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Replication and Scale Up Report

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Summary

Cities are at the forefront of climate action. To support their transition to climate neutrality, the EU Mission for Smart and Climate Neutral has been set up by the European Commission. It will assist cities to overcome the current structural, institutional and cultural barriers they face in order to achieve climate neutrality by 2030. Within the project, knowledge transfer, peer learning, and in the end the replication and scale-up of results will be crucial to achieving this objective. More, maximising the exploitation of results towards the numerous cities and towns in Europe will be critical for the EU to achieve climate neutrality by 2050. As such, the aim of this report is to gather existing knowledge on replication, looking into a great variety of sources, to identify the barriers and drivers usually faced in European projects. Based on this analysis, the reports then set out a replication framework where the focus is put on cities, and breaking down the replication process into actionable steps, including recommendations and examples. This framework is expected to feed into other tasks part of WP5, and as such foster replication within and outside of NZC.

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Replication and Scale-Up Report

Deliverable D5.1

Version N°1

Authors: Simon Gresset (ICLEI Europe)

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Abbreviations and acronyms

Acronym	Description
CCC	Climate City Contract
EC	European Commission
EU	European Union
NZC	NetZeroCities
SCCC	Smart Cities and Communities Cluster
WP	Work Package

Summary

Cities are at the forefront of climate action. To support their transition to climate neutrality, the EU Mission for Smart and Climate Neutral has been set up by the European Commission. It will assist cities to overcome the current structural, institutional and cultural barriers they face in order to achieve climate neutrality by 2030. Within the project, knowledge transfer, peer learning, and in the end the replication and scale-up of results will be crucial to achieving this objective. More, maximising the exploitation of results towards the numerous cities and towns in Europe will be critical for the EU to achieve climate neutrality by 2050. As such, the aim of this report is to gather existing knowledge on replication, looking into a great variety of sources, to identify the barriers and drivers usually faced in European projects. Based on this analysis, the reports then set out a replication framework where the focus is put on cities, and breaking down the replication process into actionable steps, including recommendations and examples. This framework is expected to feed into other tasks part of WP5, and as such foster replication within and outside of NZC.

Keywords

Replication; Scale-up; Knowledge transfer; Mutual learning; Capacity building; Good practice; City-to-city collaboration

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1. Introduction

Cities play a pivotal role in achieving climate neutrality by 2050, the goal of the European Green Deal. They take up only 4% of the EU's land area, but they are home to 75% of EU citizens. Furthermore, cities consume over 65% of the world's energy and account for more than 70% of global CO2 emissions. Since climate mitigation is heavily dependent on urban action, we need to support cities in accelerating their green and digital transformation. In particular, European cities can substantially contribute to the Green Deal target of reducing emissions by 55% by 2030 and, in more practical terms, to offer cleaner air, safer transport and less congestion and noise to their citizens[1].

That is why the European Commission (EC) set up the EU Mission for climate-neutral and smart cities, which aims to deliver 100 climate-neutral and smart cities by 2030, and to ensure that these cities act as experimentation and innovation hubs to enable all European cities to follow suit by 2050. The Cities Mission takes a cross-sectoral and demand-led approach, creating synergies between existing initiatives and basing its activities on the actual needs of cities. Selected in April 2022, the 100 Mission Cities are now invited to develop Climate City Contracts (CCCs) - overall plans for climate neutrality across all sectors, including related investment plans, and co-developed with a wide coalition of stakeholders – with the help of the Mission Platform, which will provide them with the necessary technical, regulatory and financial assistance[2].

The NetZeroCities (NZC) project comes in support of the EU's Mission "100 Climate-Neutral and Smart Cities by 2030" and will provide cities with world-class expertise and services tailored to their needs. It will assist cities to overcome the current structural, institutional and cultural barriers they face in order to achieve climate neutrality by 2030[3]. More specifically, it is supporting the development of CCCs, while also setting up the Mission Platform, offering a set of online resources to all interested cities. NZC will also run a Pilot Cities Programme that will identify and support 30 European cities to test and implement innovative approaches to rapid decarbonisation over a two-year period, working across thematic areas and functional silos in support of systemic transformation. Last but not least, a Twinning programme will be set up with around 60 cities, in order to replicate successful solutions and approaches from Pilot Cities.

Replication is essential to NZC, as it will avoid piloted solutions and groups of solutions to be 'one-off' exercises, and will allow their reproduction in a larger group of Twin Cities, decreasing costs and multiplying impacts. It is also crucial for the long-term aim of the Mission, which is to drive all European cities towards climate neutrality by 2050. Despite its novel approach and unprecedented scale within the Horizon Europe programme (to which it is related to), the Cities Mission "only" reaches a maximum of 190 cities (i.e., considering that none of the Pilot or Twin cities is also a Mission city), out of the 800+ cities in Europe that have a population over 50.000 inhabitants. For Europe, achieving climate neutrality will only be possible if those innovative solutions and approaches can be transferred to all the other cities, and if those can effectively learn from the Mission pioneers' rapid transition towards decarbonisation.

European cities are all looking to address the growing challenges of our times, with on the one hand climate change mitigation, extreme events, air pollution, biodiversity loss and environmental degradation, and on the other the housing crisis, rising inequalities, inflation, supply chain shortages and now the spectre of war... while also facing a continuous erosion of their resources. In this context, learning from peers, being inspired by other cities, reproducing well-established best practices rather that "reinventing the wheel", can be a promising option for cities – as illustrated for instance by the multiplication of bike sharing schemes in recent years, aiming to tackle both urban congestion and air pollution.

[1] EU Mission website, https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en
[2] EU Mission website, https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en
[3] https://netzerocities.eu/

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As a result, the aim of this report is twofold. First, it aims at collecting evidences on replication from a large range of projects and initiatives, in order to identify the main barriers and drivers to the replication process. Second, it intends at clearing the way for replication within NZC, with some practical recommendations and examples, in order to support the various activities that will contribute to replication, such as the Twinning Programme (T5.2).

This report is intended to support replication-related activities in the project and empower cities during the replication process. Findings will support the development of a well-structured learning programme for twinning in T5.2, supporting the identification and the articulation of knowledge transfer activities and mechanisms. It will also enable NZC to better identify Twin city's needs, and more firmly anchor the learning and replication process in local policy-making. It will help both the definition of criteria for assessing Twins applications and their matching with Pilot cities, while also providing some useful recommendations for City Advisors and mentors. In T5.3, findings will support the identification of inspiring case studies, while also ensuring that those case studies effectively respond to city needs in terms of learning and replication. Beyond WP5, we also encourage partners to take some inspiration from this report, apply the framework and potentially strengthen it.

This report is divided into two sections. The first section identifies and analyses the main barriers and drivers to replication and scale-up. It draws on an extensive research work on replication and scale-up, including a literature review, a survey of internal and partners' experiences related to replication – mostly related to European projects, plus a series of interviews, desk research, and a screening of city needs (collected as part of T13.1). Results were validated in two focus groups, respectively with WP5 partners and city practitioners. Based on collected evidences, the first section starts by a definition of replication, revealing the complexity behind a widely used notion. It then identifies different barriers to the effective replication and scale up of good practice, looking at multiple projects and at different levels, before identifying the main drivers, here again at different levels.

The second section proposes a dedicated framework for replication and scale-up in NZC. Still under development, this section will first outline the main principles that should be followed for replication to be successful and will then will break down into actionable steps with practical recommendations and good practices, to inform replication activities within NZC.

1.1. Methodology

The objective of the research was first to better understand the concept of replication, and how it has been widely used across a number of European projects and initiatives. On a more practical level, it also intended to identify the barriers and drivers to this process, to then be able to influence replication within NZC. To this aim, a combination of methods have been used. A literature review, looking at both academic papers and policy documents, allowed to better define the concept, while a series of empirical sources, collected directly from cities and project partners, brought a number of fresh insights. Each method, as well as main findings are described below.

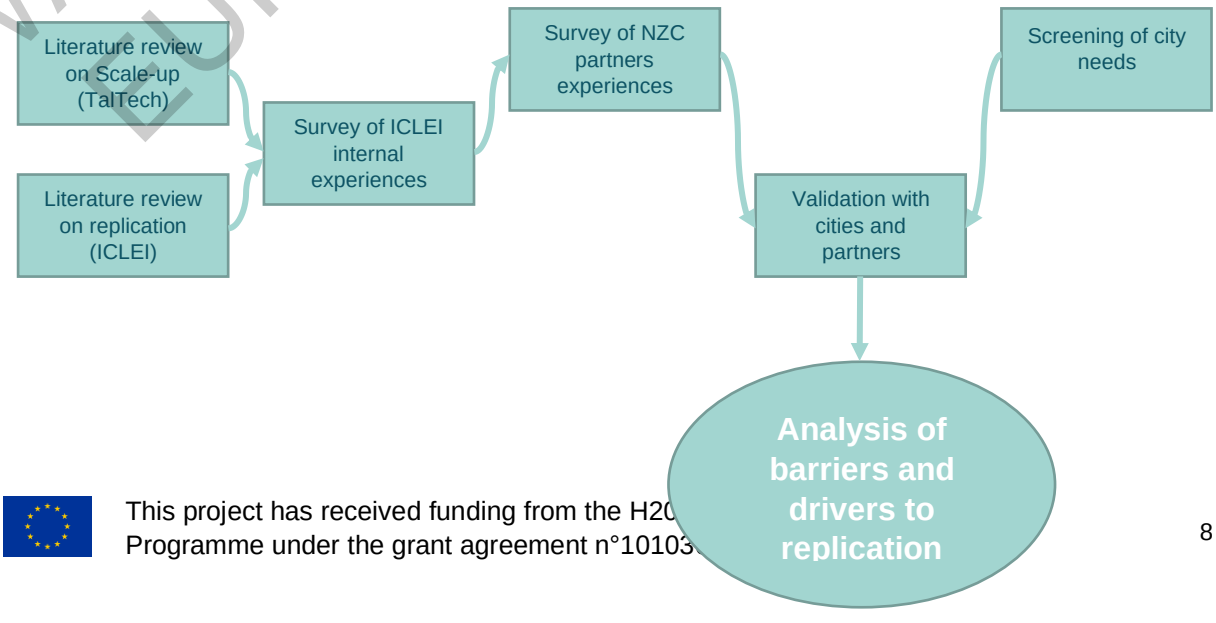

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Figure 1 - Methodology

Literature review

A literature review[4] has been carried out by Tallinn University of Technology (TalTech) and by ICLEI. In April 2022, TalTech searched articles included in the bibliographic online database of Scopus and, using a combination of keywords “replication” and “smart” and “city” OR “scale-up,” and “smart” and “city” within the title, abstract, and keywords, a total 151 papers were found on Scopus. These papers were all published in English and they represented mainly the following subject areas: Computer Science, Engineering, Energy, Social Sciences and Environmental Science. Based on the title and source, the ones that had presumably little to do with replication and scale-up process in cities or the ones that were too field specific were not taken into consideration (e.g. The impact of traffic-light-to-vehicle communication on fuel consumption and emissions, A review of blockchain architecture and consensus protocols: Use cases, challenges, and solutions and Trends in urban rat ecology etc.). In the next step, we read through the abstracts of 24 articles and additionally full-text of these if the abstracts were not clear enough. 5 papers that we screened, and then excluded from the detailed analysis, as their connection to the replication and scale-up literature was rather indirect. This screening eventually led to the inclusion of 17 publications, in which case we also analysed their references and added 5 academic papers based on this. In total, 22 papers were added to the literature review that have been published between 2016 and 2021.

In parallel, ICLEI identified a total of 36 papers, starting on Google Scholars with key words such as “replication”, “inter-municipal or city-to-city cooperation”, “policy transfer”, “lesson-drawing”, “good / best practices” and then “snowballing” to identify additional articles, this literature review also included articles from the grey literature.

Survey and analysis of ICLEI’s experience

In April 2022, a survey of NZC partners, experiences, approaches, observations on replication and scale up was carried out and let to the identification and analysis of 20 projects – for the majority funded by the H2020 programme: Sun4All, Procura+ European Sustainable Procurement Network, GrowSmarter, CLEVER Cities, Be.CULTOUR, DECIDE, WinWind, EU Covenant of Mayors, THERMOS, ARCH, ROCK, Urban Transition Alliance, RURITAGE, CLIC, ProGireG, Big Buyers Initiative, Excess, Save the Homes, CityLoops.

The survey was followed by a series of interviews with 11 projects coordinators and officers. Interviews were unstructured, loosely following questions asked in the survey, and allowed to dig deeper on a number of topics related to replication,

The questionnaire can be found in the annexes.

Survey and analysis of NZC partners’ experience

From April to May 2022, a survey of NZC partners, experiences, approaches, observations on replication and scale up was carried out and let to the identification and analysis of 13 projects and initiatives: FinEst Twins, UNaLab, North America Climate Resilience Program, Covenant of Mayors peer

[4] Note: this review is not formalised as it usually is in scientific publications. Findings are rather directly feeding into the subsequent analysis, i.e., the definition of replication, the identification and then the analysis of barriers and drivers.

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programme (CoM05), Surat and Rotterdam cooperation, R-Cities, MAtchUP, Healthy, Clean Cities (HCC), NATURVATION, Sharing Cities (and SCC cluster projects), VIPU (Demos Helsinki), Scalable Cities. Findings from ICLEI's internal survey allowed to improve questions in the survey to partners.

A number of questions were asked in this survey, such as the cities involved, the resources allocated to them, the methodology that was followed... including the barriers and drivers.

The questionnaire can be found in the annexes.

Screening of city needs

A needs assessment was carried out at the beginning of 2022 by Resilient Cities (WP13)[5]. ICLEI contributed to this needs assessment by facilitating a Focus Group and by inputting into the development of the survey. Results from the needs assessment have been screened, with a particular focus on terms such as "replication", "scale-up", "city-to-city collaboration" or "learning". Findings have been taken into consideration in the analysis of barriers and drivers to replication.

Validation of findings

Preliminary results have been presented to NZC partners during a workshop (17.06.2022) and then to a Practitioner Panel (07.07.2022). The two meetings took place online and were held on MIRO. They brought additional insights and confirmed the preliminary results on replication and scale-up.

Results from those two workshops can be found in the annexes.

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[5] Liakou et al, (2022), Report on City Needs, Drivers and Barriers towards Climate Neutrality, p.54, NetZeroCities. https://netzerocities.eu/wp-content/uploads/2022/04/DRAFT-D13.1-Report-on-city-needs-drivers-and-barriers-towards-climate-neutrality.pdf

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2. Analysis of barriers and drivers to replication and scale-up

2.1. Setting the scene: what is replication?

"*Replication is like the quest for the Holy Grail: everyone is searching but no one seems to be able to find it*[6]". This somewhat provocative contention highlights the preponderance that has taken replication in European projects. To assess whether it is valid or not, it seems necessary to introduce the concept first. This section examines replication through the lenses of the Smart Cities and Communities cluster of projects, before looking at the literature. It distinguishes between replication and scale-up, two related but distinct amplification processes[7]. Two concrete examples of replication approaches are then presented, the SCC cluster and URBACT's Transfer Networks. This allows to finally identify the main components – the "essentials" – of replication, respectively cities, good practices and then the fact that replication is a process that can – and should – be organised.

2.1.1. Starting point: replication in Smart Cities and Communities projects

The exploitation and dissemination of project results has been a cornerstone of the Horizon 2020 programme since its inception, as stated in article 43 of the Regulation (EU) No 1290/2013, laying down the rules for participation and dissemination in Horizon 2020[8]. That is why all H2020 projects have had to make sure that results could be used or mobilised not only by the research community, but also by other categories of stakeholders, beyond the initial scope and/or geographical area of the project.

This is particularly true for the 17 projects part of the EC-H2020-Smart Cities and Communities (SCC) cluster, aiming at fostering the development of smart cities in the EU, by improving data management and its different applications to guide decision-making at the local level. The SCC cluster has even gone one step further, by also encouraging the replication of technological solutions and approaches developed in the "Lighthouse cities" towards other cities, via structured programmes organising the transfer of knowledge and the reproduction of successful pilots. Drawing on the definition from The making of a smart city: replication and scale-up of innovation in Europe[9], one of the publications from the SCC cluster, replication could be defined as "*copying the specific features of a sustainable urban development approach that made it successful in a pilot setting and re-applying these in the same or another setting, taking into account that the framework conditions could be quite different from those in the piloted community or region. Replication may also encompass the management process that was used in the pilot scheme or the cooperation structure between critical stakeholders.*" This focus on replication, along with the approach developed in Lighthouse projects has been quite seminal, and

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[6] VANDEVYVERE, Han, 2018. Why may replication (not) be happening - Recommendations on EU R&I and regulatory policies [online]. European Commission - Smart Cities Information System. Available from: https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/4767_scis_report_2x16-20seiten_web.pdf

[7] Lam, D.P.M., Martín-López, B., Wiek, A. *et al.* Scaling the impact of sustainability initiatives: a typology of amplification processes. *Urban Transform* **2**, 3 (2020). https://doi.org/10.1186/s42854-020-00007-9

[8] Article 43, https://eur-lex.europa.eu/eli/reg/2013/1290/oj

[9] EC. The Making of a Smart City: Replication and Scale-Up of Innovation in Europe; EC: Brussels, Belgium, 2017.

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replication programmes have now multiplied outside of the initial Smart City scope, to be applied to a wider range of topics, all connected to sustainability.

2.1.2. What does the literature says on replication?

Quick research on the term "replication" on search engines such as Google Scholar shows limited results. At first sight, it is as if the rising interest in replication from practitioners and policy makers from the Smart City sphere was not matched by a similar interest from the research community. However, a more-in-depth review of available literature reveals that the idea behind replication, i.e., the reproduction of successful policies and projects in a different context, is actually conveyed by a number of other theoretical concepts, dating back as far as the early 1990s[10]. This includes - but is not limited to - lesson-drawings, policy transfer or best practice research. To demonstrate how closely related they are, *policy transfer* has for instance been defined as "a process by which knowledge about policies, administrative arrangements, institutions and ideas in one political system (past and present) is used in the development of policies, administrative arrangements, institutions and ideas in another political system" by Dolowitz and Marsh[11]. Similarly, *lesson-drawing* has been defined as "a detailed cause-and-effect description of a set of actions that government can consider in the light of experience elsewhere, including a prospective evaluation of whether what is done elsewhere could someday become effective here[12]". Eventually, best practice research for its part has focused, according to Overman and Boyd[13], on "the selective observation of a set of exemplars across different contexts in order to derive more generalizable principles and theories of management". Those concepts have brilliantly shed lights on different aspects of the replication process. However, they all tend to adopt a rather narrow focus on those aspects and seldom comprehend the replication process in its entirety. More, they generally target a variety of actors but not necessarily cities.

That is why Boulanger and Nagorny have come up with a proposition, seeing replication as "**a process in which projects, programs, policies, administrative arrangements or technologies are diffused between and/or inside the same or different levels of government in order to copy and/or adapt them to their own context with the aim to make the urban low-carbon transition quicker, cheaper and thus more effective**[14], thus, complementing the definition in effect in the SCC cluster. The literature review also shows that, far from limited to H2020 projects part of the SCC cluster, replication - including aforementioned concepts - has in fact become an essential lever for urban policy at the European level and beyond, as it has also permeated international organisations, including UN Habitat of the World Bank. This can be illustrated by the multiplication of handbooks, catalogues or repertoires of good practices, already described by Vettoretto in 2009[15].

[10] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, pp. 316–328. 2018.
[11] Dolowitz and Marsh (1996), p. 344 in Luciano Vettoretto (2009) A Preliminary Critique of the Best and Good Practices Approach in European Spatial Planning and Policy-making, European Planning Studies, 17:7, 1067-1083, DOI: 10.1080/09654310902949620
[12] Rose (1993), p.27, in Luciano Vettoretto (2009) A Preliminary Critique of the Best and Good Practices Approach in European Spatial Planning and Policy-making, European Planning Studies, 17:7, 1067-1083, DOI: 10.1080/09654310902949620
[13] Overman and Boyd (1994), p.69, in Luciano Vettoretto (2009) A Preliminary Critique of the Best and Good Practices Approach in European Spatial Planning and Policy-making, European Planning Studies, 17:7, 1067-1083, DOI: 10.1080/09654310902949620
[14] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, pp. 316–328. 2018.
[15] Luciano Vettoretto (2009) A Preliminary Critique of the Best and Good Practices Approach in European Spatial Planning and Policy-making, European Planning Studies, 17:7, 1067-1083, DOI: 10.1080/09654310902949620

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2.1.3. Replication, scale-up and other amplification processes

This report touches upon both replication and scale up, therefore it seems necessary at this stage to better delineate the two concepts and outline how they will be articulated in NetZeroCities. The primary focus here will be on replication, as we want to foster the reproduction of NZC pilots and best practices in other cities. Scale-up is seen as a somewhat - yet crucial - secondary step, intended to make replicated pilots and best practices in those other cities "bigger". Scaling-up decarbonisation is already included in the Climate Transition Map and consequently in the action planning process Mission cities will have to go through. That is why this report will focus primarily on those "replicator" cities, be they twins or any other types of cities, rather than on Mission or Pilot cities, and as such put the emphasis on replication rather than on scale-up.

The making of a smart city: replication and scale-up of innovation in Europe[16] defines scale-up as "*the expansion of piloted technologies and approaches in the geographical area where they were successfully implemented. (…) Normally scaling up takes place in the region where the same boundary conditions prevail*". Comparing replication and scale-up, Sista and De Giovanni (consider that the former is more complex and more context-sensitive than the latter, since it has to deal with a new context, with different regulations and new partners[17]. Some authors have proposed a third process, called "scale deep" and aiming to change collective mentalities and forge new value systems, also to amplify sustainability transitions[18]. In any case, those processes all serve a common purpose: amplifying impacts of given projects or initiatives, related to sustainability transitions. In other terms, they constitute a "*set of diverse actions deployed by sustainability initiatives together with other actors (e.g., from government, business, or society) to purposively increase their transformative impact (e.g., initiating a new initiative in another city)*"[19]. Amplification processes, whether they are strategies, programmes or mechanisms, appear to be a necessity to achieve the systematic change that represents becoming climate neutral for a city. Beyond replication and scale-up, Lam et al. further describe eight different amplification processes, notably distinguishing between transfer (doing a similar initiative in a similar context), replication (doing the same initiative in a dissimilar context) and spreading (doing a similar initiative in a dissimilar context). For the sake of simplicity, those three nuances will be indistinctly referred to as "replication" in this report.

2.1.4. An overview of two major approaches to replication

There is a great diversity of approaches to replication, and, as demonstrated previously, some do not even bear the name "replication" openly. In order to flesh out our definition of replication, this subsection briefly describes two of the most prominent approaches, starting with the already mentioned SCC cluster, and then at Transfer Networks from the URBACT program.

The EC-H2020-Smart Cities and Communities (SCC) cluster approach

Projects part of the SCC cluster all follow - roughly - a similar approach to replication, generally structured around a dedicated work package (WP) - made mandatory by H2020 call requirements. Those projects are organised around a group of Lighthouse Cities, where innovative actions are implemented to enhance an already existing innovation background. Lighthouse cities develop, under

[16] EC. The Making of a Smart City: Replication and Scale-Up of Innovation in Europe; EC: Brussels, Belgium, 2017.
[17] Sista, E., & De Giovanni, P. (2021). Scaling up smart city logistics projects: The case of the smooth project. Smart Cities, 4(4), 1337–1365. https://doi.org/10.3390/smartcities4040071
[18] Moore, Michele-Lee & Riddell, Darcy & Vocisano, Dana. (2015). Scaling Out, Scaling Up, Scaling Deep Strategies of Non-profits in Advancing Systemic Social Innovation *. Journal of Corporate Citizenship. 2015. 67-84.
[19] Lam, D.P.M., Martín-López, B., Wiek, A. et al. Scaling the impact of sustainability initiatives: a typology of amplification processes. Urban Transform 2, 3 (2020). https://doi.org/10.1186/s42854-020-00007-9

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the call, large-scale demonstration projects, supported by project partners and funded by the EC. They act as a blueprint for a group of Fellow Cities, recruited through a call - either before the project starts or in some cases after - interested in replicating those demonstrations[20]. Fellow Cities are in some cases twinned with the Lighthouse cities from which they would like to replicate pilots, thus benefiting from tailored mentoring and support for the implementation. Fellow cities then go through a structured programme, aiming at creating and strengthening connections with their twins, assessing the replicability of identified solutions in relation to their local contexts, and at transferring knowledge and building capacity. In the end, Fellow Cities have to develop a replication strategy, outlining the different steps they would take to replicate solutions, as well as in a number of projects, an Investment Plan, laying out fundings sources and finances for the replication. In these programmes, Fellow Cities usually have all travel and accommodation expenses associated with study visits or project meetings reimbursed, but do not benefit from further funding for investments or for personnel costs, as opposed to Lighthouse Cities.

A common feature of all SCC projects has been the focus on technological solutions, in various sectors (energy, mobility) - as opposed for instance to social innovation, new procedures, etc. Another one has been what Calzada has described as a rather "mechanistic" approach to replication, where the transfer of knowledge goes one way, from Lighthouse to Fellow cities, but less in the other direction, as Fellow Cities are seldom involved in the development of those solutions[21]. Ultimately, another key feature is that projects from the SCC cluster have gone relatively far in the replication process, until the planning phase. This approach to replication has become the standard approach to replication in many H2020 projects. In a few occurrences, it has been even taken one step further, for instance with the ROCK project, focusing on Fellow cities replicating successful heritage-led regeneration cases coming from outside of the project.

URBACT Transfer Networks approach

Initiated in 2002 and now entering its fourth programming period, URBACT's mission is to enable cities across Europe to work together and develop integrated solutions to common urban challenges, by networking, learning from one another's experiences, drawing lessons and identifying good practices. The URBACT programme is an instrument of the Cohesion Policy, co-financed by the European Regional Development Fund and by EU Member States, Norway & Switzerland[22]. URBACT is organised around four main objectives: building capacity in cities, supporting both policy design and implementation, as well as creating and sharing knowledge.

In 2014, URBACT launched a new initiative, the Transfer Networks, aiming to identify, disseminate and replicate good practices related to urban sustainability across European cities[23]. Those good practices are not developed within the project, but rather identified through a series of calls in line with EU urban policy goals. To apply, cities submit their own good practices, i.e., successful approaches or measures that they have implemented, and whose replicability potential has been assessed by a third party[24]. Selected cities become Lead Partners and then set up their own Transfer Networks, through which they share their knowledge and build capacity. Network participants are then selected according to their interest in the topic and their willingness to replicate the good practice in question. The transfer methodology generally follows the three-phase approach defined by URBACT: "Understand-Adapt-

[20] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, pp. 316–328. 2018.
[21] Calzada, I. (2020). Replicating Smart Cities: The City-to-City Learning Programme in the Replicate EC-H2020-SCC Project. SSRN Electronic Journal, (November). https://doi.org/10.2139/ssrn.3689054
[22] https://urbact.eu/urbact-glance
[23] Adams E. (2015), Cities and good practice: lessons from the URBACT transfer pilots, Medium, website: https://medium.com/@edmundoadams/cities-and-good-practice-lessons-from-the-urbact-transfer-pilots-40959b44c205
[24] Ibid.

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Reuse". It includes a combination of bilateral and multilateral exchanges with participants, and a number of activities such as study visits, peer reviews, bootcamps and hackathons[25], taking place along the three phases. Transfer Networks can also benefit from the support of URBACT Experts, providing in-depth thematic and methodological knowledge, notably supporting participants in carrying out a baseline study, intended at benchmarking participants and at assessing their readiness to adopt the good practice model in question[26].

A number of deliverables have to be submitted at the end of the network duration, to report on the different activities and the lessons learned, and so for dissemination purposes. Participants also have to report on the implementation of the good practice in their cities, or at least to submit plans outlining the main actions they would undertake to do so. In 2020, Baqueriza-Jackson highlighted that no less than 23 Transfer Networks were active, on topics as diverse as sustainable school meals (BioCanteens) or fighting social exclusion and poverty at community level (Volunteering Cities), each Network counting 5-9 cities, including the Lead Partner[27].

A key feature of Transfer Networks is the fact that good practices are not developed within the project, but by cities to address their own needs. As such, amplification is at the very core of the program and not just "end-of-pipe", as it is in SCC projects (where the focus would rather be on developing those good practices). Another key feature is that, albeit Networks are led by Lead Partners, mutual learning and cross-fertilisation are encouraged all along the transfer process. Mechanisms and activities such as peer reviews are used, where participants can also share their own experiences and knowledge, thus contributing to better adapt good practices to local circumstances. Finally, stakeholder engagement plays a substantial role in Transfer Networks, with participants having each to set up Urbact Local Groups (ULG), gathering all local stakeholders relevant for the transfer and adaptation of the good practice. ULGs are associated with the transfer and take part in key activities such as bootcamps.

2.1.5. Identifying the key components of replication

This brief overview of the SCC cluster of projects and URBACT Transfer Networks approaches allows to capture what is the essence of replication, and to capture what are its main components or characteristics. Respectively, those are cities, good practices and both the processual and mediated nature of replication.

Cities are at the core of replication

First of all, cities - or local authorities - are at the core of this process, since their administrations are either the initiators of good practices - e.g., Lead Partners, as well as Lighthouse, Frontrunner or giving cities[28] - or the recipient of the transfer - e.g., Follower, Receiving, Fellow, Observer or Replicator cities[29]. They are also central in a sense that good practices are designed, developed and implemented at city level, intended at addressing major urban challenges and at answering city needs. Depending on their nature, they may be applied to the entire city territory or at least to part of it, may have an effect on the entire city population, and in the end, they may affect all activities taking place in their jurisdiction. In some cases, the replication process may be led by non-city actors; nevertheless, city administrations still have a crucial role to play in order to ease the process, convene relevant stakeholders and eventually support the implementation.

[25] Ibid.
[26] Ibid.
[27] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report, Paris: URBACT.
[28] Those different labels will be used indistinctly in this analysis, even if in some cases they convey slightly different meanings.
[29] Ibid.

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Cities replicate good practices

Second, good practices are the "object" of replication, even if not necessarily labelled as such. For Vettoretto, good practices - often interchangeably referred to as "best practices" - are "*structured information (ranging from analytical reports to narratives) about successful experiences in local contexts, concerning issues generally acknowledged as relevant, evaluated according to a set of criteria*"[30]. Content wise, they can be of any sort: technological solutions, but also procedures, innovative schemes, governance approaches, strategies and plans... Possibilities are infinite. They can also focus on any sector or emission domain (e.g., the build environment, mobility, water…) or be related to levers of change (e.g., capacity building or public participation mechanisms). They can be pilots or at the opposite well-established solutions. In a number of cases, good practices are developed within projects (SCC examples), in some others, they are produced independently from projects (URBACT examples). They can even be sets of solutions articulated together.

Still, good practices must follow three criteria: to be successful, preferably well-documented and replicable. They must (or at least should) be fully implemented and well-established, so that it is possible to assess results and impacts, for instance in terms of GHG emissions reduction, and thoroughly evaluate them, e.g., cost-benefit analysis. It is a surprise for no one that costly measures that lead to limited outcomes do not constitute good practices. Similarly, they have to be codified and well-documented, with for instance strategies, plans, technical documents, evaluation reports, presentations, etc. The provision of those documents is a requisite to transfer knowledge and disseminate it effectively (even if part of this knowledge can be informal and often not captured in documents). Finally, good practice should be replicable, i.e., transferable to another context, as is or with some adaptation. It means that replicability has to be assessed, by looking at the different aspects of the good practice itself and also of the city where it originates (e.g., legislation and regulatory framework, physical and spatial characteristics of a city, modes of governance, sources of GHG emissions and economic activity, demographics, etc.). This analysis is then compared to a baseline assessment carried out in the city interested in replication. There is no secret recipe for replicability assessments as this depends on the nature of the good practice and the cities in question. It goes without saying that a highly context-specific good practice, or the existence of significant differences between two cities, will certainly hamper the replication of the good practice.

A number of critiques have been formulated in the literature against the concept and the overuse of good practices in public policy. Stead has for instance questioned the validity of highly localised solutions or instruments in the face of extremely diverse situations in Europe[31] - a good practice in Nantes might not be a good practice in Alba Iulia and vice versa. He has also showed how the transformation of experiences into good practices is in fact the outcome of complex interactions between plenty of actors at various levels, all pursuing different interests. As such, they have become a powerful territorial marketing tool for cities, always keen on showcasing flagship projects[32]. Those critiques are legitimate; however, we argue that the risk can be to some extent mitigated, respectively with an ex-post evaluation and a replicability assessment. Finally, rather than some glossy, frozen and de-contextualised accounts of a project or policy intervention, good practices should be "living objects", frequently updated, peer-reviewed and illustrated.

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[30] Luciano Vettoretto (2009) A Preliminary Critique of the Best and Good Practices Approach in European Spatial Planning and Policy-making, European Planning Studies, 17:7, 1067-1083, DOI: 10.1080/09654310902949620
[31] Dominic Stead (2012) Best Practices and Policy Transfer in Spatial Planning, Planning Practice & Research, 27:1, 103-116, DOI: 10.1080/02697459.2011.644084
[32] Luciano Vettoretto (2009) A Preliminary Critique of the Best and Good Practices Approach in European Spatial Planning and Policy-making, European Planning Studies, 17:7, 1067-1083, DOI: 10.1080/09654310902949620

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Replication is a mediated process

Third, replication is a process, that goes through several steps, and that is generally mediated, in a sense that there is an intermediary that takes care of organising the transfer between the two or more cities (e.g., Transfer Networks in the case of URBACT, or replication programmes in SCC projects).

In most cases, “replication programmes” are well-structured. They follow a dedicated methodology, usually including the identification of good practices, some sense-making and baseline assessment, an assessment of the replicability of the good practice itself, the transfer of knowledge and capacity building, the adaptation of good practices, and then the planning and implementation. The order may change while some elements may be absent in certain project. The logic behind however remains the same across projects.

Replication is not limited to European projects and also happens spontaneously, as it is common practice for city practitioners - and politicians alike - to look at other local authorities for inspiration and advice. The extent to which this happens is hard to measure, but the multiplication of, for example, bike sharing schemes in European cities over the last decade, demonstrates that ideas and good practices travel and spread from city to city. This spontaneous form of replication is also generally mediated, be it through personal connections or networks, through national environment agencies or professional associations, through case studies or good practice handbooks; good practices do not spontaneously touch down on city practitioners' desks.

This has two consequences. First, as a process replication can be organised, structured, in order to maximise success. That is why the second section of this report will propose a framework for replication. Second, it puts the emphasis on the process rather than out the outcome, which has been a common pitfall in a number of projects.

The delineation of those three components of replication allows us to better capture its reality across a plurality of concepts and approaches. It also helps to identify and analyse barriers and drivers to the replication process.

2.2. Barriers to replication and scale-up

This subsection reviews the main barriers to replication and scale-up, consistently identified across the literature, as well as NZC partners’ and cities’ experiences. A number of related barriers have been clustered together, to form seven following ones:

- The lack of resources
- Governance shortcomings at city level
- Underestimating high contextuality and marked differences between cities
- A mechanistic vision of the replication process
- Insufficient multi-level and multi-stakeholder governance
- Flaws in the production of good practices
- The "Not invented here” syndrome

2.2.1. The lack of resources

The lack of resources has consistently been pointed out as one of the main barriers to replication and scale-up, in the literature as in empirical observations. At city level, this includes the lack of personnel,

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time, skills, and organisational capabilities, as highlighted by van Winden & van den Buuse[33]. It hampers city staff's ability to make the most of the transfer process, i.e., to identify relevant good practices, to learn from peers and effectively build capacity. A focus group that took place on 24 January 2022 revealed that "*cities struggle to find the workforce with the necessary knowledge and skills, and it is particularly challenging to find people who are able to think outside of their departmental area or specific sector* [34]". Additionally, funding gaps and insufficient financial resources are also hindering replication itself, especially of those good practice which have a high capital intensity[35]. Altogether, those findings are consistent with the 68% of cities who identified the lack of funding/financing schemes as the biggest barrier to pursuing climate in the Expression of Interests for the Cities Mission[36]. Cardullo & Kitchin have shown that, this lack of resource has in some cases been the result of austerity policies and budget cuts, either at the local or at national level[37].

Cities' limited capacity is only partly compensated by those projects precisely aiming to foster replication. For instance, in projects following on the Lighthouse-Follower approach, Lighthouse cities remain the main beneficiaries. If technical assistance and funding are provided for a number of actions, including but not limited to replicability and feasibility studies, study visits or capacity building, they rarely finance personnel costs associated to these activities. Furthermore, a substantial amount of time has to be spent on developing project deliverables (e.g., assessments reports, replication plans...) under relatively short deadlines. In Zaragoza, it is for instance difficult for public officers to dedicate enough time to those replication activities, as hiring new personnel appears to be complicated[38]. Partners in the DECIDE project have reported difficulties in engaging with Fellow cities for the very same reason[39]. This has been summarised by Baqueriza-Jackson in his evaluation of URBACTS Transfer Networks: *"Cities have faced barriers at the local level in relation to the time and capacity individuals involved with the network have to spend on the local transfer. All of the people involved have other activities to do, and sometimes it has been difficult to find the required time to deliver fully on the transfer and the accompanying communications outputs*[40]". Moreover, funding does not generally cover the implementation part of the replication process carried out by Follower cities, as in UNaLab[41]. Support provided within projects to develop new business models and to identify funding schemes and financing sources is acknowledged, but is rarely sufficient to actually enable the implementation, as for the MATCHUP project[42]. The needs assessment revealed that where pilot funding has been be available for Follower cities, it did not allow to scale-up those good practices.

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[33] van Winden, W., & van den Buuse, D. (2017). Smart City Pilot Projects: Exploring the Dimensions and Conditions of Scaling Up. Journal of Urban Technology, 24(4), 51–72. https://doi.org/10.1080/10630732.2017.1348884

[34] Liakou et al, (2022), Report on City Needs, Drivers and Barriers towards Climate Neutrality, p.54, NetZeroCities. https://netzerocities.eu/wp-content/uploads/2022/04/DRAFT-D13.1-Report-on-city-needs-drivers-and-barriers-towards-climate-neutrality.pdf

[35] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, pp. 322-323. 2018.

[36] Liakou et al, (2022), Report on City Needs, Drivers and Barriers towards Climate Neutrality, p.54, NetZeroCities. https://netzerocities.eu/wp-content/uploads/2022/04/DRAFT-D13.1-Report-on-city-needs-drivers-and-barriers-towards-climate-neutrality.pdf

[37] Cardullo, P., & Kitchin, R. (2019). Smart urbanism and smart citizenship: The neoliberal logic of "citizen-focused" smart cities in Europe. Environment and Planning C: Politics and Space, 37(5), 813–830. https://doi.org/10.1177/0263774X18806508

[38] Practitioner Panel, 07.07.2022.

[39] ICLEI projects review.

[40] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report, p.29, Paris: URBACT.

[41] NZC partners survey.

[42] NZC partners survey.

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2.2.2. Governance-related shortcomings

Governance-related shortcomings in replicator cities appear as another major barrier to replication. They include the lack of political leadership, organisational silos, and deeply entrenched local administrations' routines and practices.

The first of those shortcomings is the lack of political leadership and involvement in the replication process. As public administrations are notoriously risk-adverse, political leadership is nonetheless a driver for adopting innovating approaches and experimenting new solutions, for more efficient cross-department collaboration, and for mobilising adequate resources. This lack of political leadership can be explained by political cycles: politicians tend to focus on short-term issues rather than on societal challenges for electoral reasons[43]. More, changes in political environments - typically after a municipal election – can lead to a change in public priorities and a reassessment of previous commitments, including the involvement in European projects[44]. This for instance happened in SHARING CITIES, where a mayor who was a champion for smart cities left his role, causing the Fellow city to struggle to get political support[45].

Organisational silos are often connected to insufficient political leadership, but can also appear on their own. As today's urban challenges extend beyond departments' boundaries and narrow competencies, innovative solutions or approaches require effective cross-department collaboration[46]. In European projects, Follower cities participation is typically managed by only one department, which can lead to suboptimal cross-department collaboration, as in MATchUP[47]. This differs from Lighthouse cities, where a cross-cutting governance structure if often a requirement, and as such set up right at the start of the project. In UNaLab, "e*ngaging the right people from their cities"* has proved to be a challenge, whereas "*experiences should be shared across all people involved in the process and not only between the people involved in the project"*[48]. In some cases, several departments are represented, but most of them cannot afford to dedicate too much time to it, and they do not have the capacity to join study visits and in-person meetings. Limited cooperation with support functions - i.e., procurement, finances or human resources – has also been identified as a barrier to replication[49]. Conversely, participants in networks and projects focusing on those support functions, such as the Procura+ Network, find it also difficult to engage with operational departments[50]. Organisational silos, and as a consequence the limited ability for staff to engage with other departments, can cause a lack of motivation, and even a lack of confidence in the organisation[51]. Coordination and cooperation have proved to be even more difficult with municipally-owned companies – or with city services when it is the company that is involved in replication[52]. On top of fragilising the implementation of good practices, silos can also deprive replication

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[43] VANDEVYVERE, Han, 2018. Why may replication (not) be happening - Recommendations on EU R&I and regulatory policies [online]. p.16. European Commission - Smart Cities Information System. Available from: https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/4767_scis_report_2x16-20seiten_web.pdf

[44] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, p.323. 2018.

[45] NZC partners survey.

[46] EC (2019), Urban Innovative Actions Knowledge Management Strategy 2020-2023. p.20. Online: https://www.uia-initiative.eu/sites/default/files/2020-07/UIA_knowledge_management_strategy_0.pdf

[47] NZC partners survey.

[48] Ibid.

[49] Practitioners Panel, 07.07.2022.

[50] ICLEI internal source.

[51] SMARTER TOGETHER, Replication Framework, Deliverable D8.1.1, V2.0, p22.

[52] SMARTER TOGETHER, Replication Framework, Deliverable D8.1.1, V2.0, p23.

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teams of useful experiences, skills and competencies[53]. Here again, this aligns with the 47% of cities that identified fragmentation of responsibilities as a barrier to achieving climate neutrality[54].

Entrenched routines and practices in local administrations – or "business as usual" - are closely connected to the other two governance-related shortcomings and can further hamper the replication process[55]. City administrations are notoriously risk-adverse, and not prone to explore and experiment when capacity is under constraint.

2.2.3. Underestimating differences between cities

Cities are facing similar challenges across Europe, yet they remain extremely diverse; this probably comes as a surprise to no one. To increase the chance of success, replication must happen between cities that faces similar challenges and operate in a similar environment[56]. Marked differences between cities can make the reproduction of good practices more difficult, or can simply render them irrelevant. National differences are often highlighted, and especially distinct legislative and regulatory frameworks, socio-economic structures or administrative cultures. This has been observed in SMARTER TOGETHER, where a too permissive regulatory framework hindered the uptake of building retrofit in France. Discrepancies between procurement standards and procedures from country to country are another example[57]. In addition, language remains a significant barrier to effective city-to-city collaboration, despite the widespread use of English in European projects[58], as it limits the capacity of city officers to properly express themselves and to fully grasp the ins and outs of certain good practices. Differences can also be substantial between cities themselves, regardless of which country they are in. Here, size matters (i.e., surface area and demographics), since it is correlated to the size of city administrations, with bigger cities generally having greater capacity. This also includes physical features, such as the urban fabric or the natural environment. Those differences can be assessed relatively easily before-hand, and as such do not constitute a deal-breaker for replication – they should nevertheless not be underestimated.

Other differences are however harder to properly assess or often end up being underestimated, such as modes of governance and organisation, and experience in climate policy. Profound differences in terms of governance and experience can severely hinder the replication process. As stressed by the municipality of Karditsa, "*very often the final result that we want to replicate is attractive, but the background of cities is very different and this is something that we get to know only when we start the process*"[59]. Similarly, it was noted about the Covenant of Mayors peer programme that "*matching is both one of the hardest and most critical factors in the peer programme, and this depends in large part on the application form. (...) There is a tricky balance between not making the process too long and complicated, and gathering the appropriate information*.[60]" In fact, the recruitment of Follower cities often misses key contextual information that would contribute to either driving or hindering replication. In the Volunteering Cities Network (URBACT), Baqueriza-Jackson for instance showed that the lack of local strategies and action plans in a city ended up being a barrier to push the agenda around volunteering

[53] EC (2019), Urban Innovative Actions Knowledge Management Strategy 2020-2023. p.20. Online: https://www.uia-initiative.eu/sites/default/files/2020-07/UIA_knowledge_management_strategy_0.pdf
[54] Liakou et al, (2022), Report on City Needs, Drivers and Barriers towards Climate Neutrality, p.54, NetZeroCities. https://netzerocities.eu/wp-content/uploads/2022/04/DRAFT-D13.1-Report-on-city-needs-drivers-and-barriers-towards-climate-neutrality.pdf
[55] VANDEVYVERE, Han, 2018. Why may replication (not) be happening - Recommendations on EU R&I and regulatory policies [online]. European Commission - Smart Cities Information System. p.11. Available from: https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/4767_scis_report_2x16-20seiten_web.pdf
[56] NZC partners survey.
[57] SMARTER TOGETHER, Replication Framework, Deliverable D8.1.1, V2.0, p.22.
[58] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, p.322. 2018.
[59] Practitioners Panel, 07.07.2022
[60] NZC partners survey

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forward. Similarly, an approach of local economic development focusing only on hard infrastructure greatly reduced the ability to replicate more "people-centric" approaches in the Welcoming International Talents Network[61]. Those differences can make the replication of already too context-specific pilots even more difficult, or simply impossible[62]. To sum it up, replication is more likely to happen between municipalities with similar levels of experience[63].

2.2.4. The 'Lighthouse-Follower' dichotomy

Another barrier identified is the 'Lighthouse-Follower' dichotomy, leading to a "mechanistic" approach to replication. It is based on "*the assumption that (…) Lighthouse cities could be the only ones spelling out urban solutions, without considering whether (…), second, the Fellow cities already had ongoing replicable models worth considering*"[64]. This assumption is not backed by evidences. More, alleged differences between cities can in fact be the result of this dichotomy. This is what the ROCK project demonstrated: the call explicitly required Replicator cities to be at the centre, while Role Model cities, benefited from limited funding. This led to results opposite than in most projects: a strong involvement and participation of Replicators and a limited involvement of Role Models.

This dichotomy has nevertheless been well entrenched in European projects and particularly in the first cohort of SCC projects (it was progressively dropped in favour of more participatory approaches in following cohorts). It can be linked to several shortcomings. First, it reduces mutual learning and cross-fertilisation opportunities. Replicator cities, whatever they are, also have interesting experiences to share with Frontrunner cities and, as highlighted by the municipality of Zaragoza, they are sometimes even more "advanced" on a certain topic than the Frontrunners[65]. Then, Follower cities are either not involved, or only at later stages, in the development of innovative solutions and approaches, as in the FinEst Twins initiative[66]. This greatly reduces the replicability potential of those solutions, as they tend to only address lighthouse city's needs, and additionally do not go through a peer-review process. This has also been observed in GROWSMARTER, where solutions developed by Lighthouse Cities proved to be too context-specific and the underlying technology could hardly be replicated in Fellow Cities. Finally, it has also been associated to replication programmes or initiatives focusing on the short term, and on the delivery of project deliverables rather than on the success of replication. Little attention is also paid to the long-term and on the legacy of replication after projects end[67], while partners do not usually have the resources to follow-up with cities once projects are over.

2.2.5. Insufficient multi-level and multi-stakeholder governance in cities

Multi-level governance is defined as the coordinated action of different levels of government (from local and regional government, up to the national level and to the European Union) towards achieving a specific goal. Multi-stakeholder governance refers to the involvement of all stakeholders – or "quadruple-helix" stakeholders, i.e., the public and civil society, the private sector, the research community and public entities – in policy-making. As stressed in the *Report on City Needs, Drivers and Barriers towards*

[61] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report, p.29, Paris: URBACT.
[62] Calzada, I. (2020). Replicating Smart Cities: The City-to-City Learning Programme in the Replicate EC-H2020-SCC Project. p.979. SSRN Electronic Journal, (November). https://doi.org/10.2139/ssrn.3689054
[63] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, p.322. 2018.
[64] Calzada, I. (2020). Replicating Smart Cities: The City-to-City Learning Programme in the Replicate EC-H2020-SCC Project. p.985. SSRN Electronic Journal, (November). https://doi.org/10.2139/ssrn.3689054
[65] Practioners Panel, 07.07.2022
[66] NZC partners survey.
[67] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report, p.16-17, Paris: URBACT.

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Climate Neutrality, both are strongly needed for a goal as ambitious as achieving climate neutrality[68]. This also applies to the replication of innovative solutions aiming to tackle challenges cutting across sectors, jurisdictions and competencies.

Findings have indicated that insufficient multi-level and multi-stakeholder governance slows down and hinder the replication process. First, support from higher tiers of government remains insufficient, especially for peer-to-peer learning. In fact, only 18% of cities that responded to the needs-assessment survey indicated that peer-to-peer learning is included in national programmes related to climate neutrality[69]. On multi-stakeholder governance, it has been historically difficult for cities involved in URBACT to engage with the private sector in transfer activities, be it at the international or at the local level – despite the establishment of URBACT Local Groups[70]. Public participation is also rarely sufficient during the replication process. When it does take place, this tends to be at later stages of, for instance, smart-city solutions development and replication, *de facto* reducing participation to mere consultation[71]. The dominance of technocratic approaches to replication over public participation may reduce democratic accountability at the local level, and lowers public support for the implementation of such solutions[72]. Those shortcomings are undeniably a major barrier to the replication process, as multi-stakeholder governance enables to better assess needs (city administrations are not omniscient), and to better adapt good practices to the reality of the ground. Multi-stakeholder governance also helps to create a sense of shared-ownership that increases the adoption of innovative solutions or approaches. Something that is harder to achieve when insufficient communication is made towards stakeholders and the public[73]. Insufficiencies have been explained by the difficulty of maintaining an active involvement of stakeholders on the long run[74], and, once again, by the lack of appropriate resources, i.e., personnel, skills and tools, for effectively engaging with stakeholders and for carrying out participatory processes[75].

2.2.6. Flaws in the production of good practices

The last significant barrier has to do with how solutions or good practices are produced and transferred to other cities. First, an overemphasis on either pure technology, or on technological components of city interventions, has been found consistently across findings. Smart city solutions however "*often consist of complex urban interventions involving many different parties, each one with specific interests, agendas and capacities. Everything must be there, at the right place, in the right moment: the technologies, the business models, the favourable legal context, the governance structure, social acceptance, user motivation, capacities and knowledge, budgets, aligned agendas, etc.*"[76]. And as such, all the human infrastructure that underpins the success of such solutions is frequently overlooked, be it during their formalisation into good practices or during the transfer process.

Then, the way good practices are produced - i.e., how they are identified and selected - has also been criticised due to its shortcomings. This production process rarely relies on a thorough evaluation of

[68] Liakou et al, (2022), Report on City Needs, Drivers and Barriers towards Climate Neutrality, p.28, NetZeroCities. https://netzerocities.eu/wp-content/uploads/2022/04/DRAFT-D13.1-Report-on-city-needs-drivers-and-barriers-towards-climate-neutrality.pdf
[69] Ibid. p.35.
[70] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report, p.31, Paris: URBACT.
[71] Cardullo, P., & Kitchin, R. (2019). Smart urbanism and smart citizenship: The neoliberal logic of "citizen-focused" smart cities in Europe. Environment and Planning C: Politics and Space, 37(5), 813–830. https://doi.org/10.1177/0263774X18806508
[72] Calzada, I. (2020). Replicating Smart Cities: The City-to-City Learning Programme in the Replicate EC-H2020-SCC Project. p.999. SSRN Electronic Journal, (November). https://doi.org/10.2139/ssrn.3689054
[73] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report, Paris: URBACT.
[74] Ibid. p.16.
[75] Liakou et al, (2022), Report on City Needs, Drivers and Barriers towards Climate Neutrality, p.35, NetZeroCities. https://netzerocities.eu/wp-content/uploads/2022/04/DRAFT-D13.1-Report-on-city-needs-drivers-and-barriers-towards-climate-neutrality.pdf
[76] VANDEVYVERE, Han, 2018. Why may replication (not) be happening - Recommendations on EU R&I and regulatory policies [online]. European Commission - Smart Cities Information System. p.7. Available from: https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/4767_scis_report_2x16-20seiten_web.pdf

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results and impacts. It is rather the result of a pragmatic approach, which depends on the existence of contacts in relevant cities, on the availability of data online, and on the willingness of those cities to showcase their work. It is amplified by the limited capacity invested in this production process, either by cities or by intermediaries, such as city networks, national agencies, NGOs[77]... If this has been avoided in most H2020 projects, where the development of innovative solutions is carried out during projects, short timelines make the evaluation of results and impacts at best incomplete. The functioning of those projects also makes that there is then little flexibility for other cities on to whether or not replicating those pilots.

Regarding the format to which information is transferred, Boulanger and Nagorny have noted a repeated lack of contextual knowledge in reports, catalogues or factsheets. Descriptions tend to provide a "*decontextualized and placeless knowledge*" and focus only on success stories, while hurdles or barriers faced by cities during the development and the implementation are usually overlooked. Learning from errors made by peers is nevertheless well-needed for city practitioners[78]. Finally, some confusion is caused among Replicator city practitioners by an oversupply of information. An abundance of reports, websites or catalogues is available, while overabundant information is also included in those different documents. This makes it extremely difficult for practitioners to identify what could be useful for them, in a context where they have little time to read, evaluate and prioritise good practices. Moreover, the way this information is displayed, such as non-user-friendly publications and databases, also hinder effective replication. Finally, there are also some issues related to how this information is kept up-to-date[79].

2.2.7. The "Not invented here" syndrome

Mentioned in a few instances, this barrier stems quite tellingly from the fact that cities tend to see their local context and situation as unique, thus requiring tailored-made solutions – in other terms, reinventing the wheel[80]. This can lead them to develop their own solutions rather than reproducing what has been done successfully higher, but often as a higher cost[81]. This mind-set has been observed by city practitioners, for example in Tromsø[82]. If it leads cities to entirely shun replication projects only in a few instances, it can still contribute to reinforcing organisational silos, e.g., when other departments show some reluctance in being involved in a project they have not initiated.

2.3. Drivers to replication

The replication process can be hampered by any of the aforementioned barrier. Quite fortunately, it can also be driven by a series of factors or circumstances, which should therefore preferably be

[77] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, p.321. 2018.
[78] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, p.321. 2018.
[79] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, p.322. 2018.
[80] Nelson, A., Toth, G., Linders, D., Nguyen, C., & Rhee, S. (2019). Replication of Smart-City Internet of Things Assets in a Municipal Deployment. IEEE Internet of Things Journal, 6(4), 6715–6724. https://doi.org/10.1109/JIOT.2019.2911010
[81] VANDEVYVERE, Han, 2018. Why may replication (not) be happening - Recommendations on EU R&I and regulatory policies [online]. European Commission - Smart Cities Information System. p.11. Available from: https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/document/4767_scis_report_2x16-20seiten_web.pdf
[82] City Practitioners Panel, 07.07.2022

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fostered in replication programmes. Here again, related drivers have been clustered together, to form the eight following ones:

- Placing the human component at the core
- Embedding replication in local strategies
- Breaking down good practices into modules to facilitate their transfer
- Mutual learning and co-creation at the core of the replication process
- Flexibility and ongoing assistance in the replication process
- Political leadership and integrated management
- Monitoring and evaluation
- Start small and grow big

2.3.1. Placing the human component at the core

There is an undeniable human component in replication. The creation of strong interpersonal relations, along with the participation in in-person / physical events, can amplify knowledge transfer and replication. As mentioned previously, implementation reports or good practice catalogues often miss some key information, e.g., on context, on obstacles and conflicts faced. They also tend to focus exclusively on explicit knowledge, and rarely capture the breadth of city experiences associated to the development of innovative solutions and approaches. Practitioners frequently resort to their personal connections to complement those inadequacies[83]. In fact, personal connections ease communications, as people are more likely to get in touch, to ask questions or recommendations to each other; this is what has been observed in exchanges between resilience officers from the cities of Paris, Milan and Rotterdam on the topic of "oasis schoolyards"[84]. Trust and confidence are at the heart of this process, as it allows the "candid sharing" of information that would not necessarily be made public otherwise. Strong interpersonal relations also allow connection between cities to last longer than projects, and can even give way to further collaboration opportunities for other projects[85]. Projects can capitalise upon pre-existing links between cities to drive replication[86].

Another way to do so is to encourage the participation in physical / in-person activities, something that has unfortunately greatly dwindled in recent years due to the pandemic. As put forward by the city of Valladolid, *"the advantages of online meetings are many... they are comfortable (…) but you lose the personal contact. Both personal contact and study visits face-to-face help a lot..."* Online meetings are effectively easier to set up, and require way less resources for cities to attend, allowing practitioners to reach out to colleagues internally. They make staying in touch and follow-up easier, and they are as such a good complement to in-person gatherings. However, they do not allow to build interpersonal relations. At the opposite, in-person activities allow participants to bond with peers, and also to experience, to see by themselves. This was for instance put forward in the UNaLab project, where participants "*have been able to visit the nature-based solutions locations and ask questions directly to each other and to the different people involved in the implementation and/or monitoring.*[87]" In Big Buyers, (in-person) workshops and stakeholder events have been a way to involve a larger group of persons from participating organisations[88]. In URBACT Transfer Networks, bootcamps have been particularly well-received by participants due to the possibility to "learn and to do" at the same time[89]. Another in-person activity that has proved to be quite successful is "work-shadowing", where practitioners from

[83] BOULANGER, Saveria O. M. and NAGORNY, Nanja C. Replication vs mentoring: Accelerating the spread of good practices for the low-carbon transition. In: International Journal of Sustainable Development and Planning. Vol. 13, no. 02, p.321. 2018.
[84] NZC partners survey.
[85] Practitioners Panel, 07.07.2022.
[86] NZC partners survey.
[87] NZC partners survey.
[88] ICLEI internal survey.
[89] Adams E. (2015), Cities and good practice: lessons from the URBACT transfer pilots, Medium, website: https://medium.com/@edmundoadams/cities-and-good-practice-lessons-from-the-urbact-transfer-pilots-40959b44c205

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Replicator cities have the opportunity to observe peers at their workplace, such as in the ROCK project. Then, during "mentoring visits", Replicator cities host colleagues from Role Model cities to get practical advices and recommendations. In the CLEVER project, those visits have been extended to elect Councilors, to contribute to raising awareness among decision-makers on the topic of nature-based solutions, and to creating ties at the political level.

2.3.2. Embedding replication in local strategies

Another driver relates to which extent replication is part of a "bigger plan" for the Fellow city[90]. Relying on existing plans or strategies provides a political orientation, and can additionally help to secure the allocation of further budget (considering that project funding for replication is limited). It also contributes to maximising results and impacts, as a whole set of measures are being implemented towards a same goal, and not only one isolated pilot. In GROWSMARTER, structured programmes on smart services already in place within some of the Follower Cities greatly helped the replication process[91]. Strategies are also instrumental in breaking silos, and ultimately allow to harness co-benefits associated to replication, as emphasised by the municipality of Umeå[92].

At the same time, replication provide a good opportunity to update such strategies and plans. In EXCESS, ready-to-use recommendations were shared with local planning authorities at the end of the project for the update of spatial plans[93]. Deliverables that Fellow cities must submit can also be used to make sure that replication is embedded in local plans: this is what is required in CityLoops for cities to integrate in their Replication Plans[94].

2.3.3. Breaking down good practices into modules to facilitate their transfer

According to van Winden & van den Buuse[95], successful replication requires individualised solutions. More, breaking down a good practice into clearly delineated modules or parts might actually make the replication process even easier. From the outside a good practice taken as a whole – whatever it is – can appear quite intimidating, especially for cities with little experience on the topic. That is why dividing it into small bits allows to better assign roles and responsibilities internally. It additionally eases the planning process, allowing to prioritize between the different modules and potentially to drop what does not appear as necessary. This is illustrated in URBACT Transfer Networks, in which this practice was "*as much a revelatory process for the giving city as it was for potential receivers, who were often so close to the practice that they had forgotten why it had evolved that way. This forensic review of the good practice enabled cities to identify and prioritise component parts of it. From this process, projects were able to customise the good practice so that it – or key elements of it – could be transferred across*[96]". Ultimately, breaking down a good practice into modules can allow to "deep dive", as put

[90] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report, p.2. Paris: URBACT.
[91] ICLEI internanl survey.
[92] Liakou et al, (2022), Report on City Needs, Drivers and Barriers towards Climate Neutrality, p.35, NetZeroCities. https://netzerocities.eu/wp-content/uploads/2022/04/DRAFT-D13.1-Report-on-city-needs-drivers-and-barriers-towards-climate-neutrality.pdf
[93] ICLEI internal source.
[94] Ibid.
[95] van Winden, W., & van den Buuse, D. (2017). Smart City Pilot Projects: Exploring the Dimensions and Conditions of Scaling Up. Journal of Urban Technology, 24(4), 51–72. https://doi.org/10.1080/10630732.2017.1348884
[96] Adams E. (2015), Cities and good practice: lessons from the URBACT transfer pilots, Medium, website: https://medium.com/@edmundoadams/cities-and-good-practice-lessons-from-the-urbact-transfer-pilots-40959b44c205

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forward by one partner, i.e., to understand it deeply enough to then be able to adapt it and implement it, rather than staying at the surface[97].

Replication, whether it focus on pilot projects or on well-established solutions, is akin to an innovation process for Follower cities. As such, it comes with a number of uncertainties regarding final results and impacts. That is why breaking down those good practices into modules or parts allow to start by the ones can be replicated quicker and generate some early results - i.e., “quick wins” or “low-hanging fruits”. Quick wins can also contribute to reducing local resistance by proving concepts behind good practices[98]. They can also bring some early results that would then support the implementation of other components, fostering the replication process and the transition towards climate neutrality.

2.3.4. Putting mutual learning and co-creation at the core of the replication process

Fellow cities come to projects with existing knowledge and experiences, related to either the topic in question or simply to policy-making at the local level. Taking advantage of this knowledge and experience can benefit the replication process but also Lighthouse Cities – and so beyond the scope of European projects. That is why replication approaches focusing on mutual – or peer – learning (rather than on top-down approaches) have consistently shown greater results. First, presenting and explaining their achievements to others can help Lead cities to reflect on it, as exemplified by URBACT’s Transfer Networks: "*Teaching is often the best way of learning, and the process requires giving cities to revisit, refine and improve their own methodology*”[99]. They can also learn from their peers‘ experiences. This encourages Lead cities to dedicate more time to knowledge transfer and replication, as they can get something out of it. As put forward by the city of Leuven, “*it helps if cities can find a "win-win," meaning that there is also a "return" for the Frontrunner city, since they need to have an incentive to share their experiences*”[100]. Practical examples of mutual learning can be found in peer-reviews, a mechanism used across a number of projects, such as in the BioCanteens Transfer Network (URBACT), where peer reviews have stimulated cross-fertilisation and generated pride among participants for their achievements. One by one, participants had to report on activities carried out in between each meeting, and received feedback from others afterwards[101]. In the CLIC project, “role-swapping” has been used in a twinning programme, alternating critical feedback sessions and study visits[102]. In ARCH, Follower cities have been able to give feedback and to improve the tools developed in the project during dedicated workshops[103]. Indeed, Follower Cities have a better understanding of their own needs. As such, peer reviews not only benefit Lighthouse cities, it also greatly improves the replicability of innovative solutions and approaches developed in projects. That is the reason why involving Fellow Cities at early stages, not only of the replication process, but also in the development of innovative solutions or approaches, is also a game changer for the former, as demonstrated by SHARING CITIES[104].

2.3.5. Flexible and tailored replication methodologies

The replication process benefit from well-structured replication methodologies. Still, those have to allow some flexibility, not to be “set in stone”, as unexpected challenges frequently occur along the way[105]. More, replication 1:1 does not exist and methodologies need to be adaptable to some degree to Follower

[97] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report, p.7. Paris: URBACT.
[98] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report. Paris: URBACT.
[99] EC (2021), Cities and good practice: lessons from the URBACT transfer pilots, URBACT website. Link: https://urbact.eu/cities-and-good-practice-lessons-urbact-transfer-pilots
[100] Practitioners panel, 07.07.2022
[101] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report. p.9. Paris: URBACT.
[102] ICLEI internal source.
[103] Ibid.
[104] NZC partners survey.
[105] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report. p.7. Paris: URBACT.

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city's needs. That is why replication approaches that have proved to be flexible and adaptable have shown greater success. Potential changes have to be based on results from needs assessments and transferability studies, as recruitment of Follower cities and their matching with Lighthouse cities often misses crucial - but hardly measurable - background information. When direct support provided to cities is limited, flexibility also allows to loosen requirements and to adjust the ambition, in order to make sure that knowledge transfer and replication actually happen. In particular, not overburdening cities with too many deliverables can allow them to reallocate efforts and resources to delivering on replication itself[106]. Replication methodologies can also be co-produced with Replicator cities from the start, tailored according to their needs and ambitions, as highlighted in some of URBACT's Transfer Networks[107].

2.3.6. Securing political leadership and integrated management

The lack of political leadership and of cross-department collaboration has previously been put forward as a barrier to replication. Quite logically, a strong political leadership and integrated management are at the opposite key drivers of the replication process. In a context where municipal administrations usually have a high level of risk aversion, a committed political leadership, with a clear vision, can allow them to "*take risks, make mistakes, and learn from those mistakes by developing solutions and adapting"*[108]. The SMARTER TOGETHER project has for instance praised "the right to fail" in its replication framework[109]. It also boosts staff motivation and ability to work across departments[110]. As such, integrated management, i.e., the ability to bring all internal stakeholders together towards a common goal, is a clear driver to the replication process, as it allows to mobilise more resources, skill sets on solutions that cut across traditional policy making areas. The municipality of Konya, in Turkey, for instance stated that the biggest "*enabler at city level is the institutional structure"* of the city administration itself[111].

2.3.7. Understand city needs to improve matching

Replication should be seen as a cost-effective and evidence-based answer to city needs for achieving climate neutrality, and not just as a requirement that has to be fulfilled in European projects. Misalignments between cities involved in the replication process often come from insufficient needs assessment or insufficient communication with project partners. As highlighted in the barriers section, this can be fatal if those discrepancies between cities are too substantial. That is why a clear understanding of city needs, interests and ambitions, and a good articulation with projects have been pointed as a key driver[112]. It allows to match cities that face similar climate challenges (air pollution, floods, etc.) and operate in similar environments (governance, climate, etc.), as in BuyZET[113]. *"Finding the right project partner for the right challenge*" (Mannheim) is as such a substantial driver for replication[114]. The application process has a crucial role to play to understand the needs of Follower

[106] NZC partners survey.
[107] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report. p.13. Paris: URBACT.

[108] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report. p.13. Paris: URBACT.
[109] SMARTER TOGETHER, Replication Framework, Deliverable D8.1.1, V2.0, p19.
[110] EC (2019), Urban Innovative Actions Knowledge Management Strategy 2020-2023. p.20. Online: https://www.uia-initiative.eu/sites/default/files/2020-07/UIA_knowledge_management_strategy_0.pdf
[111] Practitioners Panel, 07.07.2022.
[112] NZC partners survey.
[113] ICLEI internal survey.
[114] Practitioners Panel, 07.07.2022.

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cities and match them with similar cities, even though striking the right balance between not making the process too long / complicated and gathering the appropriate information can be challenging[115].

2.3.8. Motivation and willingness to learn

At first sight, this may seem a rather secondary driver of replication, or something that is connected to all previous drivers. Nevertheless, part of it seems to be irreducible to others, and findings have consistently shown that Follower cities' motivation and willingness to learn - as well as Lighthouse cities' eagerness to share - have been strong lubricants in the replication process. This was for instance considered as among the main success factors in the Sun4All project, where energy cooperatives are set up in low-income communities to support their decarbonisation[116]. This was also noted in some of URBACT Transfer Networks, where partners themselves – or most likely individuals representing them – have been seen as the key drivers of knowledge transfer due to their motivation and willingness to learn[117].

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[115] NZC partners survey.
[116] ICLEI internal survey.
[117] Baqueriza-Jackson, M. (2020), Transfer Study - Final Report. p.12. Paris: URBACT.

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3. Replication and scale-up framework

3.1. Introduction

Based on the analysis of barriers and drivers to replication and scale-up, this section outlines the main principles that should be followed for replication to be successful. It then breaks down the replication process into actionable steps, including practical recommendations and good practices, in order to inform all activities within NZC which may - in one way or another – lead to some replication.

As demonstrated by the research carried out in T5.1, the replication and scale-up process is the result of a complex set of interactions between cities but also between a constellation of other actors - city networks, public authorities, businesses, researchers… - at various levels. Consequently, this framework offers a schematic and simplified view of what replication should be. It is also intended to be updated, based on observations from activities related to replication and scale-up carried out within NZC.

This framework is targeting project partners, and in the first instance those who are setting up mechanisms, as well as organising activities aiming at fostering replication - i.e. sharing knowledge and building capacity - such as the Twinning Programme or the development of case studies to guide replication (respectively Tasks 5.2 and 5.3). As such, the framework will provide general guidelines on replication and practical recommendations collected during the research, in order to inform those mechanisms and activities. As replication is also connected to activities and tasks lying outside of WP5, other partners are also welcome to use the framework, and potentially to improve it.

The end beneficiaries being local authorities, their administrations are also welcome to use it. Nevertheless they are not the direct target group, as we believe that its rather general and theoretical nature does not necessarily fit with their often practical preoccupations. That is why we rather recommend project partners to act as intermediaries, able to apply the framework to specific situations, cities, or good practices.

This section starts with a series of key principles that we believe should underpin replication activities within NZC. Then, the framework itself is described; it includes three main phases, each of them divided into a total of nine different steps. Both phases and individual steps capture key elements that will enable the successful replication and scale-up of pilots. The section ends with some reflections on the next steps, and on how to capture the breadth of activities related to replication in NZC.

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3.2. Definitions and key principles

3.2.1. The replication framework

We have decided to base the replication framework on ICLEI's Integrated Management Cycle, also behind the Green Climate Cities programme[118], through which it has been used by cities all over the globe to develop Climate Action Plans. This approach has proven to be highly flexible, and able to accommodate different contexts, thus allowing any local authority to use it. It has notably empowered cities to take action in terms of climate mitigation. The approach has also inspired the Climate Transition Map developed in WP1.

This decision is justified by several reasons. First, this approach allows to break the replication down into several different yet connected phases and steps. Those steps are not intended to be prescriptive or exhaustive, nor do they have to be seen as a sequence where one step can only start after another has been completed: they are interwoven and often take place in parallel. It is also important to note that while the phases and steps are presented in a sequential manner, entry points can be found at any stage of the presented process. This makes it fit for describing the replication process, which can be applied to a great variety of solutions, in cities with different experiences and features. Second, this approach is also "circular", which is particularly relevant for replication, a process that does not really end, but is rather a continuous exchange between local authorities – and which is not, as often described in projects, a mechanistic transfer between to cities that ends once accomplished. Last, this approach focuses on cities, as opposed to a number of replication frameworks where the emphasis is put on a specific solution, often limited to one or two sectors (e.g. electric vehicle charging points). Achieving climate neutrality makes it necessary to implement at the same time cross-sectoral and systemic solutions, rendering it difficult to achieve the granularity for each solution or group of solution that would have to be replicated. Instead, this focus on cities allows to really empower administrations and to explore any kind of solutions or group of solutions.

The Green Climate Cities programme approach has been adapted to be able to closely describe the replication process. It comprises three phases, respectively 1) ANALYSE & MOBILIZE, 2) ACQUIRE and finally 3) ACT. Each phase is sub-divided into three steps each, listed below:

1. **Governance**
2. **Stakeholder engagement**
3. **Needs assessment**
4. **Learning**
5. **Exchange**
6. **Adaptation**
7. **Planning and implementation**
8. **Review**
9. **Scaling-up**

Figure 2 - Replication Framework

[118] https://iclei.org/greenclimatecities/

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Those phases and steps will be described below, after a presentation of key definitions and principles underpinning the replication process.

3.2.2. Definitions

Good practice

In this framework, “good practice” refers to any solution or group of solutions, measure, process or procedure that is developed in a specific city and worth replicating in another with regards to climate action. To do so, some knowledge - be it technical, legal, financial, or procedural - will have to be transferred to Fellow Cities for them to build capacity and implement the solution or group of solutions, etc. For the transfer to be possible, this knowledge needs to be well-documented, in reports, in case studies, and so on.

Additionally, the term “good practice” also includes some further knowledge on the informal practices, experiences, or personal connections, which are often neglected but which can be instrumental in the implementation of a solution or group of solutions. This information is generally not captured in reports, and often remains in the background. It can nevertheless be really helpful for Fellow City in the replication process. That is why knowledge transfer should also include a critical human component, in a sense that building interpersonal relationships and having frequent exchanges can enable the circulation of this crucial type of information.

To sum it up, good practices combine formal knowledge on solutions or group of solutions, etc. as well as contextualised accounts from practitioners who implemented the solution, including their own recommendations. Good practices are also living objects that must be regularly updated and widely disseminated.

Fellow City

Fellow Cities are those local authorities interested in reproducing a good practice developed and implemented in a NZC City. They show a genuine interest for a specific topic or sector related to climate neutrality, but do not exactly know where to start. They have identified different solutions and approaches but do not know which one they have to choose, or they may as well have identified some specific measures, but do not possess the expertise required to implement them. In all cases, they will look at NZC Cities and, rather than “*reinventing the wheel*”, they will capitalise on NZC Cities achievements and experiences, in order to learn and reproduce the good practice. At a personal level, Fellow Cities are expected to show some motivation and willingness to learn. They are also welcome to provide feedback to NZC Cities.

NZC City

NZC Cities are defined as those cities that are already part of the project, in one way or another – e.g. as Mission Cities or Pilot Cities - and from where a good practice originates, i.e. is developed and implemented, assuming that this good practice is worth being replicated. NZC Cities are expected to document the development and implementation of good practices in order to support the replication within Fellow Cities. They are also strongly encouraged to provide any necessary additional information during the course of the project as well as practical recommendations - NZC Cities must in some occasions act as “mentors” for Fellow Cities, guiding them through the replication process. They should also learn from Fellow Cities' own experiences, in order to review and strengthen their own good practices.

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3.2.3. Key principles for replication

The Replication Framework includes three main phases, each of them divided into a total of nine different steps that capture key elements enabling the successful replication and scale-up of good practices. They do not have to be seen as a sequence where one step can only start after another has been completed: they are interwoven and often take place in parallel.

That being said, it is also important to emphasise the existence of four key principles guiding and feeding into the entire replication process. Those principles - listed below - have also been informed by the Analysis of drivers and barriers to replication (i.e. Section 1), but are of different natures than the nine steps, as they should be taken into consideration during the entire replication process. Some of them - e.g., integrated management and stakeholder engagement – may appear to be similar to some specific steps of the Replication Framework. The idea behind is fairly simple: stakeholder engagement must take place at the beginning of the process, and as such constitutes a distinct Step, but it is also a principle that must be applied through and that will in turn support each of the other individual steps; engaging with (relevant) stakeholders will always be beneficial, at any time.

Mutual learning

As demonstrated in the Analysis of drivers and barriers to replication (Section 1), replication is sometimes depicted as a mechanistic process where a “more-advanced” city transfers a technological solution to a “less-advanced” city. Empirical findings show a somewhat different reality, where cities and their administrations are complex systems, which offer multiple opportunities for learning regardless of their maturity levels on given policies or technologies. There are countless opportunities for learning from approaches, projects, practices developed in even the smallest city.

That is the reason why Mutual Learning is at the core of this framework. We strongly recommend any city to take the time to listen, to discuss, to do some research, in order to learn more about what Fellow Cities are doing to mitigate climate change and to become more sustainable. This would certainly create cross-fertilization opportunities and lead to the generation of new ideas, and perhaps even to the replication of new solutions and approaches. This principle also applies when a selected good practice is being replicated in a Fellow City, as feedback and lessons from the replication process can not only contribute to improving the good practice in question but also increasing the chances of further uptake and replication - peer review is crucial to ensure the replicability of any good practice and here being the “proud copier” is a critical role. As such, Fellow Cities are encouraged - spontaneously or when asked - to collect feedback internally and to pass it on to NZC Cities.

Replication is about innovation - Start small, grow big

This report is dealing with the replication of good practices from NZC Cities and potentially from outside the project. Those good practices are often pilots or demonstrations themselves. In the innovation community, it is usually acknowledged that pilots have a Technology Readiness Level (TRL) of 7, while the full-scale roll out of a solution is TRL9. It means that, despite all preliminary assessments, there are no guarantees that the replication of the pilot - or of any good practice – will be successful in a different setting. That is why a key principle of replication is to start small, by experimenting and demonstrating first – grabbing low-hanging fruits - and to grow bigger progressively. This approach allows to mitigate risks associated with reproducing a full-scale solution, such as the lack of funding or resistance from local stakeholders. As such, this principles should be kept in mind at every step of the replication framework. This starts by an identification of quick wins - i.e., parts or modules of the pilot or best practice that would be easier to implement and on which success would ease and enable the replication or other parts or modules - and ends up with the scale-up, when the pilot or best practice is implemented at full-scale within the Fellow City.

Integrated management and stakeholder engagement

The analysis of barriers and drivers to replication and scale-up has shown that the replication process often fails when carried out in isolation from other local actions, especially when not politically supported, or when not engaging with local initiatives and stakeholders. That is why integrated management – i.e.

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setting up cross-department collaboration mechanisms - and stakeholder engagement altogether constitute the third key principle of replication.

Integrated management and stakeholder engagement should be present during the whole replication framework and as such will make the transfer process easier, by raising awareness among local actors, by creating unexpected opportunities and by creating a feeling of shared ownership. That is why we strongly recommend Fellow Cities, at any step of the process, to engage with both internal and external stakeholders. We also recommend NZC Cities to associate their own stakeholders, be they internal or external, to the replication process, as they can have valuable information or experience to transfer to Fellow Cities.

Replication goes beyond technological solutions

Replication is often reduced to the reproduction of technological solutions from one city to another, on the pretext that first technology has a greater impact, and second that that it is more transferable than non-technological solutions, i.e. regulations, strategies, social innovations... This belief overlooks the fact that technology is usually embedded in a local context, in social uses, and that replicating the 'hard' part without considering the 'soft' one often ends in failure.

Here, we recommend cities to adopt a critical stance on the replication of technological solutions, and to consider not only technical requirements but also modes of governance, regulation and policies, funding and more broadly all the social, economic and environmental factors that underpin them. Moreover, we would like to remind that climate neutrality do not only rely on new, cutting-edge technologies, but rather on the scaling-up of existing ones, on the adoption of social innovation, new uses and so on. Low-tech solutions or seemingly insignificant practices at the local level can potentially have a greater impact in terms of GHG emission reductions than flagship solutions. That is why we recommend NZC cities to not only showcase their most innovative technologies, but also to reflect on the many solutions or practices that are less visible but that may have, individually or taken all together, a substantial impact. Similarly, it is recommended to Fellow Cities to pay attention to what NZC Cities do beyond their "flagship" measures and themselves to look at the too-often overlooked solutions and practices developed and implemented within their own administration.

The replication process is as important as the outcome

The replication process includes a substantial part of serendipity, of unpredictability, as the outcome is often different from what is initially planned. As such, we consider that the "*journey*" Fellow cities go through as of much importance as the outcome, because it can create a whole lot of new opportunities. Not to say that replicating a new energy saving scheme or green infrastructure are not worth it, but rather that on top of trying to reproduce those, it might well be that in the process Fellow Cities will learn new lessons and grasp new opportunities. It might also be that, despite the initial replicability assessment, the transplant does not finally take place in the Fellow city. What could appear as a failure at first sight may in fact bring positive results, for instance contributing to raising awareness, to strengthening a local political agenda, to engaging with previously out-of-reach stakeholders, to creating useful connections for future projects… Here also, the list of potential benefits arising from the replication process is also really long and would justify going into it.

3.3. The Replication and Scale-Up Framework

3.3.1. PHASE 1 - ANALYSE & MOBILISE

The first phase is mostly internal and its aim is to make sure that all the pre-conditions are fulfilled for replication to take place. It starts by (1) Setting up the governance model, before (2) Engaging with Stakeholders and then (3) Identifying needy, as well as barriers, risks and opportunities. This phase aims to make the replication process easier, but we acknowledge that these actions often take place simultaneously.

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STEP 1 – Governance

The aim of the first step is to have the organisation - the city administration - ready for the replication process. This is a strong enabler, or even a pre-condition, as demonstrated by the Analysis of barriers and drivers to replication and scale-up. This starts with securing **political commitment** - from the mayor or a deputy mayor - or at least some backing from the administration's leadership. A strong mandate will then allow to approach different departments, services and public agencies - the ones that are relevant to the good practice the Fellow city is looking to replicate - in order to set up a **cross-department project team** that will be in charge of managing the replication process. Each team member has clearly defined responsibilities and roles, while the team as a whole has direct access to the city's main decision-making bodies. Having a good representation of the different departments in the Replication Team will allow to ensure buy-in across the organisation and will greatly support subsequent steps. The Replication Team's first responsibility will be, in close collaboration with the leadership, to define the ambition / vision of the Fellow City in terms of replication, and to outline how it should connect on the one hand with long-term objectives - e.g., climate neutrality - and on the other hand with existing plans and strategies. **The vision formulates in writing the political mandate**.

Description	Key results
• Secure political commitment • Set up the governance internally and making sure that all relevant departments are involved • Define vision and long term goals	• A cross-departmental **Replication Team** • A clearly defined **vision** for the replicated Pilot / best practice, in accordance with existing planning documents.
How can Fellow cities be supported in this step?	**Recommendations, tips and resources from other projects**
• NZC Cities can showcase their achievements to influence the agenda setting in Fellow Cities. • High-level exchange programs between politicians can contribute to raising awareness among Fellow Cities mayors, officials and management.	• In BuyZET, some efforts were dedicated to getting staff from various departments being involved in the peer learning process and participating in project meetings. This allowed a greater dissemination of project results within Fellow cities and a better buy-in across the administration[119]. • In Healthy Clean Cities (HCC), 15 mayors (called "challenge owners"), committed to co-design portfolios of strategic experiments and innovations capable of transforming key city systems, with the aim of accelerating their path to carbon neutrality, while bringing multiple co-benefits for local people[120]. • In CLEVER, some budget was allocated to having politicians from Fellow cities taking part in project activities, and especially to study visits.

STEP 2 – Stakeholder engagement

Engaging with local stakeholders is crucial for the replication process, as it is crucial for reducing GHG emissions generated by all sectors of urban life, thus for achieving climate neutrality. **Stakeholder engagement starts by mapping the key stakeholders**, i.e., understanding who are the key players and actors, why they should be involved and how, but also how to balance powers and interests. A stakeholder and relevance mapping allows to define the right engagement mechanism(s). Which stakeholders should involve – which are the most relevant - greatly depends on the nature of the solution

[119] http://www.buyzet.eu/
[120] https://www.climate-kic.org/wp-content/uploads/2020/07/DD_Healthy_Clean_Cities.pdf

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that is to be replicated. It could be local businesses - from start-ups to large companies - research institutes and academia, community groups and non-for-profits, and also the wider public, altogether often referred to as the "quadruple helix". It is also key to engage with other public actors, municipal companies, other local authorities and crucially other tiers of government, from the provincial or regional level to national government. Once identified and mapped, stakeholders should be approached using several engagement mechanisms, and brought together in order to validate or amend the vision. Stakeholder engagement will quite likely involve some awareness-raising activities, as not all actors may be on the same page. **Stakeholders should be involved in the replication process through a Replication Forum**, meeting 1-2 times a year, whose members would be regularly updated about progress, would be consulted for key decisions and would take part in some of the key activities. This Replication Forum should be running during all the replication process.

Description	Key results
• Map stakeholders for the issue at stake, identify who should be involved and how, understand relationships between stakeholders • Define the right engagement mechanism(s) • Engage with stakeholders, communicate the vision and get to know each other • Set up a **Replication Forum** with key stakeholders to support during the Replication Journey, define roles and responsibilities, and plan future meetings	• A **Replication Forum** fully aligned with the **vision**
How can Fellow cities be supported in this step?	**Recommendations, tips and resources from other projects**
• Share stakeholder engagement methodologies and best practices	• In GROWSMARTER, local stakeholders were invited and participated in workshops organised in Fellow cities, through a local, multi-stakeholder Smart City Liaison Group[121]. • In NATURVATION, Fellow cities engaged with business and civil society organisations through the establishment of 'urban-regional innovation partnerships'[122].

STEP 3 – Needs assessment

This step starts by a current state assessment, with a review of existing policies, targets, plans and measures in place in your city in relation to the Good practice to be replicated or, more likely at this stage, to the issue the good practice would solve. In parallel, a regulatory assessment should be carried out, to identify relevant pieces of legislation and regulation, policies at national level that could impact your project, negatively but also positively (e.g., existing funding schemes). This work will be greatly facilitated by working in collaboration with other city departments within the Replication Team and with stakeholders in the Replication Forum (e.g., national government agencies will have a better understanding of the regulation). On this basis, the vision defined in Step 1 needs to be fleshed out, by identifying potential barriers, risks, needs but also opportunities, in relation to a number of aspects: regarding the Fellow city's knowledge of the sector, or the issue that is faced, on the data that is available, on governance, on internal capacity and so on. Here again, involving other departments and external stakeholders in this assessment can help gather a great variety of data and information. This step should bring a good understanding of the Fellow city's needs, barriers, risks and opportunities. This

[121] https://grow-smarter.eu/fileadmin/editor-upload/Reports/Concluding_report_on_Replication_online.pdf
[122] https://naturvation.eu/blog/20190408/how-urban-partnerships-can-drive-nature-based-innovation.html

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will constitute this baseline - against which future progress will be assessed - and will allow to define a first set of targets to the vision.

Description	Key results
• Review existing policies, strategies, projects in place or carried out at the local level • Check the national and European legislative and regulatory framework • Check what type of data is available and what is been done already (e.g. GHG inventory) • Assess barriers, risks but also opportunities • Involve the Replication Team and the replication Forum in this process • Set the baseline and define targets to flesh out the vision	• A **baseline and a set of targets** to complement the **vision**
How can Fellow cities be supported in this step?	**Recommendations, tips and resources from other projects**
• Share past needs assessment and baseline • Give feedback on baseline and on targets • Provide methodologies and tools for the needs assessment	• In the Covenant of Mayor peer learning program, a relativity detailed application form allowed to get a good understanding of city needs, as well as where they were standing in terms of climate policy, improving matching between participants[123]. • In the Big Buyers Initiative, a three-step needs assessment of participants was carried out, on which basis they were allocated to relevant thematic working groups, along with peers facing similar challenges. This first step allowed to identify general sectoral interests, the second to identify specific challenges within those sectors and the third to actually set up working groups. This needs assessment contributed to fruitful peer-to-peer learning and the potential replication of good practices. • In the EXCESS project (retrofitting housing blocks to turn them into positive energy buildings), the replication process starts with a diagnosis, and includes a SWOT matrix. • In the CLEVER project, annual surveys have been carried out towards partners and Fellow cities, to assess needs and provide tailored assistance throughout the project. • In MatchUP, “quadruple-helix” stakeholders participated in preliminary workshops, to assess needs and then define priorities. • In ARCH, Fellow cities had to develop joint baseline reports (one for each group of Fellow cities, each Pilot having 3 Fellow cities). Baseline reports include information on city profiles, on governance, as well as a preliminary resilience assessment[124].

[123] https://www.eumayors.eu/component/attachments/?task=download&id=1292
[124] ARCH project website. https://savingculturalheritage.eu/resources/deliverables

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3.3.2. PHASE 2 - ACQUIRE

PHASE 1 aims to provide a good understanding of where the Fellow city stands, of what the problem is, and also to be able to rely on a coalition of internal and external stakeholders to the replication process. In PHASE 2, knowledge transfer, capacity building and adaption of a given good practice are taking place.

STEP 4 - Learning

STEP 3 has allowed to identify key needs and to set targets accordingly, but the actions to put together in an action plan are still unknown at this stage; this is the objective of STEP 4. First of all, it is necessary for a Fellow city to improve its **thematic knowledge**, whether it is on a specific sector, such as mobility or waste management, or on the different levers of urban policy-making, such as public procurement or awareness-raising. This can be done relativity easily by going through reports and guidance developed by national governments, European institutions, or city networks. It is also worth looking at documents developed by NGOs or scientific publications. Desk research takes time, and capacity is undoubtedly a scarce resource for most local authorities - but it is nevertheless a necessary step to be able to make wise and informed decisions.

Once more, colleagues from other departments should support, and bring their own knowledge and experience, as well as their own perspective on the issue at stake. This understanding of the state of play, of what is possible but also what is not given the baseline (i.e. the needs assessment), will then help identify and benchmark specific solutions, approaches and measures that would help solve the issue. This knowledge can also be found in aforementioned reports, while stakeholders can also contribute - government agencies can bring their knowledge on a wide range of topics, while businesses can shed light on solutions that they have implemented somewhere else. **This understanding of the state of play and a benchmark of existing solutions will allow to be more critical and to think long-term.** If the purpose of this report is to not to reinvent the wheel each time a city faces an issue - the "not-–invented-–here" syndrome - this step will nevertheless allow to identify potential measures already in place in the city that could be adapted or scaled -up. In that case there is no need for to "replicate" something – the Fellow city can go directly to STEP 6!

Description	Key results
• Review existing guidance documents and reports • Explore the academic literature on the topic • Watch webinars and attend training sessions • Benchmark best practices and case studies from other cities • Involve the Replication Team and the Replication Forum as they are likely to have a valuable input • Shortlist best practices by comparing them to your baseline	• A **benchmark of good practices**
How can Fellow cities be supported in this step?	**Recommendations, tips and resources from other projects**
• Guide Fellow city by providing ad hoc support and pointing to adequate material • Point to relevant sources of information in the Knowledge Repository • Give advice to cities and existing solutions and approaches	• In the Urban Transition Alliance, a series of case studies were developed, to be disseminated among other cities and foster replication. https://urbantransitions.org/ - https://urbantransitions.org/challenges/

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	• As highlighted in the SCORE project from the INTERREG Northsea Region Programme, it is crucial to provide clear documentation and easily accessible demos of solutions to Fellow cities[125]. • In the Covenant of Mayors peer learning programme, an Expert Mission provides some thematic knowledge on governance processes for long-term strategies, as well as citizen engagement and communication. • In the CityLoops project, Demonstration Reports are developed by Demonstration cities to provide detailed information on the implementation of a series of measures, with recommendations on how to replicate them[126].

STEP 5 - Exchange

This step is at the core of what is usually labelled as pear learning or replication activities in European projects, and not for no reason, since the objective is precisely to connect with other cities to transfer knowledge on pre-identified solutions. If reports and guidance documents allow one to get a good theoretical understanding, it becomes at some point necessary to get a more practical knowledge, and this is where NZC Cities – peers - come into play. This can be done spontaneously by reaching out to contact persons indicated in reports, on social networks - from experience officers are always happy to share their experiences when contacted, by using personal or city's network, or through formal peer learning programs, such as URBACT. In NZC, this can also be done through the platform or through City Advisors.

First, a more thorough understanding of the Good practice should be acquired, on the NZC City context, on the barriers that it faced (something that is often not reported), and on all the small things that allowed a successful development or a successful implementation. Second, the Fellow city should also get tailored-advice and recommendations from the NZC City, based on its needs assessment. This information can be acquired through one-off or frequent exchanges and communications - between Fellow city officers and their counterparts contact, ideally also involving other colleagues. Creating interpersonal connections is a great enabler to knowledge transfer, as it also fosters mutual learning; people are more likely to listen to their peers. Depending on resources available, it is also greatly recommended to go on site and experience the Good practice in question, in order to better understand the context, to meet additional people and acquire a practical experience (something that cannot be captured in reports). This can take the form of study visits, or of work shadowing. Involving colleagues from other departments or other stakeholders – here again depending on resources available - is also a great way to disseminate knowledge internally. A number of projects have also demonstrated that organising high-level study visits with elected officials and with leadership is also a great enabler. If the Fellow city is lucky enough to attend that kind of visit it is crucial to document it as much as possible and to then disseminate findings within the Fellow city administration - it will help to "evangelise" and will also be of a great help for the implementation.

Description	Key results
• Activate the Fellow city network to find information on selected pilot / best practices • Identify further pilots / best practices	• Strong connection / relationship with the pilot city • A practical understanding of the good practice

[125] https://northsearegion.eu/media/15128/score_replication_guide_final-2020.pdf
[126] https://cityloops.eu/resources

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• Create and maintain (long-lasting) relationships with NZC city • Participating in knowledge sharing and peer learning programs • Attend study visits and capacity building sessions • Get a thorough understanding on pilots / best practices • Listen to NZC city recommendations	•
How can Fellow cities be supported in this step?	**Recommendations, tips and resources from other projects**
• Organize study visits and work-shadowing sessions in your city • Share documents and practical information on pilots with Fellow cities • Make yourself available for frequent exchanges with Fellow cities • Organize knowledge sharing sessions and study visits	• In ROCK, a mentoring program was set up, with Pilot cities in a position of mentors, including mentor visits to Fellow cities and work-shadowing, i.e. the observation of Pilot cities staff in real conditions to learn from pilot implementation[127]. • In ARCH, mutual learning workshops were set up to transfer knowledge but also foster cross-fertilisation between cities[128]. • In R-Cities, knowledge transfer and capacity building included a series of training sessions on both enabling themes and technical solutions. • In EXCESS, Fellow cities were chosen from the same country (same language and same regulatory framework), or among Twin cities, in order to benefit from pre-existing links and work relationships. • In the North America Climate Resilience Program, facilitated by the Resilient Cities Network, Fellow Cities were invited to participate in all of the activities of the "Action Cities". In this way, more cities had access to the knowledge produced throughout the project, in real-time. They had the opportunity to ask questions relevant to their own challenges, but also to provide insights from their own experiences that may inform solutions in the other cities.

STEP 6 - Adaptation

Once the Fellow city has all the information it requires to replicate the identified Good practice, it then needs to make sure that the former is replicable, in order to adapt it to its city and embed the implementation in existing plans and strategies. This starts with a replicability assessment, to find out if the good practice will effectively address the issue at stake, and if it can effectively be reproduced in a different setting. Criteria to look at in the replicability assessment will vary greatly depending on the good practice. They should in any case contribute to reducing GHG emissions, alongside with co-benefits, should be imbedded in existing planning documents and to the Fellow City infrastructure, should preferably be affordable, shouldn't rely only on external capacity…

[127] https://rockproject.eu/documents-list/download/49/d11-guidelines-for-mentoring-activities
[128] https://savingculturalheritage.eu/mutual-learning

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Other criteria will be specific to some sectors or even to some solutions, but would encompass regulation, natural environment and the physical characteristics of the Fellow city, as well as the political, economic, social and cultural context. The replicability assessment should as much as possible be based on measurable data and facts. The network of local stakeholders as well as colleagues from other departments can help in this process.

If the Good practice passes the replicability assessment, the adaptation process can be started. Here also, the adaptation of a Good practice to a new setting greatly depends on its intrinsic nature; a new cycle lane network is for instance different from an energy efficiency scheme, and as such will be adapted differently. In any case, the baseline (i.e. resulting from the needs assessment) should be taken as a point of reference, while particular attention should be paid to barriers and risks, as well as opportunities. A practical recommendation for adapting a good practice to a Fellow city context would be to divide it into modules and assess whether some of them would require some customization, because different standards might be in use, different regulations apply or simply because things are carried out differently in different cities. Minimising divergences with the baseline can be a way to ease the implementation. A careful consideration should also be given to how the Good practice development and implementation has been monitored and evaluated in the NZC City. While using the same indicators will allow to compare Fellow cities to NZC Cities, not to compete but more to measure progress, they should also be adapted, to be compatible with local data and existing monitoring frameworks.

Description	**Key results**
• Evaluate impact of good practice in terms of GHG emissions reduction • Assess replicability of best practice by comparing learnings from STEP 5 with the results of STEP 3, identify potential risks and gaps • Adapt the pilot / best practice to the Fellow city to reach pre-defined targets • Plan for implementation by developing a Replication Plan, connected to existing plans and strategies • Adapt monitoring framework and develop ad hoc indicators • Involve the Replication Team and Replication Forum in the process • Communicate about the Replication Plan	• Replicability assessment • Replication plan •
How can Fellow cities be supported in this step?	**Recommendations, tips and resources from other projects**
• Share experience, data and support the planning process • Provide expert support for the assessment and the planning phase	• In the Urban Innovative Action initiative, transferability and scaling up are two of the most important criteria in the selection of projects that would then be replicated. • In ARCH, factors of replication were identified in a series of 40 case studies, leading to the development of a screening tool to identify the eight case studies that were the most likely to be replicated in other cities[129]. • In GROWSMARTER, each Follower city had to prepare a replication assessment, which proved to be the right incentive to associate relevant members of staff[130].

[129] https://savingculturalheritage.eu/fileadmin/user_upload/Deliverables/ARCH_D7.2_GoodPractices.pdf
[130] https://grow-smarter.eu/fileadmin/editor-upload/Reports/Concluding_report_on_Replication_online.pdf

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	• In the Covenant of Mayors Peer Programme, cities twinned together had to carry out a transferability assessment of what had been discussed before engaging themselves in replication.

3.3.3. PHASE 3 - ACT

While PHASE 2 is about transferring knowledge, building capacity and adapting good practices, PHASE 3 focuses on the implementation, on the evaluation of replication, and finally on scale-up.

STEP 7 – Planning and implementation

This step is a substantial one. It should start by setting out a plan, integrating results from previous steps, including the vision, the baseline, as well as outputs from STEPS 4 to 6. The objective is simply to outline all actions that will be put in place to replicate the Good practice, including financing. The action plan should preferably be developed with the Replication Team and the Replication Forum. It should also include a set of indicators to measure progress and then evaluate results, once again in relation with the baseline. Building upon the work done in STEP 3, the action planning should align and be embedded within existing plans and strategy.

Then comes the implementation itself, a substantial part of the Replication Framework, which covers so many elements that it is impossible to be prescriptive here. Whether the Fellow city is constructing a new building reusing the structure of an older one, or whether a new procurement guidelines for the whole administration is being developed, there is not much in common. The analysis of barriers and drivers to replication and scale-up shows that it is beneficial to regularly communicate with the public on progress. During the implementation, it is also crucial to collect data regularly and to report on progress made. In this step, NZC cities should provide continuous mentoring and support to Fellow cities.

Description	**Key results**
• Implement pilot or best practice • Collect data regularly, monitor implementation and report • Share progress with NZC city • Involve the Replication Team and Replication Forum in the implementation • Communicate with the public	• Fully implemented good practice
How can Fellow cities be supported in this step?	**Recommendations, tips and resources from other projects**
• Provide practical advices if (when) challenges arise • Provide expert support and resources	• In BuyZET, a group of Observer cities had to develop procurement plans, outlining the main actions they would undertake in relation to the procurement of innovative solutions for zero emission urban delivery of goods and services. • In EXCESS, replication plans are part of a ready-to-implement package for municipalities, an analysis of local and regional conditions, including a series of actions targeting pre-identified buildings and a set of recommendations.

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	• In CLEVER Cities, Fellow cities had to develop Nature-based solutions plans as the final output of their participation, with the aim of having those plans approved by their respective councils. • In SHARING CITIES, Fellow cities had to submit roadmaps and then regularly report on progress against their roadmaps. • In UnaLab, Fellow cities developed a roadmap during a series of workshops in which they mapped out concrete nature-based solutions projects that could be implemented in the city to achieve the developed vision. • In MatchUP, cities also had to develop Investment Plans, identifying potential sources to fund the replication process and its implementation part[131].

STEP 8 - Review

In practice, this step is often overlooked, despite being critical for the replication. It starts by a thorough evaluation of the replication process, examining data sets collected and systematised in STEP 7 on results and impacts. The analysis and findings should be captured in a (short) report put together by the Replication Team and to which the Replication Forum can contribute to. This evaluation should include the development of recommendations, targeting the NZC City but also any other Fellow City that would be interested in replicating the Good practice. Those recommendations can be practical, focusing on the implementation, and particularly on how to adapt it. Based on these recommendations, the Fellow city should then approach the NZC City - which is easier if good interpersonal connections exist - to submit recommendations and engage in a peer review process. Here, we would recommend organising a dedicated meeting to share lessons learnt and recommendations, before collectively discussing what could be improved, but also thinking about what would come next - how to raise the ambition? How to scale-up the Pilot? How to convince other cities to join? This peer review process is a direct application of the mutual learning principle and, at this stage, the Fellow City is as legitimate as the NZC City, since both have been through the same process.

Description	**Key results**
• Assess results and impacts, also considering co-benefits • Evaluate (implemented) pilot or best practice based on the assessment • Review and improve best practice • Share results and lessons learnt with NZC city – ideally setting up a peer-review process	• Evaluation and impact assessment • Lessons learnt and recommendations
How can Fellow cities be supported in this step?	**Recommendations, tips and resources from other projects**
• Participate in the evaluation • Engage in a peer-review process • Support Fellow city in the evaluation and the impact assessment	• In CLIC, peer reviews and roles swapping (the Pilot becomes a Fellow and vice versa) allowed to improve good practices'

[131] https://www.matchup-project.eu/technical-insights/

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• Participate in the peer review process	effectiveness as well as their transferability. • In the Covenant of Mayors peer programme, a check-point with participants is scheduled some time once the transfer is over, to assess the extent to which they are integrating results from the exchange. • In SHARING CITIES, Fellow cities joined planning stages in Pilot cities to inform and influence. They also input into project-wide deliverables, synthesising the lessons learned from implementation and replication, in order to foster further uptake of results[132].

STEP 9 – Scaling up

STEP 8 has allowed to review and strengthen the Good Practice, and now, as a "proud copier", the Fellow city is as legitimate as the NZC City to take it further. This can be done at different levels, starting in the Fellow city. If the implementation has been considered as successful (in the previous step), it needs to be scaled-up or at least to become common practice in the Fellow city. For instance, a new building code that has been tested on a specific development site can be extended to all future developments. An information campaign to encourage residents to compost or sort their bio-waste in a specific area can be extended to the whole city. New procurement criteria tested in a specific call for tenders can be integrated to all future and related calls. To cut a long story short, the Good practice needs to become the new norm, in its sector at least. This means that it should be embedded in all existing plans and strategies. Outside of the administration, it is also key to communicate results and achievements towards stakeholders and the wider public. It will foster an appetite for change and will support the scale-up. At a broader level, achievements should be showcased to other cities, and the experiences shared and disseminated at European events, on webinars, in reports and so on. As "proud copiers", Fellow cities can demonstrate that replication is not only possible but also brings positive results, and as such be ready to provide advice and recommendations to further Fellow Cities. Last but not least, Fellow cities can advocate for changes at national or European level if some of the barriers identified during the evaluation were related to either existing or lacking pieces of regulation. This advocacy role is also crucial as it can convince higher tiers of government to provide additional support and funding for climate action.

Description	Key results
• Document the implementation, the evaluation / impact assessment and lessons learnt • Reflect and how to scale-up replicated pilot or best practice within the Fellow city (e.g. looking at other sectors, other locations…) • Plan for local upscaling with the Replication Team and the Replication Forum • Showcase achievements in the Fellow city and towards other cities at national and European levels • Support other cities willing to replicate the same pilot / best practice	• Upscaling of pilot / best practice at local level • Dissemination and further replication of pilot / best practice in other cities

[132] https://sharingcities.eu/wp-content/uploads/sites/6/2022/07/D5-01-One-replication-strategy.pdf

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How can Fellow cities be supported in this step?	Recommendations, tips and resources from other projects
• Further disseminate peer-reviewed pilot / best practice • Integrate lessons learnt by Fellow city • Disseminate peer-reviewed pilot / best practice • Support upscaling	• In ARCH, a standardisation strategy was developed, with the aim of identifying standardisation potentials, initiating new standardisation activities as well as promoting these standardisation activities, in order to foster the exploitation of the Disaster Risk Management and Climate Change Adaptation Framework developed during the project[133]. • In SHARING CITIES, Fellow cities were involved in scale-up activities, especially in their own countries, for instance participating in external events[134].

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133 https://savingculturalheritage.eu/fileadmin/user_upload/Deliverables/ARCH_D_2_4_StandardisationStrategy.pdf

134 https://sharingcities.eu/wp-content/uploads/sites/6/2022/07/D5-01-One-replication-strategy.pdf

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4. Conclusion

Looking at primary and secondary sources, this report has first endeavoured to describe what replication is, highlighting its essential components, found across projects and initiatives. It has then identified the main barriers hindering the process replication, namely the lack of resources, the existence of governance shortcomings at city level, the underestimation of marked differences between cities, an often mechanistic vision of the replication process, insufficient multi-level and multi-stakeholder governance, flaws in the production of good practices, and the "Not invented here" syndrome. It also pointed out to a series of drivers: placing the human component at the core, embedding replication in local strategies, breaking down good practices into modules to facilitate their transfer, mutual learning and co-creation at the core of the replication process, flexibility and ongoing assistance in the replication process, political leadership and integrated management, monitoring and evaluation and start small and grow big.

Based on this analysis, a framework has been proposed to formalise the replication process, first to better understand it, then to empower cities willing to reproduce good practices in their quest to achieving climate neutrality. The replication framework breaks down the process into three phases and simple actionable steps, for each of them describing the main actions to undertake, providing examples and key results that should be achieved. The framework does not intend to prescribe anything – the complexity of the replication process would make it difficult anyway – but rather aims to provide flexible guidance and recommendations. We hope that it will support project partners in setting up knowledge sharing and capacity building activities, in order to foster the exploitation of NZC results.

Actions carried out by Fellow cities and by partners on replication-related activities in WP5 will be documented, with a series of progress reports to be submitted in M24 and M36, while a final report that will be submitted M48. Those reports will include an assessment of results and impacts, in order to empirically validate – or to invalidate, and in that case to re-design - the replication framework. To this aim, it will be crucial to develop a set of indicators, based on the work carried out in WP2, to monitor and evaluate replication-related activities, as well as to assess their results and impacts.

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Annexes

A. Survey of internal experiences on replication

Replication / upscaling in H2020 projects

Please complete a form for each of the H2020 projects that involved some activities related to replication or upscaling you have worked on. This exercise will help us understand what successful replication looks like and identify what are the necessary infrastructure and conditions for effective replication.

Thank you!

** Required*

Definition

We understand replication as copying the specific features of a sustainable urban development approach that made it successful in a pilot setting and re-applying these in the same or another setting, taking into account that the framework conditions could be quite different from those in the piloted community or region. Replication also encompasses the different mechanisms used in this process to transfer knowledge and enable implementation in the other setting.

1**. Your name** *

2. **Name of the H2020 project** *

3. **ICLEI Programme** (e.g. Sustainable Economy and Procurement) *

4. **Please describe the approach to replication / upscaling that has been followed in the project and all related activities**. (5 - 10 lines) *

Example from CityLoops for replication at European Level. T7.4 - A group of "Replication Zones" has been set up in order to replicate pilot actions demonstrated within the project, including 7 local authorities from all over Europe. Those cities have been paired with the most relevant "Demonstrator" cities within the project through a twinning program. As such they benefit from frequent exchanges with "Demonstrator" cities and can learn from a series of webinars, capacity building workshops and field visits. "Replicators" will at the end of the project submit a Replication Plan outlining where, how and when specific demonstration measures will be replicated within their territory.

5. **Relevant work package and tasks**. (e.g. WP7 or tasks 7.1 and 7.2). *

6. **Please list and provide links to project deliverables associated with replication / upscaling activities. Relevant deliverables can either be guidance documents aiming to support replication activities or documents submitted by local authorities as part of replication activities.** *

7. **Please list who were the "pilot" cities** (cities where the practice to be replicated originates). *

8**. Please list who were the "follower" cities (cities that learn from pilot cities and then replicate the practice).** *

9. **Has the replication / upscaling process been successful? What have been the results and impacts?** *

10. **What were the main obstacles to this replication / upscaling process?** *

11. **On the contrary, were there any enablers / drivers that made it possible?** *

12. **To sum up, what are the key success factors for replication / upscaling within H2020 projects?** *

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13**. Would you like to be part of an internal working group on replication / upscaling?***

Mark only one oval.

- Yes
- I would love to but don't have enough time.

14. **Outside of this project, would you recommend any interesting and useful publication on replication (e.g. academic literature, guidance document...)?**

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B. Survey of NZC partners experiences on replication

Title: Aggregation and analysis of NZC partners experiences, framework and inputs on replication and upscaling

Instructions: *Please respond to this questionnaire to share your experience and input on the replication of good practices from city to city or their upscaling within (or beyond) the same city. This exercise is carried out within Task 5.1 and will help us identify what are the success factors and best practices for effective replication and upscaling within NZC.*

Here is a tentative definition of replication and upscaling:

- *Replication refers to the transfer of good practices from a pilot case to other geographical areas, albeit with potentially different boundary conditions. (…) Replication may also encompass the management process that was used in the pilot scheme or the cooperation structure between critical stakeholders.*
- *Upscaling refers to expanding a pilot in the geographical area where it was successfully implemented. (…) Normally scaling up takes place in the region where the same boundary conditions prevail*[135]*.*

Estimated time to fill in the form: 20 min

This questionnaire is focused on individual projects or initiatives, in order to achieve sufficient granularity in the understanding of replication or upscaling approaches. If you would like to share experiences from several projects, please fill it in several times! You can also respond if you only have general observations on replication and upscaling.

Thank you very much for your help! The ICLEI team.

* Required

1. **Your name** *

2. **Your organisation** *

3. **Project name and acronym** *

4. **Topic, sector** * Mark only one oval.

- Climate mitigation
- Climate adaptation and resilience
- Mobility
- Nature-based solutions and biodiversity
- Governance and social innovation
- Circular Economy
- Other:

5. **Programme or initiative** (e.g. H2020, UIA...) *

6. **Did your project include some activities related to replication**? *

Replication refers to the transfer of results from a pilot case to other geographical areas, albeit with potentially different boundary conditions. (…) Replication may also encompass the management

[135] European Commission (2017). The Making of a Smart City: Replication and Scale-Up of Innovation in Europe; EC: Brussels, Belgium, 2017.

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process that was used in the pilot scheme or the cooperation structure between critical stakeholders[136].

Mark only one oval.

Yes - Go to question 7

No - Go to question 23

Replication

The replication of sustainable solutions usually comprises a number of steps, as listed below. For each of them, please indicate how this was carried out in your project - when relevant. If some of the replication activities do not fall into any of the following steps, please provide a short description in the following "other" box.

7. **List of "Follower" or "replicator" cities. In other words, cities learning from pilot cities and willing to reproduce sustainable solutions.**

8. **Selection of "follower" cities. How and why were they chosen? Were they already onboard since the start of the project?**

9. **Good practices to be replicated**

Please provide a short description of what was intended to be replicated from the pilot cities to the "follower" cities within the project, whether they were approaches, processes, technologies or policies (e.g. technical solutions to transform existing housing blocks into positive energy buildings, a green public procurement approach or the set-up of a biorefinery...).

10. "**Follower" cities needs and baseline assessment**

Did the replication cities have a clear idea on which specific solutions they wanted to replicate and on the problems they were trying to solve? Did they carry out a baseline assessment within the project and how?

11. **Replication timeline**

When did replication activities started within the project? When did they finish?

12. **Project funding and resources available to "follower" cities**

To what resources did they have access within the project for replication?

13. **Governance framework and stakeholder engagement**

Who was involved on the "follower" city side (practitioners from various departments, elected officials, municipal agencies or companies...)? To what extent did they engage with external stakeholders and with whom (businesses, community groups, research community, and other public authorities)?

14. **Knowledge transfer and city-to-city cooperation**

What were the connections between pilot and "follower" cities? What type of mechanisms were established in order to transfer knowledge and share experience from one to another? (e.g. study visits and "work shadowing", frequent exchanges, meeting and workshops...) Did follower cities have the opportunity to also share their experience and provide feedback on good practices from pilot cities?

15. **Capacity building**

[136] Ibid.

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What type of support "follower" cities received from the project for capacity building? (e.g. webinars, training sessions, workshop, help desks...)

16. **Replication work and deliverables**

How far did the "follower" cities go in terms of replication? Was it limited to planning or did it involve some implementation work? As such, what type of deliverables did they have to submit within the project (e.g. replication plans)?

17. **Results and impacts**

Of the replication process in "follower" cities - and also for pilot cities if relevant. Did they succeed to replicate sustainable solutions from pilot cities? Did they learn anything from the project? How was all of this monitored?

18. **Success factors**

According you, what were the critical success factors and necessary conditions for replication within this project?

19. **Barriers and challenges**

What barriers or challenges did the "follower" cities but also project partners faced in this process (e.g. economic, financial, technological, organisational, political...)? Also, are you aware of any city-needs that couldn't be addressed within the project?

20. **Recommendations**

Based on your experience, what would be your recommendations for a successful replication, in terms of conditions but also looking at the management process?

21.**Would you have any supporting documents to share related to replication - from the project or from other sources**?

22. **Did your project included some activities related to upscaling**?

Upscaling refers to expanding the piloted technologies and approaches in the geographical area where it was successfully implemented. (…) Normally scaling up takes place in the region where the same boundary conditions prevail[137].

Mark only one oval.

Yes

No - Go to question 34

Upscaling

Scaling up sustainable solutions usually comprises a number of steps, as listed below. For each of them, please indicate how this was carried out in your project - when relevant. If some of the replication activities do not fall into any of the following steps, please provide a short description in the following “other” box.

23. **Cities**

24. **Good practices to be upscaled and scale of upscaling**

[137] Ibid.

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For instance approaches, processes, technologies or policies. (e.g. a bio-waste separate collection system extended from one pilot area to the whole city or a procurement clause replicated from one pilot tender to all the municipality tender processes.)

25. **Resources available within the project for upscaling**

To what extent the upscaling process was covered by resources from the project?

26. **Multi-level governance and multi-stakeholder engagement**

What type of governance arrangement did the upscaling process implied? In particular, were other tiers of government involved (multi-level governance)? To what extent were external stakeholders involved and if so, who were they?

27. **Planning for upscaling**

What types of plans and deliverables did cities have to develop in order to outline the actions they would take in this process? (e.g. business cases, upscaling plans...)

28. **Results and impacts**

Have cities been successful in this upscaling process? What have been the results and impacts? Has it contributed to increase the longevity of pilot actions?

29. **Data and monitoring**

Which data were collected to support the upscaling process? Which indicators were used to assess the baseline, measure progress and evaluate both results and impacts?

30**. Success factors**

According you, what were the critical success factors and necessary conditions for upscaling within this project?

31. **Barriers and challenges**

What were the main barriers and challenges in the process? (e.g. economic, financial, technological, organisational, political...) Also, are you aware of any city-needs that couldn't be addressed within the project?

32. **Recommendations**

Based on your experience, what would be your recommendations for a successful upscaling, in terms of preconditions but also looking at the management process?

33. **Would you have any supporting documents to share related to upscaling - from the project or from other sources?**

Conclusion

34. **When would you be available for a workshop on replication and upscaling?** *

For WP5 partners only - the idea will be to share preliminary findings and get your feedback on it.

35. **Would you have any comments or suggestions related to this questionnaire to share?** *

To WP5 partners only - It could be either related to the structure, the questions or the wording...

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C. Workshop with WP5 partners

On 17 June 2022, an online workshop was held to present the Analysis of barriers and drivers to replication and to reflect on the framework. The discussion took place on MIRO and was structured around 5 main categories. Contributions are listed below for each of the categories:

- Cities
- Good practices
- Knowledge transfer
- Monitoring
- Scale-up vs scale-out

Cities & target group

Key questions: - Which cities should be involved? Pilot cities, Mission cities, applicant cities, cities outside of NZC, clusters of national cities... - Should it also include/target local stakeholders? - In terms of personnel, who in follower cities should be involved, which departments? Practitioners vs councillors, city departments, how to identify the relevant participants... - How would you name them - "lead" vs "follower" cities?

- All interested cities. The keywords are "interest" and "willingness" to share & gain knowledge.,,"Jurijs"
- Twins from an open call (GA, comms done so far, ensuring diversity)
- Mission Cities + Second Wave Cities, but all interested cities should be given the chance to be involved somehow,,"Heidi"
- Include all cities eligible for Horizon Europe, except selected 30 pilot cities,,"Ralf"
- Can we have multi-city bids as followers? (e.g. 1 pilot/mentor city + 2,3,4 follower cities),,"Sigrid"
- Relevant participants should be identified based on their level of expertise and involvement in the process - so as to be able to answer practical questions,,"Anne"
- Pilot cities (or pioneering) and twinning or mirror cities sounds better than lead and follower
- Expand the replication to cities outside the project
- For both pilot and twin city (lead/follower) it is crucial to have 1 person responsible for the programme that can connect to all relevant departments,,"Sigrid"
- All cities should be involved but in different ways. We need to remember that we are supporting the Mission Cities as well as developing a pipeline of cities to achieve climate neutrality ASAP. Different mechanisms and methodologies for each city type will be needed.,,"Brooke"
- Lead: Pilot cities. Following: Twinning cities,,"Ralf"
- We should empower cities to engage with their local stakeholders. We shouldn't do it for them. This doesn't preclude local stakeholders using resources etc that are developed.,,"Brooke"
- Selection of the departments depends on the performance of functions related with climate action.,,"Jurijs"
- Follower = Peer or twin Lead = Mentor,,"Heidi"
- We discussed about "second wave" cities when mentioning those who did not make it to the Mission => maybe something similar for "follower", to keep any connotation out?
- Pilots = 'Mentor' Cities
- Identifying the personnel who are key to replication and designing support targeted at them. This includes political level as they are key to replication here.,,"Brooke"

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- Part of the replication should reflect the CCC process, which includes building their local city team. It needs to be cross-cutting with political engagement.,,"Brooke"
- The personnel needed from the follower city's side depends to some extent on the "good practice", but practitioners from several departments should be involved (finance, technical, communication, etc),,"Heidi"
- Regarding personnel, it is very different according to cities and also in terms of staff means. Maybe a first discussion with "good practice" city to see how they did and if correspondances exist in the second city. Personnel can be relevant across departments,,"Amélie"
- Each "follower" city should engage with its local stakeholders, forming a "local stakeholder forum"- o r juts anchoring the replication process to existing stakeholder engagement activities,,"Simon"
- Involve local stakeholders to ensure acceptance and higher chances of successful replication => mapping from 2nd city based on staleholder engagement in the 1st one?,,"Amélie"
- We may only need to agree terminology for the pilots/twins rather than a wider group. Can we just use pilots/twins?,,"Brooke"
- Question of human capacity in municipalities is also a barrier to be kept in mind,,"Amélie"
- I agree, the programmes have already been presented as pilots and twins. switching names now could be confusing.,,"Sigrid"
- In terms of personnel, I would be in favour of involving a good range of actors but that often comes with challenges (you involve people with very different levels of expertise on a certain topics and you may end up excluding some). WE need to be careful.,,"natalia"
- It should also include local stakeholders as they are those who will implement climate action at the local level.,,"Jurijs"
- Involve other stakeholders, eg. public transport authorities and mobility service providers in the discussion
- Other stakeholders could be brought in through community of practice
- how to include national and regional governments in this process?,,"Simon"
- involving "lead" cities in teh development of slection criteria and in selection committees
- Use community of Practice (WP12) for stakeholders engagement
- Community of Practice. The term "community" indicates the condition of sharing certain interests in common. The term "practice" highlights the actual application and use of an idea,,"Jurijs"

Good practices

Key questions: - What could constitute a good practice? CCCs vs specific policies, technologies, approaches and procedures, projects... and how to break them down? - Which degree of standardisation and which degree of contextual information? - Should we also include informal practices? - Who will identify and select good practices? What will be the production process for good practices? Who will decide what is a good practice or not? To what extent will the follower cities be involved in the identification of good practices? - Do you agree with the term "good practice"? If not, what would you suggest? - How will the good practices be documented? Good practice factsheets / reports... - What should they look like? What information should they contain?

- including co-benefits in the selection of good practices,,"Simon"
- "follower" cities should be involved in teh selection of good practices - based on their needs
- Work focus of the Pilots under their NZC agreement
- Enriched with existing effort of Pilot that are relevant for the Twinss

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- I think we need to identify exactly what the twins/followers will be replicating: the pilots will be doing multi-sector, systemic changes and activities. We cannot just pick one of these activities/one sector to replicate. Therefore informal practices should definitely be included. With "good practices" we are running the risk that we will start isolating connected activities/practices.,,"Sigrid"
- factsheets for each good pratice with contact details and technical information on demand
- Yes, also link to knowledge repository WP10.,,"Sigrid"
- What information should they contain? Failures/implementation challenges. (this seems to be something that good practices lack),,"natalia"
- Factsheets could also be on some specific aspects (links with WP10 solutions factsheets?),,"Anne"
- Need probably be "clusters of good practices" to replicate the systemic approach of pilot cities.,,"Sigrid"
- Good practice might be a misleading term as we are constantly looking for "better practice" and improve the processes. Also pilot and twin activities will be a combination of various "good practices".,,"Sigrid"
- Build an expert group with project partners and some cities to decide what are the good practices?,,"Anne"
- Good practices can also be shown through short thematic video clips stored on the platform (e.g., how to involve local stakeholders / 5 key elements in the planning phase, etc...),,"Amélie"
- how t oavoid the usual innovation / flagship projects in good practices vs low-key projects that work,,"Simon"
- might be beneficial to associate project partners in the selection of good practices - in relation to WP2
- What info they should contain? Information around governance (multi-level and within city) could be interesting. This is something that often lacks and can help to capture the context in which the practice operates.,,"natalia"
- Factsheet with pratical know-how, explaining what were the challenges, how they were solved, what tools they used, what were the constraints,,,"Anne"
- Maybe have some criteria to also select some "smaller" projects but which still had important impact,,"Amélie"
- The good practices should also include information on barriers and enablers for implementation.,,"Heidi"
- Important to talk about failures but without "shaming" => find the right narrative,,"Amélie"
- yes, agree with the comment to the left. Mission platform should be a place to discuss failure and risks - was an important topic at the workshops in Brussels.
- How does this tie into the MEL process the Mission/Pilot Cities are doing? Could we capture the findings and practices there instead of duplicating?,,"Sigrid"
- How do we avoid duplication with other good practices out there (located in the CoM website and others)?,,"natalia"
- important to include some information on what went wrong - like a log
- Good practices should be documented in various ways - factsheets, reports, videos/interviews, podcasts, etc. We need to take a case-by-case approach but make them interesting and accessible. But it will depend on the target audience too. Political level won't want a detailed report, but the person designing/procuring will.,,"Brooke"
- Internal, cross-WP group to select the good practice cases. Need to ensure there is no duplication with good practices being developed in other WPs.,,"Brooke"
- Good practice is about tools, tips and tricks for the practitioners for localizing cross sectoral climate action.,,"Jurijs"

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- It would be important to summarize good practice examples in a form of handbook providing also technical information (tool category, duration, possible participants, materials needed,results, etc.),,"Jurijs"
- How do we document all good practices in an easy, attractive way (that is simple to navigate)? I think that searching good practices is often not a nice or interactive experience.,,"natalia"
- Contextual information is more important than standardisation. But this doesn't preclude having a good practice template to ensure that the relevant information is captured (including context),,"Brooke"
- Have also an info-sheet on what expert to involve / how to involve experts?,,"Amélie"
- Good practice: can we help them to have access to funding,,"Ralf"
- Information on how to establish a baseline (and what the lead city's baseline was) should be included in the good practices.,,"Heidi"
- how to make sure that good practices are consistent between each other and that they contribute to systemic change,,"Simon"

Replication programme and knowledge transfer mechanisms

Key questions: - How will this information be transferred to "follower" cities? Webinars / Focus groups, study visits / work shadowing... - How to create interpersonal relationships? - Should we prefer group work on specific topic (e.g. carbon neutrality in waste management) or encourage bilateral relations between two cities - or both? - To what extent the "lead" city will be a mentor? If so, what resources will be made available for assuming that role? - How will "follower" cities be able to review / give their feedback and potential improve good practices? - What is the time frame for replication within NZC? Project duration, until 2030, beyond ... - Which resources are available for supporting replication within NZC? - What type of expert support "follower" cities will benefit from"? - Is implementation included - how to support the implementation of replicated good practices in "follower" cities? - To what extent should the end user – the cities – be associated to the design of the replication programme?

- the mentoring programme should be about the systemic approach, with specific good practices in each sector being integrated.,,"Sigrid"
- Commitment (under the form of agreement/contract?) from the lead city to support during X years the following city in the implementation of its project,,"Anne"
- Dedicated focus groups could be built to exchange on specific solutions (using the WP10 thematic areas?),,"Anne"
- who will be in charge of facilitating the replication process?
- We should probably encourage long term peer relations, until 2030 (at the very least). It is good to try to establish regular check-ins/exchanges (e.g. every 6 months),,"natalia"
- Field visits and peer exchange meetings are extremely important (practical know-how + interpersonal relations) + visits to be organised with the experts that woked on the solutions and not only the city officers,,"Anne"
- crucial to organise study visits
- Working and exchange visits
- bilateral relationships (twinning programne) and interest groups on specific topics,,"Simon"
- The starting point for the creation of interpersonal relationships is the common area of interest, challenge, pathway. Local governments must clearly see the benefits of cooperation and co-creation,,"Jurijs"
- Mentor/Pilot city invited to review design of activities of twin,,"Sigrid"

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- I think this is a crucial point (how to motivate mentor). I think fostering personal relationships will be important for this. We also need to figure how to what extent this will be embedded in the pilot programme (in application they have to commit to mentoring).,,"Sigrid"
- What will be in it for the mentor city? Sometimes it is hard to have an engaging mentor/lead city when they are there to share expertise only.,,"natalia"
- interest groups based on cities' needs and interests,,"Simon"
- Should make use of the online portal and other services as much as possible, open learnings and discussions to other cities. NZC needs to assist with the facilitation.,,"Sigrid"
- At least one physical meeting between good practice and follower city,,"Amélie"
- deadline = 2030
- The replication program must be closely linked with the performance of the functions that local governments ensure,,"Jurijs"
- having a pool of experts available to support interest groups,,"Simon"
- We probably need to segment the cities and the parts of the project where they will interact. Twin cities will have a wider array of methodologies to support them compared with a random city accessing resources via the Portal.,,"Brooke"
- create the possibility for informal exchange between cities, whether they are twinned or not
- Creating some opportunities for informal interactions to build relationships
- NZC assisting with workshops/design of activities across all twins to ensure cross-fertilisation and capturing of learnings,,"Sigrid"
- How far does replication go beyond twinning? How to transfer all knowledge developed within the project to external cities?
- Cities presenting their work to other cities on a regular basis. To set up a routine of information exchange
- Study visits/on-site visits where stakeholders can take part of the good practice and directly exchange with the people who have worked on it are always the most appreciated way to transfer knowledge.,,"Heidi"
- clusters of cities based on language,, "Simon"
- replication should not be the only objective - knowledge transfer, awareness raising are already beneficial
- We also have limited budget for travel. This is solely for the twins/pilots. CINEA is even pushing back on that. So our methods will be limited by this too, unless cities want to pay for it themselves.,,"Brooke"
- develop of journey for cities willing to enrol in replication activities
- We will have national clusters of cities - Mission Cities plus those who missed out. This will be a good group to work with, particularly on replicating the CCC process.,,"Brooke"
- Available resources: 1. twinning; 2. clustered learning; 3. resources on the platform (docs, tools, capacity building programme, etc),,"Brooke"
- how to include national and regional governments in this process?,,"Simon"
- WALK-IN: All Pilot cities meetings, documents etc are by default open for Twinning Cities from a scratch,,"Ralf"
- should we ask twins and other "follower" cities to submit a deliverables? eg replication plan, report on replication...,,"Simon"

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Monitoring and indicators

- Can we have some sort of expert panel from within the consortium? Could this be part of the new FPA?,,"Sigrid"
- should we assess the climate impact of each good practice?
- It would be important to think about the use of quantitative and qualitative indicators to measure and document good practice (e.g. participants feedback, evaluation of the joint replication activities, etc.),,"Jurijs"
- Need to integrate this in the MEL processes of Mission/Pilot Cities. Replicability should be one of the aspects assessed.,,"Sigrid"
- or whether a good practice contributes to co-benefits, not directly related to climate
- For the measurement of contribution it is important to indicate how these knowledge and skills were used and results have been achieved, e.g. input > process > output (results),,"Jurijs"
- how to support "follower" cities in the baseline assessment?,,"Simon"
- Maybe organising focus groups between Pilot & Twin(s) at the beginning, during, and at the end og the replication process can help 1. Assess the impact of the best practice in the pilot, 2. Evaluate the potential impact in the twin(s) 3. Monitor the development in the Twin(s); 4. Have a first idea of impacts in the Twin(s),,"Amélie"
- What is the timeframe for monitoring? Should we go beyond the end of the project?,,"natalia"
- It might be useful to measure which replication strategies have a higher return on investment,,"Sabrina | Polimi"
- There may be a big part of qualitative evaluation,,"Amélie"
- KPI: Funding (internal/ external) received for Replication Pilot,,"Ralf"
- creating opportunities for exchange across teh twinning programme, regardless of who is twinned with who,,"Simon"
- how to monitor the twinning and assess its results / impacts?,,"Simon"
- indicators = number of meetings and exchanges between twins,,"Simon"
- '+ self-rating from "lead / follower" cities on the quality of the relationship',,"Simon"
- Pilots will have indicators linked to the funding. It's different for the twins and others as they won't be receiving a grant.,,"Brooke"
- Need to consider qualitative vs quantitative methods for assessing impact. Both are useful but quantitative might not show results until later. Also, for things like replicating the CCC, that's harder to quantify. For the duration of NZC, qualitative impact assessment might be more useful.,,"Brooke"

Scale-out vs Scale-up

- I think we need to go back to segmenting cities and where they are on their journey to answer this. We hope that the CCC process will tackle all the different elements. But on some specific areas, it might not. For non-Mission cities, they might not be embarking on a CCC (yet) but will need support in replicating specific activities and then scaling up.,,"Brooke"
- I think the scale deep approach is very interesting considering most cities have already many climate actions in place. I think this could be an aspect of the twins.,,"Sigrid"
- Scale-up is a huge challenge for cities and should be addressed in some task/WP, but not sure if this is the right one or if there's another more suitable one.,,"Heidi"
- We should make it very easy for cities, conceptually,,"Ralf"

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D. NetZeroCities Practitioner Panels Consultation - Minutes

Date:	**06.07.2022**
Time:	**2-4pm**

Aim of the sessions:

With this consultation we aim at getting a better understanding of your needs in regard to replication and scale-up. First to validate findings from the research carried out in T5.1 and then develop replication and scale-up activities within NetZeroCities.

Facilitators and notes:

- Simon Gresset, ICLEI Europe
- Sophie Callahan, ICLEI Europe
- Monika Heyder, ICLEI Europe
- Amélie Ancelle, Energy Cities
- Natalia Altman, Eurocities

Agenda:

Time	Activity
14:00	Introduction - Welcome - *Ice breaker - on Miro*
14:15	**Part 1 - Understanding replication** - Overview of the task and presentation of main findings (10') - Q&A (5') - Collecting cities' experience on replication (projects, approaches, barriers and enablers) - on Miro (15')
14:45	**Break**
14:50	**Part 2 - Replication within NZC** - Overview of replication activities within NZC (portal, services, capacity building…) (5') - Understanding city needs and expectations - on Miro (40') - *for Mission cities* - *for Second Wave cities* - *for other cities* - Open discussion on city needs (15')

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15:50	Wrap-up and outlook

Summary:

The last workshop before teh summer break focused on the current state of discussion on the the replication framework. The replication framework will address the twin cities which are expected to join the project in summer 2023 and the scaling of the pilot projects primarily through our peer-learning. Thematic clusters of pilots and twins will be created, and they will be guided through the facilitated Learning Programme by city advisors. Please note that the discussed material are drafts and might be updated.

Key takeaways:

- The issue of resources and capacity was addressed several times by the participants:
  - Cities don't always have the capacity to produce case studies, material, etc. and would welcome any type of templates to facilitate this process. E.g. If a city is not selected to be a formal case study, to be developed in collaboration with WP 5, they'd like to still be able to use the templates developed to post the information in an attractive and succinct manner.
  - Capacities are uneven and some cities won't be able to be on the portal as often as they would like.
- The ability to meet in person to exchange common interests, to share experiences but also to create interpersonal connections is an important driver to replication.
- For identifying the good practices it is crucial to know what is the potential for GHG emissions reduction - knowing what are the main GHG emission sources for each city would also help to match cities with similar profiles.

Part 1 - Understanding replication - Minutes

The first part of the City Panel meeting was dedicated to presenting results from the research work carried out within T5.1 on replication and scale up. See slides attached.

Quick definition of replication (scale-out) vs. expansion (scale-up) and explanation of replication model (City A, City B, good practices, replication programme [report, platform, etc…]).

Barriers & enablers:

- At good practice level (e.g., oversupply of good practice information and no time to read them all, etc.)
- At programme level (e.g., cultural or regulatory differences, staff changes or mapping, etc.)
- For follower city (e.g., lack of political leadership, of resources, starting from scratch instead of adapting something that works; useful to have cross-department collaborations)

A brainstorming exercise was then carried out on Miro to collect cities' experiences on replication, the barriers and challenges that they faced (or could be facing), and finally the success factors and enablers that they identified. Below are the results of this collective reflection:

- Diverse experiences, from "frontrunner" to "follower", but for Valladolid there should not be a strong labelling like that, more being on equal foot. Try and find a peer (Valladolid), with same situation, same size… Allow to share and receive.
- Same background helps replication
- Visits, face-to-face are key => online meetings are good temporary solutions but can also hinder process on the long term (Valladolid: feedback not so good as when come to the place, share

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experience and take time, mention things also outside the context, importance of emotional connection)
- Good relationship between staff
- Finding good partners & good consortium leaders
- Clear problem with oversupply of report and challenge of finding the right information to transfer it to the right project (Leuven)
- Find out what you want to replicate, not necessarily the whole project nor process (Soren)

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Cities' experience on replication (MIRO):

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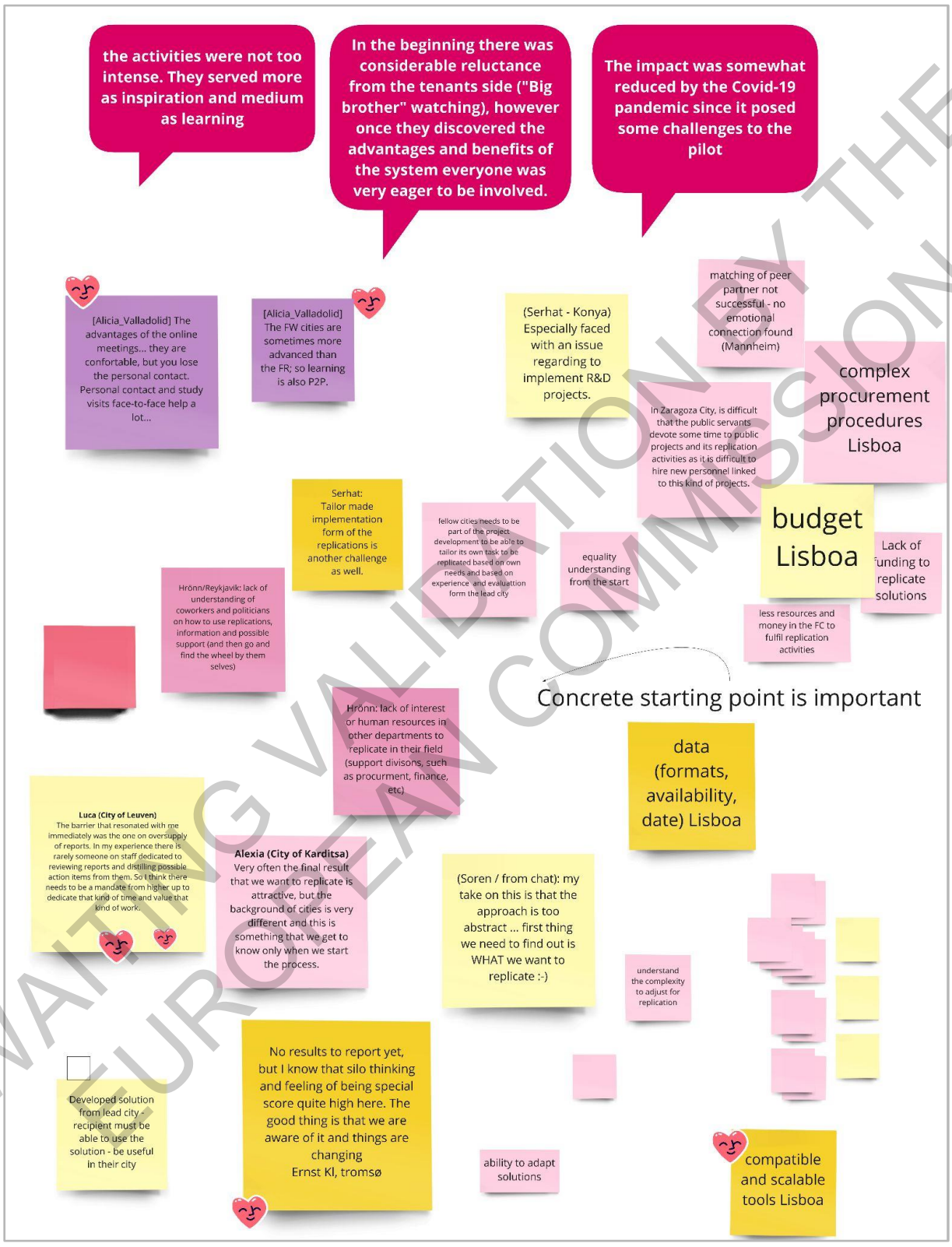
Challenges and barriers to replication (MIRO):



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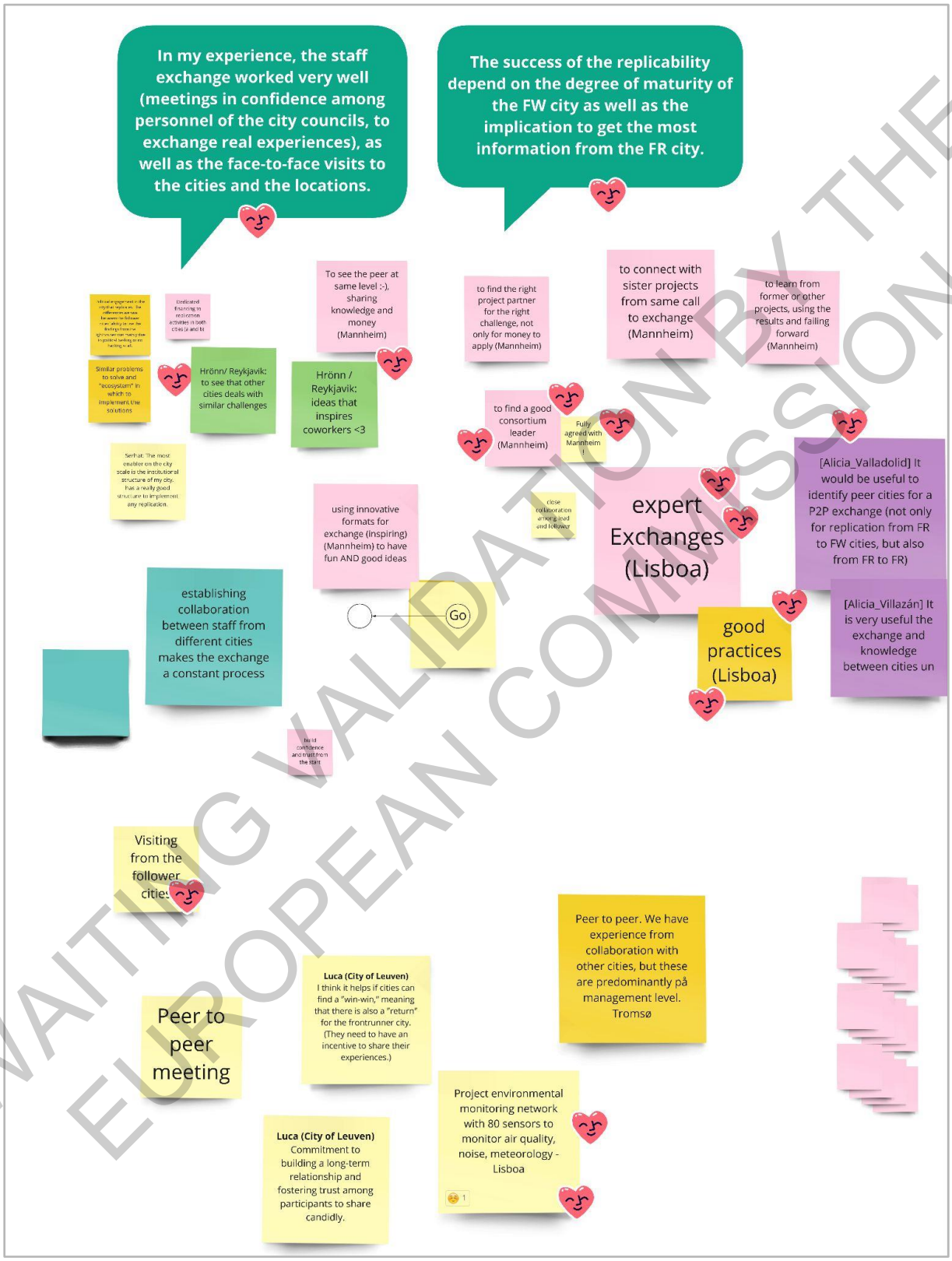
Success factors and enablers (MIRO):



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PART 2 - Understanding city needs for replication within NZC

For the second part of the meeting, ICLEI presented the different levels of services that will be offered to cities, through the portal or City Advisors.

	Online Portal Modules	Climate-Neutral City Advisor Role
Service Level 1 Any City (No. to be confirmed)	·Knowledge Repository ·Community Blog ·City Dashboard & NZC Barometer - generic reports ·P2P Collaboration Space & Social Network – access only to self-managed spaces ·Call Management application	·Direct cities to resources on the Portal ·Answer questions not covered by FAQs
Service Level 2 (a) Mission City (100+)	Service Level 1, plus: ·City Dashboard & NZC Barometer – bespoke reports ·P2P Collaboration Space & Social Network - full access, including spaces moderated by NZC consortium ·Interactive Tools	Advisors work with CCC clusters to: ·Animate P2P collaboration spaces ·Support and animate national clusters ·Monitoring engagement with national governments ·Signpost resources ·Support NetZeroCities experts to plan learning programme, ·Identify service gaps & brief NetZeroCities experts to design new services
Service Level 2 (b) Twin City (60-90 cities)		Each Advisor works with 6-9 Twins to: ·Match 2-3 Twins to each Pilot ·Facilitate collaboration and learning sessions ·Signpost resources ·Support WP5 to plan leaning programme
Service Level 3 Pilot City (30 of which many but not all expected to be Mission Cities)	Service Level 2, plus: ·Grant Monitoring	Each Advisor works with an assigned group of Pilot Cities supporting them in the formation of clusters, the refinement of pilot activities, the development of proposal and the implementation of pilot and learning activities.

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ICLEI also presented the incoin twinning programme, and how cities selected as twins will benefit from mentoring provided by pilot cities.

- 5 pillars for replication: cities with different roles, the portal, the city advisors, the panel.
- Twins can be any city but a pilot.
- Reminder on opening call for the pilot (5 September). Guidelines already published. Cities applying to be twins will have access to the different solutions the pilots will be working on, so will apply according to their interest.

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- Any city can use the portal to get knowledge, questions not addressed in FAQ can be asked to City Advisorss.
- Peer-to-peer learning and training activities to be at the core of the relationships to be built.

A brainstorming session then ensued, in order to collect cities feedback on replication and scale-up within NZC. The objectives were:

- to understand how replication but also more generally knowledge transfer and city-to-city collaboration could help them achieve climate neutrality.
- to assess their needs with regards to the topics and good practices they would like some support on (sectoral, cross-cutting…) but also the format that would be the most useful for them.
- to understand their needs with regards to knowledge transfer and replication activities on the Mission Portal.

Cities were divided into two subgroups due to their relation to the Mission: Mission cities and Second wave cities. Below are the results for each category - respectively climate neutrality, good practices and portal activities - and for each subgroup - Mission vs Second wave cities.

Mission cities

- Aarhus: take a starting point to see what the steering wheel is and be sure we are on the same page. We want to transfer good solutions to cities, watch out not to be all over the place => emission domains are the way to structure the right solutions. You know where your GHG emissions come from, why not taking this as a starting point? Also issue of the taxonomy to check.
- NZC: Also need solution which can create deep collaboration to achieve climate neutrality avoiding silos.
- Aarhus => Yes, fully right. Have some pillars (emission domains) and then other elements to be tackled under this, like data, stakeholder engagement, etc… Something can be identified, and which would do ourselves a big favour. Would also help us find out that we have a lot in common.
- Valladolid: report what is happening in cities with pictures, diagrams, reports => helps to understand it better.
- NZC: should be possible on the portal. Want to create a common ownership of the portal: also, cities providing information, shaping it. Can either use the p-2p space or start developing other outputs (short briefs, videos, etc…) bringing together questions and solutions to the topic of replication. Portal will be bottom-up.
- Valladolid: issue of resources in cities to be able to share all this
- NZC: we'll nudge cities not so active on the portal, see how those cities can be supported and bring things in a format which can be easily shared. CA will play a role in identifying good practices and case studies useful for the cities they are working with.
- Leuven: possibility for cities to review good practices and engage on mutual learning
- NZC: yes, point being discussed, seen as a request from several cities. Cities from panel to see factsheets and good practices before being published? Integrating them in committee of editorial processes?
- Stavanger: accessibility of the portal to other colleagues, giving different co-workers different accessibility to the portal.
- NZC: there will be some admin rights, but others won't be too restricted, none from the portal side, except creating meetings maybe (tbc). Real need to restrict access due to data?
- Stavanger: yes, due to how involved each is involved in the city mission.
- Reykjavik: language issue
- NZC: main language of portal = EN, but there will be a translation possibility + groups in national languages, in case the translation tool is not providing the language we will try to find appropriate solutions.
- Zaragoza: some regions share the same issue (e.g., RES integration and energy efficiency)

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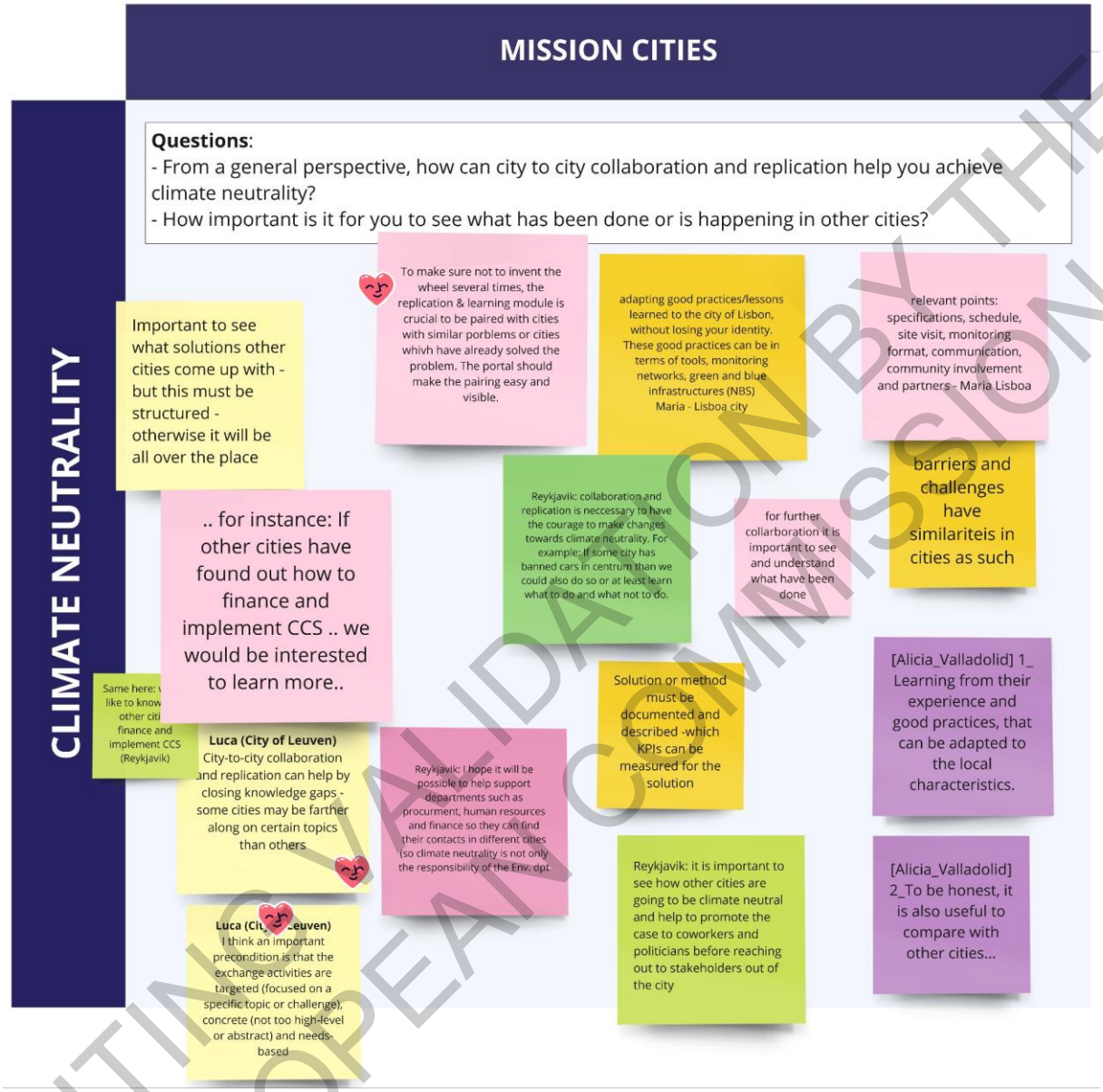
Replication and climate neutrality (MIRO):



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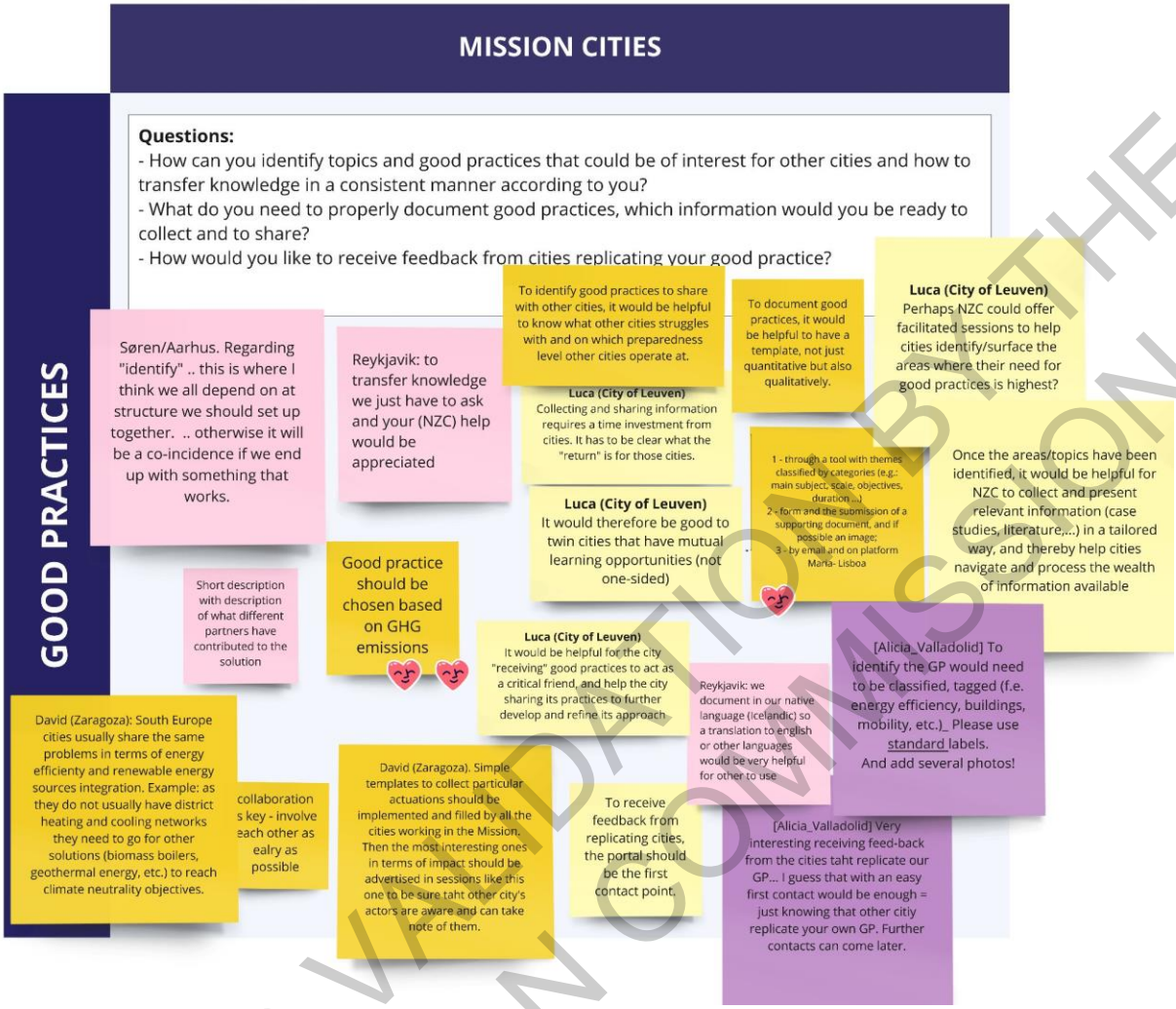
Good practices and topics of interest (MIRO):



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Replication activities on the Portal (MIRO):

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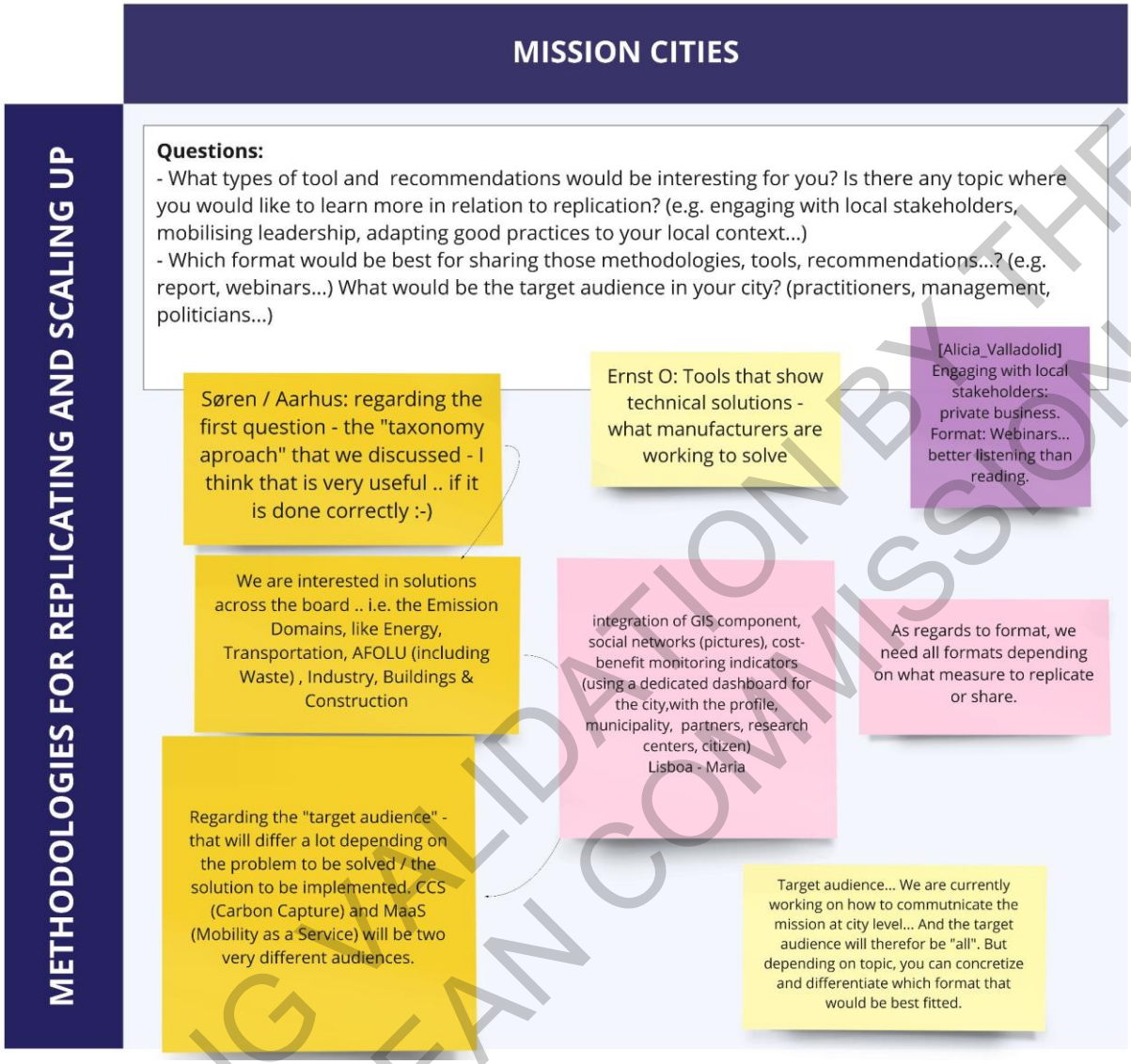
Replication methodologies (MIRO):



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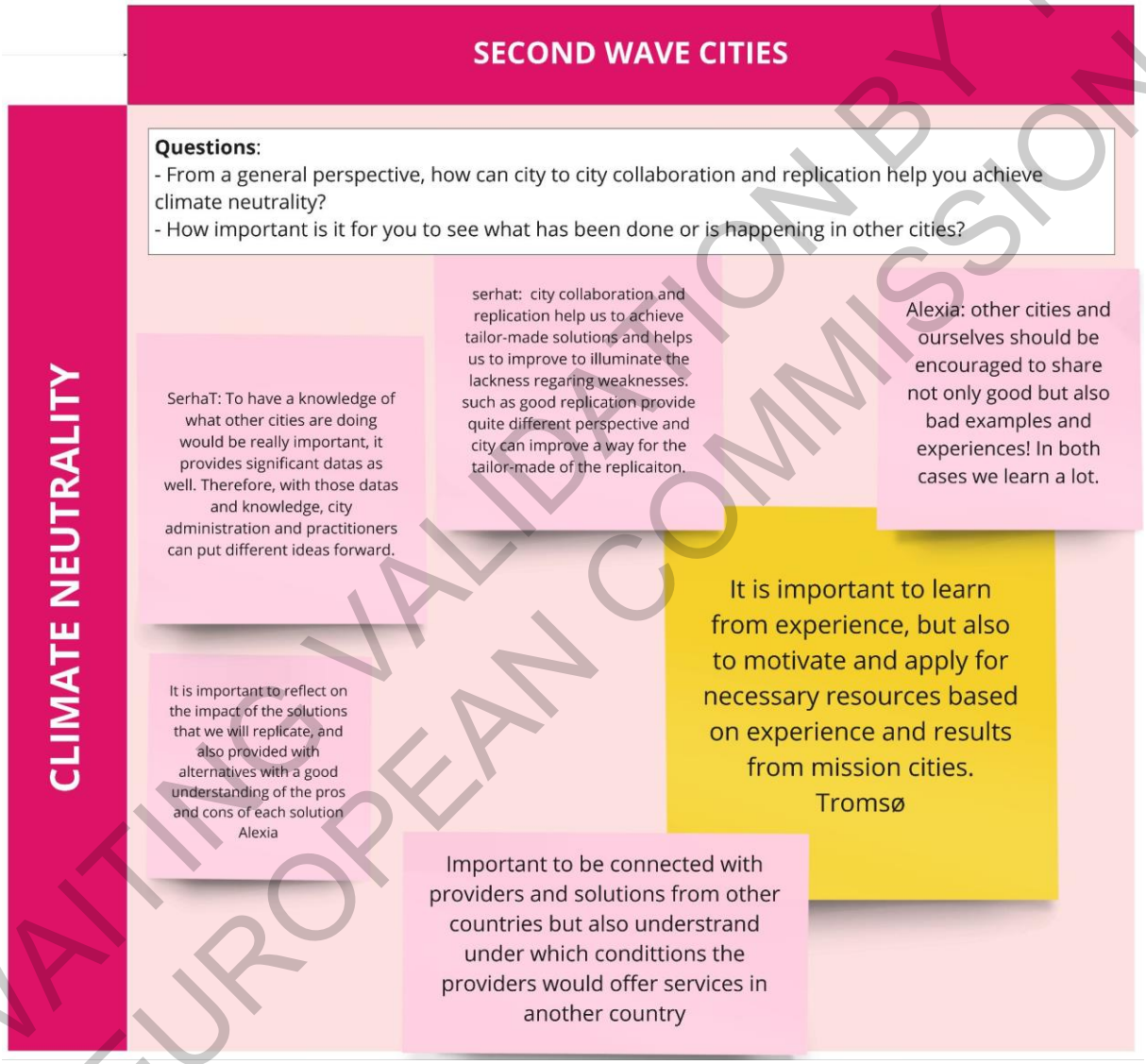
Second wave cities

- Tromso => importance of policy and functional topics: distinction between how manage policy things (organising city, etc…) and functional (concrete and practical thing that you implement). WIll the portal provide access from departments in the city to the portal => NZC: yes.
- NZC: there will also be groups per country with places to exchange good practices and failures.

Replication and climate neutrality (MIRO):



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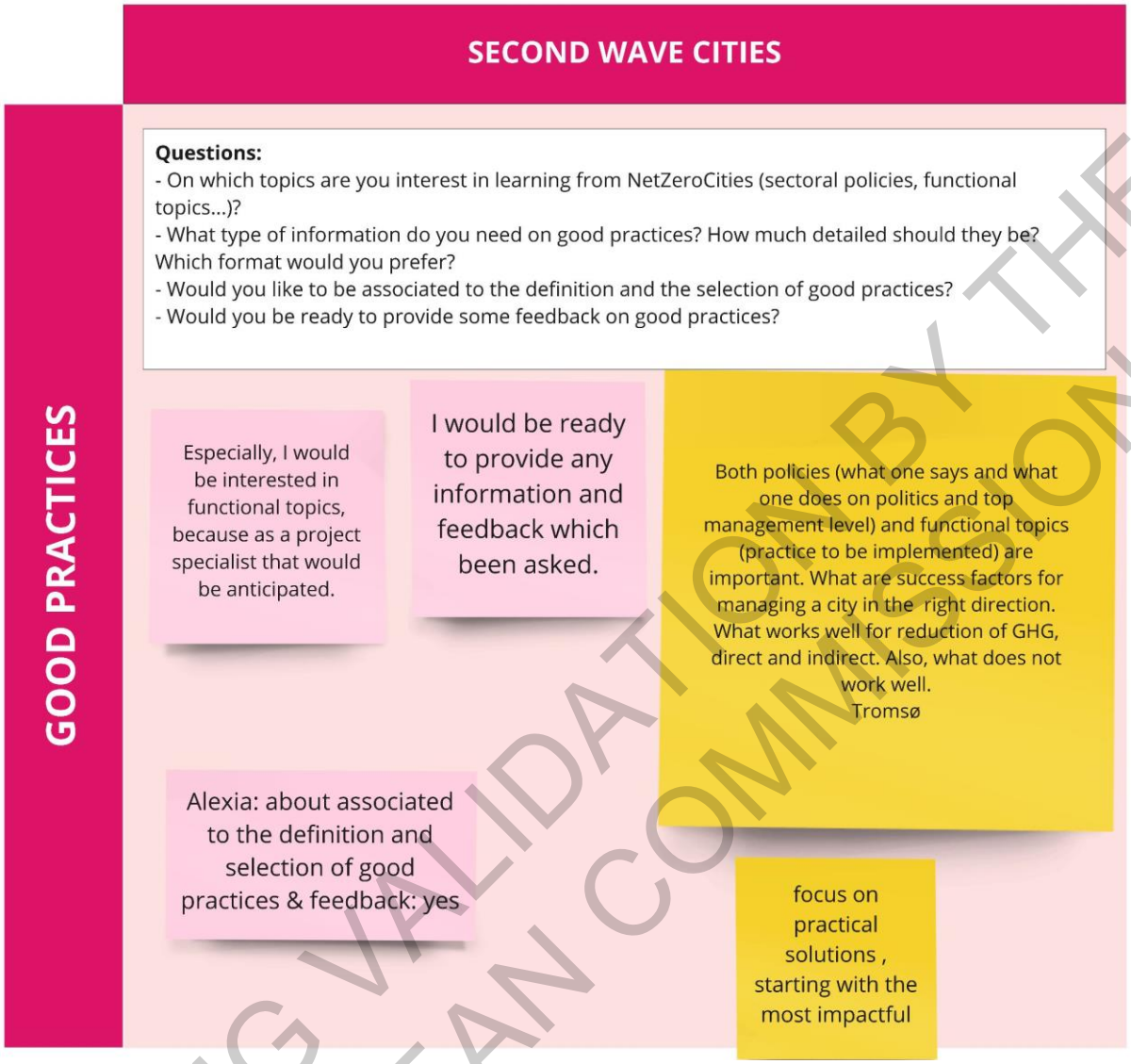

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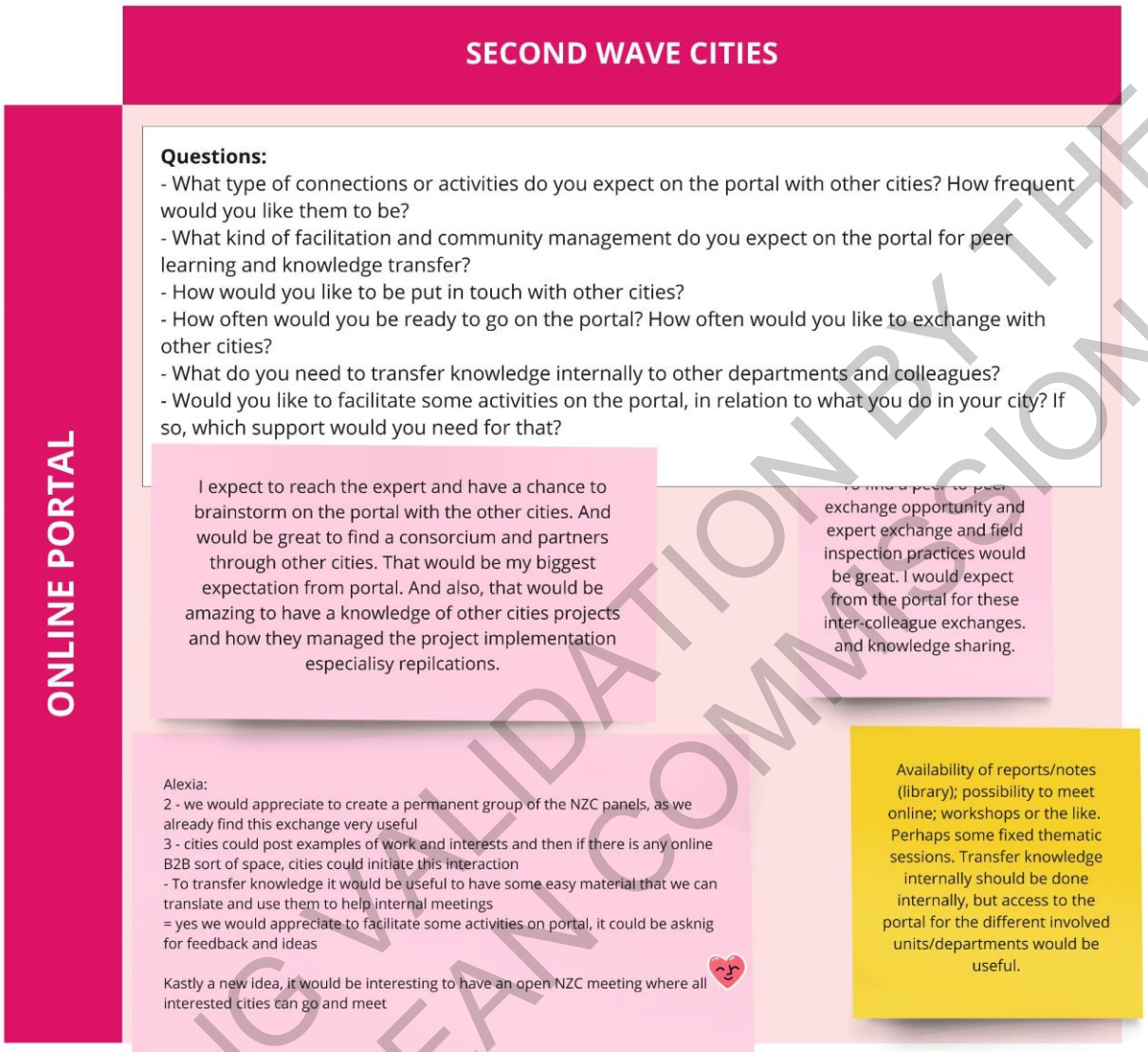

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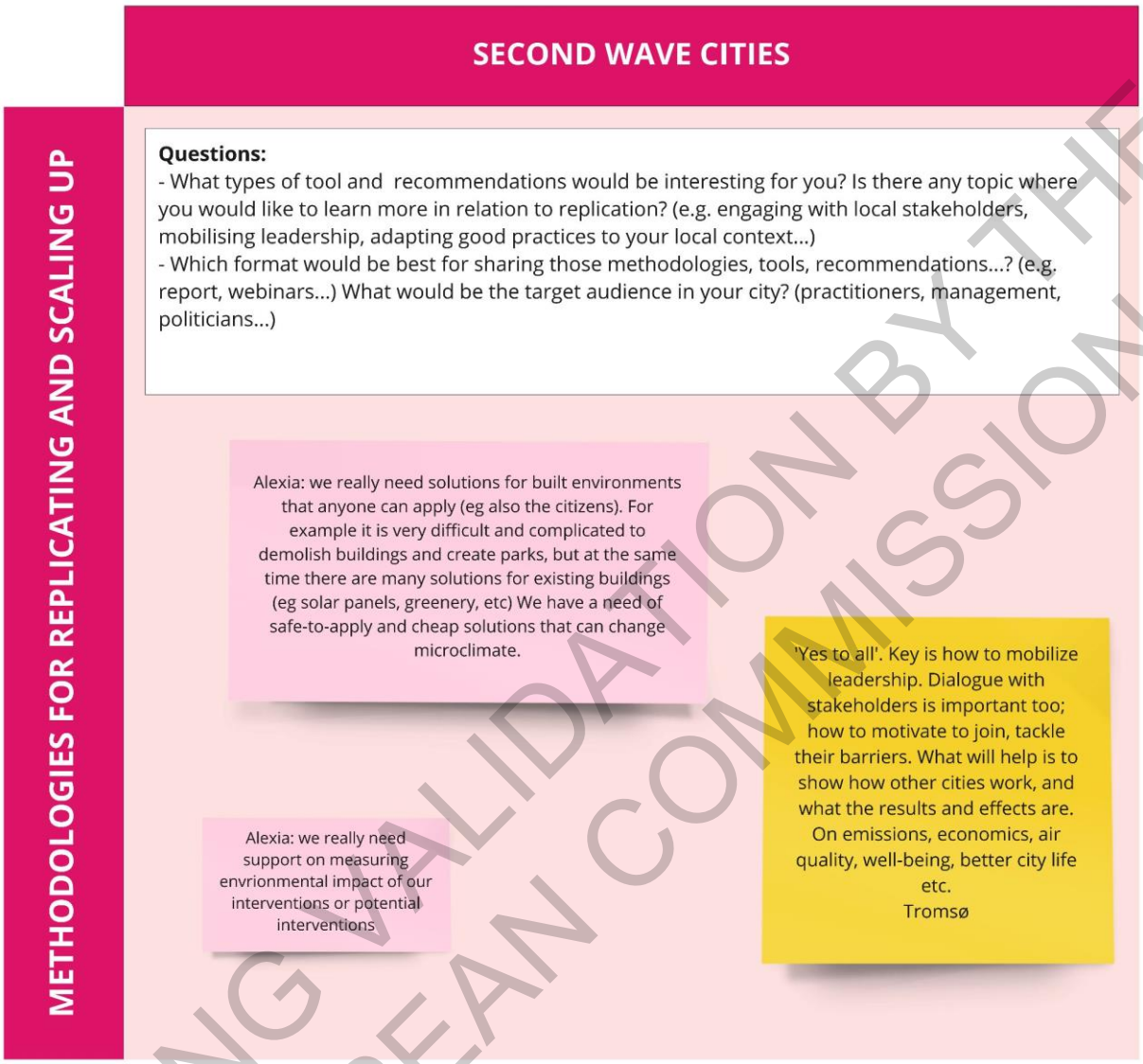

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