and through a quantitative or qualitative analysis, based on a holistic evaluation system, which may possibly lead an urban plan to:

- ✓ Be ***targeted*** and have defined goals,
- ✓ Be ***time framed*** and programmed within a precise period,
- ✓ Adopt ***measurable*** indicators to measure progresses
- ✓ Develop a system to have ***monitored*** progresses and results

Observe that the mentioned attributes, intended to emphasise effectiveness, are going to be further discussed in the next paragraphs, from 4.2.12 to 4.2.15. Besides, in order to make the best use of the available resources, avoid efforts duplication and ensure efficiency in the process management, planning policies should hinder different public bodies to produce double analyses on the same theme or subject (Emilia-Romagna Region, 2000, art. 5). As a result, it could be arguably suggested that cooperation and communication among various hierarchical level of the public administration might indirectly improve effectiveness in land planning.

Nevertheless, as RSs planning is not distinctively contemplated into current planning systems, a gap analysis should be done in order to individuate the departments that shall be charged with these responsibilities.

In the most cases and in compliance with the subsidiarity principle, the local administration is possibly the best public body to be engaged with this multifaceted theme. Besides, attention shall be put to avoid double competencies in the analysis and ensure the integration of the new thematic into the existing planning system, since it may have negative outcomes on the efficiency and effectiveness of the plan.

4.2.12 Targeted

Typically, the political will (or vision) of a community is translated into targets that are going to characterise the urban plan and be optimistically achieved under its validity period. Possibly, a good idea could be to set definite rather than vague targets: a major aspect would be the parameterisation that is going to translate the expressed targets into measurable numbers (par. 4.2.14). Next, several final targets could be divided into multiple midway goals in order to keep feasibility under control.

How to facilitate it…?

Arguably, to translate societal desires into a shared vision that would the lead to set targets could be complicated: it might be difficult to find an overall agreement about the eventual benefits. However, when this determination process is conceived comprehending a form of consultation, the local community at large is supposed to consider the targets as more rightful (Creedy et al., 2007). The Sustainable Targets for the Urban Thematic Strategy project (STATUS) constituted an attempt to produce guidance for the effective setting of targets:

- ✓ Conceive only parameters on issues that are under the plan influence
- ✓ Each target should present a “success” level (performance indicator)
- ✓ Set some easily achievable targets, as immediate results would engage stakeholders
- ✓ Targets do not substitute strategies, but are a part of them.

(ICLEI et al., 2006, Creedy et al., 2007)

An example of target setting can be found in the Bologna Structural Plan (Comune di Bologna, 2007), where the will to stop land take has been reflected into targets based on the total urbanised area parameter. The individuated indicator has been presented in its current value (6 543 ha in year 2006) and the achievement of the target is expressed by a performance

indicator, which in this case is the same valued that the plan aim to keep in the future (6 543 ha in year 2023).

A plan structurally capable to assess and set targets would arguably facilitate the integration of a RSs planning that operates according to the same logics. Although planning operations use to focus on the single municipalities, this operation should concern all the urbanised land. It might be important to find collaboration throughout the larger region and focus on the transport corridors and on those infrastructures that link together different urban centres.

RSs planning should aim at the regeneration of social and ecological networks by recovering thresholds and reconnecting urban areas. Specifically, the phase of target setting for RSs planning may have the important role of quantifying the level of commitments and set the bases for the control of the results.

Setting target in RSs planning	
1.	Widespread analysis of RSs on the urban areas and surrounding regions.
2.	Image freezing for the current status and data registration (e.g. total and single extension, total number, shape, class and centrality of RSs).
3.	Critical assessment of potential interventions on RSs and quantification of an ex-ante budget.
4.	Individuation of quantifiable parameters (e.g. % recovered surface, number of single spots and nodes, number of corridors and reconnected areas, socially regenerated public places, number of new inhabitants, number of new associations or economic activities, % total budget, % actually invested budget, environmental parameters from the ICC – Interdisciplinary Catalogue of Criteria).
5.	Target and mid-way goals setting on established parameters.
6.	Interventions.
7.	Periodical reviews, mid-way goals analysis and ex-post budget evaluation.

Tab. 4.2 – Target setting proceedings in RSs planning.

4.2.13 Time Framed

The time factor appears to be crucial in strategic planning, as periodical reassessment and short term feedbacks are highly favoured to keep an efficient management (par. 4.2.1 and 4.2.15). In fact, adopting a cyclic planning process structured by periodic evaluation could arguably strength all the aspects that contribute to planning effectiveness. The scheduling of the

planning agenda could therefore produce continuity and commitment to the territory in the years to follow, extending the job beyond the single period of the city plan preparation and adoption.

How to facilitate it…?

Firstly, as suggested by (Creedy et al., 2007), it could be evaluated if the prospected time frame is realistic related to the targets and all the activities related with the plan development and implementation (for example engage the citizens, upskill the planning staff, review effects of previous planning, set the information system for the new data acknowledgement and elaboration…).

Secondly, the decisions about the involved actors and a clear scheme of "who" gets the responsibility to perform the various actions that structure the process appear to be crucial factors as well. Indeed, as multiple public and private bodies can be involved in the process, time should be framed in compliance with those procedures that planning authorities cannot directly control. For these reasons, basic project management techniques could be applied in order to obtain positive results.

As for RSs planning, it is possible to imagine how its multidisciplinary character would benefit from a clear-cut management of the abovementioned agenda. However, apart from the necessary coordination of the various departments, it is hereby suggested that RSs planning could attain a dedicated and specialised staff whose operation may assume a central role in the planning schedule.

4.2.14 Measurable

After the targets have been set, their parameterisation into measurable quantities may allow the system to fulfil the evaluation of the planning process, that is the understanding of the progresses and the possible reposition of its strategies.

Further, it is possible to notice how several disciplines have focused their researches towards the translation of physical quantities into reliable and representative numbers: indicators and indices to develop an evaluation scheme (tab. 7.a and 7.b). An example is represented by those researches over the assessment of an economic value of the ESSs and their future accounting in budgets (Vandermeulen et al., 2011, ten Brink et al., 2011).

However, it should be observed how, in the attempt to measure GIs characteristics, there is still a lack of evaluative evidence (Naumann et al., 2011b), whilst development and fine-tuning of indicators to allow measurability are needed in the process (European Commission, 2010). Besides, special attention should be given to the quality rather than to the quantity of indicators, with the aim to obtain the highest degree of relevance (UN-HABITAT et al., 2009). For these reasons, it might be auspicious to undertake further multidisciplinary quantitative researches concerning environmental indicators that could favour the urban system analysis.

How to facilitate it…?

Firstly, it could be inferred that further political and financial support would help to subvent deeper research about the evaluation phase and therefore produce additional evidence (DG Environment, 2012); this concept affirmed in GIs research is arguably extendible to most of the environmental studies, though.

Secondly, in literature is possible to find specific indicators and criteria illustrating how to consider and interpret physical quantities that depict the urban environment through measurable parameters, together with their own evaluation methods (e.g. PFAM e FLAG methods).

Thirdly, both specialised studies (Schetke and Haase, 2008) and urban plans with a solid knowledge base (Tondelli et al., 2004, Comune di Bologna, 2007, ValSAT) present the indicators adopted explaining how physical quantities are translated into measurable numbers.

Besides, as reported in chapter two, the organic analysis and therefore measurement of R-Spaces is yet to be thoroughly developed in urban environment analysis. Hence, the individuation of an adaptable and comprehensive RSs assessment system should not be further postponed in order to let reduce, reuse and recycling of urban spaces become structural in land planning and urban management.

Moreover, tab. 4.3 presents an indication about quantities that may be considered, measured and kept under control for the sake of RSs planning in a district, possibly reported in compliance with the proposed data classification for the knowledge framework (par. 2.6). Observe that the analyses can be carried on per single RS or per the overall studied area, which can comprehend a block, a neighbourhood or a city, generally

intending as users the residents, workers, commuters or any other person active in the spaces.

Quantity	**Parameters**	**Units**
R-Spaces	Individuated RSs and relative surfaces	RSs; m^2
Networking Level	Total potential links between RSs	Links/km^2
Fragmentation Level	Interrupted links and Potential links between RSs	Links/Links * km^2
Recycling Factor	Recovered RSs/ Individuated RSs	RSs/RSs; m^2/ m^2
Ecological Network Control	Number of new nodes and corridors	Nodes; Corridors; Nodes/km^2; Corridors/ km^2
Biodiversity Control	Count of indigenous flora and fauna	species/km^2
Energy Consumption	Trends per RS, per capita (users) and area	kWh
Urban Sprawl Control	Trends of users density per RS and area	users/RS; users/km^2
Permeability Levels and Land Take	Soil sealing per RS and area	m^2/RS; km^2
Water Resilience	Trend and level of precipitations, floods, damages	mm; m/floods, floods/year; €/year, €/flood
Economy	Local Gross Product, new firms/failed firms, number of jobs/users	€/month; €/year; units/month
Entrepreneurship	Number of companies /Total Users	units/Inhabitants
ESSs Balance	Trends of Ecosystem Services per area	€/month; €/year
Car Dependency	% car-commuters, cars/users, car parks/users	%; %; km/driver
Walkability	Pedestrian areas/sealed areas	%; km^2
Cyclability	Length and width of protected cycle lanes/traffic roads	km^2 ; km; %
Urban Greening	Green spaces, GIs per RSs and sealed areas	%; km^2
Urban Agriculture	Trends of dedicated surface/paved areas, total crops/RSs and area	km^2; %; kg; €

Tab. 4.3 – Suggestion of measurable parameters for RSs.

The information could be collected into a new framework, but following guidelines similar to projects such as the URGE manual and its ICC (URGE-Team, 2004, http://www.urge-project.ufz.de) or those tools presented in the scientific literature about brownfields and urban renewal, placemaking and urban greening. Arguably adequate indicators might need to be established (via further qualitative research and scientific literature) and shared as widely as possible among decision-makers and authorities.

4.2.15 Monitored

In a parallelism with a personal computer, the formulation of measurable index and quantities could be the software of the urban plan such as the monitoring system could be its hardware.

The monitoring of the actions produced by the plan is the last and necessary element of a circular process aiming to improve itself and affect the urban environment as actually planned. An evaluation of the indicators and their trends is performed by the periodical calculation and comparison with the expected targets (Tondelli, 2011). Moreover, even some planning documents expressly recommend the adoption of effective and fast responding tools in order to constitute a permanent task force based on an adequate information system (Tondelli et al., 2004).

Nevertheless, as the principle of subsidiarity recommends, local authorities are in charge of the monitoring of the plans' effects, giving the opportunity to evaluate and possibly review decisions (Emilia-Romagna Region, 2000, art. 5). In addition, the SEA Directive dictates (European Union, 2001, art. 10) that all the planning authorities in the EU countries ought to avoid duplication of monitoring and environmental analysis (for example performed by different hierarchical levels or departments of the same public administration).

Notwithstanding its essential role to complete the plan functioning, several controversies and deficiencies appear to affect the monitoring phase. In fact, it has been possible to observe local decision-makers, which are the developers of the monitoring operations, emphasising the positive outcomes of the plan and ignoring or even rejecting the negative ones (UN-HABITAT et al., 2009). The knowledge base, so important to deliver sound urban planning, is often threatened in its consistency by lack or incorrectness of data, cost in retrieving and analysis and subsequent inadequacies in

monitoring and evaluation capacity. Supporting these arguments, Naumann et al. (2011b) studied the implementation of Green Infrastructures, founding that only a minimum part of the budgets (2%) went to monitoring and research, consequently leading to consistent lack of data (especially quantitative).

Hence, a possible explanation is that decision-makers facing a chronic lack of resources prefer to prioritise the mere installation (of a GI for example) and leave just residual and insufficient resources to monitoring (DG Environment, 2012). It could be argued that this short-sighted kind of attitude can seriously compromise the positive effects of new infrastructures and modifications in general introduced by urban planning.

How to facilitate it…?

Firstly, a set of suggestions comes from UN HABITAT, which has readapted a World Bank result-based evaluation model in order to suggest guidelines for a solid design of monitoring and assessment of the urban environments. It could be possible to group some significant concepts as follows:

- ✓ Legal framework – Prescribe monitoring as a mandatory and integrated component of the planning process
- ✓ National support – Higher authorities should provide local governments with financial resources dedicated to staff training, best practices research, data sharing and technical resources (e.g. GIS, aerial and satellite imaging, IT improvements…)
- ✓ Consistency – Plan monitoring and evaluation based on the same measurable quantities and indicators from the beginning of the process
- ✓ Participation – Make monitoring and evaluation tools as a further opportunity to enhance participation stakeholders' participation (e.g. using webGIS, survey, questionnaires, environmental reports…)

(UN-HABITAT et al., 2009, p. 182)

Moreover, as a common desirable consequence of what expressed in par 4.2.9 about the enhancement of multidisciplinary capacity, also monitoring could benefit from enlarging the planning staff with resources of other departments or public bodies. In fact, as for municipalities' consortia, the constitution of an overarching planning office in charge of landscape and urban monitoring on a permanent basis may serve a wide range of authorities and help to share the burden of monitoring costs.

Notwithstanding the generally accepted idea of further commitments for monitoring, there is still no agreement about the level at which monitoring should be performed: street, neighbourhood, city and region (UN-HABITAT et al., 2009). Probably, political and geographical divisions throughout the hierarchical levels of the governmental apparatus may have a certain role in the question. Hence, researchers in the field of political science are also called to postulate a critical analysis of the legal framework and express possible solutions to overcome divisions among the decision-makers.

In brief, the representative of all governmental bodies might be gathered around a shared society vision to be perceived, but the decision-making process should admit power delegation and synthesis (especially for what it may concern environment and land planning).

Secondly, further facilitations could be encountered in the adoption of advanced hardware and software solutions. Satellite technology is widely recognised as a pivotal tool for effective territorial analysis and its integration with ICTs and Geographic Information Systems (GIS) offers the following opportunities:

- ✓ Monitoring of land-use changes
- ✓ Tracking of land consumption patterns
- ✓ Analysis of environmental impacts
- ✓ Plans' effects and thematic interactions represented via superimposition of layers
- ✓ Availability of geo-referenced data for privates and public-sector bodies
- ✓ Integration of urban planning and transport planning
- ✓ Enhancement of stakeholders' participation

(Geymen and Baz, 2008, Tondelli, 2011, UN-HABITAT et al., 2009, Comune di Bologna, 2007, Relazione Illustrativa)

In particular, for what it may concern participation, it should be noticed how the public accessibility of the system itself could actually give further support to implement decisions and increase transparency (Creedy et al., 2007).

Following this thinking, The City of Prague developed a digital online service named "The Environmental Atlas" (Prague City Hall, 2012), which collects and illustrate a wide range of information (*inter alia* derelict sites) in order to stimulate stakeholders' involvement (fig. 4.1). In a system that comprehends several tools (webGIS, digitalised statistics and more), professionals are provided with high quality information and interactive maps,

while citizens have the opportunity to be further aware about the city, which exploit this shared platform also as a form of monitoring.

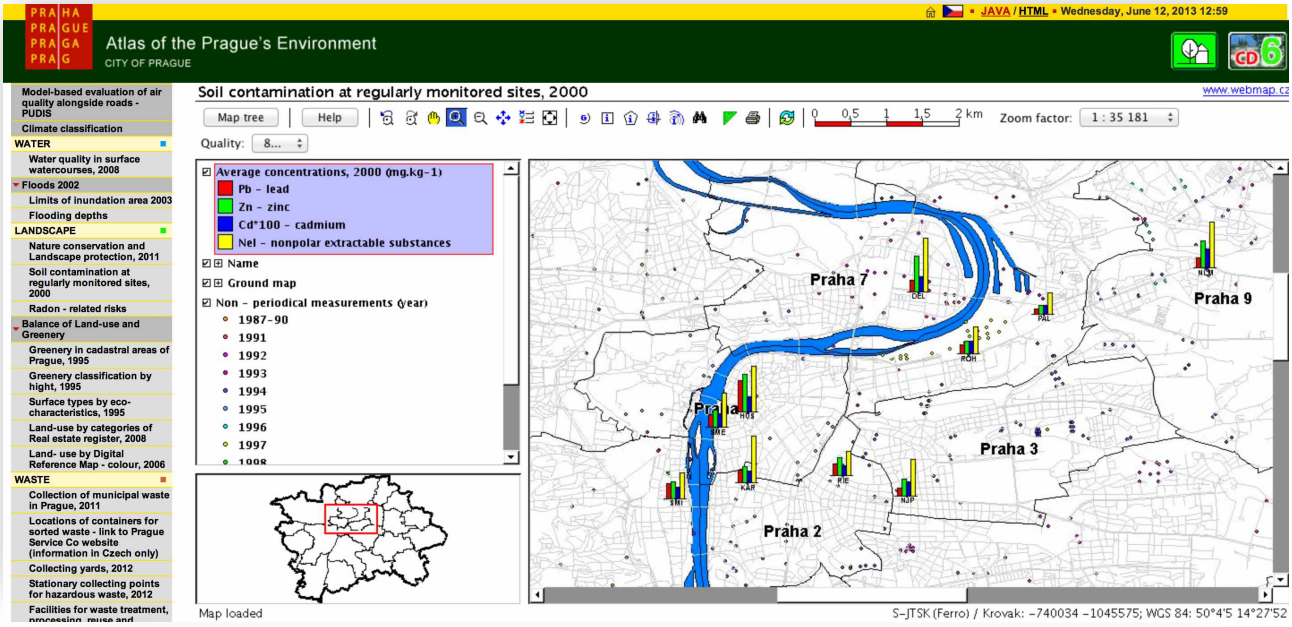


Fig. 4.1 – Soil contamination measures (spots) and monitored sites (histograms) in Prague webGIS.

Furthermore, there are numerous examples of GIS applications implemented to assist urban planning and to provide information. In the Italian panorama the City of Bologna improved its webGIS at the time the latest general plan was published, receiving an award for the use of its interactive maps (Comune di Bologna, 2007, Relazione Illustrativa).

Next, a similar system runs also for the City of Stockholm. The urban planning web portal give accessibility to various documents and maps about the current plan. In fact, interactive and downloadable web-maps or document represent a range of information that spans from the overviewing city plan to the single detail plans and from the explanation of the planning process until the larger development projects (Stockholms Stad, 2012). In particular, it could be further noticed a certain degree of accountability and transparency that follows the larger development projects, whose processes are scheduled in details for every phase and approval and then available on-line in a clear and simple form.

In addition, it could be interesting to observe the case of Istanbul, where the municipality have internally developed a computerised system to analyse the urban environment. Specifically, the main goal was to monitor urban growth and land use/change via a combination of satellite imaging and GIS

technology, which contributed to a database containing information on population, water, forest and industry (Geymen and Baz, 2008). It could be noticed in this example how the technology adopted for the necessary monitoring phase is just a tool that allows the enforcement and verification of what has been previously stated via legally binding regulations.

To sum up, the online availability of high quality planning documents may reputedly increase accessibility, transparency and participation. Next, the enlargement of the participation to citizens and experts could arguably help to prevent incongruences, adopt unshared decision or even reveal some details previously ignored by officers. Afterwards, opportunities to produce an effective tool for the urban plan monitoring have been established.

In the end, considering the peculiarities of R-Spaces, the abovementioned technologies are apparently crucial in order to identify this network of spaces and to offer a certain degree of control and monitoring that would otherwise be hardly analysable under an organic point of view.

Finally, it might be now possible to have a more comprehensive idea of those principles, ethics and techniques that should be recalled to establish an inclusive strategic planning in the name of Sustainability, and that should become structural component of a future RSs planning framework as well.

4.3 Urban Planning vs. Urban Technology: Hi-Fi Planning

In the previous paragraphs it was possible to observe a possible important role of technology in the aid of planning operations. Nevertheless, a new model for future cities, widely known as Smart City, was theorised and developed in the last few years (par. 1.8). Indeed, the model is based on a strong relationship with technology and chapter one discussed some questions about the actual limits that the Smart City model may have in terms of actual sustainability.

Nevertheless, the concept of Smart City is hereby debated under its technological aspects, following popular and debated issues that concern projects funded by international institutions (EU, UN…) and occupy researchers in avant-garde laboratories such as the MIT CoLab and MIT SENSEable City Lab (MIT DUSP, 2015, MIT, 2015).

Besides, concerning technology-integrated design, an extreme example is represented by the case of Masdar, a new foundation city in the United Arab Emirates. Masdar is one of those projects that aims to build the Future

Smart City (FSC) by the interaction of compact land use, energy saving buildings, private and public transport based on electric system and energy system based on smart grids (Yamagata and Seya, 2013). In fact, despite its higher initial building cost and unfavourable climate, the implemented infrastructures may lead to significant savings in maintenance costs and a reduction of its carbon footprint (ESRI UK, 2012). However, several doubts still remain about the high expectations over people and companies to be settled in the new city (Reiche, 2010) and the proposals of actual full carbon neutrality.

Notwithstanding its structural limits, first of all the hard climatic conditions, Masdar City presents a pair of advantages that could positively contribute to the discussion. Firstly, the project may represent an important incentive to promote sustainability, representing an icebreaker for other cities facing similar challenges in the same region. Secondly, it may imply a smarter way to perform the monitoring and evaluation process, exploiting the potentials of an interface between the modern plants, ICTs and GIS technologies.

Masdar City could be a first example on how to tend towards a future of urban design and management where variables and flows are in real time control using a single tool, resembling somehow the famous videogame “Simcity” (Electronic Arts, 2015).

Nevertheless, the European Commission has developed an important online platform that works as a constantly updated archive for Smart City solutions and proposals, best practices and project ideas (EU CoR, 2014). It probably represents a useful tool to advance through the pioneering phase, and would arguably need to have the best solutions assessed, standardised, diffused and implemented.

To sum up, high-tech and sustainable urban planning may join each other in the Hi-Fi Planning and produce a planning system that may analyse and respond at an adequate pace to such a highly dynamic environment.

However, to assist does not mean to steer, and it should be argued that the mere contribution of technology is not going to suffice in order to deliver sound urban planning. This paper would consider that the best infrastructures and most advanced technologies may be pointless if they are not going to be based on effective sustainability principles (e.g. Aalborg Commitments, 2004) and technical expertise of planning professionals.

4.4 Chapter's Conclusions

This chapter listed the hypothetical characteristics of an *ideal* kind of spatial planning, which may be inclusive towards R-Spaces and ready to integrate them. Developing the desirable qualities in dedicated paragraphs, the analysis reviewed a model based on *inter alia* environmental sustainability, transparency and participation. Besides, each and every paragraph explained via best practices how to improve the 15 specific planning characteristics.

Next, the introduction of advanced technologies was evaluated as proficient to improve environmental analysis, land use survey, community participation and open decision-making process. In particular, the monitoring phase was considered to profit considerably from this evolution, creating the conditions for the planning system to actually reassess strategies upon mid-term goals.

In addition, open data, real time information, environmental and physical sensors, webGIS and satellite imaging are just some examples of favourable tools or technologies that may have a crucial role in the specific concept of the technological Smart City.

In particular, the digitalisation gives the opportunity to have georeferenced urban data and study the interaction of the various urban thematics through simple layers' superimposition using CAD and GIS software. Consequently, also the R-Spaces shape, extension, diffusion and potential functions may be usefully represented and compared with the other urban systems.

Based upon all the information analysed, criticised and developed so far, the next chapter concentrates on the description of the mentioned RSs theoretical framework.

To conclude, the R-Spaces Framework should then exploit the ideal background exposed in this chapter to close the current planning gaps, especially on the short and long time frame. This shall happen from as well public or private initiative, as suggested by the strategic options and the other details that are going to be illustrated in the next and last chapter.

5. A Strategic Planning Framework for R-Spaces

Summing up and putting into action the knowledge built so far. Describing a conceptual strategic spatial planning framework that answers the research question and supports SUD. Reporting applications of the prototype via case studies. Discussing findings, adaptability and strategies.

5.1 Responses to Challenges: Recycling the City by Planning the R-Spaces

This paper sustains that important urban development challenges can be fulfilled adopting an *ad hoc* Strategic Spatial Planning Framework, which may interact with current local planning. If the latter owns the 15 features described in par. 4.2, the symbiosis with R-Spaces framework will arguably be the most effective one. Indeed, assuming that only open and holistic approaches are acceptable, it is required a common ground of values, visions and plans to stimulate stakeholders interest while putting Sustainability issues into practice.

Further, it could be noticed how the gap from problem awareness to real solution impact appears to be wide, and how space recycling tools encounter difficulties in becoming structural parts of the official spatial planning processes.

As observed in the State-of-the-art and trends in urban planning, many theories and techniques try to cope with the reuse and recycling of urban spaces. The focus is often put upon marginal and in-between spaces, leftovers and all other sorts of residuals, arguing that there might be a source for redevelopment and Sustainability in them.

However, all the thinking behind new theories did not result in defined proposals of structural tools and plans exploitable to potentially enable the change, especially on the short-term. Owing to these lacks, this paper intends to condense the analysed principles, guidelines and best practices into a prototype capable to start-up the process of exploitation of urban R-Spaces in a more systematic way.

It should be noticed that in the previous chapters the paper went through analyses of contemporary urban complexity, understanding the origins of the phenomena, defining the R-Spaces, proposing a classification

and listing some basic values required to integrate them into current planning. Thus, as a result of the analyses developed so far, the prototype needs to answer crucial tasks that become the ground aims of the prototype, such as:

- ✓ Use basic **Strategic Planning elements** to maintain a goal-driven process while liaising with different sides of the society about shared scenarios
- ✓ **Individuate willing actors** to flexibly design R-Spaces and develop personalised set of rules considering the participation of relevant stakeholders
- ✓ Offer solutions **scalable in space and flexible in time** to be adaptable to diverse stakeholders and site conditions
- ✓ Contain mechanisms to scrutinise, evaluate and **suggest fitting functions** compliant with the established mission and adequate to the context
- ✓ Specify **tailored incentives, roles and opportunities** to enlighten potential advantages for all participants
- ✓ **Identify core questions and strategies** to secure a high degree of feasibility and ensure the effectiveness of the process
- ✓ Act as platform to **offer test beds** for hands-on experimentation and innovation, cutting-edge urban technologies and alternative participatory planning theories

Finally, the final product of this framework would be feasible and site-related Functions Plans, which may be either submitted to the public authorities for approval or voluntarily adopted and realised by private actors, depending on the chosen strategy (par. 5.7).

5.2 Introducing a Framework for R-Spaces

Hereby the paper introduces the framework in its most general case, dealing with no established thematic and open to full customisation using desired drivers. Later, the document introduces case studies (par. 5.8) to report how the general framework can be personalised with Sustainability choices (economic, social or environmental ones) that may fit local preferences when enhancing urban resilience. Hence, the set of suggestions within the framework are meant to suit the majority of European urban context with indispensable but straightforward tailoring job.

As well established in Strategic Planning, the framework is featured with must-have steps and operations that support the translation of the challenges into the definition of the real plans, tools and processes:

- ✓ Individuation of facilitating actors and tasks forces
- ✓ Establishment and report of rules and principles

- ✓ Presentation of a vision statement based on shared values
- ✓ Goals and targets declaration, determination of the strategy
- ✓ Individuation of the main processes and tasks
- ✓ Definition of monitoring methods to assist the targets' achievement

Thus, the framework intends to be articulated in iterative circular processes both for what it concerns the design operations and the gathering process of participants. This feature also aims to be functional to monitoring and to the permanent flow of new stakeholders for the development of new products or activities.

Henceforth, the purpose is to create a new panorama of public-public, public-private and private-private collaborations that may serve urban environments on the short-medium term by means of either smaller or larger spatial interventions.

5.2.1 Start-Up Phase

Starting from scratches, there are kick-starting initiatives that may need to be undertaken to concretise the adoption of the prototype. Indeed, it is first important to understand three following variables: who is going to participate? Which spaces are going to be used? What vision is going to be empowered? Hence, the presentation of the model's idea and its potential developments may be articulated towards three main goals, creating public awareness using the media and introductory meetings with potential SHs.

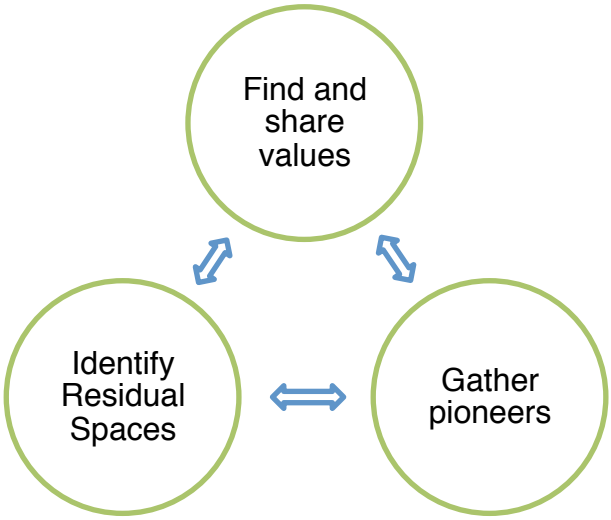


Fig. 5.1 – Circular preliminary operations at the framework's start-up.

a. Preliminary Identification of R-Spaces – Any interested stakeholder has the opportunity to present urban spaces with potentials for a re-activation and features in line with the given definition. Relevant data and analyses are to be provided privately or by collaborative public authorities. Questionnaires and web sites can be issued to gather information and guarantee accessibility (par. 4.2.2).

b. Preliminary Individuation of Shared Values and Intentions - As a first attempt to narrow down SUD into action, elaborate and express a vision statement as shared as possible, and in compliance with Sustainability principles. This common declaration containing ground values and intentions should be also seen as an opportunity for benchmarking and therefore attractivity (e.g. towards EU or other potential funding).

c. Preliminary Grouping of Participants - Scouting and liaising procedures aiming to guarantee the participation of key actors e.g. public bodies and authorities, associations and anyone who may become an actual operator or facilitator in the process.

It is possible that the exposed start-up tasks may be voluntarily undertaken by a facilitator body composed by either public or private key stakeholders, with adequate skills in communication and matchmaking of different partners, a task force that may eventually evolve into the later defined Design Group (par. 5.3.2).

Moreover, observe that the mentioned three launching-phase steps do not need to follow a definite order. In this case the operations might be iterated for a pre-established period of time (e.g. 60 to 90 days) depending on the smoothness, speed and level of response of the stakeholders.

Afterwards, a second implementation phase is up to follow: brainstorming and dealing need to engage collaborative participant in finding syntheses upon the future realisations of their proposals. Designing the R-Spaces in a more detailed way in this phase is arguably necessary to support the commencement of the processes.

5.2.2 The Functional Diagram

In order to illustrate the organisation and its core operative elements, a functional diagram of the suggested prototype is reported in fig. 5.2.

Further, the next paragraphs go through a description of the respective sections (coloured bubbles) in the functional diagram: actors (blue – par. 5.3), framework (green – par. 5.4 to 5.5) and expected results (purple – par. 5.5.3 and 5.6).

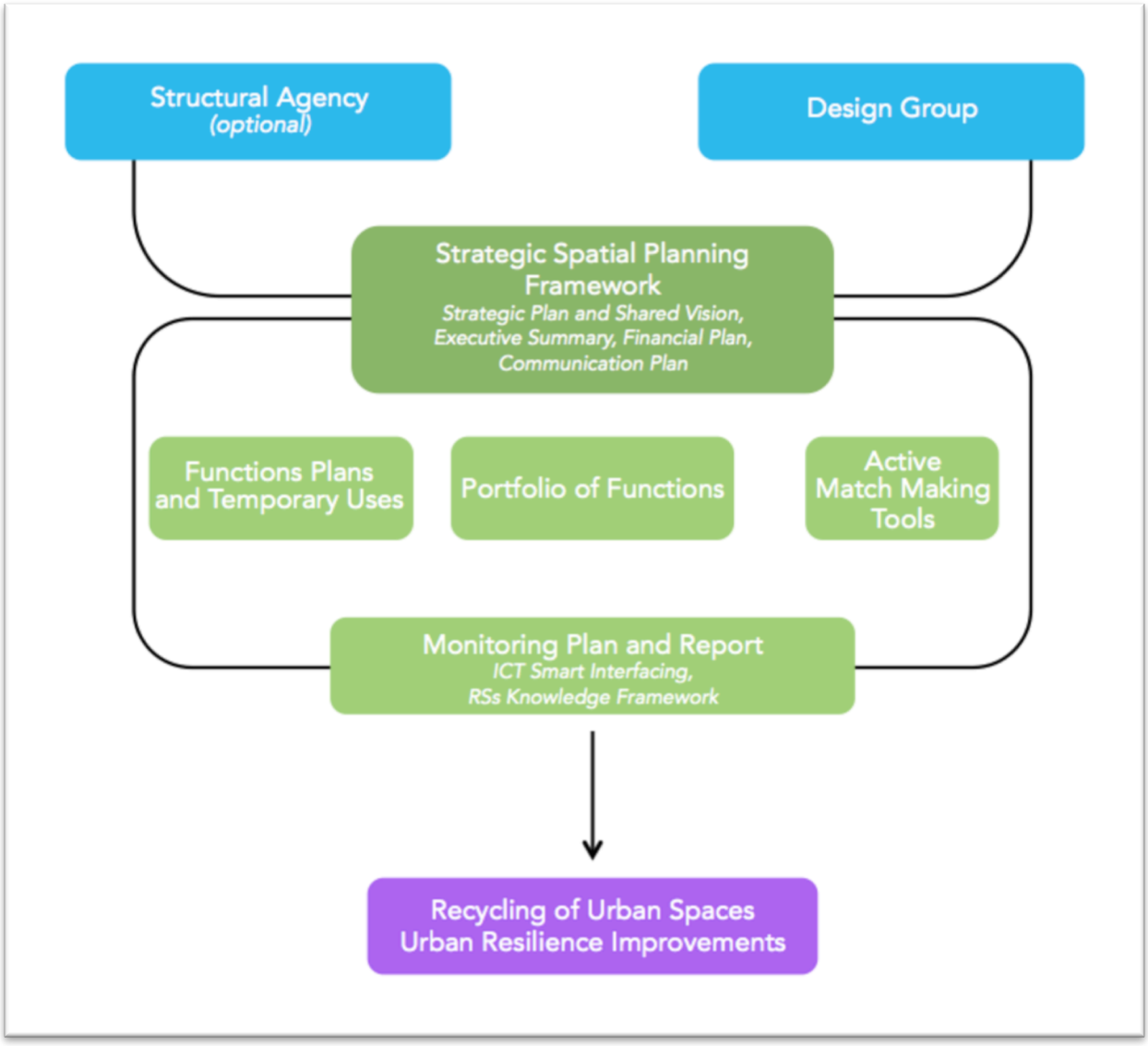


Fig. 5.2 – Functional diagram of the framework for RSs highlighting main operational elements.

5.3 Facilitating Actors, Developers and Stakeholders

As observed so far, the complexity of urban issues requires significant and widespread resources that singular actors alone (typically public authorities responsible for planning and development) may often struggle to put into practice. In these terms, it might be central at this point to liaise with those partners who are actually willing and capable to realise or support Sustainable Urban Development.

As a consequence, the framework shall now entice urban players by envisioning for them roles, advantages and opportunities according to their own accountability, ideas and goals.

Firstly, all stakeholders are divided into two important groups: a structural one and an operational one (fig. 5.3). It is assumed that this would give higher overall flexibility, independence at the design stage but at the same time guarantee the legitimacy of the advancements and better steer the process towards the desired goals over time.

Secondly the processes shall be open at various steps for all public or private subjects that actually intend to:

- ✓ Submit feasible proposals and take part in planning and operations in the R-Spaces
- ✓ Facilitate or enter already ongoing plans as actors
- ✓ Facilitate the framework processes or parts of it

Thirdly, observe how the plans and suggestions made by all participants should be compliant with the individuated shared vision of Sustainability (par. 5.4.2) and relevant to its goals.

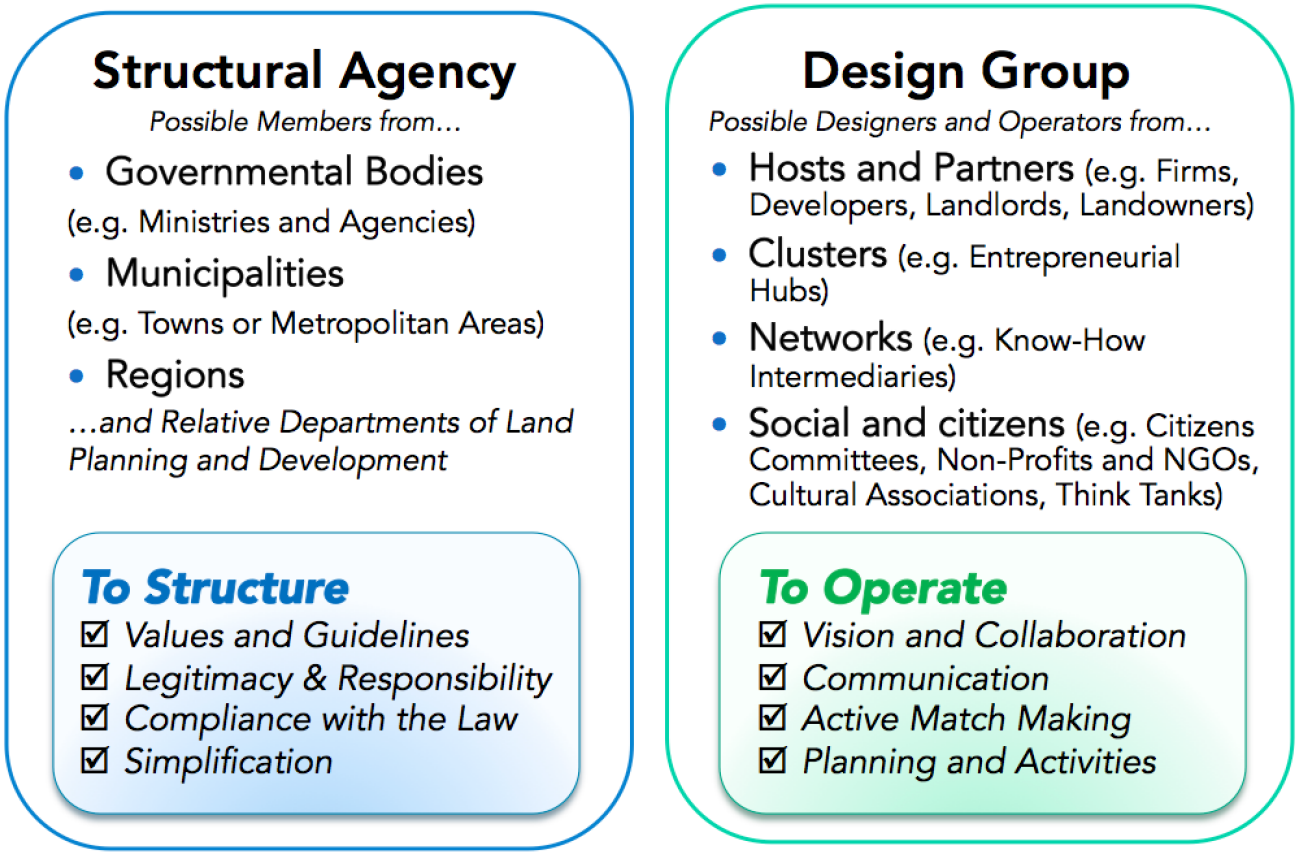


Fig. 5.3 – Structural divisions and main functions of the participants

Finally, the next paragraphs presents further detailed descriptions of how stakeholders are individuated and gathered according to the scope imagined for them.

5.3.1 The Structural Agency

A first group of stakeholders gathers in the Structural Agency (SA), which is typically formed by public decision-makers such as municipalities, regional authorities, governmental bodies and relative officials from planning and development departments.

Thus, the SA represents the backbone of the framework, assuming the responsibility for the correct realisation of the process, possibly operating as a guarantor for controversies, expressing ethical values, verifying the compliance of the produced plans with the current law, offering special incentives or ad hoc simplification and regulation, together with broad Sustainability aims to be followed. Indeed, the Structural Agency is the pillar that creates safe environments for the proceedings and leaves space for the operators to design, develop synergies, innovate and finally activate the R-Spaces.

Nevertheless, it may be important to remind that certain implementation strategies (par. 5.6.2) could reduce the involvement of the public sector, as in the case of the Kalundborg Refinery (par A.1).

5.3.2 The Design Group

Further, a second ensemble of urban players shall have representative constituting the so-called Design Group (DG). It mainly consists of private actors such as companies, single entrepreneurs, clusters and networking organisations (HUBs, Intermediaries…), but also citizens, socio-cultural associations and in general any urban changer that may be a relevant and interested developer, participant or attendant of R-Spaces.

The DG is the engine of the framework, a group of subjects that suggests, plans and actually implements those functions that aim at the recycling of the urban spaces. Moreover, as a pivotal point in the whole process, the group is responsible for crucial phases and operations such as:

- ✓ Teaming up of partners in the start-up phase
- ✓ Individuate a shared vision based upon the values identified by the SA
- ✓ Active matchmaking and synergy-booster among participants
- ✓ Narrow down the vision into goals for each planned activity.
- ✓ Open and transparent communication of management results and performances (issuing the Monitoring Plan and Report)
- ✓ Produce and implement highly feasible and compliant plans

Ideally, the Design Group should be vast in its diversity, so it can represent various sides of the urban society and indirectly obtain support and legitimacy from them. The DG is a local innovative community that aim to concentrate stakeholders around very defined challenges and objectives. For these reasons, the DG may favourably have two crucial sub-groups of actors that should be distinct from the other general partners and participants in their tasks: hosts and clusters.

First, hosts are intended as the larger actors capable of contributing with the most part of the needed physical infrastructures for the activities inside the RS. On the one hand, the host appears to have a certain leading position in its R-Space, whilst is also the one responsible to identify relevant goals and objectives for the fitting functions and activities that it plans to implement. The single hosts may submit requests to the whole DG in the form of plans for one or more R-Spaces and possibly start looking for complementary partners to co-work and share the developments.

Second, cluster organisations such as entrepreneurial hubs have the duty to search and engage potential compatible partners within specific activities and plans, spreading the requests coming from the Design Group and from the hosts. In fact, these operators act as boosters for the synergies that could arguably sustain the realisation of the activities within the R-Spaces, eventually lowering the burden of a single host.

Eventually, also networking and social organisations complete the panorama of actors committed in the active matchmaking of urban changers, collecting specialised expertise from other branches of the society and contributing to the kick-start of the activities.

5.3.3 Citizens

Next, citizens participating to the framework shall be considered urban changers and, in theory, well aware about the implication of Sustainable Urban Development. If aggregated in e.g. local committees and capable to find syntheses, they should be enabled to pone requests or submit whole plans for the R-Spaces.

Single citizens can join groups promoting specific thematics (e.g. urban agriculture, open innovation, renewable energies, soft mobility…), contribute and shaping proposals with others or back plans via IT tools (e.g. Liquid Feedback and participatory tools par. 4.2.2 and 4.2.5). Arguably, according to

the spirit of the Agenda 21 Local Plans, virtual spaces for dealing and synthesis should anyway do not completely substitute face-to-face meetings and workshops among all participants.

5.3.4 Experts and Consultants

Furthermore, University personnel such as lecturers, researchers and students or simply consultants, single professionals and expertise in general may be locked to the challenges by networking and cluster organisations. Indeed there are certain steps of the designing phases where specialised consulting and evaluation may be crucial, for example:

- ✓ DG internal ongoing verification of the **relevance of the proposals** to the overall vision of Sustainability
- ✓ Effectiveness and **relevance of indicators** and indexes when measuring performance of the activities in the R-Spaces
- ✓ Ongoing control over the plans for **compliance with current planning**

5.4 In the Framework's Toolbox: Facilitating Docs and Plans

The current paragraph intends to best describe tools and documents that found and structure the prototype, firstly by observing how some of them serve the framework organisation as a whole while others detail the uses of spaces interested by a function or activity (e.g. Functions Plans and Temporary Uses).

5.4.1 Founding Documents

In the general non-thematic case, a set of documents shall be prepared as a ground to obtain the most by the application of Strategic Planning methods to the overall framework.

Nevertheless, depending on the magnitude of the initiatives, which may be more understandable after the preliminary phase, it could be considered that the entity of the grounding documentation may be significantly reduced and the processes extremely simplified.

For example, the elaborations about the framework can be gathered in documents just as exposed in tab. 5.1.

Document	Form	Contents
Strategic Plan	(Tables)	✓ Shared vision ✓ Mission ✓ Time scheduling and milestones ✓ Goals and objectives ✓ Tasks assignment to actors
	(Report)	✓ Implementation Strategies, SWOT Analyses ✓ Descriptions of general rules: e.g. participation, resource sharing, internal controversies management ✓ Descriptions of mechanisms and processes (e.g. creation and adoption of a Functions Plan, requirements, how to submit proposals and modifications)
Financial Plan	(Report and charts)	✓ Budget, Fixed and Variable Costs and Investments ✓ Possible specific personnel to be hired ✓ Forecast of cash flows: entity, origins, destinations ✓ Amortisation plan ✓ Evaluations over the investments (e.g. Discounted Cash Flow, IRR Internal Rate of Return) and risks evaluation ✓ Monitoring and adjusting of the financial plan
Communication Plan (Adapted from European Commission, 2013)	(A report)	✓ Purposes (e.g. support framework's attractivity, gather actors) ✓ Individuation of targets, broad goals, resources ✓ Individuation of message(s), non-media (e.g. workshops, meetings, outdoors events, fairs…) and media channels ✓ Facilitators in charge of networking and synergies creation ✓ Tasks and Time scheduling ✓ Communication Plan Budget ✓ Impact assessment of the communication

Tab. 5.1 – Founding Documentation for the RSs Framework

The founding documents contain information valid for the implementation of the whole framework. Other plans and tools, namely the Portfolio of Functions, the Monitoring Plan and Report together with the RSs Knowledge Framework serve the whole framework as well but rather with a more operational and interactive way of functioning. On the other hand, the Functions Plan is conceived as an operative plan highly tailored to the activities ongoing in a specific R-Space.

Next, partly recalling some information from the previous chapters, the most important elements of constituting the framework are described.

5.4.2 From Values to Objectives via a Shared Vision of Sustainability

As said, the general mission of this framework is to connect urban actors and enhanced opportunities of sustainable development inside urban R-Spaces, facilitating a change in the pace of city recycling. The long-term vision of this prototype is a scenario in which misused, discarded, derelict, abandoned or unused urban spaces reduce their idling time and experience a better design that would allow them to enhance services and liveability to the city. Hence, it is necessary to liaise with participants who may be committed and willing to collaborate with one another, believing that by doing so a larger number of benefits and opportunities will be available for everyone.

As a first step, it shall be produced a statement, describing the vision of Sustainability that is going to be considered by participants during the activities of the R-Space. Indeed, this seems to be mandatory in order to respectfully use the adjective sustainable when describing the framework and the solutions applied to the studied areas. Established principles such as the Aalborg Commitments (2004) may be considered for the scope.

As mentioned, it is a precise duty of the Structural Agency or any other body in charge for planning to firstly promulgate clear values and broad guidelines to be followed, and express them to the interested pioneers.

Thus, all the participants shall agree on a vision of Sustainability relevant for the public decision-makers or the local stakeholders in general, report it in the Executive Summary and translate it into attainable objectives, e.g. 100% locally produced or recycled energy before 2020 (Malmö Stad et al., 2011) or 50% bicycle commuting by 2025 (Sustainia et al., 2012). Concerning these matters, the Municipal and Detailed City Plans from Stockholm, Copenhagen and Malmö contain outstanding examples. Afterwards, all the information about the statement adopted by participant shall be reported in the founding documentation.

Henceforth, it is a task belonging to the Design Group to narrow down broad goals into even more detailed objectives for the activities of each R-Space, and to further report them into the relative planning proposal (Functions Plan).

Depending on the dialogue between public decision-makers and private sectors, the level of commitments may be modulated in magnitude and/or time. However, the embracement of ambitious sustainability goals should be interpreted as a great opportunity to qualify the district instead of being

considered just as a dangerous restriction to its development (in a business as usual state of mind).

Moreover, Sustainability targets are today capable of classifying projects, highlighting the outstanding ones out of the average, and consequently raising global awareness and publicity about the local projects. As a consequence, further important participants may be attracted to the scheme and an increasing number of contributors such as citizens, companies or public authorities may be proudly interested in taking part. In addition, the high aiming targets do not act just as attractivity boosters for SHs, but rather qualify the projects for national and/or EU funding, a scope for which this framework might be particularly exploitable.

5.4.3 The Portfolio of Functions

Firstly, the PoF is an open catalogue of urban activities, services or infrastructures (generally called functions) that may fit an R-Space (or a network of them). In fact, it intends to aid urban designers and decision-makers to enlarge the panorama of opportunities and reflect local needs with alternative suggestions that typical top-down planning processes might overlook.

Secondly, the portfolio is meant to be digitalised and highly accessible to those stakeholders who desire to submit or search functions, which might be then implemented somewhere in the studied areas. The digital part can be organised around a user interface where it is possible to submit query according to, for examples, keywords or categories and browse the functions parameters, outputs, requirements and visual descriptions. Thus, it could be considered to create a section for assessment by the general public, where each function's file is provided with the relative level of appreciation or support. Then, during the subsequent planning phase, designers and proponents select functions from the PoF and justify their planning proposals taking into account the level of public endorsement received by the function.

In addition, the Portfolio of Functions presents urban fitting functions with the associated classification for chosen in the beginning of the R-Space Planning process (par. 3.4.). This implies that the classification shall be the same also in the other core tools of the framework, e.g. the R-Spaces Knowledge Framework (e.g. classification based on land cover).

To sum up, the tool should offer a chance for participation, and a vast interdisciplinary set of functions to opt for, in order to give response to a large panorama of urban threats, attaining balance among specific local deficiencies (e.g. urban floods, lack of green spaces, car dependency, socially deteriorated environments, impoverished local economy, traffic congestions…).

5.4.4 Functions Plans and Temporary Uses Plans for R-Spaces

Functions Plans (FPs) and associated Temporary Uses Plans are the most detailed level of operative plans included in the framework. Although they can vary according to the developed thematics and drivers (economic, environmental, social…), they stay in line with the overall goals of the framework.

Further, these two operative tools are the synthesis of the whole process and describe which fitting functions shall be introduced in the subjected R-Spaces, determining both physical locations and time scheduling for the activities. Indeed, they are tailored mini-master plans with a precise temporal horizon, defining what may happen in the relative R-Spaces.

In addition, observing various Functions Plans, it could be considered that they may eventually implement different strategies in order to achieve their own specific objectives. For example, it could be conceived to have several Functions Plans involving in their activities public authorities and other ones developing their functions only with private actors, or only in privately owned spaces (par. 5.6.2).

In the framework structure, Functions Plans and Temporary Uses Plans are firstly submitted to the Design Group by a host, a group of partners, a committee of citizens or any other organised stakeholder, according to own ideas and expectations. Afterwards, they are successively analysed, published and promoted in order to seek further participants, which should be relevant to the specific challenges and capable to facilitate the implementation (process, par 5.5.2)

Further, the FP lists the participating actors and describes their characteristics by reporting possible hierarchies (e.g. who is the host, partners and others), opportunities, rights and relative level of commitment in the activities: managerial, intellectual, operational rather than financial. Furthermore, all physical characteristics, location, infrastructures and

environmental data shall be included and possibly illustrated via images and maps, similarly to what happens in a master plan. In particular, it might be observed how the aid of GIS, and other visual representation tools for digital data may be very important at this point.

In the same way as a Business Plan describes how planned actions generate value for a company, the Functions Plans need to describe why and how the chosen fitting functions may bring value to the individuated urban environment.

Moreover, another precious information to be contained in a Functions Plan is the rules that regulate participation, which are going to be valid in case of controversies or sudden substitution of stakeholders. In addition, the specific regulation into an R-Space may be favourably detailed by the one valid for the overall framework in the Executive Summary, or alternatively be articulated differently because of the adoption of special thematics and conditions (e.g. Open Innovation, case par 5.7.2).

Next, a multitude of quantities may be used to offer a valid esteem of an R-Space performance: these numbers shall be periodically updated online and constitute the digital part of the Functions Plan that interfaces the monitoring system. Examples of quantities to be collected about each RS may be:

- ✓ Extension of the areas
- ✓ Number of Participants
- ✓ Public or Private Investments
- ✓ Population involved (active users)
- ✓ Gender of SHs (diversity)
- ✓ Number of jobs and firms
- ✓ Climate Change parameters (e.g. CO_2 tons avoided)
- ✓ Number of cultural events
- ✓ Number of residents in the area
- ✓ Number of new services provided or revenue by products

All measurable and relevant R-Spaces data individuated may be collected, classified, published and updated with the aid of ICT infrastructures. It could be observed that this is the point where Urban Planning interfaces the structures of the Smart City.

5.4.5 Tools for Active Matchmaking of Partners

Although the PoF may already increase participation and brainstorming among interested partners, the collaboration among actors should be taken to a higher level. In fact, the framework needs to individuate ways to gather

people around the single challenges and the proposals of the future Functions Plan.

Somehow inspired by the Agenda 21 Local Plans, participants could be aggregated in different forms at different levels to share ideas, make suggestions and find other partners that may hold key features to develop a certain project. It could be suggested how a part of this job can be positively undertaken by cluster and network organisations (e.g. Innovation and Enterprise HUBs), exploiting their contacts among companies, entrepreneurs and expertise. Indeed, clusters and networks may offer a professional way to connect a Functions Plan proposal with relevant enterprises and complementary stakeholders capable to carry on or facilitate the operations. In this way the Functions Plan might gain new partners and chances to be realised.

Via the Communication Plan, clusters and networks participate to the definition of several mechanisms can be employed to bring in the right mix of stakeholders and developers. It should be noticed that the most appropriate way to create these synergies is highly dependent on the scope contained in the proposal, as well as its thematics, dimension and objectives.

However, in the most general case, the details of a specific FP proposal shall be enlightened in a clear and non-jargonistic way, so that all interested parties can have an effective understanding. In addition, observe that this might be an important factor for small and medium partners when determining their own relevance to the plans before deciding to join.

Besides, depending on the activities ongoing in the relative R-Spaces, the facilitators in charge to create the synergies select the most adequate mechanism to connect stakeholders. This process, hereby termed Active Matchmaking, may occur via one or a combination of the following options:

1. *An Open Call* – This option may be used when preliminary proponents of a Functions Plan are searching for potential specific know-how, requirements or capacities that need to be included in their projects. Hence, the communication contains strict parameters that would select an ideal partner for the imagined Functions Plan (e.g. a firm capable to realise small temporary structures for events in different urban locations).

2. *A Direct Invitation* – In this case the proponents are already aware about precise capabilities of certain strategic partners or expertise, and they may simply prepare a request for collaboration in form of a direct invitation.

3. *An Open Competition* – Experimental version of the Open Call. A Functions Plan proposal may hypothesise cutting-edge developments as well as a set of unprecedented activities in order to achieve its objectives. Hence, it might be necessary to open up for new out-of-the-box ideas using an open contest, which shall be detailed with clear rules and principles for the final selection, but around parameters that are broader than the Open Call case.

It is arguably important for part of the Design Group members to have representatives with communication and project management skills, in order to better individuate the right options for the active matchmaking, and ensure the development of the synergies as the Functions Plan proceeds. This personnel has the crucial role to interpret the details of the proposals and assess a future participation.

Notwithstanding the exposed mechanisms around preliminary proposals, further methods may be employed to attain a larger community inclusion at this point. Indeed, the involvement of the local communities should be pursued in structural terms, to have good results both on the short and long term. In particular, residents, attendants and citizens involved in the areas should be invited to take an active part in the projects and in the relative events. In fact they could be turned into ambassadors for the place in which they live, work, commute or simply spend part of their time.

Thus, the tools that may realise these intents could be the ones typical of publicity, communication and event management, if used with the aim to increase the social value of the plans. Marketing, advertising, place making and branding (par. 1.5), questionnaires, polls and public events could be viable opportunities to enhance the community inclusion.

In the eventuality that the studied R-Spaces lies in proximity of important meeting points or infrastructures, just as in the Malmö-Hyllie's case study (par. 5.7.2), promotion programs targeting the various attendants of these spaces should be run. In fact, public squares, shopping malls, arenas, train or bus stations, airports, exhibition fairs could all be considered ideal places whence an interaction with a part of the larger community may start.

Further, arrangements should be made to take the projects into the educational institutions. From ground school to universities, the members of the Design Group, non-profit organisations and think tanks should present their plans and involve students in workshops as practical part of an environmental education program.

5.4.6 The R-Spaces Knowledge Framework

As previously identified in par. 2.5, this tool is a wide-ranging local report that contains information and describes specific sites or neighbourhoods in compliance with agreed classifications, quantities and indicators.

Necessarily derived by the participation of all SHs and favourably fed by important databases, it may ensure the data needed to take crucial decisions about inter alia the Functions Plans and the future of the studied sites in general. It is thought to be a ground collection of territorial data intended to serve planning and development.

In the most general case ideally digitalised, publicly accessible and synchronised with the Monitoring Report, it reviews quantities and indicators deprived of further analyses, commentaries or other critical interpretations. It may possibly operate following the same spirit of those webGIS and several other data that smart municipalities release at anyone's disposal (par. 4.2.4) for the sake of research or development.

5.4.7 The Monitoring Plan and Report, ICTs and the Smart City

Firstly, the Monitoring Plan individuates methods, structures and actors taking care of the monitoring proceedings, which are a strategic, essential and massive part of the framework. Thus, selecting specialists from the Design Group members, it shall be constituted an *ad hoc* unit charged with the measuring and reporting of the activities in the RSs.

Secondly, the Monitoring Report is the mean of communication used by the monitoring task force to make public the results of their measures upon a wide set of urban data, uncovering possible undesired impacts and enabling strategic evaluation about the achievement of long term objectives. In fact, the regular activity of monitoring may ensure the plans implemented in the RSs are actually about to generate the expected results and, if not, that it would be possible to modify strategies and eventually re-steer the process.

Besides, experts in monitoring (e.g. University researchers) may favourably need to constitute a panel and be involved in the start-up phase in order to study, analyse and suggest adequate set of indicators to be adopted for the measurements. In fact, in a complex and crucial activity such as monitoring, it is necessary to guarantee scientific methods, cause-effect relations, the indicator's relevance to its physical quantity and the

establishment of the adequate periodicity for measures and evaluations. So, all the just mentioned fields are interesting cross-pollination points for further quantitative research, as recalled in the What is Next section.

Furthermore, the intense and vast activity of monitoring and evaluation would possibly benefit from a potent digital platform for the data management. Indeed, a point from which Smart City solutions can be developed with strong effects is arguably that physical interface that would allow the RSs Knowledge Framework, and therefore the Monitoring Report, to receive continuous live updates from the urban environments.

By way of example, facilitations may come from the installation of smart urban sensors in the studied areas, realising the so-defined SENSEable City, which is a concept of infrastructures interfacing physical quantities and hi-tech monitoring. This platform would ideally realise a connection among human behaviours, technologies and urban environments, managing the flows of data to aid a new digital approach to urbanism and urban planning (MIT, 2015).

Indeed, it could be argued that human behaviours data are some of the most valuable for private companies as for urban planners, because they may allow the optimisation resources and services supplies (e.g. energy, water, waste, heating, public and private transport…).

5.5 Core Processes and Deliverables

The following paragraphs illustrate how all the tools and plans so far described interact with each other and how are generated in the general case. The processes intend to have circular characteristics and aims at a progressive self-optimisation. As a consequence of the structural division between Structural Agency and Design Group, it is firstly possible to individuate two iterative processes carried by these actors when consolidating its grouping after the start-up phase (par. 5.5.1). Indeed, this separation may give a certain degree of flexibility and swiftness to the processes undertaken by the operational parts (DG), possibly allowing a lower bureaucratic burden and increasing the overall efficiency.

Next, it is possible to individuate the crucial process of spatial planning, leading to the final adoption of the Functions Plans, the monitoring and the outcomes in the RSs (par. 5.5.2).

5.5.1 Scouting Processes: Grouping and Liaising

The participants declaring their interests after the start-up are invited to follow the relative procedure to join the SA or the DG. As the nature of the participant is not the same, also the two teaming-up processes may be dissimilar.

Firstly, the Structural Agency could be expected to be a rather familiar group of actors, consisting predominantly of administrative element of the general public. Hence, it could be expected to have collaborations and contacts already in place and the process of formation to be not particularly hard, if not for bureaucratic reasons. Via a brief promotion campaign, that could occur parallel to the start-up phase, and a conference ending up with an agreement between parts, the representative of the public authorities may join the process and sit in the Agency. Usually, as for the case of common land planning in Emilia-Romagna, all the relevant actors having a share of responsibility in land planning and development shall be invited (Emilia-Romagna Region, 2000, art. 14). However, as the framework is not legally binding from the start, hostile, cumbersome or uninterested subjects can be excluded at this point, for the sake of straightforwardness of the framework. Nevertheless, the teaming up process of the SA should be kept open from time to time for other public actors to join.

Secondly, the DG teaming-up process can be rather different. It could be expected to be more complex, always open for new participants, and it certainly needs more communication and networking for the active match making operations, therefore requiring the support of the facilitators bodies (clusters, networks, social organisations and citizens…).

The start-up phase should favourably end up with a list of non-public partners seriously interested to follow up and undertake the responsibilities concerning the design phase.

At this point, the pioneering participants select and propose their reliables as members for the Design Group. It appears not essential at this point to distinguish if the selected personnel are originally employees of the pioneers or not. Indeed, they may be external to the participating partner as long as they are trusted, considered representative and relevant to the developments by the latter. The number of representative per partner inside the DG should not be regulated just by the capacity of the partners to sustain

its own sitting members. Methods should be established in advance in order to guarantee the participation of weaker subjects, trying to respect a correct mix of stakeholders reflecting the community where the activities are going to take place. Hence, it should be a fair number of members that would suffice to work proficiently on a project and fulfil all the possible tasks.

In addition, since the gathered members of the DG are going to work *inter alia* on Functions Plans, it is thinkable that they may be consultants, citizens or any other kind of expertise with openness for new ideas, teamwork and design skills.

Further, it is arguable that the presence of facilitators e.g. extracted from clusters, networks or non-profit organisations may be useful in the operations of groups working around the proposals. Moreover, it could be imagined that the partners may be required to provide extra specialists to the DG in order to cope with specific technical operations e.g. a task force for monitoring.

Besides, the DG could be initially facilitated via a limited portfolio of actors who decide to participate without an extensive request for other partners. Despite the limited numbers, the more diverse is meant to be the better, as it may allow manoeuvrability upon a larger PoF and therefore feasible implementations. Arguably, at least one financially capable host (hypothetically a land developer, a landowner, a constructor, a utility company…) might be needed in order to boost up and complete the proposals around the first Functions Plan.

Thus, the Design Group stays open with further members free to join the work at any time, aiming at an increase of the potential synergies among partners. The DG is meant to be a highly collaborative group around plans that are compliant with the initial shared vision of Sustainability. Hence, there is no special contract or binding agreement in order to join the DG: the partners are somehow required to sustain the framework, show interest and present proposals having relevant objectives. For the same reasons, the DG is not intended to give any veto on the proposals made by the members. In fact, the attractivity of the proposals is thought to be the main driver capable to make willing partners cooperate in the plans and eventually realise the fitting functions.

After the start-up and the latter assembling phase, the DG may have enough members to start several discussions about feasible Functions Plans and consequently move to the second phase.

5.5.2 Analyses, Design and Action: the Strategic Spatial Planning Process

Fig. 5.4 – Strategic Spatial Planning Process: the steps

In the initial phases of the process some operations have a one-time recurrence (e.g. the start-up phase, the first group gathering, first analyses and documentation phase, composition of the founding documents), while other ones represents the circular and operative part of the core process and are iterated multiple times. In addition, fig. 5.4 sums up the process steps.
Furthermore, it is possible to add a brief step-by-step description of the process after the first groups' formation (par. 5.3), taking special care to highlight the circular set of actions leading to the adoption of a new Functions Plan.

First of all, it is conceivable the needs of further analyses on the urban fabric once a minimum force of partners are gathered in the groups. The promoters of the framework should actually take care about a first gross analysis of the local communities needs and urban environments conditions. As a recommendation, this should be done since the start-up phase in order to highlight relevant thematics, within the three pillars of SUD, to be taken into account in the R-Spaces (e.g. put a major focus on Sustainable Mobility rather than into new techniques serving entrepreneurship, such as Open Innovation). When available, existing data from the public authorities' database and specific documentation (such as Regional Plans) should be exploited to have a short digression on the larger city and region situation. In addition, profitable information in these terms can be the one related with ICT, e.g. GIS or CAD data. Further and probably the most consistent part of the urban complex analyses can be certainly retrieved by existing Detail and Municipal Plans. Besides, an additional ambition of this step would be to implement cutting-edge or alternative territorial analyses, based on human behaviours, spatial integration of the city fabric and, in general, urban objects and flows. Hence, it might be interesting to consider the running of stats, questionnaires, micro-simulation software, or involve actors similar to Space Syntax (Stockholms Stad, 2011, p.35) and SENSEable City Lab. All the collectable data shall be classified in order to successively fit the R-Spaces Knowledge Framework.

1. The DG shall start to prepare the founding documents (par. 5.4.1). At this point they are still in their preliminary version, but already act as a substantial framework as the decisions on thematics and rules are taken, vision and goals are narrowed down and the data collected.

2. The local communities are involved in the analysis, as participants and citizens make suggestions about potential R-Spaces in the targeted area (e.g. at neighbourhood level). Ensuing from these explorative conclusions, a first compilation of the Portfolio of Functions is done. In addition, it should be pointed that this is the step where the ending of the process is reconnected to the main course of the events, so that the present and the following operations are meant to be cyclically repeated.

3. The information gathered so far is expanded in the DG, formalising the individuation of the first R-Spaces to work with. Thus, the RSs are classified and described in their key parameters. Hence, at the end of this stage, the RSs Knowledge Framework should be as complete as possible.

4. After the identification of the RSs, the elaboration of the preliminary Monitoring Plan is potentially feasible. Consequently, DG participants can internally start to detail their Functions Plan proposals already including monitoring specifications.

5. A host, a partner or any other member submits and illustrates its Functions Plan proposals in the Design Group, highlighting its vision for further city liveability, attractiveness and resilience.

6. The DG and the intermediaries go through the proposals, generating a tailored request (e.g.an open call, a direct invitation or an open competition) that may complete the provisional Functions Plan as much as possible, identifying possible missing activities or actors that could proficiently cooperate.

7. The request is published and promoted via the available networking channels as forecasted by the Communication Plan and using the most appropriate tools of Active Matchmaking (par. 5.4.5).

8. The Design Group members and the possible new partners gather together in the sub-groups pertinent to each Functions Plan proposal, and fine-tune the projects. To do so, a critical number of relevant partners have to respond from the matchmaking actions.

9. The fine-tuned and executive version of the Functions Plan is presented at all the DG members. If the Functions Plan objectives are in line with the overall goals of the framework, the DG receives the plans and adopts it. In case of private subjects operating on own spaces, except from the request of any possible permission for the activities, it is conceivable that at this stage the plans are going to be implemented. On the contrary, the plans are not yet sacred for those activities that e.g. require new policies or occur on publicly owned land and need the legitimate approval by the public authorities in charge for land planning and development. In fact, these peculiar cases are normally solved only after the next (optional) step.

10. If needed by the kind of activities and spaces designed, the executive Functions Plan ought to face the adoption procedure of the Public Authority (PA). In this case, if the design process occurred along a proficient collaboration and frequent interaction between the Design Group and the Structural Agency, the approval may be effortless. Likewise, this may occur if the Functions Plan implies activities for which public authorities themselves need to develop new policies and pass new regulations.

11. The activities forecasted by the Functions Plan are realised and the practical development of the framework occur. At this stage, if the funding is secured, it could be possible to affirm that the basic preconditions facilitating SUD are produced. The activities in the R-Spaces are started by the proponents and involve all the designed stakeholders.

12. Activities and services are monitored accordingly to the Monitoring Plan as they run, while summaries and performance indicators are periodically published in the Monitoring Report. At this stage the Strategic Planning methods within the framework allow the operator to possibly modify the activities

13. At the natural end of the implemented activities (if any), or after a pre-scheduled period of time, participants evaluate the overall impacts ensued from the Functions Plan, i.e. activities or services put into practice, partners performances and level of synergy reached. Moreover, DG members verify the accomplishment of their objectives and, in case of satisfactory results, update or expand the plans, reconnecting with the process at point number 3.

First, the most desirable and tangible outputs of the process are feasible and implementable Functions Plans, enabling the city to actually use all of their urban spaces in a dynamic and sustainable way.

Second, the monitoring and evaluation phase are the tools through which hosts, partners and supporting organisations may manage to modify their own strategies in case the ongoing operations are not being oriented to the desired objectives. This option is even more valuable in case the same activities are going to be iterated after the first process.

Third, please observe how, for the mentioned reasons, the Functions Plans remain changeable during the active matchmaking process. Although major goals for the activities are outlined at the start, the specific parameters and goals for monitoring will only be able to be included once it is understood which partners will be taking part, and the complete panorama of activities that are going to be undertaken. This is crucial in order to establish reasonable timelines, which all participants need to work in accordance with.

Finally, via the iterative processes, the prototype pursues further opportunities, synergies and self-optimisation: although the DG will once again supervise the compliance of the new proposals, the decision whether functions are going to be iterated or not mainly depends by stand-alone agreements between partners.

5.6 Discussions and Implementation Strategies

At this point, a gross illustration of the essential mechanisms, operators and tools characterising the prototype is considered completed. In a theoretical and non-exhaustive analysis, this paragraph makes assumptions, reports discussion, critics and speculations about how the framework for R-Spaces can be strategically articulated in order to be as feasible as possible and deliver benefits.

5.6.1 Roles and Opportunities for all SHs

Role	Opportunities for Participants
Host or investing member (e.g. companies, organisations…)	Develop urban spaces Test activities, products or services
DG Members and further partners from the active matchmaking	Realise the planned activities
Developers of urban infrastructures or services (e.g. building companies, energy suppliers, technical vendors, public transport companies…)	Build infrastructures, products or services Assume Sustainability commitments
Intermediaries and facilitators (e.g. public relations agencies, human resources agents, IP intermediaries…)	Do networking and connect SHs Be an Intermediary for the IP market Help to build a communication platform Provide expertise
Researchers and experts (e.g. Universities, professionals…)	Advise at crucial steps and fine-tune the model with quantitative know-how Offer or acquire IP
External Investors	Invest in the activities as non-DG member Offer or acquire IP
Public authorities	To develop new public policies To support Sustainability-related commitments
Incubators, Entrepreneur HUBs, Clusters, Advisors	To boost active matchmaking To identify missing elements in the FPs

Tab. 5.2 – Main roles and opportunities in the framework

It may be arguable that the mixture and genre of participants eventually aggregated in the plans can be a determinant factor. Theoretically, the present prototype forecast a set of main roles and relative opportunities within its schemes (tab. 5.2). Afterwards, considering the entity of interests and participants, it shall be possible to infer an esteem for the budget and, consequently, for the physical dimension of the framework, and scale it to the most feasible level (e.g. city district, neighbourhood, rather than a limited number of buildings).

In addition, it might be possible to highlight attractive points for actors. Public authorities and decision-makers may be interested in developing new form of deal for public-private relations, or to offer vibrant and liveable cities, increase participation and achieve Sustainability goals at the same time.

On the other hand, private bodies may see the prototype as an alternative opportunity for business, development and collaboration with local partners. Indeed, it is not obvious that even private partners can afford alone costs and challenges for the conversion, especially smallest companies and the mentioned social organisations. Hence an open and alternative collaboration platform may serve these actors, finding therefore a key role in the schemes for the intermediaries and the facilitators.

5.6.2 Open Questions, Options and Guidelines for the Implementation

Under a multidisciplinary point of analysis, it is possible to discern a certain variety of intrinsic questions, which may probably ensue from the urban complexity and diversity of the actors typically involved.

On the one hand, it is useful to identify and report two core questions (tab. 5.3), allegedly having a great influence on the development of the model generating effects on a wide range of matters (e.g. use physical space, efficiency of the processes, inclusiveness…). Moreover, observe that the discourses derived from the two core questions may not always have obvious answer, as they open options that could be too case-by-case related. Hence, the guidelines suggested in the present paragraph are to be considered for the general case, as they may vary once tailored to a local context or articulated in accord with a certain thematic. Hence, a series of guidelines is hereby presented (tab. 5.4) with the intention to favour the best results and overcome potential obstacles in the realisation of the framework and the adoption of the Functions Plans.

Two Major Open Questions	
Question 1 **Use Public and/or Private Urban Spaces?** *Assessing possible advantages deriving from the involvement of public bodies into the prototype, depending on:*	1. How easy would it be to fit current planning and laws
	2. Particular conditions obtainable from public bodies (e.g. funding, better tax regimes on transactions and jobs)
	3. Need to boost synergies via diversity of the participants (Design Group and larger community)
	4. Necessity of scaling up the activities from small dimensions to urban 1:1 dimensions, and from experimental level to urban or citizens' final level (e.g. from a trash bin to a city farm)
Question 2 **Who Guarantees Justice and Controversies Management?** *Assessing the best suitable structure to guarantee certainty of regulation and conflicts resolution for the participants, depending on:*	1. Reliability and fairness of public authorities (in becoming guarantors and creating safe environments for investments and functions in the R-Spaces)
	2. Effectiveness and strength of alternative private-to-private agreements (refer to Eco-Industrial Symbiosis at Kalundborg Refinery Complex as effective "No Public" case study)
	3. Development level of local intermediaries, facilitators, HUBs, clusters and support organisations.

Tab. 5.3 – Assessment of two crucial open questions.

List of Guidelines			
#	**Recommendation**	**Phase**	**Purpose**
1	Identify eager actors and liaise with the most willing ones. Avoid hostile or problematic ones.	Start-up	Aim at light, quick and easy realisations that can get results in short time. Speed-up the processes.
2	Seek approval or endorsement of an important public or private actor.	Start-up	Enhance the support and the public image of the adopted prototype. Improve visibility and attractivity towards further participants.
3	Care or invest reasonably in the structures for counselling, tutoring and intermediation.	Start-up	Ease the participation and realise the active matchmaking. Connect and support smaller partners.
4	Right-size and scale the functions in the RSs.	Start-up Design of Functions Plans	Individuate the dimensions of the FPs in physical space and time. Increase the likelihood for participants to realise their ideas with minor adaptations.
5	Context sensitive individuation of the core thematics. Tailoring to local interests, deficiencies and actors.	Start-up Selectively in specific FPs	Prospect a role for potential actors and attract them. Possibly qualify the model for certain funding. Kick-start or support Place Branding.
6	Target communication and advertising of the model according to future potential participants	Start-up Active matchmaking	Enhance participation Have feedbacks on desirable directions for the model development Increase the success of the matchmaking phase

7	Liaise with hostile or indifferent stakeholders	First DG up and running Design of FPs	Enhance diversity Gain support of important SHs Enhance social inclusiveness
8	Keep density of resources and participants in a spatially limited area	Design of FPs	Get quick results and evidence of proficiency. Do not dissipate resources on wider areas jeopardising the realisations and their impacts
9	Favour multifunctionality in the Functions Plan	Always	Catch the interests of a vast number of SHs Make spaces suitable for any kind of urban user

Tab. 5.4 – Suggested guidelines for the prototype

5.6.3 Pioneers and Economical Feasibility

A further important question, so far out of the presented schemes, is the potential value embedded in being part of the pioneering actors. In fact, it may be imaginable in the dealing and start-up phase to encounter actors willing to take part in the proceedings “at almost any cost”, whilst others may express reluctance. Arguably, the proponents of the framework have the duty to outline the benefits related to the pioneer’s position, despite certain choices or investments may be perceived as risky (e.g. lose own expertise’s time for dealing, evaluating and planning).

Firstly, pioneers have an influence in the composition of the first Design Group, defining details and specifications of the nascent mechanisms within the toolbox (e.g. the openness towards public bodies and the roles of the Structural Agency). Secondly, they have an important responsibility to facilitate a seamless start for the prototype, which may be determinant to obtain quick successes and then boost the appeal of the whole framework. Potentially, this could probably bring an interesting gain in terms of public image for the pioneering actor.

Further, funding and economical feasibility are sensitive strategic issues upon which pioneers are entitled to deal upon. Indeed, financing can be differently organised and sought depending on the abovementioned questions and options.

Thus, it should be planned how this factor may be considered a problem rather than a strategic variable within the framework. In fact, while individuating the core thematics (tab. 5.3, guideline 5), the prototype can be shaped in order to meet requirements for specific funding from different sources, such as:

- ✓ European Union
- ✓ Local governments

- ✓ Governmental development agencies and HUBs
- ✓ Private companies
- ✓ Non-profits
- ✓ Crowdfunding
- ✓ HUBs and Alternative (e.g. see Camponeschi, 2010, p.59)

For instance, if reckoned to give decisive likelihood of realising the final plans, the design of the functions in the RSs may be done in compliance with the 2020 strategies expressed by the European Union. In fact, after the end of the previous program (2013), details are now available for the new Cohesion Policy related to the Multiannual Financial Framework (MFF) 2014-20 (Davies, 2013).

Besides, by following the requirements, the Design Group may have the chance to seek support for its schemes from the newly presented programs of the various EU funding available. Depending on the established thematics and expected kind of impacts of the prototype, the DG could aim at the following funds, with the related priorities:

European Social Fund (ESF)	**European Regional Development Fund (ERDF)**	**LIFE+ Programme**
Employment and Mobility	Research and Innovation	Environment
Better Education	ICTs	Climate Change
Social Inclusion	Competitiveness of SMEs	Nature conservation
Better Public Administration	Low-Carbon economy	Biodiversity

(European Commission, 2011a, 2011b, 2014a, 2014b)

As the mentioned ways appear to be mainstream, new alternative methods such as crowdfunding recently rose to the public attention. Thus, the numbers of this increasingly popular system to fund creations and initiatives from the grassroots are significant.

So far as January 2013 and only as for US based projects on the Kickstarter platform, the phenomena concerned at least 48500 projects for more than $237 millions (Mollick, 2014). In particular, crowdfunding allows any subject (from single citizens to profit-driven companies or non-profits) to collect voluntary small donations pledged to support the realisation of a specific idea by a large number of individuals.

Besides, these platforms can be effective if exploited for place-based initiatives, directly related to local needs and possibly driving the backers (local citizens case) to further durable engagement in their own neighbourhood (Camponeschi, 2013). Hence, crowdfunding could theoretically suit and support all those functions related to Temporary Uses

illustrated in the PoF of this prototype (e.g. from Placemaking to pocket parks, from temporary stores to Urban Agriculture).

Nevertheless, it should be observed that there are also remarkable cases in which crowdfunding entirely financed the creation of civil and permanent infrastructures, such as the example of the Luchtsingel pedestrian bridge in Rotterdam (Anderson, 2013).

However, it is arguable that the method may need further fine-tuning to face controversial matters concerning the inclusiveness and democracy of its proceedings, i.e. enabling only people or area with disposable income to pre-finance their favourite urban initiatives (Nelson, 2013).

As a consequence, the prototype could strategically opt to differentiate the kind of funding for the set up of the framework itself from the resources needed to introduce further heavier functions in the R-Spaces.

For example, crowdfunding could be exploited to finance the staff taking care of group gathering, first planning process and dealing with partners in order to quickly start-up the framework and involve actors in preliminary Temporary Uses. On the other hand, other resources e.g. referring to the EU Cohesion Fund, could be sought for the latter, i.e. first non-temporary realisations that may require higher costs.

5.6.4 Implementation Strategies and Incentives

As a consequence of the two core questions and the exposed general guidelines, it might be possible to speculate about two implementation strategies that may modulate the final form of the realisations between extreme scenarios (tab. 5.5). The choice to favour a first implementation should be done between a “Go Public!” and a “No Public” strategy. The evaluation for this choice may ponder about which actors demonstrate to be the most committed ones at the start-up phase between private and public ones, and questions such as funding opportunity, entrepreneurial appeal, efficiency and interest for pioneering roles by the participants.

Afterwards, the choice for the second implementation strategy should be done between “Indoor R-Spaces” and “Outdoor R-Spaces”, reasoning about the most desirable physical occupancy and scalability that the designed fitting functions need to have to be effective. The speculations upon this point regard questions such as the opportunity for a quick and cheap start or the possibility to bring the results to a larger urban dimensions and citizen level.

Options	Opposite Scenarios	Questions to Evaluate
1st Implementation Strategy (Actors, funding, and incentives)	**Go Public!** The Structural Agency is fully engaged in the process as both mentor and sponsor, and strictly follows each phase.	✓ Eligibility for special public funding ✓ International projects, agreements, protocols with public bodies and institutions ✓ Eligibility for certain incentives ✓ Democracy and legitimacy reasons ✓ Higher social inclusion
	No Public! The public authorities are external and not directly involved in the design phase. Interactions with public bodies occur only in case certain permissions are needed.	✓ Avoid possible hostile public bodies or bureaucracy ✓ Ease the start-up phase ✓ Gain higher control over the proceedings ✓ Autonomous or alternative funding
2nd Implementation Strategy (Physical occupancy, methods and scalability)	**Indoors RSs** The Functions Plan includes only RSs privately owned by the participants, excluding public spaces.	✓ Extreme personalisation of the methods (internally regulated rules, agreements and participation) ✓ Necessity to have spaces available at once and quick results ✓ No needed integrations in current planning (e.g. Municipal and Detailed Plans)
	Outdoors RSs Extension of the FPs on the outdoors and/or publicly owned spaces or urban infrastructures.	✓ Develop public and large-scaled functions (e.g. bike sharing system, pavements redesign…) ✓ Necessity of the highest number of synergies by participants' diversity ✓ Lack of own spaces

Tab. 5.5 – Comparing opposite scenarios for collaborative planning of RSs

The mentioned choices are therefore capable to modulate the final results in the R-Spaces, deciding physical size, openness and location of the Functions Plan and its fitting functions (fig. 5.5).

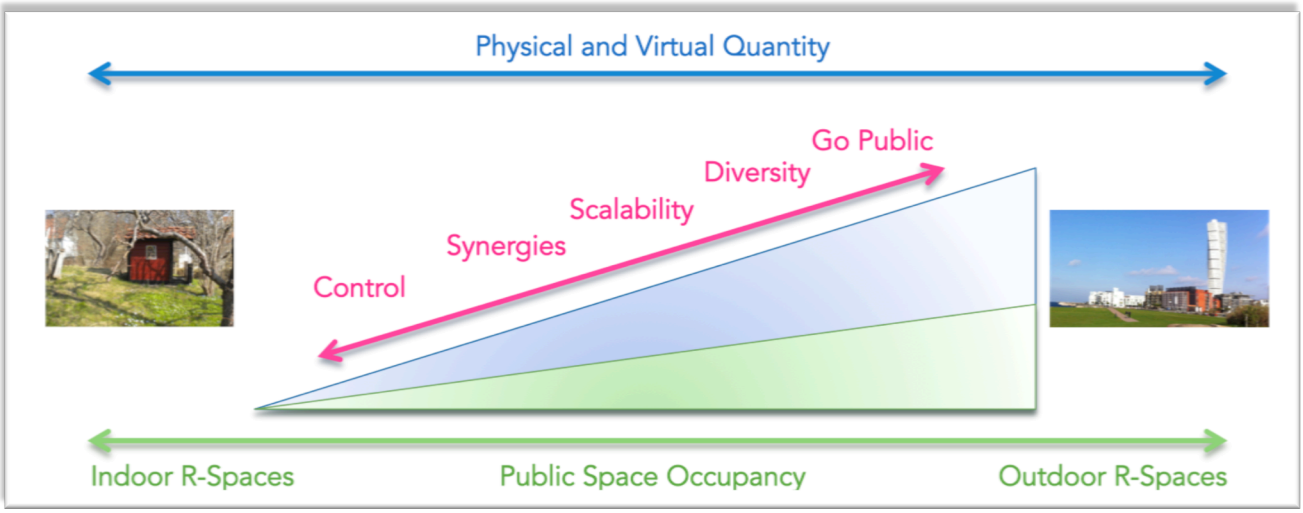


Fig. 5.5 – Scalability and physical domain of a Functions Plan and its R-Space

To sum up, once a comprehensive analysis of the local conditions, potential options and feasible guidelines is completed, a crucial tactical job is arguably needed to put everything together and evaluate the best strategies to adopt in each of the contexts of the prototype.

In addiction, another tactical element may be a program of incentives, which may support the creation of a favourable environment for the prototype and ease the engagement of any sort of stakeholder. On these terms, it might be useful to investigate opinions and needs of the targeted participants in order to find adequate and stimulating incentives to enable them. However, it might be observed that the articulation of these incentives may strongly depend upon the final scenarios depicted by the adopted strategies (tab.5.5).

Further, apart from its start-up phase, the DG should consider multiple occasions within its proceedings for the introduction or discussion of new incentives with interested actors, as the political and economic panorama is naturally subjected to changes.

As an example, it is possible to identify seven main categories of incentives, some of which may require agreements with public authorities, bank institutes or investment funds. The outcomes are intended to increase overall Urban Resilience, bring services to the local community, reduce their environmental impact or improve and innovate the local economy.

1. **Financial support for investments** – Particular conditions for loans, debts and equities
2. **Tax credit and deduction** – Earned at local or national level
3. **Policy changes** – Lowered bureaucracy and specific deregulation
4. **Net monetary contributions** – A scheme for grants and subsidies
5. **Tutoring and consultants** – Provide free/low-cost *ad hoc* education or expertise for mentoring with permissions and bureaucracy, financial issues, project development costs (feasibility studies, engineering and design work…), societal and entrepreneurial innovation
6. **Reduced costs for participants** – Program for free/low-cost office space and storehouses
7. **Urban Planning measures** – General/case-by-case special parameters and options in the Municipal Plans for Sustainable Urban Development

The mentioned categories could then generate complex schemes, which shall favourably lead to specific desirable actions and outcomes, often similar with the ones from the suggested Portfolio of Functions (par. 3.4 and

5.4.3). For example, comprehensive thematic programmes of incentives are reported as follows:

An **Energy Audit** and SUD program, with support to certify actors and activities according to established international standards (e.g. ISO, TÜV, LEED, BREEAM…)
A scheme for **Renewable Energy**, accelerating the use and the merging of high technology for energy production, sharing and consumption monitoring (Smart Energy Management Systems, domotics, Smart Grids, ICT…)
A **Brownfield-remediation** program focused in urban and peri-urban areas
An **Unsealing** program to remove unused or oversized paved areas
Free mentoring to obtain **EU funding via a consortia** of actors supported by a public institution
Benefit for companies undersigning and involving **key actors from other countries**
Scheme for **Green Infrastructures** (clean air and water, reduced greenhouse gases, increased ESSs)
Use of **local resources** in the activities (e.g. as the Transition communities)
Review of **waste taxes** for companies reducing their waste and improving the system
Review of priorities for the access to **ESF funded course** for employees of companies participating at the activities
Review of **planning coefficients** and urbanisation costs (add floors on existing building, allow to rebuild more densely in already urbanised areas, extra cubature for bio-architecture and smarter use of the internal spaces)
ToR Programme to create continuous green areas, favour public-private agreements for public use of private spaces

(NYCEDC, 2009, Kazmierczak and Carter, 2010)

Finally, it is a duty of the scheme proponents to avoid controversies connected with incentives and subsidies, e.g. such as those that can be exploited in the case of renewable energies (Woodman and Mitchell, 2011). Indeed, monitoring and critical evaluation of the results may have a further role in this case, as incentives may not always respect the original intentions in terms of desired consequences. In particular, a good praxis might be to propose an incentives scheme mainly based upon measurable performances or parameters, and discourage one-time contributes.

5.6.5 SWOT Analysis for the General Case and Road Map

As a conclusion for the paragraph dedicated to the critical discussion of the designed prototype, the present section develops a qualitative analysis in order to offer an initial platform for future fine-tuning and adaptation. The

SWOT analysis divides favourable and unfavourable factors that are internal or external to the prototype domain.

Location of factors	Type of factors	
	Favourable	**Unfavourable**
Internal	***Strengths*** ✓ Flexibility and scalability of the fitting functions for RSs ✓ An open and iterative process enables the SHs' participation at multiple levels ✓ The monitoring solutions permit stability of targets, performance control and transparency ✓ The Design Group is a new and diverse community of change makers in the area ✓ The tools to involve public bodies allow the projects to be eligible for further public funding at all levels (e.g. EU) ✓ Partners can share resources when developing spaces and maintain control over their activities at the same time	***Weaknesses*** ✓ It does not detail agreements and rules among participants (e.g. how to handle with the substitution of key actors and the conservation of participants' diversity and principle to select the DG members) ✓ Its transferability and feasibility may require further resources for compromises and on-site tailoring that is not easily quantifiable in advance ✓ It is not clear who and how possible controversies between two participating actors may be solved, leaving it to case-by-case agreements ✓ It lacks specifics about indicators for the monitoring of the functions
External	***Opportunities*** ✓ To kick-start a different and alternative way to use urban land, concentrating actors and resources, enhancing private-public agreements ✓ To have entrepreneurial possibilities to develop and implement IT and Smart City solutions ✓ To develop new policies for the public sector and represent a landmark for Sustainable Urban Development, generate pilot projects and best practices ✓ To use Strategic Planning methods and tactics e.g. work either together or without public authorities depending on consequential advantages or limitations	***Threats*** ✓ Possible sudden loss of diversity among key stakeholders crucial for the development and management of the RSs and the other operations in the process (e.g. cluster organisations, larger partners, actors responsible for the monitoring) ✓ Local lack of key actors in the areas, such as cluster organisations ✓ Lack of competitiveness in the area in the case of desired larger investments, e.g. monopolies or cartels by private companies ✓ Lack of interest by public authorities and/or local communities

Tab. 5.6 – SWOT analysis for the general version of the RSs framework

It should be reminded that this analysis is based on the general case of the framework and, at this point, it does not specifically take into account all the various possible Sustainability's thematics (e.g. socio-cultural) or the economic and physical dimensions of the Functions Plans.

Finally, in order to promote the framework from this paper, it might be useful for the proponents to follow a road map and share it with the interested

participants. A list of ideal passages could be outlined as follows, and accompanied in the original version by the relative date of the event.

1. Create and manage a **publicly accessible platform** on Internet for collaborative participation, with key expertise to receive feedbacks.
2. Collect **feedbacks to refine model** and improve the current documentation.
3. **Publicize** the model in institutions and associations and call for collaboration (universities, municipalities, governmental agencies, interests groups and think tanks on the Internet).
4. Individuate a **preliminary staff** for the promotion of the prototype in the launch phase.
5. Prepare clear and neat **illustrative** visual documentation to accompany the existing one on the websites, collaborative platforms and social networks.
6. **Crowdfunded conference and workshop** with interested developers and stakeholders. Actions at the launching meeting:
   - *Contacts and discussions with available participants. Eligibility principles for the DG. Individuate representatives for each interested SH.*
   - *Discussions with experts and public authorities representatives if and how the prototype might be integrated into the planning system or partly recognised, and how the public bodies can favour the process bureaucratically or with incentives.*
   - *Reasoning about the Structural Agency and way to gather it.*
   - *First hypothesis on the shared vision*
   - *First hypothesis on thematics, Portfolio of Functions and Functions Plans: locations, time spans, functions, SUD's characteristics and actors. Organise the results of the proposals in an appropriate open and accessible documentation.*
   - *End of the conference: preliminary shared vision with a time-specified and detailed road map.*
7. **Start-up** phase (par. 5.2.1)
8. Formal **Grouping** (par. 5.5.1), **documentation** (par. 5.4) and **core process** (5.5.2)

Tab. 5.7 – Road Map: what is next for the prototype?

Above all, it is arguable that basic drivers for a rapid and effective kick-start are the level of interest for SUD in the area and the persuasion job operated by the promoters. In these cases, it might be expected the road map to be detailed and high-paced. Notwithstanding, the paragraph presented critical analyses and options to adapt the prototype to site-related conditions and overcome potential obstacles such as actors' indifference or lack of resources.

5.7 Case Studies

The intention of this section is to apply the ideas and knowledge discussed so far to practical situations. The two cases are identified as prevalently belonging to one of the three main pillars of Sustainability: environmental, social and economic one. Both are then analysed and reviewed using the planning prototype for R-Spaces and finding a common ground to extend their magnitude in terms of Sustainable Urban Development. In line with the purposes of the paper, the intent is now to offer a structural way to support reduction, reuse and recycling of R-Spaces, adopting specific drivers to start the action from:

Sustainability Pillar	Driver	Case Study	City, Country
Environmental	Low-carbon economy	The Solar Community	Casalecchio di Reno (Bologna), Italy
Economic	Open Innovation	A Strategic Planning Framework for Open Test Beds	Malmö, Sweden

It might be further reported that, in order to host the presentation of the cases, an *ad hoc* basic template was designed and organised in the following sections:

- ✓ The Project in a Nutshell – Give rapid and basic information about the case
- ✓ The Background – Identify original purposes and problems of the cases
- ✓ The Case Study Analysis – Review the original case via the RSs prototype
- ✓ Urban Change – Discuss the potential innovation of the solutions suggested

Finally, it is shall be reminded that the speculations about the cases are the product of solely qualitative analyses. Moreover, it should be remarked that the Swedish case was kick-started via a workshop, the 2013 ACSI Camp in Malmö. The framework for Open Test Beds was then produced brainstorming with participants and applying the theories of the present research to the challenge submitted by the challenge-holder, namely E.ON Sweden (utility and energy company). The documentation produced after the workshop consists in a report, a PowerPoint presentation and a one-pager (see reference and Appendix par. A.2.1).

5.7.1 The Solar Community (Extended)

La Comunità Solare Locale, Casalecchio di Reno, (Bologna), Italy
Website (ITA): http://comunitasolare.eu

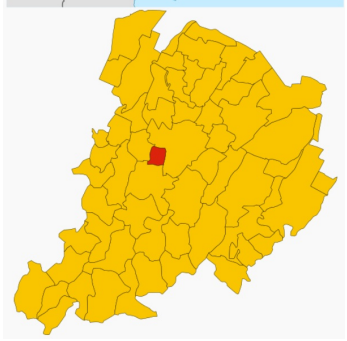
Graphics: Studio Moretti Bologna

The Project in a Nutshell

Solar panels installed on the roofs of public buildings create a first platform for renewable energy, which is partly shared with citizens and enterprises, creating a community of local changers. The revenues deriving form the platform are reinvested in energy saving measures (e.g. refurbishment of buildings, purchase of energy efficient domestic appliances…), reduce energy bills and energy dependency, therefore creating a virtuous circle and eventually cut CO_2 emissions in line with the 2020 EU Strategy.

Basics

Pioneer and panels host	Municipality of Casalecchio di Reno, Pop: 35328 Area: 17,37 km^2 (Jan. 2013)
Location	Province of Bologna, Emilia-Romagna Region, Italy
Case Organisational Form	Public tendering and 20 years concession
Case Framework	*Ad hoc* regulation, statute and municipalities convention



a. 

b. 

c. 

d. 

Fig. 5.6 – Casalecchio di Reno (a) and part of the platform: a school (b), the library (c) and the cemetery (d)

Timeline

Directive 2009/28/EC (EU 20% Renewable Energy) published April 2009

Municipal Energy Plan (Piano Energetico Comunale – PEC) adopted May 2011

Documentation Framework (Regulation, Statute, Municipalities Convention Agreement) approved October 2013

New Municipal Plan (Piano Strutturale Comunale – PSC) adopted April 2009

Physical Platform (solar PV modules and interventions) from Sept 2011 to May 2012

First subscriptions to the Solar Community November 2013

Public and Private Partners

Convention of Municipalities (at Dec. 2013)	Concessionaire, tech consortium and other developers	University of Bologna Industrial Chemistry Department
Casalecchio di Reno Medicina Ozzano dell'Emilia San Lazzaro di Savena Sasso Marconi Zola Predosa	Space design and feasibility plan Solar panels supply & installation Monitoring Energy distribution	Scientific coordination of the project Integrated System of Energy Management (SIGE - Sistema Integrato di Gestione dell'Energia)

The Physical Platform (Urban R-Spaces for Solar Panels)

Individuated spaces	Roofs of 19 publicly owned buildings
Overall interested population and area	129784 inhabitants; 418,85 km^2
Expected households taking part	2000
Overall power installed	655kW
Solar panels overall surface	5000 m^2
Power reserved to the municipalities	425 kW
Power dedicated to the Solar Community	230 kW
Overall expected production	14000000 kWh/20 years
CO_2 emissions avoided	7000 tons/20 years
Overall Costs (concessionaire)	2,3M EUR
Municipality net gain over sold energy to the net	15000 EUR/year
Municipalities direct expenses in the platform	0 EUR

Fig. 5.7 – Casalecchio di Reno: the town hall, one of the 19 sites (ph. Carlo Pelagalli).

The Background

The case is originated by an initiative of the Municipality of Casalecchio di Reno to create a local community with social and environmental purposes, such as reduce energy dependency, cut greenhouse gas emissions, create jobs and constitute a social fund. The Community poses as core values social responsibility, transparency of the process, compliance with shared goals and mutual trust. The kick-start for the Community is the production of renewable energy using solar panels. The role of the public body in this case is multiple:

- ✓ Assist and reduce the bureaucracy for the Community via tutoring
- ✓ Create the legal framework and right contractual forms among public and private partners
- ✓ Provide the spaces to host e.g. the solar platform
- ✓ Seek for further funds and participations

Method

The proponent (municipality) issues a public tender, over a 20-years concession to manage its energy bill and the advantages of the platform. The preparation of the public tender is technically aided by a tech consortium, which realises the executive project of the spaces and the feasibility study.

Further, interested commercial and technical suppliers tender for the contract, eventually win the concession and deliver the established public services and goods. On the one hand, the contracted realisations and services are:

- ✓ Reconditioning of the municipality roofs (e.g. waterproofing, asbestos removal, shingles replacement)
- ✓ Supply and installation of solar photovoltaic modules (for 655 kW)
- ✓ Discount on the municipality bill (relative to 425 kW)
- ✓ Discount on the Solar Community bill (relative to 230kW)
- ✓ Re-invest profits in energy saving refurbishment of the buildings

On the other hand, the concessionary consortium gains the control over the discounted energy bill of the municipality for 20 years and obtains part of the incentives offered by the national program (originally generated back in time by the 2001/77/EC Renewable Energy Sources - RES Directive).
Revenues from the platform are used to provide associates with bonuses, with which they can purchase energy efficient appliances or fund energy saving refurbishments of their buildings. The Community aim at the realisation of new platforms, and reuse further urban space, as the members increase during time. Thus, as citizens do, also private companies can join the local Solar Community as associates. In addition, the Convention of Municipalities opens up in the second phase to an already tuned network of further 51 municipalities in the Emilia-Romagna Region.

Problem

One of the main underlying problems of the actual system is the strong dependence from the national system of incentives and politics, in particular the subventions for renewable energy resources and the tax deductions for energy saving interventions.

Solution Adopted

In order to cope with this issue, the local Solar Communities are funded via a voluntary local carbon tariff that the associates pay in proportion to their consumption. Firstly, there are three different levels of engagement and contribution for the associates, so termed supporting, ordinary and energetic, the latter of which become the actual producer of solar energy. Secondly, ordinary associates enjoy the bonuses for the purchase of energy efficient appliances and energy smart refurbishment. All the associates receive the energy audit of their home/locals to have their consumptions checked and individuate energy saving potentials. Arguably, this should support the kick-start of the platform, activate a virtuous circle and support the achievement of the original goals.

Fig. 5.8 – The river Reno run throughout the city: here at a medieval lock (ph. Carlo Pelagalli).

The Case Study - Analysis

Relevancy

It should be observed that the Solar Community case is fully relevant to the presented framework for R-Spaces, and individuates a suitable opportunity for the application of the latter.
Firstly, the Solar Community itself represent an alternative framework in order to exploit urban spaces, as it adds new functions (i.e. solar energy production) on unused, damaged or partly worn urban spaces. Indeed,

as defined by this paper, these roofs are to be considered urban R-Spaces due to their poor design (no specialised functions e.g. water collection, green roofs, brown roofs, urban agriculture…) and their unused free space. Secondly, Solar Community and RS Planning are based on analogous premises: open participation by citizens, new relations with the private sector and other partners, strength the sense of local community. Thirdly, using a call for participation is identified a group of partners taking care of the developments and the monitoring of the spaces.

Connection with the research question

As members increase, the platform may be expanded, reusing further urban spaces and introducing functions in line with the environmental and social Sustainability goals expressed in the original statute.

Unit of analysis and system of spaces

A single urban space available to host e.g. part of the solar platform is the basic parcel representing the unit of analysis of this case. Starting from a single municipality, the Community connects a network of these spaces, which are therefore capable to have an influence upon the lives of citizens living spread over a whole administrative region.

Table of Correspondence Solar Community Case vs. RSs Prototype

It is possible to draw a correspondence table between the main elements of the prototype and the ones individuated and further developable in the Solar Community.

Structural Agency	Representative of the municipalities (main public spaces owner)
Design Group	Concessionaire, tech consortium, University (or other scientific coordinator) and all associates.
Shared Vision & Founding Documents	Regulation, statute and convention of Municipalities
Portfolio of Functions	*Missing and to be implemented* Would help to individuate other fitting and profitable functions for the spaces. It contributes to further participation.
Functions Plans and Temporary Uses	*Missing and to be implemented* From the available data correlating PV solar plant and building, and in compliance with the Municipal Plan, the DG should individuate and design further R-Spaces available. The aspect of temporary uses should be also empowered, possibly developing new policies and reviewing the Municipal Plan.
Active Matchmaking	*Missing and to be implemented* Arguably important when developing the common platform with new diverse functions that require further specialised partners. HUBs and cluster organisations should be involved and support the DG in managing a larger number of calls for tenders and innovative source of collaboration.
RSs Knowledge Framework	*To be issued* Using the already available data (mostly from the Municipal Plan, GIS and other thematic analysis), after the coordination with a scientific tutor to individuate adequate parameters and indicators.
Monitoring Plan and Report	*Missing and to be extracted from the current Municipal Plan's SEA* To be developed in parallel with the RSs Knowledge Framework and the ICT supporting infrastructure.

Case study problem

Apparently, the need for profitable or cost-cutting solutions (e.g. solar panels) is determinant to implement effectively and support the economical sustainability of complex and further enhanced scheme. An expanded Solar Community that aims to provide green functions with non-immediate economical returns would arguably need to feed the process with a source of Sustainability compatible with the present solar panel structure. Moreover, the issue concerning the recycling of the city should not be limited to the roofs, and the

Design Group supported by the Structural Agency ought to find the way to involve more partners and resolve the connections between public and privately owned RSs.
Eventually, regarding implementation strategies (par. 5.6.4), it might be observed can be observed that the case opts for a “Go Public” and “Open public spaces” strategy.

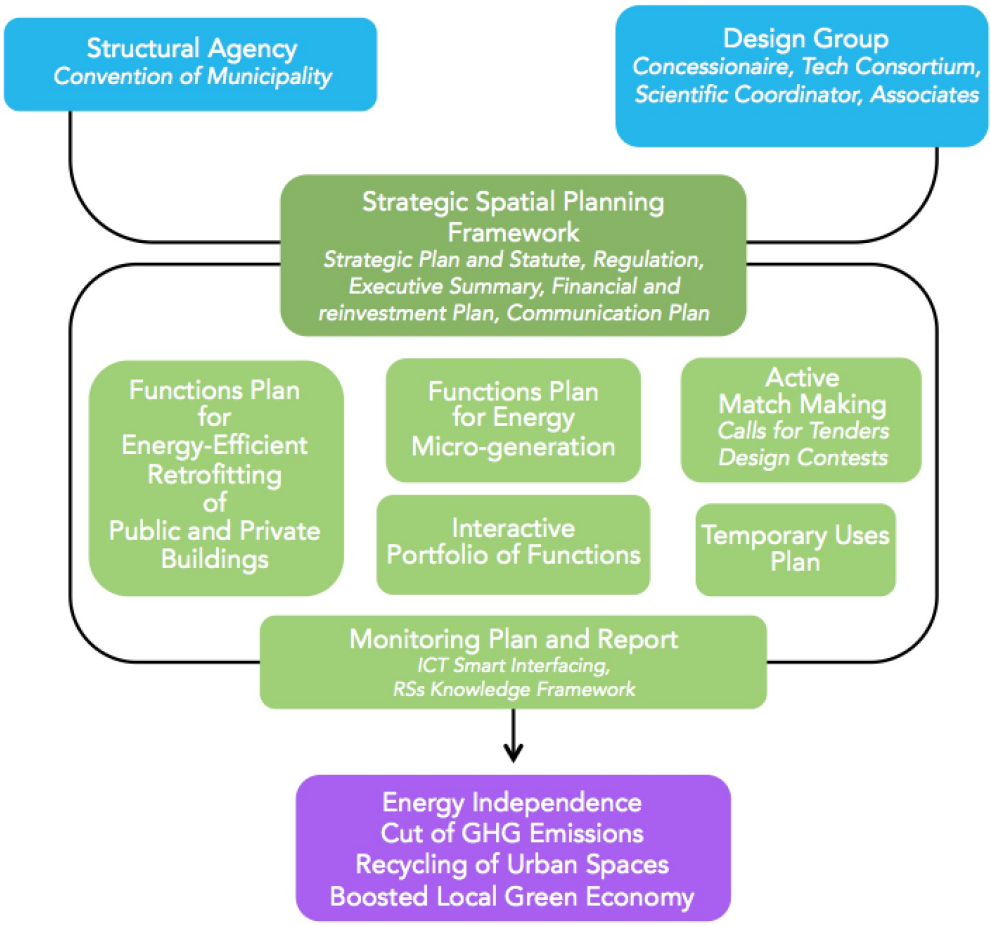


Fig. 5.9 – Functional diagram for the Expanded Solar Community.

Guidelines & Proposals

It is arguable that functions such as urban agriculture, segregated bike lanes, pocket parks and low-cost lets programs (par.3.4.) may hardly be implemented as a platform of PV solar panels do. However, just as it was done by the municipality with solar energy, similar and complementary schemes can be run in order to fund those functions that does not provide an immediate cash return. Further sources can therefore become strategic to promote an effective reduction of CO_2 emissions apart from PV solar panels.
Hence, more renewables may join the platform of the Community seeking for the best spatial symbiosis possible. Thus, increasing the energy mix could be a smart, resilient and economically boosting idea, with small-sized plants adaptable to a larger category of non-conventional spaces.
Firstly, as the river Reno flows through Casalecchio, it might be possible to individuate favourable locations for mini-hydroelectric plants or even smaller-sized ones such as the micro-hydroelectric (typically under 100 kW). Observe that along the Reno channels new hydroelectric plants have been recently restored (Emilia Romagna Region, 2012) and it is arguable that further spaces could be individuated for the scope.
Secondly, low-enthalpy geothermal pumps are often an ideal solution to support cooling/heating systems, and are advantageously integrable with measures such as energy saving refurbishment of buildings, just as originally planned by the Solar Community. Finally, wherever it might be compatible, small-scale wind turbines with short vertical axis (2-3 kW) can be inserted on north oriented roofs not perfectly exploitable with the solar PV, therefore completing the energy mix of these renewable micro-generation platforms (see simplified authorisation process on GSE, 2013).

SWOT Analysis

Location of factors	Type of factors	
	Favourable	**Unfavourable**
Internal	***Strengths*** ✓ Enables participation at multiple levels ✓ The monitoring solutions permit performance control and transparency ✓ Creates a new and diverse community of change makers in the area ✓ Partners can share resources when developing spaces	***Weaknesses*** ✓ It does not integrate further alternative sources of funding and volunteer work ✓ It lacks criteria to determine the intervention priority of the energy-efficient refurbishments
External	***Opportunities*** ✓ Have new enterprises, jobs and kick-start a local Green Economy based on renewables and energy-consumption reduction ✓ Fine-tune private-public policies ✓ Cut GHG emissions and reach 2020 European Strategy targets ✓ Reinvest revenues for a virtuous circle of Sustainability	***Threats*** ✓ Possible local lacks of adequate developers and suppliers of goods and services determinant for the process (e.g. cluster organisations, larger partners for the refurbishments, tech partners) ✓ Lack of correct tutoring for bureaucracy reduction by the municipalities ✓ Lack of competitiveness in the area in the case of energy-efficient refurbishments, e.g. monopolies or cartels by developers

Fig. 5.10 – SWOT Analysis for the extended Solar Community

Urban Change

In this case, producer and suppliers of energy smart solutions and renewables different than solar PV are probably going to be very interested stakeholders in the process. In fact, a so-designed energy platform may directly imply an increase of green economy jobs, as it would rely on an extended and more diverse set of renewable resources. Improving the energy mix of the Solar Community may also represent a measure of urban resilience itself in terms of reciprocal compensation.

Further, revenues are expected to increase owing to the enlarged energy production: this is arguably the flywheel that can dramatically increase the participation of new partners and the profits available to be reinvested in the Community. As described in the original case, the reinvestment in the platform is clearly crucial, as it is necessary to generate the virtuous circle that can make the system sustainable, also economically. Hence, special attention should be paid to calibrate the mechanisms regulating the actions of the concessionaires.

Moreover, the costs of building refurbishments in terms of material, shell and plants can be significant, although this kind of intervention is arguably the most effective to substantially abate the expenditure for heating. In addition, tackling the expenses for heating would mean to eradicate the largest part of energy consumptions from a common household, therefore abating GHG emissions and the overall dependency from non-renewable resources.

Upon these premises, the Structural Agency should then individuate the next generation of R-Spaces on its territory and, assisted by a tech consortium, issue further public tenders dedicated at the exploitation of other class of renewables. Following the same process occurred for solar energy, the Design Group can be therefore enlarged and gain more diversity. In the end, considering the participation of associates and the supervision of wise scientific coordinators, it is arguable that also less remunerative but social and environment-friendly functions may be funded and inserted.

5.7.2 Strategic Planning Framework for Open Test Beds

Based on Hyllie Sustainable City Project, Hyllie (Malmö), Sweden
Website (SWE) and (ENG): www.hyllie.com

The Project in a Nutshell

In the frame of the project Hyllie Sustainable City, E.ON Sweden launched a challenge to find methods to develop or redevelop urban areas and spaces joining Open Innovation and Sustainability as core drivers. The result is a conceptual strategic planning platform designed to create the right conditions for open test beds and develop attractive environments for living and working at the same time. For various SHs this would imply opportunities to innovate while e.g. sharing R&D costs and entrepreneurial risk, shorten time-to-market and be present in more economic branches. The expected result is a flow of innovative market products and services obtained by the active matchmaking of the partners participating in the open process.

Basics

Pioneer	Municipality of Malmö, Pop: 311 540, Area: 158,39 km^2 (Sept. 2013)
Location	Region Skåne, Sweden
Hyllie Foundations	Environmental Program 2009-2020 and Energy Strategy
Case Framework	Updated Municipal Plan and Climate Contract for Hyllie

Photo: Perry Nordeng

Fig. 5.11 – Hyllie Centre under construction, Malmö centre in the background.

Timeline

Malmö Environmental Programme 2009-2020 (Miljöprogram 2009-2020) adopted December 2009

City Tunnel project and Hyllie Train Station completed December 2010

Climate Contract for Hyllie (Klimatkontrakt för Hyllie) undersigned February 2011

Swedish Energy Agency 5,3 M EUR for smart grid and sustainable energy systems granted December 2011

Hållbarheten (Pilot for smart house in Västra Hamnen) open to the first tenants April 2013

First flats in Hyllie (with Smart Grid and EMS) open to the first tenants November 2013

Central Actors

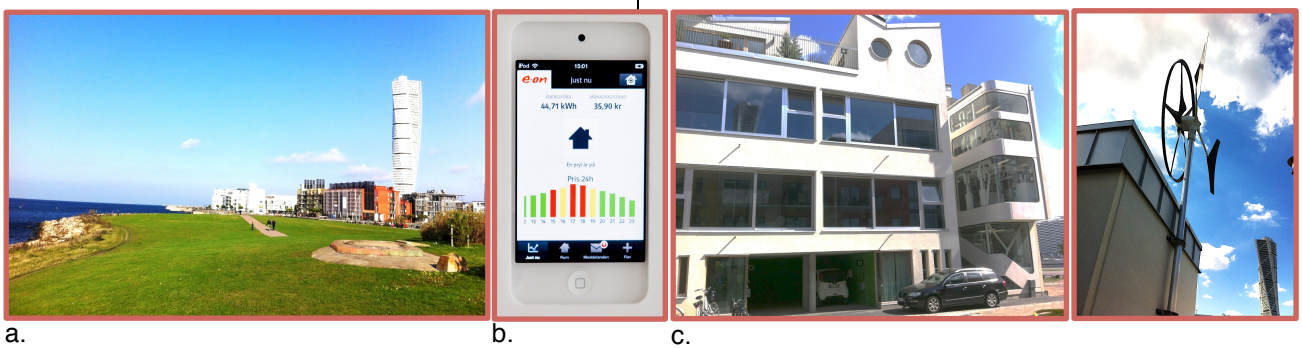
Municipality of Malmö	Private and Public Developers	Local Community
Urban Planning Dept. Environment Dept. Property Management Dept. Traffic Dept.	Architecture Studios Building Companies Real Estate/Housing Companies Energy Utilities Technical Vendors Water and Waste Utility	Citizens as residents, workers, commuters, visitors and attenders participating and living in the spaces of the open test beds

Open Test Bed

It is necessary to individuate a clear definition of open test bed for this study:
"A physical and/or virtual location, where participating actors equipped with a ready-to-go open business model decide, under certain shared conditions, to publish, licensing or release a limited part of their IP in order to create new standards and/or establish a common intellectual ground for collaborative testing".
(Cavina, 2013)

Hyllie Sustainable City project – Scenario 2030

Total Hyllievång Area	ca 2,18 km^2
Planned Dwellings and Jobs	ca 9000 + 9000
Landmarks, Attractions, Main Buildings	Hyllie Train Station (Centre 3 min; Malmö Central Station 6min, Copenhagen 24min) Exhibition Centre (17000 m^2) Emporia Shopping Centre (93000 m^2, 220 stores) Malmö Arena (51000 m^2, 15000 seats) Didactic Waterpark
Emporia Shopping Centre Parking	3500 cars
"Park-and-Ride" for commuters	1500 cars + 1000 bicycles
Advanced Technology	Smart Grids
Integrated Infrastructure System	Electricity, (Bio) Gas, Heating/Cooling
Energy Supply	100% Renewable or Locally Recycled Energy (2020)
Funds dedicated to the Smart Grids project	5,3 M EUR (47 M SEK) Swedish Energy Agency
Next target for Hyllie (2015)	2000 residents and 2000 jobs
First Pilot for Smart Grids, EMS, electric/biogas mobility and other technologies	"Hållbarheten", 8-units apartment building, by E.ON Sweden, in Västra Hamnen, Malmö



a. b. c.

Fig. 5.12 – Hållbarheten, pilot for Energy Management Systems: Västra Hamnen (a), iPod Touch® control (b), facade (c) and a mini wind turbine (photo: a. c. Cavina, b. E.ON Sweden)

The Background

Following a tradition that saw Malmö receive Sustainable Urban Development awards for the Augustenborg and Västra Hamnen/Bo01 projects, the municipality continued in the same direction by posing high requirements on the area hosting its main developments: the district of Hyllie. Via the Environmental Programme 2009-2020 and the Energy Strategies, it has been formulated a shared vision for the future

years concerning energy and climate change issues. In fact, the City of Malmö has the ambitious plans to become energy neutral, and by the 2020:

- ✓ Cut 20% of its energy consumption compared to years 2001 to 2005
- ✓ Use renewable resources to cover 100% (instead of 50%) of its whole energy mix
- ✓ Grant 100% locally produced or recycled energy
- ✓ Cut 40% of GHG emission

Moreover, in 2030 climate neutrality is to be extended to the whole municipality and energy consumption is planned to receive a further 20% cut compared to 2020.

The story continued in 2010, when a railway City Tunnel converted Malmö Central into a through station and two more intermediate stations were open: Triangeln and Hyllie. Next, the attention of many stakeholders was caught in February 2011 when it was undersigned the decisive "Climate Contract for Hyllie", which became a milestone to put the application of sustainable solutions into practice and activate collaborations among the key partners, namely City of Malmö, E.ON Sweden and VA SYD (Water and Waste Utility). Briefly after the contract signature, Siemens joined E.ON Sweden in the collaboration, intending to provide technical solutions and support for the interface with the smart grid. The partners, backed by the Climate Contract, prepared a funding request to the Swedish Energy Agency (Energimyndigheten), which granted 5,3 million EUR for the development of the smart grid infrastructure (as for 2012-2014). In parallel, E.ON Sweden was building the pilot "Hållbarheten" (The Sustainability) in Västra Hamnen, in order to prepare and test the new technologies. Observe that this might be considered one of the first test beds, close to the living lab concept, even though not "open" yet.

Starting from these premises, some questions arose about how close collaborations among diverse companies may have been implemented in order to achieve innovative solutions in the frame of Sustainability. Hence, E.ON Sweden submitted at the ACSI Camp 2013 the challenge "How to Develop Open Test Beds for Sustainable Energy Solutions", in order to find methods that would join Open Innovation and Sustainable Urban Development and consider Hyllie as a possible future area for the application.

In the environment offered by the ACSI Camp, it was possible to test the strategic planning theories developed in the current paper and apply them to create an *ad hoc* concept. In fact, after a first case analysis it was clear that, passing through the obvious tailoring work, an open, flexible and strategic spatial planning framework might have been compatible with the following questions:

- ✓ Define models of collaboration among E.ON Sweden, citizens, land developers, landowners and landlords
- ✓ Present ideas about how new business models can be built on a shared platform with other businesses
- ✓ Identify all the synergies among those services that optimise city management, therefore leading to SUD
- ✓ Test a concept capable to highlight the embedded opportunities the case reserves for each and every SH.

The Case Study - Analysis

Problems

1. First of all, a main problem is identifiable in the theoretical set of requirements needed to obtain effective results from the implementation of Open Innovation. In fact, these must-have elements and conditions are not at all given in the most of the situation, and oblige to carefully structure a specific entrepreneurial, economic and technical *milieu*.

2. Secondly, a central problem is whether to involve the public authorities or not, and in what forms. Indeed, through coordination, design, tutoring, funding and authorisation, the public body may either be a facilitator or an obstacle to the schemes. Indeed, owing to bureaucratic reasons or different political views, a negative attitude by public authorities towards the developments may irreversibly jeopardise any initiative.

3. Lastly, it was possible to notice how the dimension of the future test beds is an issue that could hinder certain actors to participate in the proceedings. In fact, the final goods and services may require certain conditions to be tested properly: a minimum quantity of space, a specialised environment (e.g. a road, an hospital) or a minimum number of citizens interested.

Solutions

1. After a first and non-exhaustive study of Open Innovation theories, it was produced a brief pamphlet identifying conditions and guidelines for the implementation of such a system (par. A.2.1). It emerged the entity of the conversion process that is needed to activate a fruitful collaboration among partners, and the centrality of the structures for active matchmaking and Intellectual Properties management. The general framework (fig. 5.14) and the process were then adapted considering the key role of these assets.
2. Nevertheless, most of the time the intentions of public actors can be simply forecasted in many ways. Documents such as thematic strategies, public budget of an administration or Municipal Plans are often useful to understand the bases upon which a public administration is available to deal. However, in case of hostile attitude, the framework conceives a “No public” way that, just as in the Kalundborg case, allows partners of a open test beds to organise themselves independently, although in full compliance with the law.
Presumably, the resulting developments may hardly occur on a large scale, therefore questioning the final impact that small-scaled test beds may have. Nevertheless, it would theoretically allow the start-up of the initiatives and bring partners to discuss further with the public administration having more confidence and, arguably, more contractual power.
However, according to the special case, the public should ideally have the following roles:

- ✓ Coordinator and supervisor of the initiatives
- ✓ Attentive tutor for partners dealing with bureaucracy
- ✓ Reactive counterpart in the authorisation procedure
- ✓ Facilitator and advisor partners searching for funds
- ✓ Responsible for the legitimacy of the process
- ✓ Guarantor for justice and respect of common rules.

Moreover, when it comes to key rules and open innovation, the debate focalises upon the level of openness requested to partners when building a common minimum standard of technology and knowledge that enables all to fully operate in the open test beds.
Arguably, the questions regarding the management of Intellectual Properties should be addressed with a general set of rules shared by all participants and, if needed, with further specific case-by-case agreements among closely strictly cooperating partners. Hence, once again, it is suggested as central as possible the role of IP intermediaries and matchmaking structures, whereas significant could be the ability of legal advisors and facilitators in organising the partnerships.
3. Finally, it is suggested that the spatial flexibility of the open test beds can arguably be solved identifying strategies for scalability (par. 5.6.4). The use of a strategic planning framework would then allow the level of flexibility needed by partners to scale products and services from an “Indoor Open Test Beds” (basically instrumental, at room or lab level) up to the everyday urban dimension of an “Outdoor Open Test Beds” (complex, transdisciplinary, occurring in whole buildings, open spaces or neighbourhood level).

Fig. 5.13 – Hyllie Centrum: a wooden model and the first group of building equipped with smart energy solutions (ph. E.ON Sweden) .

Relevancy

The Open Test Bed case relevancy with the RS framework is, as mentioned, congenital. The prototype was actually applied to the case in order to test its adaptability and conformation to specific themes and real drivers for Sustainable Urban Development. Relevant are also the case goals, as the model aims at a better use of the urban land, the achievement of important Environmental Sustainability targets, the involvement of a vast and diverse group of stakeholders, the integration with smart technology solutions and the enhancement of the local economy (i.e. also economic resilience in this case).

Unit of analysis and system of spaces

Notwithstanding the scalability of the solutions proposed, the unit of analysis of the study is identifiable with the area of potential application of the prototype, namely the district of Hyllie. Associating all the element within, it is possible to identify a whole entity influencing and being influenced by the surrounding city and the all Øresund Region at large, which constitute its system of spaces.

Table of Correspondence Open Test Beds Case vs. RSs Prototype

Besides, it is here possible to outline a correspondence table between the elements of the general framework for R-Spaces and the solution suggested for the Open Test Beds.

Structural Agency	Structural Guarantor Agency, with representative of public decision-makers such as municipalities, regional authorities, governmental bodies and planning authorities. The group represents the backbone of the framework, assuming responsibility for the correct realisation of the process, operating as a guarantor for controversies, expressing ethic values and broad guidelines, possible restrictions to be respected, special incentives or *ad hoc* regulations to be followed (par. 5.3.1).
Design Group	Innovative Design Group (IDG), private actors such as companies, entrepreneurs, involved citizens in general, social and networking organisations, possibly tutored by representative of the Structural Agency. The real engine of the processes and the new local Innovative Community prescribed by OI requirements (par. 5.3.2)
Founding Documents	Strategic Plan and Shared Vision, Executive Summary, Communication Plan, Financial Plan, as standard documents for a Strategic Planning framework (par. 5.4.1.).
Portfolio of Functions	Portfolio of Functions, as tool for Community Engagement, helps to individuate fitting and profitable functions for the open test beds and the R-Spaces apart from the ones centred on energy smart solutions. It should be further specialised on temporary uses. It can support participation also via Internet (par. 5.4.3).
Functions Plans and Temporary Uses	Test Beds Plans, with Temporary Uses for ongoing constructions until 2030 (as in Ørestad example). Analogously to FPs (par. 5.4.4.), they are tailored detail plans defining and reporting what can happen in an open test bed. A significant amount of operative data about the space and the tests should be available online and integrated with the technological platform (Test Bed Knowledge Framework), serving *inter alia* the monitoring phase.
Active Matchmaking	Calls, in terms of public and open calls, tendering, invitations, open contests, are prepared with the assistance of cluster organisations, entrepreneurial HUBs and other societal innovation boosters to connect partners around the test beds (par. 5.4.5).
RSs Knowledge Framework	Test Bed Knowledge Framework, as embedded part in the Test Bed Plans, and integrated with the ICT structures, collect the data

	about space and operation to be used. Prepared in collaboration with a scientific tutor that individuates adequate parameters and indicators (par. 5.4.6).
Monitoring Plan and Report	Monitoring Plan and Report, monitors the operations in the test beds via the Test Beds Knowledge Framework and the ICT supporting infrastructure (par. 5.4.7). Results are periodically evaluated issuing a Report.

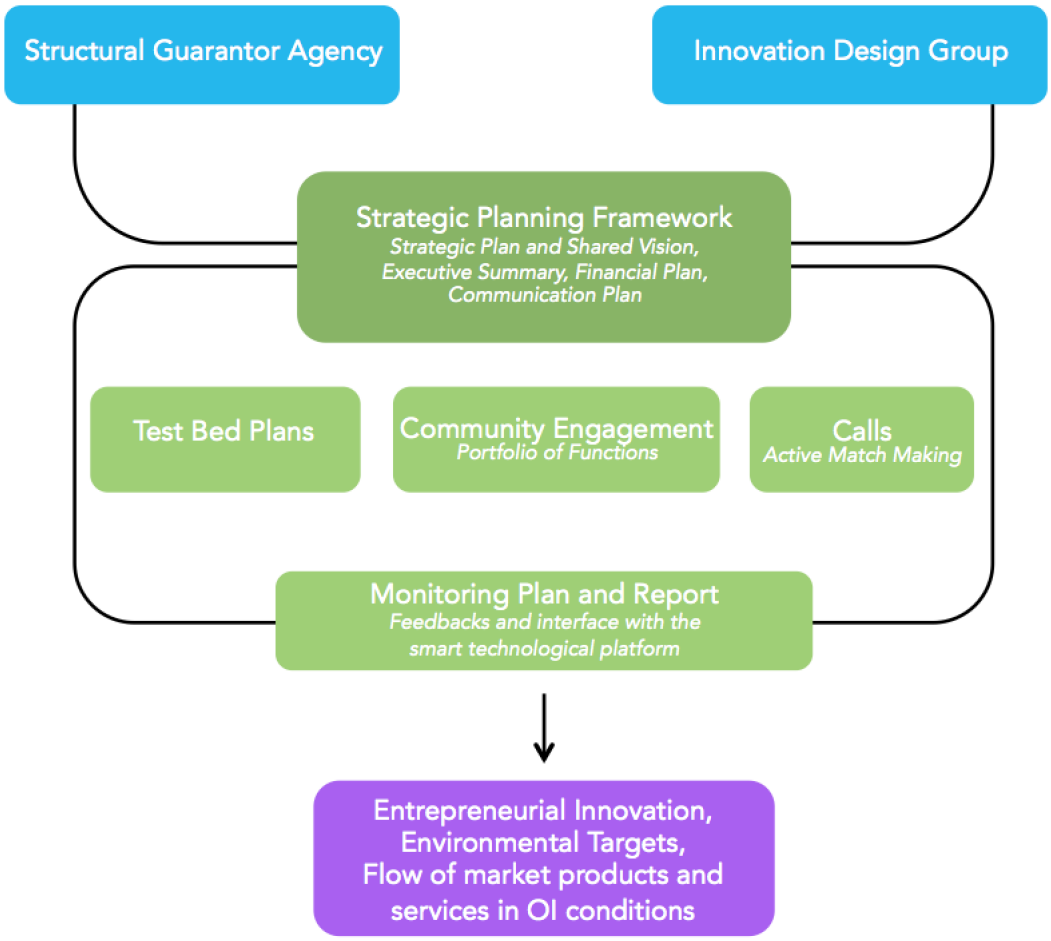


Fig. 5.14 – Functional diagram for the framework and main elements.

Core Process

Likewise the general RS prototype, the process imagined for the Open Test Beds case has circular features, is open for new partners to join at various levels, is monitored and aims for its own progressive optimisation. Further, it is hereby reported the central process, from a Test Bed Plan adoption to the attainment of innovative products and service in Open Innovation conditions:

1. A host organisation submits at the IDG a provisional Test Bed Plan, considering its own and other's open business models, plus a vision for city attractiveness
2. The IDG and the specialised intermediaries elaborate the provisional Test Bed Plan, identifying other compatible open business models
3. The IDG then creates a tailored call (public, an invitation or a contest) with the identified compatible business models aiming to complete the provisional Test Bed Plan as much as possible
4. The calls are published and promoted via available networking channels, direct invitations, contests, cluster organisations communication media…
5. In particular, cluster organisations connect their members via active matchmaking to the calls and support their members' new products and services

6. If a sufficient number of partners are relevant to the calls and accept the basic preconditions for Open Innovation, the Test Bed Plan is adopted and the innovation process starts
7. While running, open test beds are monitored accordingly to the Monitoring Plan, and a periodic publication of performance indicators is released
8. After testing and measurement, the partners evaluate their own products/services and therefore the outcome of Open Innovation
9. In case of satisfactory results the products are moved forward to the market
10. The process iterates from step 1 or 3, depending on the confirmation or not of the past activities, searching for further optimisation and better results.

SWOT Analysis

Location of factors	**Type of factors**	
	Favourable	**Unfavourable**
Internal	***Strengths*** ✓ Flexibility of the framework and scalability of its applications ✓ An open and iterative process enables entrance of participants at multiple and later steps ✓ The monitoring solutions permit stability of targets, performance control and transparency ✓ The Innovation Design Group represents the foundation of a new diverse community of innovators in the area ✓ Its tools to involve public bodies allow projects to be eligible for further public funding at all levels (e.g. EU) ✓ Companies share resources but maintain full control over their own developments at the same time ✓ New products and services for the market are developed with reduced costs over internal R&D	***Weaknesses*** ✓ It does not detail agreements and rules among participants (IP management and Test Beds planning above all) ✓ Its transferability and feasibility may require further resources for compromises and on-site tailoring work for adaptation ✓ It lacks specific indications about how to handle with the substitution of key actors and the conservation of participants' diversity ✓ It is not clear who and how may rapidly handle possible controversies between two participating actors
External	***Opportunities*** ✓ To kick-start Open Innovation and its significant related advantages (par. A.2.1) ✓ To implement IT and Smart City solutions e.g. within the monitoring system ✓ To be a global landmark for climate and energy smart solutions and therefore Sustainable Urban Development ✓ To work either together or without the public sector depending on following advantages and limitations	***Threats*** ✓ Possible sudden loss of diversity among key stakeholders crucial for the Test Beds and the other operations in the process (e.g. cluster organisations, larger partners, actors responsible for the monitoring) ✓ All the negative and well-known consequences of a mismanaged OI implementation (par. A.2.1)

Fig. 5.15 – SWOT Analysis of the Strategic Framework Open Test Beds

Urban Change

SH's Multi-Perspective Analysis

In theory, the actual application of Open Innovation is, as said, a challenging issue. The expected changes in the context in which is applied can be consistent. Moreover, considering the complexity of urban environment, the consequences of the suggested framework might be different according to the particular stakeholder considered. Hence, a synoptic table is hereby presented to speculate about the possible changes brought by the model, seen from the point of view of three main groups of stakeholders.

Private Innovators & Companies	Public Bodies	Citizens
Opportunity to test quick and cheap, Flexibility in rapid prototyping, iteration and scaling Shortened time to market	Increase reputation as cutting-edge city, region or country and role as global model for best practices	Benefit from new urban infrastructures and services (ICT, transport, schools…)
New tools to keep on innovating	Attract talents, multinational companies and new industries	Increase local safety
Develop business related infrastructure at less cost	Attract foreign investments	Job opportunities
Possible deregulation and incentives (par. 5.6.4)	Achieve Sustainability and Climate Change relevant targets	Energy micro-generation
Cross-industry development, synergies among projects	Test new public policies	Have trendy neighbourhoods
New business exposure	Reduce unemployment	Job opportunities
Interaction opportunities with end-users, feedbacks, grassroots innovation and public relations	Create cities or districts more resilient economically and environmentally	Benefit from experimental test for green best practices e.g. Urban Agriculture, Green Infrastructures, sustainable and soft mobility
Privileged access to public funding for R&D e.g. EU funding (par. 5.6.3)	Eligibility for EU funding	Possible loans for micro-business
Share of investment risk and R&D burden with partners	Enhancement of public-private collaborations	Interact with entrepreneurs and public decision maker in a more transparent way
Increased social impact	Increase capacity of local competition	Participate and contribute to the tests, be part of the change

Afterwards, for what it may concern the future steps for the concept, at the time of writing (November 2013), E.ON Sweden assesses the results of the case study as positive and satisfactory, and intends to present the produced documentation to interested stakeholders, liaising with them upon a potential implementation.

Case Study Press and Web

Challenge at MSI-ACSI website:

1. (ENG) socialinnovation.se/sv/climate-friendly-hyllie-tests-tomorrows-sustainable-solutions
2. (SWE) socialinnovation.se/sv/e-ons-acsi-bidrag-ramverk-for-oppen-innovation/
3. (SWE) http://www.socialinnovation.se/sv/e-ons-acsi-bidrag-ramverk-for-oppen-innovation/

Region Skåne:

www.skane.com/en/news/2013/08/27/innovative-minds-meet-in-malmo-for-sustainable-urban-development

Blog:

1. about.me/andrea.cavina
2. @KevPlan

5.8 From Sweden to Italy: Differences in the Implementation of Sustainable Models

So far, also using the case studies, the paper attempted to design a prototype with a high degree of flexibility. The intention is indeed to have more opportunities to adapt to new contexts while keeping the same likelihood of making the most sustainable use of the urban land.

Despite the chosen strategies, each local or regional context may present constraints and surrounding variables upon which the framework has limited or no control at all. Hence, the transferability potential of the model could be drastically reduced. Arguably, one of these situations may occur when attempting the implementation of a Hyllie-comparable case in Italy.

The next paragraphs attempt to illustrate why, despite best practices such as the Solar Community case, Italy generally tend to differ from Sweden as for ease to undertake large redevelopment interventions, especially those focused on SUD. Although reasons are surely complex and mutually linked, it might be possible to broadly distinguish two groups of impediments: the ones related with socio-political aspects (e.g. policies for economic freedom, political clientelism, corruption) and the other ones ensued from the local markets and the peculiarities of Italian enterprises (e.g. competitiveness, the size of construction companies and land developers, entrepreneurial innovation…).

5.8.1 Socio-Political Phenomena that Generate Obstacles

Although Italy and Sweden are both OECD and EU countries and own developed economic systems, it is possible to notice important gaps in the quality of life of their cities (OECD, 2013). Further, there might be some relevant indicators useful to point out societal issues influencing management and therefore urban development.

Firstly, the Economic Freedom Index 2013 (The Heritage Foundation, 2013) ranked Italy 86th, underlying serious difficulties for individuals and companies to manage properties, operate and invest freely in the country (Sweden is 20th).

Secondly, the Ease of Doing Business Index (World Bank Group, 2013), ranked Italy 65th, reflecting, *inter alia*, the cumbersome status of the local

bureaucracy, difficulties in starting a business and enforcing contracts (Sweden is 14th).

Further, the CPI Corruption Perceptions Index 2013 (Transparency International, 2014) depicts an even deeper gap, ranking Italy 69th, on the same level as Kuwait and Romania, worse than Saudi Arabia and with just minimal points more than Bulgaria, Brazil and China (Sweden is 3rd). Moreover, with respects to the depicted economic and political condition, quite far from appearing strong and cohesive, corruption can play a crucial role.

Apart from the CPI Index report, corruption in Italy is recognised as a broad and incessant phenomenon (Alfano et al., 2013), even though it is important to observe the deep differences occurring at regional level (Del Monte and Papagni, 2007). This has been explained via empirical investigations correlating corruption and civic sense, noticing that the latter varies among Italian regions. In fact, local communities with high levels of civic sense tend to transmit “skills of cooperation and sense of shared responsibility”, eventually becoming more responsive to governments and less affected by corruption (Putnam et al., 1994, p. 90).

At national level, further key factors are recognised as creators of a corruption-friendly environment: the rise of federalism (and following increase of bureaucracy), the intensification of state intervention and, eventually, the so-called political clientelism (Golden, 2000, Golden, 2003). The Italian “clientelismo” (patronage system) is defined as a mechanism responsible for both political stability and state inefficiency, where individuals linked to elected politicians gain consistent advantages via *ad hoc* laws and appointments (Del Monte and Papagni, 2007).

For example, in contrast to Sweden, hypothesising the implementation of Sustainable solutions such as wind power development, Italy is reckoned to offer major impediments in the form of political and economical corruption, jeopardising the support of facilitating tools such as the European Landscape Convention (Oles and Hammarlund, 2011).

5.8.2 Competitiveness and Structure of the Urban Developers

At this point it could be suspected that the mentioned political and social issues have intricate mutual influences on the economy and the everyday scene of urban developers as well. Indeed, in a competition to redevelop

urban spaces, private actors should compete on innovation, and large part of the realisations depends on the efficiency and trust of public-private relations.

In fact, it can be observed that corruption is broadly recognised as having an influence on the competitiveness of a national economy (Laffont and N'Guessan, 1999). In particular, reforms or initiatives increasing the economy's competitiveness are expected to discourage corruption (Rose-Ackerman, 1996). Thus, this correlation can be also observed comparing Corruption Perceptions Index and Global Competitiveness Index (GCI), noticing that high-developed and innovation-driven countries are perceived as less corrupted (Ulman, 2013).

Further, Italy occupies the 49th position out of 148 countries in 2013-14 GCI (Sweden is 6th), and an analysis of Italy's competitiveness by the report identifies core weaknesses just in the high levels of corruption, organised crime and, *inter alia*, inadequacy of financial support for business development (WEF, 2013). Arguably, central factors influencing competitiveness and possibility to handle important SUD schemes are the structure of the Italian economy and enterprises' average size. Owing to this, it is determinant the structure and size of land developers, infrastructure developers, building companies, landlords and real estates. So, Italy's low competitiveness and scarcity of larger contractors (The Construction Index, 2013) may hamper larger urban redevelopment project, running the risks to incur in problems such as credit crunch, corruption, rather than other criminal behaviours.

Nevertheless, Sweden has a more diverse entrepreneurial environment, featured by higher density of larger and medium developers such as SKANSKA, NCC and PEAB (Forbes, 2013), which, as it happens in Hyllie, can arguably offer enhanced competitiveness and higher probability to complete the redevelopment projects.

Specifically, the structure of the enterprises system in Italy confirms to be characterised by micro, small and medium-sized enterprises (SMEs, under 250 employees, 50 million euro turnover), which are accountable for the 92,6% of the total firms and 66% of the total added value (Monducci, 2013).

Moreover, probably driven by these facts, the major part of Italian enterprises tends to join forces and develop formal and informal relations (supply contracts and subcontracts), although only a 20,6% of the firms gather in a formal partnership (ISTAT, 2013). In addition, for what it concerns

SMEs, empirical data show that partnerships have better results and lead to successful product development when they are under the scientific coordination of a research institute or a laboratory (Lasagni, 2012).

For the mentioned reasons, first of all firm size, Italian enterprises are considered to be more limited in innovation, a gap they attempt to compensate creating more relations. In fact, compared to the previously seen indexes, Italy scores better in global innovation, hitting, for example, the 29th place out of 142 in the GII (2013), where Sweden is 2nd.

However, the story of Italian building consortia and public procurement recorded many illegalities, mainly related to tendering and subcontracts, and therefore highlighting needs for further controls and transparency in the processes (Monaci, 2013). Afterwards, the Italian Antitrust Authority has recently released guidelines about how to recognise and contrast widespread corruption in calls for tenders and subcontracts (AGCM, 2013), while NGOs and independent think tanks attempt to raise awareness about the problem.

Notwithstanding the positive initiatives, a deeper institutional change is arguably necessary to cope with the problem. Del Monte and Papagni (2007) would opt for the following actions:

- ✓ Procedures simplification and transparency
- ✓ Turn towards a more meritocratic job system in the public sector
- ✓ Promulgate law hindering convicted criminals to be re-elected

5.8.3 Debating Planning in Italy

It is however unpredictable when and how these epoch-making changes may occur in the future, whereas, even if completed, the issue of better uses and design of urban and rural land would yet to be solved. Indeed, even if regional legislations partially compensated certain shortcomings, Italy still follows the dream of a new national Planning Act. The current one is dated back to 1942 (fascist era) and reasonably defined obsolete numerous times by various stakeholders (INU, 2012).

The updating of the overall framework is arguably necessary in order to introduce flexibility and modern planning tools, which were so far used as if in an experimental regime and introducing deep differences among regions. For instance, the current Planning Act does not expressly conceive any of the following:

- ✓ Transfer of Development Rights
- ✓ Control and review of dysfunctional urbanisation fees
- ✓ Temporary Uses Plans and separation between structural and operative plan
- ✓ Integration of participatory planning tools on various scale
- ✓ Integrated tools for multipurpose urban land recycling
- ✓ Strategic Planning elements, and so on.

It is here argued that these basic elements are nowadays necessary to support municipalities in rebalancing the territory and enlarge the platform of participating stakeholders. On the contrary, the current situation obliges municipalities to find subterfuges in order to develop and manage land more efficiently and sustainably, exploiting the only one help unevenly provided around the nation by the various regional laws.

Probably, conjectures about a *facsimile* of the Hyllie case in Italy may be somehow realistic only in those regions distinguishing themselves for cutting-edge and comprehensive laws. Indeed, Emilia-Romagna Region is arguably one of the few ones having chances, giving its reputation of being a pioneering administration in Strategic Spatial Planning and Urbanism in general (Tassinari et al., 2013, Selicato and Rotondo, 2010).

Finally, the Solar Community and other few rare examples of this kind are surely a positive glance of hope for Italy. However, the crucial step forward would be to turn these planning practices from sporadic to structural, updating the whole national framework from its own top and, in parallel, operating at local level with participatory prototypes such as the one presented in this document.

Overall Conclusions

(See also paragraphs 1.10, 2.4, 3.6 and 4.4)

This dissertation investigated the limitedness of natural resources and the essence of Sustainability on a large span by using an interdisciplinary approach, and individuated spatial opportunities within the urban fabrics and suggested a complementary framework for SUD.

Indeed, purpose of the current study was to determine chances to reduce, reuse and recycle R-Spaces, identify new opportunities for the city to enhance its overall resilience and achieve targets of Environmental Sustainability at the same time. In order to do so, the paper has given an account of the dynamics leading to the waste of places (Ch.1) and the unbalances that jeopardise Sustainability. Secondly, R-Spaces have been defined in terms of Sustainability optimisation, finding the main features that identify them and giving a first hypothesis of classification [based on land cover] (Ch.2). Thirdly, it has been investigated and presented a diverse panorama of urban functions, which were analysed in their formality and temporality, and organised in a portfolio according to desirable outputs and suitability-compatibility-adequacy to the spaces (Ch.3). Afterwards, it has been explained the central importance of 15 must-have characteristics for spatial planning in order to favour the Transition to a more sustainable use of urban land. In addition, the integration with ICTs and the concept of Smart City have been largely considered and questioned along the writings (Ch.4).

Henceforth, the findings of the first analysis phase have been used to design a conceptual Strategic Spatial Planning Framework (RSs Framework), suggesting strategies, processes, actors, plans and guidelines. In addition, case studies have been used to hypothesise the adaptation of this prototype into real practice (Ch.5). In particular, the 2013 ACSI Camp in Malmö (Sweden) has offered the ideal platform to develop a tailored version of the prototype that joins Sustainable Urban Development and Open Innovation. Furthermore, the Solar Community of Casalecchio di Reno (BO) has been chosen as Italian case for a potential application of the concept. Finally, following the report of qualitative analysis and expectations of the case studies, it has been possible to speculate about the potential impediments that a transferral of the Swedish case to Italy might encounter.

Overall, the study managed to answer the research question posed at the beginning of the thesis, by means of the conceptual framework presented and the qualitative analysis developed in the first four chapters. Indeed, it was

possible to confirm and merge established Strategic Spatial Planning and Sustainability's literature guidelines, preparing a new scheme to put them into action.

Besides, the document offers an initial understanding about how R-Spaces can be considered a structural element in the planning for the "space recycling city", by highlighting, *inter alia*, key elements upon which efforts should be concentrated. Indeed, a selection of ten essential suggestions can be recapitulated as follows:

- ✓ **Individuate a shared vision** founded on actual Sustainable Urban Development, and determine a locally relevant driver or theme (e.g. energy, culture, innovation, health, mobility, social inclusion…). If appropriate, a driver can be dominant in one Functions Plan
- ✓ **Consider context sensitive functions**, fitting the spaces and the plans because of site conditions
- ✓ **Consider flexibility in time** (e.g. temporary uses) **and property** (e.g. concessions, licenses, long-term permissions…). Where possible, generate consequential policies to implement it
- ✓ At the **start-up phase**, concentrate only on **the most engaged and willing actors**
- ✓ **Separate** structural **actors** from operational ones
- ✓ Where critical, **consider** only-private actors, **No Public Strategy**, as an option
- ✓ **Check informal functions and processes** to support local creativeness and innovation
- ✓ Respect social aspects and **aim at max actors diversity** to limit gentrification aspects and boost potential synergies
- ✓ **Enrich and care intermediate partners** that can multiply synergies among actors (facilitators, communicators, HUBs, clusters and other intermediaries…)
- ✓ **Guarantee 24/7 operating structures for monitoring** and effective strategic planning.

Furthermore, the paper collected abundant specialised literature and developed purposes, and could be therefore used as a conceptual handbook for decision-makers or local changers, or represent a base for further fine-tuning of the framework and studies on Sustainable Urban Development (see What is Next).

Nevertheless, important limitations need to be considered. First of all, despite the large number of quantitative works used as knowledge base, the practice at the workshop and the case studies, it has to be remarked that the nature of the research remained exploratory and the kind of analyses qualitative. As a consequence, findings are not conclusive and urban designers cannot use the prototype as a top-down quantitative designing tool to have definitive and unquestionable options on land use and formal urban planning. Rather, every application of the prototype shall go through local

tailoring, supported by further quantitative research and tutoring by experts, while the most suitable plans are expected to be designed on the side of the participatory process.

This said, the framework spin-off developed in Malmö captured the interest of some stakeholders in Sweden, namely Region Skåne, innovation hubs in the area and E.ON Sweden, which declared its intention to bring the results ahead and use it to liaise with local stakeholders and partners.

What is Next?

As announced, the last paragraph of this work is dedicated to point out those issues that need to be further investigated via e.g. quantitative research or pilot projects or other sorts of empirical studies.

The ideal actors/protagonists meant to auspiciously undertake these efforts are trans-disciplinary task groups of researchers or specialised expertise, as competences are needed in a wide range of subjects, from economics to environmental sciences and from management to law studies.

All the questions isolated and described in the “tab. Next” would arguably not simply facilitate and fine-tune the presented prototype, but also deliver benefits to the land planning practice in general.

Tab. Next - Proposals for further research after this paper: what is next to be researched?

	Heading	Problem	Investigation	Subjects	Aims
1	Relevant indicators fitting ICT and sensing solutions to support effective monitoring and planning	Urban performance indicators may not always be relevant nor easily measurable in real time/short-run	How to elaborate a set of relevant indicators and urban sensors mutual compatible and supportive of real time urban monitoring systems?	Information Technology Industrial Engineering Environmental Science Governance	Evaluate benefits of specific urban functions Improve effectiveness of urban planning Optimise urban resources in general (energy, transport, natural resources, space…), keep monitoring active and give meaning to it everyday
2	Building and enhancing intermediate facilitating structures in urban and land development (innovation HUBs, agencies, planning consortia…)	Lack of communication, collaboration and organisation between public bodies and entrepreneurs. Scarcity of key actors for the development such synergy boosters gathering e.g. investors, entrepreneurs and innovators	How to involve crucial private developers and partners and keep them engaged during the whole urban development process? How to communicate and find the right developer at the right time?	Economy Governance Communication and Media Innovation	Keep a vast diversity in the panorama of local partners for development. Increase the number of useful synergies in public-private and private-private business. Increase overall competitiveness. Increase business opportunities
3	Regulations for the management of Intellectual Property in private partners consortia	Private companies refraining from collaboration, scared by industrial espionage or imitation, owing to uncertainty about how their patents will be treated	How is it possible to create a regulatory system to preserve patents and other know-how while partners collaborate in Open Innovation schemes?	Economy Justice, Laws and Rights	Increase participations in Open Innovation projects. Increase diversity of co-working partners
4	Advanced education for public decision-makers and planners, focused on participatory planning, dealing, compensation measures and agreement reaching	Possible lack of skills and dealing power by local public decision-makers in reaching agreements. Lack of accountability when reaching agreements for the public sector. Implementation of solutions in contrast with shared values of sustainability	How to increase the dealing capacity and compliance of decision-makers and planners? Individuate the indispensable skills for participatory planning, how to introduce an integrated and up-to-date education system. Study an effective accountability system capable to improve compliance between agreements and sustainability goals	Politics Governance Education & Training Ethics	Reduce pure top-down decisions. Reduce the influence of external economic power such as lobbies and corporations. Increase responsibility and acceptance of development choices. Improve the balance between ethical choices and urban development
5	Establishing a transdisciplinary task force for the evaluation of development agreements	Possible lack of know-how and data by public servants when evaluating adequacy, compliance and benefits from development agreements, concessions, preparation and elaboration of public tenders	How to establish and integrate a specialised task force of evaluators advocating the public interests in urban development? Special focus shall be given to small municipalities co-working in urban development and planning consortia.	Economy Governance Justice, Law and Rights	Increase dealing power. Support effectiveness in public investments, making a better use of public money. Individuate the "right price" to ask private stakeholders for. Individuate possible bad conditions or hidden costs in projects and agreements.
6	Temporary uses as structural component of the planning system and urban management	Idling of properties and spaces left unused after a previous activity, during a change in land use or before urban redevelopment	How to introduce public incentives and schemes of de-bureaucratised regulations for temporary use of public and private in urban properties? How to outline new simplified juridical forms for temporary entrepreneurs, associations and users of these structures?	Governance Justice Laws and Rights	Shorten the time for the reactivation of urban spaces and "close" their life cycles. Add economic opportunities. Increase urban resilience and flexibility in urban planning
7	Accountability of Ecosystem Services in the budget of local administrations	Investments in Green Infrastructures are often penalised against grey infrastructures, as budgets often do not consider the value of ESSs	How to exploit the quantitative research upon ESSs and integrate it with the local administration's budget, considering their accountability?	Economy Governance Justice, Laws and Rights	Favour the implementation of GIs. Increase the competitiveness of the Green Economy. Increase environmental resilience.
8	Adoption of precautionary security funds for the implementation of environmentally dangerous activities.	Companies polluting land create unbalances in the urban fabric, diminishing the opportunities of e.g. contaminated urban land to be recovered (typical examples: brownfields, petrol stations…)	How to elaborate a funding system to guarantee ex-post remediation of land to exploitable conditions without penalising up-front investments? How to make entrepreneurs and developers accountable for their activities on the long term?	Economy Environmental Science Justice, Laws and Rights	Reduce public costs of land remediation. Reduce entity of undevelopable land. Introduce preventive measure to reduce pollution. Increase population's health. Increase resilience towards human and environmental disasters.

Appendix

A.1 Kalundborg

In a study completed by Potts Carr (1998) about eco-industrial parks it is possible to find the description of the processes and products exchanges that occur in Kalundborg Refinery Complex, Denmark:

> "An oil refinery employs waste heat from a power plant and sells sulphur removed from petroleum to a chemical company. The refinery also sends sulphur in the form of calcium sulphate to a wallboard producer, replacing the gypsum typically used. Excess steam from the power plant heats water for aquaculture and warms greenhouses and residences'. The power plant also sends steam to a pharmaceutical manufacturer. The pharmaceutical manufacturer then sends its organic process wastes to area farmers as a fertilizer. In addition to sulphur, the refinery sends fuel gas to the wallboard producer who burns it to dry the wallboard. The exchange of by-products at Kalundborg has produced quantifiable reductions in fossil fuel consumption and air emissions. Throughout the municipality, oil consumption has been reduced by 19 000 tons per year. Coal consumption has been reduced by 30 000 tons per year (or 2%). Carbon dioxide (CO_2) emissions have been reduced by 130 000 tons per year (3%). Sulphur dioxide (SO_2) emissions have been reduced by 25 000 tons per year"

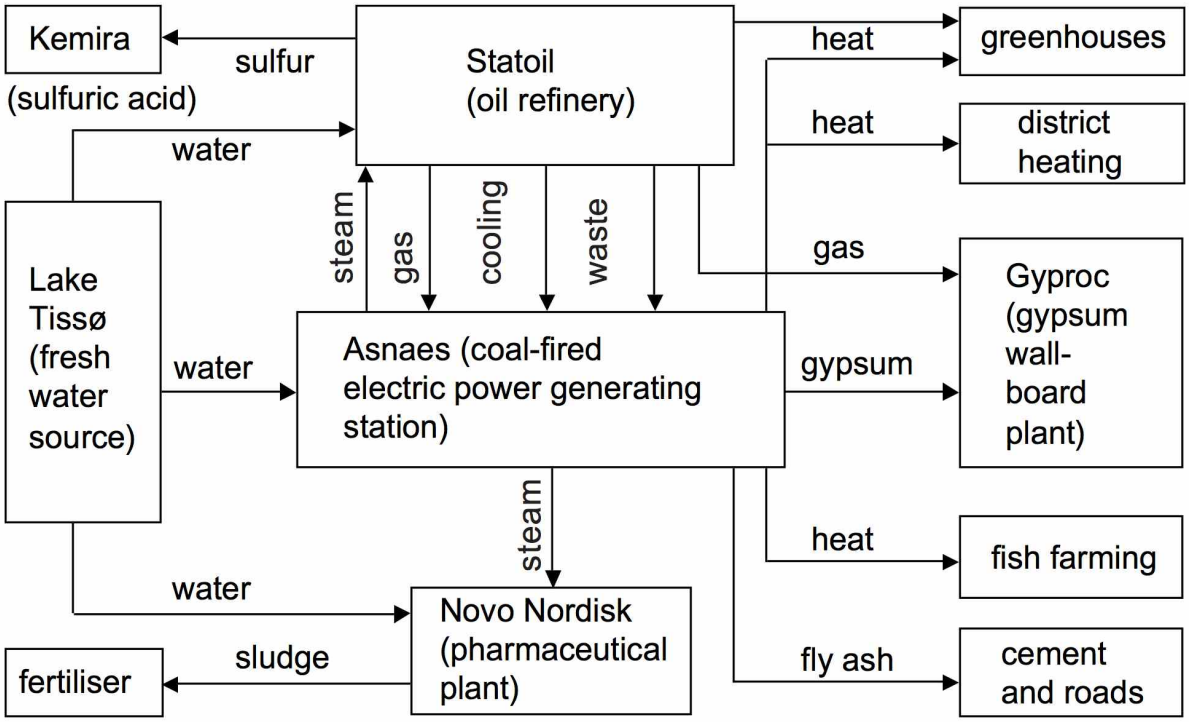


Fig. A.1 – Kalundborg refinery and Eco-Industrial Symbiosis diagram (Tibbs, 2000)

Further, it could be hereby remarked how Kalundborg is arguably one of the first, most profitable and innovative examples of industrial eco-symbiosis involving infrastructure sharing, waste reuse and smart energy solutions. Thus, notice how the symbiosis was development only by private-to-private agreements, without the intervention of public authorities or environmental regulations (Rathmann, 1998), and this is probably the most interesting factor shared with the thesis' prototype.

Fig. A.2 – Kalundborg refinery and Eco-Industrial Symbiosis aerial view (ESA/NASA, 2012).

A.2 Open Innovation Case, Malmö, Sweden

These are the links to the material connected with the Malmö workshop:

ACSI Camp 2013

http://socialinnovation.se/en/news/acsi2013/welcome-to-acsi-2013/

Documentation developed out of the E.ON Sweden Challenge

http://about.me/andrea.cavina

In the next pages, more information about Open Innovation: one of the potential added factors in the proposed framework.

A.2.1 Open Innovation in a nutshell: why and how?

This appendix has the objective to provide a better understanding of theories, words and variables that lie behind the Open Innovation concept. In particular, the section presents what should be done to facilitate the implementation of Open Innovation inside companies and why, by summing up the theories offered by Henry Chesbrough (adjunct professor at the University of California, Berkley). Origins, observations, requirements, limits, opportunities, risks and advantages arguably offered by collaborative business models are therefore discussed.
The document was prepared merging info and material from:

- Chesbrough, Henry (2006) – Open Business Models: How to Thrive in the New Innovation Landscape.
- Rivette, Kline (2000) – Rembrandts in the Attic: Unlocking the Hidden Value of Patents

1. Steps to Break the Limits of the Traditional Innovation Structure

a. Look beyond own company´s R&D laboratories because "The most intelligent persons probably do not work for us"
b. Instead of holding on exclusively to new market products and services, value also the indirect effect of owned IPs, especially unused ones, via e.g. leasing IP to others to be developed or creating spin-offs
c. Go beyond the "Not Invented Here" syndrome, learning how to deal with invention done by someone else – The so-called NIH syndrome blocks the probe for improving ideas in the environments external to the company.
d. Fight the virus "Not Sold Here" installed into conventional business units. It represents the conviction that if an internal business unit is not capable of exploiting and selling a certain technology, no one else should do it.

2. Origins of Open Innovation: General Drivers for Openness

It is a well-known aphorism that "companies that do not innovate die", but when and why may modifications in business models occur?

- A change in the environmental conditions dictated from above, at political levels (Regulations, Laws and acts, EU Directives…)
- A radical and fundamental restructuring of big companies
- The decision to team up with the costumers and share risks of innovative challenges
- The decision by established, bigger companies to anticipate own costumers' needs
- The will of small-medium companies to affirm themselves and compete with the larger actors of the respective industrial sector

However, further reasons to join a different kind of innovation may derive by urgent pressures from the market.

3. Why open and now? Long-term Sustainability of a Business Model

There are various reasons to open a business model. In general, the first one is the opportunity to join and take advantage of those technologies available in both big and small companies around the world. In fact, there is such a significant amount of high quality "raw material" being developed that even most brilliant companies can't afford to ignore.
Moreover, further specific constrictions are currently endangering the traditional model of innovation:

- Increasing R&D costs
- Shortening Product Life Cycles (PLCs)

The combined action of these two factors affects the total profitability of the investments in innovation (fig. A1). Hence, particular care shall be used in the analysis of R&D costs and sales trends for a certain business sector. If the two trends are similar, it means the business model is economically *sustainable*. Nevertheless, an R&D costs trend greater than the sales growth would determine the unsustainability of the chosen business model.

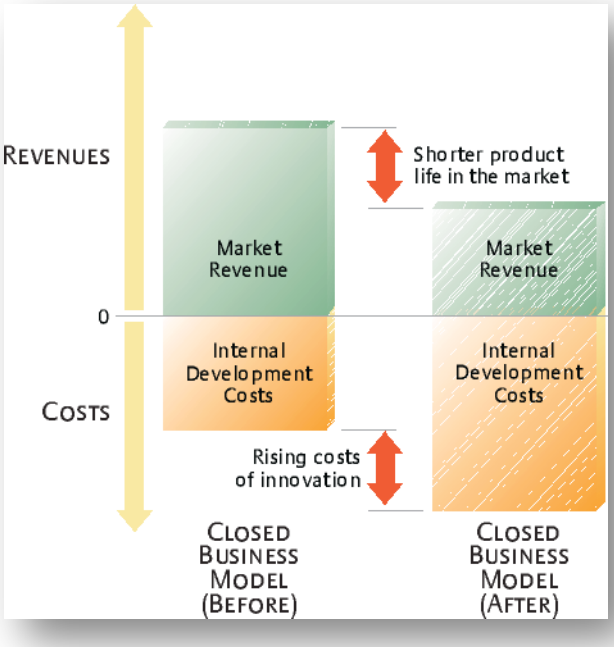


Fig. A.3 – Net result (right bar) of shorter PLCs and rising R&D costs.

The main implication of these dynamics is that R&D investments are about to be cut if the business model won't be changed or improved.

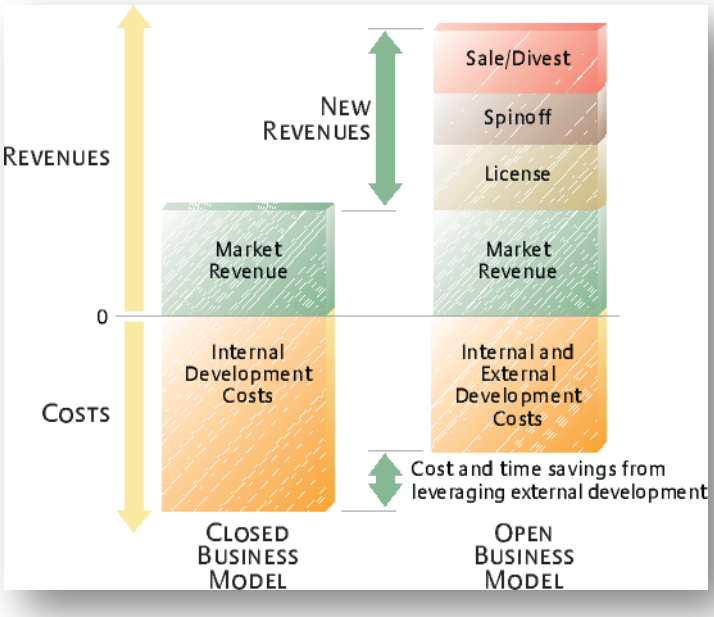


Fig. A.4 – Rising R&D costs and shorter PLCs (left) vs. open business models with IP exchanging (right).

At this point, the open business model may intervene on both sides of the problem, having a double influence both on costs and on revenues (fig. A2):

- ✓ Affects the R&D costs aspect:
  1. It saves time and money in the innovation process, as part of them are shared or externalised
  2. By the acquisition of partly ready technologies from others it also cut the time-to-market
- ✓ Affects sales and revenues aspect:
  1. It offers extra monetisation from joint ventures, spin-offs, leasing or licensing of own technologies
  2. It also enlarges the number of markets the company indirectly serves.

The final result is that innovation becomes attractive once again, despite shorter Product Life Cycles.

4. A pivotal issue for Open Innovation: IP management

Different ways to handle Intellectual Property can be observed in the industrial markets. As said, some companies adopt an offensive style, licensing IP to other companies and moving towards Open Innovation, whilst other companies adopt a defensive way, mainly concerned in preventing IP leaks.
The latter companies, especially larger ones, should verify how many assets hardly developed in their R&D units are staying dormant without producing revenues at all. In companies these IPs represent a partial waste of money, so it should be also evaluated if this is totally acceptable for the actionists. For example, it has been showed that some companies sat even on a 75-90% of unused patents (e.g. P&G before year 2000, then became a world leader in OI).
However, to discover "Rembrandts in the attic", as Rivette and Kline suggested, it is not enough. In fact, the first attempt to move towards Open Innovation models in the 90's dramatically failed, mainly because there was no real connection among the management of Intellectual Property, the innovation process and the business model:

- No tools were used to evaluate if certain IPs should have been licenced out or not
- No tools to evaluate profitability and real price of a technology on sale
- Incoming IPs were hardly integrated as part of own business models.

The result is that there were just sellers, very few buyers and the IP intermediaries went bankrupt because of the high inefficiency of that innovation market combined with the relative unpreparedness of participating companies.

5. Recommendations

Today many things are changed in companies and business models, but it should however be stressed the importance of managing with the markets of innovation and their intermediaries in the correct way. Indeed companies should check their management structure and business model before facing these challenges, in order to avoid negative consequences. Although very few companies have done this transition, it is possible to highlight some general guidelines to successfully implement Open Innovation:

1. The Internal Network – Companies need a vast and rich internal network of employees and managers profoundly convinced and willing to develop the business in the way of Open Innovation. The network ought to have an operative group that is responsible, for example, to deeply screen in advance ideas and patents before their acquisition and integration in the company.
2. The business model and the management structure – They need to be modified in order to exploit OI and integrate it until the top of the management structure. Only clear commitments from the top management can secure these changes.
3. The Innovation Community – The Internal Network needs an external environment, a vast and diverse community to connect with, in order to create those synergies essential for Open Innovation. It could be noticed how the present report individuates the Innovation Community in the mentioned Innovation Design Group and its further ramification via its virtual and extended partners.
4. Facilitating centres and IP intermediaries – Specific actors could be individuated to support small, and medium companies in the preparation of a ready-to-go business model for OI, a specialised HUB that may tutor participants and prepare them. Further, IP intermediaries should be individuated, as shared rules should be clear to all participants.
5. New policies or adjustments of the current ones by the political decision-makers could be needed to facilitate the innovation market in certain districts.

Arguably, these conditions can facilitate the creation of a better environment for Open Innovation and boosting the number of synergies among participants. However, the overall management of Intellectual Property remains a crucial, not riskless, issue.

6. Threats and Opportunities

Depending on the way companies are able to handle with IP intermediaries and the market of innovation in general, opportunities may turn into threats.
The markets of innovation may…

A. …help a company enter new markets OR be used by other to hinder the entrance of the company into new markets and annoy that one company in the markets it is already in.
B. …provide additional revenues from own IP/inventions/patents, especially unused ones OR be used by others to prevent a company from using those inventions.
C. …lead companies to create new business models OR just run the risk to destroy consolidated ones.

The way openness is implemented into the business models and the way innovation market is faced determine if the mentioned points are going to turn into opportunities rather than threats. Therefore, Open Innovation is not riskless and companies that overlook the dangers within the access to IP and innovation markets are to be exposed to potentially hostile, though legal, manoeuvres (e.g. aggregators and patent trolls).
On the other hand, in case of appropriate management, the company will have the important opportunity to innovate by means of a global market of ideas, participating at it as both supplier and costumer.

7. Potential Advantages for Every Stakeholder

To sum up, the introduction of OI and Open Test Beds in particular, provide new and stimulating technologies to companies and people in the form of a dotation of intellectual property, which allow them to collaborate with other actors to put those ideas on the market. Allegedly, advantages are available for all sorts of stakeholders:

- ✓ Small to big companies: a new and vast source of innovation
- ✓ Inventors and universities: new welcoming markets willing to receive and screen their discoveries and contributes
- ✓ Consumers: new offers in the form of products and services
- ✓ Other companies: shorter time-to-market, more valuable products and/or services.
- ✓ Local administrators: secure a more efficient economic environment.

Moreover, positive effects may be multiplied in an overall virtuous circle:

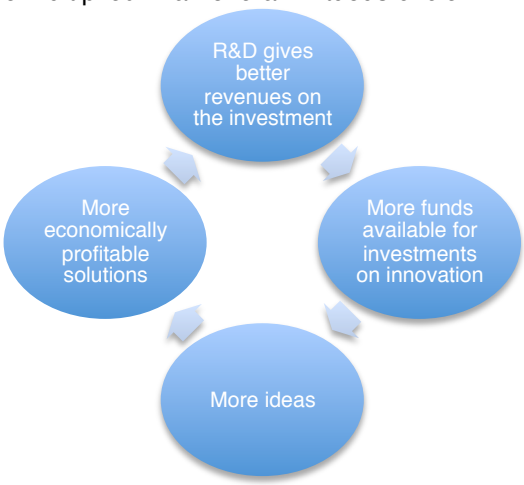


Fig. A.5 – Virtuous circle in Open Innovation.

For deeper specifications on Open Innovation, please check:

- Openinnovation.eu
- Ideaconnection.com

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