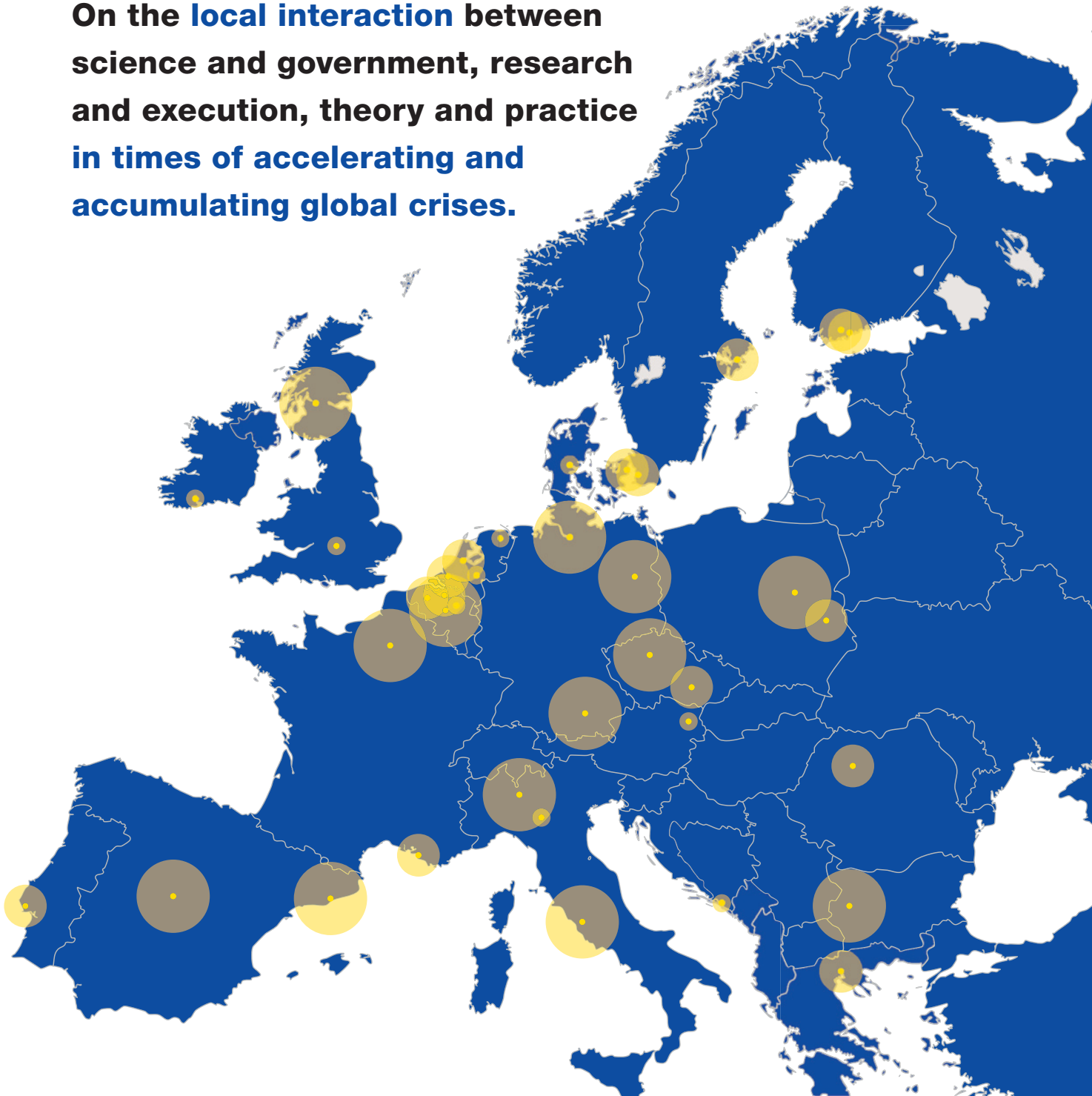
Urban Regional Research Ecology

On the local interaction between science and government, research and execution, theory and practice in times of accelerating and accumulating global crises.



Urban Regional Research Ecology

On the local interaction between science and government, research and execution, theory and practice in times of accelerating and accumulating global crises.

Authors

Prof. dr. Caroline Nevejan
City & University of Amsterdam

Prof. dr. Christian Fernando Iaione
Reggio Emilia & Luiss University

Prof. dr. Panagiotis Bamidis
Aristotle University of Thessaloniki

Thomas Jacob
International Office Hamburg

Anne-Sophie Hollstein
Economic Affairs Paris

Jean-Charles Lardic
Director of Foresight, Marseille

The concepts that are presented in this publication were discussed with various colleagues who are engaged in the City Science Initiative coming from different cities, universities, European networks and from the European Commission (The Joint Research Centre (JRC), Directorate-General Research and Innovation (DG RTD), Directorate-General Regional and Urban policy (DG REGIO), Directorate-General Communications Networks, Content and Technology (DG CONNECT)). The concepts that are presented in this publication, have been discussed in depth with different stakeholders in the city and region of Amsterdam.

On the yellow pages of the English version of this publication, different cities describe their city science developments. Authors from the cities are mentioned on those pages.

On the yellow pages of the Dutch version of this publication, the Amsterdam City Science landscape is described in detail.

For more information:
https://ec.europa.eu/jrc/communities/en/community/city-science-initiative
https://ec.europa.eu/jrc/communities/en/community/cop-cities
https://openresearch.amsterdam/nl/page/43872/europa

Colophon

Amsterdam, May 2022

Editing & Translation: Paul Evans

Editorial: Ida de Freitas, Thijs van Schijndel, Zahraa Attar, Eva Baaren

Design: Artgrafica, Office CC

ISBN/EAN: 978-90-819839-9-0

Citation: Nevejan C., Iaione C.F., Bamidis P., Jacob T., Hollstein A., Lardic J., 2022. Urban Regional Research Ecology: on the local interaction between science and government, research and execution, theory and practice in times of accelerating and accumulating global crises. Report by the City Science Initiative, City of Amsterdam

Yellow pages

1 Introduction: An Ecology of Chains and Networks

The dependence and interaction between government policy and scientific research, for example, has arguably never been more clear cut for citizens since the rise of the Covid-19 pandemic. Ambitions are impressive, a great deal is taking place, and people are well-willing. Because various crises are currently accumulating and accelerating in areas such as climate, environment, society, politics and culture, the interaction between and within, knowledge institutions and governmental authorities is consistent, intensive and involves major consequences. At the same time, confusion exists: activities are not always transparent, there are various programmes that do not appear to be congruent, and establishing connections is not always straightforward. This accounts both for terms of collaboration at a European and at a national level, but also at a regional and a local level, where policy is visible and tangible in the living circumstances of persons and animals. At the same time, successful regional and local collaborations offer important insights into what is necessary to confront major societal challenges and crises at all levels.

This publication focuses on the importance, opportunities and obstacles to formal collaboration between local and regional authorities and knowledge institutions in 2022 and beyond. The continious collaboration between government, science and education is an important humus layer for creative and commercial developments in both region and city. This publication primarily aims to offer a conceptual framework, in which the formal collaboration between science and government plays a significant role locally in the design of the future of the city and the region.

New questions between theory and practice, policy and execution.

In recent years, collaboration has grown more intensive between municipality, universities, and universities of applied sciences in many European cities. In a rapidly transforming world, new questions have continually arisen concerning theory and practice, policy and execution. Research operates in a chain of training, education, professionalization, and the facilitation of excellence. It functions within networks of knowledge institutions,

governments and the business world. In the city, residents and social and cultural organisations are part of a vital dynamic, within which relevant and pioneering research is undertaken. It is clear that municipal research flourishes in an *ecology* where there is cross-fertilization between chains and networks, functions and dynamics, so that the quality of execution and policy are continually improved and innovated. In our current knowledge society, research is a component of the primary process of the administration and management of the city.

Research is a component of the primary process of the administration and management of the city.

Various crises have transformed the demand for research in relation to policy. This has increased the tension between research that supports efficient and effective execution of policy based on evidence on the one hand, and the debate about academic freedom, societal impact and engaged science on the other. The dependence and interaction between government policy and scientific research has been more visible than ever since the COVID 19 pandemic began. Research has also proved to be indispensable for other major municipal policy challenges of our time, such as the energy transition, the preservation of biodiversity, the combatting of illiteracy, or the strengthening of social cohesion in polarized environments. However, the collaboration between a municipal administration and the scientific research institutions, such as universities and universities of applied sciences is not necessarily self-evident. Sharing knowledge requires courage and skills to handle complexity, both in the daily running and management of the city, and in crisis management in exceptional circumstances.

A well-functioning municipal and regional research ecology can offer the continuity, quality and transparency that are essential for a vital contribution to execution and policy in the city, while a well-functioning municipal and regional research ecology offers the researchers context and data, so that they can accelerate their excellent scientific, applied and practical contributions to the current issues in city and country. A good local research ecology can yield important contributions to national, European and international transition – a crisis policy for the coming years.

Until now, little attention has been paid to cohesion and the essential elements that must be invested at local level, if research is to function well in the city and region. Firstly, an essential efficiency and effectivity in the daily running of the many services in the city is required to achieve demonstrably focussed and problem-solving work, while also often having to produce results in the relatively short-term. Secondly, the uncertainties and unpredictable aspects of the crises, which unfold at different speeds and scales, require a structure that supports – with knowledge and skill – the necessary readiness, resilience and elasticity in the city.

More synergy between the challenges that a city faces, and the research that takes place in the knowledge institutions.

In many cities, in recent years, a formal task has been given either to a Chief Science Officer, a department, or an institute to create more synergy between the challenges that a city faces, and the research that takes place in the knowledge institutions. At the initiative of the CSO in Amsterdam, the Joint Research Centre of the EU Commission, together with the Directorate General for Research & Innovation & the Directorate-General for Regional and Urban Policy, has invited more than 20 cities to jointly consider the characteristics of, and the preconditions for, the successful functioning of research in the city. The intensive consultation within these international and national contexts, and also the many conversations between colleagues from universities, polytechnics and municipality over the last five years, have inspired thinking about the *urban and regional research ecology*. This publication is the first step in the mapping out of the elements, functions, dynamics and dilemmas of such an ecology.

The first chapter considers the current role of science in the city in the daily course of events, and elaborates on the role of research in the handling of different crises. The second chapter discusses the issue of cities in transition. The third chapter explores the dynamics of sharing knowledge and collaboration between city and university. The fourth chapter sketches out the possible functions, dynamics and elements that characterise a municipal research ecology, and offers a concrete approach for analysis. Finally, there is a brief consideration of the interaction between cities.

In the yellow pages of this publication different cities describe the local city science developments offering a hands-on perspective on city science in different regions of Europe.


MX3D

prof.dr. Christian Fernando Iaione
Professor of Law & Policy of Innovation & Sustainability, Luiss University
Co-Director of LabGov.City

Reggio Emilia

The City of Reggio Emilia considers the City Science Initiative a strategic opportunity for sustainable, innovative and inclusive socio-economic growth. Therefore, in collaboration with the Luiss University (ROME), it is redesigning its regulation in order to incorporate the City Science Office within the city administrative organization. The role of Luiss University, however, is not limited to consultancy regarding the reorganization of the municipal system. The City Science Office based in Reggio Emilia will be composed of a group of researchers and three Luiss Guido Carli Ph.D. students directly funded by the city. The Office will have a steering role. It will help the social innovation department coordinate the activities of all the city's offices involved in the policy and business experimentalism practices mentioned above. It will also support the design and implementation of trailblazing legal, business and governance solutions through the policy and business experimentalism labs: solutions to collaboratively innovate sectorial policies which are normally approached in silos.

City Science Office

The institutionalization of the Reggio Emilia City Science Office should be seen as the ultimate effort in a trajectory by the city government to create an institutional ecosystem and policy-making process steering the relationship between science actors, local communities, socio-economic actors and city government towards climate-neutral and mission-oriented inclusive innovation. Indeed, the city of Reggio Emilia conceives the City Science Initiative as a delivery mechanism to experiment, prototype, and scale-up citizen-science innovative and entrepreneurial initiatives to deliver a just and democratic urban sustainable development. More precisely, the city has crafted legal and policy tools to leverage the potential role of residents, social, civic, non-profit actors, mission-oriented local start-ups and SMEs in producing empirically driven knowledge in order to inform innovative urban governance and development arrangements to manage the city's resources, services, and infrastructure. Since 2015, the city of Reggio Emilia has foreseen collaborative multi-actor agreements for the management and ownership of urban commons, through the "QUA Neighbourhood as a Commons" policy. In 2015, the City approved a regulation on civic collaboration, contemplating an administrative office for social innovation coordinating the work of a new professional figure, the neighbourhood architect, a network of neighbourhood houses, a legal tool, the citizens/neighbourhood agreements, enabling the creation of public- science-community partnerships. In 2017, Reggio Emilia initiated the "Co-Laboratory" initiative aimed at designing the governance and functions of the Reggio Emilia Open Lab as a space for co-creation, incubation, acceleration of social economy solutions offering neighbourhood-based community-owned services and infrastructure. The Covid-19 pandemic confirmed the relevance of proximity services and citizen co-owned local infrastructures as they increase city preparedness for crises. Thereby, the city of Reggio Emilia is adapting its governance system to host a City Science Office with a twofold mission. On the one hand, the CSO is conceived as a scientific advisor for the co-design of vertical and horizontal urban policies requiring a cross-cutting, interdisciplinary policy approach and a multi-level governance. Thus, the City Science Office in Reggio Emilia supports the social innovation department in facilitating and coordinating the capacity building of municipal administrators. On the other hand, the CSO manages specific projects through policy and business experimentalism labs in order to engage multiple public, private, social, scientific and community actors in order to generate trailblazing and very experimental projects, policies and solutions, that can benefit from an intergenerational knowledge exchange as confirmed by the possibility to have on-field PhD students actively involved in local challenges and problem-based research.

Neighbourhood as a Commons

Within the "Neighbourhood as a Commons" policy, the case of the Coviolo Wireless Broadband Infrastructure emerges as a successful case of knowledge transfer between different actors. Indeed, the call for broadband, as well as the project idea emerged from the local community and was managed by the city government through the neighbourhood houses and the neighbourhood architects, assisted by the social innovation direction and the CSO. The implementation of the internet infrastructure at the neighbourhood level was innovative for several reasons. From a technological perspective, the Coviolo case shows a possible community-based solution that is alternative or complementary to the market-oriented one. From a governance perspective, the project allows the city of Reggio Emilia to experiment with new types of partnerships, the public-private-science, social-community partnerships foreseen in the 2015 Regulation on civic collaboration. Moreover, the project tested a community-based ownership model and management arrangement of an urban infrastructure. Overall, the Coviolo case is relevant for the CSI because it shows how the role of citizens evolved from being passive beneficiaries or users of city services and infrastructure to being civic entrepreneurs, managers and owners of the policy-making process and its solutions or results.

Need for a Paradigm Change: Polycentric Governance

The sharing of knowledge and international experience among the researchers can suggest to cities a modification of the organisational paradigm. The ability to govern experimentation in these times of rapid change has become crucial. Therefore, the administrative machine must identify and be able to rapidly evaluate the problems or phenomena of social innovation that are triggered in the territory under its jurisdiction. The guarantee of solid, effective and productive institutional arrangements for the flexibility of decisions over time is, in fact, given by a polycentric governance (Iaione, 2016), which captures civic collaboration, that is from urban co-governance.

The concentration of individuals with diverse skills and knowledge sets in such enlivened cities nurtures in a "more or less" spatially extended range a climate conducive to ideas (Adler, 2014; Agrawal et al., 2011; Florida and Jackson, 2010; Florida et al., 2010, 2012; Currid, 2007; Markusen and Schrock, 2006; Storper and Christopherson, 1987; Ghemawat and Nueno, 2003) and the willingness of communities to decide and act through experimental processes of deliberative democracy (Felicetti et al, 2016). This environment aims at establishing strong links among cities and territorial stakeholders and among researchers" (Hojnacki, 1983).

To this end, the EU policy framework calls for sharpening the capacity to change established modes of management and intervention (Dewey, 1927). The analysis of the policy literature and practice shows that the adoption of an experimental approach that considers cities as areas of experimentation, in which to co-design innovative solutions to respond to needs and problems of communities (Evans, Karvonen, 2014), is the key to making the relationship between the public system and urban policies effective. This perspective reflects the so-called "learning-by-monitoring" trend, which involves reviewing the customary rules as they are applied in the field (Sabel, Simon, 2011).

The public sector – given the need for a basic mission-oriented strategic vision (Bond, 2009) – with focused objectives, embracing experimentalism, uses of an empirical and inductive method for the updating of choices or for the definition of new directions, demonstrating the effectiveness or otherwise of its forecasts and making corrections through different iterations of a policy experimentalism cycle.

Reggio Emilia

These modifications derive from a constant confrontation with the wishes and expectations of the territory, which becomes possible only if each local context is able to build synergies among local actors in order to optimize the possibilities offered by the urban context and to avoid biases linked to indirect confrontation with stakeholders. Experimentalist governance is the connecting link between innovation and collaboration (Bookchin, 1997). It resides in the provision of tailoring services and encouraging the contribution of local initiatives to urban choices.

This declination of the theme is discernible both in the "Urban Agenda for the EU", the so-called Pact of Amsterdam (May 2016), and in the UN-Habitat "New Urban Agenda" (October 2016) and finds a facilitating hand in the City Science Initiative with the living labs attitude. In the first instance, member states are called upon to make systematic use of multi-stakeholder partnerships in urban development processes, establishing transparent policies, relevant administrative frameworks, procedures and guidelines. In the second, it recognizes the potential of civil society to co-create innovative solutions to urban challenges in order to contribute to the construction of public policies in all levels of territorial government, to strengthen democracy and the importance of cooperation with knowledge institutions, local communities and businesses.

As promoted by the European Commission Joint Research Centre (JRC), living labs are "user-centred, open innovation ecosystems based on a systematic user co-creation approach in public–private–people partnerships, integrating research and innovation processes in real life communities and settings" (ENOLL, 2013). This approach has strong connections from the methodological protocol known as "collaboratory," in the urban commons' context (Ostrom & Hess, 2010; Foster & Iaione, 2016, 2018). It takes the form of a physical or virtual setting like the one established by CSOs where innovative civic entrepreneurs of the city, normally brilliant students and urban social innovators, converge, share resources and knowledge and join efforts with more structured and organized public, private, and social actors to generate new forms of policy, technical and business solutions geared towards inclusive sustainable development.

FOUR-STEP FRAMEWORK FOR CITY SCIENCE, BY LABGOV ROME

The pre-incubation and incubation processes are emerging within universities and cities. The development of the idea and the creation of a collaborative spirit fosters the creation of dedicated layers for each phase of the evolution of the idea. Each layer foresees physical and digital hubs, where stakeholders can meet and work together. This complexity requires a clear methodology that enables different actors to share knowledge, skills and resources for the development of new initiatives. The support of the civic entrepreneurs requires the creation of dedicated places and processes, whereby different players can collaborate to experiment with ideas. Therefore, it is essential to define an operational protocol for the effective engagement of the different categories of stakeholders and to foster their collaboration.*

* The protocol was inspired by a large body of literature on the necessary steps that lead to the production of innovation geared towards the realization of sustainable development goals (Foster & Iaione, 2018).

1

Challenge, Identify, Experiment

Cities do not only need more research on the urban challenges they are facing, but they also need a comprehensive connection with science and a better understanding of available research. To bridge the gap between research institutions and local government, their different needs should be taken into account: while universities insist on independence, local governments prioritize political responsibilities and specific solutions. This also means that definitions of 'academic excellence' in universities provide targets that are not directly commensurable with the targets of local government, where academic research is judged by its societal impact, which is difficult to measure. Governance also implies financing. Even though both local government and universities are funded by public money, financing happens through different channels. Therefore, it is often difficult to find common ground. Financial instruments should allow more space for research that is relevant to local challenges. Also, having a single point of contact for research collaboration in local governments can contribute to finding common ground.

2

Co-Design

The second phase is dedicated to the development of the idea. It is meant to enable different players to work together to facilitate the knowledge and technology transfer. The co-design is at the core of a different approach to see innovation based on a collaborative and open process. Hence, this phase endorses the collaboration among the network of actors and practices. In this 'safe' space, innovators and civic entrepreneurs will be empowered through collaboration, and addressed to target social problems. Students, civic players, local experts, and public and private actors will all collaborate in the co-design of their innovative project. The co-design phase builds on the tools of collaborative digital platforms, and it contributes to the dissemination of information and to the engagement of the community. Design thinking, legal design and other collaborative tools are the building blocks that enable the development of ideas collaboratively.

3

Prototyping

The third phase is the practicing and prototyping phase, and it aims to foster experimentation with the solutions. This phase builds on the idea that in order to be sure that ideas are successful and replicable, they need to be tested on the ground. Hence, solutions emerge from the process, which have been tailored based on the local and territorial needs, and can be tested in first experimentation. This phase is able to define a first Minimum Viable Product (MVP) of the idea that has been built collaboratively and to answer to local needs. The first prototype respects all the main characteristics of the initial idea, but at the same time does not require a significant initial investment. The prototyping requires defining the main Key Performance Indicators (KPIs) that the project needs to accomplish, and how to measure them.

4

Collaborative Testing and Evaluation

The last phase aims to test/evaluate the outputs of the process. In this phase, the ability of the prototype to achieve its objectives has already been evaluated during the different steps. Hence, the project will be analysed, monitored, and evaluated during implementation. The evaluation takes into consideration both qualitative and quantitative indicators. The evaluation is mainly aimed at measuring whether the implementation of the prototype is consistent with the design principles and objectives identified throughout the process by the different participants, such as the ex-post policy analysis that is aimed at determining to what extent it has performed as expected. The process foresees that the evaluation needs to integrate all stakeholders that have participated in (or contributed to) the initiatives. At the end of the process, the prototype evolves into a complete proof of concept. This proof of concept provides real data and information that prove that the idea is reality proof, and it could be replicated.

2 Cities are at the Centre of Transition

European cities currently face major challenges. The local consequences of the climate crisis have created the necessity to radically reshape the energy supplies and mobility options, to organize chains and networks at local levels, in terms of a circular economy, and demand a redesigning of the public space so that, for example, air quality and space where children can be active are guaranteed. At the same time, it can be seen in the social and economic areas that an increasing gap between rich and poor is leading to polarization between the various population groups, that mental health problems are increasing, and that more and more people distrust the government. International business may be able to play a major role in combating the emerging social and climate crises, but they are predominantly occupied with concerns of quarterly earnings and competition.

Handling current emerging crises requires long-term thinking, and politicians are generally only appointed for four years, which is too short a time to be effective. Governments can support such issues as prototyping, pilots, and innovation for energy transition. But this requires politicians to make rules that we must all abide by, and until then, production will continue as before, and consumers may behave as though everything will remain available for ever. In addition, demographic developments such as migration and aging, geopolitical tensions, the international financial climate and trade agreements have a major impact on what happens in the city.

In a city, politicians and civil servants, residents and companies seek solutions to the challenges of our time, which is why they explore what science can provide. Evidence-based policy making has been embraced by the European Commission and many governments in Europe. It is also evident that civil servants in many cities are involved in research in all areas, and that universities and colleges are committed to the city and its region. There are many dossiers that scientists contribute to: energy transition, a circular economy, air quality, education, multilingualism, and mental health, or its undermining. The sharing of knowledge and international experience among researchers may suggest to cities a modification of the organisational paradigm. The ability to govern experimentation in these times of rapid

Politicians and civil servants, residents and companies seek solutions to the challenges of our time.

change has become crucial. Therefore, the municipal administrative organization needs to be able to identify and rapidly evaluate the problems or phenomena of social innovation that are triggered in the territory under its jurisdiction.

The ability to govern experimentation in these times of rapid change has become crucial.

Good cooperation between cities and universities is not necessarily self-evident. Both science and government are organized as hierarchical systems, and find it difficult to relate to the dynamics of the complex system that characterises cities today, in which self-organization is a dominant dynamic and movement can arise instantly. The aim of science to maintain its integrity by working transparently can sometimes find itself in conflict with the needs or interests of politicians, who namely make decisions in the short-term to keep voters satisfied, or to serve a party interest. Despite the above mentioned challenges, both national and European policy stimulate this cooperation. This is initiated by many civil servants and scientists, who have started working together and have demonstrated involvement in city science, despite the different contexts, tempos, ways of publishing, or viewing truth.

Science in the City Region

The first task of higher and secondary education, from academic universities and universities of applied sciences (HBO) to regional education centres (ROCs), is to educate young people to be good, professional, critical and skilled entrepreneurs, employees and citizens. The understanding and conducting of research plays an ever greater role in this; while until the start of this century, research only formally took place at academic universities, for the last two decades it has also been a core task of universities of applied sciences, where many lecturers currently design applied research. In recent years, Regional Education Centres have also developed research that is relevant for the occupational groups that they train for. Handling the great challenges of our time requires interaction between research groups at the level of academic universities, universities of applied sciences, and schools for further occupational education.

Universities and colleges educate young people to be good, professional, critical and skilled entrepreneurs, employees and citizens.

The first task of a government is to guarantee a healthy, safe and inspiring living environment, in which residents, businesses and visitors can live together and develop themselves. Services are designed for numerous people by various administrations and executive organisations. The territory that they manage is compact and limited. Nevertheless, it relates to thousands of people. Scale, speed, and the quality of provision of service is a daily priority. Of course, the social, physical, ecological and technological fields of the municipal region have been subject to continual change for

Jean-charles Lardic
director of Foresight, City of Marseille

Marseille

For more than 30 years, the City of Marseille has maintained very close relations with the scientific community.

In the early 1990s, it created an Internet platform highlighting the interdisciplinary research teams in Marseille working on environmental issues. It then participated in numerous research projects on terrestrial and marine biodiversity, on air pollution forecasting, and also supported more fundamental research on the evaluation of the quality of life and territorial resilience. For the past ten years, the City Foresight Department has continued to interface with interdisciplinary research teams on various societal issues. The European projects in which it has been involved have been valuable springboards for demonstrating the value of interdisciplinary action research, which is the only way to address the complexity of urban issues in a systemic way. These projects have also opened up the debate on the difficulties of multi-actor and multi-level governance. Marseille has also participated in national and international think tanks, such as the PIRVE (Interdisciplinary Research Programme on the City and the Environment), which aims to capitalise on action research on the sustainable city, draw methodological lessons from it and promote interdisciplinarity in the service of public policy.

Over the past year and a half, Marseille has changed scale by deciding to move from a position of interface, coordination and promotion of territorial research/action within municipal departments and research teams to that of facilitator and catalyst. For this purpose, the Department of Foresight, the Department of Economic Projects and other municipal departments were mobilised by the elected representatives of the new municipal majority to create a favourable foundation for the implementation of a real ecosystem allowing the direct connection of research with civil society, companies and inhabitants to produce and exchange knowledge and to contribute to generating virtuous and democratic societal transformations.

Three components have been put in place to boost this ecosystem:

- A City of Transition, currently being created, which has already brought to light an incredible array of transitional actors, notably associations and social entrepreneurs. It will respond to the need to link them together and, with researchers and training organisations, to form the basis of a transformative ecosystem for the city.

- A Scientific Council for Transition, which will strengthen the interface with research, will formulate opinions on certain technological and climatic aspects, and will propose desirable orientations in terms of societal transformations, and also facilitate the evaluation and steering of the transition.

- A process of rebuilding local democracy, around a Citizens' Assembly of the Future and many other mechanisms. It will make it possible to strengthen information and education, and, in return, to capture the expertise of users. Above all, it will enable the legitimate aspiration of all inhabitants - even those who are furthest from democratic expression - to take their destiny into their own hands, by tracing the societal transition paths - and in particular decarbonisation and social justice - that they wish to follow in the space of freedom left to them by scientific expertise, and which technocracy must no longer appropriate. It will finally allow the population to take part in these transformations.

The stakes are enormous for the city of Marseille which, like many Mediterranean cities, suffers from endemic poverty but has enormous potential for creativity and local development that has not been sufficiently mobilised. Within this new ecosystem, researchers are eagerly awaited to help adapt the new concepts of "low tech", the economy of functionality, sharing, co-production, etc. to the realities on the ground and to the needs of the population, even if it means proposing radical innovations - particularly in terms of legal transition - to make certain changes in models possible.

This gives us hope that the rate of decarbonisation of the city will double! In fact, in addition to the largely technological classic and structuring steps taken by the city to decarbonise its metabolism, we will add the beneficial effects of new ways of living and inclusive local development. We are betting that living in proximity and exchange, with adapted food practices, by relocating production to better control its harmful impacts, by producing intangible wealth and social links, by connecting with nature - and our nature - we will reduce the various consumption of imported goods and services as well as certain external travel needs which, with food produced outside the cities, represent 50% of our carbon footprint that is not accounted for in urban areas.

Even if this dimension is still insufficiently taken into account, to the extent that some cities display "pseudo carbon neutrality" by hiding their carbon consumption transferred to productive areas "outside the walls", Marseille nevertheless intends, with the support of research, to make this appeal.

Research is one means to make an uncertain and unpredictable future manageable.

centuries. However, climate change, digitalisation and economic and cultural globalization are now issues for the city that are accelerating exponentially. Research is one means to make an uncertain and unpredictable future manageable.

In many cities in Europe, and a few in the Netherlands, local collaboration over the preceding 10 years has developed increasingly intensively between city/region, universities, universities of applied sciences and industry. It is expected and anticipated that collaborations will also be of vital importance in the coming years. Currently, meetings take place in workshops and conferences for inspiration. Work is done in temporary projects, living labs and longer-term programmes. Sometimes this results in structural collaborations in workplaces and new research institutions.

There are various reasons why these science collaborations in the city have been intensified. The majority of people in Europe live in cities, and the challenges that cities are confronted with are profound. Therefore, local authorities seek contact with researchers in knowledge institutions to work in collaboration on these challenges. Local officials and local scientists know the specific situation in the city and region, they operate in proximity to one another, and can translate general insights to the local context where people live and work. In turn, scientists who work locally can provide a significant contribution to national or international research and policy because they have direct access to the experience and data that local authorities gather in their region.

Politicians, citizens, companies and others wish to understand on the basis of what scientific insights certain policy choices are made. This is essential for the functioning of local democracy. Only then can administrative decisions, policy and execution be evaluated, and allow for an informed vote. However, copyright law, property relations and business interests sometimes hinder this sharing of knowledge. Hence, various local, national and international bodies are paying increasing attention to concepts and working practices such as open data, open access, open science, open content and open government.

The city adapts and transitions with each new generation. Students have a profound impact on research and innovation.

Another fundamental aspect of the presence of universities in a city and region is the participation of students in its urban life. Housing, shopping, night life and culture are in a continual state of flux because new students arrive each year. And the city adapts and transitions with each new generation of students. But these students, as representatives of future generations, not only change the life of the city, they also have a profound impact on research and innovation. As the new generation, they sense the

direction in which their future needs to proceed. They understand urgency and potential in different ways than older generations. In the current era of accelerating and accumulating crises, the participation of students in research is fundamental to finding solutions and necessary new ways of thinking. An urban regional research ecology must ensure that new generations can enter into this ecology and contribute with their specific engagement and expertise. Also, the participation of students in an urban regional research ecology is fundamental to generating hope for a generation that will face and experience intense change.

City Science

The realization is growing that research in the city is interdisciplinary, participatory, and connects different sorts of knowledge.[1] The agenda, the research design, the methodology, the way of validating, and also the way of publishing are influenced by the collaboration between researchers and officials, residents, students and businesses. In recent years, the European Commission has also devoted special attention to research in and with the city. Presently, interdisciplinary research in the city in a European context is known as *city science*.[2] It is a specific application of – and supplement to – current research and policy practices.

City Science is a specific application of – and supplement to – current research and policy practices.

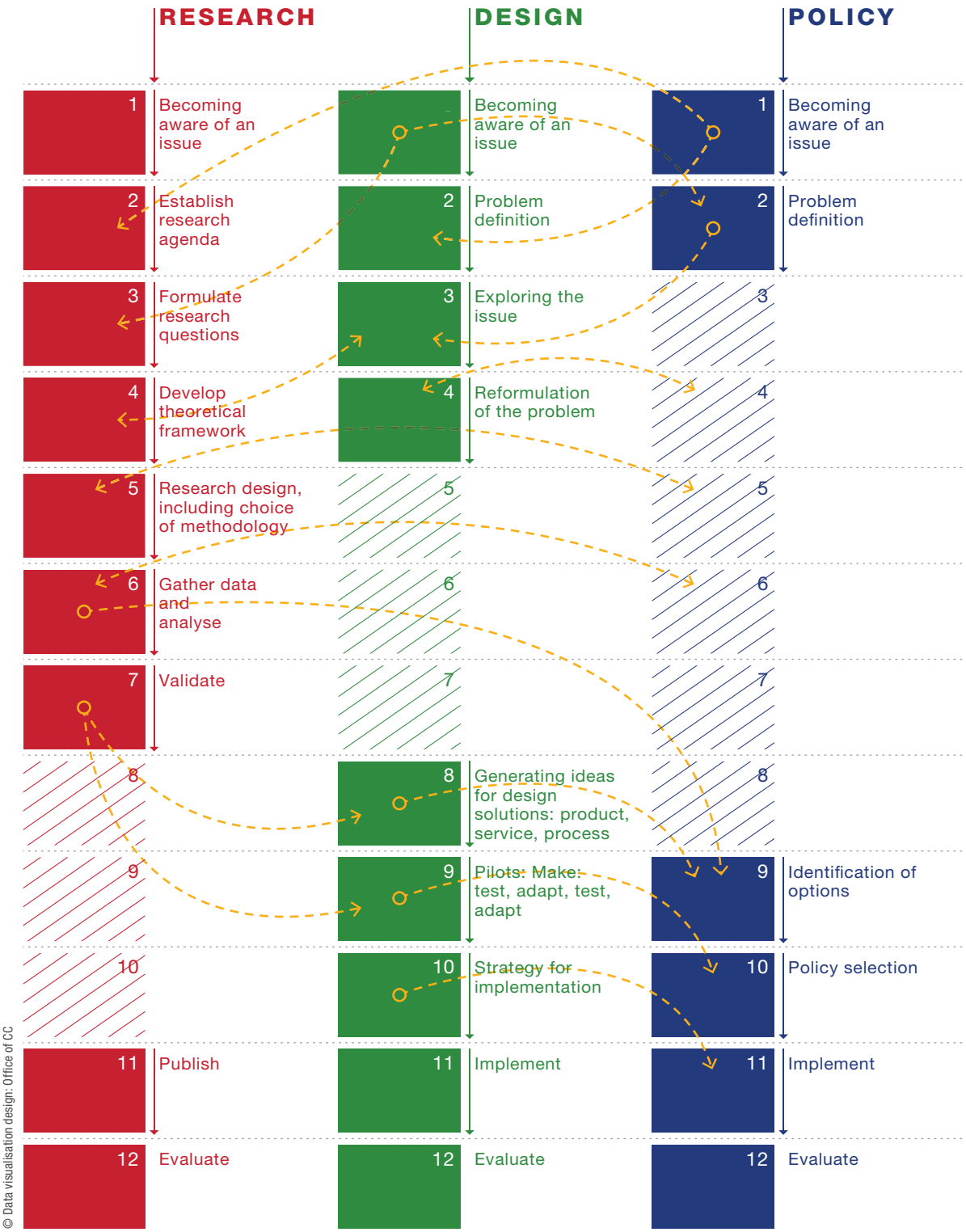
Explicit collaboration with local universities has taken form over the past 10 years in many cities and regions. Within the context of the City Science Initiative a number of large, medium and small European cities have made an inventory of how they work with research in the city. Although there are different organisational forms and sometimes they are located at the university or in the municipality, it appears that many cities have a small team to streamline and inspire the collaboration between city/region, local higher education and the research institutes of the universities. The business community, societal organizations and the research with and by residents (citizen science) also play a role in this. Different directorates of the European Commission now endorse the importance of paying attention to the specific context and methodology that characterize city science.

A characteristic of *city science* is that different forms of research collaborate in larger trajectories: scientific, fundamental, applied, designing, artistic, citizen science (research by citizens) and more. From the various experiences of recent years, it appears that when conducting research in the city, with the city, and for the city, the research process is also deeply influenced

1 European Commission, Directorate-General for Research and Innovation (2019). The human-centered city: opportunities for citizens through research and innovation. Publications Office. https://data.europa.eu/doi/10.2777/489486

2 City Science for Urban Challenges, pilot assessment and future potential of the City Science Initiative 2019–2020, report for the European Commission:https://ec.europa.eu/jrc/communities/en/community/city-science-initiative/document/city-science-urban-challenges-pilot-assessment-and-future

City Science Dynamics



This graph offers an impression of the different steps that characterize classical trajectories the fields of research, policy and design. However, in city science trajectories where research, policy and design collaborate and integrate, a variety of trajectories through these steps is possible. The yellow lines suggest such possibilities. Good communication between all stakeholders and participants about the different steps in relation to one another, is vital for success in any specific trajectory (Nevejan 2020).

REFERENCE

* Nevejan, C., (2020). City Science. In *Values for Survival,* Katern 4, Cahier 1. Complimentary research program to Dutch contribution to 17th Architecture Biennale in Venice. Het Nieuwe Instituut, Rotterdam.

Nevejan, C., (2020). Exploring City Science. In *Seeing the City,* Amsterdam University Press.

by the relationship with the city. Setting the research agenda, the choice of theoretical framework and methodology, the method of validation and valorisation, the method of publication and transferring this into results and advice are all influenced by the collaboration between policy and science. In this collaboration, the relevant parties are constantly in search of the correct course of action, given the complexity in which they collaborate. There are different responsibilities and various processes to achieve results. It appears that design, as the discipline that specializes in shaping the users' experience, plays an essential role in making the results of research-policy collaboration effective and useful. After all, policy designs, interventions, strategies, services and products profoundly influence the experience of citizens and companies. There is an increasing recognition that in order to achieve the policy objectives, a deeper understanding of the realities of the cities is required, and that ways of working need to be developed that allow for different disciplines to work together in an integrated manner.

Constantly in search of the correct course of action, given the complexity in which they collaborate.

Design, as a discipline, appears to play a key role in the translation of research into innovation, execution and policy. The design discipline is specialised in the designing of the voice of future users, when designing a product or service. The design discipline also has many methods for co-creation, participation and validation, in which the end users, such as residents, for example, can play an important role. The design discipline is specialised in the creative influencing of people's behaviour. Before enforcement is necessary, a good design can inspire people to display the desired behaviour under their own volition.

The design discipline is specialised in the designing of the voice of future users, when designing a product or service.

Medium-sized and small businesses, and sometimes large companies located in a city or region, also play a significant role in the collaboration between city/region and knowledge institutions. This collaboration is based on different motives. Sometimes it is about performing joint research, sometimes it is about innovation and facilitation of start-ups and scale-ups, sometimes it is about the future of the economic climate and developments in the employment market.

In cities with a university or polytechnic, students play an important role in the city. They have a systematic influence on the daily life and the cultural and commercial dynamic of the city and region. During their study, many students take part in education and/or research in relation to the major challenges that cities are confronted with. The city is in full development as a rich learning environment. The greatest contribution, however, is the education that the knowledge institutions offer, where they train young people to be new professionals who enter the employment market within a few years.

During their study, many students take part in education and/or research in relation to the major challenges that cities are confronted with.

In the European Commission, the DG Research & Innovation has introduced a specific "Cities Mission" to better orchestrate and finance research that is relevant to the challenges that cities are confronted with.[3] Partly because of the City Science Initiative, there has been a realisation that research in cities requires specific methodology and arrangements. The "100 Climate Cities", a new programme that has been initiated within the context of the Green Deal, also shows that the European Commission has embraced the situation of municipal regions as a focus for research.

For the meaningful utilization of the proximity of universities, universities of applied sciences and local government, it is important that municipal organisations continually obtain, use and safeguard scientific insights. On the one hand, it will then be possible to identify new research questions promptly. On the other hand, it will also be possible to evaluate research that has been carried out and published, and to translate it into practical application. For officials, it is also important to have the space to deepen knowledge and to be able to develop creative capacities for the design of new solutions on the basis of research.

The Urban Regional Research Ecology provides context and building blocks for research in the city, for city science.

An Urban Regional Research Ecology facilitates and supports City Science, and also supports different and alternate kinds of research and policymaking. The Urban Regional Research Ecology provides context and building blocks for research in the city, for city science.

3 This was inspired by the City Science Initiative, amongst others.

prof dr. Caroline Nevejan
city and university of Amsterdam

Amsterdam

Welcome to Amsterdam!

We live in a city of 890,000 residents, 180 nationalities, 10,000 species of plants and animals, and 900,000 bicycles. Amsterdam belongs to one of the largest UNESCO world heritage sites, with its characteristic buildings and canals; and in non-pandemic times, it welcomes more than 17 million visitors a year. Being close the sea, it also has several harbors, and functions as a transport hub for many international businesses.

The Amsterdam region is home to two academic universities, fourteen universities of applied sciences, two art schools, and a broad variety of societal, cultural and knowledge-based institutions spread out over the greater municipal area. The various clusters and departments of the municipality, which shares its democratic headquarters with the city's modern opera house, are also widely spread out. All of these organizations, clusters and departments develop and acquire knowledge relevant for the city.

However, it is still quite possible to miss out on potentially beneficial collaborations and forms of knowledge exchange, despite the relatively small geographical distances, the long history of collaborations between the above-mentioned organizations, and increased emphasis from research funds on societal impact. The amount of scientific knowledge produced is larger than ever and the city has to deal with increasingly complex challenges that can no longer be solved within a single discipline. Moreover, the *modi operandi* and research rhythms of stakeholders often differ, which sometimes makes it difficult to connect with each other at the right time.

While academic researchers, for example, tend to share only peer reviewed results of their research on, and within, a specific research area, civil servants and policy makers are continually searching for cutting edge knowledge and methods from a multitude of research domains in order to move the step-by-step process of policy-making forward. At the same time, these parties are highly motivated to validate and steer their research and policy choices by engaging with each other through City Science, where local challenges bring parties together despite their differences.

A Catalyst for Knowledge Sharing

In 2017, the municipality appointed a Chief Science Officer (CSO), responsible for stimulating and reflecting on collaborations and knowledge exchange in and for the city by various means. These means include the matching of supply and demand for knowledge, orchestrating knowledge exchange events with experts, and stimulating knowledge with in-house PhD candidates and professors working part-time for the municipality and the university.

A major means of stimulating knowledge exchange was the creation of a structural knowledge infrastructure between the municipality, regional government bodies and the city's major universities, in which funding from the national government (the so called *Getting to Know the City Deal)* also played a role. The consortium agreed on launching a digital knowledge platform, which a federated network of editors, working for and from the different organizations and departments, could contribute to and make use of.

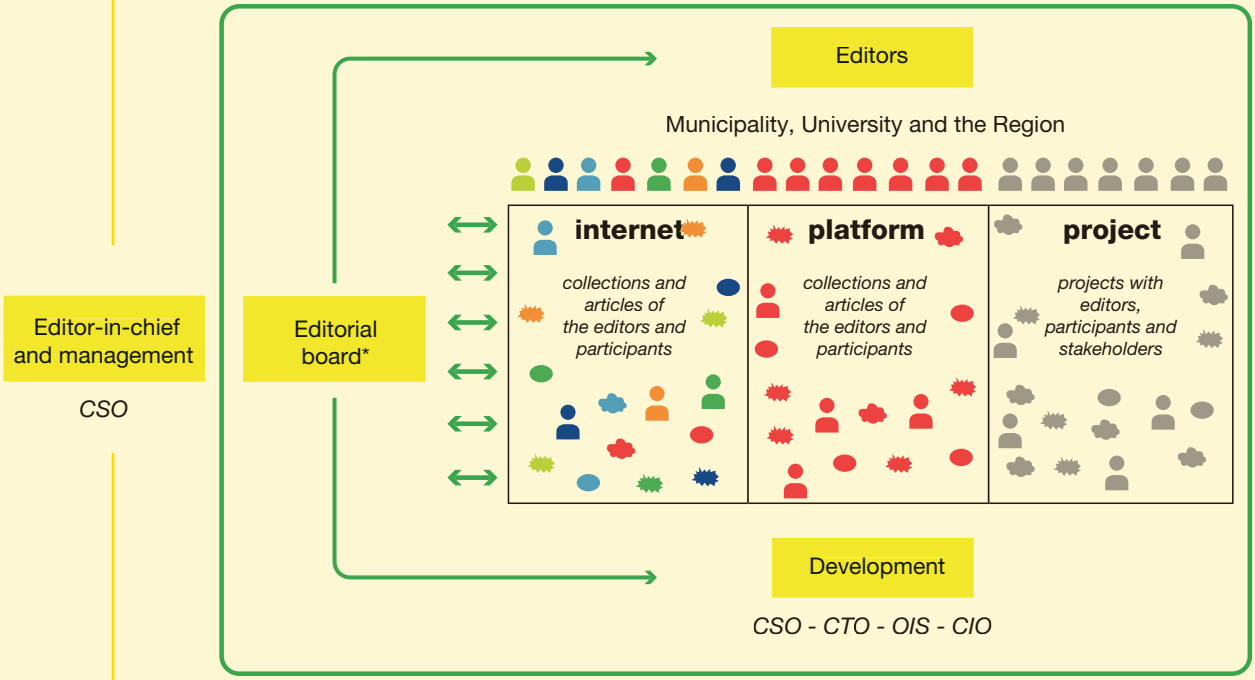
Visitors to the platform would have three questions answered: what are the latest research results; what research requirements and methods currently exist that are relevant for the city; who is currently working on what issues; and how can I contact or join them?" The name of the platform is Openresearch Amsterdam.

The Openresearch Platform

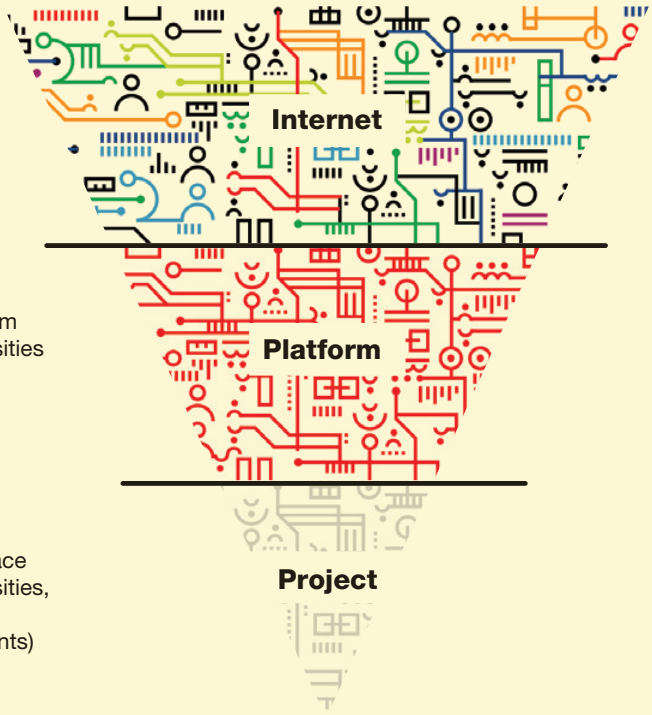
Since openresearch.amsterdam was launched in the spring of 2020, the research ecology of the Amsterdam region has grown increasingly tangible. Two years into its existence, the platform offers almost 8000 articles, has a network of 175 federated editors, more than 3000 participants and a weekly average of 2500 unique visitors. Its database currently consists of textual, audio and video documents, such as research papers, project reports, expert profiles, research-project descriptions, city council documents, interviews, and recordings of conferences, to which access would otherwise largely be restricted to experts within their own domain.

The urban challenges addressed in these documents cover everything that could be of interest for the future development of the city and

Organisation Openresearch.Amsterdam



* *Chief Science Office, Research and Statistics Bureau, Amsterdam Economic Board, Chief Technology Office, Municipal Strategy Team, City Archive and Amsterdam Metropolitan Region Bureau*



Visible for	Editable by
Everyone (public)	Editors per organisation and Chief Science Office admin
Participants of the platform (governments and universities within the Amsterdam Metropolitan Region	Authors of articles and collections
Members of a project space (companies, other universities, national organisations, civil organisations, residents)	Members of a project space

Amsterdam

the wellbeing of its inhabitants. The choice of what is relevant to share on the platform does not lie with the CSO, but with the federated group of editors. These editors, working in various layers of the municipality and faculties of the knowledge institutions, are also responsible for the quality and quantity of contributions to the platform. They can add, adjust or remove information as they see fit, and take responsibility for copyright issues and permissions. As active users of both the platform and its content management system, they also advise the CSO on the future development of the platform.

Since the database has a semantic web structure that connects metadata, users are not only presented with the sources matching their search queries, but are also given suggestions to other, possibly relevant, sources outside their own discipline and its specific language. The platform's interface also places the articles retrieved from a search query in context, thereby changing the meaning that users give to the source itself, and expanding their manner of interdisciplinary thinking.

In order to share as much content as possible for as many relevant parties as possible, Open Research Amsterdam has three layers: a fully open and public layer, and two layers that take into account the sensitivities of sharing preliminary research results and new research plans. One of these layers is only open to the municipality and local knowledge institutes, which facilitates collaboration between the different organizations; the other is only open to group members of specific projects or so called *ateliers*. Knowledge shared in these layers is made accessible to the public as soon as is feasible, and this is continually stimulated by the CSO. The CSO, in turn, is assisted by international trends in academia, such as the movements of Open Science and Creative Commons, and by developing national laws that require government bodies to be as transparent as possible.

Ateliers: where the magic happens

In the Open Research project layer, systematic City Science collaborations that take place in the physical realm manifest themselves digitally. Groups of academics, students, policy makers, societal organizations and businesses regularly come together to tackle and discuss specific urban challenges and use the platform's project layer for a variety of goals. They work on joint research proposals, share (preliminary) research results, data and presentations, post meeting notes, and point to other forms of other relevant information.

Some of these collaborations are relatively new and target relatively new policy and societal issues such as green cities, food, water, circularity and disinformation. Others, such as the public health collaborations, led by the City Health Service (GGD), have existed for a few decades and focus on ongoing health issues such as infectious diseases, vaccinations and targeting obesity.

Because of their digital representations on Open Research, old and newly formed ateliers give new researchers, students, companies, societal and civil organizations the opportunity to get to know, and become involved with, up-to-date knowledge and fresh perspectives, both in times crises and otherwise. Hence, it is precisely in these ateliers that knowledge exchange becomes systematic, trust between stakeholders is built over time, and the urban regional research ecosystem thrives.

	January	February	March	April	May	June	July	August	September	October	November	December
CSO Team Meetings	● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ●	● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ●
Editorial Board		⬟		⬟		⬟		⬟		⬟		⬟
Researchers Meetings			■	■	■	■			■	■	■	■
Researchers Network				◆		◆			◆			◆
Trainings	★	★	★	★	★	★	★	★	★	★	★	★
Department Meetings									●	● ●	● ●	●
Editors' Lunch				⬟					⬟			
Meetings with Driebit	◖ ◗	◖ ◗	◖ ◗	◖ ◗	◖ ◗	◖ ◗	◖ ◗	◖ ◗	◖ ◗	◖ ◗	◖ ◗	◖ ◗
Driebit and Information Security		⏢			⏢			⏢			⏢	
City Deal Amsterdam		▲		▲		▲		▲		▲		▲
Universities Secretary Meetings	▬			▬			▬			▬		

Science and Policy in Times of Crisis

A well-functioning municipal and regional research ecology can ensure that in times of crisis it is possible to operate with 'just-in-time' efficiency and effectivity. When scientists and officials have worked together in such an ecological system, they already know societal partners in a specific sector, there is already an understanding of each other's processes, and there is already faith in each other's capacity. All those involved are able to bear joint responsibility for the well-being of the municipal region within a context of national and international developments. After the outbreak of COVID-19, it was clear that there is great importance in interdisciplinary collaboration between science and policy, and that parties can rapidly find one another.

After analysis of the collaboration between research and policy during the COVID-19 pandemic in various European countries, the European Chief Scientific Advisors made four recommendations for the science/policy collaboration in times of crisis: to take a multidisciplinary approach, to communicate uncertainty, to be open and transparent, and to ensure a clear demarcation between science, advice and politics. The Dutch Scientific Council for Government Policy (WRR) wrote an essay on the basis of a working conference with a number of scientists and policy makers, regarding how we can deal with the use of knowledge when advising policy in times of crisis. In this essay, entitled 'Verwerven, waarderen en wegen' (Acquire, value and weigh)[4] a differentiation is made between three sorts of crises that can each flow into one another. In an *acute crisis,* certain actors or institutions can be granted exceptional authority to take rapid decisions, such as lock-down measures. In a *chronic crisis,* which the pandemic transformed into after the first wave, there is more space for debate and democracy. The third sort of crisis, the *predicted crisis,* for example the climate crisis, has been extremely politicised from the start.

Three sorts of crises:
- acute crisis
- chronic crisis
- predicted crisis

According to the Scientific Council's essay, characteristics of all sorts of crises include a high degree of urgency, uncertainty and unpredictability, whereby an appeal for a contribution from science is made as a matter of course. The Scientific Council lists three strategies to deal with science and policy in times of crisis: adaptation (the capacity to learn), a multidisciplinary approach, and a division of responsibility. The Scientific Council also emphasises the importance of having 'a broad representation of citizens, professionals and organisations to contribute thinking about the way in which a crisis is handled'. Finally, the Scientific Council formulates three ways to

4 The Netherlands Scientific Council for Government Policy, the Health Council of the Netherlands and the Council for Public Administration, (2021). Acquiring, assessing and weighing. The use of knowledge in policy advice in times of crisis. https://english.wrr.nl/wrr-en-corona/publications/publications/2021/06/24/acquiring-assessing-and-weighing.-the-use-of-knowledge-in-policy-advice-in-times-of-crisis

give form to collaboration between science and policy: ask advice of an existing advisory council, create ad hoc consensus among changing experts, or the positioning of a special multidisciplinary group that concerns itself with the issue of 'preparedness'. An Urban Regional Research Ecology contributes to such preparedness.

Resilience and Safety

Both the Scientific Council's essay and the advice of the European Chief Science Advisors focus on handling a crisis at a national level. Although more than 80% of Europeans actually live in urban regions. These residents and companies need to know where they stand, and therefore need consistency and transparency of policies in times of crisis, not only at the level of the nation state, but also from their own city, so that they can make decisions for their own survival and well-being. After all, 'the devil is in the detail', and this also applies to national rules that can sometimes create local uncertainties or regional adverse effects.

Local knowledge and experience are indispensable in times of crisis.

It is always important for everyday life in a city, especially in times of crisis, that local knowledge and experience are available and usable for researchers and policy makers. This makes adaptation possible, which in turn requires multi-disciplinary collaboration and builds on responsibility sharing. Building on this argument, we can say that a good Urban Regional Research Ecology can make a world of difference across all levels of the city in predicted, chronic and acute crises because the consequences of international and national measures are apparent locally. Where citizens live and work, the effect, success and failures are observable and tangible.

In times of crisis, a city aims to offer the community as much safety and resilience as possible. The mayor of Amsterdam wrote an essay about the public space in and after the pandemic, in which she draws attention to the well-being of Amsterdam residents, in encountering and handling differences, in relaxation and movement, and in experiencing inspiration and beauty. Such qualities help to maintain a good atmosphere in the city, also during crisis. Because the durability and resilience of a city region are determined by both physical health and mental health, enforcement is an important but also very limited instrument in this dynamic. Influencing behaviour is not straightforward, and the tension between controlling behaviour on the one hand, and inspiring the taking of responsibility on the other, is acute in times

The durability and resilience of a city region are determined by both physical health and mental health.

of crisis. Moreover, local experience indicates that readiness also means promptly being able to call upon experts in design. The design discipline possesses a great deal of knowledge about the stimulation of desired behaviour, and can thereby make a significant difference. The influence of artists, who are experts in the use of the imagination, and the designing of experience for others, has so far been underestimated in formal crisis management bodies.

In times of crisis such as the pandemic, the well-being of residents and the success of the economy depend on good cooperation between science and policy. Despite this awareness, it appears that trust between partners, even in times of crisis, cannot be taken for granted. A lack of trust is harmful in handling a crisis. Trust arises from insight into, and experience with, each other's capacity, goodwill and integrity. Also, trust is the result of a trade-off, which is why it can also be designed (Nevejan & Brazier, 2017).[5]

An architecture of trust.

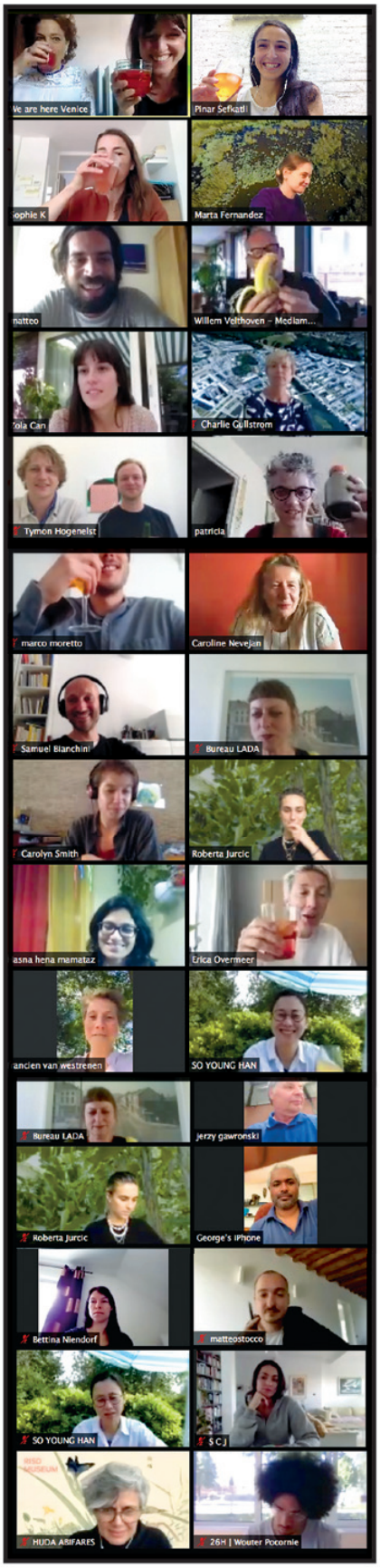
In an urban research ecology, people work together systematically, know each other's expertise, know who they trust in what area and on what occasion, and generate research and knowledge on a daily basis. In the many interactions in an urban research ecology, one can argue that an architecture of trust is built, from which many other actions and interactions can emerge.

Trust between partners is not self-evident, even in times of crisis. This is the reason for the argument here that a local and regional research *ecology,* in which the sharing of knowledge does not occur ad hoc but is a continual process, is an important starting point for preparing for various crises and the development of durability, resilience and safety.

5 Nevejan, C., & Brazier, F. (2012). Granularity in reciprocity. *AI & society,* 27(1), 129-147.

Nevejan, C., & Brazier, F. (2015). Design for the Value of presence. J. van den Hoven, PE Vermaas, I. Van de Poel *Handbook of ethics, values, and technological design: Sources, theory, values and application domains,* 403-430. Springer.

Nevejan C., (2018). *Urban Reflection, On diverse engagement in the networking city of Amsterdam.* Inaugural speech, University of Amsterdam.



© Eleonora Sovrani

Final project presentations in Venice.

Final project presentations in Amsterdam.

During the pandemic and in the context of the 17th Architecture Exhibition of La Biennale di Venezia, a special research program took place. Over a 50 international scientists, artists and activists engaged in small teams in a larger architecture of trust between people, who did not know each other and could not meet, for having local impact on Venice and its lagoon. More information: https://openresearch.amsterdam/nl/page/65307/chapter-6-architectures-of-trust-–-introduction

Júlia Miralles de Imperial
Delegada de Ciència i Universitats

Barcelona

Actions related to science and knowledge have a longstanding tradition at the Barcelona City Council. Between 1980 and 2007, these activities, despite not having a specific organic structure or joint planning, built relationships between the city and the scientific and knowledge ecosystems: the scientific centres, universities and other entities of a scientific nature began to be integrated with the City Council. For example, during this period the allocation of land to scientific projects was essential in favouring the presence of multiple scientific actors in the city that, even today, are of remarkable importance for the progress and development of our city. One of the major creations of that period was the Natural Science Museum, a modern institution open to the general public that unified and renewed the traditional zoology, botany and geology museums that derived from the end of the 19th century.

Another step forward was taken in 2007 with the start of the Barcelona Science Programme, which encourages activities such as the Science Festival, a weekend of science activities and experimentation for kids and families, and the EscoLab, a programme that invites schools to visit the laboratories and scientific centres of the city. A few years later, in 2012, the Citizens' Science Office was created, which to this day still carries out research projects based on citizen participation through schools and neighbourhoods. In 2016, the municipal government passed a measure regarding universities, to give more relevance to the relationship between the City Council and these institutions, and to working together for better integration of the university community, within academic, cultural, economic and social areas of the city. At that moment, the Municipal Advisory Council on Universities was created with the aim of improving the connections between the universities and the City Council's policies.

Science and University Strategy

A great boost for the Barcelona science strategy began in 2018 when, with the consensus of the various research centres and companies, universities, administrations and citizens, the first Barcelona Science Plan was drawn up, and the Municipal Advisory Council on Science was created to advise on its design and implementation. The framework of this plan focuses on promoting a favourable environment to enable research and technology centres, universities and the scientific businesses of the city to implement innovative solutions in relation to urban challenges such as quality of life and ageing, or environmentally friendly mobility. The most significant actions of

2019 include the new call for research grants, the first City and Science Biennial, the commitment to urban projects linked to science, the Hypatia Prize, and the promotion of urban innovation labs.

March 2020 saw the presentation of the new Barcelona Science Plan 2020-2023, a scientific roadmap with 15 objectives and 51 actions, to reinforce and consolidate the objectives of the previous plan. After the struggles of the pandemic, the plan was updated through a participatory process that included 25 new actions to deal with the health, social and economic effects of the coronavirus crisis.

Currently, the Sixth Deputy Mayor's Office for Culture, Education, Science and Community has, for the first time, included science as one of the leading areas in the policies of the City Council. Within that office, there is a specific political reference point and a technical structure to implement the Science and University Policy, which has extended its objectives to make Barcelona grow as a city of science, research and knowledge. These broad objectives are implemented through four big policy areas. Firstly, Science in the City, which includes the City and Science Biennial, whose third edition will take place in 2023, the recent study on women in science in Barcelona, and the arts and science residency that will be located at Fundació Muñoz Ramonet. Secondly, research, an area in which each year we promote a call for grants for alliances of research centres, and another call dedicated to young researchers, both of them in relation to urban challenges, or the Hypatia Prize that is celebrated jointly with the Academia Europeae Barcelona Knowledge Hub. Thirdly, education and Science, in which we promote the EscoLab or the citizen science projects in schools. And lastly, universities, in which we have permanent spaces of coordination to work both on specific and strategic projects and needs.

To sum up, after working for fifteen years to develop actions to connect science with the city, today we can say that the City Council has a specific Science and University Policy that will continue to work to make Barcelona grow as a capital of science and knowledge in regard to all its citizens.

3 Sharing Knowledge and Working Together

In a world where global dynamics profoundly affect urban realities at a great speed and scale, the collaboration between local, regional and national governments and universities is necessary for understanding what will subsequently occur. Both problems and solutions are transmitted quickly over the many networks that the world possesses in 2022. Thus, the outputs of collaboration are no longer constrained to the traditional public-private partnerships. Cities are carving out newly conceived knowledge and tech transfer processes, as well as inclusive pre-incubation and incubation processes that enable all urban actors to participate in tackling the challenges brought by the digital and ecological transition.[6] Therefore, inclusiveness and equality can be promoted by the collaboration of the more fragile groups in urban innovation processes, thanks to open science and citizen science approaches. These newly conceived knowledge and tech transfer processes enable civic players, students, citizens, local officers and local start-ups and SMEs to become promoters of new solutions, which are defined and shaped collaboratively to achieve the societal goals. These mission-oriented innovative and entrepreneurial processes aim to foster innovation through the creation of civic entrepreneurial activities, and therefore require a clear methodology and process. However, both science and government are organised as hierarchical bureaucratic systems that have difficulty relating to this dynamic in the complex system of the current cities, with self-organisation as a dominant dynamic.

Dare to Share

Knowledge is the foundation of our capacity to act.

Knowledge is a fundamental part of our existence. We need knowledge for our survival and well-being. It is directly linked to our presence. Our presence of mind depends on the knowledge we have. Without knowledge, we die, and it is a condition for being able to act in life. Knowledge arises through action, but it is also a condition for the same action. Knowledge is the foundation of our capacity to act. All kinds of actions, including actions by governments, are based on knowledge. Knowledge is a fundamental component of our

6 See the 'Rome Open Lab-House of Emerging Technologies': https://www.comune.roma.it/eventi/it/roma-innovation-progetto-smartcity.page?contentId=PRG38591

capacity to act and inspires reflection and new thinking and acting. Daily knowledge comes about through social interaction. Science, policymaking and democratic processes are also the result of structured dialogues. It is necessary for all collaborating parties in such structured dialogues, that they can know at an early stage what is taking place, and that they have access to the same information.

There are different sorts of knowledge that are formed in different ways. There is logical knowledge that stems from reasoning. There is artisanal knowledge that stems from working with materials. There is practical knowledge that stems from action. There is ethical knowledge that gives one insight into what is good action, in which norms and values play a great role. All of these forms of knowledge are the result of specific methods of research, require specific learning processes, and can become part of execution and policy. When design knowledge is also included, with insight into what users need, then new actions and practices come about. The design knowledge contributes to the interaction between research and policy.[7]

Values, data, information, analysis and experience together form the pillars of knowledge. What the correct knowledge may be is often not clear-cut. The answer is created through reflection on, and confrontation between, various perspectives and experiences, different sorts of knowledge from diverse research traditions, different interests and possibilities. The consistent conduction of dialogue about knowledge is therefore an important part of the interdisciplinary collaboration between policy and research in the city. In this dialogue, the formulation of values that underlie the knowledge that is shared is of great importance. Every party involved can relate to this, even if the knowledge contributions are extremely different.

Values, data, information, analysis and experience together form the pillars of knowledge

For a considerable time, the interaction between science and government, or industry, was restrained because of the idea that collaboration leads to conflicts of interest, and thereby not to credible research. However, the current complexity of issues in the city requires early cross-fertilization of all actors. Cities have large and often good data sets, the universities and polytechnics have good methodologies, valuable knowledge, and also an international perspective that can be important for the city. Citizens, societal organisations and entrepreneurs can provide valuable input based on their practical knowledge and experiences. Much research is financed with public money. This is why the European Commission and the Dutch Research Council (NWO) now demand that the results of (joint and individual) research are publicly accessible.

Cities have large and often good data sets, the universities and polytechnics have good methodologies, valuable knowledge, and also an international perspective that can be important for the city.

7 City Science Initiative (2021). City Science for urban challenges, pilot assessment and future potential of the City Science Initiative 2019 -2020. https://openresearch.amsterdam/image/2020/9/23/csi_report2020_def_23092020.pdf

Anne-Sophie Hollstein
Cheffe de projects, Bureau de l'innovation,
Direction de l'Attractivité et de l'Emploi, City of Paris

Paris

The city of Paris wants to help the development of the innovation and research sector in the city as part of its policy. This policy is affirmed in particular through the "Émergence(s)" call.

The "Émergence(s)" plan is an annual call for projects that promote the creation and development of new research teams in Paris. Open to all disciplines, it is aimed at researchers who have defended their thesis within the last ten years. Their research project must allow either the development of an existing young team (less than two years old) or the creation of a new team. The creation of a research team by a researcher after a professional stay abroad is also encouraged. The project must be set up and developed within Paris itself (it must be affiliated to a Parisian-based higher education research institution, public research body, or hospital institution). The team leader can either be a full member of a lab or a postdoctoral student whose position will be made permanent – or at least assured for the duration of the project.

The research team must adopt a collaborative approach with the Parisian ecosystem. The team undertakes to participate in events held to communicate and promote its research and organized by the City of Paris or its ecosystem's partner structures. These events can be addressed to start-ups, City of Paris staff, or the general public.

The admissibility examination of each project proposal is performed by the *Bureau de l'Innovation* (Innovation Agency) within the *Direction de l'Attractivité et de l'Emploi* (Attractiveness and Employment Department) of the City of Paris.
An evaluation of each project proposal is carried out by the *Conseil scientifique* (Scientific Committee) of the City of Paris.

Candidates are classified in three categories: Humanities and Social Sciences, Hard Sciences, and Biology & Medicine. Laureates are chosen in all disciplines: anthropology (*Bio-cultural diversity in the Parisians' gardens,* Emilie Stoll, 2019), sociology (*Mothers and babies in prisons: child growth, care, autonomy and rights,* Edouard Gardella, 2019), microbiology (*High-speed monitoring of metallic water contaminants,* Gaëlle Chardon, 2017), chemistry (*Conversion of everyday plastics into high-performance recyclable materials,* Renaud Nicolaÿ, 2018), agronomy (*Agricultural systems and urban supply network structures in the long duration,* Petros Chatzimpiros, 2015), urban ecology (*A clean city, metrics and practices,* Sabine Bognon, 2019), medicine (*Bacterial infection and future of cellular RNA,* Alice Lebreton, 2014).

The multiannual financial support provided is set at a maximum of 250,000 euros over four years. There are around 15 projects funded each year. The admission rate is around 15%.

Since 2009, 185 projects have been supported. Laureates have reported that this program helped them boost their careers (some of them are already directors of their labs), and also stabilize their positions and incomes.

For more information:
cifre-villedeparis.fr

Thèses CIFRE:

The system of industrial research training agreements (called "CIFRE"), managed by the National Association for Research and Technology (ANRT) on behalf of the Ministry in charge of Higher Education, Research and Innovation, is a hiring assistant system allowing the recruitment of PhD students by companies or local authorities, during the completion of their thesis.

The goal of this scheme is twofold:

- to promote the success of students placed in a job situation, by allowing them to benefit from dual academic and professional training;
- to strengthen the contribution of research to the economic and social development of the territory, by creating collaborative links between laboratories and companies or public actors.

The City of Paris, within the framework of the CIFRE system, welcomes within its services PhD students whose thesis subject relates to the priority issues of the municipality. This system allows the establishment of long-term collaborations between city services and research laboratories, thanks to the recruitment of doctoral students whose thesis work is of direct interest to the municipality.

The City of Paris set up its first CIFRE contracts in 2009. Since 2018, the selection of PhD students recruited by the City of Paris under a CIFRE contract has been carried out via a call for annual applications. The selection of doctoral students is managed by the Attractiveness and Employment Department. Published on the City of Paris website, this call for applications is distributed to all universities, research organizations and doctoral schools in Ile-de-France.

The call for applications includes a list of themes of interest to the municipality, drawn up in consultation with all of the city's operational departments. However, this list is not exhaustive: other research subjects may be presented by the candidates, insofar as these subjects relate to a field of activity of the Paris municipality and justify collaboration with its services. All research disciplines are eligible.

10 PhD students are recruited each year for around 3 years in several departments of the administration. Their working time, mainly devoted to their research project, is divided between their assignment service for the city and their laboratory. The missions entrusted to them as part of their working time for the city must therefore be related to their research work and contribute to the preparation of their thesis. Integrated for three years within the municipal services, these young researchers benefit from privileged access to data and information constituting study material for their thesis.

In return, the city has access to cutting-edge scientific work that sheds new light on its activities and public policies. The extent of this collaboration allows for the establishment of an in-depth dialogue between municipal services and laboratories, a source of mutual enrichment.

To date, 79 doctoral students have signed a CIFRE contract with the city, 30 of whom are currently in post. Their research themes concern many areas of action of the municipality.

Among them, we quote some examples: social diversity in high school, new uses of water for adapting the city to climate change, public order as a lever for the ecological transition of the territory, or even the evaluation of non-pesticide methods to control bedbugs.

An objective of recruiting an annual class of 10 doctoral students as part of the PHD system was set in 2017 by the "General Secretariat" of the city.

The 2022 call for applications for CIFRE contracts with the City of Paris was published from January 10 to February 28, 2022. It received more than 80 applications, for 10 open positions.

For more information about the thesis: For more information: cifre-villedeparis.fr

The community is also working to combat the practical, economic or political obstacles that obstruct the sharing of knowledge between policy makers and knowledge institutions. In the academic world, the call to share as much public knowledge as possible has been growing ever louder. In the preceding decades, the degree of public accessibility of research has primarily been determined by the various publication indexes that are based on non-publicly accessible publications by scientific publishers. The debate about open access and open science is nevertheless conducted with verve, and more and more universities, national scientific organisations, and also the European Commission are committed to the public accessibility of the results of research that is financed with public funds. In addition to the publication index, there is currently increasing attention for measuring societal impact. This is not straightforward, but it is taking on more form. Digital media make a great difference in this. Many researchers now publish with online scientific platforms, and during the pandemic the new custom developed among medical scientists of sharing provisional results globally.

For policy makers, actively sharing knowledge is often complicated. Many officials are involved with research, with new data, monitors, processes, scenarios, risk analyses, evaluations and trends. The source code of the digital instruments that the government uses is often not accessible, the digital architecture is not transparent and the algorithms are not published.[8] People work in a bureaucratic hierarchy, with a strictly delineated framework and communications protocols, and even though they represent the common interest, they are also determined by political dynamics. Also, possible unanticipated framing by (social) media leads to caution about sharing knowledge with external partners (at an early stage). Such an environment often produces risk-averse behaviour at the governing organisation, whereby people can find it difficult to share knowledge externally, and to be on the safe side they avoid doing this for as long as possible. This comes at the cost of enriching knowledge and potentially collaborating fruitfully with external experts, residents and businesses who also wish to think about solutions to issues. Here, tension exists between the social environment of the citizen and the systemic world of government. This tension is recognisable in many areas of policy.

The tension between the social environment of the citizen and the systemic world of government.

8 The city of Amsterdam opened its first algorithm register in 2021. A camera and sensor register are also in place.

Collaboration Cannot Be Taken for Granted

In many cities, there is a lack of knowledge and insight about the international dimension, while the local situation is often also dependent upon an international context. After all, the financial markets are international, the climate is global, networks of relations cross borders and goods come from everywhere. Science is internationally orientated. One complicating factor is that policy and research have different processes in time. Policy and execution require quick solutions, science requires more time and often does not offer a clear-cut solution, but an insight that has been deliberated over. Science validates and refutes, formulates in such a way that someone else can disagree. Politics, in contrast, wants to persuade with a certain decisiveness, and proceeds from the desired possibilities, which may not always have been scientifically proven.

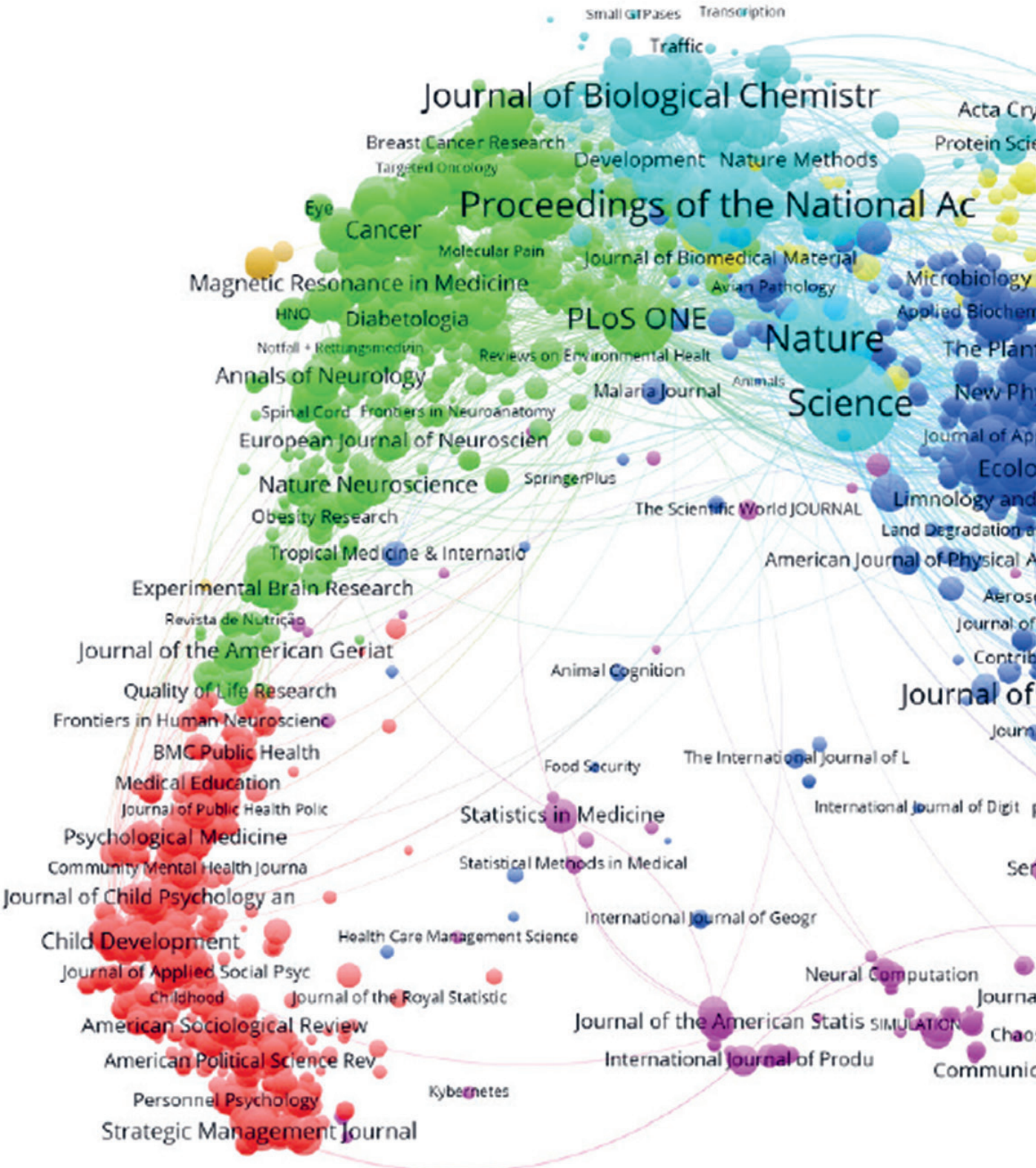
For many civil servants, daily pressures are so intense that they do not have the attention to engage with potential distant international allies, if it is not crystal clear from the beginning how a study may contribute to enhancing practices and services in the city.

For both officials and politicians, knowledge and research are of strategic value, and often play an important role in the political debate. Despite the fact that both scientists and politicians strive to differentiate roles and responsibilities, a conflated impression can be created in the media, so that sometimes the integrity of the science, and the consistency of policy, can become a matter of discussion in a way that is undesired.

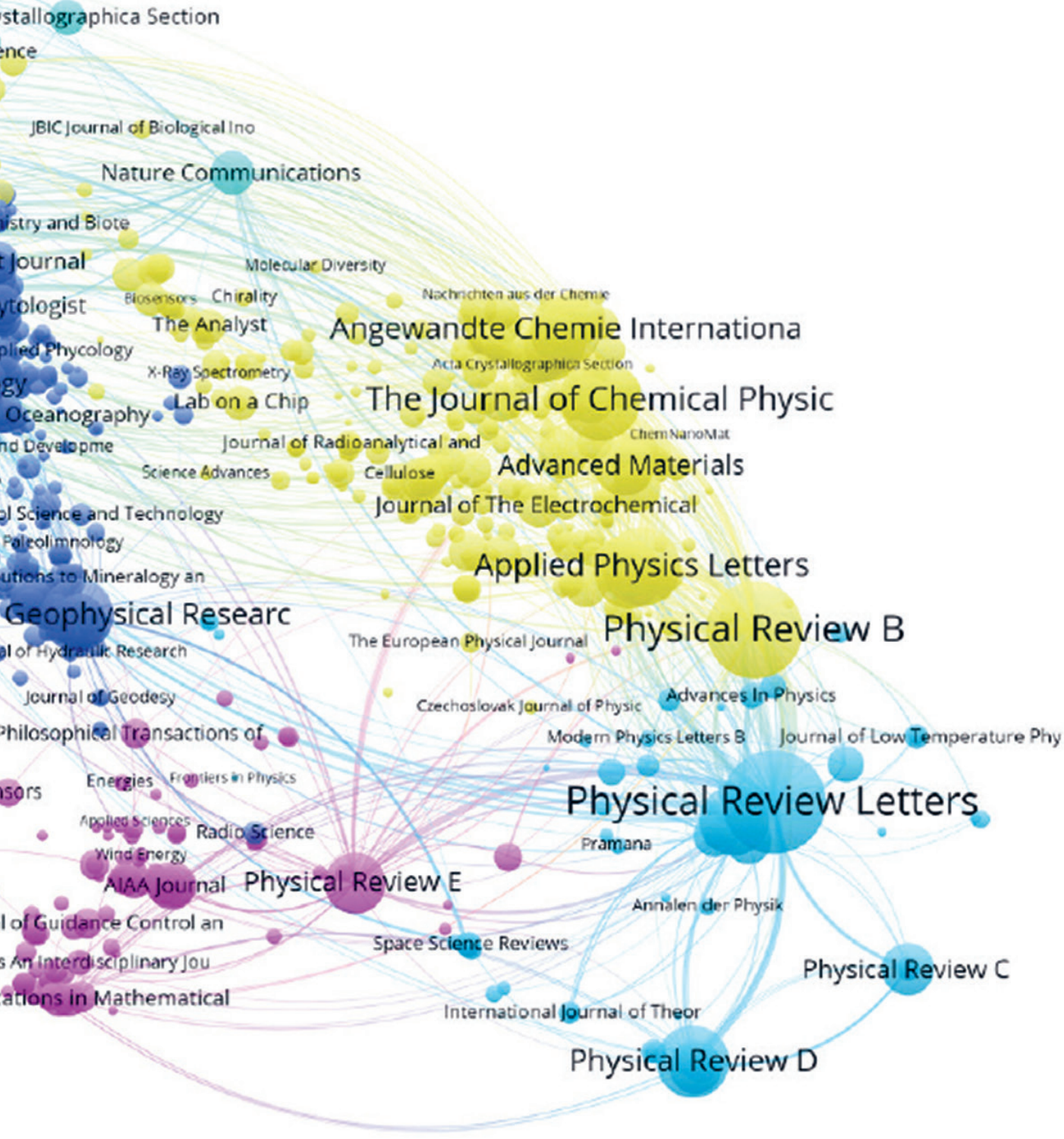
In universities, the protection of academic freedom is of great importance, whereas in the universities of applied sciences, the relationship with the employment sector is of great importance. Collaborations with businesses and governments can restrict this freedom, or indeed inspire engagement. Who has what freedom, and when? Who has the right to speak, and when?

Who has what freedom, and when? Who has the right to speak, and when?

But even after obstacles are removed, the various ‘languages’ continue to make it difficult to share knowledge. Thus, parties do not readily understand each other, they use the same terms but mean something different. Thomas Kuhn, the well-known American philosopher of science, called this ‘incommensurability’, not sharing what one is sure of. Although in a few cases, this is inevitable, in very many cases (with or without an intermediary who knows the different languages) it is possible to gradually understand one another better. When people collaborate over a longer period, they begin to learn and respect each other’s methods and language, and learn to work well together in ‘incommensurability’.


Small GTPases
Transcription
Traffic
Journal of Biological Chemistr
Acta Cry
Protein Scie
Breast Cancer Research
Development
Nature Methods
Targeted Oncology
Proceedings of the National Ac
Eye
Cancer
Molecular Pain
Journal of Biomedical Material
Microbiology
Magnetic Resonance in Medicine
Avian Pathology
Applied Biochem
HNO
Diabetologia
PLoS ONE
Nature
Notfall + Rettungsmedizin
Reviews on Environmental Healt
The Plant
Annals of Neurology
Animals
Malaria Journal
Science
New Phy
Spinal Cord
Frontiers in Neuroanatomy
Journal of Ap
European Journal of Neuroscien
Ecolo
SpringerPlus
Nature Neuroscience
Limnology and
The Scientific World JOURNAL
Obesity Research
Land Degradation
Tropical Medicine & Internatio
American Journal of Physical A
Experimental Brain Research
Aeros
Revista de Nutrição
Journal of
Journal of the American Geriat
Animal Cognition
Contrib
Quality of Life Research
Journal of
Frontiers in Human Neuroscienc
Journ
BMC Public Health
The International Journal of L
Food Security
Medical Education
International Journal of Digit
Journal of Public Health Polic
Statistics in Medicine
Psychological Medicine
Statistical Methods in Medical
Community Mental Health Journa
Ser
Journal of Child Psychology an
International Journal of Geogr
Child Development
Health Care Management Science
Neural Computation
Journal of Applied Social Psyc
Journa
Childhood
Journal of the Royal Statistic
Journal of the American Statis
SIMULATION
American Sociological Review
Chaos
International Journal of Produ
American Political Science Rev
Communic
Kybernetes
Personnel Psychology
Strategic Management Journal

Map of scientific journals with their citation relationships. This map gives a picture of all the world's scientific publications, illustrating the networks through which journals are connected by citations and authors.
Source: CrossRef, courtesy of Ludo Waltman (CWTS).



When working on the great challenges of the city, being able to handle this 'incommensurability' is a requirement. It calls for a specific attitude of respect for other sorts of knowledge and the readiness to put one's own knowledge up for discussion.

This is not evident at the current time. There is a collision of differing speeds when it comes to the contribution of science to the public debate. The scale and speed with which social networks can spread scientific news globally is completely new. On the one hand, this gives wonderful new opportunities for collaboration and the sharing of knowledge, and for new methodologies for conducting research; on the other hand, the tempo of science is sometimes at odds with this speed, and time is lost for reflection, and for the exchange and handling of incommensurability. Analysis and reflection are transformed in the network society, and this requires attention.

In the collaboration between the city and knowledge institutions, teams collaborate well across various borders; new positions are created, relationships are re-formed. Successful collaborations between researchers and civil servants are often driven by the task that they are working on. In the specifics of the task, everyone's contribution is identifiable and often complimentary. The concreteness of the task also frequently resonates with people's personal living environment, or ethical and/or moral values. It is clear that the establishing of communal values, which engage one with the research project, helps to make moments of misunderstanding useful during the process rather than counter-productive. It also helps with the communication between the resident, the entrepreneur, the researcher, the civil servant and others who bring various sorts of knowledge to the table.

In the specifics of the task, everyone's contribution is identifiable and often complimentary.

When the collaboration between science and government goes well, and the results of research are shared so that other people can also understand what has been researched, then policy based on evidence is created and science proves its societal value. Scientific concepts such as *validation* and *falsification* are also important for research in the city. The method of validation aims to take account of the municipal context, but also aims to determine that the results of research are logical, dependable and reliable. In the political context of the city, falsification – the formulating of results in such a way that one can disagree with the analysis and conclusions – is more complicated. While one can argue that such a principle actually stimulates the dialogue that is the essence of democracy, this appears to be difficult in the current media age. Doubt and caution are all too soon presented as vulnerability and weakness in this media age.

Transparency of methodology and validation is highly valued, and at the same time the personal reputation of scientists plays an ever greater role in the current media age. Disinformation and devaluation of scientific work in the use of social and mass media commands great attention. The safety of the scientist is also an issue. It is not only the politician and the journalist that is threatened, but also currently the scientist who communicates certain insights. If things go well in the collaboration between science and government, then any disinformation and 'framing' can be revealed. The 'matching opportunities' between various fields on a task can be recognised and used.[9] It is clear that when scientific researchers and civil servants function together as one team, the differentiation between them disappears, the various capacities are seen as complementary and the team comes to positive and unexpected results.[10] In contrast, it appears that personal interests and shifting power configurations can sometimes retard good collaboration.

It is clear from interactions in the European City Science Initiative that when cities come together, and share in detail how they connect research with execution and policy in specific policy areas, that cities face comparable challenges. Firstly, it is not always straightforward to give form to learning and communication between large organisations. Secondly, the financing and governance of collaboration is often complicated. Thirdly, the city has a limited range of action because many things are independent of national or European law and international trade treaties. Finally, research in the city is interdisciplinary in all phases of the research process, and the collaboration with the council and the players in the city have influence on each of these phases.

9 Grin, J. (2020). 'Doing' system innovations from within the heart of the regime. Journal of Environmental Policy & Planning, 22(5), 682-694.

10 Duiveman, R.M. (2021) Knowledge coproduction & urban governance. Collaborative research in institutionally embedded practices. PhD Thesis, University of Amsterdam.

Dr. Emba Päivi Sutinen
Director for City as a Service Development, City of Espoo

Espoo

With its nearly 293,000 inhabitants, Espoo is the second biggest and fastest growing city in Finland, recognized worldwide as an innovation environment for science, art and the economy. Espoo is the home for education and research institutes such as Aalto University and VTT Technical Research Centre of Finland, but also global corporations such as Nokia, Kone and Fortum. In addition, Espoo is a significant growth company incubator: all Finnish unicorns, i.e. technology startups valued at over a billion dollars, have emerged in Espoo. These include MySQL and the game companies Supercell and Rovio. Thanks to them, Espoo is home to high technology, innovations and world-class expertise.

Boosting the local innovation ecosystem in Espoo depends on an experimental culture and co-creation. Espoo's City as a Service concept opens infrastructure and services as testbeds and living labs for innovation and experimentation for research institutions, companies and other stakeholders, together with citizens and NGOs, building the path towards a sustainable future. The testbed and living lab operation model is designed jointly with partners such as VTT, Aalto University, and companies, with the aim of an easy and trusted access to testbed assets and co-creation tools including data – for a multilevel innovation and experimentation hub. Smart Otaniemi is an example of such a platform for easy-going and active collaboration where researchers, together with citizens, companies, and the city co-create new innovations for a sustainable future.

Together with its partners, Espoo collaborates in a way that can be described as an open, continuous dialogue: considering common goals and challenges, continuous collaboration activities and related projects are built together as a continuous process.

SPARCS

SPARCS (Sustainable energy positive and zero carbon communities, 2019-2024) is an EU Horizon2020 funded multiyear research and innovation project involving more than 30 companies across Europe. Its aim is to study and develop urban solutions for future positive energy districts (or PEDs) that can help cities to achieve carbon-neutrality targets and to create citizen-centric ecosystems. The project is a collaboration between cities, universities and research institutions, companies and organizations. The project produces both practical demonstrations and scientific contributions.

Impact Leadership

Tackling sustainability challenges requires changes in the public sector roles, operation models and legislation. Municipalities have been emphasised as key when turning challenges into opportunities for sustainable growth. City-as-a-Service is an approach to drive change. It is grounded on the premise of ServiceDominant Logic: value is co-created in multi-actor networks. A shift to service-thinking requires fundamental changes in the prevailing operations and mind-sets, equally requiring tools such as maps, models and an impact evaluation framework to accelerate the change. City of Espoo has worked together with VTT Technical Research Centre of Finland to find solutions for this.

Espoo has participated in an impact leadership project by VTT, funded by the Academy of Finland, where the city community serves as a platform for research and experimentation, chosen due to its forerunner role as a city with a vision of becoming a City-as-a-Service for local innovation and business ecosystems. Having a clear vision and commitment to realise this vision is a critical success factor in making a transformation of this magnitude.

VTT has generated such key results as a comprehensive impact evaluation framework and key performance indicators to

understand the multiple impacts of the city and city ecosystems. In addition, concrete evaluation criteria and related quantitative and qualitative impact indicators have been identified. In addition, VTT has suggested ways in which to implement the framework as part of steering and management of the municipality.

The UN Agenda 2030, Sustainable Development Goals and the SDG Sensemaking Tool

In Espoo, the UN Agenda 2030 & SDG work in Espoo is done in close collaboration with different stakeholders, including universities and research institutions. The overall aim of the SDG Sensemaking Tool (SST) process is to explain how work in each local context relates to and advances the SDGs (see Figure 1). Selected phenomena have been analyzed via SST, and the process results translated into new, localized SDG indicators linked to both local and global goals and indicators.

The SST can be applied to individual, team, unit, or department level phenomena or projects. They can be descriptive, such as 'building a new bike lane to location A', or thematic, for example 'developing a sustainable and smart urban area in location B'. The meta-level goal of the process is to create focused interactions amongst participants and across different stakeholders.

The six largest cities in Finland have committed to using the SST tool, and the Ministry of Finance in Finland is funding its development until the end of 2023. In November 2021, the Ministry of the Environment announced two-year funding for the City of Espoo for building a concept for how to engage citizens in local SDG work.

The SST was presented at the UN High-Level Political Forum in July 2021. The SST is open access, open source and follows the Linux philosophy. We hope that the SST contributes to collaborative processes and to the improvement of methods towards localizing and accelerating global sustainable development.

Figure 1. Abstract-level description of the SST process. An analyzed phenomenon goes through a sensemaking process where it is reflected in relation to SDGs through a sensemaking process.

Proximity

Proximity ensures that researchers, civil servants, students, residents and other involved parties meet each other

The Rotterdam Municipality and the Erasmus University have conducted research into the knowledge infrastructure of the city of Rotterdam. It appears that the 'ateliers' (working spaces where stakeholders come together and share knowledge on a particular theme in a systematic way) are fundamental to collaboration between city and university. They function well because of proximity, it is argued. Geographical, social, cognitive and organisational proximity ensure that researchers, civil servants, students, residents and other involved parties meet each other.[11] They share time and space, a culture, a language. This creates a rich humus layer that gives rise to collaborations between various inspired, but also defined, practices that are also part of the larger dynamic in the city.

University labs, urban collaborative spaces and incubators become interconnected nodes of an urban ecosystem, which leverages the power of open science and citizen science to generate climate-neutral and mission-oriented urban innovation. Certainly in interdisciplinary teams, it is of great importance to formulate common values, and thereby to provide direction to the research process. Thus, every person involved can relate to these values and in doing so, to each other. In this way, a good diversity of knowledge and skills can regularly be gathered together, and the discussion about dealing with uncertainties and unpredictable factors can be conducted more precisely and with less reserve.

The city collects data professionally, and the quality of these sets is often good. Urban data are often connected to locations, whereby insight is created into the dynamics on the territory of the city. Researchers appreciate working with such datasets. In turn, science also works in an international arena and has knowledge and insight of the 'state of the art' at a global level, in terms of content and methodology, and this is of benefit to the city.

Cross-fertilization, including research in the business sector and culture, can create an excellent research environment, and at the same time the sharing of data between government and the business sector can be extremely problematic on numerous fronts. The major international network businesses in particular collect a great amount of data 24/7, in and about the city, which neither the residents nor the council have access to. It is complicated for governments to relate to the commercial data market. On the one hand,

11 Smit, J. Westerduin, H., van Buuren, A. (2021). Bevlogen grenzenwerk, begrensde nabijheid. Erasmus University Rotterdam & City of Rotterdam.

costs are high and access to, and aggregation of, this data is complicated; on the other hand, sometimes agreements are made with third parties for convenience sake and to save costs, whereby core processes of the council are outsourced and control and transparency disappear.

Given the need for local collaboration between science and policy in this period of complex issues, we will have to find new ways to give form to independence and reliability amid the many 'interdependencies' and 'proximities'. In European projects, and in municipal collaborations, people are seeking customization in designing research trajectories. Different stakeholders have the right to speak at some moments, but not at others. Work packages have different holders, and there is frequently coordination at 'milestone' moments. Many forms have been created in this complex environment to develop work forms that make collaboration possible. In spite of the proximity of many players in the local research landscape, people are still dependent on the creativity and flexibility of the hierarchical and bureaucratic systems in which the collaborations function.[12]

Independence and reliability amid the many interdependencies and proximities.

The issues mentioned above can be approached and balanced through the structural design of an urban and regional research ecology. Dilemmas will continue to exist, but collaborations can proceed more easily and transparently.

12 Landry, C. & Caust, Margie (2017). The Creative Bureaucracy & its Radical Common Sense. Comedia (Routlegde), United Kingdom.

Marco G. Persico
City Resilience Department, City of Milan

Milan

Milan has enormously increased its international recognition in recent years, resulting in the growth of investments in urban development, in the strengthening of its university and research system, and in the increase of its population, especially young people from the rest of the country. Milan hosts 7 universities, attended by nearly 200,000 students, 8.5% of whom come from abroad. There are 20 universities and R&D centers located in the city specifically concerned with the subjects of environment, energy, and innovation.

Multidimensional and Multisectoral Approach

The Resilient Cities Department has decided to equip itself with a scientific committee. This committee is made up of professors and researchers from the various universities in the Milan area: the Politecnico, with its Department of Architecture and Urban Studies and its Department of Design; the Bocconi University, with its Department of Social and Political Sciences; and the University Cattolica, with its Department of Sociology. The scientific committee is also fundamental for the support in the periodic and systematic recruitment of internships to accompany the management's work: they have contributed to the management's activities with dynamism and in direct connection with the academic and scientific realities involved in the theme of resilience. Their contribution is certainly not only operational and supportive, but allows the management to integrate innovative and updated points of view within the ordinary public administration, and to integrate diversified skills, and develop a multidimensional and multisectoral approach to the theme of strategy. Specifically, the management has hosted internships from the faculties of architecture, urban planning, law, political science, economics and international relations. Furthermore, with the collaboration of various professors, the management has proceeded to a mapping of all the projects and all the studies relating to the theme of resilience, developed and carried out by the various university departments involved.

The main cooling action proposed for Milan is greening the city, aimed at locating the areas for new plantings, the development of governance processes to plan, design, implement and manage urban forestry interventions, and the implementation of models of financing that allow the increase of green areas and their management in the long term. This measure's frame of reference is on a metropolitan scale in the ForestaMI urban forestry program, which provides for the planting of three million trees in the entire metropolitan city of Milan by 2030, with the scientific support of the University Politecnico of Milan.

The Politecnico of Milan University and the IUAV University of Venice have created the climate risk map of the municipal territory. By overlapping the mapping of heat exposure in different city areas with the socio-economic data of the inhabitants, it is possible to attribute a different level of risk that considers the exposure to the hazard of the most vulnerable socio-economic categories. Such mapping is useful to the local government to develop targeted policies and improve local resilience, both with structural intervention such as improving green spaces, or with mitigation strategy aimed at decreasing vulnerability.

A plan has been defined in the Municipality for the decarbonisation of thermal energy by 2050, with an intermediate transformation and development program by 2030, shared with the various energy operators (distributors of electricity and natural gas, district heating operators, and university research institutes). This plan must be coordinated and integrated with the measures relating to the energy efficiency of buildings. For the development of the plan, the mapping of renewable sources and recovery heat will also be used, which will be developed in collaboration with the University Politecnico of Milan, as part of the Climate Kic - DDMI (Deep Demonstration Milan) project. The "Milan Transition Fund 2026" project, aimed at testing an innovative finance mechanism for the deep energy requalification of buildings, will provide elements on the financing front of the interventions, and the proposal

of industrialized technologies for the requalification and modalities of "citizens' engagement". The intention is to set up a Zero Carbon Fund to finance decarbonisation actions based on revenues from the implementation rules of the City Master Plan. This action would expand the possibility of using the proceeds of monetization for the creation of a fund to be used to finance a wider range of projects of public interest, such as: building redevelopment, production of energy from renewable sources, urban forestation, fourth generation district heating, sustainable mobility. The initiative was investigated by the University Politecnico of Milan with the support of BWB (Bankers without Boundaries) as part of the "Milano Zero Carbon Fun" project co-financed by EIT (the European Institute for Innovation and Technology) as part of the Climate-Kic program in 2019. The idea is to structure a portfolio of projects characterized by different levels of risk in terms of profitability (with or without return on investment), in order to attract additional capital from financial institutions, institutional investors, and national and international private investors.

Citizens' Consultation

During the next two years, we will activate a citizens' consultation process on environmental policies as part of a European project promoted by the University of Siena. Citizens of Milan will be invited to discuss environmental policies at local, national and European level, both through group meetings and through paths mediated by web tools. The results of the engagement of citizens will produce contents on environmental policies to be used for local policies and at the same time indicators of performance and effectiveness regarding the structuring of participation paths useful for their reproduction (https://www.eucommeet.eu/).

The Universities Canteens' working group is an initiative that has engaged all the 8 universities of Milan to share knowledge and practices for a more sustainable food procurement. The working group has mapped and studied existing universities canteens' good practices and set up priorities and objectives toward healthy and sustainable diets. Dedicated guidelines to support the Chief Procurement Officers in their activities of preparation of GPP tenders with good food criteria were produced with the support of the Health Authority.

European programs and projects are likewise a valuable resource for several reasons. First of all, the elaboration of project proposals to be submitted to the various calls constitutes an excellent methodological exercise to identify common points of integration, synergy and complementarity between the theme of resilience and other issues, also in collaboration with other directions that contribute to the proposal. Some European projects won by the Municipality highlight the city's ability to provide innovative content and responses to the various themes proposed by the European Community. Secondly, the international dimension of European projects by its nature makes it possible to enhance and make available the exchange between cities. Finally, from a more operational and implementation-oriented point of view, they allow access to additional resources compared to the ordinary ones of the Administration, to ensure a more solid future for the various actions.

Analyzing the thematic areas identified for interventions in the city revealed the overlap in the aspects that the different areas deal with, the transversal nature of the themes, and the interdisciplinary approach of some identified actions and strategies. This awareness has favored greater synergy between the subjects involved with a vision aimed at new organized forms of work, increasingly inter-agency, intersector, inter-competency.

Many cities are working hard to study, innovate and experiment with solutions to improve themselves and collaborate with other cities in the world. And Milan is doing the same, without thinking of solving the environmental issue alone but without losing a single opportunity to improve itself and the other cities with which it collaborates.

4 Urban and Regional Research Ecology

The experiences of the last few years show that there is a need for a more structured and vigorous knowledge infrastructure to optimally facilitate the growing collaborations between the city, knowledge institutions and societal partners, and also to secure knowledge for the future. In the context of the challenges that confront Europe, it is obvious and essential that cities in Europe collaborate. After all, they find themselves in each other's geographic and ecological proximity, and also in each other's social, cognitive and organisational proximity.

The research ecology is expressly referred to as an urban *and* regional research ecology because the relationship between city and region is of great relevance in most major challenges that cities face. The major portfolios of sustainability, housing, mobility, economic resilience, education, etc. require intense collaboration between cities and the region that they are part of. Cityl regions are faced with comparable challenges and problems. The formulation of functions, elements and dynamics that are recognizable, but at the same time different, can be elaborated upon, and can help with the communal reflection about action, both in the municipal region and between cities.

City regions are faced with comparable challenges and problems.

More Than the Sum of the Parts

When viewing the research landscape as an ecology, the underlying dependencies become visible, while the autonomy of the various research studies is also acknowledged. Ecology is a concept that suggests a complex system in which every participant coordinates individual actions and is thereby partially a designer of the whole. The word ecology is used in different fields. An ecology consists of many elements that are connected with each other in various dynamics and functions. An ecology accommodates many incidents, but is not actually one itself. The choice

of the word ecology indicates the long-term relationship between government, knowledge institutions, business world, culture and other organisations, in which there is space for many sorts of projects and initiatives.

The choice of the word ecology indicates the long-term relationship between government, knowledge institutions, business world, culture and other organisations, in which there is space for many sorts of projects and initiatives.

Research helps to discover: 'What is happening?', 'What are the possibilities for action?' and 'What are the effects of what is done?' It is precisely the local conversation about truth in a certain situation, between people who do not agree, that guarantees the human dimension and the dignified nature of policy. Thus, a dialogue arises regarding reflection on the action between the variety of perspectives, the different sorts of knowledge, and the different qualities that are necessary to live well in close proximity, as is the case in municipal regions. It is because of the structural organisation of this inclusive dialogue, and knowing where and when and by whom this dialogue is conducted, and also knowing how this dialogue connects with other conversations elsewhere in the municipal and regional research ecology, that resilience is strengthened when meeting the unknown, together and with confidence.

Most major questions in the city are interdisciplinary, and interdisciplinary collaboration is not straightforward or comfortable. It is important to support this interdisciplinary collaboration with new methodologies and international insights in the local research ecology, and to make this transparent and easily accessible for the city and knowledge institutions. Discussions about new issues and dilemmas can be conducted more fundamentally and with more knowledge of the different research and policy processes in their relation to one another. It is exciting for students to take part in these discussions at the cutting edge. This is how they feel about the importance of what they are learning.

In times of crisis, a municipal and regional research ecology can contribute to the management of the crisis because the 'just-in-time' research makes better policy possible. The right knowledge and experts can be quickly brought into the picture. A local knowledge infrastructure makes a world of difference in a predicted, chronic, or acute crisis. It is precisely then that the interaction that research generates in the capillaries of the city is needed. In a local research ecology, people know each other's capacity, integrity and the possibilities. This is how mutual trust is built, and one is able to gather together the correct knowledge in the very short term, on the basis of which people can decide how they wish to act.

In a local research ecology, people know each other's capacity, integrity and the possibilities.

Panagiotis Bamidis | Despoina Mantziari | Stella Psarropoulou*

Thessaloniki

Thessaloniki's case study (with reference to the Urban Regional Research Ecology' for City Science) for Times of Accelerating and Accumulating Crises

* prof. dr. Bamidis Panagiotis – Director, Lab of Medical Physics and Digital Innovation, School of Medicine, Aristotle University of Thessaloniki, Thessaloniki, Greece / Founder, Thessaloniki Active and Healthy Ageing Living Lab (Thess-AHALL), CSI Mental Health, Lead City Thessaloniki Co-ordinator

Despoina Mantziari – Research Assistant, Lab of Medical Physics and Digital Innovation, School of Medicine, Aristotle University of Thessaloniki / Thessaloniki Active and Healthy Ageing Living Lab (Thess-AHALL) / PhD Candidate

Stella Psarropoulou – Resilient Thessaloniki office (Deputy CRO), Dep.of Operational Planning & Development Programs monitoring, City of Thessaloniki / PhD Candidate

© Archive Resilient Thessaloniki office

1. Our role/function as in-between science and policy team aiming at formally establishing a City Science Municipal Office

During the last seven years, the City of Thessaloniki has undertaken several initiatives related to City Science & participatory research actions, either as the main host and supporter or as one of the primary contributors, in close collaboration with the Living Lab, Thessaloniki Active & Healthy Ageing Living Lab (Thess-AHALL), an effective/core member of the European Network of Living Labs (ENoLL) established within the Medical Physics and Digital Innovation Laboratory (iMedPhys Lab), School of Medicine of the Aristotle University of Thessaloniki (AUTH). More than 300 funded research projects have been implemented, during this time period, specifically for Thessaloniki, with the majority of them addressing issues of environmental protection and climate change, resource management and application of smart technologies in the city's systems.

As iMedPhys and Thess-AHALL are pioneers in the fields of the Health and Well-Being R&D sector for over a decade, both regionally and nationally, all undertaken initiatives were related to the enhancement of citizens' health (physical, mental, social) and the promotion of their well-being in everyday living, especially for the most vulnerable groups of citizens (chronic patients, persons with physical/cognitive disabilities, older adults, people from lower socio-economic groups etc). Collaborating continuously with the Mayor's office and the relevant to CSI municipal structures (Resilience officer), but also with other teams inside AUTH (within the School of Medicine and the Department of Chemical Engineering, Environmental Engineering Laboratory and HERACLES Research Centre on the Exposome and Health), as well as, the wider ecosystem like the Urban Health Cluster, these actions are now expanded, into covering wider aspects of everyday life, like those involving the environment and urban ecology and their impact on health and well-being. Efforts are currently being spent into realising a proper CSI office within the municipal structures. Towards this direction, the Municipality of Thessaloniki (MoT) operates an Urban Resilience Observatory with

the mission to collect and evaluate city's data and measure indicators under the pillars of sustainable development, city's health & wellbeing.

2. Examples of interdisciplinary projects with a clear scientific involvement (as an example to tacking the issue of 'incommensurability')

Non-pharmaceutical interventions, including the exploitation of assistive and novel technologies, innovative experiential training activities and peer-support & intergenerational actions, which led by iMedPhys Lab and the Thess-AHALL, were set at the focal point of Thessaloniki's CSI actions to support and cultivate citizens' skills, attitudes, knowledge towards the improvement of their Quality of Life and their everyday living within a responsibly and sustainable healthy environment. All the above-mentioned participatory research actions were designed and implemented on the basis of co-creation, co-experimentation and responsible research and social innovation policies with the active involvement and equal collaboration of the Quadruple Helix stakeholders (citizens, policymakers, industrial actors, the academia). This is exactly what the City of Thessaloniki calls **"WITH the Citizens & FOR the Citizens"**.

Through this journey, the often perceived as a "close elite" research community (the University) has opened its doors to the City, embracing citizens and trying to co-design solutions that meet their real needs and concerns. In Thessaloniki, this has been achieved through a series of open and intergenerational courses with the active participation of undergraduate/postgraduate students and citizens at the AUTH School of Medicine[I] or as part of the Municipal programme "Open Schools in Neighborhoods". The active involvement of citizens in the research process, even in a more experiential & life-long learning way has led to the increase of their active citizenship sense, while for the most vulnerable ones has been a means of tackling the cultural stigma and improve their social inclusion and social health. Citizens are not just occasional participants of the CSI activities, but mutual collaborators & **"Partners of Experience"**, since they might lack in scientific knowledge, but they have invaluable experience from everyday living situations.

At the same time, the City turns itself into a **co-creation and experimentation "playground"**, promoting the interaction among citizens, policymakers, researchers & experts in-field to explore and tackle together key societal (i.e. ageism & social inclusion-SISCODE H2020)[II] & urban environment challenges (i.e. contemporary environmental issues in big cities & impact on urban health-URBANOME H2020). Citizens become the vehicle for design, approval & validation of solutions and good practices that are transformed into concrete policies. In the framework of this interaction between the city/citizens and the research community, the iMedPhys has established the **"Collaboration**

Thessaloniki

© Archive Resilient Thessaloniki office

and Research Community for Independent Living", a community of early-stage older adult researchers (over 60 y.o.), formal/informal caregivers and healthcare professionals (more than 100 member in total) that runs co-design research activities and gathered for the first time officially in September 2019 in the framework of the Open Living Lab Days held by ENoLL and hosted by Thess-AHALL in Thessaloniki to discuss and set the health & well-being agenda points for the regional level. Indeed, that public deliberation led to the formation of the CSI Pillars of Thessaloniki: Mental Health City at the end of the same year.

A concrete example was the collaborative development of City's Resilient Strategy, with the active involvement of 40 organizations and 2000 citizens, between March 2016 and March 2017, via committees, working groups, workshops, round tables & public events. City's aim was to foster active citizen participation, empower self-organizing groups, and support new forms of collective action to address issues of public concern.

3. Examples of (formal or informal) collaboration between local governance and the university

Another aspect of the CSI collaboration between policymakers and the research community at the regional level is the **Urban Living Lab (ULL) of Thessaloniki**, which is currently being established in the framework of URBANOME H2020 project to contribute to the effective tackling of the environmental change impact on urban health, as well as to improve the living conditions and well-being of citizens, especially those of lower social and financial backgrounds. The URBANOME participatory research approach is a European-wide initiative, which runs in nine ULLs in leading EU capitals & cities (Paris, Amsterdam, Milan, standing among others), with an aim to develop and promote local actions and policies on urban health through the active involvement and interaction of all the integral parts of the society (Quadruple Helix). Within the URBANOME co-creation journey the local stakeholders mutually collaborate, adopting a horizontal integration paradigm of combining the different social, environmental, financial and spatial characteristics of each urban environment to co-design and implement a sustainable and common policy framework.

Social awareness and common cause campaigns, out in the city, in the framework of special awareness days and the Open Sundays (Open Days) of the AUTH University have also contributed to the increase of the interaction and collaboration among researchers, policymakers and citizens. In the framework of such kind of events, **like the "Participate4" (and the mother-idea "Play4) actions**, citizens are invited to join a social responsible/ awareness action in the city,

"play", attend or contribute to the fulfillment of a joint, targeted common cause, also contributing to highlight of a key societal problem and collaboratively find ways to tackle it effectively.[III]

What is currently exploiting Thessaloniki, beyond its participation in the European network of the CSI is the expansion of its CSI activities from the core center of the city to the metropolitan area first (through the collaboration with other neighbor municipalities within its region, i.e. URBANOME H2020) and at the national level, as a means to scale up and increase the exchange of knowledge with other cities in Greece (through its collaboration with the Hellenic Inter-Municipal Network of Healthy Cities of the WHO).

Specifically, the City of Thessaloniki, through its coalition with the University, acknowledges the global challenges and the role of the cities to actproactively to mitigate the effects of climate crisis and implement robust, approaches to address current and future challenges. The city's main challenge is now to rapidly adapt sustainable systemic changes including redesigning and delivering urban infrastructures and services that enhance citizen's participation, connectivity and community, shape a thriving and sustainable city, build a dynamic urban economy, become responsive and support climate resilience and disastermanagement. Tremendous opportunities for the city to be improved, advanced, and maintain its contribution to the goals of sustainable development lie also in the utilization of big data computing and the underpinning technologies, and in the implementation of their novel applications.

The city follows this vision and commitment through the quadruple-helix model by including academia and research, public and private sector and organizations of the civil society in planning and working together the MoT has already kicked off the creation of urban vineyards, gardens, desires to continue investing in green and blue infrastructure, NBS, protect and enhance the peri urban forest and Thessaloniki's most important natural resource, Thermaikos Bay. Through data-driven management, MoT will establish more responsible ways of facilitating, managing, and monitoring city services and providing innovative education and training for upskilling and reskilling.

I Konstantinidis, E. I., Petsani, D., & Bamidis, P. D. (2021). Teaching university students co-creation and living lab methodologies through experiential learning activities and preparing them for RRI. Health Informatics Journal. https://doi.org/10.1177/1460458221991204

II Mantziari, D., Konstantinidis, E., Petsani, D., Kyriakidis, N., Zilidou, V., Sidiropoulos, E., Nikolaidou, M., Katsouli, A.-M., & Bamidis, P. (2021). ThessAHALL—A Life-Long Learning Programme for the Social Inclusion of "Early-Stage" Older Adult Researchers. In Springer Series in Design and Innovation (pp. 89–97). Springer International Publishing. https://doi.org/10.1007/978-3-030-78733-2_9

III Mantziari, DA, Petsani, DG, Konstantinidis, EI, et al. Ageism and open Academia: exploring new pathways towards the limitation of social exclusion of older adults and chronic patients. In: Paper presented at the european triple helix congress on responsible innovation & entrepreneurship (ETHAC2019), Thessaloniki, Greece, 30 September–1 October 2019.

Orchestration, Editing and Reflection

The transparency of the research ecology makes it possible for residents and visitors, and companies and organisations in the city and region, to take part in the research of the municipal region. In doing so, they contribute to the collective insight that is created by research, and they acquire more insight into what is possible and what is not. By seeing what others do, new possibilities come about. Thanks to the data collection of a municipal council, for example, certain research studies are made possible. Thanks to certain research studies, data are also collected that are important to the municipal council, and an interaction is created that had previously not existed.

Because research is collected from different domains and disciplines, it becomes possible to connect these in policy, research and design. Becoming acquainted with each other's work, and seeing one's own work function in the midst of that of others, increases the quality of the different parts, and of the whole. This also makes it easier to continue to build on each other's work and to prevent doing double work. A recognisable structure offers stability to newcomers. It is easier to begin new, efficient and effective collaborations because it is clear who is working on what. Moreover, a transparent research ecology can ensure that accumulated knowledge does not disappear when those parties involved with that knowledge do. This is how an ecology works, and this provides a solid basis for research as a component of the primary process of policy and execution in the city.

Becoming acquainted with each other's work, and seeing one's own work function in the midst of that of others, increases the quality of the different parts, and of the whole.

Orchestration, editing and reflection are the pillars beneath a well-functioning, transparent research ecology. Orchestration is important in the design of meetings and gatherings. Editing is important in the sharing of information about ongoing and completed research. Reflection is necessary to provide structural common insights when taking action. To this end, professional skills are necessary that utilise specific methods and techniques, but that are often not acknowledged in large hierarchical organisations. It is not a question of information provision or an events' agency. It is a question of inspired content, exchange and resilience in the well-being of the city in a new age.

Municipal regions are faced with accelerating and accumulating crises that arise at different speeds and scales. In times of various crises, a well-functioning urban and regional research ecology can help in executing national and international policy developments at a neighbourhood level.

And vice versa, a well-functioning urban and regional research ecology offers the opportunity, even from a neighbourhood level, to allow local authorities to systematically participate in national and international research and policy development. With the right orchestration and editing, this becomes a possibility.

After a period of intensive collecting, it is possible to sketch out what the dynamic appears to be between research and policy in many cities, and it is also possible to recognise potential that is not being used and to formulate new ambitions. It is of great importance to realise that research is, in the first instance, a creative process, and that design between research and policy requires not only fairness and reliability, but also inventiveness. It is largely a question of directing at a meta-level, and of facilitating self-organisation. It is about having faith that people with knowledge and skill in a certain specific context will be able to allow the correct dynamic to arise, so that good results are achieved in the complex environment that characterises the municipal region. It is a question of different elements that together form more than the sum of their parts, it is a question of an ecology.

Values, Dynamics and Organisational elements

A municipal and regional research ecology plays an important role in the future of the city. As described above, it concerns a complex landscape with many players. Underlying values direct the development in each of the many collaborations and initiatives that gives rise to the municipal and regional research ecology. These underlying values represent the core values of society in both region and city.

A well-functioning municipal and regional research ecology demands investment in time and funds to function properly. The rationale for these investments can be seen at different levels. There are ethical, political, scientific, didactic, practical and management-related reasons to invest in a research ecology.

A number of organisational elements together make up the urban and regional research ecology. The elements are related to one another both hierarchically and horizontally. The elements are comparable in every city, but the way in which they are made concrete can differ. Together, the elements make up the dynamic, and thus form the common values for research in the city.

The great challenge for the majority of cities is to genuinely implement the insights and evidence of research in the city. A research ecology shows the networks and chains that are relevant, and play a role in any specific problem. It is nevertheless the responsibility of the administrators, the politicians, the directors, the businesses and the residents to ultimately act on this. On the following pages is a first draft of a matrix that can be developed into a portrait for a local research ecology.

VALUES

- Value: **Sharing Research for Democracy**

  If the general public is well informed, democracy can function better. If the public has access to the underlying research for policy, it is better able to evaluate what policy and execution choices are made. It is also important for the general public that a history of research, that previous decisions have been based on, is readily available. This helps to place the issues of the day in perspective, and supports counteracting disinformation.

- Value: **Evidence-Based Policy**

  Cities and regions are engaged in the formation of policy based on evidence, and formulating strategies and policy based on research results. To this end, data is collected in a professional way, with consideration of the privacy of citizens. Alliances with universities, societal organisations and the business world are created, and research is converted into policy scenarios and recommendations. Evidence-based policy makes it possible to base the debate about quality and execution on data and shared scientific insights, so that political choices become more clear.

- Value: **Valorisation of Research For and By the City**

  If one wishes to conduct policy based on evidence, validation of the research on which the evidence is based is of great importance. Because research in the city is interdisciplinary, and stakeholders and time horizons are connected, this attaches specific conditions to validation (is it true?), falsification (can one disagree with this?), and *valorisation* (How do we make results of research accessible?). Seen from the perspective of the knowledge institutions, this more extensive and diverse way of publication for cities can contribute to the perceived added value of the investment in research. Universities, research institutions and schools also require this appreciation to legitimize the public financing that they receive.

- Value: **Design for people, planet and profit**

  Preferably solutions need to be designed in such a way that people, and the natural environment and the economy all thrive. Sometimes policy and research focus on very detailed issues and generate unfortunate side effects. Transdisciplinarity is a given when facing urban challenges that have social ecological and economic consequences by default.

Values Urban Regional Research Ecology

Sharing research for democracy

Evidence-based policymaking

Societal impact in the city

Design for Planet People Profit

Dynamics Urban Regional Research Ecology

Inspire & Advise

Connect & Collaborate

Faciliatate & Implement

Document & Publish

Learn & Test

Collect & Organize

Include & Control

Just-in-time & All-the-time

Organisation Urban Regional Research Ecology

Research capacity

in management, organization

Formal agreements

between city & universities

Structural collaborations

ateliers, centers, institutes

Temporary collaborations

living labs, pilots, projects

Data

harvest aggregate, publish

Networking

different kinds of knowledge

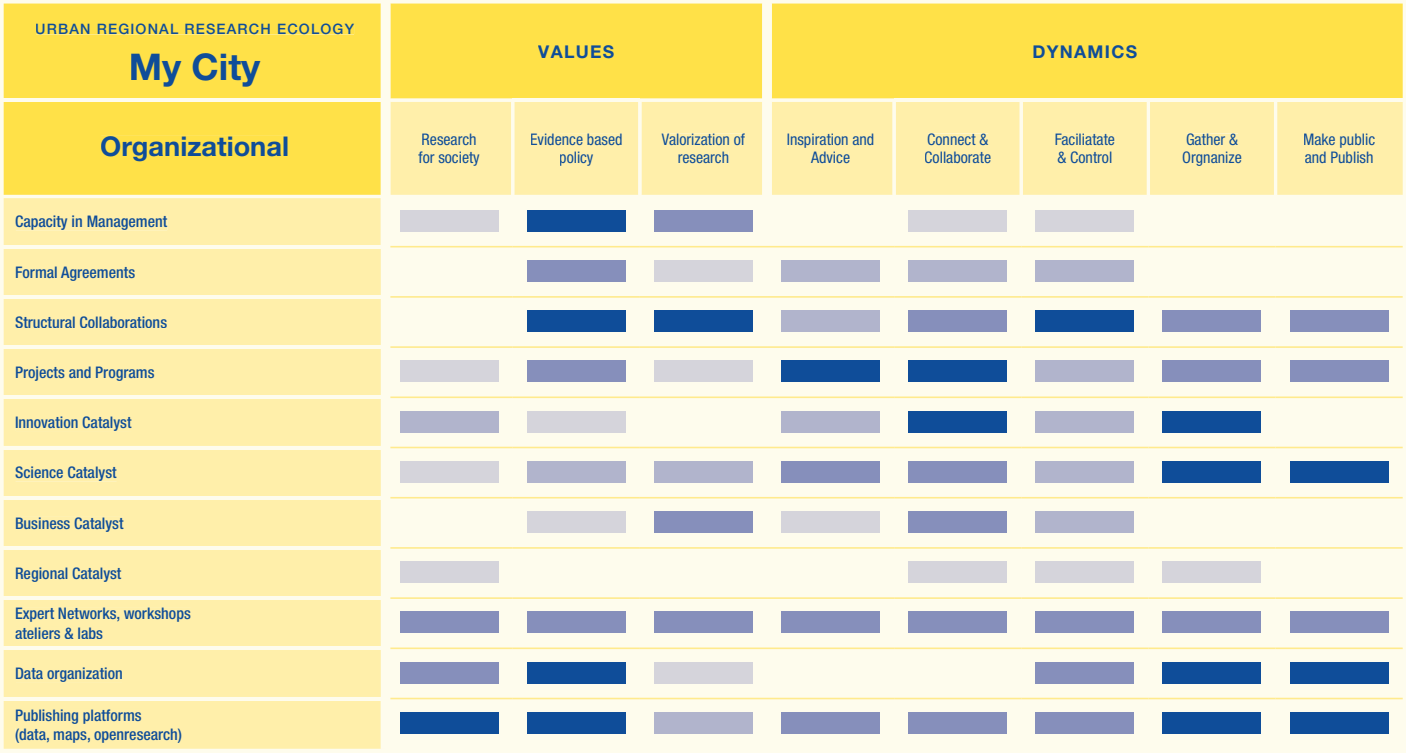
Catalysts

science, innovation business culture

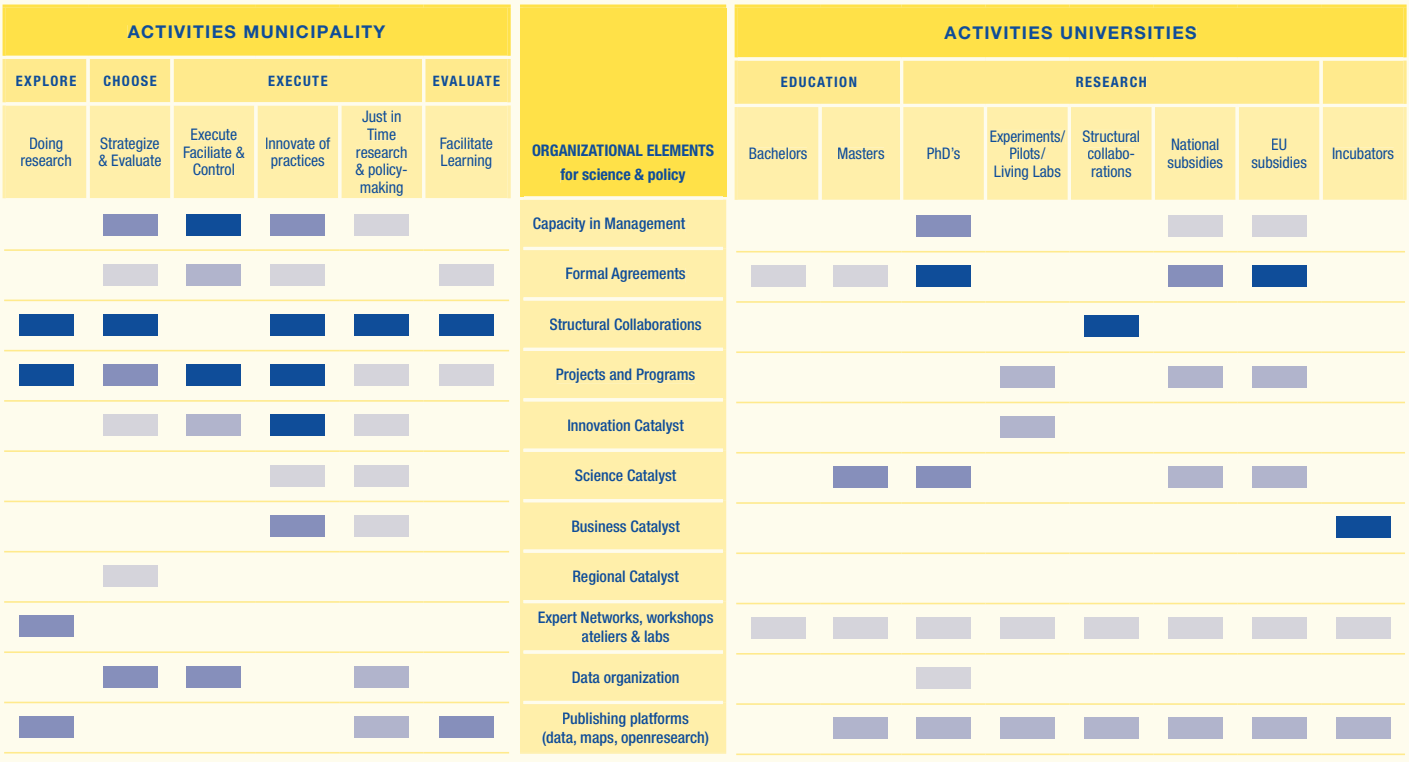
Publish

relevant research work in progress

Urban Regional Research Ecology



Contributions to an Urban Regional Research Ecology



DYNAMICS

- **Inspiring and Advising**

  In order to participate in a knowledge infrastructure long-term, people need inspiration and motivation. Knowledge and research are necessary for action and engaging with new challenges. Inspiration leads to shared values and also curiosity and a readiness to share knowledge or data. Reflection on action leads to new knowledge and insight. By sharing reflection on action, knowledge becomes transferrable.

- **Connect and Collaborate**

  The government, the business world, the knowledge institutions, and the societal organisations connect at different levels. There are people at different nodes in the network in the municipal council; in the faculties of the universities, there are also people who help to formulate the appropriate questions and find the correct partners to make a relevant contribution. The City Science Catalyst plays an important role in this, with the task of orchestrating the different networks, and advising on projects and programmes.

- **Facilitate & implement**

  Once solutions and new practices have been identified, it is great challenge to facilitate and implement these findings.It means that daily routines will shift, that people will need to develop other practices and engage with new interactions. It means that goals and means may transform and the organization will go through uncertain times in which outcomes are not yet known. Transition management is hard nd not easily successful and it may take many years.

- **Document and Publish**

  The current knowledge about local research and local solutions can be of crucial importance for future issues affecting the city. This is why the documentation and publication of this work and knowledge is important for all citizens and involved parties. In every city and region, added value is created if people know what others are doing and what others have done previously.

- **Learn & Test**

  Students take part in education and participate in research in the city: in Living Labs, in Field Labs, in special projects, in internships and theses. The city is a learning environment, a test environment and research terrain. Thus, students are able to develop skills and creativity for their later professional life. In so doing, students can also contribute to an optimal

DYNAMICS

approach to the municipal tasks. The consistent design of the city as a rich learning environment also makes it possible for students to build on each other's work. It is important to coordinate this efficiently and effectively and to ensure that results of student work are made more readily available for the city, and that new students working on a subsequent assignment can build on earlier work. The city is greatly beneficial for the education of students as a rich, consistent and honest learning environment.

- **Collect and Organise**

  Research that is carried out in the city and at the universities is collected and made available. It is essential that professionals are aware of what others are doing, so that they can learn from each other and build on each other's work. At city councils, this is often not straightforward. There are usually no structural systems to collect the results of municipal science over time. A city science catalyst can play a good role in this. Ultimately, the responsibility for sharing knowledge lies with the various directorial boards, faculties and organisational departments.

- **Include and Control**

  In the city, and particularly in times of crisis, influencing the behaviour of both residents and visitors is of great importance in order to create a good atmosphere, and to safely maintain public order. In recent years, people have sought tools to influence behaviour, on the one hand, and design capacity on the other. The relationship between these two disciplines is often not determined, which can result in confusion about the ability to influence the behaviour of the population of the city. Offering space and exercising control and creativity and fairness are then at loggerheads. Both researchers and officials have a role to play in this. The municipal and regional research ecology can support and design these processes.

- **Just In Time& all the time Research and Policy**

  The various elements of the municipal and regional research ecology offer tools in order to act locally in an adequate and timely manner in times of crisis. There is already collaboration in various networks and work places, people trust each other and know the local societal area that is important. People work together systematically to counter the immediate issues of the day and disinformation. Systematic structures can play a role in preparing for, and acting on, various crises. National policy can be translated and enriched with local possibilities, and in turn local policy and execution can inspire national and international policy.

ORGANISATIONAL ELEMENTS

- **Scientific Quality at Board Level and Management**

  Research capacity can be organised at different levels in an organisation to identify the necessity for research, to formulate good research questions, to guide research and to apply results. It is important that the application of this capacity is regularly harmonized among the respective involved parties to avoid double work, and to enrich research results from different approaches.

- **Formal Agreements for Collaboration**

  The faculties of the universities and research institutions work together systematically at the city level to support the municipal regional research ecology. At a directorial level, it is said that the city, the region and the universities wish to join forces to be able to make a significant contribution to the solution of the municipal challenges that cities are confronted with. To this end, formal agreements have been signed that make it possible for people in the different organisations to work together.

- **Systematic Collaborations**

  Specific thematic systematic collaborations facilitate continual reflection between practice and theory, to harmonize them as much as possible. This systematic structure also makes it possible to integrate projects and programmes in practice in the city and in the region. Subsidies are applied for, and research designed and carried out. The ateliers can play an important role in the innovation of policy practices and dealing with crises. There are already 18 work places in Amsterdam where people from practice itself, policy makers and scientists together reflect and formulate new research questions that are important for the specifics of the theme that brings people together. New institutes such as Sarfati, the Kenniscentrum Kansongelijkheid (Knowledge Centre Unequal Opportunities) and the Amsterdam Green Campus have emerged in this way.

- **Temporary collaborations**

  Many research questions arise in the municipal districts, and also in the administrative boards of larger municipal regions, concerning municipal execution under the influence of societal change. In the first instance, these questions are often resolved practically. If a question continues to return, and a problem remains unsolvable in spite of various policy efforts, one can decide to begin a research study. Many administrations and also the municipal districts actually have researchers on staff. The department of Research, Information and Statistics also contributes a great deal to this research. Also, there is collaboration with knowledge institutions and sometimes with advisory agencies (In 2020, Amsterdam awarded 1/3 of assignments to commercial agencies and 2/3 to knowledge institutions). If an issue is even greater, and requires a multi-year investment, then research is bedded into the organisational structure. For example, the Aanpak Gezond Gewicht (Healthy Weight Initiative) contained researchers structurally within its teams, so that the public health service, the GGD, could attempt to prevent and reduce obesity in children in various ways.

ORGANISATIONAL ELEMENTS

- **Data Organisation: Harvesting, Collection and Publication of Data**

  As noted in the section above on policy formation, data are collected and harvested in professional ways. There is a department at the municipality that systematically gathers these data and creates statistics for policy formation. Nationally, the Central Office for Statistics collects and makes specific data and statistics for many municipalities. In addition, there are also local organisations that do this. In Amsterdam, this is the department of Research, Information and Statistics. This department can also publish raw data to make it accessible for research by citizens, students or researchers. The exchange of data, aggregation of data, buying or selling of data, and publishing of data are complex processes because of the possible infraction ofprivacy, security risks and possible chain liabilities.[13] The visualization of these data requires specific attention to make them as accessible as possible for as many people as possible.

- **Networks**

  Different local networks connect people from the university, the business world, social and citizens' organisations, the municipal council, the cultural institutions and artistic players in the city. While some networks are based on content, others ensure that interested parties come into contact with each other. In these networks, knowledge is exchanged and people meet. The power of a cultural infrastructure and the ability of citizens to obtain access to this infrastructure make an enormous difference. Direction, editing and reflection give form to this culture.

- **Catalysts**

  Catalysts in the domains of technology, business, and sciences develop methodologies for enhancing the research, innovation and policymaking in their domain. They orchestrate networks of stakeholders, initiate projects, pilots and programs and advise politicians and policymakers.

- **Online Publication of Relevant Research and Work in Progress**

  Publications, meetings of networks and digital disclosure of the information about research via online platforms is necessary to support the local research ecology now and in the future. The public sharing of knowledge is not self-evident. Such questions arise as: by whom, for whom, what exactly matters or doesn't, where and when, everything matters. Here, the role of a city science catalyst is also important. Different cities, and also the EU Commission, have experimented with how knowledge can be published in a way that all groups in cities can profit from research results. In Amsterdam, the platform openresearch.amsterdam has been set up to achieve this end. This platform will be further developed in the coming years.

13 Los, W. (2018). Towards an internationally trusted exchange of data. The data hypermarket. Rapport Amsterdam Data Exchange, versie 1.2, 26 januari 2018. Online: https://openresearch.amsterdam/image/2018/3/28/amdex_plan_v1_3.pdf

Thomas Jacob
Head International Projects, Senate Chancellery,
Senate of the Free and Hanseatic City of Hamburg

Hamburg

Free and Hanseatic City of Hamburg

Welcome to Hamburg, the second largest city in Germany and the Northern European continental hub, for centuries the "gateway to the World", with a long tradition in trade, a prospering port and offering its citizens a broad spectrum of culture, arts, jobs, nature, mobility (including an international airport) and education: all in all, a fine place to work, live and enjoy.

Economic life in Hamburg is diverse: industry (i.e. Airbus, Copper production "AURUBIS", all port-related activities, Beiersdorf), a large service sector (i.e. insurance, finance, media), and the vast majority of work is done by SMEs, a permanently growing start-up-scene, and crafts, entertainment and creative industries.

The Free and Hanseatic City of Hamburg is one of the 16 German regions ("Länder") that retain ownership of their state universities. This ownership gives Hamburg direct access to its scientific institutions: the "classical" University Hamburg, the Technical University, the Hafencity University (Built Environment), the University Clinic Hamburg Eppendorf, the University of Applied Science, the University of Music & Theatre, the University of Fine Arts, the Helmut Schmidt Military Academy, the Police Academy, the University for Finance & Tax, and the Professional University. In addition, a growing number of private research institutes are offering additional research and education in finance, trade, economics, and also in technologies.

With DESY (Deutsches Elektronen-Synchrotron) Hamburg hosts one of the largest European basic Research facilities.

Hamburg is oriented internationally because of its long international tradition and its geographical location seawards between the West (North Sea, Atlantic Ocean) and its proximity to the Baltic Sea Region, as well as being the northern access to the European continent landwards. A great part of the region's prosperity has its origins in this tradition, and it still influences government and policy to this day.

The independence ("Free and Hanseatic City"), and its actual status as a region, has created a close connection among all forces as the city aims for innovation, international activity and prosperity for the sake of its citizens. For many years, there has been very close collaboration between high schools and universities, on the one hand, and the city administration on the other. This collaboration was, and is, pragmatic and takes place in a problem and solution-oriented, direct and cooperative manner. As a result, many academic institutions continue to work directly with city agencies and ministries today.

The authority responsible for science in the city (the Ministry for Science, Research, Equality and Boroughs) manages the needs and development of the universities on the one hand, and it steers the implementation of a science policy geared towards sustainability and excellence on the other.

Hamburg works internationally wherever this is logical and appropriate, and thereby permanently renews its international relations.
Reporting directly to the First Mayor, the Senate Chancellery

develops new international collaboration projects, which in most cases require concrete cooperation between offices and universities.

Example:
For many years, the European Commission has been promoting international collaboration within research framework programmes (since 2014, through the Horizon programme), including in areas that directly serve urban interests. The Senate Chancellery identifies very specific calls for proposals and connects the requests (of offices, public agencies) with the appropriate research institutions in direct dialogue. Together, solutions are developed for the challenges described in the calls, coordinators are appointed if necessary, and the central position of both the Senate Chancellery and the Ministry of Science ensure smooth and fruitful cooperation. In the last 10 years in particular, more than 100 EU-funded projects, beyond pure research projects have been carried out additionally, and the intention to continue this is visible and intensive.

What makes it work:

It is particularly the fact that both city government offices/agencies and research institutions belong to the city. There is no difference between the "City of Hamburg" as a provider of research for city science and the research institutions – both operate at a regional level. In addition, the comparatively short distances within the city enable frequent personal encounters, exchange and cooperation. Politically and administratively, this very concrete cooperation is always supported, staffed and practicable. Hamburg has so far refrained from establishing the position of a "City Science Officer". The cooperation between the different areas functions well even without an explicit position.

It is the people who make this fruitful collaboration possible: Heads of departments, clerks, politicians, professors, and scientific staff, through their everyday efforts to find solutions to urgent questions about future demands, and helping to work together in an uncomplicated, effective and efficient way wherever possible. Challenges are only challenges, not obstacles, and in Hamburg both science and administration have recognised that these challenges can be solved better together.

FACTS AND FIGURES

Population:
1,850,000 inhabitants

Proportion with migrant background:
35%

Households:
975,000 (54% single-households)

BIP (per capita):
65 T €/a – No 6 in Europe (NUTS2-regions)

UNESCO World Heritage:
"Speicherstadt" and "Kontorhausviertel"

Proportion of green space:
14%

5 Conclusion: Between Urban Regions

Cities share the sea, rivers, mountains and woods. Just as a local biological ecology is influenced by the global climate, a local research ecology is also in contact with others. And we, as humanity on the planet, develop thinking and technology that profoundly influence our way of living together locally. It is of great importance that cities also contribute more to these developments, and thereby discover how we can better live together in this new age of great global change.

Given the major problems that cities are confronted with, one would expect that the exchange between cities is important and would be seen as an added value. However, it appears that collaboration between cities is not always straightforward. Daily issues often demand so much attention that there is little time to express interest in what is happening elsewhere. While international networks are essential in science, and belong to the core tasks of the scientist, this is not self-evident for civil servants. The colleague that is responsible for internationalisation frequently receives little response for his or her work, and international guests are received with difficulty. Even social networks appear to function primarily as local 'bubbles'.

European collaboration between cities needs new ways of communication.

European collaboration between cities could be much better if we could discover new ways of communication. At this moment, international departments have contact with each other, but in practice people generally have no time to immerse themselves in this topic. There is an absence of new communication systems that would make exchange possible in a meaningful way. And this is at a time when international collaboration on local challenges has been made much easier through ICT: we can now be together audio-visually online in real time. We are currently discovering these possibilities during the pandemic, and principally the orchestration and editing and reflection that this requires. Presently, we are not only learning to adapt to climate change, we are also learning to get into contact with each other in new ways, and also to calibrate our physical presence in new ways in the various media configurations in which we live.

During the 17th Architecture Biennale in Venice a special experiment took place in which over 50 artists and scientists and designers collaborated online to make local impact in Venice during the pandemic. In this so called 'Exploratorium" small distributed teams, including at least one Venice local expert, collaborated in a larger orchestration for exchanging ideas, imagination and policy advise. Due to the merging on-and offline realities and the acceptance of online communication international collaborations can engage with local urban challenges and contribute to solutions.[14]

This report confirms that research, which is constantly renewed by flows of young students, is very useful for informing the choices of local political decision-makers in the development of public policies, and should be mobilised much more for this purpose. In turn, taking advantage of the field of study and experimentation of the city brings a lot to research and training. The rapprochement between researchers and politicians is even more essential than ever in order to find solutions to the new urban challenges, sometimes in an emergency.

The structural and cultural obstacles to exchanges are real, but the keys to removing them are known. Among them, trust, which cannot be decreed but is built over time around shared values, which can supersede known and accepted conflicts of interest. Digital technology, which is obviously conducive to the sharing of knowledge, can accelerate the creation of operational knowledge that can be used to deal with crises, if it is protected from haste and from the intrusion of incompetent or ill-intentioned would-be experts. Understanding also takes time to overcome the sometimes misleading language and methods that are difficult to reconcile between one discipline and another. Finally, the sustainability of exchanges and research mechanisms, often funded for a limited time, remains a major concern.

This report highlights the need to create and consolidate a genuine ecosystem that brings together the concerned parties in a sustainable way, in order to overcome the difficulties in co-producing, hybridizing, and sharing and exploiting knowledge that could be objectionable, or sensitive. It proposes examples of inspiring success stories and elements of methodology. It must be possible in the coming years to allow these principles to be implemented, and within the framework of the CSI, to capitalize on the feedback from experiences of a wider circle beyond the pioneer cities.

To create and consolidate a genuine ecosystem that brings together the concerned parties in a sustainable way.

The report also mentions emerging issues that are somewhat transversal to the themes dealt with by the CSI thus far, and which are listed below and constitute largely new, often interrelated, fields of research that may give rise to new approaches and new research configurations. The CSI could take

14 For more information on the parallel research program to the Dutch contribution to 17th Architecture Exhibition of La Biennale di Venezia: https://openresearch.amsterdam/nl/page/52688/values-for-survival---17e-architectuur-biënnale-venetië

on the task of encouraging their exploration and organising feedback in order to draw up new recommendations in terms of methods and levers for strengthening the contribution of research to society on these issues.

Evaluation can be mentioned first, as it is a pressing issue, but is rarely sufficiently addressed. It may concern the efficiency of research, or even its reproducibility and transposability, or the vitality of local democracy. The evaluation of public policies and their effects is also essential, because they often cut across different areas, particularly with regard to the Sustainable Development Goals.

The report also insists on the question of interdisciplinarity and transdisciplinarity: by being invited to consider the territory as an ecosystem that we must help in order to recover its capacities for resilience, we are obliged to resort to interdisciplinary approaches. However, the exercise of this interdisciplinarity, which is still insufficiently encouraged by the academic systems, encounters almost all of the difficulties raised by this report, often in an even more amplified manner.

The reflection on the organisation of institutions, territorial governance, and the management of our administrations, which is still too marked by compartmentalisation that is incompatible with systemic approaches, is a third subject of territorial research with high stakes. Local democracy is a field of study and also of research and experimentation that is related to the issue of territorial governance, and also needs to be revisited urgently. Indeed, at a time when cities are aiming for decarbonisation by 2050 (or even much earlier within the framework of the Green Deal and the European 100 Climate Neutral Cities programme), they realise that they must choose a decarbonisation trajectory, because an infinite number of paths are possible between massive recourse to so-called green technologies (often pushed by states and large companies), and radical changes in lifestyles, or even "low-tech" economic models. Even if they can lead to the same result in terms of carbon neutrality, their social impacts can be very different. In order to make these choices, many aspects of local life must be taken into account, as well as the needs of citizens and their desire to get involved, which is not a matter of traditional expertise.

A city region is a territory in which also knowledge development requires attention for enhancing local resilience.

Given the importance of the societal changes that they will bring about, these choices must not be left in the hands of technicians and elected officials. The population, starting with the most fragile and precarious, who are the first victims of our social problems, must take part in these choices of collective and individual trajectories. The organisation of

these processes of listening and co-construction of a desirable future is a difficult task. Some research subjects that require exchanges of good practices, as well as methodological support and solid interdisciplinary research actions, include the examination and formulation of the margins of manoeuvre to be submitted to democratic debate, the engineering of consultation, listening and participation mechanisms, and the support of citizen commitment, etc. The swarming of emerging societal innovations (functionality economy, collaborative economy, sharing economy, local currencies, hybridisation of activities and professions, etc.) can and must be the focus of action research too.

Finally, by taking a step back from these transformations, when we consider that they are leading us to a change in civilisation and that cities will be major players in these transitions or ruptures, cities are in a position to ask themselves the questions: "How do we want to live together? What kind of world do we want to give to our children?" This question inexorably leads to reflections and research in fundamental areas involving the economy, the social and digital sciences, law of course, but also history, philosophy, ethics, arts & culture, even epistemology, and no doubt other 'disciplines' too. Fundamental to these outcomes will be our capacity to engage with the unexpected and the unpredictable together while including different skills, perspectives, experiences and different kinds of knowledge all the way.

"How do we want to live together? What kind of world do we want to give to our children?"

Amsterdam Antwerp Barcelona Berlin Brno Brussels Cluj-Napoca Copenhagen Cork Dubrovnik Espoo Gent Glasgow Groningen Hamburg Helsinki Leuven Lisbon Lublin Madrid Malmö Marseille Milan Munich Nijmegen Oxford Paris Prague Reggio Emilia Rome Rotterdam Sofia Stockholm Thessaloniki Vejle Vienna Warsaw

City Science Initiative, May 2022