Bold urban visions: towards people-centred smart sustainable cities

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Abstract

Le amministrazioni cittadine nel mondo creano piani e progetti ambiziosi che uniscono energia, acqua ed aria pulite con comunità sostenibili, resilienti, inclusive e sicure.

Da un lato, le città hanno il potenziale per divenire motori delle società sostenibili del future: città che generano più energia di quanto ne consumino, con un'emissione netta di gas serra pari a zero, e con una produzione di un surplus positivo di energia rinnovabile. Dall'altro lato, le città sono le nostre case, il luogo dove viviamo. Le persone vogliono comunità sicure e inclusive, con aria ed acqua pulite, e che forniscano i servizi necessari alla vita e al lavoro quotidiani.

Il progetto Positive City ExChange (+CxC) ha come scopo quello di dimostrare come la creazione partecipata e una innovazione urbana aperta possano essere usate come elementi centrali nella transizione verso città intelligenti, sostenibili e produttrici di energia. Amministrazioni cittadine ed esperti sono riuniti in questo progetto per discutere, sperimentare, imparare dai propri errori ed alla fine trovare soluzioni sostenibili per le loro comunità locali. In questo modo, il progetto diviene il ponte che collega esperti e cittadini per dialogare insieme ed innovare.

Questo Background Paper descrive le modalità con cui amministrazioni cittadine ed esperti collaborano nel progetto +CityxChange per creare ed implementare le loro ambiziose idee e per ampliare la cooperazione tra i diversi attori coinvolti.

Urban authorities across the world create ambitious plans and projects that combine clean energy, air and water, with sustainable, resilient, inclusive and safe communities.

On the one hand, cities have the potential to become the batteries of tomorrow's climate-neutral society: positive-energy cities that generate more energy than they consume, with net zero greenhouse gas emissions and a surplus production of renewable energy. On the other hand, cities are our homes. People want safe and inclusive communities, with clean air and water, which provide the facilities needed in daily life and work.

With this knowledge in mind, the Positive City ExChange project (+CxC) set out to showcase how co-creation and open urban innovation could be used as key drivers towards smart, sustainable and positive-energy cities. In the project, cities and solution providers come together to discuss, test, fail, try again and eventually find good solutions for their local environment. As such, the project becomes the bridge that helps the experts and citizens to come together and innovate.

This Background Paper describes the manner in which the cities and solution providers

cooperate in the +CityxChange project, in order to create and implement their bold city visions, with, for and by citizens. Furthermore, the paper identifies important supporting expert networks and opportunities for expanded cooperation.

Parole chiave / *Keywords*

Green new deal europeo, Innovazione urbana, Positive energy cities, Positive city exchange, Smart cities / *European green new deal, Positive energy cities, Positive city exchange, Smart cities, Urban innovation*

Towards positive energy cities that are sustainable, resilient, safe and inclusive

Urban authorities across the world create ambitious plans and projects that combine clean energy, air and water, with sustainable, resilient, inclusive and safe communities, in line with the United Nations Sustainable Development Goals [Un 2015], the Paris Agreement [UnFccc 2015], and the recent European Green Deal [Ec 2019].

On the one hand, cities have the potential to become the batteries of tomorrow's climate-neutral society: positive-energy cities that generate more energy than they consume, with net zero greenhouse gas emissions and a surplus production of renewable energy [Set-Plan Action 3.2 2018]. On the other hand, cities are our homes. People want safe and inclusive communities, with clean air and water, which provide the facilities needed in daily life and work.

Discipline-specific approaches often do not have the adequate capability, scope and scale to solely handle complex societal challenges; however, developing high-impact, cross-disciplinary, cross-sectoral and cross-cultural cooperation has proven challenging to implement.

In the Replication Paper of the Smart City Information System, Vandevyvere (2018) documents the most common challenges and opportunities in ambitious smart city projects, based on, amongst others, the experiences of the European Smart City Lighthouse projects funded by Horizon 2020 [Scis 2019]. A first common challenge is for the projects to deal with complex urban interventions, rather than simply implementing individual technologies. This requires cooperation across silos and value chains, which needs to be managed actively within the project. A second challenge is the need for a trigger for change, to spur on cities and solution providers to move away from business as usual. Thirdly, cities require solutions that are adapted to their local context, and hence often prefer to develop their own bespoke solutions. A more efficient solution would be to have a common minimum standard solution or approach, based on which cities can build their own local adaptations. Fourthly, the added value of smart city projects often lies beyond a mere economic balance, such as better quality of life, better inclusiveness and accessibility – however, these types of values might not be taken into account in investments as they are difficult to measure and quantify. A fifth challenge consists of regulatory bottlenecks, requiring close cooperation with regulatory authorities to create regulatory sandboxes or to apply for dispensation.

In the European Smart City Guidance Package, Borsboom-van Beurden (2019) solicits the experiences and advice of urban decision makers and stakeholders of cities, private sector, academia and Non-Governmental Organisations, to move beyond the challenges identified by Vandevyvere (2018). Based on on-the-ground experiences, extracted during workshops and interviews, a guidance document and roadmap is developed for integrated planning and management of smart city and low energy district projects, that enables cities to define and manage their ambitious goals throughout the entire life cycle: from visioning, deciding and committing, to planning, doing, checking, acting, scaling up and replicating. The document includes guidance on how to avoid the most common challenges related to participatory processes, investment models and cross-sectoral cooperation.

These learnings across projects, cultures, sectors and disciplines, were taken into account during the preparation of the +CityxChange project.

The +CityxChange Bold City Vision

In the +CityxChange project, seven cities (Trondheim, Limerick, Alba Iulia, Písek, Sestao, Smolyan and Võru), 23 solution providers within energy, Ict, mobility and citizen engagement, and two universities, have set out on a journey to co-create positive energy blocks, districts, and cities. The project is built on three main pillars: (1) deliver integrated planning and design by better data and better use of data, (2) create a local energy flexibility market through public-private partnerships and regulatory sandboxes, and (3) community exchange with local citizen and professional stakeholders, to co-create solutions that are advantageous for all. The three pillars are depicted in Figure 1.
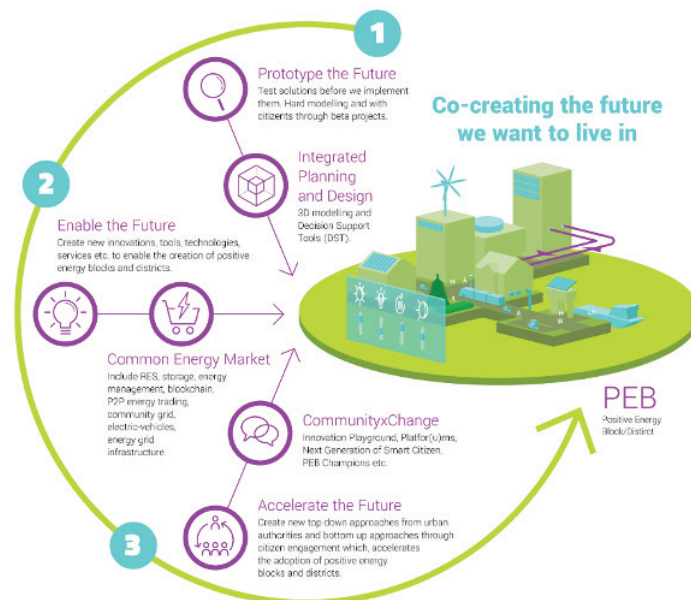

Fig. 1. The +CityxChange co-creation process with three main pillars: Integrated planning and design, Common energy market, and Communityxchange (Available at: https://cityxchange.eu/about-cityxchange/)

Within the +CityxChange project, integrated solutions for energy, mobility, Ict and citizen engagement will be planned, demonstrated and monitored within dedicated test zones within each city. To be successful in the long term, however, these solutions will need to be scaled up across the city, and shared with other cities for local replication and adaptation. In order to make such transfer processes within and across cities possible, a Bold City Vision Framework was developed. The Bold City Vision facilitates learning processes within and between cities. Rather than directly copying approaches or solutions, it is important to identify and translate the intensions, drivers, ecosystems and other resources behind the approach, to the local context available in the other city [Vandevyvere 2018; Borsboom-van Beurden 2019].

The +CityxChange Bold City Vision was created by Tanum, *et al.* [2020] to help cities define their ambitious vision and goals, break it down into actionable steps, and implement them in cooperation with local and international stakeholders. The +CxC Bold City Vision approach merges technical, social, spatial, economic, innovation and other perspectives, supporting cities in their quest to achieve the United Nations Sustainable Development Goals and contribute to a climate-neutral Europe by 2050.

The +CxC Bold City Vision Framework, shown in Figure 2, is broken down into six main processes with distinct target groups: Standardisation, Policy development, Innovation Partnerships, Organisational development, Citizen engagement and Project development. These six processes are described in five consecutive phases, from engaging to designing, activating, accelerating and supporting, each of which given an opportunity for learning that can be iterated back into the previous phases for improved performance.

	Engage	Design	Activate	Accelerate	Support
Standardisation	Evaluation	Visualisation	Simulation	Funding	Sharing
Policy development	Review	Revision	Planning	Budgeting	Analysis
Innovation partnerships	Appointment	Linking	Collaborating	Prioritising	Portfolio management
Organisational development	Idenification	Leadership	Intrapreneurship	Self organisation	Twinning
Citizen engagement	Acknowledgement	Deliberation	Localisation	Connection	Amplification
Project development	Pitching	Prototyping	Delivering	Capitalising	Storytelling

BOLD CITY VISION FRAMEWORK FOR 2050

Fig. 2. The +CxC Bold City Vision Framework [Tanum, *et al.* 2020: 8]

The +CxC Bold City Vision Framework was created by and for city administrations as a "mission-oriented approach" [Mazzucato 2017, p.3] to tackle complex societal challenges with democratically accountable, collaborative experimentation and learning in cooperation with diverse stakeholder groups from private and public sector, academic, and civil society.

The framework was developed through cooperative processes with city leaders and key stakeholders, during which their experiences were extracted, analysed, and summarized into a guidance document for use within the involved cities as well as by others. In addition to being implemented in the seven +CxC cities, the framework has been adopted by the Norwegian Association of Local and Regional Authorities for testing in multiple Norwegian municipalities, and is being introduced to the global United for Smart Sustainable Cities network [Tanum *et al.* 2020].

An open urban innovation framework for cooperation

Already during the proposal phase, the +CityxChange cities, solution providers, academia and civil society partners decided to adopt an open innovation framework (Chesbrough, 2003; Curley and Salmelin, 2018; Wyckmans, et al, 2019), to better be able to address the cross-cutting challenges of creating positive energy blocks, districts and cities.

The framework aims to balance the organizational dynamics of detailing the activities, investments and commitments of partners and local stakeholders in a Horizon 2020-funded project 6 years in advance, while leaving room for the uncertainty, serendipity and exploration that societal innovation requires [Mazzucato 2013].

The +CityxChange project uses elements of "open innovation" as defined by Chesbrough *et al.* [2006], on the one hand, and "open innovation 2.0", as defined by Curley and Salmelin [2018], on the other hand. Chesbrough *et al.* [2006] define open innovation as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology" (p.vii). Building on the widespread distribution and rapid development of digitalization in society, Curley and Salmelin define "open innovation 2.0" as based on the principles of "integrated collaboration, co-created shared value, cultivated innovation ecosystems, unleashed exponential technologies, and rapid adoption due to network effects" [Curley and Salmelin 2018: 1].

The open innovation framework adopted and adapted by the +CityxChange project aims to align the goals of the project partners and local stakeholders, and govern the cooperation in a manner that creates added value for all involved. Activities typically include ideation and co-creation workshops, learning sessions, study visits, and opportunities to build on experiences from the +CityxChange Citizen Observatories [García and Mora 2020] and Innovation Playgrounds [Mee and Crowe 2020].

The project has a distributed leadership model in which each city authority is in charge of the demonstration activities within the city. An Executive Board composed of the cities and the project coordinator, and a Technical Board composed of work

package leads and the project manager, each meet monthly to exchange progress and share learnings across their individual tasks. Dedicated learning sessions identify on-the-ground experiences of the project partners, which are then analysed, summarized and implemented back into the project to improve practices. In addition, metrics are being developed within the +CityxChange project to be able to monitor the effect of the cooperation between the partners and local stakeholders intra- and inter-projects and networks, to identify important insights and improve the added value of the project cooperation.

This open innovation framework has spurred on the emergence of a more entrepreneurial role for the Norwegian University of Science and Technology (Ntnu), which is the only university to lead a European smart city lighthouse project. The other projects are led by Research and Technology Organisations, cities or city networks [Scis 2019]. As project coordinator, Ntnu is not just facilitating, but actively orchestrating, intermediating and shaping the cooperation between the partners, local stakeholders and international networks, to ensure that the knowledge created in the project, gets transferred to and embedded in market and society.

The aim is to build a culture of open innovation with cross-functional teams that optimise the skills and expertise of the partners. Project coordination activities hence include tracking team dynamics, encouraging partners to cooperate across their pre-defined tasks and work packages, and providing partners and local stakeholders with the opportunity to vent their frustrations, identify barriers and formulate their aspirations. This allows the project to continuously align expectations across partners, promote shared understanding, ensure that sufficient resources are available or can be sourced, reframe models of operation, and identify emerging opportunities for cooperation that play to the strengths of each partner.

In addition to optimizing cooperation between partners and local stakeholders within the project, the +CityxChange project engages intensively with other projects and networks.

For example, across Europe, there are currently 17 Smart City Lighthouse projects with similar ambitions, funded by European Framework Programme Horizon 2020 [Scis 2019], with cross-cutting Task Groups on diverse topics of mutual interest. The Smart Cities Information System is a knowledge platform in which data, stories, learnings and other experiences from the Smart City Lighthouse as well as other European-funded projects are gathered, analysed and summarized into meaningful knowledge for urban stakeholders [Scis 2020],The European Innovation Partnership on Smart Cities and Communities is a match-maker between European urban stakeholders from public and private sector, academia and civil society, aiming to join forces to generate and find investments for innovative smart city projects and activities [Eip Scc 2020]. The European Strategic Energy Technology Plan Action 3.2 Smart Cities and Communities aims to create 100 Positive Energy Districts by 2025, with cities in the driving seat [Set-Plan Action 3.2 2018]. In the Joint Programme on Smart Cities of the European Energy Research Alliance [Eera Jpsc 2020], 45 European research institutions and universities cooperate to provide evidence-based knowledge to cities and industry for generating the positive energy cities of tomorrow.

Such interactions help build common understanding of challenges and opportunities, and generate trust to jointly take risks in experimenting with new

approaches and solutions. Eventually, such cooperation will help participants gain buy-in for their innovations, and give them access to a much larger range of influence [Leonardi and Contractor 2018].

Next Steps

The +CityxChange project initiated in November 2018, and will last until October 2023. After a first year of planning, the first demonstrations of energy, mobility, Ict and citizen engagement innovations have now started to be implemented, within the broader framework of the Bold City Vision for each city. Beyond the original scope of the project, two main recommendations for further work can be made.

A first recommendation for next steps would be to expand the cooperation to other countries and regions, beyond Europe, and to engage more people in this type of work, beyond the Smart City Lighthouse projects. Creating positive energy cities and communities in Europe is useful and certainly no small endeavour, but creating them in China, or India, or Africa, would have a much larger impact.

A second recommendation would be to firmly link the on-the-ground innovation to research and education - the quadruple helix. Train professionals, get students involved, empower citizens to contribute, to build the capacity to transform cities and communities to become positive energy, sustainable, safe, resilient and inclusive, across the world.

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