Universidade de Aveiro Departamento de Ambiente e Ordenamento
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Dissertação apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Estudos Ambientais. realizada sob a orientação científica do Professor Doutor Peter Roebeling (categoria do orientador) e da Professora Doutora Teresa Fidélis (categoria da co-orientadora), do Departamento de Ambiente e Ordenamento da Universidade de Aveiro, e do Doutor Martin Lehmann (categoria do co-orientador), da Aalborg University.

I would like to dedicate this research to all the wonderful people that have made it happen. To the JEMES colleagues and friends, and to those I met at the Universities where I spent the past two years, specially at Aveiro.

To Javier, Anik, Max, Joana, Marcos, Carole, Nick, Rita, Luiz, Catarina, Lucas, Sandra, Samuel and Ana.

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To my family and friends in Mexico.

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palavras-chave

Soluções Baseadas na Natureza (SBN); serviços ecossistémicos urbanos (SEU); metodologia Roadmapping de UnaLab (MRU); ação coletiva; Instituições Cooperativas; espaços verdes comuns (EVC)

resumo

De acordo com a definição de trabalho da Comissão Europeia de Soluções Baseadas na Natureza (SBN), estas são diversas soluções inspiradas e apoiadas pela natureza, proporcionando co-benefícios sociais, ambientais e económicos. Corretamente implementado, as NBS funcionam como uma abordagem sistémica para fornecer serviços ecossistémicos urbanos (SEU) através da Infraestrutura Verde Urbana (IVU). Para testar a eficácia do NBS em estratégias de resiliência climática urbana e integrá-las a um cenário de 2050, o projeto H2020 UNaLab oferece às cidades em todo o mundo know-how, ferramentas, assistência técnica e suporte de rede.

Para abordar a complexidade do desafio, o UNaLab apela à participação de diversas partes interessadas em exercícios de planeamento prospectivo, seguindo a metodologia Roadmapping de UnaLab (MRU). O URM tem potencial teórico para criar Instituições Cooperativas para governar a riqueza comum baseada nos SEU co-produzidos na IVU, em espaços verdes comuns (EVC). A presente pesquisa estuda esse potencial na prática. Pretende avaliar se permite a cooperação das partes interessadas além do estágio de planeamento, proporcionando, assim, uma abordagem alternativa para a produção do espaço urbano.

Pesquisas e entrevistas com profissionais da MRU permitiram avaliar a implementação da MRU e seu potencial para o envolvimento cooperativo. Os resultados dos dois estudos de caso mostram que não existem características específicas decorrentes da primeira etapa da MRU que sustentem as reivindicações por tal potencial. Entretanto, os resultados mostram também a importância das *soft-skills* como potenciadoras da participação das partes interessadas e a media visual para apoiar a construção de sentido. Existem áreas de oportunidade no processo, como uma abordagem metódica na seleção de *stakeholders* e permitir que os participantes influenciem as atividades da URM de modo a harmonizá-las localmente. Estas recomendações são relevantes para realizar o potencial da MRU e permitir que a ação coletiva use as SBN como para transformar a IVU em EVC.

keywords

Nature Based Solutions (NBS); urban ecosystem services (UES); UNaLab Roadmapping Methodology (URM); Collective action; Cooperative Institutions; Urban Green Commons (UGC)

resumo

According to the European Commission's working definition of Nature Based Solutions (NBS), these are diverse solutions inspired and supported by nature, delivering co-benefits in the triple bottom line. Properly implemented, NBS work as systemic approach to deliver urban ecosystem services (UES) through Urban Green Infrastructure (UGI). To test the effectiveness of NBS in urban climate resilience strategies and to mainstream them towards a 2050 scenario, the H2020 UNaLab project provides cities across the world with know-how, tools, technical assistance and network support.

To address the challenge's complexity, UNaLab calls for the participation of diverse stakeholders in prospective planning exercises following the UNaLab Roadmapping Methodology (URM). The URM has theoretical potential to create Cooperative Institutions to govern the common-wealth based on the co-produced ES at UGI, becoming Urban Green Commons (UGC). The present research studies this potential in practice; assessing whether it enables stakeholder cooperation beyond the planning stage, thus, providing an alternative approach to producing the urban space.

Surveys and interviews with URM practitioners allowed to assess the implementation of the URM and its potential for cooperative engagement. Results from two case studies show that there are no particular features of the first stage of the methodology that sustains the claims for such potential. However, it also pointed at the importance of soft-skills for facilitation to enable stakeholder participation and visual media to support sense-making, and areas of opportunity such as a methodical approach to address biases in stakeholder selection and allowing participants to influence the URM activities to locally-attune them, as relevant to realise the methodology's potential to enable the collective action to use the NBS approach as a frame to turn the UGI into UGC.

NBS for climate change adaptation: the *Roadmap* potential to enable cooperative institutions for managing urban green commons

This Thesis was undertaken during the second year of the JEMES CiSu master program at the University of Aveiro (UA). It fits into the European Union 2020 Horizon **UNaLab** project (https://www.unalab.eu/) undertaken by a consortium of which the UA is part of. The UNaLab project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052, Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions.

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List of acronyms[1]:

BAS	Başakşehir
CAS	Complex Adaptive System
CC	Climate Change
CI	Cooperative Institutions
CoCr	Co-creation
CoCr*	Co-creation, found in literature as co-production
CPR	Common Pool Resources
CPR-DP	Common Pool Resources Design Principles
DP	Design Principles
ES	Ecosystem services
E-SH	External Stakeholders
FC	Follower City
FC-CT	Follower City Core Team
FT	Facilitation Team
IAD	Institutional Analysis and Development Framework
IPCC	Intergovernmental Panel on Climate Change
I-SH	Internal Stakeholders
NBS	Nature-based Solutions
NIASES	New Institutional Analysis of Social-Ecological Systems
PE-NIASES	*Political Ecology-rooted New Institutional Analysis of Social-Ecological Systems (p. 39)*
PL-SH	Policy Level Stakeholders
PRA	Prague
RM	Roadmap
SES	Social-ecological Systems
SESF	Social-ecological Systems Framework
SH	Stakeholders
SL-SH	Strategy Level Stakeholders
SRM	Standard Roadmapping Methodology
SRM-P	Standard Roadmapping Methodology Principles
TU/e	Technical University of Eindhoven
UES	Urban Ecosystem Services
UGC	*Urban Green Commons (p. 37)*
UGC-DP	*Urban Green Commons Design Principles (p. 38)*
UGI	Urban Green Infrastructure
URM	UNaLab Roadmapping Methodology
URM-P	*UNaLab Roadmapping Methodology Principles (p. 43)*
URM-AS	UNaLab Roadmapping Methodology's Ambition Setting stage

[1] In italics, the acronyms for concepts and tools that were developed in this research

I. Introduction

I.I Theoretical and practical background

Climate change refers to the global change in the parameters that have an effect on climatic conditions. This is reflected in seasons' variation, longer and more intense drought periods and planetary temperature increase, to name some. It poses a threat to human societies capacity to survive and thrive, as resource availability becomes uncertain in the medium and long term. As human societies predominantly dwell in urban centers, and at an increasing rate, they are relevant settings to study and transform in this context. Because of cities main physical traits, such as sealed surfaces and dense concentration of buildings and grey material, they are particularly susceptible to flood and urban heat island risks. (see § II.II.i; UN, 1992; Graedel & Klee, 2002; Seto, Parnell, & Elmqvist, 2013).

Risk is defined by the interaction of independent factors such as the probability and intensity of an event (in this case, climate-related), with manageable factors such as vulnerability and exposure. This means that while avoiding an event of certain magnitude to happen may be impossible or too expensive, containing the social and physical damage that may be caused by such event at a location is a feasible task. Risk can be diminished or eliminated by addressing the *receptor* before consequences happen e.g. by reducing exposed population. Thus, risk is manageable and this approach is being adopted world-wide, as human settlements are adapting to climate change (see § II.II.ii.c; Cardona et al., 2012; Depietri & McPhearson; 2017; Tapia et al., 2017).

Climate change **adaptation** consists of actions, measures or general strategies that can be followed to reduce the vulnerability of the social-ecological urban systems. The strategies for adaptation and its components can be characterised into two general paths, depending on their intensity of resource use and institutional requirements, and on its actor or infrastructural complexity. The *soft path* consists in interventions with a localised scope, prioritising natural infrastructure-based and capacity building measures. The *hard path* consists in interventions that of large magnitude and scope, prioritising resource, actor and institution-intensive measures. Within these paths, *adaptation options* are categorised into three areas: *structural and physical*, referring to discrete technical interventions; *social*, referring to actions tackling the social conditions driving vulnerability, and *institutional*, encompassing governmental actions, strategies and instruments. It is of this thesis' particular interest to study the structural and institutional options within the soft path (see § II.III.i.a; Sovacool, 2011; Field et al., 2014; Noble et al., 2014)

Working with both set of measures at different areas of societies and communities –from government to markets; from knowledge production and communication institutions, to civil society– and cross-cutting within them, will build their **resilience**. Such a trait in a system makes it capable of withstanding shocks and stresses and still perform its fundamental functions. In the case of urban systems, the stresses may be external or internal, but uncertain scenarios driven by climate change make adaptation towards climate-resilience an urgent matter. The purpose is to keep on providing the services and hosting the activities that take place in the urban setting, both equitably and sustainably, this is: covering all city inhabitants, and achieving a balanced and sufficient performance in the social, economic and environmental realms in the long run, respectively (see § II.III.i; Folke, 2006; Ruhl & Chapin, 2012; Pickett et al., 2014)

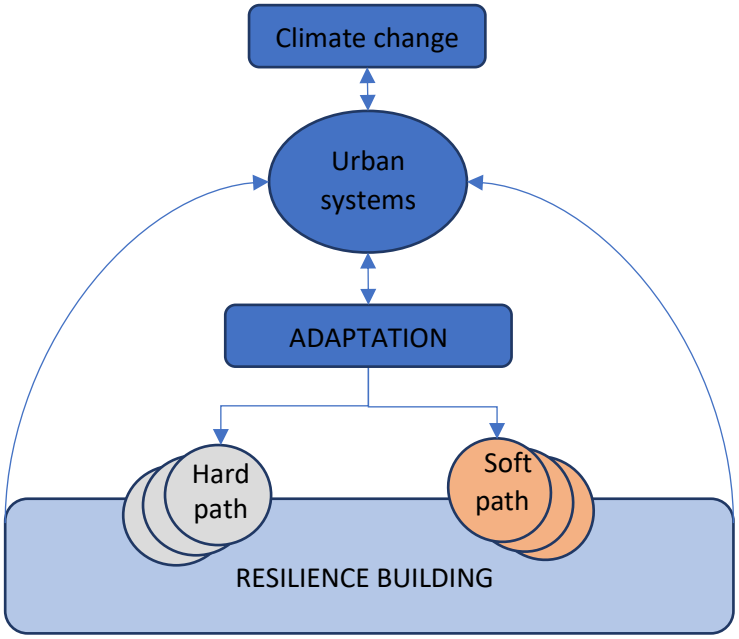

Figure 1 Working visualisation of the process of climate change adaptation

I.II Scope definition and problem formulation

Attending the pointed urgency, diverse resilience-building efforts for urban societies to adapt to climate change diminishing its risks, are taking place. One of them is **UNaLab**, a European Union-based project funded by the European Commission's *Horizon 2020* programme, aiming to provide both a framework and an evidence base for a paradigm shift in the way cities are planned (institutional change; soft) and built (structural change; soft). The fundamental premises of the project are that (UNaLab, 2016): i) *co-creation processes* may yield more integral answers to the question of how to create climate-resilient cities, while addressing implementation and legitimacy issues, provided broad participation in the urban planning activities –its institutional proposition– , and ii) that *nature-based solutions* (NBS) may be more effective than "traditional engineering solutions" to adapt urban infrastructure to climate change, with lower costs and a wide range of co-benefits associated –its structural proposition

To test both premises, UNaLab consortium includes pilot cities where different courses of action will take place. *Front runner cities* (FRCs) will be provided with technical and methodological assistance to advance on their climate change adaptation strategies and projects. A second set of cities, *follower cities* (FCs), will have their participation framed in UNaLab by outlining a strategy for climate-resilience building towards 2050, driven by NBS implementation. This is done through the ***Roadmapping* (RM) *methodology***, co-creating a common vision of a climate-resilient future among stakeholders, and the steps required to achieve it. As participants would not necessarily be technical experts on the matter, their process is enriched with technical input from external actors. Thus, the process relies on the technical expertise to frame the discussions, but in local experience to nourish them, aiming for a robust and locally-attuned participatory strategy.

This stakeholder-inclusive process with an ambitious goal spanning for over more than 30 years, sets high expectations for its 5-year time-frame of funding and operation. In this regard, what is needed from the project to have a long-lasting effect in the resilience building of the urban systems involved in it? This question should be addressed two-fold, following the analysis of Ruhl and Chapin (2012): one is how UNaLab's processes and outcomes help build resilience, and the other is how these are resilient *themselves*, effectively extending their impact until 2050. These two sides of the coin may, in turn, be relevant questions for both the pillars of the project: the co-creation processes and the NBS implementation.

Attending this concern at the co-creation pillar, it is critical to understand how and to what extent the collectively decided steps could be effectively implemented by 2050. Similarly, the URM process with its built capacities and social infrastructure created, ought to be studied as well as its stages and outputs, such as the overall strategy and the proposed physical interventions, since they contribute to the urban system's resilience-building. These needs lead the discussion to the second pillar of the project: the NBS. Although they seem to have a transformative potential over the urban system's form and functions, being a recently developed concept there are still pending questions regarding how they affect and are affected by their embeddedness within the urban system. Their capacity to perform as expected on solving societal issues is still to be assessed, as shown in Figure 2.

In a previous own research project where the UNaLab activities were studied (Lameiras, 2017), two initially unrelated topics came together: on the one hand, the conceptualization of public spaces and resources as *commons*. On the other, research pointing at the Standard Roadmapping Methodology (SRM) as an *enabler of cooperative institutions* for managing commons. Although superficially addressed, such relation was out of the past research's scope and thus only recognized as a subject worthy of looking deeper into. Thus, the present research will build-up from that identified link, aiming to explore how it could enhance the project's performance at the FCs, even beyond the 5-year time-frame.

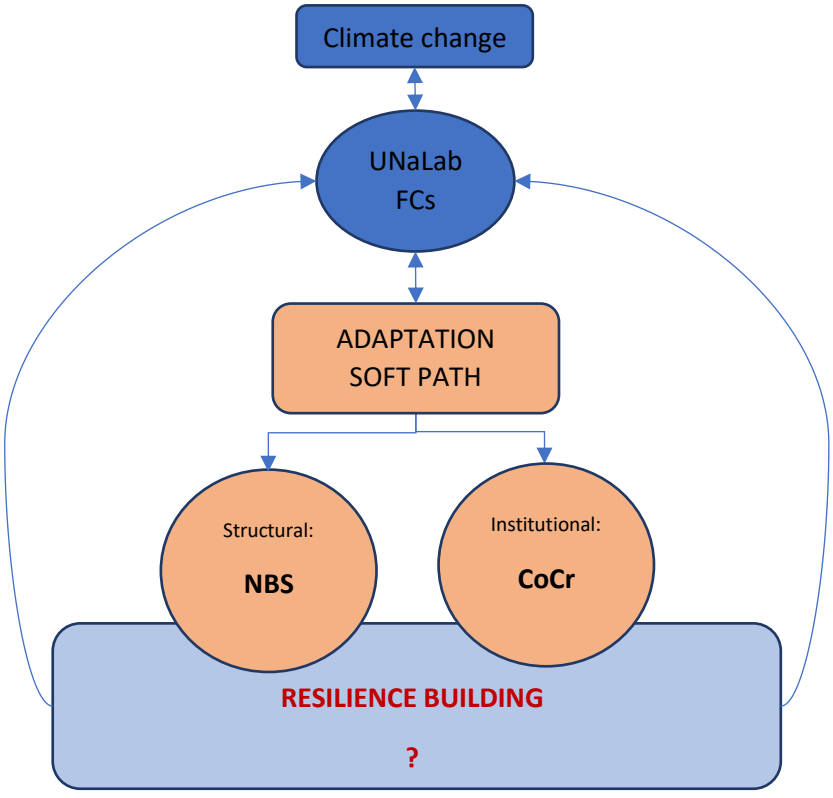

Figure 2 Working visualisation of UNaLab's approach to resilience building

In other words, the research starting point is based on an *informed intuition* that the NBS could be characterized as urban commons; that the URM has a potential of enabling cooperative institutions to manage commons; and that working with the project's soft structural and institutional measures (namely, the NBS and co-creation, respectively) from this perspective, would enhance the project resilience-building as well as its outcomes. Although the last question requires a longer research effort and larger multi-disciplinary input, this Master thesis research aims to provide starting steps towards such larger conclusion.

Hence, framing the overall objective of this Master thesis research as a research question, in the following pages it is explored

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how the URM activities in FCs enable the creation of cooperative institutions to manage common nature-based solutions, as a component of a sustainable, fair and effective climate-resilience strategy

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Corresponding specific objectives of this Master thesis research are to:

- determine the validity of classifying NBS as urban commons;
- assess whether the URM holds the same potential as the SRM to create the social infrastructure of cooperative institutions for managing the commons; and
- assess whether the early implementation of URM enhances or undermines such potential.

It is important to highlight that UNaLab efforts aim to be framed within cities' own climate resilience strategies. Further, such strategies and their components ought to: i) aim for a triple-bottom-line while providing the cities' services in both the present and future (sustainable); ii) ensure that all stakeholders have equitable access to the decision-making and benefit-reaping (fair), in the context of iii) uncertain climate-related risks (effective).

II. Literature review

This chapter is preceded by an effort to characterize the setting in which this research takes place as well as the direction it is aiming to. The purpose was, on the one hand, to make clear that climate change presents a challenge for current human societies, not for the meteorological events or the ecosystemic disturbances *per se*, but because of the degree of vulnerability of societies to such occurrences and processes (Collins et al., 2011; Berrouet, Machado & Villegas-Palacio, 2018). On the other hand, it also introduced UNaLab as a project which aims to help cities mainstream the concept of NBS as an approach to plan urban renaturation as part of their resilience strategies. This background allows to note that the object of research not only takes place in the *interface of social systems and ecosystems*, but it also reveals a tension between the existing *order of things* in the converging systems and the *alternatives* that challenge it. Thus, the literature review is structured in those terms to further inform the background and create a solid base to address the research question.

II.I Picking the lenses: the SES framework for climate change adaptation in urban areas

II.I.i Beyond divisions: social-ecological systems

The abstract thought of an interface of the *natural* and the *social* domains, allows to address the deep and complex interrelations that bind together rational and non-rational actors in a shared environment (Morse et al., 2011). Building up from the nature-society arbitrary and artificial divide, the concept of the interface is key to understand these coupled domains' multidirectional and reciprocal interactions at diverse spatial and temporal scales. Further, it allows to act upon the role of the social institutions, dynamics, order and resources in the shaping of the common space and resources (Folke, 2006; Liu et al., 2005; Grimm et al., 2000). The integration of both domains has been conceptualised as *social-ecological systems* (SES), recognising that both social and ecological domains –onwards, *subsystems*– are influenced by drivers and contain patterns and processes which explicitly converge in the spatial context of interactions, as clear in Figure 3 (Grimm et al., 2000).

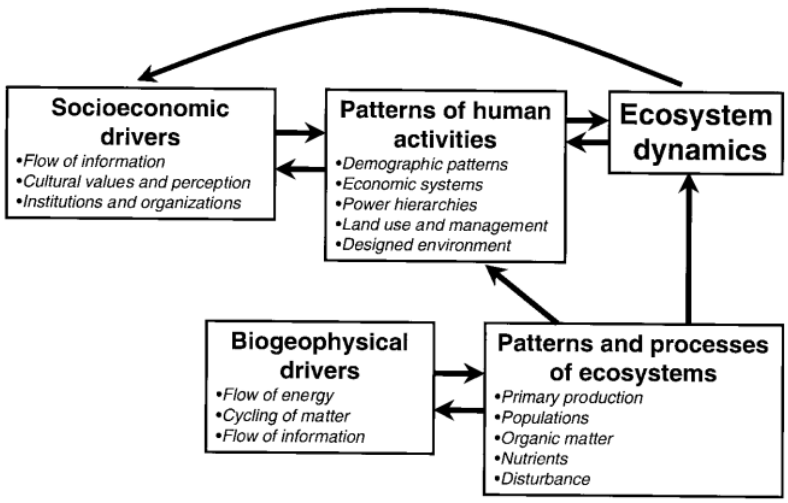

Figure 3 Schematic view of the interaction between social and ecological systems (Grimm et al., 2000)

The diverse components of the SES reciprocally feedback each other, through non-linear relationships determined by thresholds, which change the systems' behaviours either spatially or temporally (Liu et al, 2005). Moreover, SES' elements iteratively interact and co-determine each other in such integrated context, and thus they are characterised as *complex adaptive systems* (CAS) (Morse, 2011). CAS self-organise through these multi-scale- and feedbacked interactions, developing mechanisms for evolving genetics, behaviours or spatial distributions; response diversity to allow regeneration and renewal, and redundancy for the system to withstand disturbances (Folke, 2006).

It is this complexity of the SES that make sole social or natural sciences theories insufficient to approach them without being too broad and general, or too narrow and specific (Bodin & Tengö, 2012). Further, addressing the non-linearity and adaptivity of the complex coupled interaction requires not only to link the existing theoretical advances and tools of those traditional research areas, but also to create new ones (Liu et al., 2005; Berrouet, Machado & Villegas-Palacio, 2018). For such reason, over the past couple of decades researchers have called for the creation of frameworks that allow to take an explicitly integrated and conceptually consistent perspective to understand the complex dynamics of the SES (Collins et al., 2011).

Of particular interest to this research is how the SES dynamics play out in the urban setting in the face of climate change. According to Grimm et al. (2000) the urban setting is a SES on its own. This is both reflected in and caused by the dynamics of its spatial heterogeneity and its relationship with the ecosystem services that sustain them (see § II.III.I). Its complex and adaptive essence reminds that the actions and outcomes in such setting will have impacts across spatial and temporal scales (Müller et al., 2013). From this understanding of the urban setting, four main traits were synthesised by McHale et al. (2015) to work towards those systems' sustainability: *complexity* of interactions, *connectivity* of vital flows, *diffuseness* of the material and immaterial boundaries, and the resulting *diversity* of conditions, drivers, and processes of urbanisation.

Although both subsystems within the SES are complex in their own, understandings, expectations, institutions and technologies emerge from humans' abstraction, reflection and evaluation capacities (Morse et al., 2011). Thus, components of social subsystems can deliberately shape the interactions in the SES (Grimm et al., 2000). In this regard, to guide the research on the urban settings' status quo and the alternatives for their sustainability, the analytical divide between the social and ecological domains is brought back –although now conceptualised as *complex adaptive subsystems of the SES*. Thus, this research looks deep into the social system, while still based in a SES perspective. To operationalise this task:

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in this study SES will be used as a framework to study the role of the social systems in building the urban settings' resilience in the face of climate change.

Attending the call for integrative frameworks to study the SES, researchers have developed multiple analytical approaches and tools. Three frameworks will be briefly described to provide context, and then a fourth one will be justified as the chosen of one for this research:

- Collins et al. (2011) devised a framework based on the assumption that changes in the SES come both subtly, gradually and predictably –*Press*–, and suddenly, largely in magnitude and pervasively in time-frame –*Pulses*. These changes, in turn, influence each other creating *press-pulse dynamics* which affect the ecological subsystem, feedbacking to the social subsystem as changes in the ecosystem services. Both efforts were driven by the threat that climate change poses on the goods and services societies extract from ecosystems.
- Bodin & Tengö (2012) designed a highly abstract approach that conceptualises SES as networks. The social actors and ecological resources are *nodes* that link to each other, creating a configuration that characterises abstractly the interdependencies in SES. Each configuration, called *SES motif*, is determined by their relation based on three fundamental traits: symmetric or asymmetric access to the resource by the social actors; shared access and substitutability, and social and ecological connectivity.
- Berrouet, Machado & Villegas-Palacio (2018) designed a framework that aims to fill the gaps in vulnerability-risk assessment frameworks regarding the links between social and ecological subsystems. They did so by incorporating the concept of *ecosystem services* and their *change on the provision levels* as a proxy of the threats to the social subsystem, and contemplating feedbacks towards the ecological subsystem in the form of *adaptation strategies*.

These frameworks were reviewed to show the different approaches and aims that can give rise to methodical and internally coherent representations of the SES. This is important because studying these systems through a common framework, allows to shape a thorough understanding of them through a "general set of variables" logically related that explain how the elements behave and interact (Ostrom, 2005, p.28). As it was seen in the previous chapter, this research is close to a scholarship of common resources management studies in which collective action based on social institutions are central (Ostrom, 1990). Thus:

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to assess the potential relevance of the Ostromian *paradigms in the urban SES, it is consistent to use a framework in which components of social subsystems, namely actors' interactions, guiding institutions and governance forms, are not only present but fundamental.*

II.I.ii Abstraction for action: the social-ecological systems framework

Elinor Ostrom built upon Liu's et al. (2005) ground striving to examine jointly the actors and resources' attributes, as well as the governing structures and institutions that determine their interactions and outcomes in the SES over time (Ostrom, 2007). The *social-ecological systems framework* (SESF) that was then developed, allows for an analytical approach to study the patterns of interactions and expected outcomes embedded in, influenced by, and affecting the management of common resources in a particular setting. The framework addresses the SES by decomposing its "complex, multivariable, nonlinear, cross-scale and changing" structure into components, which contain variables that can be hierarchically "unpacked and further unpacked" (Ostrom, 2007, p.15181-15182) into other variables. The interactions among these, either vertically or horizontally –within the own components' hierarchy, or across components–, lead to emergent properties in the SES.

The operationalisation of the rationale for the SESF is graphically represented in Figure 4. Its current structure is the result of multiple iterations (Ostrom, 2007; Ostrom, 2009; McGinnis, 2010; Epstein et al., 2013; Cole, Epstein & McGinnis, 2014, and McGinnis & Ostrom, 2014), and it is described next. The SES is delimited by the dotted line, signalling the system boundaries and thus determining which of its components will be studied according to the analysis' scope. However, it still recognises the differentiated links they maintain with the *RELATED SOCIAL, ECONOMIC AND POLITICAL SYSTEMS (S)* as well as *RELATED ECOSYSTEMS (ECO)* (Ostrom, 2007). It also acknowledges the biogeophysical principles that natural sciences like Chemistry, Physics and Biology have so far revealed. Thus, the components and variables, their interactions, and the conclusions derived from the SES analysis need to comply with the *ECOLOGICAL RULES (ER)* (Epstein et al., 2013).

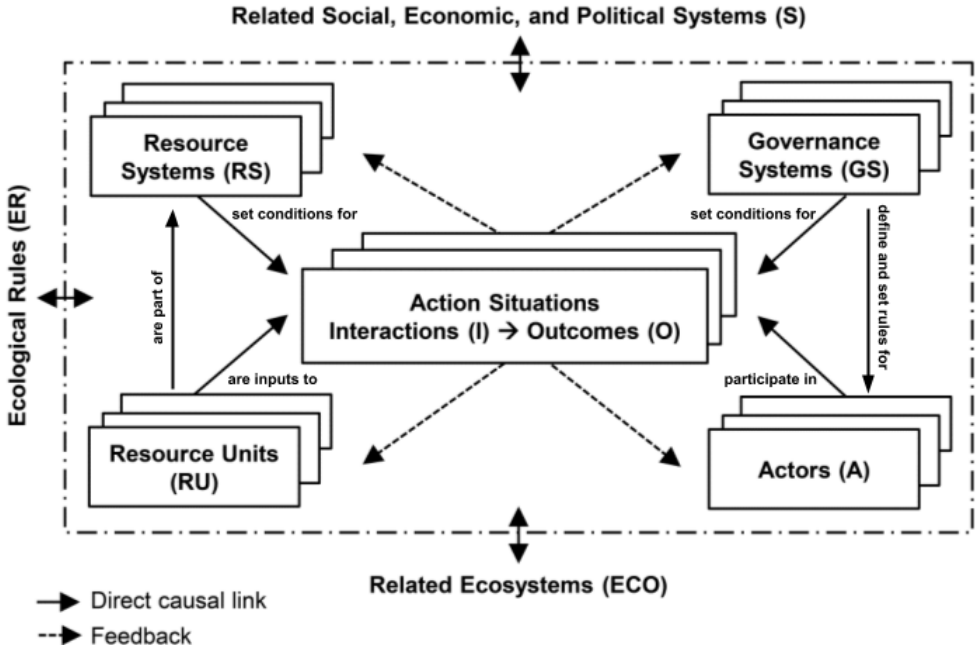

Figure 4 SESF multiple instances of top-tier components, interactions and labels. Adapted from Cole, Epstein & McGinnis (2014) and McGinnis & Ostrom (2014).

Within the boundaries, there are five *top-tier components* which contain –in the logical meaning– hierarchically descriptive variables:

- *ACTION-SITUATION*, in the centre of the figure, encompasses the variables for the patterns of interaction and the expected outcomes, describing both the activities and processes, and the outcome criteria. The action-situation is the concept of a rule-driven social space where the social agents interact among them and with the common-pool resources (Polski & Ostrom, 1999; McGinnis, 2010; McGinnis & Ostrom, 2014).
- *ACTORS* describe the agents, previously conceptualised as *users* (Ostrom, 2007; Ostrom, 2009), which have an interest on using, extracting or transforming resource units. They are characterised by socioeconomic attributes and cultural traits (Epstein et al., 2013).
- *RESOURCE UNITS* are the discrete elements existing in ecological subsystems which are appropriated by users. They are characterised by ecological attributes and economical traits (Epstein et al., 2013).
- *RESOURCE SYSTEM* refers to the system in which resource units are aggregated, generated and stored, characterised by ecosystem dynamics and their overall physical structure and form (Epstein et al., 2013).
- *GOVERNANCE SYSTEM* are rules, strategies and norms; institutions and organisations crafted by actors to regulate these resource systems' maintenance and overall management, as well as the actors' positions and rights in the interaction. They provide, knowingly or not, the mechanisms and incentives for patterns to emerge (Cole, Epstein & McGinnis, 2014; Epstein et al., 2013).

These components are linked between them by direct and feedbacked flows to/from the action-situation; these are labelled by their logical relations. It is relevant to clearly specify those relations in the analysis as the multiple instances of each top-tier component –represented by the boxes–, may not have the same relation between them in a given action-situation (McGinnis, 2010; McGinnis & Ostrom, 2014).

As it can be inferred from the past description, the SESF leans heavily on the components of the social subsystem to conceptualise the SES. A visual proof is the centrality of the action-situation, taking up this characteristic from previous approaches (McGinnis & Ostrom, 2014). Moreover, going through the Resource Unit and Resource System's hierarchically lower levels of variables, or *second and third-tier variables* (Cole, Epstein & McGinnis, 2014), one can find "economic value", "resource unit mobility", "human-constructed facilities" and "storage location", for instance (Epstein et al., 2013, p.438). This means that while still acknowledging the relevance of

the conceptual distinction between the ecological and social subsystems, the SESF embraces and develops the capacity of the latter's institutions and interactions to deliberately shape the ecological subsystem, and thus the SES (Grimm et al. 2000; Morse et al., 2011).

Nevertheless, the level of abstraction the SESF and the institutions-related variables it offers to understand the interactions in the SES are not enough to make it useful. The variables that need to be investigated to "diagnose a phenomenon, explain its processes, and predict outcomes" (Ostrom, 2005, p.28) will only surface through theoretical explanations of reality. Attending this need for theoretical support and considering the SESF orientation towards the social subsystem:

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this research will be further enabled by the advances in the study area of urban political ecology, to address the role of power relations in the urban SES, particularly the roles of urban political economies in its dynamics (Wilkinson et al., 2013; Heynen, 2006), and it may provide relevant positive and normative insights to answer the research question

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With such objective, the following sections in this chapter study the urban setting through an urban political ecology-rooted SESF, to support the understanding of the present state of things, the envisioned alternatives and the pathways at hand.

II.II Looking at the present: where are we standing?

II.II.i Grasping the SES complexity through urban ecology

Mainly manifested in demographic and spatial changes, the process of urbanisation[2] has largely evolved, reconceptualising the urban setting from city, to *continuum of urbanity* (McHale et al., 2015). These continuums are characterised as *complex*, given the variety of components and processes they contain, allowing for multiple, non-linear and retrofitting interactions, not only in the spatial/physical realm, but also socially/culturally. They are also *connected* within and among urban settings through the multidirectional flows of resources, energy, information and people, extending even to the global scale. This is allowed by the *diffuseness* of the urban settings' physical boundaries, enlarging the processes and forms of governance beyond the scale and jurisdiction of government. Reflecting the various expressions of complexity, connectedness and diffuseness, there are *diverse* conditions, drivers, and processes of urbanisation across urban settings, creating an urban mosaic of land-uses, form, culture and institutions.

In a formal sense, the urban mosaic appearance is composed by *patches*, a "discrete spatial pattern" materially, functionally and spatially defined (Morse et al., 2011). This concept puts forward the notion that such heterogeneity of spatial form results in heterogeneity of the ecosystem function (Pickett et al., 2008). Although individual patches have their own ecological dynamics, they are vertically nested within larger spatial configurations; the particular ecosystem structure at each patch level has a relation of affect and effect with the other patch levels (Morse et al., 2011). Hence:

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to understand and act upon this urban mosaic, it is important to adopt a SES perspective, this is: to think of the urban setting as a complex and adaptive system of interconnected social and ecological subsystems.

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[2] "[Urbanisation is] a multidimensional process that manifests itself through rapidly changing human population and changing land cover" (Seto, Parnell, & Elmqvist, 2013, p.4).

As mentioned before, the SES are partially determined by their social element. In fact, eminent social processes, such as agricultural development or urbanisation, fundamentally modify the components and relations of the ecosystems by acting upon the spatial form (Seto et al., 2011) – i.e. creating the patches. However, despite the reflective, aware and deliberate nature of the dynamics of social subsystems, it is also true that the ecological subsystems' dynamics will provide different conditions and incentives for the development of certain social practices and institutions (Cole, Epstein & McGinnis, 2014). According to Morse et al. (2011, p. 62) such dialectics of the subsystems are synthesised in the patch, becoming simultaneously, "both the outcome of previous disturbances and the medium providing future system potential".

This spatial heterogeneity driving social-ecological feedbacks reflected in the patch structure, support conceptualising the urban setting as an ecosystem on its own (Pickett et al., 2008). This, in turn, allows to study energy and matter flows in and out the urban setting from their surroundings, and how they are processed inside, which is the field of urban ecology (Grimm et al., 2000). Further, it allows to understand how nature is reconstructed into urban settings by action of human planning (Tanner et al., 2014). This is possible because in addition to the structure, function and processes, which are the focus of ecological studies, the social subsystems' components of social institutions, culture and behaviour, and the built environment are also addressed by urban ecologists (Grimm et al., 2000).

The theoretical tools provided by the urban ecology studies set the ground to grasp thoroughly the urban SES. In that sense, it is easy to identify a period of accelerated change in the magnitude and composition of urban metabolism starting the industrial revolution, through an increase in the urban populations –both by birth and migration– and in the emissions of CO_2 (Elmqvist et al., 2013; Wilkinson et al., 2013). Further, from that period on the still non-urbanised land was considered as a seemingly never-ending source for production inputs, both natural and human, and a sink for outputs. Such changes in land and population brought about large economic expansion and prosperity (Costanza et al. 2007), and environmental and social externalities of such a way of organising society and production were considered as "relatively small and ultimately solvable" (Elmqvist et al., 2013, p. 25).

Fast forward to the present, even if the current concentration of population in urban settlements make the resource allocation for consumption more efficient (Brunner & Rechberger, 2002), the sourcing of the materials and energy for such demands' satisfaction is not focalized but rather spread across the globe, as argued by Graedel and Klee (2002). Current patterns of urban consumption do not necessarily source their materials nor energy from their hinterlands, in line with McHale et al.'s concepts of connectivity and diffuseness (2015). As Graedel and Klee put it, this presents a large potential for environmental degradation, which manifests in the ongoing change in the physical, ecological, and biological dimensions of the planet, referred to as climate change. In practical terms, its impacts represent a large threat to contemporary societies' capacity to survive and thrive, since it jeopardizes the provision of ecosystem services they rely on to satisfy human needs (Collins et al., 2011; Berrouet, Machado & Villegas-Palacio, 2018). If the impacts on the SES are mainly driven by the social subsystem, then the necessary responses to ensure its prevalence will also emerge from there. But how will the responses emerge? Who will decide? Which needs will they attend?

II.II.ii Linking the dots: urban political ecology

From the past section it is clear that climate change is a large pressing issue for SES. The urban settings are not exempt of this threat; what is more, they are both drivers of it and recipients of its consequences given their population and built infrastructure densities and their overall metabolism. However, these do not occur spontaneously in the urban SES; the blending of physical, social and symbolic components produces these settings, heavily influenced by conflicts and power struggles (Swyngedouw & Heynen, 2003). Thus, to articulate a response it is important to assess the dynamics of the social subsystem which led in the first place to this situation. Political ecology's study area addresses the role of power relations in the SES (Wilkinson et al., 2013),

and that scholarship may be a relevant source for both the positive and normative insights that are needed to attend the challenge of climate change in the urban setting.

Similar to the SES concept, political ecology is founded on the notion that the dynamics of social and environmental domains are fundamentally interlinked (Swyngedouw & Heynen, 2003). It is said then that…

Political ecology addresses the role of power relations in the SES (Wilkinson et al., 2013)

From such departing point, a theoretical ground was developed to politicise the environment – i.e. acknowledging the role that power relations have in such social-ecological interface (Bryant & Bailey, 2005). In this scholar tradition, *power* mediates actors' ability to control the own and other actors' interactions with the environment. In such regard, Swyngedouw and Heynen argue, it is the political and economic processes that rules the use of resources (2003) and, thus, the costs and benefits of said exploitation will be assigned accordingly –reinforcing the prevalent social and economic conditions (Bryant & Bailey, 2005).

Being socially constructed, the spatial differences in the urban settings may be fundamentally explained by the interconnected dynamics of (Passidomo, 2016):

- power, both its exercise and the structures that allow its exercise;
- local cultural features,
- site's ecological processes, and the societal relationship with those processes.

Such is the aim of urban political ecology as a discipline on its own, providing insights on how power-laden social relationships dialectically produce the urban metabolism with the existing environmental conditions (Heynen, 2006), ultimately creating inequitable urban landscapes (Swyngedouw & Heynen, 2003). In particular, the Marxist strand of urban political ecology points out at capital-oriented organisation of the ecological subsystems –or nature's metabolism– as the driver of these inequitable conditions in the urban SES (Swyngedouw & Heynen, 2003).

II.II.ii.a Neoliberalism and the city: capital driving the urban processes

Following such theoretical line, several researchers among which both Henry Lefebvre and David Harvey stand out, have largely developed on the influence of the processes of capitalist dynamics over the urban setting, being it the physical space where labour, capital and class struggle converge (Gabriel, 2014). This builds on the notion that the social production of urban space is not neutral, but rather the product of power-mediated SES dynamics (Passidomo, 2016). From the Marxist perspective, Swyngedouw and Heynen state that the interests of capitalist elites manage these spaces, distributing the costs to marginalised actors by influencing the forms of organisation that govern the urban space (2003; Harvey, 2008). This results in social, economic and environmental well-being "in some places and for some people", but large externalities elsewhere, be it within the same urban continuum, or in other, even distant, produced spaces (Swyngedouw & Heynen, 2003, p. 909; Graedel & Klee, 2002; McHale, 2015).

Power is a transversal element determining social subsystems features (Grimm et al., 2000), and urban political ecology takes this element to explain the production of urban SES. In that regard, from a Marxist perspective, it is the global capitalist system with the interests and structures it creates in the urban setting that appears as a large driver of inequitable environmental change (Bryant & Bailey, 2005). In the context of this study:

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it is important to characterise how these economic and political forces materialise both globally and in the urban SES.

In that regard, it is useful to follow Castree (2010b) when he defines capitalism as a process depending on restless and unstable accumulation of capital. Synthesising Marx's insights, he characterises it as 1) growth-oriented: adding value to commodities at each stage of its transformation; 2) competition-based: suppliers contending for consumers' resources, and 3) innovation-driven: as a result of high competition to grow. These traits make capitalism a process tending to be all-encompassing, provided the markets can expand parallelly.

Markets refer to the spheres in which human life's necessities and desires are satisfied by means of "money-mediated relations between various producers" (Castree, 2010a, p. 1726), and the approach of purposely expanding markets to ensure capital growth is referred to as *neoliberalism*. To commodify previously non-market spheres, it relies of private and State-led processes of privatisation –private property rights to hitherto non-private aspects; marketisation –make alienable and exchangeable goods/services that were not subject to market dynamics; de-regulation –reducing government intervention in favour of economic actors freedom of choice; re-regulation –increasing government intervention to drive privatisation and marketisation; government guided by market proxies as efficiency; increasing relevance of society to fill voids after de-regulation, and stressing a self-sufficiency ethos for individuals and communities (Castree, 2010a; Jessop, 2002).

However, the neoliberal reform of the State –through practices, discourse and ideology– has interacted with the local existing institutions and contexts, developing diverse versions of "actually existing neoliberalism" at each location (Brenner & Theodore, 2002). Furthermore, the *neoliberalisation of cities* has occurred not only by expanding the market sphere to the production of urban space, but also by developing in the urban setting and its institutions nonmarket arrangements to sustain the accumulation processes despite market failures. As Jessop (2002) puts it, this relies on modifying urban political and social institutions to sustain and complement the globalizing market economy. Among these are public-private-partnerships, development of interorganisational networking for local interventions, and promotion of "good governance" between civil society, government and private sector to counter "ineffective local administration" (Jessop, 2002, p. 121; Brenner and Theodore, 2002).

Nevertheless, Revi et al. (2014, p. 577) argue that good governance is not only about providing the institutional space, but rather facilitating the *mediation* of decision processes across those who participate: the different actors, interested parties, and sources of information. However, is providing mediation and acknowledging power inequalities enough when governance forms themselves operate within political ecologies aimed at reproducing capital? (Harvey, 2008; Jessop, 2002). Several authors go further by acknowledging the uneven playing field in which participatory forms of urban governance take place, and point at the need of an active role of the State at *enabling* disempowered actors to prevent elite-biased or co-opted processes (Agger & Larsen, 2009; Silver, Scott & Kazepov, 2010; Curran & Hamilton, 2012). Building up on this finding, Preparatory Committee for the United Nations Conference on Housing and Sustainable Urban Development called for a recognition of the diverse vested interests, existing power and influence relations, and even the negotiating capacities of the actors, for local governments to manage and facilitate accordingly and not reinforce inequalities (2016).

II.II.ii.b Disputing power: contesting dynamics of the SES production

Although the concern of uneven social structures retrofitting into uneven spatial structure has effectively moved from academic to policy recommendation arenas, it is unclear to what extent it has echoed and influenced in practice the local governance processes in the neoliberal urban SES. Building up on Jessop's (2002) notion of the transformation of social institutions to better sustain market economy, the traditional focus of State-sponsored participation, and thus its institutionalisation, has changed. This meant moving from issues of representation, power and right to influence the own habitat, towards partnerships for innovation, business-based service-providing potential and civic engagement to compensate for market inadequacies (Rosol, 2010; Lund, 2018). The latter open the possibility to have processes biased in favour of cultural, economic and political elites, further driving exclusion, particularly when there is a lack of mechanisms that require, at least, representatives of the diverse social groups to participate on behalf of their stakes (Geddes, 2000; Silver, Scott & Kazepov, 2010).

In a concrete case studying community gardens in Berlin, Rosol (2010) analysed how practices of civic engagement are integrated into these governance processes over the urban SES. She explains they are used as a cheap solution to the retreat of the State, as developed by Castree and Jessop (2010a; 2002), but also how they are contained by framing them as manageable activities that fall within the social discipline desired by the State. Moreover, Rosol argues that this is achieved through recurrent neoliberal urban governance patterns such as placing more responsibility on citizens for institutional functions, but without granting them power, resources nor influence; co-opting citizens time, energies and agendas with those hitherto State-provided services; having the community organisations competing for resources rather than collaborating between them, and depoliticizing the governance forms.

There are some examples (see Bunce, 2016; Curran & Hamilton, 2012) that make the case for the success of organising and contesting the right to produce equitably the urban SES –the *right to the city*, as developed by Lefebvre (Passidomo, 2016). However, the pervasiveness of the neoliberal ethos and praxis in the forms of governance defined by Ansel and Gash (2008), pushed actors organising within this realm to make large compromises by accepting the "neoliberal settlement" (Castree, 2011, p. 41). Relying solely on *deliberation* principles and practices to persuade, reach consensus and jointly produce de SES –the foundation of the 'good governance' previously mentioned (Jessop, 2002; Revi et al., 2014)– proved insufficient in highly uneven and unacknowledged politicised settings. In this regard, the *agonist* approach of revealing the power and domination structures, and thus assuming adversarial roles to drive participation through conflict, effectively complemented deliberation. A parallel or sequenced "cycle of contestation and consensus" (Silver, Scott and Kazepov, 2010, p. 454) using and disputing the platforms provided in the status quo proved useful for the grassroots efforts.

As developed by Curran and Hamilton (2012) the emergence of environmental gentrification processes arises from environmental planning and dis/investment, as capital reproduction dynamics condition the production of the urban setting (Heynen, 2006). Such implementation of ecologically minded urban development or improvement relies on an a-political understanding of sustainability that ultimately "subordinates equity to profit-minded development" (Checker, 2011, p. 212). Thus, the agonist call for transparency of the power landscape is key for actors to dispute these dialectics of the social and ecological subsystems. Not doing so, allow neoliberal governance forms to depoliticise greening projects and situate them in the technical realm, in which conflict and dissent are neutralised by "projecting the creation of benefits" (Anguelovski, 2016, p. 29). With such approach, Anguelovski follows, structural inequities in the social structure are disregarded, and thus matters of environmental justice become secondary as those benefits are distributed unequally and un-neutrally (Swyngedouw & Heynen, 2003).

Not aiming for a transparent dispute of the dialectics of the social and ecological subsystems allow neoliberal governance forms to depoliticise greening projects and situate them in the technical realm, in which conflict and dissent are neutralised by presumed aggregated benfits

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II.II.ii.c Looking ahead: uneven landscapes, uneven vulnerabilities

Seen from the SES perspective, particularly from Machado and Collins et al.'s operationalisation (2011; 2018), changes in policy aimed at the management of SES ecological subsystem happen as a response to an experienced or expected reduction in the benefits and services it provides to the social subsystem. However, throughout this section it has been addressed both in an abstract and concrete regard how the benefits and costs of such effects and responses in the urban SES are ultimately determined by the power relations that mediate the interactions in such setting. The focus of this review has shed light on how the neoliberal approach to capital expansion process frame and form those relations. Thus, this section of the literature review will conclude by briefly

assessing how these urban political ecologies shape the understanding and action upon climate change not as an abstract planetary process, but as real threats to vulnerable components of the SES.

The efforts of the Intergovernmental Panel on Climate Change (IPCC) recognise that beyond the *actual* planetary changes and stresses, it is relevant to study how they will impact human society. A comprehensive assessment of academic research shed light on the *risks* emerging from this threat and what determines them (Cardona et al., 2012), decomposing them into: i) existence of a *hazard event*; ii) *exposure* of SES to such event, i.e. the elements that may be affected, and iii) exposed elements' *vulnerability*, referring to the propensity to adverse effects from the event. The variables of vulnerability to CC are, thereby, set in three domains: environmental, social and economic. The environmental refer to geographical locations and biophysical spatial patterns and infrastructures. The social refer to the social subsystems, accounting for its demographics, their cultural diversity, their structural order, and the institutions developed for SES governance. Finally, the economic contains variables regarding susceptibility of resource and labour organisation after a hazard event, access to financial support for recovery (Cardona et al., 2012).

Depietri and McPhearson (2017) argue, healthy ecosystems don't experience disasters, but rather disturbances which may even bring about ecological benefits. On the contrary, SES with already degraded or non-diverse ecological subsystems are exposed and vulnerable at different degrees thus the risk they face, depend on its integration and interaction with the settings' built environment and social subsystems. The earlier reviewed large spatial heterogeneity of the urban SES mediated by built infrastructure, as well as their population densities with associated resource consumption, allow to generalise them as SES with degraded ecological subsystems and, following Depietri and McPhearson (2017), can be characterised as risk-prone. In that regard it is possible to identify three main CC-related vulnerabilities faced by urban settings in the European context (Tapia et al., 2017): i) *heatwaves impacting on human health*, ii) *droughts impacting on and urban systems for water management and planning*, and iii) *floods impacting on socio-economic tissue and urban fabric*.

From these three main risks the urban space faces, the vulnerability to CC is essentially driven by the social subsystem's actions upon the SES, for instance given of the high proportions of sealed surfaces in the urban space –aggravated by unregulated expansion over floodplains– or the lack of basin-level water planning (Cardona et al., 2012; Tapia et al., 2017). However, although the IPCC efforts do reflect this relevance, they stop at describing how the socioeconomic factors produce vulnerability instead of pondering *why* those vulnerabilities occur (Mikulewicz, 2018). This a-political notion of the environment and policy, as previously reviewed (Checker, 2011; Curran & Hamilton, 2012; Anguelovski, 2016), can be countered by addressing issues of power-mediated social relations producing the urban setting (Swyngedouw & Heynen, 2003). Thisi is of high importance as even the efforts that aim to produce an alternative status of the SES may be subject to the same power relations that drove the vulnerability in the first place if they are not overtly considered, as "what counts as 'adaptive' is always political and contested" (Eriksen, Nightingale & Eakin, 2015, p. 523).

In that regard, three notions of how power operates in CC adaptation processes are recognized (Eriksen, Nightingale and Eakin, 2015):

1. *Authority*, or the capacity to effectively influence and exert agendas over the adaptation governance processes;
2. *Knowledge*, or the primacy of scientific knowledges –and within those, managerial, climate science and classical economics, argues Mikulewicz (2018), legitimising neoliberal ideology without making visible its elements, Jessop would add (2002)– over situated or traditional knowledges and perspectives; and
3. *Subjectivity*, or the internalised and reproduced structures of domination and discipline that creates social differentiations.

These notions aim to frame the manifestation of power *in action*, referring to the capacity of actors' to influence the process of cooperation and collusion to govern their contexts –close to the working definition of power in

political ecology tradition (Bryant & Bailey, 2005, p. 37). Hence, it allows to identify at a fine grain level how power relations manifest in the context of adaptation to CC, both at the epistemic and at the interaction layers.

II.III Envisioning a scenario: where do we want to go?

As shown previously, the challenge climate change (CC) represents to the social-ecological systems (SES) that societies produce and dwell in, is fundamentally related to its complex dynamics. Such processes and relations between and within the ecological and the social subsystems may, however, be purposely driven by the latter. This section begins from such standing point, which deals with the question: where to and how should the system be steered? As with any other, attending these normative questions require to assume a position. Hopefully clearly enough, § II.II.ii confirmed that the capital-based status quo governing the urban SES production may hardly address the CC risks at its drivers. In that regard, throughout this section, a general direction to lead the SES at will be set, to then elucidate on the alternatives we count on.

II.III.i The resilience of SES: from science to practice

It is worth bringing back the notion that ecosystems experience disturbances, not disasters (Depietri & McPhearson, 2017). Elaborating further on it, ecosystems being complex-adaptive systems (CAS), can withstand and re-organise when facing a change in their ruling variables or in their framing parameters. Such capacity is named *ecological resilience*, and it allows for self-organisation, continuous learning and adaptation to dynamic and variable environments (Morse et al., 2011; Folke, 2006). Although this characterisation stemmed from ecosystem studies, its use has expanded towards social and SES as well. Thus, in such CAS unpredictability and uncertainty would ultimately govern them through the co-existence of stability and disturbances across temporal and spatial scales (Folke, 2006).

Precisely defined, ecological resilience emerges in a complex system as its capacity to "absorb disturbance and reorganise while undergoing change so as to still retain the same function, structure, identity, and feedbacks" (Walker in Welsh, 2014, p. 17). This refers to the CAS' components and the relation between them, how they organise to perform certain functions, and how some processes loop back to influence the system –e.g. a forest's biotic and abiotic components cycling carbon (Cumming & Collier, 2005; Alderson & Doyle, 2010). Further layers of complexity such as spatial and temporal scales are added to fully characterise what a resilient system is, when it becomes so or to measure its resilience (Cumming & Collier, 2005). However, to have an operative understanding of what systems' ecological resilience is, relevant narratives and proxies have been developed, such as the *adaptive cycle* and *adaptive capacities* (see Holling & Gunderson in Folke, 2006; Pickett et al., 2014, pp. 147-150) and the *robustness typology.*

The proxy referred to robustness, creates a working typology that characterises resilience into five properties of systems' invariability with respect to perturbations. These are: *Reliability*, as robustness to component failures; a system reorganising after disturbances to produce its critical functions, driven by its diverse and redundant components and processes. *Efficiency*, as robustness to scarcity; a system maintaining the functions critical to the system's integrity in a context of scarce essential resources. *Scalability*, as robustness to multi-scale changes in the system; slow/large components and processes interacting with fast/small to respond to disturbances. *Modularity,* as robustness through component's networks arrangement; system's diversity and redundancy, as well as cross-scale interactions, allowing differentiated impacts of a disturbance. *Evolvability*, as robustness through adapting to changes in long time frames; system's dynamic relations and components responding to internal and contextual changes; conditioned by the other four traits (Ruhl & Chapin, 2012; Alderson & Doyle, 2010).

It is important to note that resilience narratives and proxies are merely tools to approach the understanding of changes in CAS, and don't provide normative assessments neither for such changes nor the systems' subsequent response (Pickett et al., 2014). In other words, they may be useful to understand the SES components and processes that would make them respond one way or another to the diverse hazards of CC, but

a resilience-informed action rather depends on the decided purposes and functions of the SES. Moreover, such political nature of the urban setting may even influence which understanding of resilience would inform the decisions (Ruhl & Chapin, 2012; Benson & Garmestani, 2011).

For instance, defining resilience as the capacity and speed of return to a certain equilibrium state after a disturbance, applies to linear systems. This is *engineering resilience*, and it places focus on conserving optimal states of function despite disturbances (Folke, 2006).

The conceptual opposition between the ecological and engineering perspectives of resilience is fundamental. The former stems from the notion of unpredictability, while the other does from predictability. One studies the existence of function, while the other studies the efficiency of function. One embraces uncertainty and change, while the other embraces constancy and equilibrium (Folke, 2006; Picket et al., 2014; Ruhl & Chapin, 2012). Again, this matter can be clearly explained through proxies, particularly the robustness typology. The five traits address a system's capacity to maintain function, structure, identity and feedbacks in face of disturbance, but placing more focus on its reliability and efficiency –withstanding component failures and thriving in a context of scarcity– is related to engineering resilience. Oppositely, placing more focus on scalability, modularity and evolvability –cross-scale system re-configuration and constant change– is related to ecological resilience (Ruhl & Chapin, 2012). Deciding on one or the other understandings of resilience has an impact on planning, policy and investment decisions, and thus it is critical to acknowledge their differences.

II.III.i.a Resilience building as a goal: fair, effective and sustainable adaptation

Building resilience has been mainstreamed by both academia and organisations as the way to integrate the scientific concept of resilience into a SES decision arena of CC adaptation. The overall normative purpose of resilience building is to achieve sustainability: a set of conditions that develop from the notion of ensuring equity through time and across societies when dealing with the vulnerabilities and hazards of human development. Sustainability's goal is to govern intergenerational development through environmental integrity, social well-being and economic feasibility (Giménez, Labaka & Hernantes, 2016; Pickett et al., 2014; Wendling et al., 2018). As previously reviewed, this is not a technical question and it is rather crossed by the dialectics of the social and ecological subsystems. In that regard, having a clear notion of the urban SES properties and their power-mediated interactions is key for the discussion about which decisions must be made, by whom, when and where, to build its resilience towards sustainability (Anguelovski, 2016; Pincetl in Pickett et al., 2014).

In the face of CC, achieving sustainability requires to address both the drivers of its phenomena and its impacts; in other words, mitigation and adaptation. According to the European Environment Agency in Kabisch et al. (2017), mitigation aims to reduce the magnitude of anthropogenic drivers of CC –green-house gas emissions from fuel combustion, agriculture, land use conversion, among others. Adaptation, on the other hand, refer to adjusting SES to the current or estimated CC and its effects (Field et al., 2014), and this is where the resilience building decisions are made. Adaptation consists of actions, measures or general strategies that can be followed to reduce the vulnerability of the SES components. For the ecological subsystems, anthropogenic intervention may facilitate adjustment to expected climate and its effects. With social subsystems, and specifically those in the urban setting, the aim is to moderate or avoid harm, or exploit beneficial opportunities that the changes may bring about (Emilson & Ode Sang, 2017).

Urban SES and their vulnerabilities are diverse, and thus it can be expected that the responses to adjust the system in the context of CC will be so too. In that regard, Sovacool characterised the strategies for adaptation and its components into two general *paths*, depending on their intensity of resource use and institutional

requirements, and on its actor or infrastructural complexity (2011). These are *hard paths* and *soft paths*. Hard paths mainly rely on large built infrastructure; are capital intensive and prioritise advanced technological solutions. In turn, soft paths rely on natural infrastructure and simple and modular technologies; they focus on developing institutional and social infrastructure, as well as local agency (Sovacool, 2011, p. 1178-1179). The scale and nature of the components in each path have an implication in their capacity to adapt to further context changes; large, resource intensive elements of hard paths may not be open ended and thus flexible in design, contrary to the elements of the soft paths (Andersson, Borgström & McPhearson, 2017).

This categorisation is usefully complemented by the one presented in the IPCC's assessment on impacts, adaptation and vulnerability to CC. In the chapter written by Noble et al. (2014), the *adaptation options* are categorised into three areas: i) structural and physical; ii) social, and iii) institutional. *Structural options* are discrete interventions with a technically defined scope and expected outcomes. They can materialise as engineering solutions or built environment interventions; technological options; ecosystem-based adaptation, and services. The *social options* refer to reducing social inequities to address vulnerability, targeting particular social groups. These may include educational programmes; informational strategies, and behavioural measures. Finally, *institutional options* refer to government actions, strategies and instruments as: planning, regulation and policy making at diverse scales; implementing taxing schemes, and ensuring effective governance processes. For descriptive purposes, Sovacool and Noble et al.'s categorisations are intuitively synthesised into a single one, presented in Table 1.

Table 1 Adaptation paths and containing adaptation options. Based on Sovacool (2011) and Noble et al. (2014 p. 845).

Hard path Large magnitude and scope; resource, actor and institution intensive measures. Mainly rigid.		**Soft path** Modular, local scope; natural infrastructure-based and capacity building measures. Mainly flexible.	
Structural / physical options	**Large-scale engineered interventions** e.g. Sea walls	Structural / physical options	**Ecosystem-based adaptation** e.g. Green infrastructure
	Hard, newly developed technologies e.g. Genetic techniques		**Traditional technologies and methods** e.g. Floating gardens
	Infrastructure for public services e.g. Water and sanitation	Social options	**Local education** Participatory action research
Social options	**Information production** e.g. Early warning and response systems		**Local information sharing** e.g. Participatory scenario development
Institutional options	**National level planning, policies and regulations** e.g. Insurance policies, zoning laws and building standards		**Behavioural** e.g. Changing livestock and aquaculture planning
	Design and deployment of economic instruments Financial incentives (tax and subsidies)	Institutional options	**Local level planning, policies and regulations** e.g. Property rights, municipal water management plan, community based management

Although sometimes oppositional, hard and soft paths can be used parallelly to achieve effective adaptation (Sovacool, 2011). However, it is particularly in the soft path were the research on SES resilience building has put the focus.

For instance, Wilkinson reflects on adaptive co-management as a governance, planning and management practice that relies on broad participation for decision-making to better grasp the system complexities, and in "learning by doing" at governing the SES to deal with its uncertainty (2012, p. 153). Further on that line, it is argued that ecosystem services have a "critical" role in the urban SES resilience building (2012, pp. 155-156), thus highlighting the relevance of soft path measures in the physical options, such as ecosystem-based adaptation.

Nevertheless, as acknowledged by Wilkinson herself and others, the current use of adaptation paths for resilience building is "oblivious to power, conflict and contradiction" (Hornborg, 2009, p. 255); it fails to "contest the dominant power asymmetries" (Ziervogel, Cowen & Ziniades, 2016, p. 960) and even reinforces them, as happens with the neoliberal production of the urban space, concentrating benefits in elites while socialising costs in a "society-based conceptions of distributed risk and reaction" (Welsh, 2012, p. 19; Swyngedouw & Heynen, 2003). Unknowingly or not, it becomes an approach that primarily relies on scientific knowledges, further imposing them at a general, global level, and at the local, interaction level where decisions are made (Eriksen, Nightingale & Eakin, 2015; Hornborg, 2009; Welsh, 2012). Such criticism mirrors Pickett et al.'s (2014) warning on depriving resilience-in-practice, i.e. resilience building, of a normative content that challenges the status quo, focusing instead on the merely positive/informative nature of resilience-in-science, i.e. ecological resilience.

Reviewed previously in Checker (2011), Curran and Hamilton (2012) and Anguelovski (2016), de-politicising efforts towards sustainability allow, on a system scale, to subordinate equity to capitalist-driven growth, setting the ground for what While, Jonas & Gibbs call a *sustainability fix* (2004). Such approach attends selectively the pressures for environmental policy making, complying with neoliberal practices of de/re-regulation favouring privatisation, marketisation, and self-sufficiency (While, Jonas & Gibbs, 2004; Castree, 2010a). In such regard, and in line with the theoretical grounds of this research, Wilkinson calls for carrying out the SES resilience-building processes with a political ecology perspective. The argument poses that identifying and accounting for the "ideological and political as well as ethical and moral" drivers of the CC challenge (Harril, 1999 in Wilkinson, 2012, p. 157) is necessary to understand "whose sustainability gets prioritised" (Smith and Stirling, 2010 in Wilkinson, 2012, p. 154).

It is thus a matter of adaptation efforts' fairness, implying that they have differentiated beneficiaries based on the current structures and processes for decision-making.

In other words, power relations shape adaptation, and not accounting for this political dimension may further reinforce the disregard of diverse –and likely opposing– perceptions, needs and wants of individual and collective actors when planning for urban sustainability (Haase A, 2017; Colding & Barthel, 2013).

In this regard, failing to equitably integrate diversity into such processes –i.e. not having a *situated* approach to participation (Gulsrud et al., 2018)– may in turn affect the strategies' long-term effectiveness. It jeopardises opportunities of synthesising a shared understanding from antagonisms and knowledge/experience/power gaps; of increasing the local pool of skills, values and experiences to draw from for 'resourceful' resilience-building, and of increasing the participants' investment and support of decision-making (Newton & Elliot, 2016; Colding & Barthel., 2013; Petrescu et al., 2016, p. 717-718).

The position of UNaLab in this context is not clear, and to overcome these caveats it is important to review the project's core elements of *nature-based solutions* (NBS) and *co-creation* (CoCr) in the model of the adaptation paths. Thus, the soft path adaptation options to which they belong will be reviewed, namely the *structural* and *institutional*. NBS belong to the ecosystem-based measures category; CoCr, as concerned with participation in

planning, belongs to local level planning, policies and regulations options. In that regard, literature on the provision of *ecosystem services*, delivered through *urban green infrastructure*, will be reviewed to understand the management of the ecological subsystem. Moreover, framing the institutional option within the framework for this research, Ostromian institutionalist perspective on the *commons* will inform the research to determine afterwards if collective action can undertake such planning and management guided by *cooperative institutions*. These two soft-path components will be cross-cut by the political ecology viewpoint, to review how they may materialise in an uneven and disputed urban SES.

II.III.i.b Ecosystem services: from the country to the urban SES

The concept of *ecosystem services* (ES) appeared previously in the literature review as it is thought of as the biophysical source of satisfaction of social needs, firstly, but also a proxy for humans to perceive changes in the state of the ecosystems; a feedback from the ecological subsystem to the social subsystem which drives the dialectics of the SES (Berrouet, Machado & Villegas, 2018; Collins et al., 2011). Concretely, ES are "the functions and products of ecosystems that benefit humans, or yield welfare to society" (Pauleit et al., 2017, p. 38). As succinctly put by Pickett et al. referring to ES in urban settings, "connections exist between infrastructure and biophysical processes", "biophysical processes contribute significantly to urban ecosystem function" and "biophysical components of urban systems can have quantifiable benefits". (2014, p. 152). In that regard, Wilkinson pointed out the ES central role in the task of building the overall system's resilience (2012).

The nature of such benefits is diverse, and so they have been classified into four broad categories: i) *provisioning*, which refers to the obtention of materials from ecosystems, e.g. food, fibre and water; ii) *regulating*, as in the ecological subsystems' processes that regulate environmental variables, e.g. humidity or temperature regulation; iii) *cultural*, regarding the benefits for the satisfaction of non-material needs, e.g. aesthetic or spiritual meaning assigned to the ecosystems, and iv) *supporting* or *habitat*, which are the processes that sustain the ecosystems' themselves and thus allow the other services to exist, e.g. biogeochemical cycles (Gómez-Baggethun et al., 2013). The original objective of these conceptualisations was to account for the ecological processes and elements in "conventional economics" (Pauleit et al., 2017). To valuate their utility, it is needed to identify which kind of concrete benefits are extracted from the ecosystems and their processes.

Going specifically to the urban SES, the area of interest of this research, Gómez-Baggethun et al. review the utility of urban ecosystem services (UES), relating them to ecosystems processes and components (2013). Provisioning ES are enabled by healthy soil and vegetation in city catchment, manifesting in a secure water supply. Regulation of temperature is possible through evapotranspiration from vegetation and heat buffering from water areas. The attachment of communities to green spaces drives social cohesion, a cultural ES. However, the connection of social and ecological subsystems is not only through services, as certain disservices to health such as allergies increased by pollination, or physical damages to the built infrastructure by vegetation or fauna may also come about. The association of UES to multiple values is relevant when integrating ecological infrastructure in local spatial planning, as it implies multiple related actors with different value-scales, and not only as beneficiaries (Gómez-Baggethun et al., 2013; Ernstson, 2013).

The value that the UES provide is not only due to biophysical processes in the ecological subsystem, but they are socially produced (Ernstson, 2013).

Thinking of the urban SES as a network of interconnected ecological patches –representing that subsystem in Bodin & Tengö's framework–, at each node there is direct, *in situ*, interaction with the social subsystem that allows for the ecological processes to take place, either by their protection or management (Ernstson, 2013). This interaction is further mediated by contextual socioeconomic conditions, as Wilkerson et al. expand (2018), as wealthy neighbourhoods' commonly count with more ecological patches and have larger leverage to press for

public management of their green spaces. In a second instance, social actors construct and communicate value *ex situ* for those patches and their UES, too (Ernstson, 2013). Such external influences may be driven by planning or advocating for different uses and values of the patches, relating again to socioeconomic factors, as UES beneficiaries' ethnical and cultural backgrounds' diversity may imply diverse preferences and priorities regarding UES provision (Wilkerson et al., 2018).

However, beyond the node level, the internal and external sources for UES social production and valuation are framed within the capitalist status quo in which, Ernstson argues, the value of land and its potential uses "becomes to a large extent a matter of political struggle" (2013, p. 9). In that regard, economic and biophysical methods of valuing the ecological subsystems are prioritised in research and practice over other frames for assessing and managing land uses and ecological processes, such as those related to social equity and environmental justice values (Gómez-Baggethun et al., 2013). This is not to deny that framing ecological processes and elements within referential market values has provided an effective complement to command-and-control approaches, and that it enhanced decision-making processes by making cost/benefit analyses more robust. Still, it presents a risk in terms of turning nature into a commodity, which needs to be addressed (Chapin & Ruhl, 2012).

Although a disputed concept, the UES have successfully been embraced in city policy and thus their provision has been been operationalised through *urban green infrastructure* (UGI). From Lafortezza et al. UGI can be defined as a network of green, natural features in the urban landscape, which provides benefits to human populations through the support of ecological processes (Benedict & McMahon, 2011, Weber et al., 2006, and Tzoulas et al., 2007 in Lafortezza et al., 2012). Contrary to the static engineered structures, also called *grey infrastructure*, that supplant ecological functions, UGI is based in well-functioning biophysical systems, enhanced and maintained at some degree, as exposed by Ernstson (2013), which is flexible and adaptable to its environment. Nevertheless, major drawbacks of UGI show in the context of CC, as it lacks grey infrastructure's sophistication, replicability, monitorability and controllability at mitigating climate-related risks (Depietri & McPhearson, 2017). Moreover, it is estimated that its contributions to the urban SES health, such as temperature regulation, carbon sequestration and pollutant removal, for instance, are outweighed by the impact caused by the activities in the system in the first place (Baró and Gómez-Baggethun, 2017).

In that regard, deeper understanding of the ecological processes within the urban SES is required to enhance UGI's performance as a complementary solution embedded in a strategy addressing other components and processes in the SES (Baró and Gómez-Baggethun, 2017). Referring to the characterisation of adaptation paths, the development of UGI was listed as an example of a physical measure in the category of ecosystem-based adaptation (Sovacool, 2011; Noble, 2014), as its function is to provide services that allow ecological processes to take place in the SES (Depietri & McPhearson, 2017; Gómez-Baggethun et al., 2013). Such preserved and enhanced processes enable ecosystem function diversity, redundancy and cross-scale ecological processes, pillars of two traits of robust systems: reliability and scalability, key to enable "adaptation to slower, ongoing change". Moreover, by purposely connecting the diverse ecological patches driving their complex relations, the SES' functions become modular, and by flexibly integrating the built infrastructure to the ecological subsystem, UGI allows for evolvability (Chapin & Ruhl, 2012; Biggs et al., 2012, p. 425; Andersson et al., 2014).

Such traits of the UGI show how it can drive advances on the overall resilience of the SES, as explained through the robustness typology. Nevertheless, as it has been widely exposed previously, it is key to disaggregate the benefits and reflect on who gets them; whose resilience is being enhanced, and whose vulnerabilities are disregarded. In line of thought, Haase (2017) notes too that there is limited attention to how the environmental planning for UGI is framed by power and market-based structures, providing a de-politised view on UES. Thus, building up on Ernstson's political ecology approach to the social-ecological nodes of UES production and management (2013), the following section will address such notion from an Ostromian institutionalist perspective, in which the nodes are units of decision-making and the UES are *commons*. The intention is to

envision the possibility of producing and managing *UES as common-wealth*, to dispute the narrative and practice of resilience through *collective action*.

II.III.i.c Commons: collective governing and its institutions

The notion of nodes where socio-ecological interactions produce the UES is useful to start envisioning an alternative to the prevalent approach to managing and provisioning these services, based on unacknowledged power asymmetries that shape the overall urban setting. From the scope of this research, articulating such different approach requires studying actors' interactions, rules and organisations. These will be woven together by the concept of *commons*, which refer to *shared* resources of interest to diverse stakeholders (Hess, 2006). Conceptualising UES and UGI as commons serves the purpose of distancing them from the capital-mediated dynamics of the markets, providing a stepping-stone towards more integral criteria for their planning and management. To that end, a brief review on the Ostromian scholarship's concepts, models and propositions will take place, in line with the social-ecological systems framework (SESF) as the previously selected tool to interpret the SES complexity (see § II.I.ii).

The concept of commons is operationalised as *common-pool resources* (CPR) in neo-classical economics based on the characterisation goods and services according to two main attributes: excludability and substractability. The former refers to the capacity to restrict who benefits from the provision of a good or a service, or exploitation of a resource, and the latter to the extent at which one individual's use or consumption of a resource limits other's use or consumption (Ostrom, 2005). The permutations of such attributes create four different classes: i) *Public goods*, with difficult excludability and low substractability; a lack of user control is not problematic for their provision. Ii) *Private goods*, with easy excludability and high substractability; limits for its provision are enforced for its sustainability. Iii) *Club/toll goods*, with easy excludability and low substractability; limits can be enforced but are not necessary for the sustainability of the good. iv) *CPR*, with difficult excludability and high substractability; imposing controls on the exploitation of its resource units is difficult, and it is critical for the resource system sustainability (Ostrom, 1990).

A frequent consideration is that CPR are at risk of over-exploitation by "rational, self-interested individuals" which fail to manage the resource in absence of an imposed coercive structure, either a command-and-control or market (Ostrom, 2000, p. 137; Cox, Arnold & Villamayor, 2010; see Hardin's notion of the *tragedy of the commons*, 1968). However, several case studies of diverse CPR –"inshore fisheries; irrigation systems; and forests" (Ostrom, 2005, p.34)– show that their management could be sustainably carried out as a result of engaging in *collective action*, a process in which communities relate with the shared habitat aiming for collective benefits that outweigh the costs of self-organisation (Łapniewska, 2015; Ostrom, 2009a). It advances a notion for efficient resource allocation through collective *property rights*, opposing the 'neoliberalisation of nature' as discussed by Bakker (2007; p. 432-441). It proposes that through trust and reciprocity developed over interaction and communication, the boundaries of CPR, its governing structures and decision-making mechanisms can be collectively defined (Ostrom, 2000).

The arrangements for collectively governing the CPR are *cooperative institutions* (CI). Defined in the Ostromian tradition, institutions are rules, expectations or conventions that serve the purpose of organising repetitive and structured interactions of individuals and groups. The rules for cooperation, or CI, are based on accepted understandings about the actions and outcomes that are allowed, prohibited or required for the resource use. Thus, they influence individuals' choices and strategies in the context of the resource collective use and management at different nested levels of action, namely: at the *operational level*, referring to day-to-day decisions, such as provision, distribution or consumption, for instance; at the *collective-choice level*, governing operational activities' rules and who can craft them, and at the *constitutional-choice level*, governing collective-choice-rule-making and who may participate in it. Mechanisms for the monitoring and sanctioning of these rules are collectively defined, too –providing clear incentives to abide or break them–, based on a shared understanding of the meaning of the rule itself and of the phenomenon which the rule is acting upon (Ostrom, 2005; Polski & Ostrom, 1999).

The aforementioned property rights over the resource derive from these rules, thus determining rights of: *access*, or who enters the resource boundaries; *withdrawal*, who uses/extract it; *management*, who oversees and regulates the resource-related dynamics; *exclusion*, who decides who is entitled to these rights, and *alienation*, who may lease or sell these rights (Schlager & Ostrom, 1992). Although independent from one another, these set of rights may be bundled to different actors according to their position in a resource use and management context. In the case of CPR, as rules are crafted collectively in a legislative fashion, with own mechanisms to define who participates at each of the action levels, the entitlement of the commoners to these rights is defined accordingly to those levels. (Ostrom, 2005; Colding et al., 2013). For the other three categories of goods and services, different actors receive bundles of rights regarding their position for their use and management, as synthesised in Table 2.

Table 2 Bundles of rights assigned to the positions associated to four classes of goods and services. Adapted from Colding et al. (2013) and Schlager & Ostrom (1992)

	Positions in private, public and toll goods and services.					Positions at levels of action in CPR	
	Authorised entrant	Authorised user	Claimant	Proprietor	Owner	Operational	Collective-choice
Access	X	X	X	X	X	X	X
Withdrawal		X	X	X	X	X	X
Management			X	X	X		X
Exclusion				X	X		X
Alienation					X		X

The Ostromian tradition has long worked with diverse CPR across the world to understand how they are governed by the commoners, gathering evidences and creating a framework to systematise the analyses of their variables and institutions around them: the *Institutional Analysis and Development framework* (IAD) (Polski & Ostrom, 1999; Ostrom, 2005). It systematically models the social-ecological complex relations that come at play in CPR-management, by breaking them down into simpler components. The core of the analysis is the *action situation*: the social space where diverse participants with diverse stakes, interact based on certain rules that influence their behaviour (Ostrom, 2005). This conceptualisation of the interaction is further characterised by variables such as *positions*: roles of the actors regarding the CPR-use and management situation –refer to table 2. Firstly, *participants*: who have a position in the interaction; *actions*: the activities that lead to *potential outcomes* in the situation; *information*: the contextual information available to participants; *control*: the influence of participants over actions and outcomes, and lastly *net costs and benefits* associated to the potential outcomes (Polski & Ostrom, 1999). The relation between these variables can be seen in Figure 5.

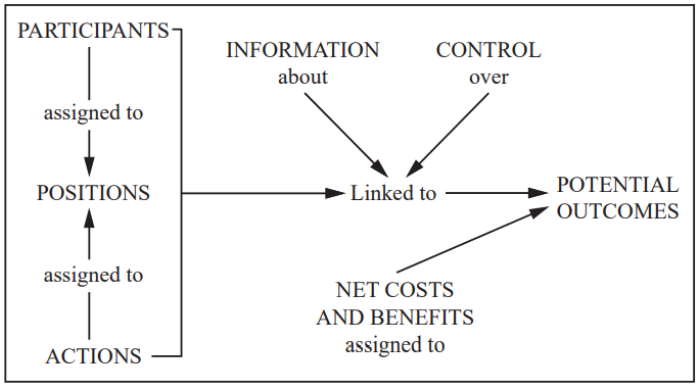

Figure 5 Variables in the action-situation, taken from Ostrom (2005, p.189)

The action-situation happens at an *action arena*, a unit of analysis that frames it within a purpose and setting of collective action and relate it to it *participants*. In the latest update of IAD, these interactions are framed within the context of a SES by coding the existing conditions in which CPR-management occurs using the SESF; such update rebranded IAD as *New Institutional Analysis of Social-Ecological Systems* (NIASES) (Cole, Epstein & McGinnis, 2014). As represented in Fig 5, the SESF's top-tier components of *Resource System*, *Resource Unit*, *Governance System* and *Actors*, are the parameters to model the context under study. NIASES accounts for the *patterns of interaction* that emerge when self-crafted rules turn action-situation into a repetitive and predictable setting, and for their successive *outcomes*, which are both assessed against *evaluative criteria,* creating information for participants regarding the usefulness of their institutions. Finally, the feedbacks represented by dotted lines in Figure 6 model the influence of the collective action over the system at hand (Polski & Ostrom, 1999; Ostrom, 2005).

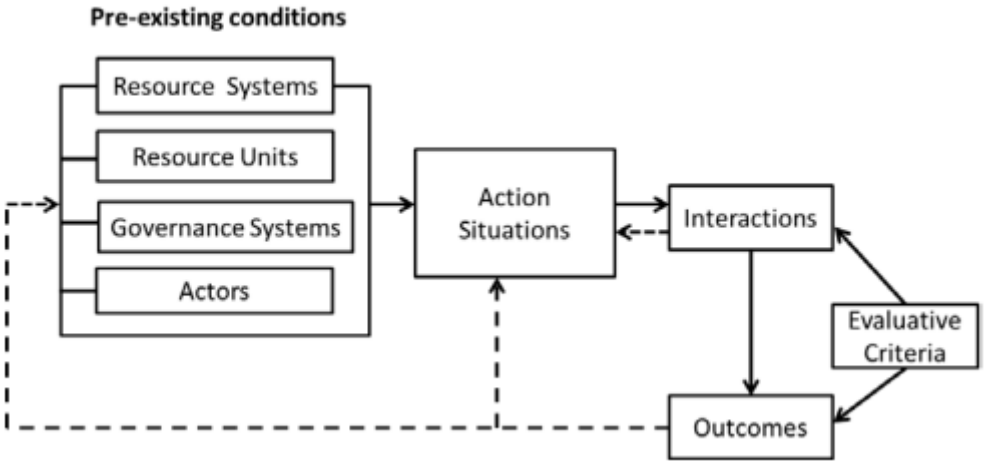

Figure 6 The NIASES architecture, taken from Cole, Epstein & McGinnis (2014, p. 16)

The extensive use of the IAD, and now NIASES, for studying CPR allowed Ostromian scholarship to identify a series of shared elements across their case studies that explain from an institutions' perspective the success or failure of such collective efforts. These *design principles* (DP) for the collective exploitation and governing of a CPR system reflect the likelihood of rules' emergence for commoners to engage in cooperation for its sustainable management.

In other words, the design principles work as a proxy for the emergence of cooperative institutions, in order to systematise their assessment despite the SES-contexts that make each rule unique (Ostrom, 2000; Ostrom, 2005; Cox, Arnold & Villamayor, 2010; Baggio et al., 2016)

These 8 DP touch upon a clear definition of the CPR system and its internal context –**1A**, **1B**, **2A**, **2B**–; the rules that govern its exploitation and the enforcement of these rules –**3**, **4A**, **4B**, **5**, **6**–, and its relation with the surrounding social-ecological context –**7** and **8**.

Going over each one, CPR-DP **1A** refers to the *User Boundaries*, and it calls for a clear definition of users and non-users, which may happen through diverse attributes, such as belonging to a specific community or sharing beliefs or aspirations (Ostrom, 2005). This definition is closely related to CPR-DP **1B:** the definition of the *resource system boundaries*, which separates the components that are subject to the collective action from the remaining biophysical environment. Defining actors and system is then followed by the CPR-DP **2A** and **2B**, which call for "*congruence between appropriation and provision rules and local conditions*". The former refers to matching the crafted rules for overall benefit production and the SES where the resource system exists, and the latter to assigning those benefits fairly it among the users (Cox, Arnold & Villamayor, 2010, p. 43; Baggio et al, 2016). In sum, these call for a clear understanding of the social and ecological subsystems of the SES, to determine the initial rules that will govern the cooperative enterprise (Ostrom, 2005). These four are subsequently referred to as CPR-DP I.

Further, CPR-DP **3** address to the *collective choice arrangements*, as a proxy for the capacity of those affected by the operational rules to participate in the crafting and modifying them, so they may be tailored accordingly to local conditions and in favour of the commoners and not a "local elite" (Ostrom, 2005, p. 263). Beyond trust between commoners, CPR-DP **4A** and **4B** relate to the *monitoring of CPR and the operational rule abiding*, and the *accountability of those who monitor*, being them internal or external to the community. Such monitoring would allow for the existence of *graduated sanctions*, CPR-DP **5**, which enables case-specific consequences for breaking the operational rules. Despite the rules and their mechanisms for their abiding, internal conflicts may arise, and the access to *arenas and mechanisms for conflict-resolution* becomes key to ensure the sustainability of the cooperative engagement; this is represented in CPR-DP **6**. These principles reflect on the importance of the operational rules and the institutions around them to govern the CPR and its exploitation (Cox, Arnold & Villamayor, 2010; Ostrom, 2005), and are subsequently referred to as CPR-DP II.

Finally, CPR-DP **7** and **8** go outside the defined resource system and user boundaries. CPR management relies on the agency of the commoners, but such *capacity and right to self-organise requires recognition* from the larger local or national government, CPR-DP **7** studies. This means assessing whether the autonomously crafted rules are acknowledged as legitimate and not dismissed in practice by externally imposed rules. CPR-DP **8** refers to actions and institutions on the CPR, thinking the resource system as embedded within and fundamentally related to other CPR systems, thus becoming *nested enterprises* which have other institutions –not necessarily collective-based– for interaction, action and rule crafting. (Cox, Arnold & Villamayor, 2010; Ostrom, 2005). What these two last principles show, englobed in the label CPR-DP III, is that the local collective action is fundamentally related to other scales of the SES, and thus accounting for them when crafting the institutions that sustain the CPR use is key.

II.III.i.d Naming the alternative vision: UES as common-wealth

It is necessary to expand the focus from solely the institutionalist perspective to understand how the notions of the commons and collective action may be articulated in different contexts than those traditionally studied by

Ostrom's scholarship, becoming useful concepts for resilience building. Although CPR are rather scarce in the urban setting, various researchers use the term *urban commons* when referring to urban shared spaces, although with diverse understandings regarding their property rights (Colding et al., 2013). In a further difference from Ostromian commons, theoretical and empirical research from Parker and Schmidt (2017) argue that they may also be understood as practices i.e. *commoning practices*, that allow public/citizen engagement to overcome governance deficits in the face of the State's responsibilities withdrawal. Their approach, however, frames these practices as a technical fix –as it is based on participatory design scholarship–, rather than problematising the governance forms in the neoliberalised city (Jessop, 2002).

Nevertheless, diverse empirical researches have indeed studied the occurrence of these practices as collective action that challenges the capital-driven urbanisation processes, creating new de-commodified imaginaries and relations with and within the urban habitat (Łapniewska, 2015; Follmann & Viehoff, 2015; see *commoning* in Linebaugh, 2008 as the conceptual foundation). This conceptualisation builds on the notion of producing urban commons through the aforementioned commoning practices, applied to a physical space or a location. Fundamentally opposed to the status quo of producing urban space, urban commons are simultaneously "alternative to, and endangered by, processes of enclosure and accumulation by dispossession" in the disputed urban setting (Becker, Naumann & Moss, 2017, p. 73). In this light,

> *urban commons become a category that is broader than exploitable resources, this is: a shared space and collective practice that produces symbols and diverse benefits; a political project rather than a mere category of economic nature (Caffentzis & Federici, 2014).*

Still, argue Caffentzis and Federici, the political approach of the commons must not reduce importance of their material side, namely producing *common-wealth* (2014, p. i101). Hence, they call for using the collective action on the shared space to articulate it around the production and governing of the common-wealth to sustain the life of the commoners. In a similar light, Colding and Barthel labelled as *urban green commons* (UGC) those green spaces that depend on collective action for their management (2013), ultimately providing UES which become common-wealth. From the institutionalist perspective they assume, they develop the concept of UGC by referring to the bundles of property rights over the common that the engaged actors are entitled to. For UGC, however, the actual ownership of the space is subordinated to the commoners' capacity to establish, monitor and enforce their own rules, as well as to decide who may participate in their crafting (Colding & Barthel, 2013; Ostrom, 2005).

On the one hand, the envisioned scenario of collectively producing UGC has potential to attend the gap of the de-politisation of UGI reviewed in § II.III.i.b. Thus, in § III.I the political dimension of the UGC as a seemingly plausible alternative to sustainability fixes in resilience building will be conceptually developed. On the other, going specifically to the UNaLab project and the scope of this research, the notion of UGC may provide the way of modelling the project in Ostromian frameworks' parameters, allowing to answer the research question. To this end, NBS and CoCr will be reviewed in the following section, alongside the *roadmapping methodology*: an approach to CoCr which is itself linked to the DP found in CPR governed by CI. Afterwards, in § III.V, these elements will be studied through the lens of the developed UGC concept, to understand their relation and to define how they could be framed within the SES framework and the Ostromian scholarship.

II.III.ii Resilience building in UNaLab: building blocks towards the vision

As it was described at the beginning of this report, the scope of the research lies within the boundaries of the European Commission's (EC) project UNaLab –a network of 28 partners from different countries and continents working together to co-create innovative, replicable and locally attuned *Nature-based solutions* (NBS) as a response to the challenges of CC and growing urbanisation (UNaLab, 2016). It is important to note that there is

an explicit intention of favouring high levels of participation and inclusion, which aims to feed on the local actors' agency to understand and act upon their local contexts. This is reflected in the project's main argument: it is through multisectoral *co-creation* (CoCr) of locally attuned NBS, that cities can adapt to a changing environment, enhancing their climate and water resilience with lower costs and a wide range of co-benefits associated.

However, UNaLab has different goals for different participants and so, the participant cities are divided into front-runner cities (FRCs) and follower cities (FCs), depending on how they will use the project as a platform to adapt to climate and urbanisation-related challenges. The first group is made up by the European cities of Genova, Eindhoven and Tampere. FRCs will rely on UNaLab to materialise their visions using NBS to reach adaptive urban scenarios. To facilitate the process, UNaLab will take advantage of previously designed frameworks, such as the Urban Living Lab model and the European Awareness Scenario Workshop method. These participation-oriented tools would enable an effective co-creation process, further enhanced by a systemic decision support tool, in which the stakeholders can interact in the basis of a common language and understanding of the context and possibilities.

The FCs, in turn, are Buenos Aires, Başakşehir, Cannes, Castellon, Hong Kong, Prague and Stavanger. In their case, the role of the UNaLab consortium is to facilitate the definition of their own vision of the future scenarios they want to reach. For this end, the Eindhoven University of Technology's (TU/e) Lighthouse supports the project. with participatory scenario backcasting methodology adapted to the context of smart cities. It was further attuned in the field of urban ecology to be useful for advancing the NBS and co-creation aspects in the project, and so here it is referenced as the *UNaLab Roadmapping Methodology* (URM). Its aim is to provide the FCs a framework for multiple participants –onwards, *stakeholders* (SH)– to define the common scenario they want to achieve (the *ambition*); then, how it looks like and which processes and interactions are taking place there, adapting their urban space to the challenges of CC and urbanisation (the *vision*); reviewing the current conditions of the SES (*system analysis*); a expert-based path towards climate resilience through NBS (the *general roadmap*), and the specific set of steps to reach the local visions (the *FC roadmap*). The FCs processes end with a selection of NBS projects to materialise their vision by acting in the short, middle, and long-term (the *project portfolio*).

In line with these discursive elements of the URM, through the previous sections of this report *a vision* of a resilient urban setting was sketched: a SES that relies on politically-aware dialectics of its ecological and social subsystems for its production. In this scenario, the urban ecosystem services (UES) provided by the patches of UGI are further enhanced and produced by the collective action of organised SH, thus turning them into common-wealth. Such approach turns the UGI into UGC through the commoning practices, effectively disputing the right to produce, and ultimately govern, the urban SES. In this envisioned scenario, the UGC are a stepping stone towards a fair, effective and sustainable resilience building strategy that moves from privatisation to commoning practices; from private capital accumulation to common-wealth distribution, and from self-sufficiency and competition, to collective action and cooperation. In other words, from neoliberal to *commons-based resilience building*. This subsection reviews NBS, CoCr and URM to reveal possible contact points with the Ostromian concepts, models and tools.

II.III.ii.a Nature Based Solutions

Nature-based solutions (NBS) is defined by the European Commission (EC) as "actions inspired by, supported by or copied from nature" (Kabisch et al., 2017). Their aim is to help cities reach a globally sought solution: building resilience. However, the understanding of resilience may be situated more in the engineering resilience, which also aims at preserving initial conditions, as its definition further deals with cost-effectiveness, resource efficiency and diversity to sustain the functions of the SES. This is related to the still shallow understanding of the urban SES and the UES that sustain it, putting the NBS closer to engineering resilience than to complexity-embracing ecological resilience.

As previously reviewed, engineering resilience is functional to the capitalist urban space production, as the sustained ecological efficiency is a fundamental condition for the economic efficiency, mainly conceptualising the ecological subsystems as sources of the input for production processes (Ruhl & Chapin, 2010). In line with

this argument, Haase points out that NBS as defined by the EC seems as if they were merely an adaptation of concepts like UGI or UES in a more business-friendly and de-politicised way, particularly given the deployment of the concept in EC-funded projects, which explicitly invite developers and investors to join in (2017). Being this definition of NBS a conceptualisation that helps marketise the provision the UES, it puts it in line with the previously reviewed sustainability fixes (Castree, 2010a; While et al., 2004)

However, In a different aspect, EC's understanding of NBS make them an instrument for urban spatial planning, not necessarily a discrete physical intervention (Kabisch et al., 2017). Despite A. Haase's criticism of NBS being a business-friendly version of UGI, NBS are i) *broad in scope* –from conservation to promoting green economy; from addressing poverty to reducing disaster risk–, and they use a ii) *broad concept of nature* –the natural functions and processes range from river daylighting, which may be classified as blue infrastructure, to green roof implementation. Moreover, iii) NBS *relies on action of diverse stakeholders* at different stages and scales of the UES service production and provision (Depietri & McPhaerson, 2017; Maes & Jacobs, 2017; Pauleit et al., 2017). For these reasons it is useful for this research to understand NBS rather as a systemic approach for the maintenance, enhancement and restoration of the ecological subsystems for positive feedbacks in the social subsystem (Wendling et al., 2018).

This systemic approach of NBS complements the biophysical performance of the structural/physical measures with the role of social institutions, management practices and forms of governance that drive their effect and mainstreaming (Baró & Gómez-Baggethun, 2017).

For instance, collaboration between government and private sector in the green-roof market has produced ecological standards for those products, avoiding economies of scale determine their features, thus enhancing the potential for UES provision (Enzi et al., 2017). In other case, Melbourne framed its urban forestry strategy as NBS, focusing on socio-cultural-anchored efforts, too. By acknowledging the SES diversity, it was aimed to balance SH's powers to push their contested and diverse values and localised knowledges; a "situated approach to environmental governance" (Gulsrud et al., 2018, p. 159). The reported Melbourne's effort also abandoned a technocratic "view from nowhere", in which hegemonic scientific knowledges are enabled to wield more power in the in decision making processes (Eriksen, Nightingale and Eakin, 2015; Mikulewicz, 2018; Williams in Gulsrud et al., 2018, p. 165)

Attending Haase's concern on the politically empty concept of NBS, such situated approach opens the possibility to democratize the politics of urban space production as multiple stakeholders are enabled to dispute this production (Gabriel, 2014). For instance, locally-initiated collective environmental stewardship practices –i.e. civic ecology practices (Krasny et al., 2013)– feedback again to government's authorities providing them a "context-sensitive approach to planning" (Buijs, A. E. et al., 2016, p. 5). Indeed, such civic ecology practices are drivers of collective engagement for governing directly the provision of the UES, and the articulation of their value, as previously mentioned (Ernstson, 2013). Thus, purposely linking these practices to NBS approach may make equitable the resilience-building of the SES. As pointed out by Saldivar-Tanaka and Krasny (2004), civic ecology practices may be pivotal for marginalised groups in urban settings, as they provide them with UES *and* foster their development of competencies and social abilities relevant for other domains in the civic life.

In sum, NBS may be thought of as a double-edged sword with regard to inclusive resilience-building. On the one hand, it may represent the opening of a new arena for the State to delegate its strategic planning responsibilities regarding UES provision to the for-profit private sector, effectively marketising CC adaptation measures. SH would be left to their own devices to produce/acquire their UES, which in the current status quo of SES production, may lead to an unequal distribution benefits and vulnerabilities. On the other hand, this approach

could be used to advance diverse and situated collective action and de-centralised decision-making; Melbourne's approach show the capacity of governmental efforts to enable stakeholders' autonomy and agency to govern the UGI (Gulsrud et al., 2018). Which way would a deployment of the NBS concept go is likely to depend on the complementary measures, and so the following section deals with the second pillar in UNaLab: *co-creation*.

II.III.ii.b Co-creation

Co-creation[3] (CoCr) refers to the processes in which organisations innovate and generate value through a collaborative process with the involvement of *stakeholders* (SH) outside the organisation's boundaries (Lund, 2018). According to Newton and Elliot, SH are individuals or groups with an interest or influence in certain sector, being affected directly or indirectly by its activities or management (2016). In the private sector, this means including clients and/or other companies in the production/provision of a good/service for a cost-effective value generation (Petrescu et al., 2016; Becker, Naumann & Moss, 2017). As described by Osborne and Strokosch (2013), CoCr can be characterised in terms of the roles expected from the end-users: *Consumer CoCr** happens when the user is relevant for value generation only at an operative level during the delivery or consumption of the service or product. When end-users provide inputs for the process at the stages of strategic planning and design, the process is referred to as *Participative CoCr**. If the process relies on users at both stages, it is referred to as *Enhanced CoCr**.

However, the collaborative innovation and value creation efforts are not constrained to the private sector. When *citizens* and other SH act collectively over the provision of a public service, it becomes a CoCr* process (Becker, Naumann & Moss, 2017). This interaction implies sharing some responsibilities in the tasks of the State in a similar fashion as explained by Rosol in § II.II.ii.b, although it may follow two main motivations: enhance the value's quality or quantity, or provide an open and democratic process of value creation (Lund, 2018; Petrescu et al., 2016). As Lund would explain, these two rationales relate to the legitimacy of the CoCr process: either it is provided by the innovativeness or effectiveness of the co-created service provision i.e. output legitimacy, or it gets it from bridging the "structural exclusion" of some SH, balancing out these situated inputs with dominant professional views and knowledges i.e. input legitimacy (2018, p. 28).

In the context of urban planning for CC adaptation, input legitimacy is close to Revi et al.'s argument that "participatory decision making is essential where uncertainty and complexity characterize scientific understanding of policy problems" (2014, p. 580). However, as shown by Voorberg et al. (2014) it is the output legitimacy the rationale that has been mostly used when implementing CoCr* processes, focusing on the creating solutions without questioning "whose problems are being solved" (Lund, 2018, p. 36). This has a relevant impact on the process itself, as a focus on the output will have a process designed and evaluated in terms of how the solutions can be used or mainstreamed, while focusing on the input will prioritise process openness and its capacity to reflect critically on its internal dynamics and epistemic biases, as argued by Frantzeskaki and Kabisch (2016).

The sources of CoCr's legitimacy indicate the shape the process may take when implemented, as well as who may participate and their roles. Namely, a process prioritising the innovation for the public services provision requires a set of SH that provide technical insights. These spaces for participation foster "elitist, neo-corporatist principles" in the urban SES production, with processes led by expert SH rather than *citizens* as political actors (Lund, 2018, p. 28).

[3] A systematic review on the scientific literature regarding the terms of *co-creation* and *co-production* by Voorberg, Bekkers & Tummers (2014) pointed out that there's no significant conceptual or practical difference between the two when used by practitioners or researchers. Thus, this section builds up from both sources to understand how co-creation as an element of UNaLab may enable the vision, noting with an asterisk when the source refers particularly to co-production (CoCr*)

Conversely, a CoCr process aiming for open and democratic value production requires summoning and partnering with diverse groups, attending power and ethical and concerns (Petrescu et al., 2016; Pohl et al., 2010). Striving for open decision-making processes, contributes to social inclusiveness and citizenship; works as a learning process for social change, and creates social infrastructure (Becker, Naumann & Moss, 2017).*

It then becomes a challenge to obtain usable solutions to solve aggregate societal problems, whilst inclusive inputs from less visible SH groups to address the particular societal problems; in other words, making CoCr "as much about harnessing resources as about empowering the deprived" (Lund, 2018, p. 29).

Despite the different drivers of CoCr in the public sector and the rationale for participant inclusion, participants may be classified depending on their expected influence in the process. *Co-implementers*, are SH whose input is used to make an already developed service work and to improve it; *co-designers*, create a new service or different provision, although within a previously delimited action frame, and *co-initiators,* are SH that perceived a problem, organised and mobilised to create the arena for their collaboration with public sector (Voorberg et al, 2014; Lund, 2018). The last two categories may correspond to the Participative and Enhanced CoCr*, which require facilitating soft-skills, making three roles particularly important: The *steward* starts formally the process, and looks after clarity, transparency and inclusiveness in it; the *mediator* handles the interactions; manages conflicts and builds trust, key for developing social relations', and the *catalyst* encourages participants to create and grasp opportunities enhancing the CoCr* (Ansel & Gash, 2012; Newton & Elliot, 2016; Lund, 2018).

These facilitating skills may foster the participants' engagement and build local capacities for common-wealth creation and collective action and decision-making –as opposed to for-profit-production and hierarchical structures–, turning the CoCr* processes in sources for commoning practices (Becker, Naumann & Moss, 2017). Such transition is relevant as it contributes to social equity and citizenship; creates social infrastructure at the local level, and works as a learning process for the commoning as a political project (Petrescu et al., 2016; Caffentzis & Federici, 2014). However, they may be "highly institutionalised and resource-intensive" with high barriers of entrance (Becker, Naumann and Moss, 2017, p. 76). Particularly for CC adaptation, other challenges emerge in such as ecological literacy or "other more immediate priorities related to work, health and housing" (Petrescu et al., 2016, p. 729). If those with higher vulnerabilities may be impeded to participate by the causes of the vulnerabilities themselves, then *whose* citizenship may be developed? *Which* social infrastructure can be built?

Beyond the abstract CoCr purposes and the participants' roles, case studies on CoCr and collaborative projects outline several good practices that are relevant from the political ecology standing point. Regarding participants, Newton and Elliot call for identifying and mapping *all* SH who have a direct or indirect interest in the object of the process (2016) (see Reed et al., 2009, p. 1936). For the scope of action, using the locally available resources to collectively act upon the defined area (Gulsrud et al., 2018; Petrescu et al., 2016). For the interactions, engaging through visualisations and scenario-building provide a common language to make sense of the issues at hand, and of the costs and benefits of acting, thus enhancing participants' agency (Gulsrud et al., 2018; Bourgeois, 2017), and actively situating the knowledges and capacities that shape the CoCr, abandoning technocratic perspective that portray scientific technique and knowledges as neutral and objective. This translates as being *reflexive*, by contextualising the paradigms that frame accepted knowledges and dismisses others (Gulsrud et al., 2018; Buizer et al., 2016).

To understand how these critical considerations for CoCr may play out in UNaLab effort, in the following section the back-casting methodology used by UNaLab consortium to define the local set of actions for Follower Cities (FCs) will be reviewed: the *UNaLab Roadmapping Methodology* (URM). Its purpose is to drive the participatory

efforts in each FC to define their vision of a climate-resilient 2050 in which NBS have a decisive role. Such vision and the steps towards it are intended to influence the local and regional climate change adaptation strategies. In that regard, by having a broad set of SH participating in the URM outlining, such diversity could be reflected onto the strategy. Thus, studying the theoretical foundations of the methodology will provide insights to understand the degree at which its implementation at the FC may lead to a sustainable, fair and effective strategy through the use of commons and collective action around it.

II.III.ii.c UNaLab Roadmapping Methodology

A roadmap (RM) is a flexible technology management tool to estimate the paths for disruptive innovations in a particular environment (Phaal et al., 2004). However, it went beyond the single-firm boundaries in 1992 when it provided the semiconductor sector an overlook of the sector's R&D needs for the following 15 years (Phaal, 2015; More et al., 2015). This allowed to strategically align the sector's product and technology development by sharing cross-firm insights and business intelligences (Kostoff & Schaller, 2001). The success it represented fuelled its wide adoption in a myriad of sectors and with diverse purposes, bringing along a large diversity of approaches for its implementation and design. To bridge the resulting taxonomical and procedural differences and create a clear reference, Phaal (2015) proposes a generic roadmap, such as the one in Figure 7, which in this research is referred to as the *Standard Roadmapping Methodology* (SRM).

There are fundamental questions that guide the process of SRM. *Where do we go?*, *From where?* and *How we do it?* Are guidelines that frame the effort in terms of position, as it begins with deciding a point to be reached, following by determining the current standing point, and naturally bridging with middlesteps (Phaal, 2015) Asking *why act?* and *How?* Refer to the drivers: market pull and technology push, respectively. *What's to be done?* Is answered by the intersection of both drivers, as it refers to the technologically feasible products that would satisfy markets' demands. Finally, *By when*? Refer to the timeframe in which this interaction between drivers and products happen. (Phaal, 2015). Such questions, when answered by relevant SH in terms of knowledge and/or decision-making power, provide the setting to obtain consensus-based information on forecasted changes and helps coordinating the management of the forecasted changes (Kostoff & Schaller, 2001).

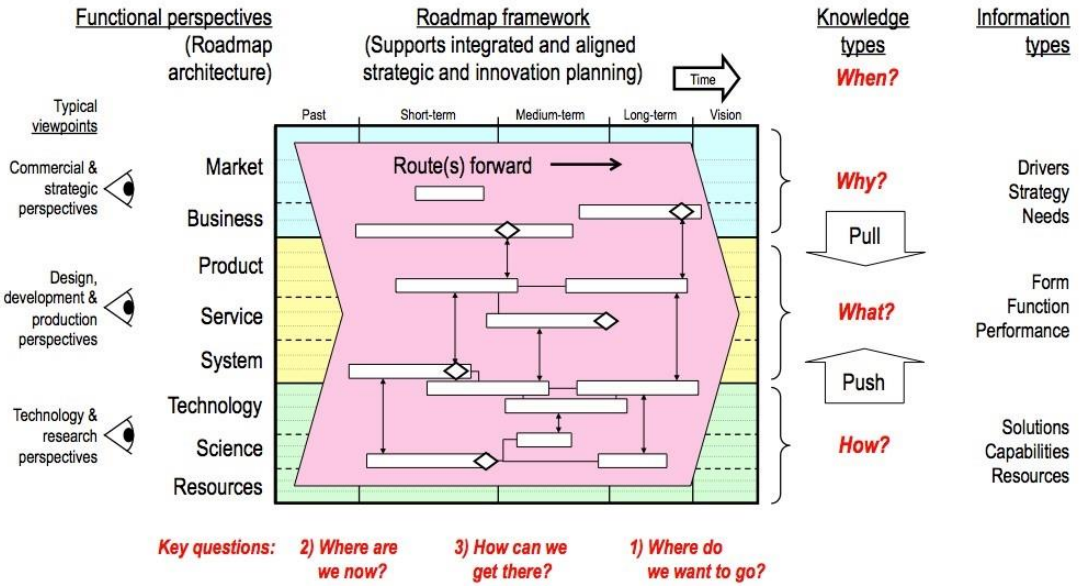

Figure 7 Visual representation of the SRM's output (Phaal, 2015, p.2)

As it can be seen, the SRM is based and oriented to serve market-driven and expert-led strategic planning. Nevertheless, studying it abstractly Kerr et al. (2013) outlined seven features that characterise the process,

namely: i) *Human-centric*, referring to the key role of individuals co-creating solutions by exposing and integrating their viewpoints, ideas and knowledges in a ii) *workshop-based* arena that enables the interaction of participants in a hands-on and iii) *neutrally facilitated* space which guides the dialogue and promotes the mutual understanding. The SRM is iv) *lightly processed* and thus it is flexible to procedural adaptations required for each context in which it is implemented. In that same regard, the SRM relies on v) *modularity* to use different tools depending on the participants' needs and traits, and on vi) *scalability* to prove a useful tool for different levels and granularity of strategic planning. Vii) its *visual nature* "has a strong effect on the actual engagement that takes place between the tool and the participants" and serves communication as it helps "to report the results of the workshop and mobilize action in the organization" (2013, pp. 1064-1066).

Based on these abstract features, a potential of the SRM to enrich participatory planning was acknowledged by More et al. (2015), who stated that the SRM may enable communities to craft CI to manage their common resources. To support this proposition, they synthesised four contact points between the SRM traits and the DP found in successful cooperative efforts at CPR management (see § II.III.i.c). Following Kerr et al.'s characterisation of the SRM (2013), More et al. (2015) argue first that it creates social infrastructure; the cohesion and connections that emerge from the interactions among participating stakeholders. Secondly, it is self-managed, as the external intervention required is only to facilitate and enable the participants' agency, not to impose direction or control. Further, it is pointed that SRM can be nested within hierarchies, allowing the vertical linking of strategies, Finally, it is argued that it has a visual nature and is periodically updated, referring to a double purpose of the visual medium: effective communication and mobilization for action, which allows to easily modify the path of actions towards the visions.

Using RM in the public sector, i.e. for policy making or strategic spatial planning, implies a fundamental difference compared to private sector RM, which is following a normative objective (Kerr, Phal & Probert, 2013). Thus, the approach is no longer limited to tracking market and the techno-scientific systems' dialectics, it rather aims to modify the SES for a strategic goal. This is the case of the *UNaLab Roadmapping methodology* (URM), mainly designed by the consortium's partner Technical University of Eindhoven's (TU/e) Lighthouse. Developed and tested in previous projects, the general aim of the URM is not only the creation of joint visions for the future, but also "fostering within participatory processes the knowledge generation and improvement" (Masseck et al., 2017, p. 392). The normative goal for which the URM is employed is to mainstream NBS into the FCs climate-resilience strategies, allowing a "smooth replication of NBS in the follower and front-runner cities in the context of an integrated urban ecological approach" (den Ouden & Valkenburg, 2017, p. 4).

Through participatory knowledge generation and improvement, the URM is used to mainstream NBS into the FCs climate-resilience strategies, in the context of an integrated urban ecological approach.

The URM is structured around workshops, and it relies on four groups of participant SH: *policy level* (PL-SH), *strategy level* (SL-SH), *internal (*I-SH) and *External SH* (E-SH) (TU/e Lighthouse, 2017a). The PL-SH group includes those government actors that can create and modify laws, norms, regulations, policies or governmental programmes. The SL-SH are public servants that make high-level managerial decisions on the management of resources, space and institutions; they craft the municipal long-term strategies in diverse departments, e.g. urban planning or health. Conversely, I-SH is a diverse group of public servants whom operate or participate at ground level in the government organisations, spaces and institutions related to NBS implementation. Finally, E-SH is integrated by every other SH that has interest on the project, "ranging from research institutes, project developers, consultants, industry, local governmental agencies" (TU/e Lighthouse, 2017b, p. 2).

To summon the actors to the workshops and coordinate the overall project's activities, the URM relies on a *FC core team* (FC-CT), a sub-set of the I-SH representing the UNaLab consortium at the municipal government and vice-versa. However, their activities during the workshop activities themselves are limited to assist the *Facilitation Team* (FT). The FT, composed by representatives of TU/e Lighthouse and developers of the URM, Elke den Ouden and Rianne Valkenburg, mediates the SH groups interactions and articulates their contributions for the objective of envisioning scenarios where the NBS are a central element of the 2050 FC setting. The FT and FC-CT guide the URM process at each FC, which consists on 5 chained in-situ activities as shown in Figure 8: 1) *ambition setting* (URM-AS) –workshop; 2) *vision development* –workshop; 3) *system analysis* –interviews, site visits and desk studies; 5) *roadmapping* or *replication framework* –workshop, and 6) *project portfolio* –workshop. The fourth step is the creation of a general roadmap which frames the FC's workshop for the site-specific roadmap creation (den Ouden et al., 2018/in press).

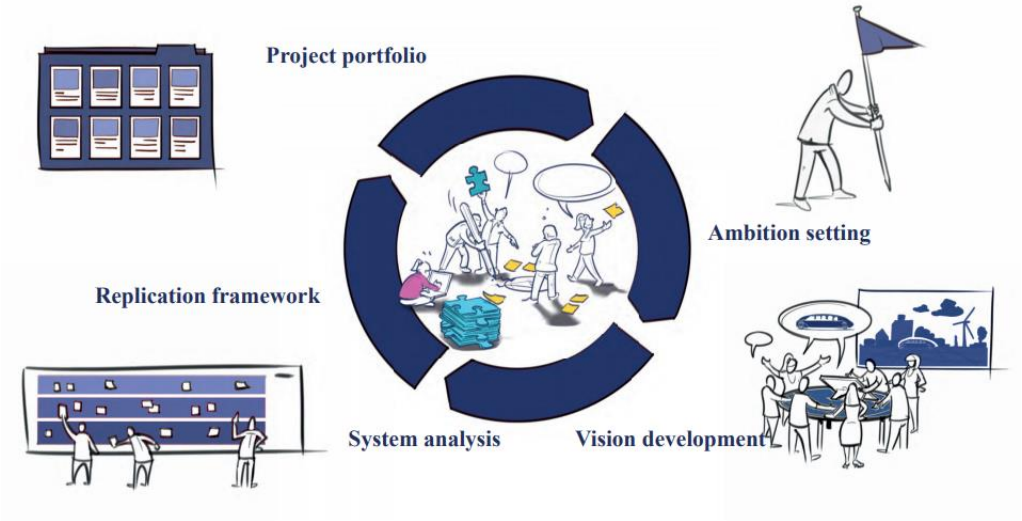

Figure 8 The URM process, (den Ouden et al., 2018/in press, p. 10)

In the first stage, URM-AS, individual workshops for each SH group take place in which each they define internally a coherent position reflecting their views on the current achievements and challenges for climate and water resilience, the features of an aspired scenario in 2050, their strategic ambitions and the barriers and hurdles that may hinder such ambition (den Ouden and Valkenburg, 2018a, personal communication). After each group had their activities, FT and FC-CT use the SH's inputs to synthesise the overall ambition and three prioritised ambitions for each FC, as well as specific opportunities to achieve them (den Ouden & Valkenburg, 2018b). These products of the local activity are complemented with a set of *Drivers for change*, i.e. the perceptions of "thought leaders on climate and water resilience" regarding the important aspects for the development of future scenarios for NBS in the urban setting (UNaLab, 2018; den Ouden & Valkenburg, 2018b).

To define the vision in the second stage, efforts are divided into two: first, outlining the general elements of the aspired future scenario in a compact group made up by the FC-CT and other heavily involved I-SH. Afterwards, a broad participation of other I-SH and E-SH make further contributions to enrich the outline. Evolving from the strategic ambitions and the identified drivers, these sessions rely heavily on visual aid which consists of live-drawing the imagined options for the scenario, allowing the participants to make sense out of their collective contributions. Once more, the workshop sessions are closed with a working session between the FT and FC-CT to synthesise the main elements of the envisioned scenario. This output is assessed against the Fraunhofer's System Analysis, in which the FC is studied in-depth in terms of urban ecology and resilience-building, thus revealing the gaps between the present and the vision (den Ouden & Valkenburg, 2018b; see *Morgenstadt framework*).

For the fourth stage, general RM creation, participant SH-crafted scenarios and experts' insights regarding future technical developments are used to shape a general route to water and climate resilience. This development is then used at each FC to feed the for the creation of a FC-specific RM, with workshop sessions once more divided: I-SH and E-SH contribute to identify local solutions or projects that could form a path from the present towards the 2050 objective. In a second session, the FT and FC-CT set out to define milestones in the action paths as well as the topics and subtopics that will frame the overall actions towards the vision. Finally, the process is completed with the portfolio creation, in which the SH at the FC identify on-going and new projects to be framed by the RM in the short and medium term (den Ouden et al., 2018/in press).

After describing the URM, some concerns arise regarding issues such as the methodological approach to deliberation among diverse SH, particularly in the E-SH group being it a broad category. Particularly, there is no explicit reference to seeking out for participant diversity, situated approaches to facilitation nor to an attempt to balance out the influence capacity of the SH, i.e. their power. Further, it seems to consider NBS as merely physical interventions, thus requiring intense technical expertise to deliver innovative results through the CoCr process. These considerations will be dealt with by studying the implementation of the URM-AS. To understand how the case studies will be coded from the institutionalist perspective to answer the research question, the following chapter addresses the conceptual and practical developments that stem from this review. Afterwards, such advances will be used in a successive chapter to define the methodology for the case study's information retrieval and assessment.

III. Conceptual and practical framework

Throughout the literature review, *the city* was approached as a *complex* system with several *connections* and feedbacks, which are driven by *diverse* and even site-specific factors. Moreover, its material and immaterial dynamics are not constrained by administrative borders, i.e. it is a system with *diffuse* boundaries. Given such characterisation, the city was further framed in the analytic category of *social-ecological system* (SES), as its features of complexity, connectivity and biophysical and social context and limits, are the result of social and ecological subsystems' dialectics. To approach the latter, the research builds up from notions of urban ecology, being of particular interest the city's *spatial heterogeneity* and the *ecosystem services* that sustain urban life. To make sense out of the social subsystem, urban political ecology's proposition of *power* mediating societies' interaction with the environment was used, pointing at *neoliberal practices* as a strong driver in city's production and governing.

On the one hand, this conceptualization of the urban space allows to relate its patch-like morphology to capital accumulation and reproduction processes; those functions of land which are more profitable will be prioritised over others, transforming fractions of land accordingly. However, it also adds to the SES dialectics the notion of *dispute* over the right to produce the city, challenging through *deliberation and contestation* the status quo that ultimately creates unequally distributed benefits and vulnerabilities unequally for urban dwellers. On the other hand, it relates the urban system's health to the process of *climate change* (CC); the hazardous events it brings result in risks that are aggravated by constructed *vulnerabilities* in the environmental, social and economic domains. In this regard, the role of the social subsystem responding to CC no longer appears to be politically-neutral: to provide an equitable response, it is necessary to address power disparities when producing the city.

Stemming from the social subsystem, *adaptation efforts* are concerned with the physical, social and institutional adjustments required to account for the estimated effects of CC. Adaptation deals with concrete measures differentiated as *soft-path* and *hard-path*, depending on the resource intensity for their realisation. In parallel, *resilience building* pursues the overall goal of ensuring equitable intergenerational development despite SES' uncertainties. In that regard, adaptation strategies are aimed to building resilience, which means using the concrete measures and actions to create a sustainable future SES. However, the urban political ecology perspective questions this proposition, mainly referring to the normative criteria supporting the notion of resilience building: would the same values, assumptions and power relations that sustain the current status quo be able to, provide an equitable future? Can the adaptation paths be provided with a political dimension, turning resilience building into an alternative to, rather than a way to strengthening, the status quo?

These questions represent a gap in both CC adaptation literature and practice, and they provide a general frame for the objective of this research. Within the UNaLab project, soft paths of adaptation are advanced through the use of nature-based solutions (NBS) and co-creation (CoCr) processes, specifically with the UNaLab Roadmapping Methodology (URM). In that regard, this thesis research question asks whether the URM can help actors organise around the NBS to manage it cooperatively. To inform such potential, further literature was consulted in the *ecosystem services* field and on the *commons*, synthesising them through the political ecology perspective: the *urban ecosystem services as common-wealth*. To assess the implications of such idea from the institutional side, conceptual and practical considerations emerged in order to answer the research question. Their purpose is to code the UNaLab case study with the parameters and variables of Ostromian scholarship, to assess its possibilities to enable SES dialectics which depend on collective action rather than only Market and State dynamics.

III.I The Urban Green Commons emerging from SES dialectics

The main advances in the scholarship of the commons and collective action to govern them rely on case studies of common-pool resources (CPR), particularly fisheries, irrigation systems and forests (Ostrom, 2005). Using Ostromian frames and tools to study any other system, like this research does in urban SES, demands a previous definition of *what* will be the object around which actors organise. In that regard, the concept of Urban green commons (UGC) is an important starting point, as it has been already put forward from an institutions' perspective (Colding & Barthel, 2013). From their approach, it is the actors' interactions that turn the urban green

infrastructure (UGI) into a common by acting collectively on it, by crafting rules and by assuming positions to manage them. Contrary to CPR, the UGC are not only exploitable by actors but they are also produced through their institutionalised cooperation.

This notion complements the developments on the urban commons, which refer to non-commodified common-wealth in the city that aims to fulfil social needs and create alternatives to capitalist-driven processes of SES production (Becker, Naumann & Moss, 2017). Again, these commoning processes emerge with collective action and decision-making over components of the urban SES (Łapniewska, 2015). Combining both perspectives, it becomes clear that the *emergence* of the UGC is driven by a political vision which disputes the current status quo of producing the urban setting, and articulated through actors interactions. From this convergence, and supported in the past literature review, the following working definition of the UGC is proposed:

UGC are green open spaces in cities where a self-governed community produces common-wealth through commoning practices. They emerge from the in situ and ex situ dialectics of the social and ecological subsystems.

Going through each component in the working definition, open green spaces refer to non-enclosed patches in the urban SES in which ecological processes are predominant; it also refers to publicly owned UGI. Self-governed community refers to a group of actors that define autonomously their rationale, objectives and rules for collectively acting over a green space. Common-wealth, as mentioned in § II.III.i.d, refers to the urban ecosystem services (UES) that are provided by collective action over the green space; it includes the development of related knowledge and skills in the actors. Commoning practices refer to the collective action that aims to effectively manage and/or govern the source of common-wealth. Emergence refers to the fact that UGC come to existence when these conditions are met, becoming a result of SES dialectics in which each subsystem influences the other. However, the influence of the social subsystem can be in situ, through protecting and managing the green space, or ex situ, through articulating discursively the value of the green space and/or enabling it through planning, ultimately producing the common-wealth.

Framed within the purpose of this research, this working definition provides clarity on what fairness, effectiveness and sustainability mean from the UGC perspective. As previously reviewed, the merely top-down and business-oriented deployment of UGI may derive in unequal and disadvantaging results for vulnerable groups in the urban SES. Relying on local agency and resources, as well as collective decision-making, may not only provide a *fair* approach to producing the urban SES at the patch level; it may also become an *effective* approach to resilience building if sufficiently supported and recognised by larger governance structure, i.e. enabled by the State, as posed by the subsidiarity principle. The contribution to sustainable resilience building has to be assessed from a long-term perspective, and for this purpose the design principles (DP) of successful CPR system exploitation can be used. As a proxy to assess the likeliness of cooperative institutions' (CI) emergence to guide collective action, it relates to these efforts' possibilities to be sustained through time. In the following Tables 3, 4 and 5, DP are adapted to the concept of UGC and compared to the ones for CPR, per bundle.

Table 3 Contrast between CPR-DP and UGC-DP for the first bundle (I). Based on Cox, Arnold and Villamayor (2010, p. 46)

CPR-DP I		UGC-DP I	
Definition of CPR system and its internal context	***1A** User boundaries* Clear definition of the group that is entitled to the common exploitation and governing of the CPR	***Definition of UGC system and its traits***	***1A** Community boundaries* Clear definition of the group that creates the common-wealth through in-situ and ex-situ practices
	***1B** Resource system boundaries* The boundaries of the CPR must be well defined		***1B** Resource system boundaries* Defining the green space subject to collective action within the SES
	***2A** Congruence between appropriation rules and local conditions* Appropriation rules are consistent with local conditions in **1B**		***2A** Congruence between common-wealth production rules and patch conditions* Match between the in situ and ex situ operational rules and the conditions of **1B**
	***2B** Congruence between provision rules and appropriation rules* Assignation of benefits proportional to inputs required		***2B** Congruence between common-wealth production and distribution* Match between the inputs required from 1A and their partaking on the common-wealth produced

Table 4 Contrast between CPR-DP and UGC-DP for the second bundle (II). Based on Cox, Arnold and Villamayor (2010, p. 46)

CPR-DP II		UGC-DP II	
Rules governing CPR exploitation and their enforcement	***3** collective choice arrangements* Enabling those in **1A** to participate in the rule-crafting and modifying	***Governing the UGC internal dialectics***	***3** collective choice arrangements* Enabling those in **1A** to participate in the rule-crafting and modifying
	***4A** Monitoring* Monitors actively audit CPR conditions and appropriator behaviour		***4A** monitoring of UGC and the operational rule abiding* Defining actors and procedure to guarantee the correct management of UGC
	***4B** Monitoring* Monitors are accountable to or are part of group defined in **1A**		***4B** Monitoring accountability* Monitors are accountable to or are part of group defined in **1A**
	***5** Graduated sanctions* Assessing operational rule-breaking cases to impose according sanctions.		***5** Graduated sanctions* Assessing operational rule-breaking cases to impose according sanctions.
	***6** Conflict resolution mechanism* Availability of arenas to resolve conflicts		***6** Conflict resolution mechanism* Availability of arenas to resolve conflicts

Table 5 Contrast between CPR-DP and UGC-DP for the third (III). Based on Cox, Arnold and Villamayor (2010, p. 46)

CPR-DP III		UGC-DP III	
CPR relation to its surrounding socio-ecological context	***7** Minimal recognition of rights to organise* Rights of 1A to craft their institutions are not challenged by external governmental authorities.	***Governing the UGC external dialectics***	*7 Self-organisation recognition and enablement* Larger local or national governance structures in which **1A** and **1B** are embedded, guarantee UGC's autonomy and support it if needed.
	***8** Nested enterprises* Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organised in multiple layers of nested enterprises.		***8** Nodes and networks* Linking or nesting the UGC's activities, flows and common-wealth to other resource system or governance system outside **1B**

UGC-DP III in Table 5 reflect on a key point regarding the concept of *polycentricity*. Formally defined, polycentric systems are complex-adaptive systems governed by multiple authorities and institutions at different connected and/or nested scales, called *units* (Ostrom, 2010). The units, in this case the UGC, are supported and enabled by official authorities; this is relevant for the UGC being a political project which is opposed to and endangered by the status quo of urban production. Thus UGC-DP **7** and **8** propose that for their sustainability, the UGC's

objective should not be to rely solely on the autonomously managed and governed patch-level efforts. Rather, building up on Ernstson's notion of patches-as-nodes for the UES production (2013), the UGC could be understood as nodes of commoning practices and common-wealth provision, also nested within larger governance structures. However, this research is intended to provide initial steps to understanding the UGC and their internal context, thus such larger governance setting is out of the scope and will not be further assessed.

III.II PE-NIASES: accounting for power and diversity when modelling interactions

To address the research question, a first step was to understand what the commons within the urban SES context could be. The following step is to determine how the URM CoCr process could be studied in order to reveal its commoning potential from the institutionalist perspective. Following Cole et al.'s (2014) New Institutional Analysis of Socio-Ecological Systems (NIASES) tool, the case studies for the research will be coded using the Ostromian scholarship models, categories and variables. Framing the interactions in this way systematises the assessment of the collective action that takes place in the CoCr process, thus allowing to confirm or refuse the commoning potential as well as the emergence of cooperative institutions (CI) to govern the UGC. Characterising the interaction according to the action-situation components in the NIASES provides an overview of what the arena looks like in terms of who participates in which positions, as reviewed in § II.III.i.c, and which forms a fundamental step to assess the participant diversity.

In addition, as the interactions are affected by usually overlooked power relations, a modification to the NIASES is proposed for this research as to acknowledge the manifestation of power in action in three aspects: authority, knowledge and subjectivity (Eriksen, Nightingale & Eakin, 2015). The NIASES contains the social-ecological systems framework (SESF) by using its first-tier categories to define the pre-existing conditions influencing interactions. Thus, assessing the powers in action in the action situation operationalises the notion of informing the SESF with the urban political ecology theory, as developed in § II.I.ii. In this way, the capacity of power relations to shape the outcomes of collective action will be considered both at the interaction level and at the system level – the latter achieved through the UGC concept that acknowledges and opposes the influence of neoliberal practices producing the urban SES. In that regard, the proposed modification of the tool aims to provide a politically-aware collective action model, which is further referred to as *political-ecology-rooted NIASES* (PE-NIASES).

Accounting for diversity and the effect of power in collective action from the Ostromian scholarship on the commons is the purpose of the PE-NIASES. The tool aims to determine the potential of such efforts to create commoning practices by modelling the interactions with the variables of an action-situation.

In the PE-NIASES, as used for the CoCr process of the URM as the action situation, the main variables are related to the joint *sense-making* of the costs and benefits of acting upon the system; *participants' diversity* and their *roles in CoCr*, and the recognition of *situated knowledges* and of potential *contestation* (Figure 9). Elements that influence the *commoning potential* of the collective action in CoCr are labelled yellow in Figure 9, and elements related with power at the interactional and SES-level are labelled in green in Figure 9. *Subjectivities* are related to the variable ACTIONS, as they may encourage or discourage actors to participate in the action-situation. *Knowledge* is related to INFORMATION, as depending on which epistemic approaches are validated different inputs would inform the process. *Authority* is related to CONTROL, as the actors with this power may directly influence any of the variables, thus affecting the potential outcome. *System-level power*, associated with the capitalist-oriented approach to producing the SES, is related to the POTENTIAL OUTCOMES as a commoning process by definition recognises and opposes it.

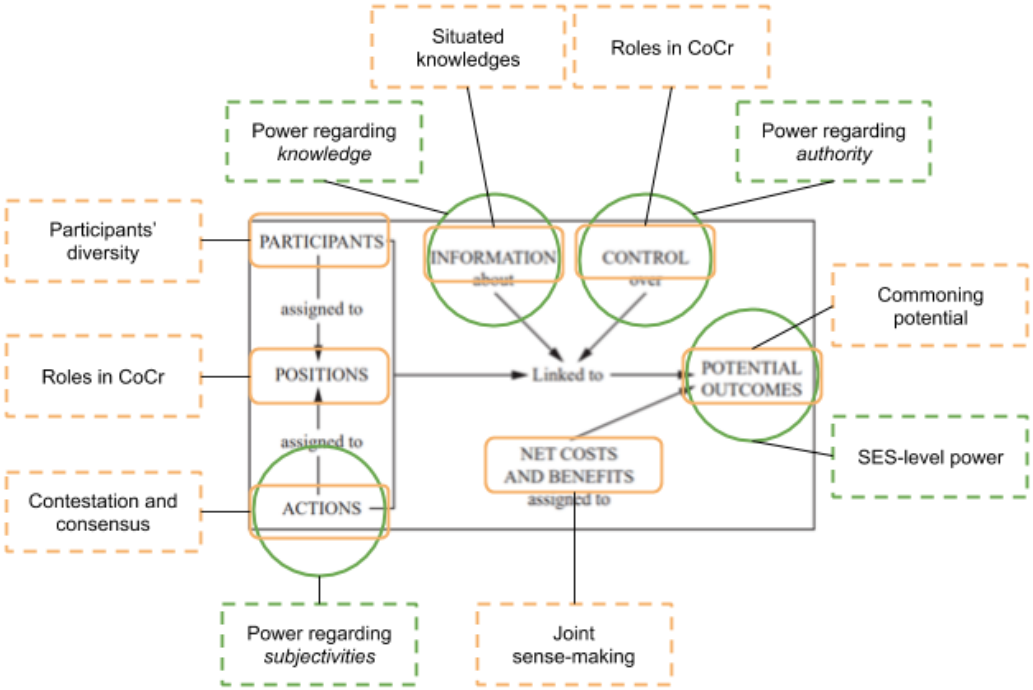

Figure 9 CoCr and power considerations in the PE-NIASES action situation. Adapted from Ostrom (2005, p.189)

Both the working definition of the UGC and the PE-NIASES tool to model the CoCr process from the Ostromian institutionalist perspective, provide the necessary conceptual and practical framework to work with UNaLab's Follower Cities (FC) cases. In that regard, the project's main pillars to deliver a water and climate resilience strategy in the FC will be matched to these two advances. For the NBS, considerations regarding its capacity as an approach to enable the UGC will be defined. For CoCr, the features that would make it suitable to derive on a commoning process will be listed. Finally, the URM as a specific methodology for CoCr, will have its potential to enable the emergence of CI for UGC management through the proxy of the UGC-DP assessed, complementing the fitting of the URM workshops into the PE-NIASES' shape to inform the research question. To do so, the URM features will be contrasted against the SRM principles to determine if the latter are transitive to the former, in which case, the principles will be related to the UGC-DP in the characterising tool that will be presented in § IV.II.ii.

III.III From CoCr to commoning

Participative and Enhanced CoCr involve SH in the design and planning phases of the provision of a service. In the case of UNaLab's WP6, the involvement aims to create a water and climate resilience strategy for FC. This approach is considered here as collective action, as the involved SH are able to jointly influence the strategies for resilience building in the face of CC adaptation. As seen in § III.I, when these actions take a political stance regarding the production of the urban SES (i.e. aiming to produce common-wealth), the collective action in the CoCr has commoning potential. In that regard, and considering the concepts developed in the previous section, three features were identified to characterise the CoCr process's likeliness to lead to commoning (see Figure 10): i) *purpose and concern*; ii) the technical details of the *CoCr arena and its tools* for facilitation and participant enabling, and iii) its approach to *enhancing collective action*.

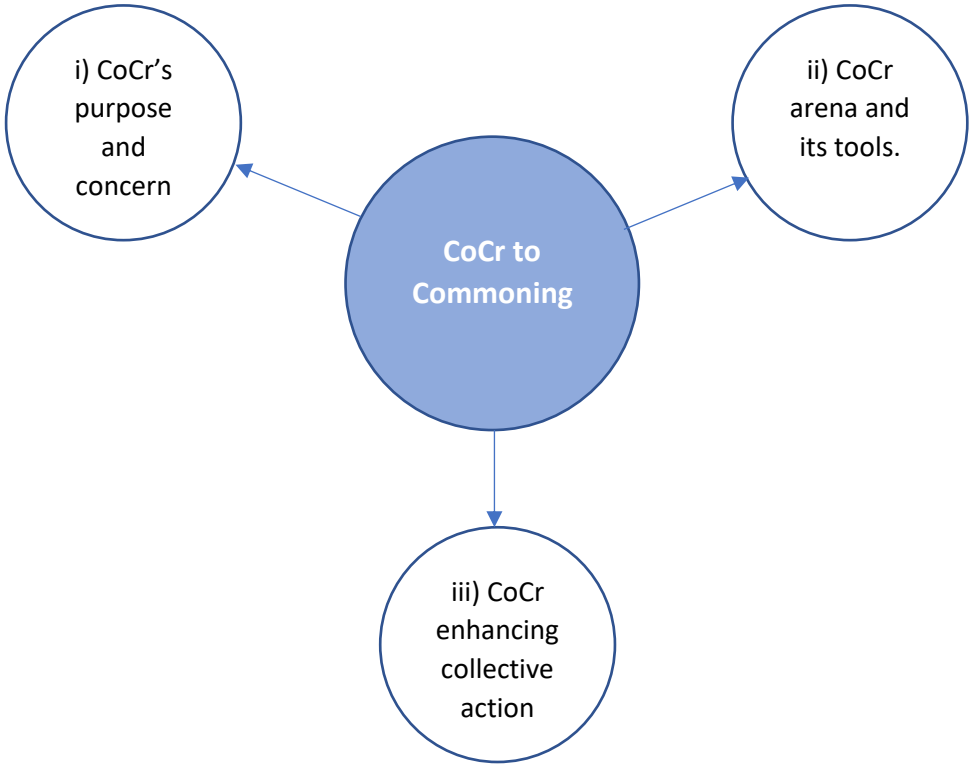

Figure 10 UNaLab's CoCr features that lead to commoning practices

Each of the four components aspires to an "ideal" condition in which the CoCr process provides an arena for collective action and decision-making over the crafting of the resilience strategy and the deployment of UGI as part of a strategic approach to NBS – turning it into a process of commoning.

i. **What is the purpose and concern of CoCr?**
   CoCr as an approach to bring about inclusive participation, concerned with diversity, power and conflict, addressing them methodically in order to harness the potential and avoid its drawbacks.
ii. **What is the CoCr process and arena technically like?**
   The steady provision of arenas for CoCr in which collective action lead to commoning, allow for a sustained facilitated interaction of SH, developing social relations based on trust and reciprocity. Such conditions lead to craft rules (institutions) to frame the cooperative efforts and to govern the produced commons: cooperative institutions
iii. **What is the approach regarding the enhancing of collective action?**
   CoCr enabling the collective action and self-organisation of participants to influence strategic planning, by providing the SH with responsibilities, power and capacities to do so. Acting and deciding collectively over the production of the urban SES make it a commoning process.

III.IV NBS enabling the UGC project

As aforementioned, the purpose of the interactions in the case studies is to collectively build a water and climate-resilience strategy, revolving around the concept of NBS. However, as reviewed in § II.III.ii.a, their deployment in the urban SES can be conceived as a broad and systemic planning approach, or as an opportunity to deliver punctual solutions through UGI deployment. Which way it would go is linked to the selected approach to resilience: the former relates to ecological and commons-based, whilst the latter does to engineering and neoliberal resilience. In this regard, it is critical to acknowledge that NBS will not necessarily lead to a fair strategy

in the sense of inclusiveness and attending vulnerabilities; its effectiveness is conditioned by its systemic implementation, and its sustainability would depend on the decision-making and governing arrangements that guide such implementation. Linking these critical insights to the emergence of UGC, which this chapter characterised as an opportunity to deliver a fair, effective and sustainable strategy, four relevant features of the use of NBS in the UNaLab project were found (see Figure 11). The following features provide an indication of the likeliness of the UGC to emerge through NBS: i) the *conceptualization of NBS*; ii) the expected *influence over the urban SES*; iii) the *benefits, costs and governing of NBS* across/by SH, and iv) the *inclusion of NBS in FC planning*.

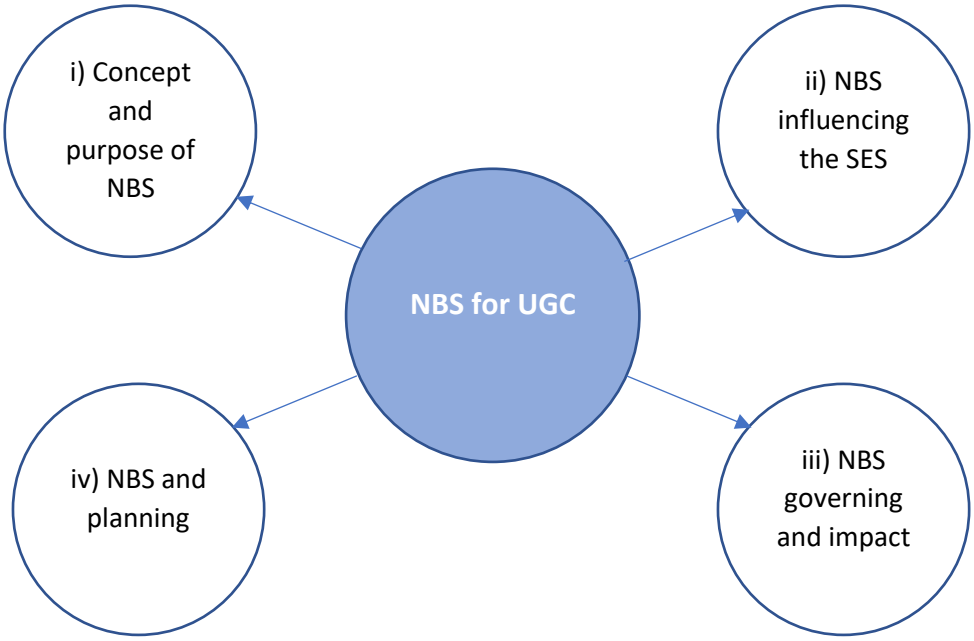

Figure 11 UNaLab's NBS features relevant for the UGC emergence

Each of the four components aspires to an "ideal" condition in which the NBS, as an strategic deployment of UGI with broad goals and approaches, provides the opportunity to common the physical interventions and create UGC.

i. **What's the understanding (purpose and concerns) of NBS?**
   NBS as a planning approach based on the SES dynamics –relying more on the UES, acting with evaluative criteria based on SES rather than capitalist profit, and deepening the understanding of the local system.
ii. **How do NBS materialise the UES and produce the urban SES?**
   NBS approach to enable the dialectic production of UES and to enable citizens to collectively act upon the UGI and create UGC – i.e. provide the material and legal framework as well as the incentives.
iii. **Who governs, who bears the costs and who reaps the benefits of NBS?**
   Basing the NBS approach on the UGC to build the urban space and urban society's resilience through common-wealth generation. The bottom-up governing of the individual patches where the UES are produced, how they connect in a network –enhancing the provision of UES.
iv. **How are NBS institutionalised and mainstreamed?**
   NBS as the planning approach that effectively links the State's efforts and resources to the multiple nodes of self-governed UGI.

III.V URM and the UGC-DP

In the scope of this research, framed by UNaLab's WP6, the CoCr process takes the shape of a roadmapping process: the URM. As reviewed in the previous section the SRM has principles which may enable the CPR-DP, grouped into four bundles that allegedly develop the CI that govern the CPR (More et al., 2015), namely:

- *SRM-P I*, regarding its capacity to create social infrastructure;
- *SRM-P II*, regarding its level of self-management;
- *SRM-P III*, which refers to the tool's flexibility to be nested within hierarchies; and
- *SRM-P IV*, which refers to the tool's visual nature and the possibility to update it periodically.

To propose those bundles for the URM, i.e. URM-P I, II, III and IV, SRM principles are compared against the URM features described in § II.III.ii.c, as shown in Table 6. As described there, a fundamental coincidence can be found between both, allowing then to make valid a theoretical transitivity of the SRM-P towards the URM.

Table 6 SRM principles present in the URM. Based on Kerr et al. (2013); den Ouden & Valkenburg (2017); den Ouden & Valkenburg, (2018a)

SRM principles	URM features
Human centered-ness: the process relies on humans engaging for co-creation, reflecting the diversity of their own human setting.	In the URM, four main sets of SH participate to co-create the water and climate-resilience strategies at each FC. The participation allows for diverse inputs that strengthen the end-result.
Workshop-based: the process takes place in groups, structured around active participation that transform individual knowledge into collective knowledge.	In the URM, the SH interventions are framed within different workshop sessions, in which the discussion among the participants –first from their own group perspective, then integrating the groups– is the basis to create the joint objectives.
Neutral facilitation: the process favours mutual understanding and shared responsibilities; it helps articulate preferences and supports negotiations, but without influencing content.	In the URM, the experience of the FT allows to harness inputs from diverse SH; it asks participants to *dream* and allows to translate those collective dreams into shared ambitions and visions.
Light process: the process is flexible and can be adapted for particular groups. It is a means to obtain a result rather than a method to be followed a-critically	In the URM, the process is divided into 5 stages to obtain different but sequenced outcomes. Their set-up has guidelines, although the implementation depend on the FC characteristics.
Modularity: the process can be tailored to other technology management tools, in a synergetic way	The integration of the Fraunhofer's *system analysis* and the *future telling interviews* as the drivers for change show how the process is complemented by other tools beyond those used within the workshops.
Scalability: the process feeds from different actors and factors, different environments and sectors and different depths of detail	In the URM, the 4 SH categories group different actors and sectors. That diversity provides different degrees of detail and aims.
Visual-base: using the visual medium as a common ground for the interaction and understanding.	In the URM, the *vision* stage benefits particularly from the on-the-spot drawings that you mention to help the participants to *make sense* out of the complex issues they are working with.

To further justify this transitivity within the scope of the research, it is necessary to identify to what extent are each URM-P related to the UGC-DP. This means assessing explicitly how the methodological features of the URM would ideally enable the establishment of CI, through the proxy of the UGC-DP. This assessment is important because the CPR-DP and UGC-DP are not the same: as described earlier, the UGC take the institutional traits of the CPR and expand it with biophysical and political considerations, for resource systems that were not studied by the Ostromian scholarship. The task is a fundamental step for this research, as it provides the theoretical support for a methodology to assess the main question guiding this research: how the URM *in practice* enables

the emergence of the CI around hypothetical UGC. Such assessment will be done in the following subsections, divided by the UGC-DP bundles presented in § III.i, describing how each URM-P enables each of the UGC-DP.

III.V.i Clear definition of the UGC and its internal context

URM-P I enables UGC-DP 1A

That the URM setting provides the arena for interactions between different SH groups and individuals, allow for social relations to emerge between these participants. Being the primary task that gathered them working towards a resilience strategy based on NBS, the emerging relations spin around that object. The emerging relations will determine their possibility of turning the UGI into UGC through the collective action that spans from the URM-AS. Thus, the URM setting may provide the space for a first batch of commoners to be created.

URM-P II enables UGC-DP 1A and 1B

The principle of having participants carrying out the URM-AS activities with the guidance but limited influence of sponsors, in this case either other UNaLab consortium partners or the FC-CT, not only helps strengthen the social infrastructure, but it also allows for them to define the boundaries of the areas to act upon with technical guidance to frame it in the SES context.

URM-P III enables UGC-DP 2A and 2B

The capacity of the URM process to be adapted to different hierarchical or organisational needs, make it work to help define the appropriation/operational rules with the insights from both the governmental and the commoner perspective, as well as defining the benefits that are obtained and costs incurred. This means, on the one hand, that the crafting of operational rules may not only be influenced by the commoners' activities, but they could be framed within a larger scheme of the FC resilience strategy supported by the NBS approach. On the other hand, given the URM activities help different authority-nested SH groups collaborate, it opens the possibility for the influence flow to go the other way around: commoners participating in the overall NBS strategic planning.

URM-P IV enables all UGC-DP I

The visual nature of the URM allows to clearly define the shared understanding of the NBS, the SES and UNaLab itself, which is the precondition to the rule crafting. In other words, the visual medium frames the foundational agreements which every institution stems from. Accounting for its updatability is critical tool for this internal context definition, as it is important to count on flexible tools for planning and organising the production of the urban SES in the face of climatic uncertainty.

Table 7 provides a visual summary of the first bundle of UGC-DP enabled by each URM-P.

Table 7 URM-P enabling specific UGC-DP for the first bundle

	UGC-DP I Definition of the UGC system and its traits			
URM-P I	**1A**	1B	2A	2B
	X	—	—	—
URM-P II	**1A**	**1B**	2A	2B
	X	X	—	—
URM-P III	1A	1B	**2A**	**2B**
	—	—	X	X
URM-P IV	**1A**	**1B**	**2A**	**2B**
	X	X	X	X

III.V.ii Rules governing UGC management and its internal context

URM-P I enables UGC-DP 3, 4A, 4B and 5

The potential to create social infrastructure leads to a potential to organise democratically the collective choice over the UGC. Beyond the trust that may exist among the commoners, the social infrastructure also lead to the identification of available resources to devise a monitoring system for the UGC management: 'resources' refer to *who* could do it and he *mechanisms* the commoners count on to carry out such monitoring, as well as to create and impose sanctions.

URM-P II enables all UGC-DP II

The URM being a self-managed approach to the strategic planning, not only enables but *depends* on the community's capacity to craft their own collective arrangements. Being the participants relations already collectively regulated around deliberation regarding the planning of the urban SES' production of the urban SES, collective action to enforce such planning would be based on collective-choice arrangements that are consistent with the devised plans. Moreover, the monitoring tasks and their accountability are already framed within the community's interest. The self-management may, too, provide graduated sanctions and conflict resolution arenas that are suitable for the specific social group that is organised.

URM-P III enables UGC-DP 6

The URM arena allows the participants to identify which hierarchies are connected to the UGI on the NBS strategic approach, at the node and network levels. This allows for having a clear map of which possibilities are there to act for conflict resolution in case the rules, monitoring and sanctioning mechanisms are not sufficient.

URM-P IV enables UGC-DP 3

The URM flexibility to be updated is critically related to collective choice arrangements, as an update in the overall strategy, in the pursued objectives or in the prioritised values should have a consequent effect on the arrangements to determine the operational rules under the new status quo.

Table 8 provides a visual summary of the second bundle of UGC-DP enabled by each URM-P.

Table 8 URM-P enabling specific UGC-DP for the second bundle

	UGC-DP II Governing the UGC internal dialectics				
URM-P I	**3**	**4A**	**4B**	**5**	6
	X	X	X	X	—
URM-P II	**3**	**4A**	**4B**	**5**	**6**
	X	X	X	X	X
URM-P III	3	4A	4B	5	**6**
	—	—	—	—	X
URM-P IV	**3**	4A	4B	5	6
	X	—	—	—	—

III.V.iii Relation of the UGC with its surrounding social-ecological context

URM-P I enables UGC-DP 7

The URM may provide the social infrastructure not only across the commoners that interact in-situ with the UGC, but it may also foster the creation of governmental institutions based on the participation of their representatives in the URM activities.

URM-P II enables all UGC-DP IV

The self-management of the URM would imply that there is no necessary legal or bound to the activities and the FC planning strategy. However, the participation of State representatives in such self-management, as it may be the case in URM-AS, could lead to the officialisation of the URM results in the overall FC resilience strategies.

URM-P III enables all UGC-DP IV

The URM potential to design nested strategies is key to *actually* nest the actions and interventions. In other words, being able to visually and collaboratively identify which vertical relations cut through the collective action is the first step towards asserting the UGC's institutional autonomy and its embeddedness within the larger SES.

URM-P IV enables all UGC-DP IV

The visual nature of the URM may make clearer the node-network relations, and the nested systems in the UGC net, as the metabolic flows diagrams make clear the circular economy relations between firms. If the links between the larger governance structures and the UGC change, they can be updated.

Table 9 provides a visual summary of the third bundle of UGC-DP enabled by each URM-P.

Table 9 URM-P enabling specific UGC-DP for the third bundle

	UGC-DP III Governing the UGC external dialectics	
URM-P I	**7**	8
	X	—
URM-P II	**7**	**8**
	X	X
URM-P III	**7**	**8**
	X	X
URM-P IV	**7**	**8**
	X	X

IV. Methodology for case studies

As shown in § III.V, UNaLab's WP6 holds theoretical potential to enable the commoning of the UGI stemming from the co-creation of the strategy for NBS. However, its realisation is dependent on several factors at the implementation level. These may be general and fundamental considerations such as whether the NBS are considered as physical interventions or an overall strategy, or specific and contingent elements such as the extent to which the visual-medium is used to enhance the interaction. The study of these factors is *necessarily empirical*. Moreover, the relevance of the observations is also consistent with the Ostromian scholarship on the commons: rather than relying on assumptions to determine whether actors may cooperate to manage their resources, a systematic assessment of their interactions better informs a conclusion. For such reason, the cases of the FC will be reviewed for the URM's first stage, the *ambition setting* (URM-AS). Interviews with FC-CT members and project reports are used to retrieve the information required to complement and operationalise the conceptual developments from the past chapter, as described in the following sections.

IV.I Characterising the URM-AS

The assessment is concerned with the interaction of three factors: the features of the CoCr process in general; the understanding of NBS, which is the object of the CoCr process, and the implementation of URM, which is the particular shape of the CoCr process. The parameters that determine each factor's potential to enable the UGC, are found in § III.III, III.IV and III.V, respectively; the case studies are characterised accordingly. As mentioned above, both interviews and UNaLab project reports are used to assess the URM-AS at each FC; while the interviews inform the research from the FC-CT perspective, the reports do so from the participant SH's perspective. The aim of the semi-structured interviews is to retrieve detailed information about the underpinning activities, decisions and rationales that shaped the workshops at each FC. To do so, the interview is framed in a guideline of 29 questions in a survey format that are complemented by further open questions (see Figure 12); the purpose of the former is to characterise standardly the URM-AS across FC, while the latter allow the interviewee from the FC-CT to provide deeper explanation regarding the actual workshop unfolding.

The structure of the guideline is based on the workshop's structure itself and is supported by the reported results of the two case studies for this research: Prague and Başakşehir (for the complete guidelines for each of the FC, see Annex A and B, respectively). The guideline comprises the following six parts:

- Part 1 address the preparatory work before the workshop, in particular the groups training to fulfil their roles in the WP6 (1), specifically regarding facilitation soft-skills.
- Part 2 address the preparatory work before the workshop, in particular the actor selection, the invitation process (2.1) and the participant characterisation (2.2).
- Part 3 assesses the actual workshop section in which participant SH *reflected on the present*, discussing the FC's current achievements (3.1) and challenges (3.2) in past resilience building efforts.
- Part 4 assesses the workshop session in which each group of participants *imagined the future*: the SH's aspirations (4.1), strategic ambitions (4.2) and the barriers and hurdles in the path (4.3).
- Part 5 assesses the concluding activities carried out by FC-CT and FT: synthesising participants input into a scope for the project's performance (5.1), a set of general strategic ambitions (5.2), and the opportunities, achievements, challenges and barriers (5.3) in the FC's present standing point towards the ambition.
- Part 6 closes with asking practitioners about participant SH's feedback on the workshop (6).

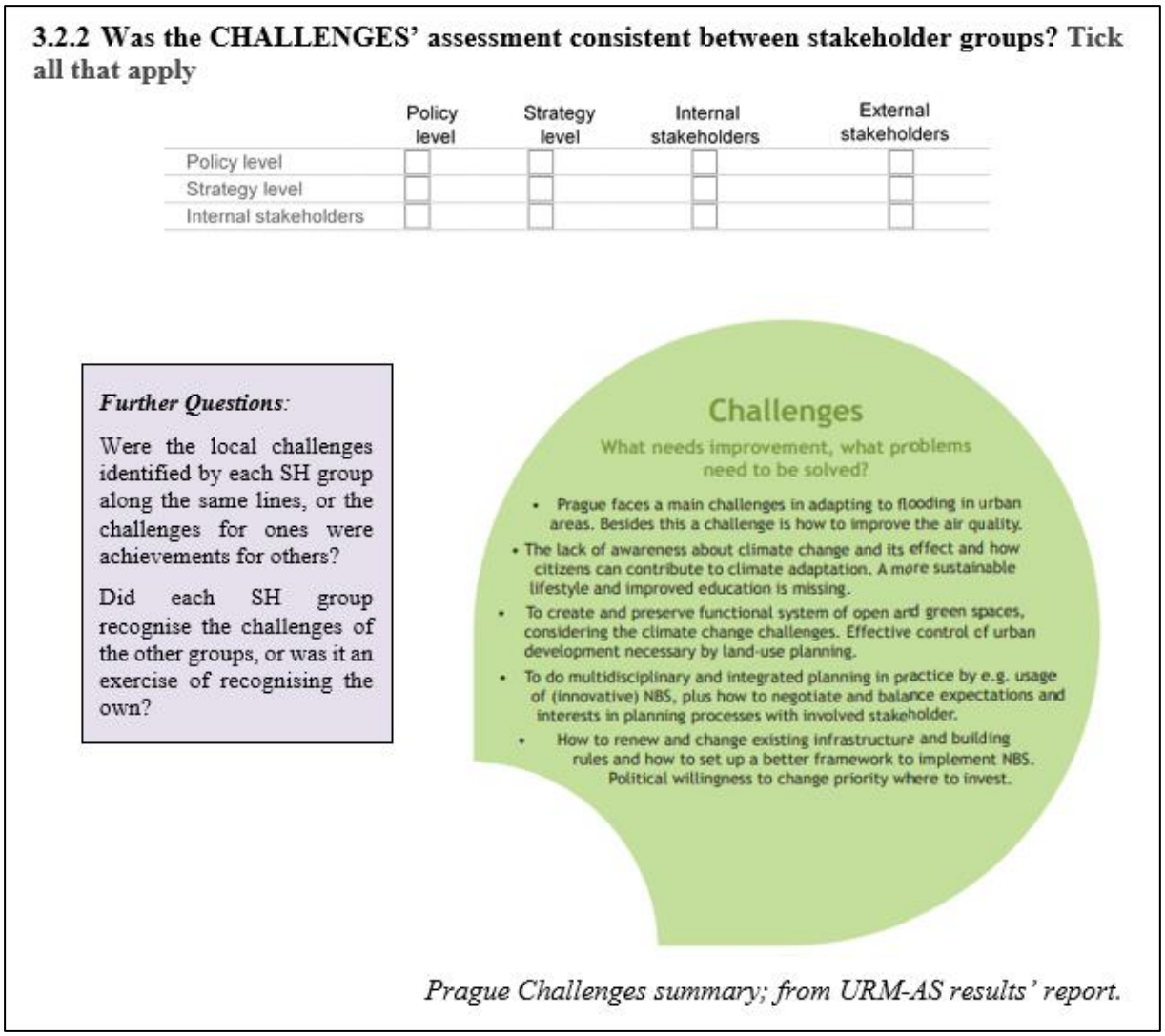

Figure 12 Extract of Prague's interview guideline. Contains survey-type question, open questions and supporting material from Prague's URM-AS results' report.

The information retrieved from the interview and from the reports regarding participants' contributions to each section, will allow to characterise the URM-AS at the two case studies, according to the CoCr and NBS features that were pointed as useful for the potential emergence of UGC in § III.III and III.IV, respectively. This is explained in the following sections.

IV.I.i Characterising the CoCr process

§ III.III touches upon the features of a CoCr process that allows to turn the collective action into commoning. In Figure 13, the elements for characterisation are further detailed. *i) Purpose and concern*, characterises the process based on the transparency and accountability of its objectives (Newton & Elliot, 2016); the inclusion of diverse SH to the process (Lund, 2018; Gulsrud et al., 2018); the type of knowledges, experiences and urban production approaches that are prioritised and sought as input for the process (Gulsrud et al. 2018; Buizer et al., 2016; Heynen, 2006), and the presence of conflicts and deliberation as well as the manifestation of powers-in-action (Eriksen et al., 2015; Silver et al., 2010). Feature *ii) CoCr arena and its tools*, takes the practical elements of the process that frame the participation, based on the general roles of the process (Voorberg et al, 2014; Lund, 2018); the workshop environment of the URM (Kerr et al., 2013; den Ouden et al., 2018/in press), and its facilitation (Ansel & Gash, 2012; Newton & Elliot, 2016). Finally, the feature *iii) CoCr enhancing collective action*

refers to the activity's potential to enable participant's agency to self-organise (Łapniewska, 2015; Lund, 2018) and transform their environment through decision making power (Rosol, 2010; Passidomo, 2016; Becker et al., 2017).

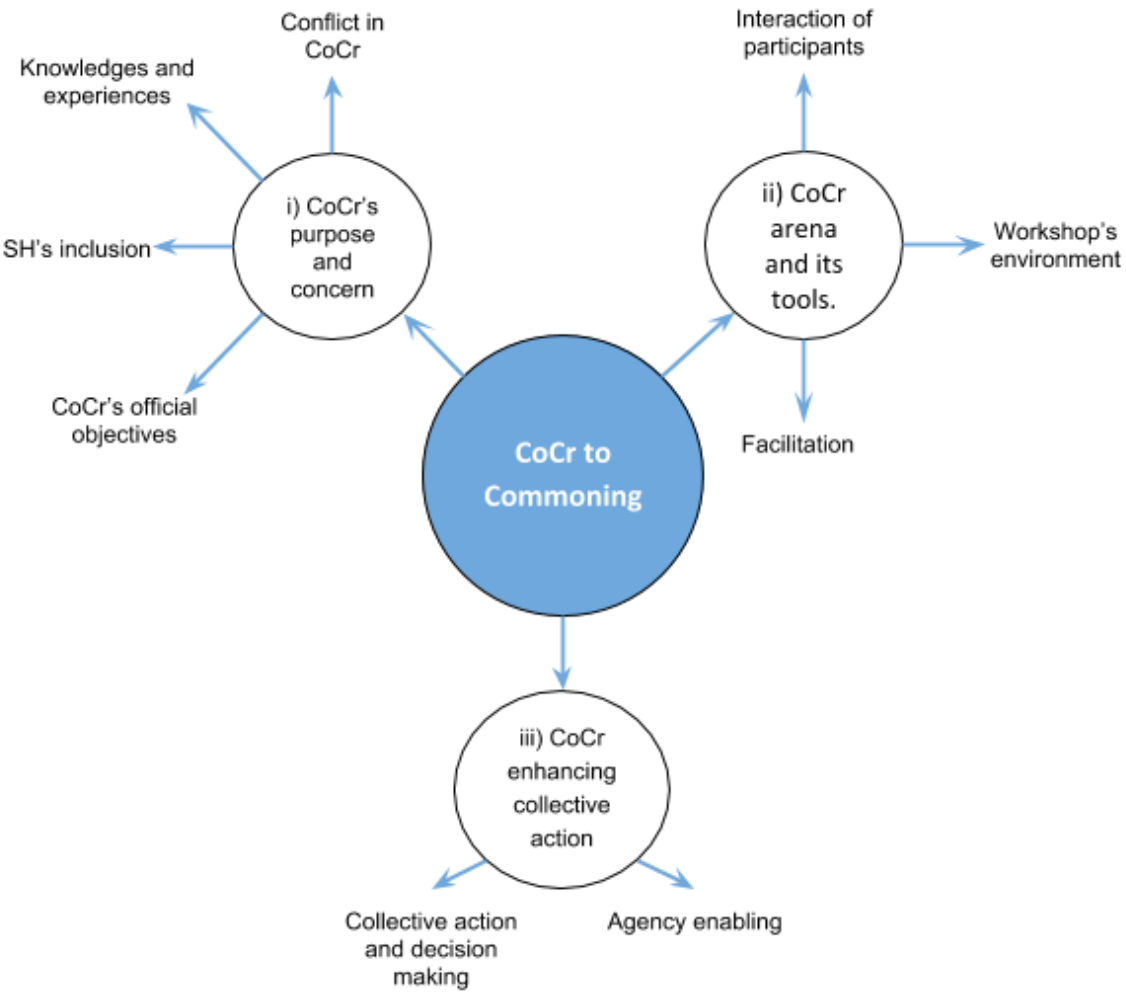

Figure 13 Variables for the characterisation of the CoCr

Some of the data that inform this characterisation is to be found in the official reports, particularly related to the contributions of the participants at each of the activities during the URM-AS, namely: identification of achievements (3.1) and challenges (3.2), and definition of aspirations (4.1), ambitions (4.2) and barriers and hurdles (4.3). However, the CoCr characterisation deals with underpinning activities and frames that are not reported, and so it is preferred to retrieve the necessary information from the URM-AS practitioners. This provides an opportunity to make the interviews with the FC-CT a source for a standardised frame of reference. Table 10 refers to the Survey-type and open-ended questions that inform each element accordingly to the previous detail of each descriptive feature. The aforementioned SH contributions per section will complement the characterisation of each element.

Table 10 FC-CT interview sources to inform the CoCr characterisation

Characterisation of CoCr		Interview guideline questions addressing each feature	
		Survey questions	Open questions
What's the purpose and concern of CoCr?	Official objectives	2.2.2, 2.2.3, 5.1.1, 5.2.1, 5.2.2, 5.3.1, 5.3.2, 5.3.3, 5.3.4, 6.1.1, 6.1.2, 6.1.4	5.1.1a, 5.1.1b, 5.1.2b, 5.2.2a, 5.2.2b, 6.1.1a, 6.1.1b, 6.1.2a, 6.1.2b, 6.1.2c, 6.1.3c, 6.1.4c
	SH inclusion (representation)	1.1.1, 2.1.1, 2.2.1, 4.3.1, 4.3.2, 6.1.1, 6.1.2, 6.1.4	2.1.1a, 2.1.1c, 2.2.1a, 5.1.1b, 5.2.2b, 5.3a, 6.1.1a, , 6.1.2a, 6.1.2b, 6.1.4c
	Interaction of knowledges / experiences	2.2.2, 2.2.3, 4.3.1, 4.3.2, 5.1.1, 5.1.2, 5.2.2, 5.3.2, 6.1.1, 6.1.2, 6.1.3,	2.2.1b, 2.2.2a, 2.2.3a, 3.1.2a, 3.2.2a, 4.1.2a, 4.2.2a, 4.2.2b, 4.3.3a, 4.3.3c, 5.1.1a, 5.1.1b, 5.1.2a, 5.1.2b, 6.1.1a, 6.1.1c, , 6.1.2a, 6.1.2b, 6.1.3a, 6.1.3b
	Conflicts through the process	1.1.2, 3.1.2, 3.2.2, 4.1.2, 4.2.2, 4.3.1, 4.3.2, 4.3.3, 5.1.2, 6.1.1, 6.1.2	3.1.2a, 3.2.2a, 4.1.2a, 4.2.2b, 4.3.3c, 4.3.3f, 5.1.2a, 5.1.2b, 5.2.2a, 5.3c, 6.1.1a, 6.1.2a, 6.1.2b
How is the interaction arena technically like?	Interaction of participants	1.1.2, 3.1.2, 3.2.2, 4.1.2, 4.2.2, 4.3.1, 4.3.2, 4.3.3, 5.1.2, 5.2.1, 5.3.1, 6.1.1, 6.1.2, 6.1.4,	3.1.2b, 3.2.2b, 4.2.2a, 4.3.3a, 4.3.3b, 4.3.3d, 5.1.1b, 5.1.2b, 5.2.2b, 6.1.1a, 6.1.1b, 6.1.2a, 6.1.2b, 6.1.4, 6.1.4a
	Workshop environment	5.2.1, 5.3.1, 5.3.3, 5.3.4, 6.1.1, 6.1.2, 6.1.4	3.1.2b, 3.2.2b, 4.3.3a, 4.3.3b, 4.3.3d, 4.3.3e, 4.3.3f, 5.1.1b, 5.2.2b, 6.1.1a, 6.1.1b, 6.1.2a, 6.1.2b
	Facilitation	1.1.1, 1.1.2, 5.1.2, 5.2.1, 5.3.1, 5.3.3, 5.3.4, 6.1.1, 6.1.2, 6.1.4	4.1.2c, 4.2.2a, 4.3.3a, 4.3.3b, 5.1.1b, 5.1.2a, 5.1.2b, 5.2.2b, 6.1.1a, 6.1.2a, 6.1.2b,
What is the approach regarding enhancing the collaborative action?	Agency enabling	1.1.1, 1.1.2, 5.2.1, 5.3.1, 5.3.3, 5.3.4, 6.1.1, 6.1.2, 6.1.4	2.1.1b, 2.2.2a, 2.2.3a, 4.1.2b, 4.3.3a, 4.3.3b, 4.3.3e, 5.1.1b, 5.2.2b, 5.3a, 5.3b, 6.1.1a, 6.1.1c, 6.1.2a, 6.1.2b, 6.1.4b
	Collective action and decision making	2.1.1, 2.2.1, 3.1.2, 3.2.2, 4.1.2, 4.2.2, 4.3.1, 4.3.2, 5.1.2, 5.2.1, 5.2.2, 5.3.1, 5.3.2, 5.3.3, 5.3.4, 6.1.1, 6.1.2, 6.1.4	2.2.2b, 2.2.3b, 3.1.2b, 3.2.2b, 4.1.2b, 4.2.2b, 4.3.3a, 4.3.3b, 4.3.3e, 4.3.3f, 5.1.1b, 5.1.2a, 5.1.2b, 5.3a, 6.1.1a, 6.1.2a, 6.1.2b, 6.1.4a, 6.1.4b, 6.1.4c

IV.I.ii Characterising the understanding of the NBS

As stated in § III.IV, understanding NBS as a planning approach for solving societal and environmental problems through the dialectically produced UES, makes possible to enable the UGC as a political project to dispute the urban SES production. Thus, such potential depends on the sort of conceptualisation and use of the concept and tool of NBS. Figure 14 details each element that informs the characterisation of the NBS as used on the URM-AS. The first feature *i) NBS concept and purpose*, refers to SH literacy regarding UES provision (Gómez-Baggethun et al., 2013), UGI (Lafortezza et al., 2012) and NBS (EC, 2015; Haase A., 2017), as well as the contextualisation of the NBS within the urban SES (Morse et al., 2011; Chapin & Ruhl, 2012; Ernstson, 2013). Further on the topic of the city as a SES, feature *ii) NBS influence over the SES* goes deeper in said contextualisation and questions how the discussion on NBS potentially affects the urban system, based on the participants' understanding of complexity (Grimm et al, 2008); the participation of diverse actors in the UES co-production (Ernstson, 2013), and the predominance of either technocratic or situated approaches in this production (Petrescu et al., 2016; Gulsrud et al., 2018).

For the third feature in figure 14, *iii) NBS governing and impact*, the characterisation helps to point out who governs the NBS approach and provides further detail on the sort of impacts that the approach and interventions have, as well as who reap the benefits and who bear the costs. This requires a politisation of the NBS in the production of the urban SES (While et al., 2004; Checker, 2011; Anguelovski, 2016), as well as identifying the dimensions of the impacts, being them related to climate change (Tapia et al., 2017) or to the urban SES social subsystem (Krasny et al., 2013). Finally, the feature *iv) NBS and planning* explores how the NBS approach and its

physical interventions are mainstreamed at different action levels for a sustained effect (Baró & Gómez-Baggethun, 2017) and how they are taken into governmental planning strategies (Rosol, 2010).

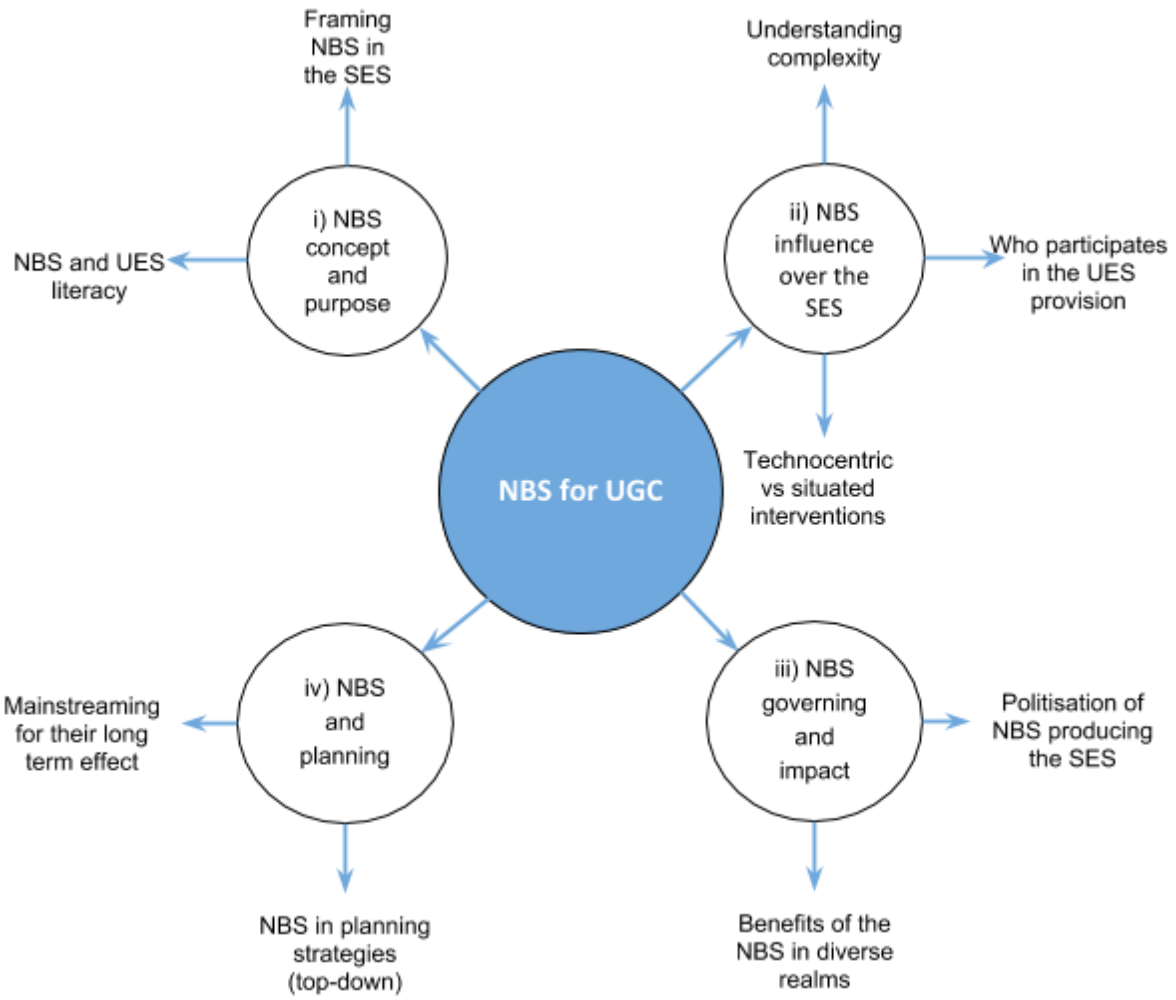

Figure 14 Variables for the characterisation of the NBS

Contrary to the characterisation of the CoCr process, which was mainly concerned with the FC-CT practitioners' actions and perspectives, the characterisation of the NBS understanding will lean towards the side of the participants, since they are the actors that provide the inputs in the workshop setting. However, the reports only represent a fraction of the discussion; the interviews will provide insights to go deeper in detail for each of the previously described features, through the questions shown in Table 11.

Table 11 FC-CT interview and activity reports sources to inform the NBS characterisation

Characterisation of NBS		**Interview guideline questions addressing each feature**		**From reported activities**
		Survey questions	Open questions	
What is the understanding (Purpose and concern) of the NBS?	UES and NBS literacy	2.2.1, 2.2.3, 4.2.1, 6.1.1, 6.1.3,	2.2.3a, 2.2.3b, 6.1.3a, 6.1.3b	SH's contributions per section
	Framing NBS in the SES	4.2.1, 5.2.2, 5.3.2, 6.1.3,	5.2.2a, 6.1.3a, 6.1.3b	FC's *today's reality*, scope and general ambitions
How do the NBS materialise the UES and produce the urban SES?	Understanding complexity	2.2.3, 3.1.1, 3.2.1, 4.1.1, 4.3.2, 5.3.2, 6.1.3	2.2.3, 3.1.1, 3.2.1, 4.1.1, 4.3.2, 5.3.2, 6.1.3	SH's contributions per section, FC's scope and general ambitions
	Technocratic v situated interventions	2.2.1, 4.2.1, 4.2.2, 5.2.2, 6.1.3	2.2.1b, 4.2.2a, 5.2.2a, 6.1.3a, 6.1.3b	FC's general and strategic ambitions
	Participants in the UES provision	6.1.3	5.3a, 5.3b, 6.1.3a, 6.1.3b	SH's contributions per section, FC's strategic ambitions
Who governs, who reaps the benefits and who bears the costs of NBS approach?	Politisation of NBS producing the SES	2.2.3, 4.2.2, 5.1.2, 6.1.3,	4.2.2a, 5.3a, 5.3b, 5.3c, 6.1.3a, 6.1.3b	SH's contributions per section, FC's strategic ambitions
	Dimensions of the NBS' impacts	4.2.1, 6.1.3	4.2.2a, 6.1.3a, 6.1.3b	SH's contributions per section, FC's strategic ambitions
How are NBS institutionalised and mainstreamed	Mainstream for their long-term effect	4.2.1, 5.3.3, 5.3.4, 6.1.3,	6.1.3a, 6.1.3b	FC's scope, general and strategic ambitions
	NBS in planning strategies (top-down)	4.2.1, 4.3.1, 4.3.2, 5.2.2, 5.3.3, 5.3.4, 6.1.3	5.2.2a, 6.1.3a, 6.1.3b	FC's general and strategic ambitions

IV.II From characterisation to modelling

The characterisation of both the use of NBS in the URM-AS and the overall approach to CoCr in this first stage, provide leads to estimate the methodology's potential to enable the UGC. However, to provide a solid answer to the research question, such insights ought to be complemented with the institutional perspective on the commons. In that light, the characterisations will be used as input data to model, on the one hand, the URM-AS as an action-situation, by using the PE-NIASES tool developed in § III.II. On the other, it will inform the extent at which the URM is a methodology that enables the UGC-DP, the proxy of the establishment of CI for hypothetical UGC. In other words, the PE-NIASES tool models the interactions that could lead to commoning, while the assessment of the UGC-DP enabled by the URM models the possibility of the CI to emerge from and regulate such commoning.

IV.II.i Modelling the URM-AS through the PE-NIASES

Given the objective and scope of this research, the use PE-NIASES is heterodox. First, because it is not used to analyse the dynamics of an already existing common, but it rather studies the "first round" of interactions that could lead to the commoning itself. Secondly, the approach here used is a mixture of the "empirical" and "theoretical" approaches to an institutional analysis (Ostrom, 2005, p. 33). From the empirical approach, it takes the observation of participants' interactions at the action-situation to then model it accordingly. However, the interactions and outcomes are merely predicted, as happens in the theoretical approach. As the case studies deal with the first encounter of the UNaLab SH at the provided arena in the first stage of URM, the patterns of interaction –in this case, the commoning itself and the progressive crafting of CI– and the expected outcomes –in this case, the sustainable governing of a hypothetical UGC– can only be inferred from the resulted interpretation of the action-situation. As those elements in the PE-NIASES are not approachable from the limited

available data from the first round, they will be addressed at the Results and Discussion chapter, particularly the patterns of interaction and the potential devising of the CI, which is related to the UGC-DP enabling.

The pre-existing conditions characterised by the SESF consist of components as: the categories of *Governance*, related to legal and political frameworks in which this CoCr process is embedded in; *Actors*, referring to the actors that take part in the process and that are relevant for the overall context, and finally, *Resource system*, referring to the urban SES in which the NBS approach will be deployed, and the existing UGI network that will be influenced by it. It differs from the orthodox use of NIASES because it is not describing the system of an existing commons. In this case, the UGC is a hypothetical result of the yet unknown outcomes of the overall URM process. Both elements of the PE-NIASES will be filled out informed by the characterisations of their CoCr and NBS approach. However, the variables that currently inform these categories are related to CPR and not UGC, and thus they may fail to provide de necessary information for the ends sought here. Thus, the pre-existing conditions will not be developed.

IV.II.ii Expected patterns of interaction: the URM-P enabling the UGC-DP

It was argued in § III.V that each URM-P has the possibility to enable certain UGC-DP. In that regard, an ideal reference situation related to each potential was described in order to confirm the inherent aptitude of the URM to enable the traits of a sustainable production and governing of an emergent UGC. Since the UGC-DP are a proxy of the establishment of CI, then it is theoretically sound to assume that the statement "the SRM may enable CI to manage the CPR" can be transformed to "the URM may enable CI to manage the UGC". Although the full assessment of the intersections between the URM-P and the UGC-DP is not yet feasible, the CoCr and NBS characterisation do inform if the URM as implemented so far in the first stage of the process is indeed *compatible* with the UGC-DP. In Table 12, the specific UGC-DP enabled by the methodology are shown alongside the NBS and CoCr's features taken from the URM-AS that will ratify or reject such potential enabling. As explained previously in § III.I, the UGC-DP III were left outside the scope of this research as they refer to a system-wide perspective on the UGC.

Table 12 The UGC-DP enabled by the URM-P, and the elements of the CoCr and NBS' characterisation that inform this potential

URM-P / UGC-DP BUNDLES	**URM-P I**	**URM-P II**	**URM-P III**	**URM-P IV**
UGC-DP I	**1A** NBS: ii, iii CoCr: i, iii	**1A 1B** NBS: i, ii CoCr: ii, iii	**2A 2B** NBS: i, iii, iv CoCr: i, iii	**1A 1B** **2A 2B** NBS: i, ii CoCr: ii
UGC-DP II	**3** **4A 4B** **5** NBS: ii, iii CoCr: i, iii	**3** **4A 4B** **5** **6** NBS: ii, iii, iv CoCr: i, ii, iii	**6** NBS: ii, iii CoCr: i	**3** NBS: ii CoCr: iii

Following, for each intersection between URM-P and UGC-DP bundles, the elements of the characterisation of NBS and CoCr that confirm or reject the potential are described next.

URM-P I enables UGC-DP 1A

To assess this potential, it is key to know ***iii) who governs, who reaps the benefits and who bears the costs of NBS approach***, as well as ***ii) how do the NBS materialise the UES and produce the urban SES*** as they reflect on different approaches to producing and governing UES, for instance for common-wealth or private profit; with private investment or State and local resources. In that regard, it is also key to know ***iii) what is the approach***

regarding enhancing the collaborative action since that will determine the extent at which the participants are led by the methodology itself towards collective action. In that regard, knowing about the participants and the method to select them, through understanding ***i) what's the purpose and concern of CoCr***, is also key to assess the compatibilities of their stakes and situations, which have an effect on the created social relations.

URM-P II enables UGC-DP 1A and 1B

To assess this potential, it is key to know ***i) what is the understanding (purpose and concern) of the NBS***, as well as ***ii) how do the NBS materialise the UES and produce the urban SES*** as they reflect on how the physical interventions are conceptualised, and on the different motivations to define areas of intervention. To this end, the three components of the CoCr as described in the Conceptual and Practical framework are relevant. Knowing ***i) what is the purpose and concern of CoCr*** determines the possibilities to create a diverse community, and use its resources to define the area of intervention. Further, being assisted by the FC-CT and the facilitation tools and approaches, framed within the component ***ii) What is the CoCr process and arena technically like***, will determine the extent at which the diverse participants are enabled to act upon their SES, covered by the component titled ***iii) what is the approach regarding enhancing the collaborative action***.

URM-P III enables UGC-DP 2A and 2B

To assess this potential, it is key to know ***iii) who governs, who reaps the benefits and who bears the costs of NBS approach***, in order to have clear which rule-crafting potential may be assigned to which SH. It is important, too, to know ***i) what is the understanding (purpose and concern) of the NBS***, since this literacy allows the groups to account for SES complexity that influences the NBS approach and the physical interventions, providing insights to the potential benefit creation. Still on the NBS side, by understanding ***iv) how are NBS institutionalised and mainstreamed***, it would be clear if the URM-AS is allowing for a conceptualisation of the NBS that requires integration of different actors across sectors and throughout governmental hierarchies.

Further, the categories of ***i) what is the purpose and concern of CoCr*** and ***iii) what is the approach regarding enhancing the collaborative action*** are relevant. The former regarding the criteria to define who is eligible to participate in the URM, and thus in the rule-crafting, cost-bearing and benefit-reaping of the UES provided by the implementation of NBS, as well as defining which kind of benefits and costs are assigned to which SH group. The latter, related to the NBS mainstreaming, addresses the way in which the collaborative action may be arranged in terms of responsibilities and decision-making power across the different sectors and authority/hierarchy levels in the urban SES.

URM-P IV enables all UGC-DP I

To assess the compatibility of these UGC-DP with said URM-P, the components regarding ***i) what is the understanding (purpose and concern) of the NBS*** and ***ii) how do the NBS materialise the UES and produce the urban SES*** are useful as they inform how the NBS is conceptualised in relation to a changing SES, and in relation to how complex are the SES changes. For CoCr, the component that will inform this intersection is ***ii) What is the CoCr process and arena technically like***, based on the understanding of the facilitation tools and approaches that allow to have clear and updatable interactions.

URM-P I enables UGC-DP 3, 4A, 4B and 5

To assess this potential, it is key to know ***iii) who governs, who reaps the benefits and who bears the costs of NBS approach***, as well as ***ii) how do the NBS materialise the UES and produce the urban SES*** as they reflect on the decisions that are made in the context of the implementation of NBS and the UGC management, as well as what counts for such decisions. In that regard, it is also key to know ***iii) what is the approach regarding enhancing the collaborative action***, namely he capacities that may be built among participants, and ***i) what's the purpose and concern of CoCr***, which makes clear the sort of knowledges and stakes are present and how they could shape the rule crafting and enforcing.

URM-P II enables all UGC-DP II

To assess this potential, it is key to know for NBS ***ii) how do the NBS materialise the UES and produce the urban SES,*** as it reflects on the participants capacities to dialectically interact with the UGC, setting the arrangements to do so, ultimately disputing which is related to the question of ***iii) who governs, who reaps the benefits and who bears the costs of NBS approach.*** The self-management allowed by the URM may systematise and institutionalise the social arrangements that allows the dialectical interactions, making It important to understand ***iv) how are NBS institutionalised and mainstreamed***.

Further characterising ***i) what's the purpose and concern of CoCr***, i.e. the reason why participants interact, is key to determine whether they will organise to manage an UGC, as well as ***ii) What is the CoCr process and arena technically like***, because it reveals the tools available for participants for this purpose. In parallel, understanding ***iii) what is the approach regarding enhancing the collaborative action*** reveals the likeliness of participants to have capacities developed to carry out the commoning of the UGI towards a UGC

URM-P III enables UGC-DP 6

To assess this potential, it is key to know ***iii) who governs, who reaps the benefits and who bears the costs of NBS approach***, as well as ***iv) how are NBS institutionalised and mainstreamed*** as they allow to understand how the NBS approach relates to the current hierarchical institutional arrangements and actors that will govern it. For the case of CoCr characterisation ***i) what's the purpose and concern of CoCr*** will shed light on how the current status quo of urban SES production is represented in the process and thus indicate a potential fundamental conflict between the commoners' rules and the imperatives of capitalist urban production, which would need mediation arenas to be solved.

URM-P IV enables UGC-DP 3

To assess how the URM-AS is using this principle towards the UGC-DP 3 enabling, it is important to know from the NBS side ***ii) how do the NBS materialise the UES and produce the urban SES*** in order to assess how the understanding of the UES value-articulation, determine who gets rights for collective choice rule-crafting. From the side of CoCr components, ***iii) what is the approach regarding enhancing the collaborative action*** works as a proxy to understand how the participants have their capacities built to manage the changes in the rules after the project time-frame is over.

V. Results and discussion

As mentioned previously, the information retrieved from each of the case studies will be first presented individually and disaggregated. Per FC the results will show the characterisation of the CoCr process and the NBS understanding, as well as the description of the action situation through the PE-NIASES tool. Afterwards, those results are used as input for the assessment of the intersections between the URM-P and the bundles of UGC-DP at each FC which serves as a proxy for the likelihood of CI to emerge from the interactions in the action-situation. The degree of compatibility between the URM-P and the enablement of the UGC-DP in the first stage of the process, will inform the answer to the research question. The sections of this chapter follow those methodological steps:

- The CoCr characterisation (result 1);
- The NBS characterisation (result 2);
- The action situation description through the PE-NIASES (result 3);
- Results 1 to 3 are presented for each FC, and they are also used as an input for the URM-P / UGC-DP intersection description (result 4).

As seen in the methodology chapter, the characterisations will inform the extent at which the theoretical potential of the URM-AS to foster the cooperative institutions around the UGI is maintained at the implementation. Thus, at each intersection between the URM-P and the UGC-DP, the URM-AS at each FC will be labelled as compatible or opposed to the enablement of the first two UGC-DP bundles, and the particular features of the characterisation that determines this compatibility will be pointed out. This results in 5 different possible combinations of results per UGC-DP bundle: from 4 compatibilities, to no compatibilities, which will be reflected in a synthetic table of the intersections, per FC too. The overall combination of positive and negative compatibilities will then be translated into a five units scale of '+' and '-' symbols, i.e. '++' to four compatibilities; '+' to three; '+-' to two; '-' to one, and '--' to no compatibilities.

Finally, yet another table will be used to represent a cross-FC compatibility potential. **This table will be used to answer the research question**: based on the activities of the URM-AS, the potential of the URM to enable CI by creating the adequate environment for participant SH to turn the UGI into UGC will be revealed.

V.I Prague

Starting with the CoCr characterisation, the process aims to influence city's planning, supported by the municipality and the Planning Institute. It relies heavily on experts' inputs, and so technical profiles that could add value to the process were sought. Also, it relied heavily on State actors, as they make up 3 of the 4 SH categories. The expertise criterion was prioritised over others for participant selection, forming an important barrier to entry in a context where "climate literacy is low". In the workshop, scientific and technological contributions shaped the discussion, which was particularly advantageous for I-SH and SL-SH who could frame their discussions in a system level perspective. However, the workshop results show that the approach to urban ecology was mainly based on material flows, excluding from it the role of social institutions, culture and behaviour. Still, although conflicting perspectives were not explicitly sought for the workshop, participants did recognise the disputed nature of urban development, adding a political dimension to their discussion. Nevertheless, the mainly technical focus of the discussion shaped the workshop process and results accordingly; instead of becoming a deliberative arena, the action situation became a space where technoscientific knowledges were imposed for the ambition setting. Whilst this trait would guarantee the I-SH's influence over the process, this group could further shape the result as the FC-CT had the capacity to cluster contributions and synthesise the outputs. This is represented in point i) of Figure 15.

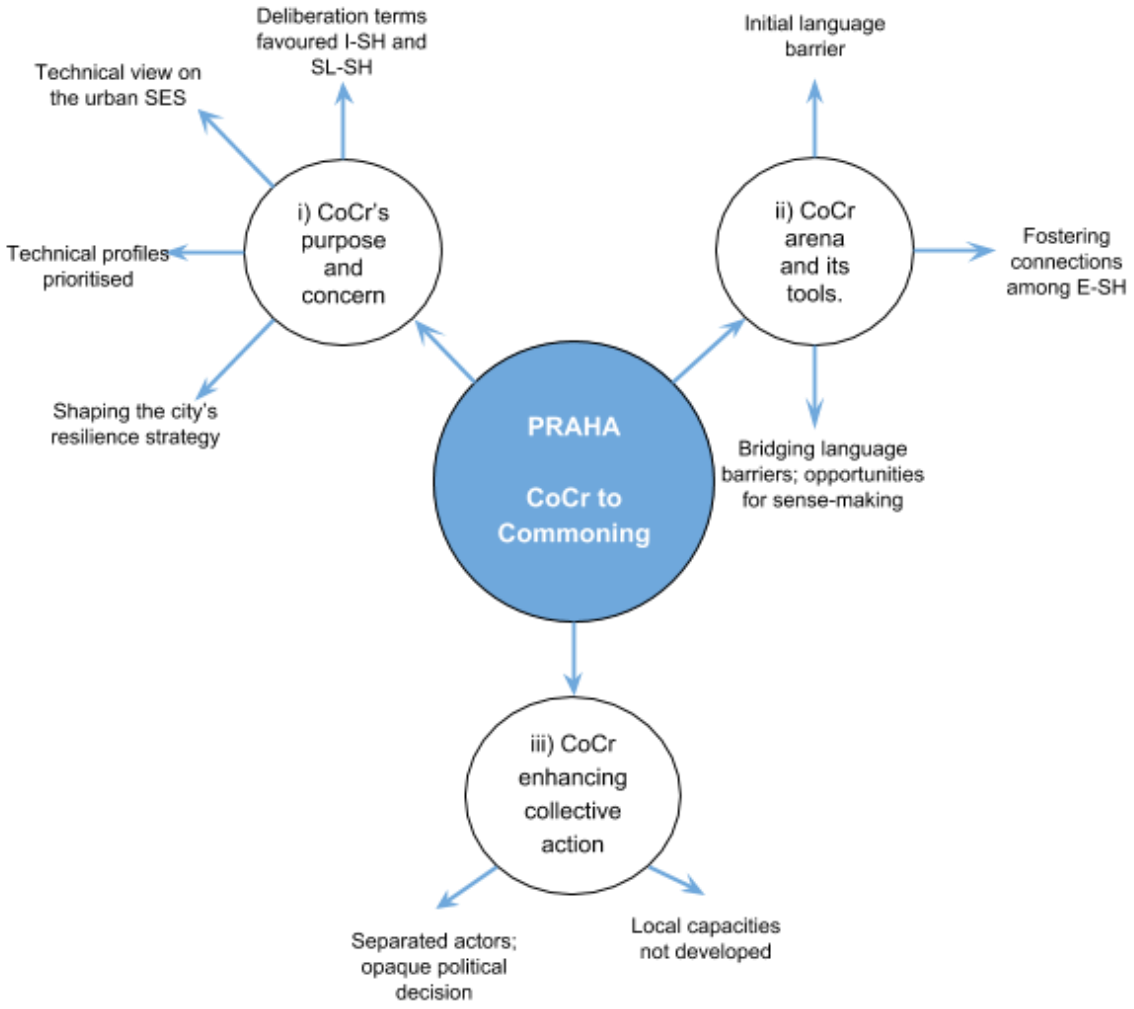

Figure 15 Prague's CoCr process characterised

Regarding the technical details of the workshop (see Figure 15-ii), the participating SH worked separately. Moreover, they were summoned by the FC-CT in a process in which the potential participants were selected between the municipality and the Planning Institute, and once at the workshop day, their participation was guided by the FT. In this regard, it is interesting to note, according to the interview, that having the workshop in English constitutes a barrier in the Czech context, further limiting participants interaction. About the workshop's environment, for 2 days the participant SH could contribute from their own groups' perspectives to the ambition setting. This was particularly fruitful for E-SH, who could develop connections among them. Interestingly, despite the overall separation of SH, there was considerable compatibility among their points, which could be related to the FT's capacity to create a common setting across sessions by providing an initial explanation of the project context. Further on their facilitation achievements, according to the interview, their use of sticky notes helped bridge effectively the language barrier. However, there is room for improvements namely: using more visual support to foster a clearer and deeper understanding of NBS among participants; using tools to help participant SH make sense out of the future, and enhancing participant engagement through continuous communication beyond the workshop.

Regarding the collective action (see Figure 15-iii), local capacities were not intentionally built for the participant SH nor for the FC-CT. For the former there was no effort to balance out theoretical knowledge and practical experience, and for the latter there was no training in terms of facilitation soft-skills – thus the role of the FT+FC-CT is limited to stewarding and mediating the process. The State actors who participated in the I-SH, PL-SH and

SL-SH sessions played a role as experts, as their capacities were the reason they were invited to participate in the first place. Moreover, as PL-SH were asked about their priorities, they also fall in the role of authority, together with the FC-CT who had the last word on the scope and ambition synthesising. For the case of E-SH, being external to the State structure, they fall into the role of co-designer of the planning activities. Such separation of SH's contributions is part of the current context of urban planning in the city, which is not convenient for collective action; this is worsened by perceived general ineffective, opaque political decision making and low public engagement.

Now, regarding the characterisation of the NBS, the reports show a clear understanding of the potentials of UES and UGI in urban planning, but, according to the interview, the NBS concept is still abstract and its use in the workshop did not fully satisfy the FC-CT. Such discrepancy between report and interviews could be explained by the FC-CT's capacity to synthesise the results after the SH sessions, to obtain more meaningful outputs than what participants' UES and NBS literacy allowed. In that regard, the discussions fell short on explaining how the UGI and UES could be produced in the city and how specifically they would deliver on the ambitions, although this could be explained by the nature of the URM-AS as a first stage of the process. Nevertheless, some participants' interventions show a broad understanding of the SES dynamics which could be further exploited, as shown by participants' comments reflecting on the capital driven pressure of the urbanization process over the landscape, the effect of UGI deployment on the city's identity or the need for UGI's multifunctionality. Thus, participants seem on a right track towards grasping the urban SES complexity, as they were able to identify key relations between the system's components for the NBS to transform it, such as barriers of a fragmented administration depending on political will, or the need for leveraging cultural heritage. This is shown in point i) of Figure 16.

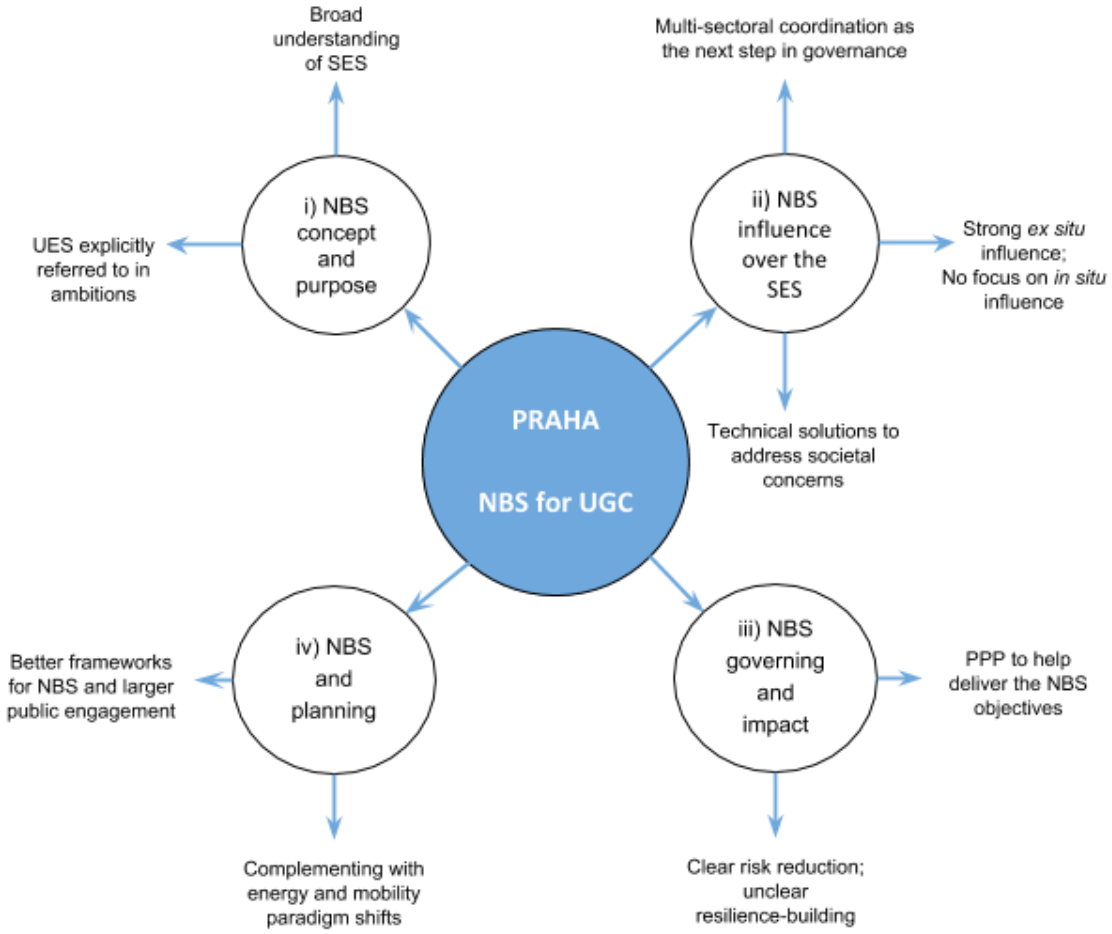

Figure 16 Prague's NBS approach characterised

Regarding the social subsystem's contribution to the UES provision (see Figure 16-ii), participants were keen on identifying multiple ways of articulating their value through discourse, planning, awareness raising or cross-department mainstreaming. However, coming to the in situ contributions to produce the UES, the discussions were centred around general measures such as "all flat roofs are green" or planting trees "wherever possible", without pointing at *who*, *how*, *scales* nor *funding*. Although such level of detail is not expected for the first URM stage, this situation is also related to the technocratic focus on the NBS approach. All SH groups placed large importance to technological solutions to manage flows effectively, reduce expenses and influence the city's micro-climate, and did not problematise thoroughly the current urban SES production frame. However, the discussed evaluative criteria were not only technical, such as saving energy or preserving functions of the city in the face of climate change; participants were concerned with framing the NBS deployment for peoples use and enjoyment, too.

According to participants, the NBS approach would be framed in a low public engagement and opaque political decision context (see Figure 16-iii). In that regard, and in line with the un-problematised politics of urban SES production mentioned above, the costs of an NBS approach are considered high and so suggestions of utilizing public private partnerships (PPP) to deliver accessible and attractive UGI came about. The benefits of such an approach are expected to be reflected in the city's CO_2 footprint, fostering small-scale agriculture, alleviation of flood and drought risks, adding value for citizens and tourists, and awareness raising, workshop's results show. However, these benefits were discussed mainly at an aggregate level: there was no further discussion on how these benefits would be distributed among the diverse populations in the city.

As mentioned above, the discussions moved around the planning sphere (see Figure 16-iv), and so they touched upon how the NBS approach would affect and could be affected by other domains, such as energy and mobility policies and strategies. Particularly on the governance dimension, it is considered important to increase the level of cooperation among the state actors as well as external stakeholders for the strategies to reach their expected potential. To do so from the governmental sector at a metropolitan scale, it is expected to enhance the existing knowledge and tools for strategic and systemic planning, to develop frameworks suitable for NBS, and to share with other municipal departments the advances in UNaLab. However, it was discussed that the public involvement, currently low, had also a relevant role; the emergence of social leaderships as well as enhanced awareness rising and education would be key to have more public participation in decision making for NBS.

Having characterised the CoCr and NBS in the terms proposed in § IV.I.i and IV.I.ii, the following step is to code it into the PE-NIASES (as shown in Figure 17) with the variable description labelled in yellow and the power description labelled in green. Regarding the *participants*, their diversity was not accounted for, as professional background was the only variable to invite participants. In that regard, although purposely summoning divergent political/ideological positions may allow to confront them in early stages and build from such dispute, politics is considered a "big issue" better to be avoided. Regarding the *positions* in the URM-AS, related to the roles in a CoCr process, the participants would be considered as co-designers; the involved SH do participate in the strategy, but they are constrained by the large influence of the State sector. This makes it difficult for *actions* to be framed beyond only deliberation, if diverse stakes were even represented in the arena. However, participants do recognise in their discussion that the urban SES is a constantly disputed land, as one member of the PL-SH mentioned that there is a "collision between ecology & digging companies" (sic), referring to the drive of producing the urban SES through capital-driven criteria, against other criteria such as ecological sub-systems' health or social-welfare, as previously mentioned. The intended focus on deliberation could provide an opportunity to thoroughly assess *costs and benefits*. However, although language and conceptual barriers were surpassed with facilitation techniques such as the sticky notes, there was no particular use of tools to help participants make sense out of the future and assess the long term's costs and benefits. Such issues reduced the effectiveness of the action situation at setting an ambition for 2050.

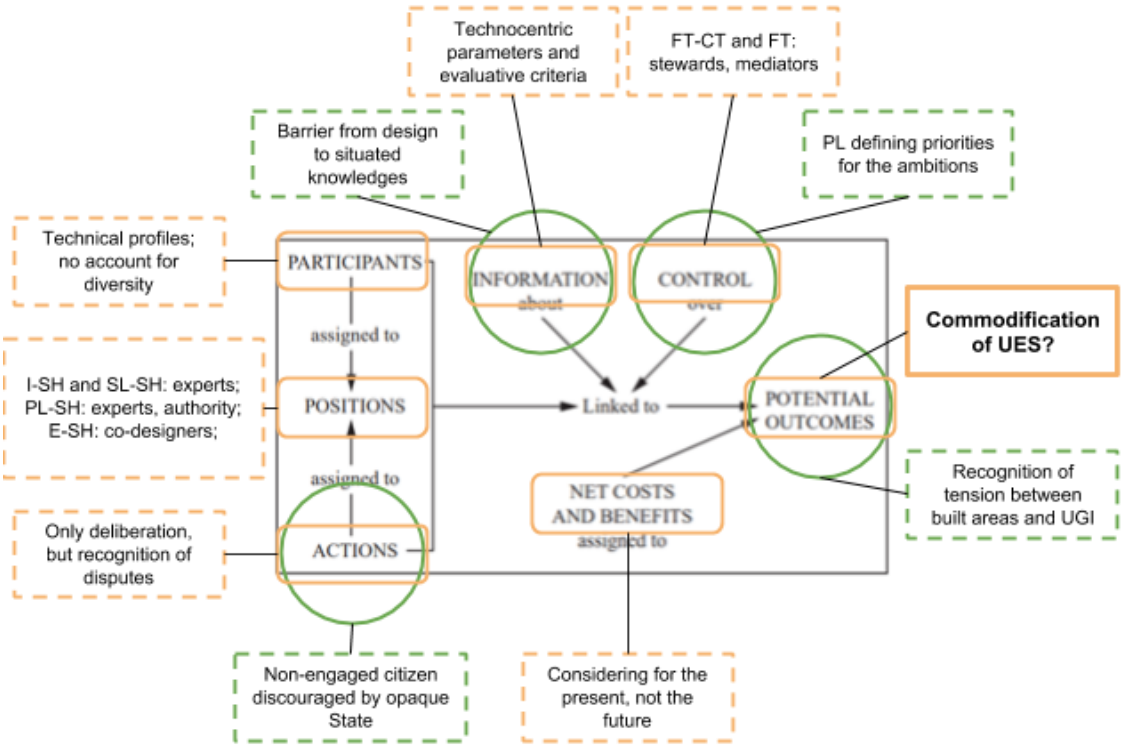

Figure 17 PE-NIASES for Prague

Regarding the *control* over the action-situation in the CoCr arena, there are two perspectives: one for the authority that may be implicitly exercised by the PL-SH given the focus of their participation during the workshops as well as the fact that they are the only SH group that is asked for their priorities. The other concerns the control that the FT and FC-CT have over the process itself and its outcomes. Nevertheless they do keep distance from the discussions, behaving as mediators when participants interact, and as stewards when summoning them, communicating the results and giving proper maintenance to the overall process. In the case of *information*, the priority was to summon technically capable SH with relevant professional background; this operates against the inclusion of diverse knowledges. Such an entry barrier regarding the kind of knowledges that will be relevant for the discussions, is another manifestation of power-in-action. Moreover, these deliberation approaches in a system in which there is "low confidence to institutions and politicians", as reported, allows a narrative of the subjectivity of powerless citizens against larger powers, in this case the State, to emerge. Thus, the participation of citizens in public affairs, particularly governing and planning, is *de facto* discouraged.

In the reported results there is a clear recognition that the urban space is under dispute: a tension between built areas and the UGI deployment. This is the reflection of competing values guiding urban SES production: the predominant economic values against ecological values. However, although acknowledged, the *potential outcomes* do not seem to question such hegemony. On the contrary, whilst the aspired scenarios call for open and accessible UGI that fosters new mobility habits and larger enjoyment of the urban space, they also advocate for provisioning UES, such as small-scale farming, with the purpose of generating "added value for citizens and tourists". While this could be thought of as civic ecology practices, the lack of detail on the *in situ* activities for the UES co-production, point more towards their commodification rather than a driver for social learning and community-creation. Such decisions may operate against the possibility of turning the CoCr into a commoning process.

Based on the criteria presented in § IV.II.ii, the intersection between the CoCr and the NBS characterisation allow to determine if the URM-AS, as implemented to date, displays the theoretical potential to enable certain design principles, as a proxy of cooperation to manage hypothetical UGC. This is shown in tables 13 and 14.

Table 13 Prague's URM-AS potential to enable the UGC-DP I bundle

URM-P / UGC-DP BUNDLES	**URM-P I**	**URM-P II**	**URM-III**	**URM-IV**	**Overall URM-UGC-DP compatibility**
UGC-DP I	Aiming for collaborative governance, through PPP and technology Prioritised technical profiles, favouring State actors and no local capacity building **NOT COMPATIBLE**	Aiming for collaborative governance of the SES and its UES Common understandings and intra-group connections **COMPATIBLE**	Diverse sectors and departments linked acting on the SES Technical insights favoured, but each SH group worked on its own **COMPATIBLE**	Aiming for collaborative governance of the SES and its UES Bridging lacks in communication; opportunity to use more visual aid **COMPATIBLE**	4Y: ++ 3Y: + 2Y: +- 1Y: - 0Y: -- **+**

For the first intersection in Table 13, although the approach to selection of participants did not allow for a meaningful social infrastructure development given the focus on the technical profiles, it is important to note that some relations were woven in the E-SH session. Still, the implementation of the URM-AS at PRA showed an incompatibility between the URM-P I and the enabling of the first UGC-DP bundle. This is different for the following URM principles, as the FC-CT is aware of and committed to taking participants into account for the following workshops' planning, enabling a self-definition of a system and a community by increasing the self-management of the process. Moreover, the explicit interest in making the URM work with participants from

different sectors, obtaining results that are useful for multiple actors as well, shows how a cross-hierarchical potential of the URM may enable the UGC-DP. Finally, although not fully exploited in this first stage, the potential of the URM's visual nature was acknowledged by the FC-CT and it is to be used in further stages to help create a shared understanding of the NBS approach. Nevertheless, Table 14 shows that the case is not positive for the second bundle of UGC-DP as none of its elements are dealt with in this first stage; there is no recognition of the internal dialectics of the UGC. The URM-AS is not concerned with specific operational and institutional features of the aspired UGI strategy.

Table 14 Prague's URM-AS potential to enable the UGC-DP II bundle

URM-P / UGC-DP BUNDLES	**URM-P I**	**URM-P II**	**URM-III**	**URM-IV**	**Overall URM-UGC-DP compatibility**
UGC-DP II	Multi-sectoral action; PPP; no detail for operational rules Prioritised technical profiles, favouring State actors; no local capacity building **NOT COMPATIBLE**	NBS mainstreamed through diverse ex situ value articulation. Technical understandings and intra-group connections **NOT COMPATIBLE**	Technical solutions for ex situ resilience-building Technical approach favouring State actors to shape NBS **NOT COMPATIBLE**	Technical solutions and ex situ value articulation No local capacity building **NOT COMPATIBLE**	4Y: ++ 3Y: + 2Y: +- 1Y: - 0Y: -- **--**

V.II Başakşehir

For the CoCr characterisation, the process aims to influence the district's Municipal strategy, so the ambitioned scenarios may be officially bound to the municipal action, supported by the Municipality and Basaksehir's Urban Living Lab. However, to achieve such goal, the URM-AS moved around ambitions that were previously designed by the FC-CT and then reviewed and approved by the Mayor. In this regard, the aim of the CoCr process was to get technical input to nourish those predetermined lines of action. It thus relied heavily on experts' inputs, and so technical profiles that could add value were sought. There was a larger focus on technical and data-based solutions than social institutions; these inputs come from technocratic approach, in which local cultural background and mental models, i.e. "Turkish mentality" is even considered as a barrier. The approach to participant selection relied on professional background and proved experience in environmental solutions, rather than representation of diverse stales and their empowerment, thus leaving limited space for both deliberation and contestation. However, whilst this approach to CoCr limits the capacity of participants to effectively mould the process, it does guarantee high-level governmental support, making its objective achievable. This is represented in point i) of Figure 18.

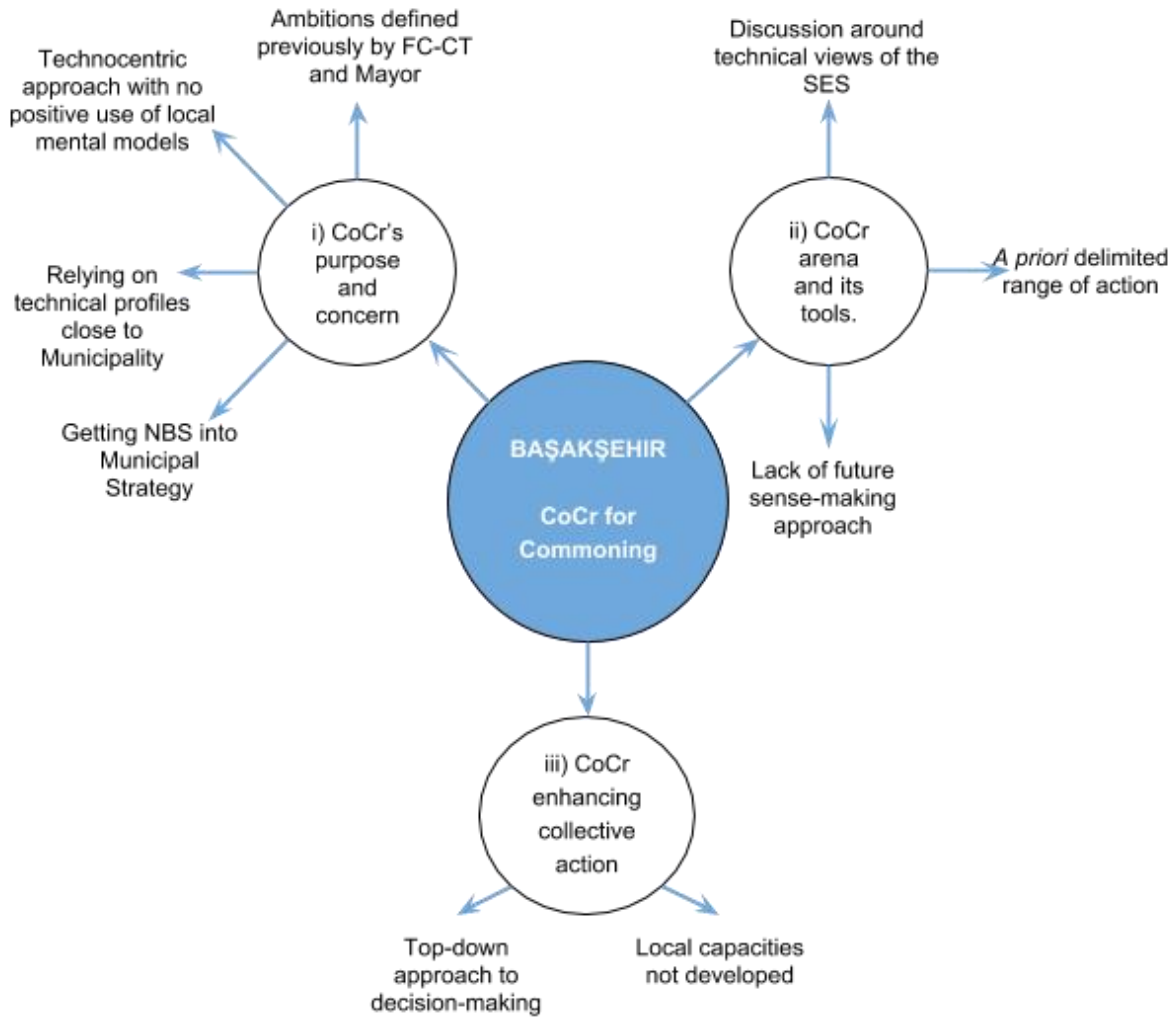

Figure 18 Başakşehir CoCr process characterised

Regarding the technical details of the workshop (see Figure 18-ii), the participating SH worked separately; they were summoned by the FC-CT after a list of actors that had previously collaborated with the Municipality to provide planning and environmental solutions. The list was initially provided by the Mayor, but these first actors further enlarged the list by suggesting others for invitation; in other words, this invitation process may be represented as a network of nodes connected by previous acquaintance, with the central node being the Mayor's office. Characterising the E-SH within this network, all of them were representatives of businesses, except for the Technical University of Istanbul, and they had a similar background regarding technical capabilities. As defined by the methodology, for 2 days the participant SH could contribute from their perspectives to the ambition setting, although working within an *a priori* limited set of options. Given the limited possibilities for the participants to shape the ambitions towards 2050, the lack of a methodological approach to foster a future sense-making did not hamper the result.

Regarding the collective action (see Figure 18-iii), the BAS Urban Living Lab's previous experiences provided them with skills to conduct this process as they saw fit regarding their context, despite not having received major training from TU/e Lighthouse or any other member of the consortium for starting and facilitating collaborative activities, just as the case of Prague. The participants, on their side, did not have any capacities of their own further built, but it is important to remind that it was their professional experience and the inputs they could provide to the project in terms of environmental solutions what had them invited in the first place. The way this local resourcefulness was exploited, however, is contrary to the spirit of the collective action enhancement, as

the major driver for reaping these participations is creating profits for the private company they represent, and not creating common-wealth.

With these considerations, the characterisation of participants' roles in the first stage of the CoCr process would result as follows: the FC-CT has a fundamental role of strategist, after the a priori design of the ambitions, alongside the PL-SH actors –whom evidently hold the position of authority, too. The group FT+FC-CT, besides being expert in CoCr processes, is responsible of stewarding and mediating the process, guiding the other two State actors –ISH and SL– to bring their critical technical insights to the discussions, as with the case of Istanbul Waterworks company. For that reason, they are classified as experts within the process, too. Although within a very constrained range of action in the URM-AS, the workshop sessions still allowed the E-SH to shape the strategy at some extent, framing this group as a co-designer. This overview of the positions of actors in the action arena reveals that the top-down approach that would be expected in conventional planning is still present during this URM-AS, maintaining a limited capacity of the participant SH to influence decision making over the SES.

Now the characterisation of NBS, there is a clearly technical understanding of the NBS as an approach and interventions, as shown in point i) Figure 19. Regarding its potential as an approach, the NBS were thought as influencing urban waste system, mobility and overall citizens "happiness and well-being", the latter being the scope of Basaksehir's URM process. This implies that their expected effects are understood as broad, interconnected with other subsystems in the SES, affecting them beyond the biophysical realm. However, as mentioned previously, the contributions that shaped this potential were mostly situated in the technological rather than social side. For instance, although the recreational and contemplational services provided are explicitly ambitioned, the possibility of linking the SMART technologies with the UGI, or closing the resource loops for their maintenance were prioritised over biodiversity protection or going deeper into the cultural services provided. Although such technical and metabolic-centred conceptions of the ecological patches are indeed relevant for the optimisation of resources in a context of "competition for the urban space", the understanding of the NBS lacked depth on its other equally relevant aspects.

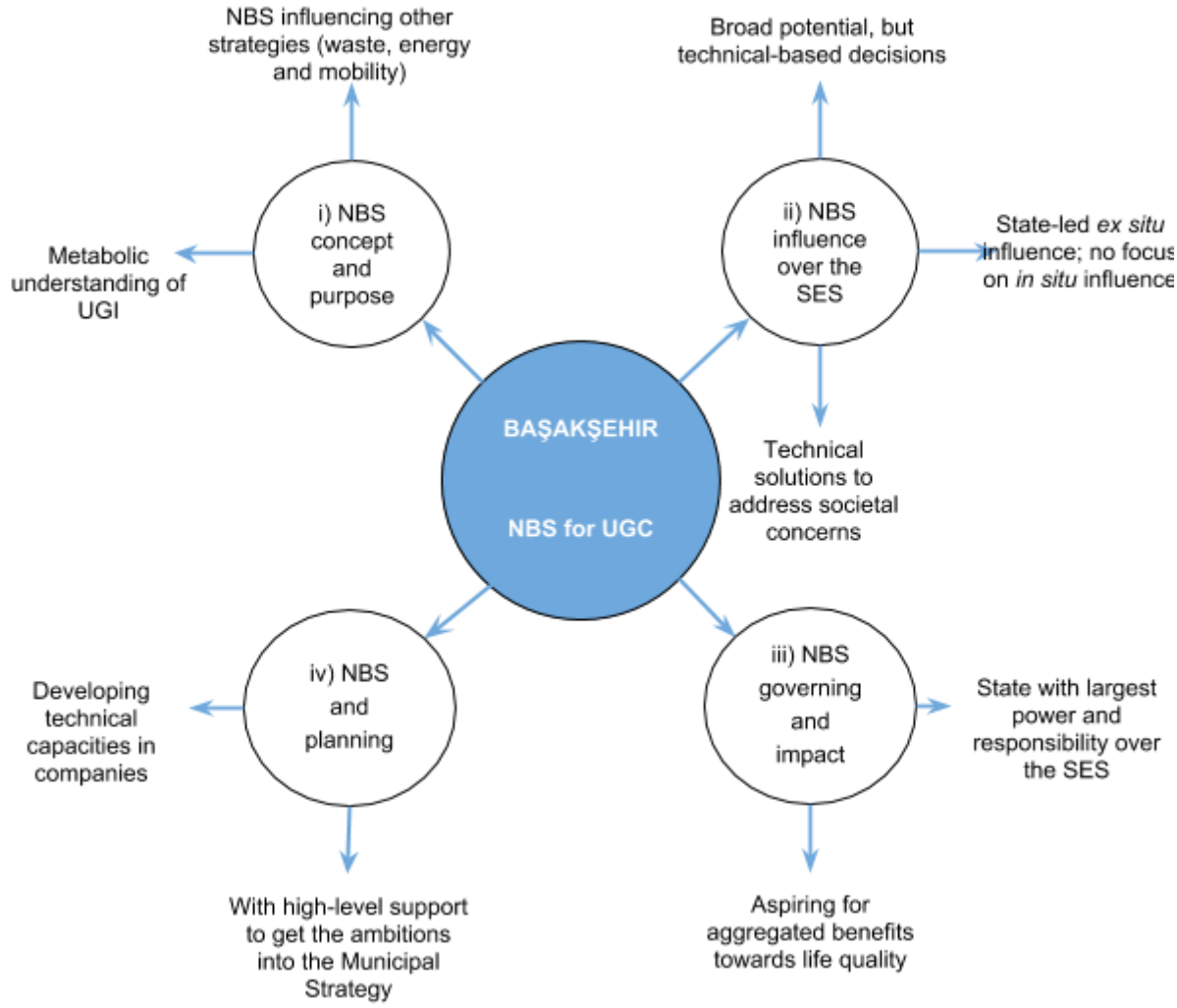

Figure 19 Başakşehir NBS approach characterised

Such issue is confirmed when assessing how the projected NBS could materialise the UES and produce the urban SES, as succinctly shown in Figure 19-ii. Although the scope of the URM addresses multiple variable issues, general ambitions rely mostly on technical solutions. Certain contributions from participant SH reflected on the large relevance of the State's role, as it designs policy and decides infrastructure. Their *ex situ* influence on the urban SES has, however, perceived interactional and system-level drawbacks. According to both report and interview there is lack of trust on the governmental authorities' commitment to change the urban SES production towards a larger presence of nature's elements and processes, in particular UES of regulation –for clean air–, and cultural –for social cohesion. Nevertheless, these lacks in the ex situ and top-down production of the UES were not compensated by reflecting on the possibilities for the *in situ* and bottom-up UES co-production. Citizens were considered, ideally, as stewards that respect the urban green, and private actors' role was limited to complying to State's command-and-control policies and regulation through green technologies, circular resource use and material efficiency.

Such understanding of the NBS approach sets the largest responsibility on the State at several levels. Firstly, as mentioned previously, the a priori approval of the guidelines for the ambitions for them to be scaled upwards to the Municipal Strategy document. Secondly, designing and implementing the policies, regulations and systems for waste and water treatment, and greening in buildings. Thirdly, in the large investments for the development of city-wide NBS interventions, such as one "big park per district". Finally, in providing the capacity building for

would provide entrepreneurs and regular citizens to attain basic knowledge about environmental topics. Thus, the NBS approach was understood as a top-down responsibility of the State, which would organise for the adequate knowledges, technologies and regulations in the matter to come about. Once more, it shortens the range of action for those currently marginalised from decision making to dispute the urban production. However, in a clear example of a CoCr process pursuing output legitimacy, this approach would deliver aggregated benefits specially through the strategically deployed UGI. As seen in point iii) in Figure 19, these interventions could provide the setting to changing mobility and resource consumption habits, as well as for substantial increases in life quality, according to the participants ambitions.

The final feature of the NBS characterisation, in Figure 19-iv deals with its mainstreaming and institutionalisation, which are quite relevant aspects for the FC-CT, considering the path chosen to implement the NBS approach in the Municipal strategy, guaranteeing a long-term impact. In this regard, the need for better knowledge and tools for strategic and systemic planning was recognised by the I-SH. Also developing capacities of private actors to comply with environmental performance regulations was considered by participants. However, as previously mentioned, considering the "Turkish mentality" as a potential barrier to the environmental protection show that there may be an over-reliance in the State's capacity to impose sought changes of the urban SES process, instead of realising them collectively. Thus, if the NBS approach is effectively institutionalised in government's practices and regulations, it may be a work too heavy for the State actors to communicate and share their ambitions and visions with the general public, as well as cooperating with them on the matter.

Having characterised the CoCr and NBS in the terms proposed in § IV.I.i and IV.I.ii, the following step is to code it into the PE-NIASES (as shown in Figure 20) with the variable description labelled in yellow and the power description labelled in green. Regarding the *participants*, their diversity was not accounted for and, instead, narrowly technical profiles were sought for the URM-AS. Within this action situation, the *positions* that may be different from what the methodology suggests is having FC-CT and PL-SH as strategists, with them having the first and last word in shaping its results. This becomes an undisputed arena in which the *actions* are framed in a deliberation format, but with very low capacity to build jointly the outcomes. The assessment of *costs and benefits* was influenced by such approach as the rationales that guided it was mostly centred in biophysical metabolic resource flows of the urban SES and the capacity to increase their efficiency.

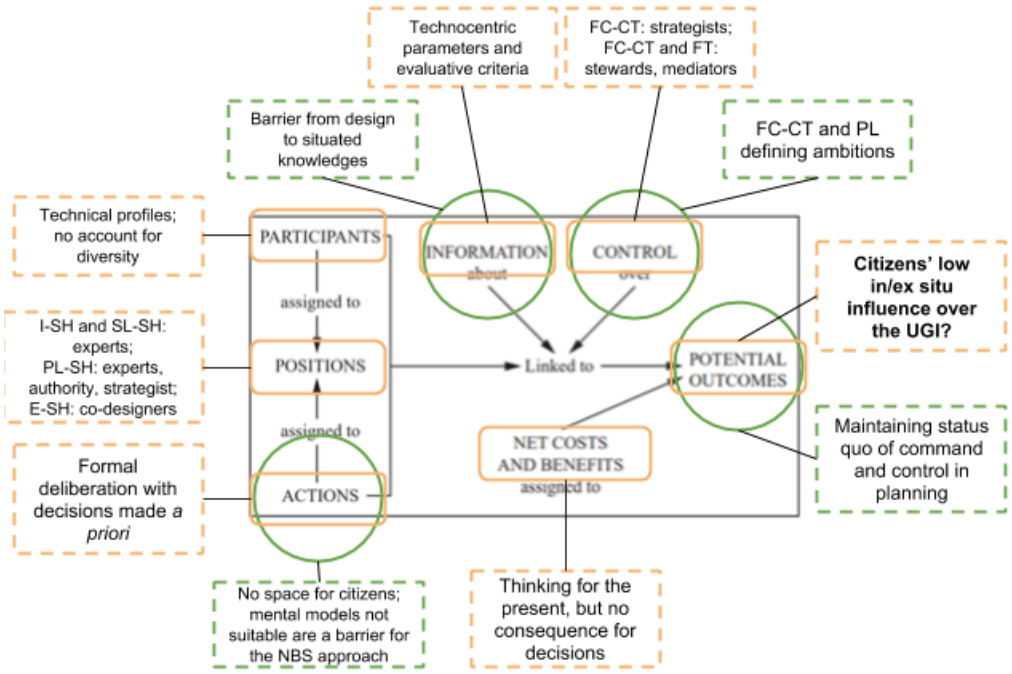

Figure 20 PE-NIASES for Başakşehir

Regarding the *control* over the action-situation in the CoCr arena there is a limited range of action for participants during the workshop, resulting in an evident exercise of authority power in the interaction by the FC-CT and PL-SH. This authority influences the URM-AS even before the workshop starts, as shown by the previously outlined ambitions, and by the Mayor's capacity to shape the network of potential participants. During the workshop itself, FC-CT and FT were controlling the interactions sticking to the methodological procedure, this is: behaving as mediators when participants interact, and as stewards when summoning them, communicating the results and receiving feedback from participants in the workshop closing session. In the case of *information*, technocratic approaches were perceived as necessary, and thus the priority was to summon technically capable SH with relevant professional background; this operates against the inclusion of diverse knowledges. What is more, the apparent disregarding of the localised, non-technical, culturally-based knowledges, is another manifestation of power-in-action.

Moreover, the very large role of the government State actors sharing no power nor responsibility with citizens in the NBS approach, as well as a perceived lack of trust on the governmental approach, as reported, allows a narrative of the subjectivity of powerless citizens against larger powers, in this case the State, to emerge. This is further worsened by participant selection methods which increased the gaps between those participating in this CoCr arena and those who were excluded from it. This level of epistemic and material marginalisation from the NBS CoCr process makes it impossible to think about regular citizens taking ownership of the design of the strategy, and it also poses a critical question regarding how the produced environment would look like under these ambitions. The overly technocratic approach to UGI and the SES illustrates a case in which a minimum level of technical capacities would be needed to influence the production of UES, both in situ and ex situ. By creating these high barriers of entrance, it is safe to conclude that this first stage has no potential to lead to commoning of the UGI.

Based on the criteria presented in IV.II.ii the intersection between the CoCr and the NBS characterisation allow to determine if the URM-AS, as implemented to date, displays the theoretical potential to enable certain design principles, as a proxy of cooperation to manage hypothetical UGC. This is shown in tables 15 and 16.

Table 15 Başakşehir's URM-AS potential to enable the UGC-DP I bundle

URM-P / UGC-DP BUNDLES	**URM-P I**	**URM-P II**	**URM-III**	**URM-IV**	**Overall URM-UGC-DP compatibility**
UGC-DP I	State actors shape the NBS approach and interventions Technical profiles for strategic impact; no local capacity building **NOT COMPATIBLE**	State actors commanding the technical UGI Technical profiles working within limits set by the State. **NOT COMPATIBLE**	Diverse sectors and departments linked acting on the SES, commanded by State Technical insights favoured; likely to get into long-term strategy **NOT COMPATIBLE**	State actors commanding the technical UGI Discussion to enrich the State's ambitions **NOT COMPATIBLE**	4Y: ++ 3Y: + 2Y: +- 1Y: - 0Y: -- **--**

As it can be seen in Table 15, the URM-AS implementation in BAS did not allow for any of the URM-P to enable the UGC-DP in the first bundle. Starting with the first intersection, the overreliance both on State actors and acquainted technical profiles narrows the opportunity to have social infrastructure to be built from diversity of participants in the action-situation. Thus, the creation of a community around a UGC is not enabled by this implementation. Again, the limits on participation set by the State actors and formal institutions, i.e. the FC-CT and the Mayor's office, make the process far from being self-managed by the participants. Moreover, even during the interview it was made clear that there is no particular interest to empower them to take ownership over the

process and its outcomes, which has a clear impact in the definition of the UGC system and its community. Regarding the URM's potential hierarchical flexibility as a planning tool, this was not present at this FC since it was only set to work for technical and political elites' purposes. Finally, the URM's visual nature was not fully exploited by the FC-CT + FT, much less used to understand participants and system's boundaries, nor to understand their features that would allow for common-wealth production and distribution. As mentioned for PRA's case study, and shown in Table 16, none of the elements of the UGC-DP II are dealt with in this first stage, and so none of the URM-P at the URM-AS enable them.

Table 16 Başakşehir's URM-AS potential to enable the UGC-DP II bundle

URM-P / UGC-DP BUNDLES	**URM-P I**	**URM-P II**	**URM-III**	**URM-IV**	**Overall URM-UGC-DP compatibility**
UGC-DP II	State actors shape the NBS approach and interventions Technical profiles for strategic impact; no local capacity building **NOT COMPATIBLE**	Technical to policy, regulations and UGI interventions led by State actors Technical insights to enrich the State's vision towards municipal Strategy **NOT COMPATIBLE**	Technical solutions for ex situ resilience-building Getting the NBS approach into the Municipal Strategy **NOT COMPATIBLE**	Technical solutions and ex situ value articulation No local capacity building, only technical profiles. **NOT COMPATIBLE**	4Y: ++ 3Y: + 2Y: +- 1Y: - 0Y: -- **--**

V.III Cross-FC results

Building up from the past description and brief discussions, it is clear that the URM-AS –that is *the first stage* of the URM methodology– has no particular features that provide adequate setting for deliberation with diverse perspectives to come about. It also showed it does not challenge the vertical status-quo of urban planning, where authorities rely on themselves and the technical capacities to produce the urban SES, instead of relying on local resourcefulness and direct citizen participation. Moreover, legitimises the status quo of the urban production, in which private profit-seeking actors use and transform the resources and the environment for their own ends. It does so by not providing a space for deliberation and representation –much less for contestation– to harness views and inputs from actors that are usually marginalised from the decision-making processes.

This is particularly exemplified in BAS case, which moved around the technological enhancement of the UGI instead of discussing the possibilities of enabling collective action over the UGI to co-produce common-wealth. For the case of Prague, whilst the methodology allowed the participants to have a better understanding of the overall context in which they would be implementing the NBS approach and deploying the UGI accordingly, there was no particular consideration that allowed them to govern the process itself. This means, no influence over the CoCr process and no considerations regarding the potential self-management of the designed UGI for the strategy. Again, the reliance on the technical considerations to enhance the green infrastructure towards resilience building, as well as little to no mention about the influence that the citizens may have in the process, shows that the methodology has no particular concern on fostering in practice nor conceptually, the self-organisation of participants for the common-wealth creation.

Such performance of the case studies in the first stage is summarised in Table 17. For the case of PRA, the implementation was compatible with an what would be required for an initial definition of the UGC system and its traits (UGC-DP I), contrary to the case of BAS. Let it be recalled that the difference does not mean that the results of the URM according to UNaLab's objectives would be more positive for the former; the FCs did not set out to work towards the resilience building vision that informed the synthesis of the UGC concept in this research. The purpose of this analysis is to understand and assess the URM's raw potential to fit to such vision. In that regard, the coincidence for both FCs in their incompatibility with the enablement of UGC-DP II, represented in table 17 with two negative symbols at both case studies, is a clear reflection that the scope and content of the URM-AS as a first stage does not touch upon the elements of that UGC-DP bundle. However, further stages in the CoCr process such as the fifth, *roadmapping*, or sixth, *project portfolio*, could host more concrete discussions on strategies and actions regarding the operational conditions of an hypothetical UGC.

Table 17 Synthesis of cross-FC UGC-DP enabling potential

FC / UGC-DP BUNDLE	**Prague**	**Başahkşehir**
UGC-DP I	**+**	**--**
UGC-DP II	**--**	**--**

Regarding the process itself as assessed by the PE-NIASES, it is clear that the URM falls into the definition of a co-creation process, since it allows for innovative collaboration emerging from a diverse set of SH, but it should be defined as *participative co-creation* (see § II.III.ii.b), since it is mainly concerned with the intervention of SH at the strategic planning and designing of UES through NBS. Moreover, although the role of the E-SH is that of co-designers because they can influence the design process, the participation is fundamentally concentrated in State-related actors; it is them who have either the last word on the ambition setting or they outline the possible

scenarios for the visions or the milestones to guide the pathways towards the visions. For that reason, the role of the State should be characterised as that of authority, experts and strategists, and not necessarily enablers of other actors' agencies. Considering these traits of the URM, it may be deduced that the main rationale for the co-creation to take place is not to foster inclusivity at decision-making but to get more innovative results when implementing the strategies shaped by the top-levels of government i.e. it draws its legitimacy from the outputs rather than the inputs.

Further on that line, it is worth to discuss that although the broad category of E-SH may be important to advance the notion of deliberation given its capacity to represent diverse stakes and positions, there is no particular methodology to foster or handle it. Moreover, the normalised and sought inclusion of private urban service providers and businesses into the CoCr process may indicate that the project –and thus the methodology– has no particular interest in proposing an alternative to the marketising roles of the State, not even against the privatisation of UES provision (see § II.II.ii.b). Furthermore, the weak methodological interest in providing a space to bridge the marginalisation of actors and knowledges, is maintained in the implementation. Thus, the possible patterns of interaction will be framed by the exercise of knowledge and authority powers, making it difficult for a commoning process to emerge from trust and shared ownership. This would be ultimately reflected in a poor performance of the UGC-DP proxy. In sum, all things kept equal, the URM-AS as implemented in the two studied FCs, is a process that aims to produce sustainability fixes in the SES while maintaining unchallenged the status quo of the production of the urban setting (see § II.III.i.a). It provides no tools and no spaces for the participants to develop ownership over the process and capacities in that matter, missing the opportunity to balance the influence over the urban SES production, opposing merely State and capital-driven interests.

A final note from the insights provided by the use of the PE-NIASES, is that not accounting for the SES components of the social subsystems such as structures and institutions in the power realm, may drive the expected outcomes for adaptation efforts far from addressing the political ecologies that shape the urban setting, preparing the ground for a process of greening capitalism (see § II.III.i.a, and Brand, 2016). In this regard, although the focus is urban ecology, the complex nature of the urban SES is partly dismissed by basing it mainly on the technical side, i.e. accounting for the biophysical metabolic flows of UES to be delivered, similarly to an industrial ecology perspective (see Petrescu et al., 2016). What is more, the political ecology lenses add a further consideration: at what extent may a methodology that tracks techno-scientific developments for their market deployment, and that is based on collaboration with private-for-profit SH, be useful to enable the commoning of the UGI? It does not actively account for the situated perspectives nor contested knowledges; doesn't foster knowledge reflexivity; there is no space provided to develop the commoning practices, and the planning process allows them to think ahead and flexibly, but unequally and un-representatively. Is commoning necessary to attend the two-fold question of UNaLab project helping build resilience at FCs, and making its outcomes resilient themselves?

For the case of PRA, there is awareness of the need to increase cross-sector and cross-department cooperation, as well as social activism and leadership, to create a stronger and sustained momentum around the NBS approach. In this regard, their mention to a lack of social leadership puts forward the possibility of not waiting for it to emerge, but fostering it by including local civic ecology groups in following URM stages, for instance. This not only would provide the process with more inputs, but it would help build local capacities, strengthen activism networks and allow for decision making in planning and governance to reach other actors. Such approach does rely on commoning for the two-fold resilience. Conversely, BAS example puts forward a counter-proposition. Their approach to the CoCr process seems to stem from the FC-CT's past experiences in public participation, allowing them to find a "sweet-spot" of mixing an open participation and authorities control. In this way, the innovative solutions for the NBS approach may come about through private and public cooperation heavily coordinated by the State, thus guaranteeing its long-term support and its effective mainstreaming into other policies and strategies. However, it is still unclear how sustainability fixes would be avoided with this approach, clearing the way for a neoliberal resilience building that threatens fair, effective and sustainable adaptation (see § II.III.i.d).

VI. Conclusions

The guiding question of the research was how the UNaLab Roadmapping Methodology (URM) activities in FCs enable the creation of cooperative institutions (CI) to manage common nature-based solutions (NBS), as a component of a sustainable, fair and effective climate-resilience strategy. Addressing the question required a thorough preliminary assessment of its components, such as: i) the validity of classifying NBS as urban commons; ii) defining what was fair, sustainable and effective, and iii) determining if the URM had indeed an inherent potential to foster rules that enhance collective action. As the question refers to diverse scholarships, an extensive literature review had to be carried out in order to inform the case study. However, in order to systematically gather and interpret relevant evidences, a solid framework was required which conceptual and practical tools that managed to consistently put together the diverse scholarships that nourished the research question. The fundamental starting point was the social-ecological system framework (SESF), which was further complemented by the political ecology perspective, a theory that would allow to make sense and help explain the complexity that the SESF managed to describe.

Applied to the case studies, it revealed an evident dispute for the right to produce the urban social-ecological system (SES), specially in the context of climate change: the threat to urban societies' capacity to survive and thrive opens a possibility to question which kind of habitat is being produced, who decide so, who benefits and who pay its costs. And so, it became clear that some notions regarding climate change adaptation and building resilience are not necessarily fair, effective nor sustainable. What is adaptive is not neutral, paraphrasing Eriksen, Nightingale and Eakin, and when the urban SES' health is at stake, it is necessary to provide the adaptation debates with a deeply political connotation. Otherwise, what will adapt is the current status quo of exploitation of cheap nature and cheap labour to reproduce and accumulate capital, not urban communities, as While, Jonas & Gibbs' denounce with the *sustainability fix* concept. Framing this diagnosis within the boundaries of the UNaLab project, it was possible to see that its pillars of NBS and co-creation (CoCr) may be influenced too by this trend.

However, the literature review also provided threads that allowed to weave alternatives from those elements: understanding the NBS as a systemic planning approach that uses ecological sub-system's functions and properties to solve problems, and understanding CoCr processes as an opportunity for collective action to produce the urban SES. Specifically, the NBS approach enhances the potential benefits of the urban green infrastructure (UGI), such as the provision of urban ecosystem services (UES); the collective action, in turn, may lead to commoning which increases the decision power capacities of the involved communities. When these two possibilities intersect and co-produced UES are provided to the urban habitat, these can be seen as urban common-wealth which depend on the SES dialectics. In other words, from the complex relations in the system a new element emerges, the **urban green commons** (UGC). Defining the UGI by their Ostromian institutional features but also from a political perspective not only provides the theoretical support to validate the object of the research question, but it is a general conceptual development that could be further used to articulate an alternative to resilience-building efforts that are useful for the urban production's status quo.

In plain words, the objective of this research was to assess the potential of the UNaLab project to help articulate this *nature-based political alternative* to the production of the urban space. A difficult task, since that is not the actual objective of the project itself. However, aiming to make such assessment pushed the research towards developing characterisations of the CoCr and NBS that would bridge the existing gap between UNaLab's official objectives and those findings in the literature review regarding the disputed nature of adaptation and a dichotomic classification of neoliberal resilience and commons-based resilience. Moreover, beyond the scope of the UNaLab project, the crafted analytical tools such as the **Political Ecology-rooted New Institutional Analysis of Social-Ecological Systems** (PE-NIASES) and concepts such as the UGC that may be further used to develop a systematic assessment of the possibility of achieving commons-based resilience, ultimately, its realisation.

Going deeper into detail in the theoretical findings of this research, previous to the case study, the literature review on the URM revealed some concerns regarding diversity, deliberation, acknowledgement of situated contributions and power. These elements were deemed important to achieve solving the existing tension in CoCr processes between the sources of their legitimacy: either their innovative potential –output legitimacy– or a democratic empowerment focus –input legitimacy. However, they were not explicitly dealt with in the methodology, and so their study had to be done at the implementation; a systematised study of the action situation where the CoCr takes place would shed light on that matter. To study the institutional traits of an interactional space such as the URM workshops, although only the first one for this research, the previously mentioned PE-NIASES was developed. Building up from previous advances from the Ostromian scholarship, this heterodox tool served to assess whether the provision of such mediated interaction, namely the CoCr's action situation, would foster the emergence of patterns and institutions for commoning UGI. To do so in an understanding of the existing disputes in the urban SES, the notions of interactional power-in-action and system-level power dynamics were adapted to the tool.

However, one-point data-sets make it impossible to assess trends, and so would be to infer from only one stage of the URM, i.e. one round of interaction, which sort of patterns would emerge, and which potential outcomes would result. Nevertheless, the methodological and operational decisions made by the URM practitioners revealed the different degrees of compatibility between the process principles (URM-P) and an Ostromian proxy for the emergence of CI: the UGC design principles (UGC-DP). That way it was possible to approximate the likeliness of a UGC system to be defined, even with a single observation, based on the URM-P of creation of social infrastructure, self-management of the process by the participants, the cross-hierarchical flexibility of the URM, and its visual nature. Through the reported activities of the FCs and interviews, first steps were taken to understand the roles of trust and reciprocity among participants in the action situation, which are the foundational elements for a community to govern autonomously a shared system.

The methodology's limitations are not constrained to the reliance on only one observation per FC. What is more, in such single observation was not possible to assess two of the three UGC-DP bundles: those related to the internal and external dialectics of the UGC. The impossibility of assessing the latter was acknowledged early on the research and thus explicitly left out from its scope, as it meant not only studying a hypothetical UGC, but also its relationship with the Governance Systems and Resource Systems it would be embedded in. Conversely, the study of the UGC's internal dialectics was considered within the scope, and so it was only revealed by the identical results of the two case studies in such category, that a lack of a detailed discussion about the specific features of the NBS approach at each FC would impede the UGC-DP II enablement. Nevertheless, such assessment could be realised during other rounds of interaction, such as those in which specific projects, strategies and milestones are defined to achieve the FCs' vision of 2050, i.e. the *roadmapping* workshop or the portfolio creation workshop.

As mentioned above and in previous chapters, a significant caveat of this research is that its guiding question aims to assess something the UNaLab project does not intend to do. Moreover, the critical political dimension of urban production and resilience building that heavily shaped its development, is barely present in the project's Working Package 6, in which the roadmapping activities are embedded. Nevertheless, this perspective did reveal areas of opportunity in the URM procedure and its implementation, which if attended, may help the FC navigate the tension between the practices of the output and input legitimacies. For instance, assessing the interaction arena through the PE-NIASES tool, allowed to unveil traits of the process that were not acknowledged in the methodology, such as aiming for participant diversity, and opposition even. Doing so make the existing and potential conflicts clear from the start, presenting an opportunity to address them through facilitated deliberation.

Transparent participants' dynamics would increase the likelihood of the NBS approach and interventions to be resilient themselves at each FC, by being nourished instead of endangered, by confrontation turned into collaboration. Concretely for the case of BAS, it could be reflected in the development of local ownership over

the project that releases pressure from exclusively top-down decision making and management processes. For PRA, such interactional space could mean enhancing the reportedly weak trust from the public in governmental officials, ultimately increasing the acceptance of NBS approach for UGI deployment. A tool to operationalise this participant diversity is a SH mapping process, as Newton and Elliot suggest. Such a participant map would allow the URM practitioners to identify the possible synergies and set-backs for the long-term strategy. For BAS it implies increasing the pool of local resources beyond State-sponsored and State-governed. For PRA, borrowing the terms of Ruhl and Chapin's terms of the robustness typology, it means creating a more diverse, modular and thus evolvable network of SH by considering new E-SH actors, enhancing the ongoing development of connections among this group.

However, opening the participation beyond technical and political elites implies yet another challenge to be addressed at the interaction arena, which is levelling the ground across participants –in terms of information and SES literacy. The advantages of accepting such challenge is to obtain richer inputs both for the local, regional and national strategic planning levels, as well as for the patch operative level. This means relying on actors that have participated so far with high technical capacities and expertise, as well as on local actors that have both a legitimate interest and situated knowledges of the *in situ* SES dialectics. Thus, hosting more activities in between URM sessions to develop simultaneously a robust body of knowledge and stronger trust between SH would be in place. Although operatively challenging, this provides an opportunity for the URM process at each FC to remain reflexive of the project and the way in which urban SES is systematically produced, so practitioners may avoid sustainability fixes and thus create a fair, effective and sustainable climate-resilience strategy in their own terms. The importance of civic ecology in this process is evident, as the already existing local environmental initiatives may effectively complement the structural/physical measures with the local social institutions and capacities.

To finalise this research, a final note regarding what I consider the most important development of this research: the definition of the UGC. I deem important to follow the Ostromian scholarship's proven practice of the systematic study of the common-pool resource systems. Only by gathering comparable data on UGC case studies, the definition of precise second and third-tier variables, i.e. those used in the PE-NIASES, or the development of accurate UGC-DP will be possible. Nevertheless, the dialectical nature of the SES puts certain responsibility in the researchers to not only understand the urban SES, but to transform them. In that regard, I see in action-research a suitable methodological approach to keep on studying the UGC while creating them; trial-and-error as well as lessons' sharing should point the way. The planetary dimension of the social-ecological crisis calls for an urgent mobilisation in a similar scale towards crafting alternatives that may allow the diverse SES to survive and thrive… *to flourish*. **Thus, let this be a call for other humans, regardless their technical, cultural and epistemic backgrounds or skills, to wonder *if new worlds are possible*, *if there are other ways of relating to each other and the rest of the web of life*. Let us try collective action based in trust and reciprocity to produce common-wealth for all life, as a challenge to exploitation, scarcity and competition**.

Life on Earth, unite!

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Annexes

Annex A
Roadmapping Assessment Interview guidelines for Prague

27/07/18

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052

Topic: ***SCC-2-2016-2017: Smart Cities and Communities Nature based solutions***

About UNaLab

UNaLab will develop, via co-creation with stakeholders and implementation of 'living lab' demonstration areas, a robust evidence base and European framework of innovative, replicable, and locally-attuned nature-based solutions to enhance the climate and water resilience of cities. UNaLab focuses on urban ecological water management, accompanied with greening measures and innovative and inclusive urban design. The UNaLab partners aim to develop smarter, more inclusive, more resilient and more sustainable local societies through nature based innovation jointly created with and for stakeholders and citizens. UNaLab's 3 front runner cities: Tampere, Eindhoven and Genova, have a track record in smart and citizen driven solutions for sustainable development. They support 7 follower cities: Stavanger, Prague, Castellon, Cannes, Basaksehir, Hong Kong and Buenos Aires plus share experiences with observers as City of Guangzhou and the Brazilian network of Smart Cities. Therefore UNaLab results will impact on different urban socio-economic realities, with diversity in size, challenges and climate conditions. In order to create an EU reference demonstration and go-to-market environment for NBS, UNaLab will use and further develop the ENoLL Urban Living Lab model, and the European Awareness Scenario Workshop method for the co-creation of solutions, and the roadmap approach, in this way achieving an innovative NBS toolbox.

Partners

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052
Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

EXECUTIVE SUMMARY

The following material contains 29 questions that will guide a *semi-structured interview* and a *survey filling activity* with the UNaLab's leading groups at each Follower City. The questions cover workshop and stakeholder-related aspects of the first stage of the UNaLab's Roadmapping Methodology (URM): the Ambition Setting (URM-AS).

The sections that frame the questions are based on the URM workshop structure itself. Its aim is to complete the information that will be retrieved from TU/e regarding the methodological aspects of URM-AS. The information will be the input material for a Master thesis research.

The research's aim is to identify the possibilities of the URM to enable Cooperative Institutions to manage urban commons. Previous research has shown that the standard Roadmapping methodology (SRM) has traits that allow this to happen. However, as found in the consulted literature, not all roadmaps are the same: different contexts and objectives for its use determine its nature and, thus, its outcomes.

For that reason, the URM will be compared to the SRM to determine if the cooperative institution-enabling potential is present in the former. This will be done through a literature review of the Roadmapping topic, particularly focusing on the SRM, and on the exercises that led to the attunement of the URM.

Further, the implementation of the URM at each FC will be compared to the SRM principles, and also studied under the light of the CI-enabling potential to determine if it still exists beyond theory. This is the aim of this survey/interview guideline, which will frame a conversation with MSc. Monika Uhlenbruch, from *Institut plánování a rozvoje hlavního města Prahy* (Prague Institute of Planning and Development, in English; IPR). This is a site-specific guideline which contains and references the activities that the Prague's UNaLab leading group has carried out and reported.

European Commission

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Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

1. SETTING THE GROUND : TRAINING

1.1 FC-leading group's capacity building

1.1.1 Was your team trained for kickstarting collaborative multistakeholder initiatives, e.g. identifying participants and invitations? Mark only one oval.

- ◯ Yes
- ◯ No

1.1.2 Was your team trained for conducting collaborative multistakeholder initiatives, e.g. developing facilitation and communication skills? Mark only one oval.

- ◯ Yes
- ◯ No

2. SETTING THE GROUND: SELECTING THE ACTORS

2.1 INVITATION PROCESS

2.1.1 The call for participation followed a method with the aim of addressing biases in participants' identification and selection? Mark only one oval per row

	Yes	No
Policy level	◯	◯
Strategy level	◯	◯
Internal stakeholders	◯	◯
External stakeholders	◯	◯

Further Questions:

Was a SH identification process carried out before the invitations?

Do you have any sort of *Stakeholder Map*?

Which steps were taken to ensure all relevant SH groups were represented and invited?

What was the ratio of invitation/participation?

2.2 PARTICIPANT CHARACTERISATION

2.2.1 For each stakeholder group, which of the following characteristics were considered for the participant invitation? Tick all that apply

	Gender	Ethnicity	Professional background	Cultural/religious background	Political orientation
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

Further Questions:

In which way was diversity considered? What is its weight in the SH invitation process?

Was *situated knowledge* sought when inviting the SH?

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Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

2.2.2 For each stakeholder group, did the participants satisfy the project team's expectation regarding knowledge and expertise in multi-stakeholder participatory/collaborative/co-creative planning? Mark only one oval per row

	Didn't satisfy	Slightly satisfied	Satisfied	Exceeded expectations
Policy level				
Strategy level				
Internal stakeholders				
External stakeholders				

***Further Questions**:*

Was the professional experience in this area sought when inviting the SH?

Were participants invited specifically because of their affinity to the project?

2.2.3 For each stakeholder group, did the participants satisfy the project team's expectation regarding knowledge and expertise in environmental/climate/sustainability-related topics? Mark only one oval per row

	Didn't satisfy	Slightly satisfied	Satisfied	Exceeded expectations
Policy level				
Strategy level				
Internal stakeholders				
External stakeholders				

***Further Questions**:*

Was the professional experience in this area sought when inviting the SH?

Were participants invited specifically because of their affinity to the project?

Guiding elements for section 2:

***For who to invite we will trust your judgement**. So please feel free to invite a diversity of organizations, concerns and people (…) **Look for your relations, ranging from research institutes, project developers, consultants, industry, local governmental agencies**, etc.*

TU/e recommendations regarding the FC stakeholder selection processes; from TU/e training material.

3. AMBITION SETTING: REFLECTING ON THE PRESENT

3.1 ACHIEVEMENTS

3.1.1 For each stakeholder group, were the following elements discussed regarding the achievements at planning for climate change adaptation and city resilience...? Tick all that apply

	Specific actions/results	Processes	Critical actors	Drivers for the achievement	Consequences of the achievement
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

Prague's Achievements from different SH's perspectives; some examples from URM-AS workshops evidences.

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	60% increase in use of public transport	Last 20 years number of accidents has decreased	Make people more aware of the essence of waters	Mainstreaming of environmental approach in policy	High quality of water
Policy	Reduce electricity bills	Replacing cars with trees -> discussion with public is a challenge	Collaboration with other districts	Cooperation with knowledge institutes to come to a well-thought implementation plan	Good place to live
Internal SH	Big number of nature protected in the area	Ongoing projects with different SH and disciplines	Private agricultural gardening	Strategic plans & adaptation strategies with riverside approach	Technical measures reduce state expenses
External SH	Implementation of new technologies		We managed to make people aware of water management	Already involved in climate change adaptation: -Covenant of Mayors -Adaptation strategy	Rainwater remains in the area where it is collected for further use

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Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

3.1.2 Was the achievements' assessment consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐

***Further Questions**:*

Were the local achievements identified by each SH group along the same lines, or the achievements for ones were challenges for others?

Did each SH group recognise the achievements of the other groups, or was it an exercise of recognising the own achievements?

Prague Achievements summary; from URM-AS results' report.

3.2 CHALLENGES

3.2.1 For each stakeholder group, were the following elements discussed regarding the CHALLENGES at planning for climate change adaptation and city resilience...? Tick all that apply

	Specific actions/results	Processes	Critical actors	Drivers for the challenge	Consequences of the challenge
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

Prague's Challenges from different SH's perspectives; some examples from URM-AS workshops evidences.

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	flooding & droughts	Public private partnerships and how to work together on our goals	Complex city governments (city, districts, provence)	Regulation & implementation of water retainment systems -> tech. Is not the problem	Preservation of the city & implementation of green and blue
Policy	Houses built in areas that are not well protected to flooding	Urban greenery: -Used to be cultivated -Much opportunity to make it natural again	Challenges in administration to be able to plant trees (commitment and priority)	Collision between ecology & digging companies -> hot question today!	Floods: more than ever and more severe
Internal SH	developing public spaces relating with rainwater management and NBS	Protection of open landscape is public space plan -> sustainable planning on long term.		Pressure on the gardens by city development	Rainwater management is neglected: non effective
External SH	Pipeline of drinking water is sometimes destroyed	Adopting EU concept of shared space is difficult here	Using urban forests as climate measure: public trees and parks are managed by different parties	Cultural heritage has strong protection	Unkown if problems are with species or planting technology

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Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

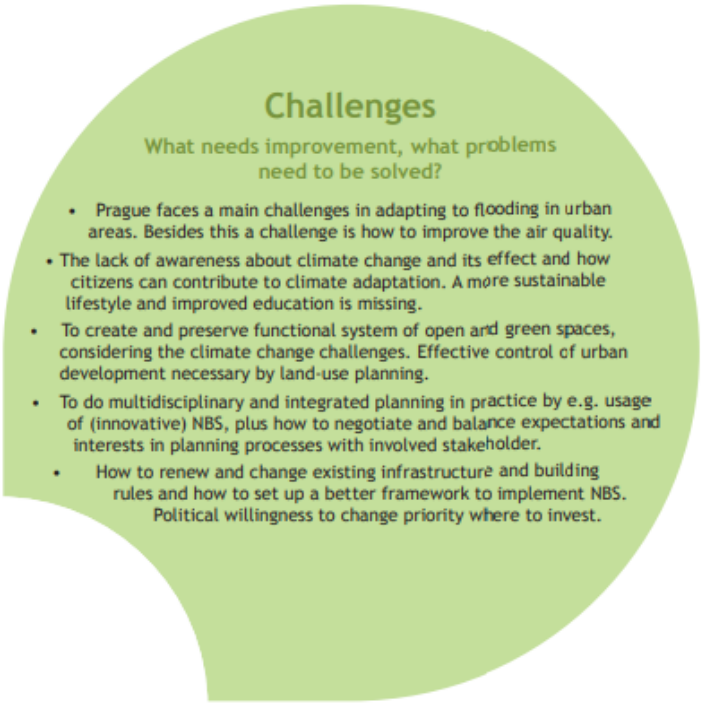
3.2.2 Was the CHALLENGES' assessment consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐

***Further Questions**:*

Were the local challenges identified by each SH group along the same lines, or the challenges for ones were achievements for others?

Did each SH group recognise the challenges of the other groups, or was it an exercise of recognising the own?



Prague Challenges summary; from URM-AS results' report.

4. AMBITION SETTING: IMAGINING THE FUTURE

4.1 ASPIRATIONS

4.1.1 For each stakeholder group, were the following elements discussed regarding the features of the 2050's city scenario? Tick all that apply

	Specific actions/results	Processes	Critical actors	Drivers to realise the aspiration	Consequences of not acting (business as usual)
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

Prague's Aspirations from different SH's perspectives; some examples from URM-AS workshops evidences.

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	100% water recycled	Better coordination of projects / less barriers for negotiations		Water in landscape -> change in approach	Quality of open land near compact city used also for recreation on daily basis
Policy	No cars in city center			Prague government thinks more green	city where you can live 24/7
Internal SH	Most of the buildings (even in the city center) have zero or positive energy balance	Every strategic infrastructure project planned as complex urban/landscape interaction	Prague city hall cooperates with city departments without prejudices and barriers	Protection of natural processes integrated into development	Prague has a fully functional green and blue infrastructure
External SH	Remote management of sewage network/system	Supporting human-wellbeing through NBS	Cooperation between bureaucracy and professional politics	More public participation in decision-making	NBS (green roofs, SUDS…) imprinted in all new development project

European Commission

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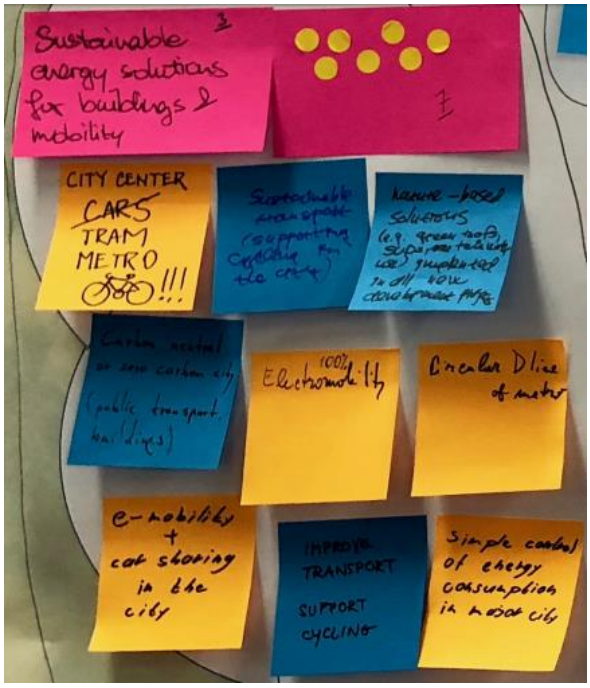
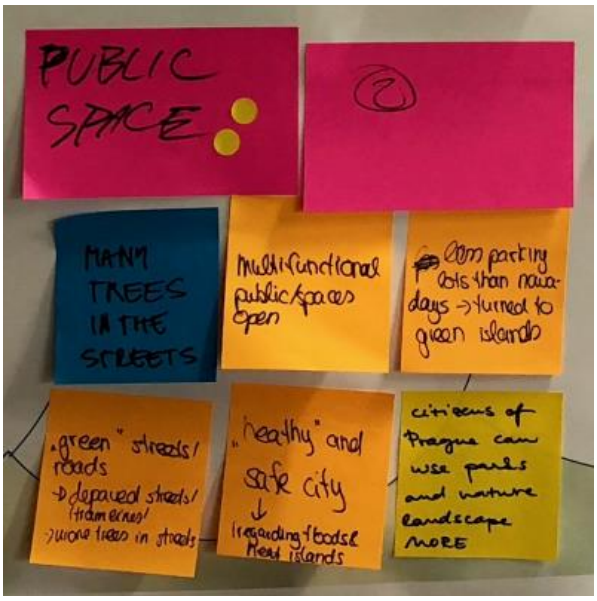
Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

4.1.2 Were the future scenario aspirations consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐





Some of Prague's aspirations: External (left) and Internal (right) SH. From URM-AS workshops evidences.

***Further Questions**:*

Were the aspired scenario defined by each SH group along the same lines, or were there oppositional features?

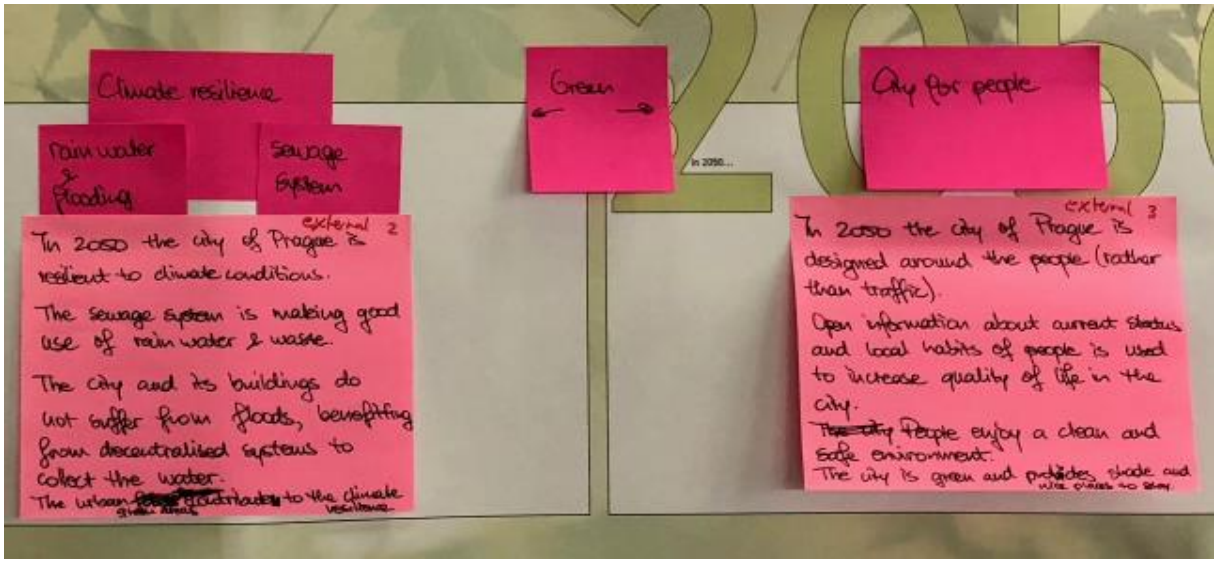
Did the groups find synergies to realise each others' aspirations?

Were the aspired scenarios visually defined in each group? How different did they seem from each other?

4.2 STRATEGIC AMBITIONS

4.2.1 For each stakeholder group, were Nature-based solutions used as drivers that enable the strategic ambitions? Tick all that apply

	Yes	Partially	Not
Policy level	☐	☐	☐
Strategy level	☐	☐	☐
Internal stakeholders	☐	☐	☐
External stakeholders	☐	☐	☐



External SH ambitions identified at their session: From URM-AS workshops evidences.

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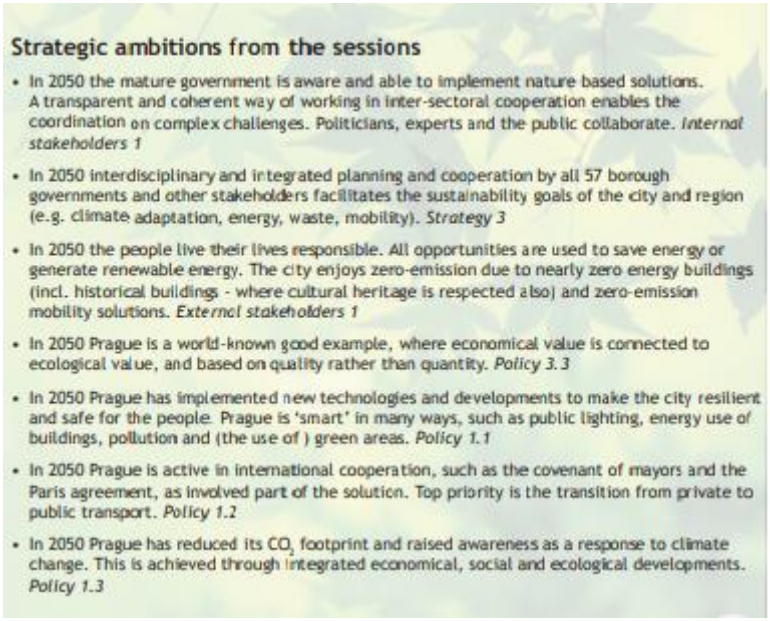
Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

4.2.2 Were the strategic ambitions consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐



Strategic ambitions from the sessions

- In 2050 the mature government is aware and able to implement nature based solutions. A transparent and coherent way of working in inter-sectoral cooperation enables the coordination on complex challenges. Politicians, experts and the public collaborate. *Internal stakeholders 1*
- In 2050 interdisciplinary and integrated planning and cooperation by all 57 borough governments and other stakeholders facilitates the sustainability goals of the city and region (e.g. climate adaptation, energy, waste, mobility). *Strategy 3*
- In 2050 the people live their lives responsible. All opportunities are used to save energy or generate renewable energy. The city enjoys zero-emission due to nearly zero energy buildings (incl. historical buildings - where cultural heritage is respected also) and zero-emission mobility solutions. *External stakeholders 1*
- In 2050 Prague is a world-known good example, where economical value is connected to ecological value, and based on quality rather than quantity. *Policy 3.3*
- In 2050 Prague has implemented new technologies and developments to make the city resilient and safe for the people. Prague is 'smart' in many ways, such as public lighting, energy use of buildings, pollution and (the use of) green areas. *Policy 1.1*
- In 2050 Prague is active in international cooperation, such as the covenant of mayors and the Paris agreement, as involved part of the solution. Top priority is the transition from private to public transport. *Policy 1.2*
- In 2050 Prague has reduced its CO_2 footprint and raised awareness as a response to climate change. This is achieved through integrated economical, social and ecological developments. *Policy 1.3*

Prague's SH groups' strategic ambitions for the Ecological Governance topic; from URM-AS results' report.

***Further Questions**:*

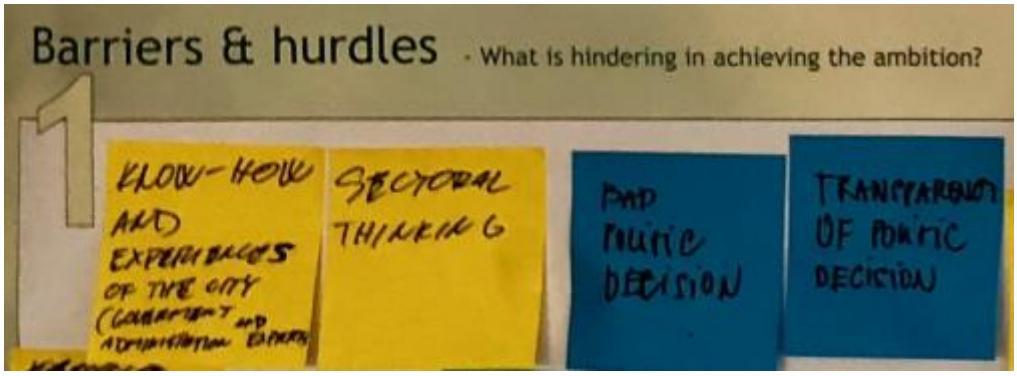
At what extent did the facilitation team promote the NBS as core drivers for the strategic ambitions?

Were strategic ambitions defined by each SH group along the same lines, or were there oppositional features?

4.3 BARRIERS AND HURDLES

4.3.1 For each stakeholder group, did the discussion on barriers and hurdles include elements that are evident in the present? Tick all that apply

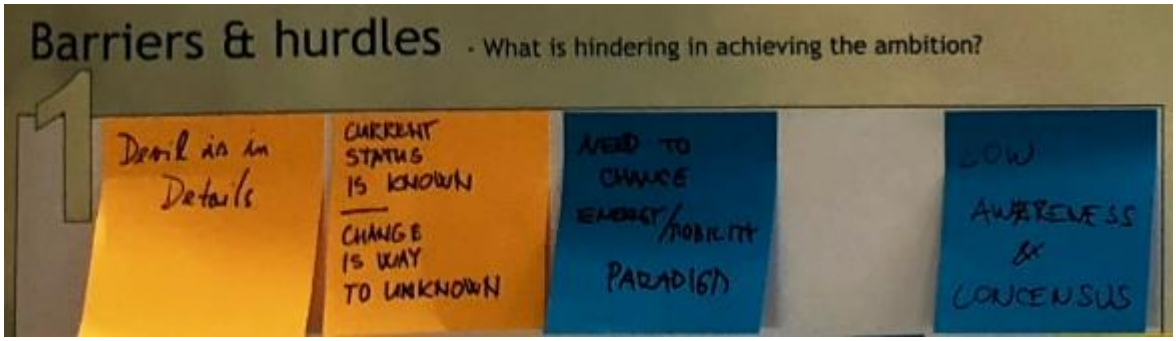
	Yes	Partially	Not
Policy level	☐	☐	☐
Strategy level	☐	☐	☐
Internal stakeholders	☐	☐	☐
External stakeholders	☐	☐	☐



Identified Barriers and Hurdles for Prague's ambitions at the Internal SH workshop session: From URM-AS workshops evidences.

4.3.2 For each stakeholder group, did the discussion on barriers and hurdles include elements that may arise in the future? Tick all that apply

	Yes	Partially	Not
Policy level	☐	☐	☐
Strategy level	☐	☐	☐
Internal stakeholders	☐	☐	☐
External stakeholders	☐	☐	☐



Identified Barriers and Hurdles for Prague's ambitions at the External SH workshop session: From URM-AS workshops evidences.

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Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

4.3.3 Were the identified barriers and hurdles consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐

***Further Questions**:*

What was the role of the facilitation team to have a meaningful discussion regarding the possible future barriers that exist in the particular context of the FC? i.e. were city-specific future barriers part of the discussions?

Were any particular tools or techniques used to help the participants across sessions in this matter?

Were the current and *future* barriers identified by each SH group along the same lines, or the ones faced by ones were not by others? E.g. are barriers in policy the same for internal SH?

Did each SH group recognise the barriers faced by the other groups, or was it an exercise of recognising the own?

Did the SH groups find synergies to curve each other barriers and hurdles?

Did the SH groups find possible conflicts between them when attending the barriers and hurdles?

5. AMBITION SETTING: CONCLUSION

5.1 SCOPE FOR VISION AND ROADMAP

5.1.1 As experts on planning, climate change adaptation and roadmapping, did the resulting general scope satisfy the facilitation team expectations? Mark only one oval

	1	2	3	4	
Didn't satisfy	◯	◯	◯	◯	Exceeded expectations

Further Questions:

Are there any specific issues in which the set scope differs from the expected? Any in which the expectations and result matched?

In your opinion, did the diversity of input strengthen or weaken the initially expected scope?

5.1.2 Which stakeholder group's agenda has a larger presence in the set scope? Mark only one oval

- ◯ Policy level
- ◯ Strategy level
- ◯ Internal stakeholders
- ◯ External stakeholders
- ◯ None: balanced influence

Further Questions:

Is there any group whose intentions, agendas or projects shaped in a larger way the discussion? In such case, what were the reasons for it (expertise, access to decision-making, legal frameworks…)?

For instance, in the case that strategic ambitions were different between certain groups, whose ambitions were more heavily weighed to define the overall strategic ambitions? Or were they balancedly weighed?

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5.2 GENERAL STRATEGIC AMBITIONS

5.2.1 Overarching topics were explicitly shared among the individual strategic ambitions, or was the clustering of topics carried out by the facilitation team? Mark only one oval

	1	2	3	4	
Same topics were found among individual ambitions	◯	◯	◯	◯	Diverse topics were clustered by facilitation team

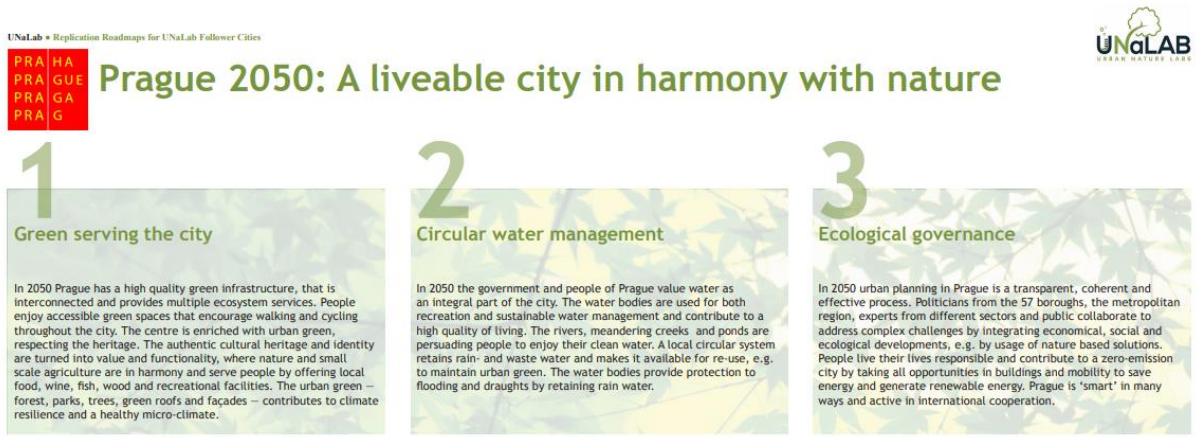
5.2.2 As experts on planning, climate change adaptation and roadmapping, did the result satisfy the project team expectations for the general strategic ambitions? Mark only one oval

	1	2	3	4	
Didn't satisfy	◯	◯	◯	◯	Exceeded expectations

Further Questions:

Are there any specific issues in which the set strategic ambitions differ from the expected? Any in which the expectations and result matched?

In your opinion, did the diversity of input strengthen or weaken the initially expected ambitions?

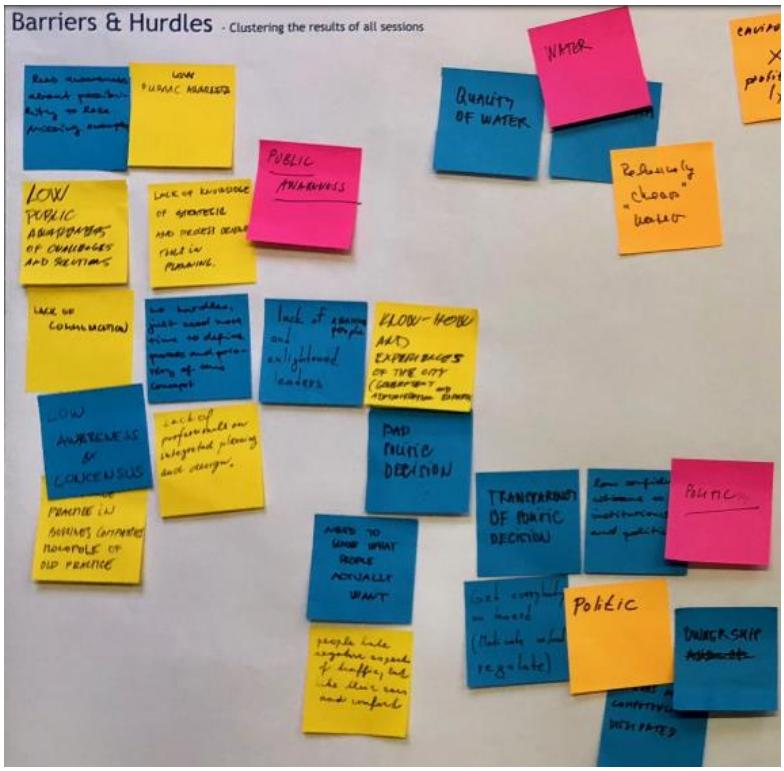


Prague's general strategic ambitions; from URM-AS results' report.

5.3 OPPORTUNITIES, ACHIEVEMENTS, CHALLENGES AND BARRIERS

5.3.1 Overarching achievements, challenges, opportunities and barriers were explicitly shared among the individual strategic ambitions, or was the clustering of elements carried out by the facilitation team? Mark only one oval

	1	2	3	4	
Same elements were found among individual ambitions	◯	◯	◯	◯	Diverse elements were clustered by facilitation team



Clustered Barriers and Hurdles for Prague's ambitions at the External SH workshop session: From URM-AS workshops evidences.

5.3.2 As experts on planning, climate change adaptation and roadmapping, did the participants' diagnoses of achievements, challenges, opportunities and barriers match with *yours*? Mark only one oval per row

	Opposite diagnoses	Partially matched	Mostly matched	Identical diagnoses
Achievements	◯	◯	◯	◯
Challenges	◯	◯	◯	◯
Opportunities	◯	◯	◯	◯
Barriers	◯	◯	◯	◯

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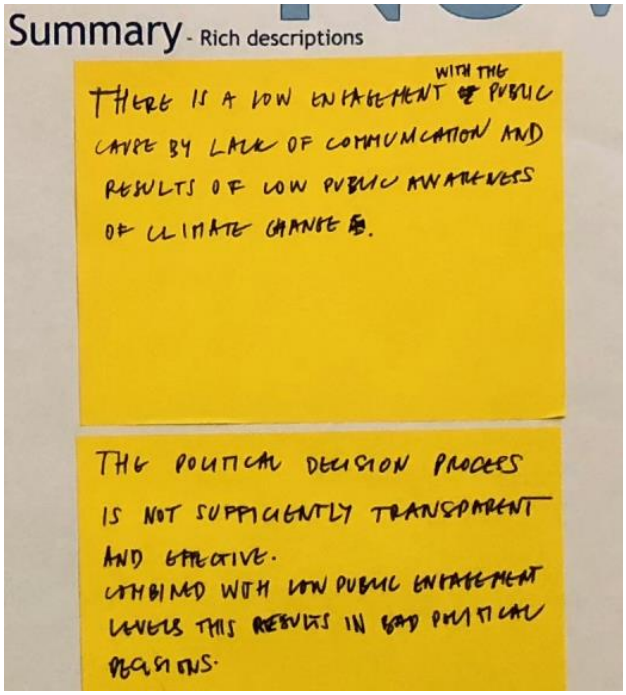
5.3.3 To what extent are the identified opportunities exploited on the strategic ambitions? Mark only one oval.

	1	2	3	4	
Not exploited	◯	◯	◯	◯	Fully exploited

Prague's Opportunities summary; from URM-AS results' report

5.3.4 To what extent are the identified barriers avoided on the strategic ambitions? Mark only one oval.

	1	2	3	4	
Not avoided	◯	◯	◯	◯	Fully avoided



Further Questions:

Are the actions to avoid/exploit the barriers/opportunities relevant for all the SH groups, or does the responsibility of taking action fall more upon specific groups?

Are there clear possible synergies between SH groups and actors to make the action more effective?

Are there any possible conflicts between SH groups when attending the opportunities and barriers?

Prague's summary of barriers and hurdles; from URM-AS workshops evidences.

6. FOLLOWING STEPS AND PARTICIPANTS FEEDBACK

6.1.1 Which aspect(s) could be addressed to enhance the stakeholder groups' contributions? Tick all that apply

	Participant profile/ Selection criteria	Information for participants	Activities/ Discussion format	Visual resources	Facilitation (NBS, co-creation, complexity…)
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

***Further Questions**:*

From your experience, which other aspects could be enhanced within the methodology?

Are there any aspects inherent to the methodology used (workshop format, SH classification, sessions division, etc.) that limit the stakeholder contribution?

Do you consider a particular SH group requires assistance to increase the relevance of their participation?

6.1.2 In terms of co-creation processes (creating a shared ambition, stakeholder engagement, stakeholders interaction, participant diversity) did this workshop satisfy your expectations? Mark only one oval per row

	Didn't satisfy	Slightly satisfied	Satisfied	Exceeded expectations
Creating a shared ambition	◯	◯	◯	◯
Stakeholder engagement	◯	◯	◯	◯
Stakeholders interaction	◯	◯	◯	◯
Participant diversity	◯	◯	◯	◯

***Further Questions**:*

Can you point at specific features of the workshop that defined your perception in such way?

Which steps can be taken to improve performance in this matter?

How important is this matter for the final result -an accurate and useful roadmap?

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6.1.3 In terms of the use of NBS in the discussions (clear conceptualization, agreement on transformative potential, driver for ambition materialization), did this workshop satisfy your expectations? Mark only one oval per row

	Didn't satisfy	Slightly satisfied	Satisfied	Exceeded expectations
Clear conceptualization (what it is)	◯	◯	◯	◯
Agreement on transformative potential (what it can do)	◯	◯	◯	◯
Driver for ambition materialization (city-context specific)	◯	◯	◯	◯

Further Questions:

Can you point at specific features of the workshop that defined your perception in such way?

Which steps can be taken to improve performance in this matter?

How important is this matter for the final result -an accurate and useful roadmap?

6.1.4 Was any of the following resources used to obtain feedback on the workshop from participants? Tick all that apply

- ☐ Closure sessions at the workshop
- ☐ Informal spaces for conversation (coffee, lunch, dinner...)
- ☐ Interviews
- ☐ Post-workshop online surveys
- ☐ Other: _____

Further Questions:

How important is for the following sessions to have feedback from the participants?

Does the participant involvement belong only to the workshop, or are there continual activities?

Are the participants' involved in the planning of the following activities, or merely informed and invited to take part of later on?

7. END OF THE AMBITION SETTING ASSESSMENT

Thank you for taking the time to carry out this assessment

Feedback is highly appreciated! If there is any further comment regarding the topics in the survey or suggestions regarding the questions (including new ones or changing the current ones), please reach out at: lameirasb@ua.pt

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8. RESULTS PRAHA

8.1 Results by section; report + interview summary

PRA 1.1

There was training in the sense of RECEIVING MATERIALS and FAQs from FT. There were also Stavanger's shared experiences from the CONSORTIUM MEETING 11/17. There was also support from TU/e whenever the process was not clear to follow.

However, although helpful, there are some limitations as to the actual SKILL DEVELOPMENT for starting and conducting co-cr processes. The skills that IPR, as operative arm of the Municipality, had regarding this topic was because of other previous projects i"

PRA 2.1

Although not methodically, a SH identification process between IPR and Municipality happened, in which each selected and took into account their own prospects for participants and then came together to rule out which would bo further."

Eliška Bradová	IPR Prague - Director of City Planning Department
Karel Brezina	Povodí Vltavy, Water management State Enterprise
Lenka Burgerová	Prague 7 District - Councillor
Martin Churavý	City of Prague - Department of the Mayor's Office
Elke den Ouden	TU/e LightHouse
Tomáš Drdácký	Prague Troja District - Deputy of the mayor
Adam Emmer	Czech Globe - Department of the Social Dimension of Global Change
Růžena Fišáková	Prague Watermanagement Company (PVS)
Miroslav Havránek	Charles University Environment centre
David Hora	SZKT (Czech landscape and horticulture association) - arborist
Magdalena Hubená	City of Prague, Project Manager, Project Preparation and Implemenation Unit
Tomáš Lapáček	IPR Prague - Director of Strategy and Politics
Jaromír Kačer	City of Prague - Department of water management - civil engineer
Jiří Karnecki	City of Prague - Head of the greenery department
Mária Kazmuková	City of Prague - Coordinator of the Adaptation Strategy of the City of Prague
Štěpán Kyjovský	City of Prague - Director of the Department of Environmental Protection
Tereza Líbová	City of Prague - Department of Environmental Protection - Air protection specialist
Eliška K. Lorencová	Czech Globe - Department of the Social Dimension of Global Change
Miloslav Mikulčík	Operator ICT - project manager of department Smart Prague OICT
Tereza Myšková	CENIA - Czech Environmental Information Agency
Ondrej Mirovský	Prague 7 District - Deputy of the mayor
Hana Pernioová	CENIA - Czech Environmental Information Agency

Jana Plamínková	City of Prague - Councilors for Infrastructure, Technical Equipment and the Environment
Radek Rejna	Prague Zbraslav District - Deputy of the mayor
Jan Richtr	IPR Prague - Public Space Office - Landscape architect
Kristýna Schwarzová	Operator ICT
Ivana Síbrtová	City of Prague - Head of the state administration of monument care
Karel Slánský	IPR Prague - Infrastructure and Landscape Section: Head of the Technical Infrastructure Office
Lubor Smejtek	City of Prague - Department of Nature and Landscape Protection - Nature and Landscape Protection Specialist
Marie Smetana	IPR Prague - Metropolitan Plan Office - specialist for nature and landscape
Štěpán Špoula	IPR Prague - Public Space Office - landscape architect
Petr Suska	Fraunhofer IAO
Tomáš Trubačík	Šance pro budovy (Chances for Buildings) - analyst for economical building
Monika Uhlenbruch	IPR Prague - Project Manager, Office of Management and Projects
Rianne Valkenburg	TU/e LightHouse
Lukáš Vacek	City of Prague - Assistant to the City Councilor of Prague for Territorial Development and Territorial Planning
Matěj Michalk Žaloudek	City of Prague - Assistant to the City Councilor of Prague for Territorial Development and Territorial Planning

PRA 2.2

PL-SH and SL-SH and were selected based on their positions/organisational relevance. Here, political militance could have been an issue to consider but they decided again to just focus on the operational side of the public service.

There's an overall satisfaction with the process of the URM-AS and the workshop itself. There are particularly good surprises regarding active participation from every SH group involved.

However, there are some limitations to the ""satisfaction"" and one could be the availability of the desired participants. For instance, PL-SH had 3 high-level representatives:

for the environmental and city planning departments, and from the office of the Mayor.

Although they contributed, they had only short time to listen and contribute (1:30 hours), and they could also only participate in individual sessions.

On another topic, there was at some extent a language barrier, as discussions were carried out in english. This was well handled too by moving away from only verbal communication and using the sticky notes and posters to work"

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PRA 3.1 achievements

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	60% increase in use of public transport	Last 20 years number of accidents has decreased	Make people more aware of the essence of waters	Mainstreaming of environmental approach in policy	High quality of water
Policy	Reduce electricity bills	Replacing cars with trees -> discussion with public is a challenge	Collaboration with other districts	Cooperation with knowledge institutes to come to a well-thought implementation plan	Good place to live
Internal SH	Big number of nature protected in the area	Ongoing projects with different SH and disciplines	Private agricultural gardening	Strategic plans & adaptation strategies with riverside approach	Technical measures reduce state expenses
External SH	Implementation of new technologies		We managed to make people aware of water management	Already involved in climate change adaptation: -Covenant of Mayors -Adaptation strategy	Rainwater remains in the area where it is collected for further use

PRA 3.2 challenges

Overall, there is a good nourished discussion because the I-SH and SL-SH have technical capacity to go deeper into the urban system operation and its processes. It helps drive the discussion further from wish-lists that are difficult to make operable. However, how can this nourish the four groups? It is yet unclear, but maybe for following stages the SH groups can interact and influence each other more.

I-SH and SL-SH have the system view to discuss HOW to make things happen. Within the SH groups, it was seen how the ideas and solutions discussed were slowly complementing each other. Particularly in the E-SH group they were even exchanging business cards."

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	flooding & droughts	Public private partnerships and how to work together on our goals	Complex city governments (city, districts, provence)	Regulation & implementation of water retainment systems -> tech. Is not the problem	Preservation of the city & implementation of green and blue
Policy	Houses built in areas that are not well protected to flooding	Urban greenery: -Used to be cultivated -Much opportunity to make it natural again	Challenges in administration to be able to plant trees (commitment and priority)	Collision between ecology & digging companies -> hot question today!	Floods: more than ever and more severe

Internal SH	developing public spaces relating with rainwater management and NBS	Protection of open landscape is public space plan -> sustainable planning on long term.		Pressure on the gardens by city development	Rainwater management is neglected: non effective
External SH	Pipeline of drinking water is sometimes destroyed	Adopting EU concept of shared space is difficult here	Using urban forests as climate measure: public trees and parks are managed by different parties	Cultural heritage has strong protection	Unkown if problems are with species or planting technology

PRA 4.1 aspirations

Again, the SH group with a larger capacity to see the bigger picture was the I-SH. E-SH were focusing more on the actual interventions but less on the processes, although they were bringing in lots of diverse opinions.

Although S-SH interventions were not as broad, they did provide good insights into the how-to's. PL-SH had good perspective and they are usually very involved with other projects led by IPR, but this sessions arrangement didn't allow them to be part of a thorough exchange with others.

In that sense, the clustering was carried out by the FC-CT+FT, rather than a natural linking of themes across sections."

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	100% water recycled	Better coordination of projects / less barriers for negotiations		Water in landscape -> change in approach	Quality of open land near compact city used also for recreation on daily basis
Policy	No cars in city center			Prague government thinks more green	city where you can live 24/7
Internal SH	Most of the buildings (even in the city center) have zero or positive energy balance	Every strategic infrastructure project planned as complex urban/landscape interaction	Prague city hall cooperates with city departments without prejudices and barriers	Protection of natural processes integrated into development	Prague has a fully functional green and blue infrastructure
External SH	Remote management of sewage network/system	Supporting human-wellbeing through NBS	Cooperation between bureaucracy and professional politics	More public participation in decision-making	NBS (green roofs, SUDS…) imprinted in all new development project

PRA 4.2 strategic ambitions

Both I-SH and SL-SH were more focused on processes rather than in specific ambitions (good understanding of the complexity and strategic thinking).

The correct implementation requires mature governing, cooperation acroess dicsiplines and sectores, and transparency (the contrary to the CURRENT STATE AT PLANNING, according to Monika, which are long and inefficient, not so open and working in silos). This places the focus of the ambitions more in the governance side rather than in the NBS side, while not using NBS to drive the governance processes themselves.

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In this regard, for this interview, WHAT DRIVES THE GOOD AND CONSISTENT DELIVERY OF THE UES IS GOVERNANCE.

In that sense, it is good to have this sort of exercise not only to develop know-how on the matter (developing soft skills with I-SH and FC-CT), but to spread the word (""educate"") with the externals to show the benefits of co-cr and working for joint aims; in other words, learning from co-cr for governcance."

SL

- In 2050 the people enjoy greener spaces that add functionality to the urban quality. A wellstructured & well-maintained green system is accessible for all people to enhance the social function and engage with history and nature
- In 2050 the water and air are clean and tempting for recreation. Water is an integral part of public space and made open and accessible for people to use
- In 2050 interdisciplinary and integrated planning and cooperation by all 57 borough governments and other stakeholders facilitates the sustainability goals of the city and region (e.g. climate adaptation, energy, waste, mobility).

PL local

- In 2050 the people enjoy a high quality of living. Mobility is clean and affordable. The different areas of the city are well accessible for pedestrians and cyclists. Buildings are zero-emission with a really low consumption of electricity, due to measures such as green roofs and façades that also contribute to water retention
- In 2050 the government thinks more green. Wherever it is possible green is implemented in the city centre: trees are planted in every street and fountains of every square. The river and the river banks are also green and provide an example of ecological thinking. They are open for people to access and enjoy

PL ind 1

- "In 2050 Prague has implemented new technologies and developments to make the city resilientand safe for the people. Prague is ‘smart’ in many ways, such as public lighting, energy use of buildings, pollution and (the use of) green areas"
- "In 2050 Prague is active in international cooperation, such as the covenant of mayors and the Paris agreement, as involved part of the solution. Top priority is the transition from private to public transport"
- " In 2050 Prague has reduced its CO2 footprint and raised awareness as a response to climate change. This is achieved through integrated economical, social and ecological developments. "

PL ind 2

- In 2050 Prague is a city designed for people to use and enjoy. Extensive green areas stimulate people to walk and cycle. Transport by polluting cars and ships is reduced, providing good air quality. Energy use is reduced and all flat roofs are green
- In 2050 blue and green infrastructure combine functional and recreational functionality. A meandering river, accessible borders and new ponds allow people to recreate and enjoy near the city. At the same time solutions for flooding and water retention are integrated.
- Increase air-quality (by decreasing mobility); Decrease energy reduction (impacto on air pollution); Improve quality of air (smog episodes; dilemma with mobility in the whole country); Transport reduction, including ships -> measures to reduce.

PL ind 3

- In 2050 Prague is a world-known good example, where economical value is connected to ecological value, and based on quality rather than quantity
- In 2050 Prague is known for it’s green and agricultural identity. The cultural heritage on both natural forest as well as agriculture is turned into value and functionality, e.g. natural ventilation, micro climate and recreation.

- In 2050 the city of Prague adds value for citizens and tourists through it's authentic identity. City and economy, as well as nature and agriculture are in harmony and serving people, offering local food, wine and fish, using synergistic effects and distinguishing through identity.

ESH

- In 2050 the people live their lives responsible. All opportunities are used to save energy or generate renewable energy. The city enjoys zero-emission due to nearly zero energy buildings (incl. historical buildings - where cultural heritage is respected also) and zero-emission mobility solutions.
- In 2050 the city is resilient to climate conditions. The sewage system is making good use of rain and waste water. The city and its buildings do not suffer from floods, benefiting from distributed systems to collect the water
- In 2050 the city is designed around the people (rather than traffic). Open information about current status and local habits of people is used to increase quality of life in the city. People enjoy a clean and safe environment. The city is green and provides shade and nice places to stay

ISH

- in 2050 the mature government is aware and able to implement nature based solutions. A transparent and coherent way of working in inter-sectoral cooperation enables the coordination on complex challenges. Politicians, experts and the public collaborate
- In 2050 a high quality green infrastructure is realised, consisting of interconnected green areas and for multi-functional use. The green infrastructure is accessible for people for different ecosystem services, e.g. cycling, food production, education, and is also part of the water management system.
- In 2050 the government and people value water as an integral part of the city. The rivers and water areas are used for recreation and water management. A local circular system retains rain- and waste water and makes it available for re-use. Priority is given to nature based solutions for water management.

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PRA 4.3 barriers and hurdles

This assessment of the barriers was mostly focused on the present, not only because of the input received, but from the dacilitation team. However there is shared impression --consensus-- on the neet to address MINDSET AND PARADIGMS WHEN IT COMES TO PLANNING, specially in the central isses UNaLab tackles: NBS and collaboration. To this end, however, the participants see as desirable the arrangement of PPP

ISH

1
-Know-how and experiences of the city (government and administration experts)
-Sectoral thinking
-(some) rigid city organizations
-Monument protection
-Bad public decision
-Too many stakeholders
-Low confidence to institutions and politicians
-Lack of knowledge of strategic and process oriented tools in planning
-Complicated & fragmented administration (city/regional)
-Transparency of political decision
-Less time after comunism and (...) to have a dialogue with (...) opinion
-Complicated & fragmented administration (city & regional)
2
-No hurdles, just need more time to define process and priority of this concept
-Terminology; plan and strategy; law
-Public awareness of challenges and solutions
-Ownership
-Low public awareness
-Urban development without ecological approach
-Owners and competences are dissipated
-Lack of communication
-Private ownership of land
Lack of professionals on integrated planning and design
3
-Quality of water
-Water is isolated system
-Less awareness about possibilities; missing examples
-Legislation & regulation
-Relatively "cheap" water
-The change in practice in business companies, monopole of old practice

ESH

1
-Devil is in the details
-Current status is known; Change is way too unknown
-Need to change energy/mobility paradigm
-Low awareness & consensus
-rainwater change by law; benefits to savings system
-Money; accountability; red tape
-Changes need money
2
Building develpment: areas are used for building; pressure on green space
-Limited coordination and cooperation among stakeholders
- low time in project planning
-need to support and implement suitable adaptation/mitigation options
-Low financial and institutional capacity
3
-Lack of people awareness and of enlightened leaders
-Politic
-Environment vs profitability
-Solutions focused for one problem
-Media: invest in lifestyle and non-commercial advertisement
-Need to know what people actually want
-Get everybody on board (motivate and regulate)

PRA 5.1 scope

Although the level of participation and engagement was good for it being the first workshop, there are issues that drive the experience away from the optimal. Some issues like availability and willingness to participate from the invited SH (because of other responsibilities or matching agendas, for instance); Language barriers, lack of common understanding of the NBS (more in a technical/academical sense than down to earth); too big of a workload without a clear understanding of the objectives and general sh fatigue, among others

Relating to the unbalanced technical knowledge of the NBS, it is likely that the I-SH have a larger presence on the discussed material. They are the ones clustering.

This is interesting as it presents the oportunity for unbalanced participation and,even more, biased facilitation / biased carrying on with the project."

Prague 2050: A liveable city in harmony with nature

PRA 5.2 general strategic ambitions

The clustering was a good reflection of the existing visions on the matter and thus would be a good ool to help participants across the 4 groups not only to understand better the others' perspectives and objectives, but to further work and understand their own.

The strategic ambitions are 2 focused on tech, technique and management, and one is focused in governance and integarl-environmental oriented planning."

Green serving the city In 2050 Prague has a high quality green infrastructure, that is interconnected and provides multiple ecosystem services. People enjoy accessible green spaces that encourage walking and cycling throughout the city. The centre is enriched with urban green, respecting the heritage. The authentic cultural heritage and identity are turned into value and functionality, where nature and small scale agriculture are in harmony and serve people by offering local food, wine, fish, wood and recreational facilities. The urban green — forest, parks, trees, green roofs and façades — contributes to climate resilience and a healthy micro-climate.

Circular water management In 2050 the government and people of Prague value water as an integral part of the city. The water bodies are used for both recreation and sustainable water management and contribute to a high quality of living. The rivers, meandering creeks and ponds are persuading people to enjoy their clean water. A local circular system retains rain- and waste water and makes it available for re-use, e.g. to maintain urban green. The water bodies provide protection to flooding and draughts by retaining rain water.

Ecological governance In 2050 urban planning in Prague is a transparent, coherent and effective process. Politicians from the 57 boroughs, the metropolitan region, experts from different sectors and public collaborate to address complex challenges by integrating economical, social and ecological developments, e.g. by usage of nature based solutions. People live their lives responsible and contribute to a zero-emission city by taking all opportunities in buildings and mobility to save energy and generate renewable energy. Prague is ‘smart’ in many ways and active in international cooperation.

PRA 5.3 ACOB

Achievements:

- Prague has increased collaboration within the city governance and increased public awareness about climate and environmental challenges and new projects.
- Prague has a good water quality and it is a better place to live. The city has well developed public transportation systems and has increased number of green places and trees in public space.
- Prague has been revitalising small water courses, ponds, orchards and parks and has begun new pilot projects of urban and peri-urban parks with involvement of variety of stakeholders
- Prague has large historical protected areas and many protected natural parks and monuments. Flood protection of the urbanised areas is state of the art in European context.
- Prague has developed number of new strategic documents such as: new strategic plan, adaptation strategy, public space manual and river front concept. the city has started to work on e-mobility strategy, green infrastructure strategy and has been collecting various spatial and environmental data and analyses

Challenges

- Prague faces a main challenges in adapting to flooding in urban areas. Besides this a challenge is how to improve the air quality

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- The lack of awareness about climate change and its effect and how citizens can contribute to climate adaptation. A more sustainable lifestyle and improved education is missing.
- To create and preserve functional system of open and green spaces, considering the climate change challenges. Effective control of urban development necessary by land-use planning
- To do multidisciplinary and integrated planning in practice by e.g. usage of (innovative) NBS, plus how to negotiate and balance expectations and interests in planning processes with involved stakeholder
- How to renew and change existing infrastructure and building rules and how to set up a better framework to implement NBS. Political willingness to change priority where to invest.

Opportunities

- Learn about how front-runner cities set up NBS solutions (process
- To present NBS in Landscape Festival Prague 2018 and further landscape conferences.
- Present UNaLab in action plan group on climate adaptation.
- Increase awareness of the concept NBS. Many projects are in progress already: use the terminology
- Promote UNaLab (workshop results to workshop participants) and learning process in and from abroad + promote front-runners NBS.
- Develop value model for Prague's ecosystem services (with support of UNaLab knowledge and Petr).

Barriers

- There is a low engagement with the public caused by lack of communication and results of low public awareness of climate change
- The political decision process is not sufficiently transparent and effective. Combined with the low public engagement levels this results in bad political decisions
- Administration of the city is fragmented and complicated with many stakeholders. Lack of economical approach is hindering sustainable urban development. Sectoral thinking create solutions focused on solving only one problem
- implementation of NBS requires sufficient allocation of financial resources.

PRA 6.1

Using the visual medium to create a common understanding could be a good addition to the following WS, as well as having clear messages for each SH-group.

Going deeper into the operationalisation of the NBS; beyond the abstract nature, how it is used by the non-expert SH when imagining solutions to the future? MAybe explaining better what it is, to ensure there is a commonground whihc is sufficient for everyone to have a meaningful participation.

Communication with SH could provide them with better results at the engagment. Besides, ti could also help them work on their visions and positions for further sharing. For instance, they already sent out the ambitions and the summaries of the opportunities and challenges, so the SH can understand them too.

8.2 Treated interview results

8.2.1 CoCr2Comm i: CoCr purpose

Objectives:

Interview guideline sections: 2.2, 5.1, 5.2, 5.3, 6.

Mid to high satisfaction of knowledge and expertise in participation and environment

mid to high satisfaction of expectations from the scope

Overarching ambitions found by SH's and FC-CT, more towards SH

Mid to high satisfaction in strategic ambitions

Mid to high avoidance/exploitation of barriers and opportunities

More visual resources needed

Language is a barrier to be worked out

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction participant diversity

Experts invited sent substitutions because of time constraints

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

SH's Feedback thru Informal spaces

Considering getting more tools for feedback for the following workshops; Also an space to make more contact would be good to use the ongoing exchanges.

SH inclusion

Interview guideline sections: 1.1, 2.1, 2.2, 4.3, 5.1, 5.2, 5.3, 6.1

Own method was used for invitation: first both IPR and Magistraat (municipality) brainstormed their possible options, and then they met to decide which would go in

Professional background was the only criteria for E-SH and I-SH

I-SH were sourced from IPR and municipal level

SL-SH were sourced from policy, environmental and traffic departments

There was no account for diversity, as professional background --meaning, the technical capacity to participate in the co-cr to provide innovative inputs-- was the only variable to invite participants, although they were filtered by the participants own interest, or "willingness" to participate.

In case of political orientation, FC-CT decided to not use it as a filter as it is a "big issue" and they may represent the interests of their parties

Situational knowledges were also left out for the I-SH and E-SH, since the invitation was driven by the professional side rather than by the possibility of fostering diverse participation. For instance, although some sessions were 50/50 in terms of participants' gender, this was not actively pursued.

Each SH group found B+H in the present

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The scope was quite *good -from the observer side- although there are some issues that need to be worked out for it to be optimal*

More visual resources needed

Language is a barrier to be worked out

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction SH diversity

Experts invited sent substitutions because of time constraints

SH's Feedback thru Informal spaces

Considering getting more tools for feedback for the following workshops; Also an space to make more contact would be good to use the ongoing exchanges

Knowledges experiences

Interview guideline sections: 2.2, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

Mid to high satisfaction of knowledge and expertise in participation and environment

For achievements, coincidences between ISH and SLSH

Each SH group providing inputs from their perspective

For challenges, *E-SH presented creative and complementing ideas in their own session; business card exchange included*

For aspirations, *synergies were clustered at the end*

For aspirations, *more visual would have supported future sense-making through NBS*

Each SH group found B+H in the present

Further use of tools for future sense-making of B+H was *not considered*

Curving future B+H *through PPP*

The scope was quite *good -from the observer side- although there are some issues that need to be worked out for it to be optimal*

I-SH with larger influence on the scope

Mid to high satisfaction with general strategic ambitions

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction participant diversity

Experts invited sent substitutions because of time constraints

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

Conflicts

Interview guideline sections: 1.1, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

No capacity building for FC-CT in facilitation soft-skills

For achievements, coincidences between ISH and SL

Each SH group providing inputs from their perspective

For challenges, coincidences between ISH and SL

For challenges, *E-SH presented creative and complementing ideas in their own session; business card exchange included*

For aspirations, *synergies were clustered at the end*

For aspirations, *more visual would have supported future sense-making through NBS*

For strategic ambition, coincidences between ISH, PL and SL

Each SH group found B+H in the present

For B+H, ESH contributions had coincidences with the other three groups

Further use of tools for future sense-making of B+H was *not considered*

Curving future B+H *through PPP*

I-SH with larger influence on the scope

Mid to high satisfaction with general strategic ambitions

More visual resources needed

Language is a barrier to be worked out

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction SH diversity

Experts invited sent substitutions because of time constraints

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8.2.2 CoCr2Comm ii: CoCr Interaction arena

Interaction

Interview guidelide sections: 1.1, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

No capacity building for FC-CT in facilitation soft-skills

For achievements, coincidences between ISH and SL

Each SH group providing inputs from their perspective

For challenges, coincidences between ISH and SL

For challenges, *E-SH presented creative and complementing ideas in their own session; business card exchange included*

For strategic ambition, coincidences between ISH, PL and SL

Each SH group found B+H in the present

For B+H, ESH contributions had coincidences with the other three groups

Further use of tools for future sense-making of B+H was *not considered*

Curving future B+H *through PPP*

The scope was quite *good -from the observer side- although there are some issues that need to be worked out for it to be optimal*

I-SH with larger influence on the scope

Overarching ambitions found by SH's and FC-CT, more towards SH

More visual resources needed

Language is a barrier to be worked out

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction participant diversity

Experts invited sent substitutions because of time constraints

SH's Feedback thru Informal spaces

Considering getting more tools for feedback for the following workshops; Also an space to make more contact would be good to use the ongoing exchanges.

Environment

Interview guideline sections: 3.1, 3.2, 4.3, 5.1, 5.2, 5.3, 6.1

For achievements, coincidences between ISH and SLSH

Each SH group providing inputs from their perspective

For challenges, E-SH presented creative and complementing ideas in their own session; business card exchange included

Further use of tools for future sense-making of B+H was *not considered*

Curving future B+H *through PPP*

The scope was quite *good -from the observer side- although there are some issues that need to be worked out for it to be optimal*

Overarching ambitions found by SH's and FC-CT, more towards SH

Mid to high avoidance/exploitation of barriers and opportunities

More visual resources needed

Language is a barrier to be worked out

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction participant diversity

Experts invited sent substitutions because of time constraints

SH's Feedback thru Informal spaces

Considering getting more tools for feedback for the following workshops; Also an space to make more contact would be good to use the ongoing exchanges

Facilitation

Interview guideline sections: 1.1, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

For aspirations, *synergies were clustered at the end*

For aspirations, *more visual would have supported future sense-making through NBS*

Further use of tools for future sense-making of B+H was *not considered*

Curving future B+H *through PPP*

The scope *was quite good -from the observer side- although there are some issues that need to be worked out for it to be optimal*

I-SH with larger influence on the scope

Mid to high avoidance/exploitation of barriers and opportunities

More visual resources needed

Language is a barrier to be worked out

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction participant diversity

Experts invited sent substitutions because of time constraints

SH's Feedback thru Informal spaces

Considering getting more tools for feedback for the following workshops; Also an space to make more contact would be good to use the ongoing exchanges

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8.2.3 CoCr2Comm iii: CoCr Enhancing coll. Action

Agency

Interview guideline sections: 1.1, 2.1, 2.2, 4.1, 4.3, 5.1, 5.2, 5.3, 6.1

Capacity building for initiating collaborative initiatives

No capacity building for FC-CT in facilitation soft-skills

Own method was used for invitation: first both IPR and Magistraat (municipality) brainstormed their possible options, and then they met to decide which would go in

I-SH were sourced from IPR and municipal level

SL-SH were sourced from policy, environmental and traffic departments

For aspirations, *synergies were clustered at the end*

For aspirations, *more visual would have supported future sense-making through NBS*

Further use of tools for future sense-making of B+H was *not considered*

Curving future B+H *through PPP*

Overarching ambitions found by SH's and FC-CT, more towards SH

Mid to high avoidance/exploitation of barriers and opportunities

More visual resources needed

Language is a barrier to be worked out

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction participant diversity

Experts invited sent substitutions because of time constraints

SH's Feedback thru Informal spaces

Considering getting more tools for feedback for the following workshops; Also an space to make more contact would be good to use the ongoing exchanges

Decision making

Interview guideline sections: 2.1, 2.2, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

Own method was used for invitation

Professional background was the only criteria for E-SH and I-SH

For achievements, coincidences between ISH and SL

Each SH group providing inputs from their perspective

For challenges, coincidences between ISH and SL

For challenges, *E-SH presented creative and complementing ideas in their own session; business card exchange included*

For aspirations, *synergies were clustered at the end*

For aspirations, *more visual would have supported future sense-making through NBS*

For strategic ambition, coincidences between ISH, PL and SL

Each SH group found B+H in the present

For B+H, ESH contributions had coincidences with the other three groups

Further use of tools for future sense-making of B+H was *not considered*

Curving future B+H *through PPP*

The scope was quite *good -from the observer side- although there are some issues that need to be worked out for it to be optimal*

I-SH with larger influence on the scope

Overarching ambitions found by SH's and FC-CT, more towards SH

Mid to high satisfaction with general strategic ambitions

More visual resources needed

Language is a barrier to be worked out

Mid to high satisfaction shared ambition

Mid to low satisfaction SH engagement

Mid to high satisfaction SH interaction

Mid to high satisfaction participant diversity

Experts invited sent substitutions because of time constraints

SH's Feedback thru Informal spaces

Considering getting more tools for feedback for the following workshops; Also an space to make more contact would be good to use the ongoing exchanges.

Mid to high avoidance/exploitation of barriers and opportunities

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8.2.4 NBS4UGC i: NBS understanding

Literacy

Interview guideline sections: 2.2, 4.2, 6.1

Report elements: SH's contributions

Professional background was the only criteria for E-SH and I-SH

Mid to high satisfaction of knowledge and expertise in environment

Partial use of NBS as driver for the ambition from all SH

More visual resources needed

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

NBS in the SES

Interview guideline sections: 4.2, 5.2, 5.3, 6.1

Report elements: FC's *today's reality*, scope and general ambitions

Partial use of NBS as driver for the ambition from all SH

Mid to high satisfaction with general strategic ambitions

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

8.2.5 NBS4UGC ii: NBS influencing the SES

Complexity

Interview guideline sections: 2.2, 3.1, 3.2, 4.1, 4.3, 5.3, 6.1

Report elements: SH's contributions, FC's scope and general ambitions

Mid to high satisfaction of knowledge and expertise in environment

medium recognition of complexity from ISH, PL, SL; medium to low for ESH

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be a common language.

Technocentric v situated

Interview guideline sections: 2.2, 4.2, 5.2, 6.1

Report elements: FC's general and strategic ambitions

Professional background was the only criteria for E-SH and I-SH

There was no account for diversity, as professional background --meaning, the technical capacity to participate in the co-cr to provide innovative inputs-- was the only variable to invite participants, although they were filtered by the participants own interest, or "willingness" to participate.

In case of political orientation, FC-CT decided to not use it as a filter as it is a "big issue" and they may represent the interests of their parties

Situational knowledges were also left out for the I-SH and E-SH, since the invitation was driven by the professional side rather than by the possibility of fostering diverse participation. For instance, although some sessions were 50/50 in terms of participants' gender, this was not actively pursued.

Partial use of NBS as driver for the ambition from all SH

For strategic ambition, coincidences between ISH, PL and SL

Mid to high satisfaction with general strategic ambitions

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

Participants

Interview guideline sections: 5.3, 6.1

Report elements: SH's contributions, FC's strategic ambitions

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be a common language.

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8.2.6 NBS4UGV iii: Governing the NBS

Politisation

Interview guideline sections: 2.2, 4.2, 5.1, 5.3, 6.1

Report elements: SH's contributions, FC's strategic ambitions

Mid to high satisfaction of knowledge and expertise in environment

For strategic ambition, coincidences between ISH, PL and SL

I-SH with larger influence on the scope

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

Impacts

Interview guideline sections: 4.2, 6.1

Report elements: SH's contributions, FC's strategic ambitions

Partial use of NBS as driver for the ambition from all SH

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

8.2.7 NBS4UGC iv: NBS in planning

Mainstream

Interview guideline sections: 4.2, 5.3, 6.1

Report elements: FC's scope, general and strategic ambitions

Partial use of NBS as driver for the ambition from all SH

Mid to high avoidance/exploitation of barriers and opportunities

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

In planning

Interview guideline sections: 4.2, 4.3, 5.2, 5.3, 6.1

Report elements: FC's general and strategic ambitions

Partial use of NBS as driver for the ambition from all SH

Each SH group found B+H in the present

Mid to high satisfaction with general strategic ambitions

Mid to high avoidance/exploitation of barriers and opportunities

Low to mid satisfaction with NBS conceptualisation

Mid to high satisfaction with NBS transformative potential

Mid to high satisfaction with NBS as driver of ambitions

the introduction of NBS at the beginning of the WS is not strong enough. It is still very abstract and there needs to be acommon language.

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8.3 Characterisation of CoCr

CoCr2Comm i

CoCr objectives

- What is the deliverable
    - Who's the final user?
        - **Municipality and IPR, FC-CT**
    - The scope of the deliverable
        - **Livable city in harmony with nature**
        - **The strategic ambitions are 2 focused on tech, technique and management, and one is focused in governance and integral-environmental oriented planning.**
        - **Influencing governance, spatial planning, enhance SES knowledge**
- What are the sources for legitimacy
    - **Providing "value and functionality". Focus on identity and heritage and service provision, PL**
    - "**Experts from different sector and public collaborate"; level of knowledge and expertise of participant SH satisfy the FC-CT**
    - **Value generation through both low intensity technology use and towards the SMART, ambition**
    - **CoCr processes that involve negotiation between SH, challenge**

SH inclusion (representation)

- Diversity
    - ***There was no account for diversity, as professional background was the only variable to invite participants; politics is a "big issue" better to be avoided,*** **FC-ct**
    - **"centre enriched with urban green, respecting the heritage", ambition**
    - **"too many SH" seen as a hurdle by participants, I-SH**
    - **Incidental equal gender representation in the URM-AS**
- Marginalisation
    - **Increase climate literacy**
    - **STATUS QUO: currently engagement and few spaces for engagement**
    - **Providing more space for participants to influence the URM-AS**
- Accessibility
    - **Enhance participation from authorities and from citizens**
    - **Foster the use of NBS concept for broad familiarisation, opportunities**
    - **Aiming to change city's shape to make it more *livable, ambition***
    - **"people enjoy accessible green spaces", ambition**

- **“Language barrier” in the URM-AS itself, FC-CT**

Interaction of knowledges / experiences

- Hegemonic scientific knowledges vs situated knowledges
  - Legitimacy/primacy
    - **Discussion in URM-AS went deep with I-SH and SL given their technical knowledge of urban systems, FC-CT**
    - **Aspirations are framed within technology driven material metabolism: “100% water recycled” SL, “remote sewage management” E-SH; buildings “energy balance”, I-SH**
    - **“educate” FC-CT**
    - **NBS still a “very abstract”; need for “a common language” FC-CT**
  - Reflexivity
    - **FC-CT mainly satisfied with knowledge and expertise in workshop**
- Challenge to management/ planning/ governing status quo
  - **“regulation and implementation; tech is not the problem” SL**
  - **“adopting EU concept” of urban space is difficult, E-SH**
  - **“more public participation in decision making”, E-SH**
  - **Slow and inefficient planning; working in silos. FC-CT Ambition to change that by 2050.**
  - **Linking ecological to economical value through “*quality*, not *quantity*”, PL**
  - **“Environment v profitability”, E-SH**
  - **Still advocating for PPP, FC-CT**

Conflicts through the process

- Provision of agonistic/deliberative spaces
  - **No local built capacities for facilitation, FC-CT**
  - **Each SH group providing insights from their perspectives, FC-CT**
  - **E-SH with complementary exchanges**
  - **PL contribution: “Collision between ecology & digging companies -> hot question today”**
  - **Opportunity: present NBS in local conferences**
  - **“Administration of the city is fragmented and complicated”, barrier**
  - **Deliberation and sense-making could be enhanced with visual aids, FC-CT**
- Manifestation of power-in-action

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- **Discussion in URM-AS went deep with I-SH and SL given their technical knowledge of urban systems, FC-CT; *Knowledge***
- **Clustering relied on the large influence of I-SH, FC-CT; *Authority***
- **"Low confidence to institutions and politicians", ISH. *Subjectivity***
- **"Lack of enlightened leaders", ESH**

CoCr2Comm ii

Interaction of participants

- Who initiates and guides?
  - **WP6 activities initiated by FT, providing information on the URM.**
  - **I-SH in the role of FC-CT organises the workshop itself.**
  - **FT guides workshops**
- Integration of diverse SH
  - **No method provided in URM. SH selected based on FC-CT criteria and joint definition by municipality and planning institute (IPR).**
  - **E-SH is only SH group outside the government**
  - **English language constitutes a barrier to participation in Prague's context**
  - **FC-CT was satisfied with participants' diversity**
  - **High-level PL-SH were briefly available**
  - **The invited experts were not available and sent substitutions to the workshop**

Workshop environment

- Structure
  - **Based on the URM: assessing the present conditions and them aim for a concrete scenario.**
- Project time-frame
  - **Until May 2020 for the FC-attuned roadmap; until June 2022 for the end of the project**
- Activity (stage) time-frame
  - **1st day for PL-SH (workshop + individual interviews) and SL-SH (workshop)**
  - **2nd day for I-SH workshop and E-SH workshop**
  - **3rd day for clustering and synthesising inputs; output creation.**
- Mutual learning
  - **SH groups working separately during the workshop**
  - **SH groups were contributing based solely on their stakes.**
  - **E-SH participants were exchanging business cards among them**

- **Common understanding through visual medium may enhance further workshops**
- **Participant SH's feedback only through informal spaces**
- **Synergies among contributions were mostly found at the end**
- **Ambitions were compatible among SH groups**

Facilitation

- Approach and tools
  - **Tools to make sense of the future were not considered**
  - **Need for more visual resources**
  - **Sticky-notes technique helped with the language barrier**
  - **More communication with SH outside the workshop for more engagement**
  - **Outputs of the workshop were shared with SH**

CoCr2Comm iii

Agency enablement

- FC-CT capacity building in collaborative activities
  - **Training to initiate the activities**
  - **Materials received to carry out the workshops**
  - **Shared experiences from Stavanger's**
  - **No local capacity building for facilitation**
  - **Lessons learned for further workshops**
  - **Use of existing skills for initiating the activities**
- Participants capacity building
  - **Visual aid to help participants' discussions**
  - **Aim of the project is to further *educate* SH**
  - **Currently, "low public awareness" on CC, I-SH**
- Fostering local resourcefulness
  - **Relying in PPP to materialise the ambitions**
  - **Materialising ambitions through collaboration and transparency in planning**
  - **Promote NBS in local events, *Opportunities***

Collective action and decision making

- Roles of participant SH in CoCr (table)
  - **FC-CT+FT synthesising and clustering in the end**
  - **I-SH with larger influence**

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  - **E-SH providing creative input but more towards punctual interventions**
  - **PL usually very involved with IPR and good insights; time restrictions were contrary this tiime**
  - **According to characterisation**
    - **FT+FC-CT: steward and mediator; experts; looking forward to become catalysts through more communication with SH**
    - **I-SH: experts; co-designer**
    - **PL: experts**
    - **SL: experts**
    - **E-SH: co-designer**

- Who makes the rules?
  - **Who participated was *de facto* decided top down, through the SH invitation**
  - **Acknowledged need to operationalise feedback in further workshops**
- What is required from each participant at this stage?
  - **SH groups to provide insights from their own perspective**
  - **I-SH and SL-SH have good technical capacity and system view.**
  - **PL: high & lowlights; priorities; aspirations; ambitions**
  - **SL: high & lowlights; aspirations; ambitions**
  - **ESH-ISH: high & lowlights; aspirations; ambitions; barriers and hurdles**
- Activities' influence on urban governing.
  - **Shape the resilience strategy**
  - **Change paradigms in planning towards collaboration and transparency**
  - **Towards metropolitan scope**
  - **Aim do plan around people "rather than traffic", ESH ambition**
- Partner-State
  - **Barrier: ineffective, opaque political decision + low public engagement**
  - **"Low confidence in institutions and politicians" ISH**
  - **Aiming for cross-borough cooperation; cross-discipline and cross-sectoral (SL-SH and ISH… contrary to current state, FC-CT**

8.4 Characterisation of NBS

NBS4UGC i

NBS and UES literacy

- UES provision
    - **Achievement: increased SH collaboration in revitalising UGI and UBI**
    - **Ambition: UES provision fundamental for 2050**
        - **Cultural: accessible green spaces for mobility habits; contemplative; recreational**
        - **Provision: small scale agriculture.**
        - **Regulation: UGI creating healthy micro-climate; waterbodies for flooding and drought**
    - **ISH ambition: explicit reference to multifunctional UGI and UES provided**
- UGI
    - **Achievement: city working in UGI strategy**
    - **Achievement: revitalising UGI and UBI**
    - **Achievements: protected areas and parks**
    - **Barriers: building competing with UGI**
- NBS approach and intervention
    - **Low to mid satisfaction with NBS conceptualisation**
    - **NBS still abstract; not necessarily a common language**
    - **Opportunities: increase awareness of NBS**
    - **All SH groups concerned with UGI accessibility**
    - **ISH ambition: NBS approach to circular water management**
    - **ISH ambition: mature government to implement NBS approach**

Framing NBS in the SES

- UGI needs and connections (node and link)
    - **Challenges: set better building rules and framework for NBS**
    - **ESH contribution: trees and parks managed by different parties**
    - **ISH ambition: interconnected UGI and multifunctional use**
    - **ISH contribution: understanding interventions as result of "urban-landscape interactions"**
    - **PL ambition: value of city's agricultural identity; a cultural heritage**
    - **ES barrier: Competition for urban space**

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- **Ambition: circular water management to maintain the UGI**

- Ecosystem functioning
  - **Opportunities: "value model for ES"**
  - Which robustness is sought?
    - **PL ambition: river renaturation as an example of ecological thinking**
    - **SL ambition: "well structured and maintained" UGI is in place to "enhance the social function"**
    - **ESH contribution: NBS "supporting human wellbeing"**
  - Connection
    - How are UGI patches connected across the urban SES?
      - **Ambition: metropolitan scope**
      - **PL ambition: trees planted "wherever possible"**

NBS4UGC ii

Understanding complexity

- The relations between the SES components
  - **ISH ambition: mature government for multi-sector coordination to address complex challenges**
  - **Barrier: fragmented city administration; difficult.**
  - **Challenges: political willingness determine the investment priorities; land use planning control urban development**
  - **Ambition: "cultural heritage and identity are turned into value and functionality"**
  - **ISH ambition: multifunctionality of the UGI**
  - **ISH contribution: strategic infrastructure planned as complex urban-landscape interactions**
  - **ISH and PL contribution: pressure on green by urban development**
  - **PL contribution: increased cooperation with knowledge institutes**
  - **SL contribution: tech is no problem for water retainment, rather regulation and implementation**
  - **ESH barrier: environment v profitability**

Who participates in the UES provision

- Articulate value or planning (ex-situ influence)
  - **Only criteria for invitation to URM-AS was professional background**
  - **SL contribution: awareness rising on value of water**
  - **PL contribution: the discourse "cars v trees" is challenging**

- **Ambition: multidisciplinary and collaborative planning**
- **Achievement: revitalisation of UGI and UBI**
- **Achievement: strategic documents: adaptation strategies, UGI strategy; data gathering and analysis**
- **Challenge: lack of citizen awareness on sustainable lifestyle; "improved education is missing".**
- **Challenge: political willingness determines the public investment priorities**
- **Opportunities: present NBS in local conferences; use the terminology**

- maintenance or protection (in-situ influence)
  - **PL contribution: replacing cars with trees**
  - **ISH contribution: increase of nature protected areas**
  - **ISH contribution: private gardening**
  - **PL ambition: planting trees "wherever is possible"**
  - **PL ambition: "all flat roofs are green"**
  - **ISH ambition: UGI for "food production, education"**

Technocentric v situated interventions

- **ESH contribution: "remote management of sewage system"**
- **PL ambition: extensive green areas "people to use and enjoy"**
- **PL ambition: new technologies for resilience**
- **ISH contribution: "technical measures reduce State expenses"**
- **ESH ambition: rain and waste water managed by sewage system**
- UES prioritised
  - **Ambition: provisioning and cultural; "fish, wine and recreational facilities"**
  - **PL ambition: regulation; micro-climate effect with "green roofs and facades"**
  - Inputs required for the provision
  - Evaluative criteria for the provision
    - **Challenge: preserve the functions of UGI for climate change challenges, such as flooding or air quality**
    - **Ambition: energy saving, emissions and "smartness"**
    - **PL ambition: green roofs and facades for energy savings.**

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NBS4UGC iii

Politisation of NBS producing the SES

- Investment
    - Who pays and who expects a return?
    - **Challenge: political willingness determines the public investment priorities**
    - **Collaborating through PPP (also a contribution from SL)**
    - **PL ambition: "economical value is connected to ecological" through quality**
    - **SH ambition: savings in buildings' energy consumption**
    - **Barrier: NBS implementation require allocation of financial resources**
- Location
    - What determines the location?
    - **Challenge: land-use planning to control urban development**
    - **ISH barrier: private ownership of land**
    - **ISH + PL contribution: Tension between building an UGI development**
    - **ISH contribution: protection of open landscape is public space plan**
    - **ISH barrier: monument protection**
- Management / governance
    - Who decides the collective and operational rules?
        - **Challenge: to renew and change building rules to favour NBS**
        - **Barrier: low public engagement**
        - **Achievements: UGI and UBI revitalisation with diverse SH**
    - Power relations (ideology) shaping decision making
        - **PL contribution: Pressure on UGI from city development**
        - **ISH barrier: transparency of political decision**
        - Market oriented v common
            - **PL ambition: adding value for citizens and tourists**
            - **Ambition: accessible and attractive UGI and UBI**
            - **Ambition: provisioning UES for the marketplace**

Benefits of the NBS though in the realm of

- **Partial use of NBS as a driver for the ambitions**
- Climate change
    - Adaptation
        - **Opportunities: share UNaLab activities with CCA working groups**

        - **Ambition: city is enriched with urban green respecting the heritage**
        - **ESH ambition: city climate resilience**
    - Mitigation
        - **Ambition: zero-emission**
    - Risk reduction
        - **Ambition: water retention alleviates drought and flood**
        - **Ambition: healthy micro-climates through UGI**
        - **PL ambition: Improve air quality**
- Social subsystem
    - economic
        - Production
            - **Ambition: small-scale agriculture**
            - **ISH barrier: water mismanagement by businesses**
        - Consumption
            - **Ambition: provision UES as commodities**
        - Private/common benefits
            - **ESH +SL ambition: Enough shading, open spaces for mobility and recreation**
            - **PL ambition: adding value to citizens and tourists**
    - societal
        - Awareness rising
            - **ISH ambition: water perceived as an integral part of the city**
            - **PL ambition: awareness rising as a response to climate change**
            - **ESH contribution: awareness rising in water management**
        - Civic ecology
        - Cohesion
            - **Ambition: use NBS for heritage and identity**
    - Aggregated vs distributed benefits
        - **Aggregated:**
            - **Ambition: UGI and UBI for recreation and life quality**
            - **PL ambition: mobility is clean and affordable**

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NBS4UGC iv

Mainstream for their long-term effect

- Capacity building (direct)
    - **ISH +SL ambitions: mature government collaborates; addresses complexity**
    - **ISH barriers: knowledge and tools for strategic and systemic planning.**
- Social institutions (bottom-up)
    - **ESH barriers: lack of people awareness and enlightened leaders**
- Legal frameworks (top-down)
    - **Achievements: strategies for adaptation, public space, riverfront, UGI**
    - **Challenges: create a framework to implement NBS**

NBS in planning strategies (top-down)

- Complementing strategies / actions
    - **ESH barriers: change energy and mobility paradigms**
    - **Ambition: building energy, mobility and renewable energies; Smart city approach**
    - **Ambition: international cooperation**
    - **ESH + ISH contribution: cooperation between State actors**
    - **Opportunities: increase awareness on NBS by using the terminology**
    - **ESH barriers: media to invest in non-commercial advertisement**
    - **ESH ambition: open information about citizens habits**
- Support of the State / influence on the State
    - SH influencing the decision making
    - **ESH contribution: more public participation in decision making**
    - **Achievement: increased collaboration in city governance**
    - **ESH barriers: limited coordination and cooperation among SH**

Annex B
Roadmapping Assessment Interview guidelines for Başakşehir

02/08/18

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About UNaLab

UNaLab will develop, via co-creation with stakeholders and implementation of 'living lab' demonstration areas, a robust evidence base and European framework of innovative, replicable, and locally-attuned nature-based solutions to enhance the climate and water resilience of cities. UNaLab focuses on urban ecological water management, accompanied with greening measures and innovative and inclusive urban design. The UNaLab partners aim to develop smarter, more inclusive, more resilient and more sustainable local societies through nature based innovation jointly created with and for stakeholders and citizens. UNaLab's 3 front runner cities: Tampere, Eindhoven and Genova, have a track record in smart and citizen driven solutions for sustainable development. They support 7 follower cities: Stavanger, Prague, Castellon, Cannes, Basaksehir, Hong Kong and Buenos Aires plus share experiences with observers as City of Guangzhou and the Brazilian network of Smart Cities. Therefore UNaLab results will impact on different urban socio-economic realities, with diversity in size, challenges and climate conditions. In order to create an EU reference demonstration and go-to-market environment for NBS, UNaLab will use and further develop the ENoLL Urban Living Lab model, and the European Awareness Scenario Workshop method for the co-creation of solutions, and the roadmap approach, in this way achieving an innovative NBS toolbox.

Partners

EXECUTIVE SUMMARY

The following material contains 29 questions that will guide a *semi-structured interview* and a *survey filling activity* with the UNaLab's leading groups at each Follower City. The questions cover workshop and stakeholder-related aspects of the first stage of the UNaLab's Roadmapping Methodology (URM): the Ambition Setting (URM-AS).

The sections that frame the questions are based on the URM workshop structure itself. Its aim is to complete the information that will be retrieved from TU/e regarding the methodological aspects of URM-AS. The information will be the input material for a Master thesis research.

The research's aim is to identify the possibilities of the URM to enable Cooperative Institutions to manage urban commons. Previous research has shown that the standard Roadmapping methodology (SRM) has traits that allow this to happen. However, as found in the consulted literature, not all roadmaps are the same: different contexts and objectives for its use determine its nature and, thus, its outcomes.

For that reason, the URM will be compared to the SRM to determine if the cooperative institution-enabling potential is present in the former. This will be done through a literature review of the Roadmapping topic, particularly focusing on the SRM, and on the exercises that led to the attunement of the URM.

Further, the implementation of the URM at each FC will be compared to the SRM principles, and studied under the light of the CI-enabling potential to determine if it still exists beyond theory. This is the aim of this survey/interview guideline, which will frame a conversation with Ömer Onur, from *Başakşehir Living Lab Istambul*. This is a site-specific guideline which references the activities that the Başakşehir's UNaLab leading group and the facilitation team (leading group + TU/e team) have carried out and reported.

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1. SETTING THE GROUND: TRAINING

1.1 Başakşehir's leading group's capacity building

1.1.1 Was the group trained for kickstarting collaborative multistakeholder initiatives, e.g. identifying participants and invitations? Mark only one oval.

- ◯ Yes
- ◯ No

1.1.2 Was the group trained for conducting collaborative multistakeholder initiatives, e.g. developing facilitation and communication skills? Mark only one oval.

- ◯ Yes
- ◯ No

2. SETTING THE GROUND: SELECTING THE ACTORS

2.1 INVITATION PROCESS

2.1.1 The call for participation followed a method with the aim of addressing biases in participants' identification and selection? Mark only one oval per row

	Yes	No
Policy level	◯	◯
Strategy level	◯	◯
Internal stakeholders	◯	◯
External stakeholders	◯	◯

Further Questions:

Was a SH identification process carried out before the invitations?

Do you have any sort of *Stakeholder Map*?

Which steps were taken to ensure all relevant SH groups were represented and invited?

What was the ratio of invitation/participation?

2.2 PARTICIPANT CHARACTERISATION

2.2.1 For each stakeholder group, which of the following characteristics were considered for the participant invitation? Tick all that apply

	Gender	Ethnicity	Professional background	Cultural/religious background	Political orientation
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

Further Questions:

In which way was diversity considered? What is its weight in the SH invitation process?

Was *situated knowledge* sought when inviting the SH?

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2.2.2 For each stakeholder group, did the participants satisfy the leading group's expectation regarding knowledge and expertise in multi-stakeholder participatory/collaborative/co-creative planning? Mark only one oval per row

	Didn't satisfy	Slightly satisfied	Satisfied	Exceeded expectations
Policy level				
Strategy level				
Internal stakeholders				
External stakeholders				

***Further Questions**:*

Was the professional experience in this area sought when inviting the SH?

Were participants invited specifically because of their affinity to the project?

2.2.3 For each stakeholder group, did the participants satisfy the leading group's expectation regarding knowledge and expertise in environmental/climate/sustainability-related topics? Mark only one oval per row

	Didn't satisfy	Slightly satisfied	Satisfied	Exceeded expectations
Policy level				
Strategy level				
Internal stakeholders				
External stakeholders				

***Further Questions**:*

Was the professional experience in this area sought when inviting the SH?

Were participants invited specifically because of their affinity to the project?

Guiding elements for section 2:

***For who to invite we will trust your judgement**. So please feel free to invite a diversity of organizations, concerns and people (…) **Look for your relations, ranging from research institutes, project developers, consultants, industry, local governmental agencies**, etc.*

TU/e recommendations regarding the stakeholder selection processes; from TU/e training material.

3. AMBITION SETTING: REFLECTING ON THE PRESENT

3.1 ACHIEVEMENTS

3.1.1 For each stakeholder group, were the following elements discussed regarding the achievements at planning for climate change adaptation and city resilience...? Tick all that apply

	Specific actions/results	Processes	Critical actors	Drivers for the achievement	Consequences of the achievement
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

Başakşehir's Achievements from different SH's perspectives; some examples from URM-AS workshops evidences.

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	Smart rubbish collection system (more than 50% of all rubbish is collected)	Creation of public awareness for the last 9 years	Educating children on rubbish and recycling	Park areas are already reserved in city planning	Storage of rain and greywater now included in plans for the buildings.
Policy	6 river beds -> reconstruction to prevent risk of flooding	600 undeground containers now; aim is to cover all municipality	Old establishment = paid by municipality New = paid by constructor	Example areas to promote green to other municipalities	Increase of green m2/pp to over 20m2 (forest area not included)
Internal SH	Treatment facilities for industrial (purple) water -> then inserted in sewage	Metro project -Transportation benefits, but also -Air quality -climate action mitigation	Improve awareness on Climate Change: -training programme for local administration & NGOs	Action plans open to public: online access	Research projects in Istanbul areas: -Air quality measurements (longitudinal) -Emission measures -Data for improvement
External SH	20-40% water provided to industry comes from greywater treatment	Collecting big data on garbage and waste collection -> analysing the patterns	Awareness at government level on greywater treatment	In our culture, water and water treatment are important.	High class construction -> its mandatory to realise water treatment

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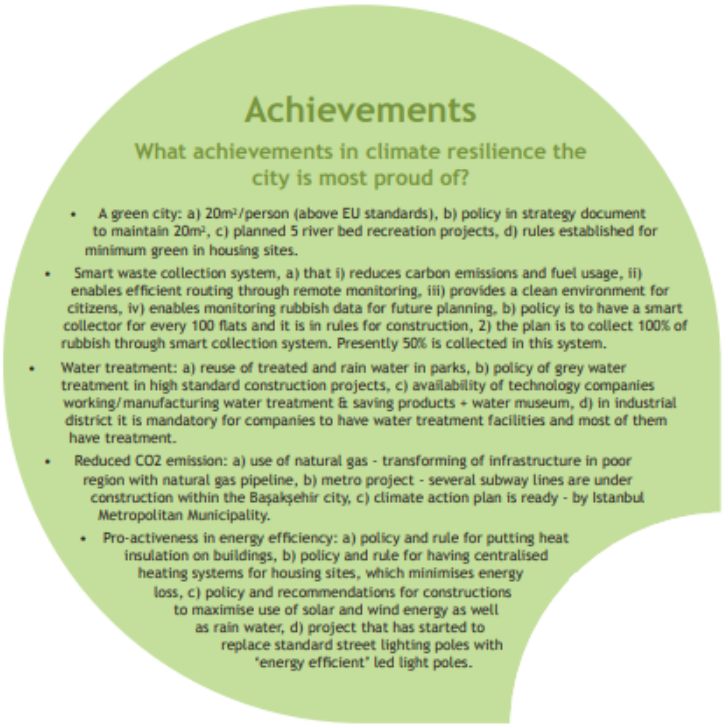
3.1.2 Was the achievements' assessment consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐



***Further Questions**:*

Were the local achievements identified by each SH group along the same lines, or the achievements for ones were challenges for others?

Did each SH group recognise the achievements of the other groups, or was it an exercise of recognising the own achievements?

Başakşehir's Achievements summary; from URM-AS results' report.

3.2 CHALLENGES

3.2.1 For each stakeholder group, were the following elements discussed regarding the CHALLENGES at planning for climate change adaptation and city resilience...? Tick all that apply

	Specific actions/results	Processes	Critical actors	Drivers for the challenge	Consequences of the challenge
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

Başakşehir's Challenges from different SH's perspectives; some examples from URM-AS workshops evidences.

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	1/3 Basaksehir buildings are not right (built) or illegal	Urbanisation of certain areas; planning was not done properly or legally		Infrastructure for rainwater collection and reuse is expensive	Equipment has to be imported from EU/US -> maybe produce technology locally?
Policy	Waste recycling	Expected population in 10 years: 750'000	Air quality -> manufacturing sites	One of the fastest growing municipalities in Istanbul	Indirect problem: -Traffic -aire pollution
Internal SH	No air-pollution monitoring stations in Basaksehir		Issues with responsibility: auditors cannot write penalty	Data not open for development of solutions (regulations)	Conflicts in administration: -Control and authorization
External SH	Turkey, water-poor country by 2030	Create awareness in people on purposes and value of water	Construction companies to change	No respect to water	Auditing of constructions according to legislation (private buildings)

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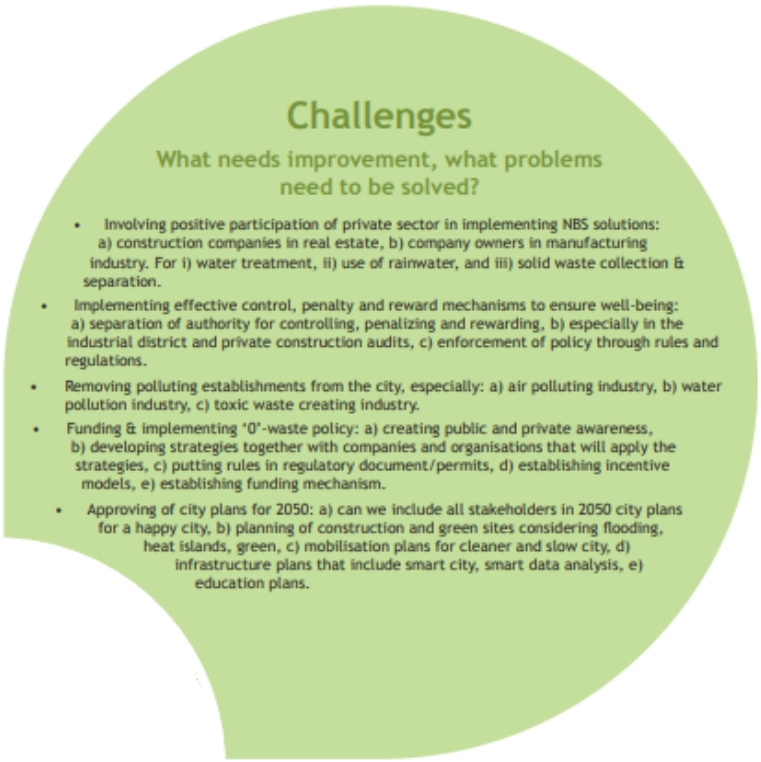
3.2.2 Was the CHALLENGES' assessment consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐

***Further Questions**:*

Were the local challenges identified by each SH group along the same lines, or the challenges for ones were achievements for others?

Did each SH group recognise the challenges of the other groups, or was it an exercise of recognising the own?



Başakşehir's Challenges summary; from URM-AS results' report.

4. AMBITION SETTING: IMAGINING THE FUTURE

4.1 ASPIRATIONS

4.1.1 For each stakeholder group, were the following elements discussed regarding the features of the 2050's city scenario? Tick all that apply

	Specific actions/results	Processes	Critical actors	Drivers to realise the aspiration	Consequences of not acting (business as usual)
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

Başakşehir's Aspirations from different SH's perspectives; some examples from URM-AS workshops evidences.

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	Cooking oils separated from liquids (restaurants, mandatory; household, collected)	Rainwater collection and reuse	Public buildings as green buildings	The artificial canal will cross the city and create new opportunities	Maintain the level of green percapita with the 50% population increase
Policy	All changes regarding NBS will be integrated with smart technologies	Optimise the waste production percapita and recycling different waste (paper, plastic…)	Improve air-quality together with manufacturers	Be example to other cities for new application	City of happiness -> Basaksehir
Internal SH	Air pollution monitoring station	Efficient recycling service			Ecological and smart district
External SH	Autonomous waste collection with zero CO2 footprint	A city that protects its water reserves	-Minimize energy use in buildings -Minimize energy use in residents	Mandatory treatment of waste water in all constructions (by government)	Will become waterproof in 2050

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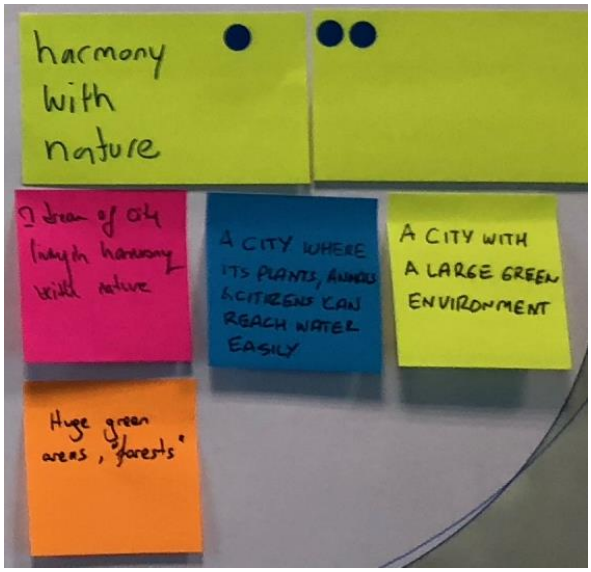
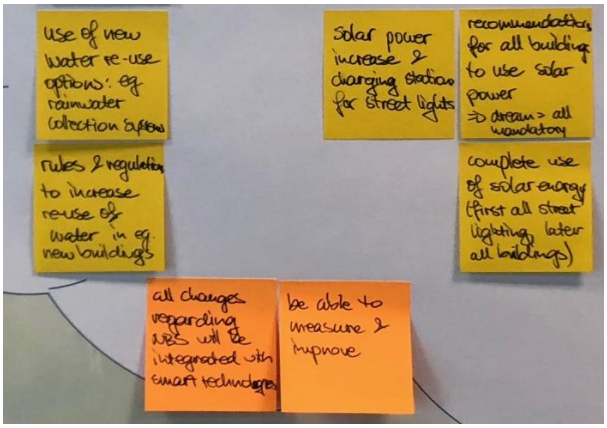
4.1.2 Were the future scenario aspirations consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐





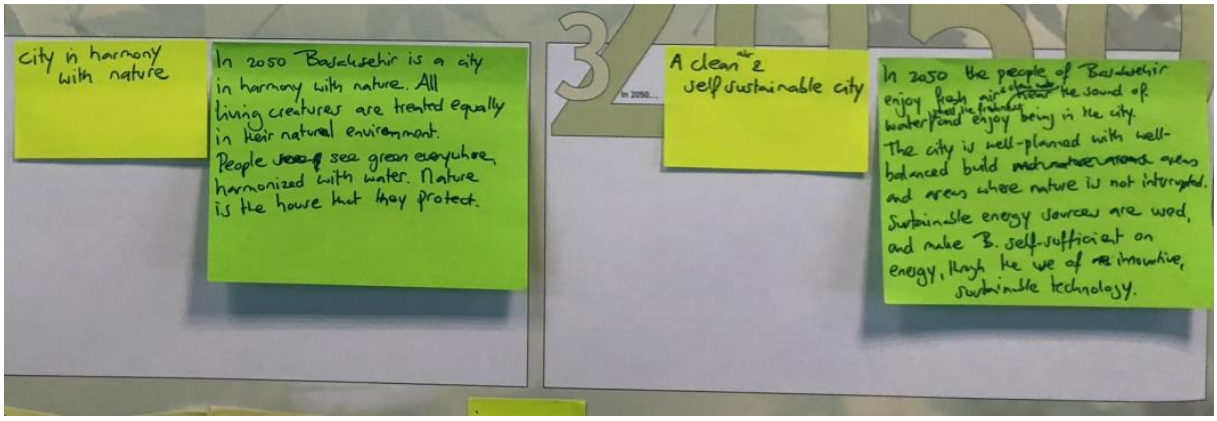
Some of Başakşehir's aspirations: External (left) and Policy makers (right) SH. From URM-AS workshops evidences.

> ***Further Questions**:*
>
> Were the aspired scenario defined by each SH group along the same lines, or were there oppositional features?
>
> Did the groups find synergies to realise each others' aspirations?
>
> Were the aspired scenarios visually defined in each group? How different did they seem from each other?

4.2 STRATEGIC AMBITIONS

4.2.1 For each stakeholder group, were Nature-based solutions used as drivers that enable the strategic ambitions? Tick all that apply

	Yes	Partially	Not
Policy level	☐	☐	☐
Strategy level	☐	☐	☐
Internal stakeholders	☐	☐	☐
External stakeholders	☐	☐	☐



Başakşehir's External SH ambitions identified at their session: From URM-AS workshops evidences.

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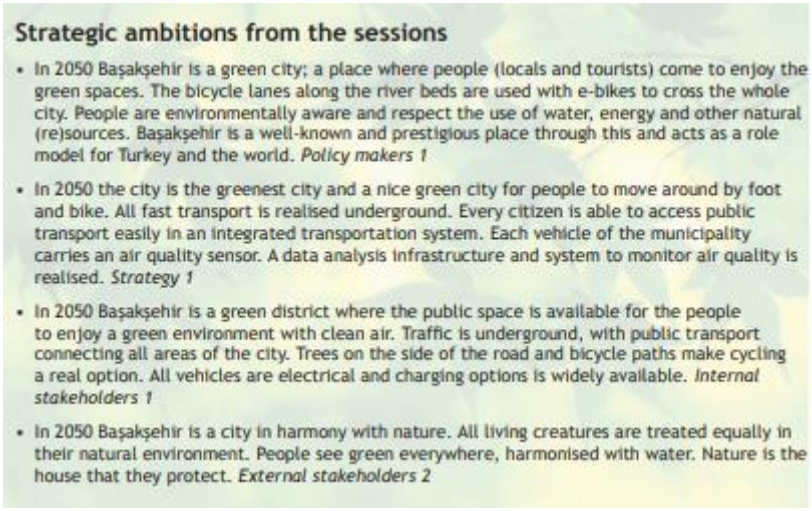
4.2.2 Were the strategic ambitions consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐



Strategic ambitions from the sessions

- In 2050 Başakşehir is a green city; a place where people (locals and tourists) come to enjoy the green spaces. The bicycle lanes along the river beds are used with e-bikes to cross the whole city. People are environmentally aware and respect the use of water, energy and other natural (re)sources. Başakşehir is a well-known and prestigious place through this and acts as a role model for Turkey and the world. *Policy makers 1*
- In 2050 the city is the greenest city and a nice green city for people to move around by foot and bike. All fast transport is realised underground. Every citizen is able to access public transport easily in an integrated transportation system. Each vehicle of the municipality carries an air quality sensor. A data analysis infrastructure and system to monitor air quality is realised. *Strategy 1*
- In 2050 Başakşehir is a green district where the public space is available for the people to enjoy a green environment with clean air. Traffic is underground, with public transport connecting all areas of the city. Trees on the side of the road and bicycle paths make cycling a real option. All vehicles are electrical and charging options is widely available. *Internal stakeholders 1*
- In 2050 Başakşehir is a city in harmony with nature. All living creatures are treated equally in their natural environment. People see green everywhere, harmonised with water. Nature is the house that they protect. *External stakeholders 2*

Başakşehir's SH groups' strategic ambitions for the Green and Nature topic; from URM-AS results' report.

***Further Questions**:*

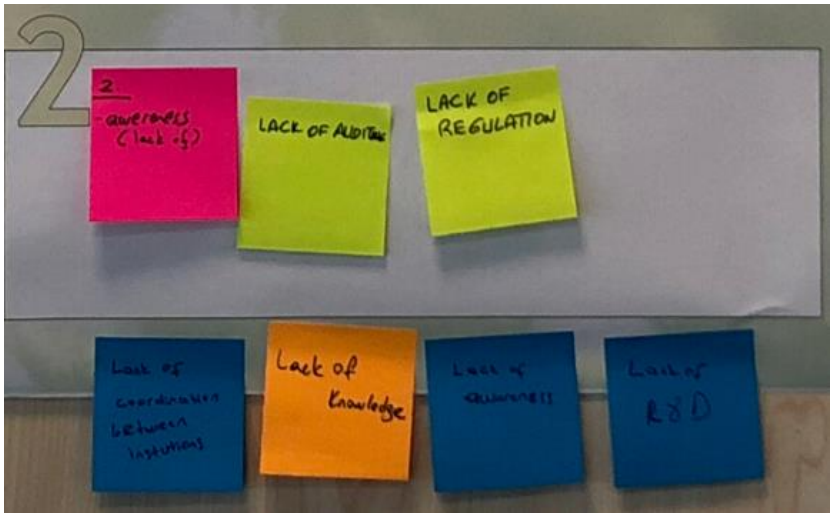
At what extent did the facilitation team promote the NBS as core drivers for the strategic ambitions?

Were strategic ambitions defined by each SH group along the same lines, or were there oppositional features?

4.3 BARRIERS AND HURDLES

4.3.1 For each stakeholder group, did the discussion on barriers and hurdles include elements that are evident in the present? Tick all that apply

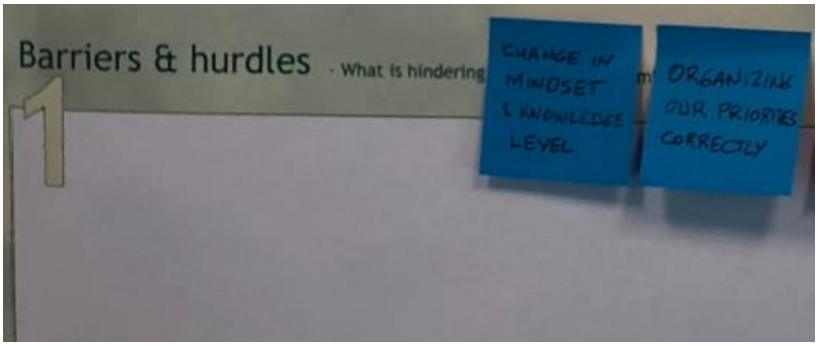
	Yes	Partially	Not
Policy level	☐	☐	☐
Strategy level	☐	☐	☐
Internal stakeholders	☐	☐	☐
External stakeholders	☐	☐	☐



Identified Barriers and Hurdles for Başakşehir's ambitions at the Internal SH workshop session: From URM-AS workshops evidences.

4.3.2 For each stakeholder group, did the discussion on barriers and hurdles include elements that may arise in the future? Tick all that apply

	Yes	Partially	Not
Policy level	☐	☐	☐
Strategy level	☐	☐	☐
Internal stakeholders	☐	☐	☐
External stakeholders	☐	☐	☐



Identified Barriers and Hurdles for Başakşehir's ambitions at the External SH workshop session: From URM-AS workshops evidences.

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4.3.3 Were the identified barriers and hurdles consistent between stakeholder groups? Tick all that apply

	Policy level	Strategy level	Internal stakeholders	External stakeholders
Policy level	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐

***Further Questions**:*

What was the role of the facilitation team to have a meaningful discussion regarding the possible future barriers that exist in the particular context of the FC? i.e. were city-specific future barriers part of the discussions?

Were any particular tools or techniques used to help the participants across sessions in this matter?

Were the current and *future* barriers identified by each SH group along the same lines, or the ones faced by ones were not by others? E.g. are barriers in policy the same for internal SH?

Did each SH group recognise the barriers faced by the other groups, or was it an exercise of recognising the own?

Did the SH groups find synergies to curve each other barriers and hurdles?

Did the SH groups find possible conflicts between them when attending the barriers and hurdles?

5. AMBITION SETTING: CONCLUSION

5.1 SCOPE FOR VISION AND ROADMAP

5.1.1 As experts on planning, climate change adaptation and roadmapping, did the resulting general scope satisfy the facilitation team's expectations? Mark only one oval

	1	2	3	4	
Didn't satisfy	◯	◯	◯	◯	Exceeded expectations

Further Questions:

Are there any specific issues in which the set scope differs from the expected? Any in which the expectations and result matched?

In your opinion, did the diversity of input strengthen or weaken the initially expected scope?

5.1.2 Which stakeholder group's agenda has a larger presence in the set scope? Mark only one oval

- ◯ Policy level
- ◯ Strategy level
- ◯ Internal stakeholders
- ◯ External stakeholders
- ◯ None: balanced influence

Further Questions:

Is there any group whose intentions, agendas or projects shaped in a larger way the discussion? In such case, what were the reasons for it (expertise, access to decision-making, legal frameworks…)?

For instance, in the case that strategic ambitions were different between certain groups, whose ambitions were more heavily weighed to define the overall strategic ambitions? Or were they balancedly weighed?

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5.2 GENERAL STRATEGIC AMBITIONS

5.2.1 Overarching topics were explicitly shared among the individual strategic ambitions, or was the clustering of topics mainly carried out by the facilitation team? Mark only one oval

	1	2	3	4	
Same topics were found among individual ambitions	◯	◯	◯	◯	Diverse topics were clustered by facilitation team

5.2.2 As experts on planning, climate change adaptation and roadmapping, did the result satisfy the facilitation team's expectations for the general strategic ambitions? Mark only one oval

	1	2	3	4	
Didn't satisfy	◯	◯	◯	◯	Exceeded expectations

Further Questions:

Are there any specific issues in which the set strategic ambitions differ from the expected? Any in which the expectations and result matched?

In your opinion, did the diversity of input strengthen or weaken the initially expected ambitions?

Başakşehir's general strategic ambitions; from URM-AS results' report.

5.3 OPPORTUNITIES, ACHIEVEMENTS, CHALLENGES AND BARRIERS

5.3.1 Overarching achievements, challenges, opportunities and barriers were explicitly shared among the individual sessions, or was the clustering of elements mainly carried out by the facilitation team? Mark only one oval

	1	2	3	4	
Same elements were found among individual ambitions	◯	◯	◯	◯	Diverse elements were clustered by facilitation team

Clustered Barriers and Hurdles for Başakşehir's ambitions at the Facilitation Team session: From URM-AS workshops evidences.

5.3.2 As experts on planning, climate change adaptation and roadmapping, did the participants' diagnoses of achievements, challenges, opportunities and barriers match with the one of the facilitation team? Mark only one oval per row

	Opposite diagnoses	Partially matched	Mostly matched	Identical diagnoses
Achievements	◯	◯	◯	◯
Challenges	◯	◯	◯	◯
Opportunities	◯	◯	◯	◯
Barriers	◯	◯	◯	◯

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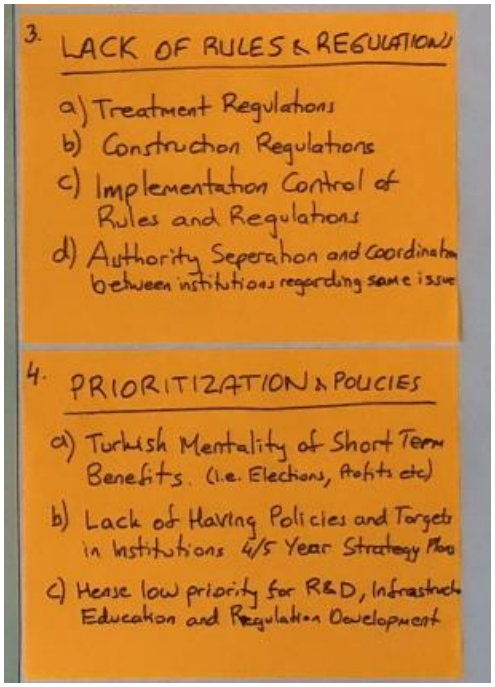
5.3.3 To what extent are the identified opportunities exploited on the strategic ambitions? Mark only one oval.

	1	2	3	4	
Not exploited	◯	◯	◯	◯	Fully exploited

Başakşehir's opportunities summary; from URM-AS results' report

5.3.4 To what extent are the identified barriers avoided on the strategic ambitions? Mark only one oval.

	1	2	3	4	
Not avoided	◯	◯	◯	◯	Fully avoided



Further Questions:

Are the actions to avoid/exploit the barriers/opportunities relevant for all the SH groups, or does the responsibility of taking action fall more upon specific groups?

Are there clear possible synergies between SH groups and actors to make the action more effective?

Are there any possible conflicts between SH groups when attending the opportunities and barriers?

Başakşehir's summary of barriers and hurdles at the Facilitation Team session; from URM-AS workshops evidences.

6. FOLLOWING STEPS AND PARTICIPANTS FEEDBACK

6.1.1 Which aspect(s) could be addressed to enhance the stakeholder groups' contributions? Tick all that apply

	Participant profile/ Selection criteria	Information for participants	Activities/ Discussion format	Visual resources	Facilitation (NBS, co-creation, complexity…)
Policy level	☐	☐	☐	☐	☐
Strategy level	☐	☐	☐	☐	☐
Internal stakeholders	☐	☐	☐	☐	☐
External stakeholders	☐	☐	☐	☐	☐

***Further Questions**:*

From your experience, which other aspects could be enhanced within the methodology?

Are there any aspects inherent to the methodology used (workshop format, SH classification, sessions division, etc.) that limit the stakeholder contribution?

Do you consider a particular SH group requires assistance to increase the relevance of their participation?

6.1.2 In terms of co-creation processes (creating a shared ambition, stakeholder engagement, stakeholders interaction, participant diversity) did this workshop satisfy your expectations? Mark only one oval per row

	Didn't satisfy	Slightly satisfied	Satisfied	Exceeded expectations
Creating a shared ambition	◯	◯	◯	◯
Stakeholder engagement	◯	◯	◯	◯
Stakeholders interaction	◯	◯	◯	◯
Participant diversity	◯	◯	◯	◯

***Further Questions**:*

Can you point at specific features of the workshop that defined your perception in such way?

Which steps can be taken to improve performance in this matter?

How important is this matter for the final result -an accurate and useful roadmap?

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6.1.3 In terms of the use of NBS in the discussions (clear conceptualization, agreement on transformative potential, driver for ambition materialization), did this workshop satisfy your expectations? Mark only one oval per row

	Didn't satisfy	Slightly satisfied	Satisfied	Exceeded expectations
Clear conceptualization (what it is)	◯	◯	◯	◯
Agreement on transformative potential (what it can do)	◯	◯	◯	◯
Driver for ambition materialization (city-context specific)	◯	◯	◯	◯

Further Questions:

Can you point at specific features of the workshop that defined your perception in such way?

Which steps can be taken to improve performance in this matter?

How important is this matter for the final result -an accurate and useful roadmap?

6.1.4 Was any of the following resources used to obtain feedback on the workshop from participants? Tick all that apply

- ☐ Closure sessions at the workshop
- ☐ Informal spaces for conversation (coffee, lunch, dinner...)
- ☐ Interviews
- ☐ Post-workshop online surveys
- ☐ Other: _____

Further Questions:

How important is for the following sessions to have feedback from the participants?

Does the participant involvement belong only to the workshop, or are there continual activities?

Are the participants' involved in the planning of the following activities, or merely informed and invited to take part of later on?

7. END OF THE AMBITION SETTING ASSESSMENT

Thank you for taking the time to carry out this assessment

Feedback is highly appreciated! If there is any further comment regarding the topics in the survey or suggestions regarding the questions (including new ones or changing the current ones), please reach out at: lameirasb@ua.pt

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8. RESULTS BAŞAHKŞEHIR

8.1 Results by section; report + interview summary

BAS 1.1

The BLL has been conducting collaborative multi-sh activities for the past years, so they have been developing soft-skills on the matter. However, they did not receive any further training from TU/e besides the joint session at the consortium meeting.

BAS 2.1

The I-SH were selected from the municipal actors.

For the E-SH the method followed was similar to a top-down snowballing. After having the Mayor's approval for the project, this governmental sector provided them with a list of industrial partners that may be relevant to the project, from an environmental management perspective. They had personal meetings with these SH and then received from them more advice regarding who else to invite.

Ali Alper	Başakşehir Municipality (Parks&Gardens)
Enda Balcı	Başakşehir Municipality (Parks&Gardens)
Serkan Çelik	Başakşehir Municipality (Vice Mayor)
Soner Dedeoğlu	Basaksehir Municipality
Elke den Ouden	TU/e LightHouse
Elif Dükkancı	Başakşehir Municipality (Planning & Project Mgr)
Sencer Ertaş	Evreka (Customer Relations)
Gülten Ertuğral	İstanbul Organized Industry District (Permissions)
Zehra Betül Gauds	Başakşehir Municipality
Hasan Basri Gül	Başakşehir Municipality (Vice Mayor)
Yasin Kartoğlu	Başakşehir Municipality (Mayor)
Sebahatdin Kayas	Başakşehir Municipality (Vice Mayor)
Aykut Koçak	Aktif Isı (Environment Mgr)
Abdullatif Kurt	Başakşehir Municipality (Vice Mayor)
Selen Kus	Fraunhofer IAO
Ömer Onur	Basaksehir Living Lab
Taceddin Özcan	Başakşehir Municipality (Recycling Chief)
Hüseyin Özdemir	İstanbul Technical University (President Consultant)
Seda Özdemir	İstanbul Metropolitan Municipality (Environment Protection Chief)
Sinan Özkorkmaz	stanbul Organized Industry District (Permissions)
İrem Reis	Aktif Isı (Environment Mgr)
Claudius Schaufler	Fraunhofer IAO
Mehmet Tan	Makro Insaat Tic. A.S. Mimar
Recep Ali Topçu	Adell (Chairman)
Nihat Toprak	Başakşehir Municipality (Building Control)
Rianne Valkenburg	TU/e LightHouse

Fırat Vatan Başakşehir Municipality (Permissions Chief)

BAS 2.2

The only relevant trait to select a participant was the professional background. On the one hand, the selection and characterisation process resulted very constrained as how it started (reduced list that was expanded in snow-ball), particularly regarding the fact that those potential actors were considered based on their technical features. Thus, the participants have good possibilities to provide innovative technical solutions throughout the process

BAS 3.1 achievements

The discussion was framed around the dispute of two urban narratives: one promoting more traditional concrete-based development (through growth), and another one promoting the archetipical green city. In that sense, the discussion was not on adding green elements to the built environment, but to imagine a different built status quo. Then, they could imagine and discuss around a more complex set of topics.

Moreover, critical actors like Istambul Waterworks were not only broadly mentioned during the discussion, but they were even invited to shape the discussions themselves.

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	Smart rubbish collection system (more than 50% of all rubbish is collected)	Creation of public awareness for the last 9 years	Educating children on rubbish and recycling	Park areas are already reserved in city planning	Storage of rain and greywater now included in plans for the buildings.
Policy	6 river beds -> reconstruction to prevent risk of flooding	600 undeground containers now; aim is to cover all municipality	Old establishment = paid by municipality New = paid by constructor	Example areas to promote green to other municipalities	Increase of green m2/pp to over 20m2 (forest area not included)
Internal SH	Treatment facilities for industrial (purple) water -> then inserted in sewage	Metro project -Transportation benefits, but also -Air quality -climate action mitigation	Improve awareness on Climate Change: -training programme for local administration & NGOs	Action plans open to public: online access	Research projects in Istanbul areas: -Air quality measurements (longitudinal) -Emission measures -Data for improvement
External SH	20-40% water provided to industry comes from greywater treatment	Collecting big data on garbage and waste collection -> analysing the patterns	Awareness at government level on greywater treatment	In our culture, water and water treatment are important.	High class construction -> its mandatory to realise water treatment

BAS 3.2 challenges

Some of the challenges described were mostly about the interaction between different SH and the "authority levels". Besides, there is also an authoritarian problem in the sense of lack of transparency as

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well as lack of commitment from the government/politicians side to follow the agreed bases of cooperation with other actors.

The E-SH have a particular worry that the politicians will, in the end, go for a more "safe"/traditional option for investment in urban development, which may be more related to car/concrete-based infrastructure. If the E-SH (and others?) do not find authorities' position worth trusting, how would the process keep on moving forward?

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	1/3 Basaksehir buildings are not right (built) or illegal	Urbanisation of certain areas; planning was not done properly or legally		Infrastructure for rainwater collection and reuse is expensive	Equipment has to be imported from EU/US -> maybe produce technology locally?
Policy	Waste recycling	Expected population in 10 years: 750'000	Air quality -> manufacturing sites	One of the fastest growing municipalities in Istanbul	Indirect problem: -Traffic -aire pollution
Internal SH	No air-pollution monitoring stations in Basaksehir		Issues with responsibility: auditors cannot write penalty	Data not open for development of solutions (regulations)	Conflicts in administration: -Control and authorization
External SH	Turkey, water-poor country by 2030	Create awareness in people on purposes and value of water	Construction companies to change	No respect to water	Auditing of constructions according to legislation (private buildings)

BAS 4.1 aspirations

	Specific actions/results	Processes	Critical actors	Drivers	Consequences
Strategy	Cooking oils separated from liquids (restaurants, mandatory; household, collected)	Rainwater collection and reuse	Public buildings as green buildings	The artificial canal will cross the city and create new opportunities	Maintain the level of green percapita with the 50% population increase
Policy	All changes regarding NBS will be integrated with smart technologies	Optimise the waste production percapita and recycling different waste (paper, plastic…)	Improve air-quality together with manufacturers	Be example to other cities for new application	City of happiness -> Basaksehir
Internal SH	Air pollution monitoring station	Efficient recycling service			Ecological and smart district
External SH	Autonomous waste collection with zero CO2 footprint	A city that protects its water reserves	-Minimize energy use in buildings -Minimize energy use in residents	Mandatory treatment of waste water in all constructions (by government)	Will become waterproof in 2050

BAS 4.2 strategic ambitions

If the FC-CT team has a large influence in the co-cr process, then an effort should be made to provide them with a thorough understanding of NBS. In such regard, Ömer said that only what is known can be wanted or projected towards the future. In that sense it was obvious that a more technological/smart-city oriented type of ideas would be more present than others, specially because of the potential of technology to enhance the NBS performance.

SL

- In 2050 the city is the greenest city and a nice green city for people to move around by foot and bike. All fast transport is realised underground. Every citizen is able to access public transport easily in an integrated transportation system. Each vehicle of the municipality carries an air quality sensor. A data analysis infrastructure and system to monitor air quality is realised.
- In 2050 there is no waste in Başakşehir. Water and waste types are collected separately and recycled to create value
- In 2050 Başakşehir will be an energy self-sufficient city through solar and wind and energy generated by waste. The city even exports energy

PL local

- In 2050 Başakşehir is a green city; a place where people (locals and tourists) come to enjoy the green spaces. The bicycle lanes along the river beds are used with e-bikes to cross the whole city. People are environmentally aware and respect the use of water, energy and other natural (re)sources. Başakşehir is a well-known and prestigious place through this and acts as a role model for Turkey and the world.
- In 2050 Başakşehir is the leading city in waste and water recycling with nature based solutions. Through a zero waste policy and by establishing all infrastructure and systems, all waste is recycled and value is created from waste. Also water is recycled and re-used.
- In 2050 smart buildings in Başakşehir are self-sufficient. A complete use of solar power provides enough energy for e.g. street lighting, use in buildings and charging of cars. Nature based solutions are combined with smart technologies

ESH

- In 2050 the people live their lives responsible. All opportunities are used to save energy or generate renewable energy. The city enjoys zero-emission due to nearly zero energy buildings (incl. historical buildings - where cultural heritage is respected also) and zero-emission mobility solutions.
- In 2050 the city is resilient to climate conditions. The sewage system is making good use of rain and waste water. The city and its buildings do not suffer from floods, benefiting from distributed systems to collect the water
- In 2050 the city is designed around the people (rather than traffic). Open information about current status and local habits of people is used to increase quality of life in the city. People enjoy a clean and safe environment. The city is green and provides shade and nice places to stay

ISH

- In 2050 Başakşehir is a green district where the public space is available for the people to enjoy a green environment with clean air. Traffic is underground, with public transport connecting all areas of the city. Trees on the side of the road and bicycle paths make cycling a real option. All vehicles are electrical and charging options is widely available.

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- In 2050 all water in Başakşehir is re-used. The waste water of industrial areas is treated and available for re-use. There is an efficient and effective audit system with the authorisation to ensure companies comply with the regulations.
- In 2050 Başakşehir has a circular system, which results in zero waste. The service in waste collection is of high quality and efficient. The people are aware of the value and separate their waste. The municipality has the capacity to recycle all different types of waste. Data on availability of resources from waste and demand is used to improve the system.

BAS 4.3 barriers and hurdles

For the present B+H the discussion centered more around elements like the regulations, referring to the interaction between private actors and the State, and the "Turkish mentality", referring to the cultural variables.

This project (and generally the NBS approach) is not important or relevant enough to be a matter of high priority for authorities. In this regard, the advances are in a constant threat --both in present and future-- by the planning and urban development status quo, specially if the larger context --i.e. "the economy"-- is not favourable

ISH

1

Insufficient infrastructure

2

-awareness

-Lack of auditions

-Lack of coordination between institutions

-Lack of knowledge

-Lack of regulations

-Lack of R&D

3

Incentives

finance

ESH

1

-Change in mindset and knowledge level

-Organising our priorities correctly

-Expensive technology or inability of technology

-Laziness of people

-Education

2

-I think all of them are about Turkish people mentality

-Its about money

-It's about rule of our public corporation

3

-Increasing population

-The need for more houses

-Originally industrial, now residential -> industry should be moved

BAS 5.1 scope

The industrial sector was largely benefited from the URM-AS workshops, since they had the chance to shape the discussion around the technology and the opportunities to create value in the project, revealing for them windows to develop business cases.

The city's scope: BAS 2050: Smart city of happiness and well-being

BAS 5.2 general strategic ambitions

Although the technocratic, growth-oriented approach to urban space production (currently the SQ) was over-represented in the URM-AS and shaped the ambitions in its direction, they are still fragile and with no warranty of realisation. In order to be effectively protected they need to get into the MUNICIPAL STRATEGY DOCUMENT, otherwise it won't represent a material for the urban planning.

A particular example comes with the green space m2/pp, which in the current strategy document is thought of a matter of conservation. However, it is FC-CT's aim to actually expand this proportion. Thus, the strategy document needs to be changed in order for it to support "officially" the objectives of the URM, and sort of guaranteeing the accomplishment of the ambitions.

This reflects the importance of the governance context, as in this FC the power of authority is very large.

Green and nature In 2050 Başakşehir is a green city, where people live in harmony with nature and enjoy green spaces, smell the fresh air and hear the sounds of nature. All living creatures are treated equally in their natural environment. The city is well-planned with balance between buildings and uninterrupted nature. All fast transport is realised underground. Every citizens is able to access public transport easily in an integrated system. Trees along paths, green rivers beds and connected green and blue areas make walking and cycling an attractive option. People are environmentally aware and protect nature as their house.

Zero waste water In 2050 not one drop of water is wasted in Başakşehir. All water is collected separately, recycled and used multiple times. The waste water of industrial areas is treated and available for re-use. Rain water is collected, stored and used for e.g. gardening. The people are aware of the value of water and use it wisely, supported by smart technology and knowledge based on data analysis. The government has a zero waste water policy and actively protects water availability. There is an efficient and effective audit system with the authority to ensure companies comply with the regulations.

Circular and self-sufficient In 2050 Başakşehir has a circular system with zero waste. The city is leading in waste recycling with nature based solutions. The people are aware of the value and separate their waste. The municipality has a zero-waste policy and a smart recycling infrastructure is available to capture the value from waste as a resource. Data on the demand and resource availability is used to improve the system. The city is self-sufficient on energy from renewable sources and people respect the use of water, energy and other natural (re)sources

BAS 5.3 ACOB

The opportunities had to be prioritised according to what is more feasible and also more relevant to achieve the ambitions.

Today's reality Achievements:

- A green city: a) 20m2/person (above EU standards), b) policy in strategy document to maintain 20m2, c) planned 5 river bed recreation projects, d) rules established for minimum green in housing sites.
- Smart waste collection system, a) that i) reduces carbon emissions and fuel usage, ii) enables efficient routing through remote monitoring, iii) provides a clean environment for citizens, iv) enables monitoring rubbish data for future planning, b) policy is to have a smart collector for every 100 flats and it is in rules for construction, 2) the plan is to collect 100% of rubbish through smart collection system. Presently 50% is collected in this system.
- Water treatment: a) reuse of treated and rain water in parks, b) policy of grey water treatment in high standard construction projects, c) availability of technology companies working/manufacturing water treatment & saving products + water museum, d) in industrial district it is mandatory for companies to have water treatment facilities and most of them have treatment.
- Reduced CO2 emission: a) use of natural gas - transforming of infrastructure in poor region with natural gas pipeline, b) metro project - several subway lines are under construction within the Başakşehir city, c) climate action plan is ready - by Istanbul Metropolitan Municipality.
- Pro-activeness in energy efficiency: a) policy and rule for putting heat insulation on buildings, b) policy and rule for having centralized heating systems for housing sites, which minimises energy loss, c) policy and recommendations for constructions to maximise use of solar and

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wind energy as well as rain water, d) project that has started to replace standard street lighting poles with 'energy efficient' led light poles**.**

Today's reality Challenges

- Involving positive participation of private sector in implementing NBS solutions: a) construction companies in real estate, b) company owners in manufacturing industry. For i) water treatment, ii) use of rainwater, and iii) solid waste collection & separation.
- Implementing effective control, penalty and reward mechanisms to ensure well-being: a) separation of authority for controlling, penalizing and rewarding, b) especially in the industrial district and private construction audits, c) enforcement of policy through rules and regulations.
- Removing polluting establishments from the city, especially: a) air polluting industry, b) water pollution industry, c) toxic waste creating industry.
- Funding & implementing '0'-waste policy: a) creating public and private awareness, b) developing strategies together with companies and organisations that will apply the strategies, c) putting rules in regulatory document/permits, d) establishing incentive models, e) establishing funding mechanism.
- Approving of city plans for 2050: a) can we include all stakeholders in 2050 city plans for a happy city, b) planning of construction and green sites considering flooding, heat islands, green, c) mobilisation plans for cleaner and slow city, d) infrastructure plans that include smart city, smart data analysis, e) education plans.

Today's reality Opportunities

- Construction permits to be adapted to integrated the rules and regulations for waste and water solutions (NBS) for new constructions, and create incentives for construction companies.
- Motivate people through advice and incentives to leave their individual cars and make use of the (extended) metro, so car traffic is reduced and air becomes cleaner.
- There is already a policy to ensure green and trees are planted to compensate for usage of space for constructions to keep at the level of 20m2 pp green, but enforcement and compliance for the longer term needs to be improved.
- To include a big park in every district in the city plans, big enough to be able to wander around in nature. Ensure collaboration with, and commitment of government for non-municipal owned areas in and around the city.
- Increase knowledge on climate changes and impact, also to parents and entrepreneurs through education programs. Use the smart lighting poles not only for energy saving, but also to collect data (through sensors) and data analysis, also as input for education programs.

Today's reality Barriers

- Money: a) how do we fund, b) profit (quick) oriented mentality, c) lack of incentive models.
- Lack of knowledge
- Lack of rules & regulations: a) treatment regulations, b) construction regulations, c) implementation control of rules and regulations, d) authority separation and coordination between institutions regarding same issue.
- Prioritisation and policies: a) Turkish mentality of short term benefits (i.e. elections, profits etc.), b) lack of having policies and targets in institutions 4/5 year strategy plans, c) hence how priority for R&D, infrastructure, education and regulation development.
- Willingness to grow population, due to: a) economic benefits rather than other benefits, b) branding of being BIG.

BAS 6.1 participants' feedback

The SH groups received the workshop very well, according to the FC-CT, and they are engaged to keep on participating in the following stages of the URM.

8.2 Treated interview results

8.2.1 CoCr2Comm i: CoCr purpose

Objectives:

Interview guideline sections: 2.2, 5.1, 5.2, 5.3, 6.1

No register of satisfaction of knowledge and expertise in participation and environment

No register of satisfaction of expectations from the scope

Regarding SH's influence:

a) the technocratic approach would be over-represented in each SH category (high level government officials in PL-SH; experts in I-SH, and industrial sector in the E-SH). However, it is clear that the largest influence lays on the side of the Mayor's agenda, which was prioritised for the ambitions over the rest's. According to Ömer, this was also an strategic issue, in order to prevent the effort from being dismissed (confronted or simply ignored) by the high-level municipal authorities.

Overarching ambitions clustered by FC-CT

Regarding FC-CT's satisfaction with general ambitions

a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beginning with the three topics of the ambitions.

b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with similar professional backgrounds and epistemic frameworks.

Overarching ACOB clustered by FC-CT

Low to mid avoidance/exploitation of barriers and opportunities

SH's Feedback thru closure session at the workshop

Regarding participants' feedback

a) the SH feedback is mostly neglected, and thus they have no impact on the planning of further workshops.

b) there are no continual activities, they just are informed of the results

c) the role of participants is mainly reserved to participate in the activities and be informed of the results and following steps; they are not asked to help manage the URM activities.

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SH inclusion

Interview guideline sections: 1.1, 2.1, 2.2, 4.3, 5.1, 5.2, 5.3, 6.1

No method was used for invitation

Regarding invitation process

a) There was a top-down SH identification process, in which municipality provided information of potential partners from the industry/private sector in the areas of action /sectors which were previously defined for the focus.

a1) The method followed was a sort of snowball from the top. First they received the Mayor's vision of the project and his approval --to them, this SH is a key issue, as political will determines their range of action--, and the municipality provided a list of industrial partners that may be relevant because they have focus/experience in providing environmental solutions --in the environmental engineering way.

b) no SH map

c) They had personal meetings with these SH and then received from them further advice regarding who to invite --snowballing from there. Those who were interested were so because they saw the potential of a business case that NBS and UNaLab offer.

Professional background was the only criteria for E-SH and I-SH

Regarding participants' profile:

a) For the SL-SH and PL-SH they didn't have much of a criteria because they just have to work with whoever represents the positions in the government. However, FC-CT deliberately chose not to include more diverstiy than professional background for the I-SH and E-SH. This was not only because the list provided by the municipality, but their overall process for selecting participants was based on the potential provision of technical solutions they needed for the already decided focus. In this regard, the E-SH were composed of technical profiles such as entrepreneurs, start-ups and potential users of NBS (instead of citizens)

b) They left behind the look for diverse inputs and perspectives from other SH. In this case the Co-creation process is composed by municipality experts, entrepreneurs and other users that provide material to develop solutions, not to ask questions.

Each SH group found B+H in the present

No SH group found B+H in the future

Regarding FC-CT's satisfaction with general ambitions

a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.

b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with similar professional backgrouds and epistemic frameworks.

Overarching ambitions clustered by FC-CT

SH's Feedback thru closure session at the workshop

Regarding SH feedback

a) the SH feedback is mostly neglected, and thus they have no impact on the planning of further workshops.

b) there are no continual activities, they just are informed of the results

c) the role of participants is mainly reserved to participate in the activities and be informed of the results and following steps; they are not asked to help manage the URM activities.

Knowledges experiences

Interview guideline sections: 2.2, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

No register of satisfaction of knowledge and expertise in participation and environment

Regarding participant cross-cutting experience in topics related to URM-AS:

They were inviting industries which sector would be compatible with the NBS topic.

Regarding achievements and challenges:

a) achievements and challenges were based on the "green city" narrative but leaning heavily on the technicl (technocratic, even) edge of it --close to the sustainability fix concept. There was little consideration of diversity and thus the SH groups were representing similar agencies -- government and private sector that usually works with government. For instance, a relevant axis at which discussions revolved around was the "value generation".

All SH groups consistent with PL-SH aspirations

Regarding consensus for aspirations

a) influence of the 3 main ambitions result very clear in the aspirations. this reflects how the FC-CT vision and that of the high-level municipal authorities has a large influence in the final co-created result.

All SH groups consistent with PL-SH ambitions

Regarding consensus for ambitions

a) Skewed understanding of NBS, leaning more towards "green technologies", particularly related to material metabolic flows (rain harvesting, green technologies for energy production, etc.), more than UES provision.

Each SH group found B+H in the present

No SH group found B+H in the future

Regarding consensus for B+H

a) the FC-CT guided the discussion around context-specific traits that add up for the challenges, like the governance arrangements between actors and cultural traits.

c) the SH groups recognised in the governmental side potential difficulties regarding the priorisation the NBS may receive. It could be reflected in terms of budgeting, capacity building, institutional development and so on

PL-SH with larger influence on the scope

Regarding SH's influence on scope:

a) the technocratic approach would be over-represented in each SH category (high level government officials in PL-SH; experts in I-SH, and industrial sector in the E-SH). However, it is clear that the largest influence lays on the side of the Mayor's agenda, which was prioritised for the ambitions over the rest's. According to Ömer, this was also an strategic issue, in order to prevent the effort from being dismissed (confronted or simply ignored) by the high-level municipal authorities.

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Conflicts

Interview guideline sections: 1.1, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

No capacity building for FC-CT in facilitation soft-skills

Regarding achievements and challenges:

> *a) achievements and challenges were based on the "green city" narrative but leaning heavily on the technicl (technocratic, even) edge of it --close to the sustainability fix concept. There was little consideration of diversity and thus the SH groups were representing similar agencies -- government and private sector that usually works with government. For instance, a relevant axis at which discussions revolved around was the "value generation".*

All SH groups consistent with PL-SH aspirations

Regarding consensus for aspirations

> *a) influence of the 3 main ambitions result very clear in the aspirations. this reflects how the FC-CT vision and that of the high-level municipal authorities has a large influence in the final co-created result.*

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No SH group found B+H in the future

Regarding consensus for B+H

> *a) the FC-CT guided the discussion around context-specific traits that add up for the challenges, like the governance arrangements between actors and cultural traits.*
>
> *c) the SH groups recognised in the governmental side potential difficulties regarding the priorisation the NBS may receive. It could be reflected in terms of budgeting, capacity building, institutional development and so on*

PL-SH with larger influence on the scope

Regarding SH's influence on scope:

> *a) the technocratic approach would be over-represented in each SH category (high level government officials in PL-SH; experts in I-SH, and industrial sector in the E-SH). However, it is clear that the largest influence lays on the side of the Mayor's agenda, which was prioritised for the ambitions over the rest's. According to Ömer, this was also an strategic issue, in order to prevent the effort from being dismissed (confronted or simply ignored) by the high-level municipal authorities.*

Overarching ambitions clustered by FC-CT

Regarding satisfaction with general ambitions

> *a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.*
>
> *b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with similar professional backgrouds and epistemic frameworks.*

8.2.2 CoCr2Comm ii: CoCr Interaction arena

Interaction

Interview guideline sections: 1.1, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

No capacity building for FC-CT in facilitation soft-skills

Regarding achievements and challenges:

> *a) achievements and challenges were based on the "green city" narrative but leaning heavily on the technicl (technocratic, even) edge of it --close to the sustainability fix concept. There was little consideration of diversity and thus the SH groups were representing similar agencies -- government and private sector that usually works with government. For instance, a relevant axis at which discussions revolved around was the "value generation".*

All SH groups consistent with PL-SH aspirations

Regarding consensus for aspirations

> *a) influence of the 3 main ambitions result very clear in the aspirations. this reflects how the FC-CT vision and that of the high-level municipal authorities has a large influence in the final co-created result.*

All SH groups consistent with PL-SH ambitions

Regarding consensus for ambitions

> *a) Skewed understanding of NBS, leaning more towards "green technologies", particularly related to material metabolic flows (rain harvesting, green technologies for energy production, etc.), more than UES provision.*

Each SH group found B+H in the present

No SH group found B+H in the future

Regarding consensus for B+H

> *a) the FC-CT guided the discussion around context-specific traits that add up for the challenges, like the governance arrangements between actors and cultural traits.*
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PL-SH with larger influence on the scope

Regarding SH's influence on scope:

> *a) the technocratic approach would be over-represented in each SH category (high level government officials in PL-SH; experts in I-SH, and industrial sector in the E-SH). However, it is clear that the largest influence lays on the side of the Mayor's agenda, which was prioritised for the ambitions over the rest's. According to Ömer, this was also an strategic issue, in order to prevent the effort from being dismissed (confronted or simply ignored) by the high-level municipal authorities.*

Overarching ambitions clustered by FC-CT

Regarding satisfaction with general ambitions

> *a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.*

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b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with similar professional backgrouds and epistemic frameworks.

Overarching ACOB clustered by FC-CT

SH's Feedback thru closure session at the workshop

Regarding participants' feedback

a) the SH feedback is mostly neglected, and thus they have no impact on the planning of further workshops.

b) there are no continual activities, they just are informed of the results

c) the role of participants is mainly reserved to participate in the activities and be informed of the results and following steps; they are not asked to help manage the URM activities.

Environment

Interview guideline sections: 3.1, 3.2, 4.3, 5.1, 5.2, 5.3, 6.1

Regarding achievements and challenges:

a) achievements and challenges were based on the "green city" narrative but leaning heavily on the technicl (technocratic, even) edge of it --close to the sustainability fix concept. There was little consideration of diversity and thus the SH groups were representing similar agencies -- government and private sector that usually works with government. For instance, a relevant axis at which discussions revolved around was the "value generation".

Regarding consensus for B+H

a) the FC-CT guided the discussion around context-specific traits that add up for the challenges, like the governance arrangements between actors and cultural traits.

c) the SH groups recognised in the governmental side potential difficulties regarding the priorisation the NBS may receive. It could be reflected in terms of budgeting, capacity building, institutional development and so on

Overarching ambitions clustered by FC-CT

Regarding satisfaction with general ambitions

a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.

b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with

Low to mid avoidance/exploitation of barriers and opportunities

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c) the role of participants is mainly reserved to participate in the activities and be informed of the results and following steps; they are not asked to help manage the URM activities.

Facilitation

Interview guideline sections: 1.1, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

Regarding consensus for aspirations

a) influence of the 3 main ambitions result very clear in the aspirations. this reflects how the FC-CT vision and that of the high-level municipal authorities has a large influence in the final co-created result.

Regarding consensus for ambitions

a) Skewed understanding of NBS, leaning more towards "green technologies", particularly related to material metabolic flows (rain harvesting, green technologies for energy production, etc.), more than UES provision.

Regarding consensus for B+H

a) the FC-CT guided the discussion around context-specific traits that add up for the challenges, like the governance arrangements between actors and cultural traits.

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PL-SH with larger influence on the scope

Regarding SH's influence on scope:

a) the technocratic approach would be over-represented in each SH category (high level government officials in PL-SH; experts in I-SH, and industrial sector in the E-SH). However, it is clear that the largest influence lays on the side of the Mayor's agenda, which was prioritised for the ambitions over the rest's. According to Ömer, this was also an strategic issue, in order to prevent the effort from being dismissed (confronted or simply ignored) by the high-level municipal authorities.

Overarching ambitions clustered by FC-CT

Regarding satisfaction with general ambitions

a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.

b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with similar professional backgrouds and epistemic frameworks.

Low to mid avoidance/exploitation of barriers and opportunities

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8.2.3 CoCr2Comm iii: CoCr Enhancing coll. Action

Agency

Interview guideline sections: 1.1, 2.1, 2.2, 4.1, 4.3, 5.1, 5.2, 5.3, 6.1

No capacity building for initiating collaborative initiatives

No capacity building for FC-CT in facilitation soft-skills

Regarding invitation process

> *a) There was a top-down SH identification process, in which municipality provided information of potential partners from the industry/private sector in the areas of action /sectors which were previously defined for the focus.*
>
> *a1) The method followed was a sort of snowball from the top. First they received the Mayor's vision of the project and his approval --to them, this SH is a key issue, as political will determines their range of action--, and the municipality provided a list of industrial partners that may be relevant because they have focus/experience in providing environmental solutions --in the environmental engineering way.*
>
> *b) no SH map*
>
> *c) They had personal meetings with these SH and then received from them further advice regarding who to invite --snowballing from there. Those who were interested were so because they saw the potential of a business case that NBS and UNaLab offer.*

Regarding participant cross-cutting experience in topics related to URM-AS:

> *They were inviting industries which sector would be compatible with the NBS topic.*

Regarding consensus for aspirations

> *a) influence of the 3 main ambitions result very clear in the aspirations. this reflects how the FC-CT vision and that of the high-level municipal authorities has a large influence in the final co-created result.*

Regarding consensus for B+H

> *a) the FC-CT guided the discussion around context-specific traits that add up for the challenges, like the governance arrangements between actors and cultural traits.*
>
> *c) the SH groups recognised in the governmental side potential difficulties regarding the priorisation the NBS may receive. It could be reflected in terms of budgeting, capacity building, institutional development and so on*

Overarching ambitions clustered by FC-CT

Regarding satisfaction with general ambitions

> *a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.*
>
> *b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with similar professional backgrouds and epistemic frameworks.*

Overarching ACOB clustered by FC-CT

Low to mid avoidance/exploitation of barriers and opportunities

SH's Feedback thru closure session at the workshop

Regarding participants' feedback

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c) the role of participants is mainly reserved to participate in the activities and be informed of the results and following steps; they are not asked to help manage the URM activities

Decision making

Interview guideline sections: 2.1, 2.2, 3.1, 3.2, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 6.1

No method was used for invitation

Professional background was the only criteria for E-SH and I-SH

Regarding participant cross-cutting experience in topics related to URM-AS:

They were inviting industries which sector would be compatible with the NBS topic.

Regarding achievements and challenges:

a) achievements and challenges were based on the "green city" narrative but leaning heavily on the technicl (technocratic, even) edge of it --close to the sustainability fix concept. There was little consideration of diversity and thus the SH groups were representing similar agencies -- government and private sector that usually works with government. For instance, a relevant axis at which discussions revolved around was the "value generation".

All SH groups consistent with PL-SH aspirations

Regarding consensus for aspirations

a) influence of the 3 main ambitions result very clear in the aspirations. this reflects how the FC-CT vision and that of the high-level municipal authorities has a large influence in the final co-created result.

All SH groups consistent with PL-SH ambitions

Regarding consensus for ambitions

a) Skewed understanding of NBS, leaning more towards "green technologies", particularly related to material metabolic flows (rain harvesting, green technologies for energy production, etc.), more than UES provision.

Each SH group found B+H in the present

No SH group found B+H in the future

Regarding consensus for B+H

a) the FC-CT guided the discussion around context-specific traits that add up for the challenges, like the governance arrangements between actors and cultural traits.

c) the SH groups recognised in the governmental side potential difficulties regarding the priorisation the NBS may receive. It could be reflected in terms of budgeting, capacity building, institutional development and so on

PL-SH with larger influence on the scope

Regarding SH's influence on scope:

a) the technocratic approach would be over-represented in each SH category (high level government officials in PL-SH; experts in I-SH, and industrial sector in the E-SH). However, it is clear that the largest influence lays on the side of the Mayor's agenda, which was prioritised for the ambitions over the rest's. According to Ömer, this was also an strategic issue, in order to prevent the effort from being dismissed (confronted or simply ignored) by the high-level municipal authorities.

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Overarching ambitions clustered by FC-CT

Overarching ACOB clustered by FC-CT

Low to mid avoidance/exploitation of barriers and opportunities

SH's Feedback thru closure session at the workshop

Regarding participants' feedback

a) the SH feedback is mostly neglected, and thus they have no impact on the planning of further workshops.

b) there are no continual activities, they just are informed of the results

c) the role of participants is mainly reserved to participate in the activities and be informed of the results and following steps; they are not asked to help manage the URM activities.

8.2.4 NBS4UGC i: NBS understanding

Literacy

Interview guideline sections: 2.2, 4.2, 6.1

Report elements: SH's contributions

Professional background was the only criteria for E-SH and I-SH

Regarding participant cross-cutting experience in topics related to URM-AS:

They were inviting industries which sector would be compatible with the NBS topic.

Partial use of NBS as driver for the ambition from all SH

NBS in the SES

Interview guideline sections: 4.2, 5.2, 5.3, 6.1

Report elements: FC's *today's reality*, scope and general ambitions

Partial use of NBS as driver for the ambition from all SH

Regarding satisfaction with general ambitions

a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.

b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with similar professional backgrouds and epistemic frameworks

8.2.5 NBS4UGC ii: NBS influencing the SES

Complexity

Interview guideline sections: 2.2, 3.1, 3.2, 4.1, 4.3, 5.3, 6.1

Report elements: SH's contributions, FC's scope and general ambitions

Regarding participant cross-cutting experience in topics related to URM-AS:

They were inviting industries which sector would be compatible with the NBS topic.

Regarding achievements, medium recognition of complexity from all SH

Regarding challenges, medium recognition of complexity from I-SH and E-SH

Regarding aspirations, low recognition of complexity from all SH

No SH group found B+H in the future

Technocentric v situated

Interview guideline sections: 2.2, 4.2, 5.2, 6.1

Report elements: FC's general and strategic ambitions

Professional background was the only criteria for E-SH and I-SH

Regarding participants' profile:

a) For the SL-SH and PL-SH they didn't have much of a criteria because they just have to work with whoever represents the positions in the government. However, FC-CT deliberately chose not to include more diverstiy than professional background for the I-SH and E-SH. This was not only because the list provided by the municipality, but their overall process for selecting participants was based on the potential provision of technical solutions they needed for the already decided focus. In this regard, the E-SH were composed of technical profiles such as entrepreneurs, start-ups and potential users of NBS (instead of citizens)

b) They left behind the look for diverse inputs and perspectives from other SH. In this case the Co-creation process is composed by municipality experts, entrepreneurs and other users that provide material to develop solutions, not to ask questions.

Partial use of NBS as driver for the ambition from all SH

All SH groups consistent with PL-SH ambitions

Regarding consensus for ambitions

a) Skewed understanding of NBS, leaning more towards "green technologies", particularly related to material metabolic flows (rain harvesting, green technologies for energy production, etc.), more than UES provision.

Regarding FC-CT's satisfaction with general ambitions

a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.

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Participants

Interview guideline sections: 5.3, 6.1

Report elements: SH's contributions, FC's strategic ambitions

(Without answer from interviews)

8.2.6 NBS4UGC iii: Governing the NBS

Politisation

Interview guideline sections: 2.2, 4.2, 5.1, 5.3, 6.1

Report elements: SH's contributions, FC's strategic ambitions

All SH groups consistent with PL-SH ambitions

Regarding consensus for ambitions

> *a) Skewed understanding of NBS, leaning more towards "green technologies", particularly related to material metabolic flows (rain harvesting, green technologies for energy production, etc.), more than UES provision.*

PL-SH with larger influence on the scope

Regarding SH's influence on scope:

> *a) the technocratic approach would be over-represented in each SH category (high level government officials in PL-SH; experts in I-SH, and industrial sector in the E-SH). However, it is clear that the largest influence lays on the side of the Mayor's agenda, which was prioritised for the ambitions over the rest's. According to Ömer, this was also an strategic issue, in order to prevent the effort from being dismissed (confronted or simply ignored) by the high-level municipal authorities.*

Impacts

Interview guideline sections: 4.2, 6.1

Report elements: SH's contributions, FC's strategic ambitions

Partial use of NBS as driver for the ambition from all SH

Regarding consensus for ambitions

> *a) Skewed understanding of NBS, leaning more towards "green technologies", particularly related to material metabolic flows (rain harvesting, green technologies for energy production, etc.), more than UES provision.*

8.2.7 NBS4UGC iv: NBS in planning

Mainstream

Interview guideline sections: 4.2, 5.3, 6.1

Report elements: FC's scope, general and strategic ambitions

Partial use of NBS as driver for the ambition from all SH

Low to mid avoidance/exploitation of barriers and opportunities

In planning

Interview guideline sections: 4.2, 4.3, 5.2, 5.3, 6.1

Report elements: FC's general and strategic ambitions

Partial use of NBS as driver for the ambition from all SH

Each SH group found B+H in the present

No SH group found B+H in the future

Regarding satisfaction with general ambitions

> *a) the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office, thus there was a clear commitment from the beggining with the three topics of the ambitions.*
>
> *b) the technical oriented ambitions (greening, waste-water and circularity) were defined by groups with similar professional backgrouds and epistemic frameworks.*

Low to mid avoidance/exploitation of barriers and opportunities

European Commission

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8.3 Characterisation of CoCr

CoCr2Comm i

CoCr objectives

- What is the deliverable
    - Who's the final user?
        - **Municipality, Basasksehir ULL, FC-CT**
    - The scope of the deliverable
        - **Smart city of happiness and well-being**
        - **Three prioritary areas: urban greening, waste-water and self-sufficiency**
        - **The aim is to influence the Municipal Strategy so the ambitioned scenarios are officially bound to the municipal action.**
- What are the sources for legitimacy
    - **More focus on technical and data-based solutions than social institutions.**
    - **The three ambitions were previously delimited, so the aim was to get technical input to nourish these guidelines**
    - **Professional background is a warranty that technical innovations were possible for the guidelines: output legitimacy.**
    - **Such top-down strategy doesn't get its strength from collaboration, but it might get actual changes**

SH inclusion (representation)

- Diversity
    - **No need of problematising the project with diverse insights, rather getting enough technical capacities.**
    - **No representation of diverse groups; just government and companies**
    - **Inputs come from technocentric approach; local cultural background and mental models are even considered as a barrier.**
- Marginalisation
    - **The approach to participant selection relies on a network of previously connected actors that collaborate for planning and environmental solutions.**
    - **Whoever out of the network –with the Mayor as the central node—is *de facto* marginalised from the CoCr process.**
    - **There's a recognised *challenge* to include properly all SH in planning.**
    - **Participants have no impact on the planning of further workshops.**
- Accessibility
    - **An ambition is to have accessible city for all, from mobility perspective.**

Interaction of knowledges / experiences

- Hegemonic scientific knowledges vs situated knowledges

- Legitimacy/primacy
  - **CoCr arena that relies heavily on authorities and experts.**
  - **Professional background is the most important criteria for invitation**
  - **Technical green solutions to adapt the technocentric SQ to climate change.**
  - **Large focus on metabolic flows and green technologies**
  - **Representatives of industries that would be compatible to FC-CT NBS idea.**
- Reflexivity
  - **The top-down approach to setting the areas of action prior to workshops derives from the FC-CT experiences in dealing with the governmental authorities.**
  - **Although the scope aims for a different urban production, participants' platform is still technical driven.**
  - **"Only what is known can be wanted for the future"**

- Challenge to management/ planning/ governing status quo
  - **Industrial/business opportunities shape the ambitions.**
  - **Playing along hierarchical and authoritative process.**
  - **"All living creatures are treated equally" in BAS SES, Ambition**
  - **Collaboration and transparency in decision making is not the norm; ESH are doubtful of PL commitment.**

Conflicts through the process

- Provision of agonistic/deliberative spaces
  - **No local built capacities for facilitation, FC-CT**
  - **Actors from the same network; similar experiences**
  - **No explicit space for dissent; imposed consensus on the ambition guidelines**
  - **Sweet spot found by BAS ULL between participation and realisation of project?**
- Manifestation of power-in-action
  - **Technocratic approaches perceived as necessary for transformation (data driven; autonomous; technical elites/privates were the only ones in the table) *Knowledge***
  - **PL through mayor's figure has the last word; also his blessing is what determines if the present ambitions will be worked on; *Authority***
  - **"Low confidence to institutions and politicians", ESH; local cultural/behavioural traits (mental models) are considered as *barriers*; those usually not represented nor taken into account in planning (regular disempowered citizens) and affected by current SQ are excluded from the action situation *Subjectivity***

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CoCr2Comm ii

Interaction of participants

- Who initiates and guides?
    - **WP6 activities initiated by FT, providing information on the URM.**
    - **I-SH in the role of FC-CT organises the workshop itself.**
    - **FT guides workshops**
    - **FC-CT initially designed ambitions, then had them reviewed and approved by the mayor**
- Integration of diverse SH
    - **No method provided in URM. List of actors suggested by the mauor, then they received suggestions about who else could be interested. A network was created with the mayor at the center.**
    - **E-SH is only SH group outside the government; all of them are businesses except for the Technical University**
    - **Industrial actors were selected based on their proximity to the NBS topic and environmental solutions expertise**
    - **Diversity was not needed to decide which would be the range of action of the strategy, that was settled before the URM AS**

Workshop environment

- Structure
    - **Based on the URM: assessing the present conditions and then aim for a concrete scenario.**
    - **the overarching topics were actually defined prior to the URM-AS workshop by the FC-CT and then reviewed and approved by the Mayor's office**
- Project time-frame
    - **Until May 2020 for the FC-attuned roadmap; until June 2022 for the end of the project**
- Activity (stage) time-frame
    - **1st day for PL-SH (workshop + individual interviews) and SL-SH (workshop)**
    - **2nd day for I-SH workshop and E-SH workshop**
    - **3rd day for clustering and synthesising inputs; output creation.**
- Mutual learning
    - **SH groups working separately during the workshop**
    - **SH groups are expected to contribute based solely on their stakes.**
    - **Present ESH are part of a network of collaborators with State, so there is a sort of knowledge of each other**
    - **similar professional backgrouds and epistemic frameworks. Wouldn’t more diversity disrupt the group’s homogeneity and spark further discussions?**

- **Participant SH's feedback in closure session**
- **Low chance of learning from each other if the ambitions are previously defined and clustered at the end**
- **Sh's feedback has no impact over planning of other workshops.**
- **Can SH learn from governmental actors?**

Facilitation

- Approach and tools
  - **Preparation of results (presenting the ambitions and calling the mayor… is that part of BAS ULL learning curve?)**
  - **No tools to use**

CoCr2Comm iii

Agency enablement

- FC-CT capacity building in collaborative activities
  - **Training to initiate the activities**
  - **Materials received to carry out the workshops**
  - **Shared experiences from Stavanger's**
  - **No local capacity building for facilitation**
  - **Lessons learned for further workshops**
  - **Use of existing skills for initiating the activities, from the BAS-ULL experience**
- Participants capacity building
  - **Participants were actually invited because of their technical capacities in environomental solutions**
  - **Unwanted "Turkish mentality"; mental models as abrriers rather than sourches of innovations**
  - **Currently, "low public awareness"**
- Fostering local resourcefulness
  - **Althouh maybe fostering local business/R+D, there is no focus on commonwealth**
  - **No use of locals' resources for further workshops**
  - **Promote NBS in local events, *Opportunities***

Collective action and decision making

- Roles of participant SH in CoCr (table)
  - **FC-CT designing the initial ambitions, then reviewed and approved by the mayor**
  - **FC-CT+FT synthesising and clustering in the end**

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- **PL with larger influence**
- **ISH providing critical technical insights (Istambul waterworks)**
- **PL usually very involved with IPR and good insights; time restrictions were contrary this tiime**
- **According to characterisation**
  - FC-CT: **strategists**
  - **FT+FC-CT: steward and mediator; experts;**
  - **I-SH: experts; co-designer**
  - **PL: authority; strategists**
  - **SL: experts**
  - **E-SH: co-designer**

- Who makes the rules?
  - **Who participated was *de facto* decided top down, through the SH invitation**
- What is required from each participant at this stage?
  - **PL to provide prior approval to frame action**
  - **SH groups to provide insights from their own perspective**
  - **ESH: technical expertise in environmental solutions**
  - **ISH: technical insights to the public infrastructure**
  - **PL: high & lowlights; priorities; aspirations; ambitions**
  - **SL: high & lowlights; aspirations; ambitions**
  - **ESH-ISH: high & lowlights; aspirations; ambitions; barriers and hurdles**
- Activities' influence on urban governing.
  - **Aiming to influence the municipal strategy**
  - **Workshop itself does not develop ownership**
- Partner-State
  - **For command and control; top-down approach**
  - **State with last word on the strategy**
  - **High barrier of entrance; only if previous ly acknowledged by the State**
  - **There's low confidence in State's commitment to urban SES production paradigm shift**

8.4 Characterisation of NBS

NBS4UGC i

NBS and UES literacy

- UES provision
    - **Achievement: 20 m2/pp of greenspace, the intention is to increase it**
    - **Ambition: UES provision fundamental for 2050**
        - **Cultural: accessible green spaces for mobility habits; contemplative; recreational**
    - **Describinf overall benefit of solution in the system, not mentioning the UES themselves**
- UGI
    - **Ambitions integrating SMART technologies into the UGI**
    - **Ambitions: infrastructural changes frame behavioural changes**
    - **Intention of connecting green and blue areas**
- NBS approach and intervention
    - **Broad application of NBS; even influences waste system (policy and infrastructure)**
    - **Large focus on the metabolic aspect of NBS, for its optimisation**
    - **Largely responsibility of State: privates must act on their companies, which would be strongly audited by the State**
    - **Citizens are passive actors in the strategy**
    - **Scope: focus on "happiness and well-being".**

Framing NBS in the SES

- UGI needs and connections (node and link)
    - **Clear policy standards for spatial protection o ecological subsystem**
    - **Recognised tension for land uses; UGI patches compete with conventional development**
    - **UGI nodes provide benefits to citizens but citizens don't' give back; only protection or "respect".**
    - **Ambition: circular water management to maintain**
    - **PL ambition: value of city's agricultural identity; a cultural heritage**
    - **ES barrier: Competition for urban space**
    - **Ambition: circular water management to maintain the UGI**
- Ecosystem functioning
    - **Opportunities: "value model for ES"**

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- Which robustness is sought?
  - **Focus on resource flows: closing loops with technology; resource efficiency**
  - **Looking for a balance between built environment and uniterrumpted natur**
- Connection
  - How are UGI patches connected across the urban SES?
    - **Ambitions: "Trees alongside patches" "green river beds" and "interconnected green and blue"**

NBS4UGC ii

Understanding complexity

- The relations between the SES components
  - **Scope's "happiness and well-being" addresses multiple variable issues, but general ambitions rely mostly on technical solutions**
  - **Achievements: contributions reflect on complexity, but don't go too deep.**
  - **Challenges: ESH perceived interactional and system level drawbacks from the government: trust and urban SES production inertia.**
  - **Cultura traits are considered as barriers and hurdles**

Who participates in the UES provision

- Articulate value or planning (ex-situ influence)
  - **Only criteria for invitation to URM-AS was professional background**
  - **Citizens thought as receivers of the UES**
  - **State is the largest actor as it designs policy and decides infrastructure**
  - **Challenge: creating public awareness**
  - **Challenges: include all SH for 2050 strategies**
  - **Achievement: 20 m2/pp green space**
  - **Challenge: lack of enhancing NBS potential through policy, rules and incentives**
  - **Opportunity: educational programmes for parents and entrepreneurs**
- maintenance or protection (in-situ influence)
  - **State is the largest actor for managing**
  - **Ideally citizens are stewards**
  - **No specific mention to UES co-production**
  - **State's command ad control approach to pressure privates into NBS**

Technocentric v situated interventions

- **Participant selection based on the technical input they could provide to already decided focus**
- **FC-CT (technical) devised focus; reviewed and approved by hihgh-level municipal authority**
- **Focus on green technologies**
- UES prioritised
    - **Regulation: clean air**
    - **Cultural: cohesion, impact on citizens habits**
    - Inputs needed:
        - **(ISH) circular systems; technological development for crean and efficient**
    - Evaluative criteria for the provision
        - **PL ambition: resource self-sufficiency; BAS as a rolemodel**
        - **SL ambition: people move on bikes and walk**
        - **ISH zero waste**

NBS4UGC iii

Politisation of NBS producing the SES

- Investment
    - Who pays and who expects a return?
    - **State command and control; invest in systems (policy and infrastructure)**
    - **PL achievements: environmentally friendly technology is paid by constructors, not the state**
    - **Barriers: profits and quick-return-oriented practices**
    - **Barrier: large investment that requires funding for the systems**
- Location
    - What determines the location?
    - **Opportunities: city-wide interventions**
    - **1 big park per district**
    - **Interventions in business**
- Management / governance
    - Who decides the collective and operational rules?
        - **Barriers: state: treatment, construction, implementation regulations needed!**
        - **Ambition effective audit system -> pushed by the state**

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        - **Opportunities: enforcement and compliance of green is to be improved**
    - Power relations (ideology) shaping decision making
        - **Municipal strategy as document with largest authority in planning**
        - **Without high -level political commitment from the start, UNaLab wouldn't deliver**
        - **Challenge: rule-making, controlling and penalizing is all concentrated**
        - Market oriented v common
            - **PL+SL ambition: creating value from waste water**
            - **Ambition: accessible and attractive UGI and UBI**
            - **Challenge: including privates in implementing NBS**

Benefits of the NBS though in the realm of...

- **Partial use of NBS as a driver for the ambitions**
- Climate change
    - Adaptation
        - **Opportunities: water circularity to attend scarcity**
        - **Using UGI and UBI for lifestyle changes**
    - Mitigation
        - **Challenge: moving polluting industry away; but not finishing it**
    - Risk reduction
        - **Ambition + achievement: riverbed renaturation to prevent fooding**
        - **Challenge: improve air quality and emissions by pushing back industry**
- Social subsystem
    - economic
        - Production
            - **Better environmental performance for businesses**
            - **NBS driving water and waste valorisation**
        - Private/common benefits
            - **Achievements + opportunities: NBS driving more accessible mobility**
    - societal
        - Awareness rising
            - **Ambition: "people use water wisely"**
        - Capacity building

- **Educational programmes for parents and entrepreneurs, but on the technocratic side**

- Civic ecology
  - **Challenges: "Turkish mentailit" of quick returns**
  - **ESH achievements: "in our culture" water is important**

- Aggregated vs distributed benefits
  - **Aggregated:**
    - **Happiness, education and awareness**
    - **Ambition: UGI and ubi for recreation and life quality**
    - **PL ambition: mobility is clean and affordable**

NBS4UGC iv

Mainstream for their long-term effect

- Capacity building (direct)
  - **Developing capacities of private actors to comply with regulations**
  - **ISH barriers: knowledge and tools for strategic and systemic planning.**
- Social institutions (bottom-up)
  - **Barriers (General + ESH): Turkish mentality is discredited for environmental protection**
- Legal frameworks (top-down)
  - **Barriers: lack of rules and regulations**
  - **Ambition: policy for solid wastes and waste water:**

NBS in planning strategies

- Complementing strategies / actions
  - **Get NBS strategy into the municipal strategy**
  - **Barriers: low incentives for R+D and long term investments**
  - **Challenge: ongoing policu for energy efficiency**
  - **Challenge: creation of zero-waste municipality**
  - **Challenge: industrial policu for pullition in BAS**
- Support of the State / influence on the State
  - SH influencing the decision making
  - **PL with large influence and the last word; both in the action situation and in policy**
  - **Lack of trust from ESH in State**

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