

ERA-NET Cofund SMART URBAN FUTURES Synthesis Report



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1 ENSUF Synthesis

In 2017, fifteen R&I projects were approved in the ERA-NET Smart Urban Futures (ENSUF) call, a collaboration between JPI Urban Europe and the European Commission, to address urgent and long-term urban challenges by co-creating ideas and projects. Stakeholders in over 70 cities and 20 countries were involved in the projects and published project results in a variety of forms.

The ENSUF projects have challenged "business as usual" in urban infrastructures and governance. They reflect on "smart urban futures" by analysing how learning, narratives, and place development is currently practiced in European cities, where current approaches are taking us, and by suggesting new ways forward by uncovering the added value of their results and integrated approaches. About half of the ENSUF projects have engaged in methods central to urban living labs, with some projects even showing signs of "Urban Living Labs 2.0" — an effort in the JPI Urban Europe community to further advance the transformation capacities of urban living labs.

This synthesis report aims at highlighting the embeddedness of ENSUF in a wider policy context and showcasing contributions to the overarching policy objectives. For this purpose, the project outputs were collected and analysed to illustrate the breadth of the addressed objectives and achievements of the ENSUF participants.

2 Embeddedness of ENSUF in a wider policy context

2.1 Policy Context

The foundation of the ENSUF call lies in the *Strategic Research and Innovation Agenda* (SRIA) of the *JPI Urban Europe*. Here, one of the main challenges is to address the implementation gap in urban sustainable development. On the one hand, the implementation gap refers to the problem of the missing link between the current state of knowledge and vision of sustainable cities and their implementation in actual policy, planning, management, and design of European cities. On the other hand, European programs often take a sectoral approach that may not be sufficient to achieve overall

sustainability. This is also reflected in the term "wicked problems" or in the updated SRIA 2.0 as "urban dilemma", where solving problem X might hinder or prevent the achievement of problem Y (SRIA 2.0). Therefore, a more holistic and cross-sectoral approach is needed that seeks ways to understand and manage this complexity.

ENSUF places itself in the broader European policy context by contributing to the *EU Cohesion Policy 2014-2020 on integrated sustainable urban development* and its aim to promote integrated strategies with a more holistic approach and a stronger focus on networking and involvement of different actors. In addition, ENSUF points to its indirect alignment with the objectives of the *EU's circular economy policy*, as the project also aims to achieve a full systemic change that includes different aspects of cities. ENSUF projects have now contributed to capacity building of different stakeholders and the cocreation of knowledge and innovations. *Urban innovation ecosystems* and *urban living labs* – recurring themes in JPI Urban Europe – are spaces for experimenting with co-creation, integrated governance, and urban research and innovation. The purpose of this was to foster sustainable, open, innovative, and inclusive urban areas.

Recent policy updates since ENSUF's design and project launch emphasize the importance of cities to a carbon-neutral world. One of the biggest changes is reflected in the *UN 2030 Agenda* and its *Sustainable Development Goal* (SDG) 11 "Make cities and human settlements inclusive, safe, resilient and sustainable." Cities and urban development are therefore recognized by the United Nations as one of 17 other priorities to enable global sustainable development. Within this goal, *UN Habitat's New Urban Agenda (2016)* and the *Urban Agenda for the EU (UAEU)* complement its goals and priorities for urban development and climate action both globally and in Europe. Urban and peri-urban development is also seen in the *Global Sustainable Development Report 2019* as one out of six entry points to transform sustainable development.

The underlying and central messages remain broadly the same: integrated and sustainable urban development is needed to meet today's challenges. Cities in particular face a number of interrelated challenges and dilemmas that are multidimensional and cross-sectoral. Concepts such as cooperation, local development, transformation of current systems, needs-driven research and innovation pave the way to cities climate neutrality.

Three pillars are often at the centre of these policies: inclusion, environment, and economy. The *European Green Deal* sets the goal of Europe being carbon neutral by 2050, decoupling economic growth from resources, and leaving no person or place behind. These three dimensions are also integrated within Kate Raworth's *Doughnut Economy*, which defines the new challenge of the 21st century as lifting all the world's people out of poverty and deprivation while staying within the planetary boundaries of our world. These two important levels are illustrated with the shape of a doughnut, with the outside representing the environment and the inside of the doughnut representing the people living in poverty. The new economic space we need to think about is the doughnut itself, integrating an inclusive and sustainable approach to the economy. This is also reflected in policies for cities such as the *New Leipzig Charter*, which describes sustainable cities as fair, green, and productive.

The above political landscape demonstrates the continued relevance of the ENSUF call and its important contribution to the broader challenges and dilemmas facing cities.

2.2 Objectives

ENSUF overall states three main elements that need to be operationalized in projects.

- Transdisciplinary co-creation in research and innovation. European cities are seen as important
 innovation hubs and centres of job creation. Transdisciplinary and co-creative research and
 innovation will reinforce this idea by enabling a vision on the transition towards a new model
 of sustainable urban development.
- Smart integrated urban development. Smart approaches and solutions are being promoted by connecting, and integrating various systems, sectors, and services. This multilevel approach should reduce fragmentation of urban services and infrastructure and should help to close the implementation gap.
- 3. Utilising the spatial dimensions and processes of urban areas. The last pillar represents the inclusion of broader urban areas such as suburban areas at different scales.

These inputs result in their three priority call topics:

- Concepts and strategies for smart urban transformation, growth, and shrinkage;
- New dynamics of public services;
- Inclusive, vibrant and accessible urban communities

Through the call and the different projects and their results, ENSUF provides tools and methodologies for sustainable, open, innovative, and inclusive urban areas. In particular, it provides knowledge on strengths and weaknesses of urban development, a validation and evaluation of co-creation models and finally an outline of new paths for urban development.

These outputs are intended to bring about a change in the behaviour of the target groups, accompanied by a change in the urban system. Through its tangible outputs, ENSUF aims to contribute to the broader environment by:

- Tackling fragmentation and the implementation gap. The ENSUF aims to deliver viable
 measures to manage and drive the transition by pursuing new insights in European urban
 dynamics, localization of economic and social activities, and smart integrated urban
 development.
- Contributing to integrated sustainable urban development. The ENSUF aims to convey national
 research towards a common framework to enable a greater understanding of the societal
 changes in Europe and impact on social cohesion.
- Strengthening European urban research and innovation alignment. The ENSUF aims to achieve
 this by fostering development of innovative societies and policies through the engagement of
 citizens and actors and innovation in the promotion of integrated research and innovation
 policies.
- Scaling up and translating best practices. By attaching to and building on existing programmes and projects where appropriate to reduce overlap and fragmentation.
- Developing, analysing and testing new strategies and technologies of urban governance and urban living in order to shape the economic, social and environmental needs of citizens for sustainable urban development. To call for the design of new, future-looking models of governance and solutions, based on the SRIA vision and built on results already achieved in terms of urban best practices and ongoing innovative projects.

3 Contribution of ENSUF projects to overarching policy objectives

3.1 Project outputs and dissemination

ENSUF projects published their results across a wide spectrum of communication channels. More than 75 published outputs, 32 project reports and 13 websites were created by the 15 ENSUF projects. Among the published outputs, a large proportion presented learnings in the form of case study reports or policy briefs.

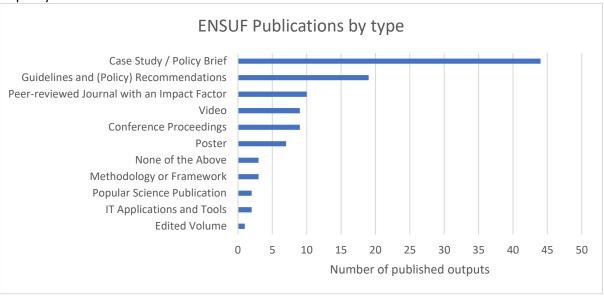


Figure 1: Published ENSUF project outputs by type.

Projects put different emphasis on media channels for communicating their results. While the GLIMER, PLACED, Urban Education Live, and Smart UrbI projects created extensive websites counting the number of pages on the project website, other projects such as 3S RECIPE or Bright Future focussed on other means of publishing their results.

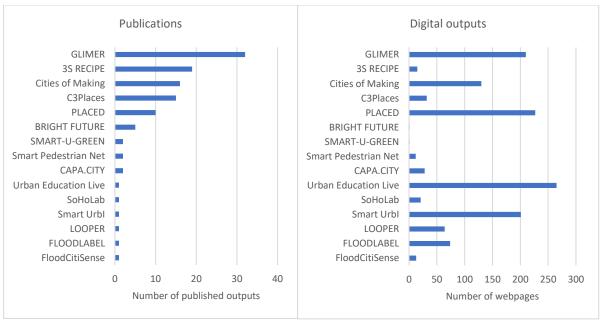


Figure 2: Number of published outputs versus webpages on the project website.

3.1.1 Involvement of cities

An explicit goal of the ENSUF call was to stimulate researchers, practitioners, innovators, and other stakeholders to join forces with municipalities, their relevant business entities, and industrial suppliers to address the urban challenges at hand. Moreover, it encouraged collaboration between partners from across Europe with broad geographical spread where relevant for implementation. 100 organisations from 17 countries were official project partners in the 15 ENSUF projects and many more were directly or indirectly involved. *Figure 3* shows the distribution of beneficiaries across partner type and geographical location. The majority of official project partners were universities (55%) and research organisations (15%). More than 1 in 10 project partners were industry actors which spans businesses, public utilities operating on a market logic and private commercial actor. Around 4% of all project partners were city authorities and another 15% governmental institutions or non-profit organisations. Geographically, beneficiaries were located across their respective countries with slight clustering towards dense urban areas.

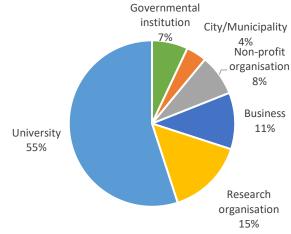


Figure 3: Distribution of project partners across partner type categories.

The distribution of project partner type differed between countries as shown in *Figure 4*. The United Kingdom hosted the largest number of project partners with a majority stemming from universities or industry. 68% of project partners were based in the UK, Belgium, Italy, France, or the Netherlands. Due to the regulations of the funding agencies, only the Netherlands, France, Belgium and Italy hosted business partners.

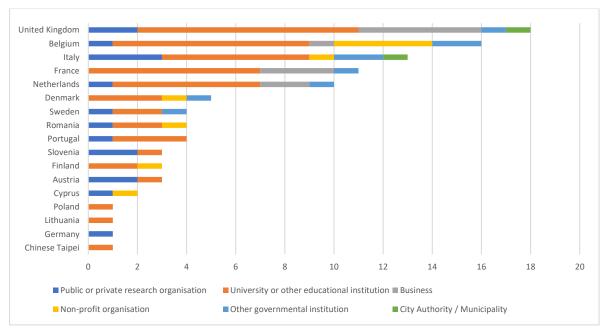


Figure 4: Number of project partners by country.

Figure 5 shows the network of countries which supported urban research projects in ENSUF. The size of a node represents the number of project partners based in a country while the thickness of the connections depicts the number of partners collaborating between these countries. Countries are positioned close to each other if many projects have involved (funded) project partners from both countries, which results in a network structure with highly connected countries positioned towards the centre of the diagram. Project partners from the United Kingdom and the Netherlands collaborated most frequently, leading to the strongest connection between the two country nodes. Across 5 joint projects, 12 British and 7 Dutch project partners led to 22 collaborative combinations. For example, FloodCitiSense¹ is a collaborative project involving 12 project partners including businesses, universities, non-profit organisations, and cities from the UK, the Netherlands, Austria, Belgium, and Chinese Taipei.

The density of the network, i.e., the number of connections between countries as a proportion of all possible connections, is 62% and a country is on average connected to seven other countries. In general, the collaboration network can be described as having a core-periphery structure. The Netherlands, the United Kingdom and Belgium comprise the core structure of collaboration in ENSUF. Almost all projects involved a partner from one of these countries and there was frequent collaboration between these countries.

7

¹ Vrije Universiteit Brussel, Delft University of Technology, Imperial College London, International Institute for Applied Systems Analysis, Ecosystems Services and Management Program, Etats Généraux de l'Eau à Bruxelles – vzw, Local Government Information Unit, RainPlusPlus Ltd, RPS Environmental Management Ltd, Disdrometrics, City of Brussels, City of Amsterdam, Birmingham Council, Severn Trent Water, National Taipei University of Technology

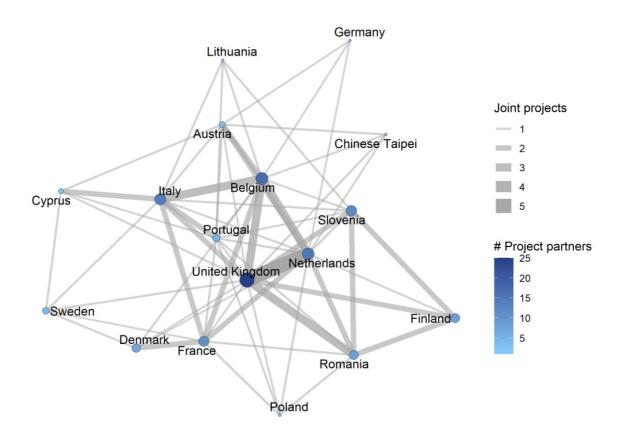


Figure 5: Collaboration network based on ENSUF project partners: social network structure. Node size shows the number of project partners and line thickness the number of collaborations in projects.

While the list of project partners in the consortia includes only two cities (Birmingham City Council, Comune di Verona), a far greater number of cities are involved in the projects as case study areas, cocreation or cooperation partners, or hosts for Urban Living Labs. Figure 6 shows the 76 cities actively engaged in the ENSUF projects. Compared to other JPI Urban Europe calls, the number of cities involved is one of the largest. Furthermore, the cities engaged in the projects goes beyond the countries participating in the ENSUF call. For example, the project Smart-U-Green worked with the local authorities in Belarus (Mahilioŭ) and Russia (Pskov) to co-create knowledge on new options for governance taking into account conflicting perspectives on urban landscape quality.



Figure 6: Cities involved in the ENSUF projects as project partners, case study areas or living labs.

3.2 Results from the mapping of projects and project outputs to policy goals

The published project outputs were matched to overarching policy goals, specifically the UN Sustainable Development Goals, to highlight the breadth of activities within the ENSUF projects and the linkage between objectives. The matching between project outputs and SDGs is based on the linked open data project, LinkedSDG², which provides an interface to extract concepts from text corpora.

The analysis shows that the ENSUF projects cover a wide variety of mutually supporting goals.

Figure 7: Related SDGs based on the published project outputs and tagged using the Linked SDG API.

Figure 7 shows the summary of tagging all 75 collected ENSUF outputs. A project output, such as a case study report or academic paper, may be tagged with multiple goals. The chart highlights that the projects largely address Sustainable Development Goal (SDG) 11 "Make cities and human settlements inclusive, safe, resilient and sustainable." including 10 sub-goals. On average across all outputs, a weight of approximately 38% is laid on goal 11.

² https://sustainabledevelopment.un.org/LinkedSDGs/about

However, many other SDGs are related to the outputs of the projects, specifically addressing SDG 4 "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (14%), SDG 1 "End poverty in all its forms everywhere." (10%), SDG 13 "Take urgent action to combat climate change and its impacts" (8%), and SDG 17 "Strengthen the means of implementation and revitalize the global partnership for sustainable development" (7%). With these SDGs, the addressed targets heavily relate to resilient societies, e.g., SDG 1.5 "build the resilience of the poor and those in vulnerable situations" or SDG 13.1 "strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries".

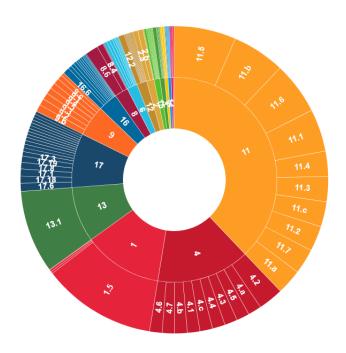


Figure 7: Related SDGs based on the published project outputs and tagged using the Linked SDG API.

While the taxonomic approach of mapping outputs to SDG targets helps to highlight the addressed policy objectives, analysing the text of project abstracts yields a high-level picture of the underlying concepts. Figure 8 shows the network of terms in the project abstracts and their co-occurrence. Words that appear more frequently together in an abstract are located closely together. The size of the node shows the frequency a term occurs across all abstracts. The colour of the node is based on a clustering algorithm that highlights frequently co-occurring terms.

The network of terms widely mirrors the ENSUF call topics, i.e., concepts and strategies for smart urban transformation, growth and shrinkage, new dynamics of public services and inclusive, vibrant and accessible urban communities. The dark blue cluster on the left side of the network includes projects revolving around the future of manufacturing, urban planning and technologies. This cluster includes projects such as Cities of Making, which explores opportunities for strengthening urban based manufacturing in European cities following year of decline and offshoring.

Towards the top of the network in red, a theme around the co-creation of urban spaces emerges, capturing the inclusion of stakeholders. This reflects projects such as C3Places which aims at increasing the quality of public open spaces. Finally, in light blue towards the right side of the network, terms such as 'smart', 'system' and 'learning' highlight a cluster of projects focussing on location-based experiential learning methods and smart system-wide solutions.

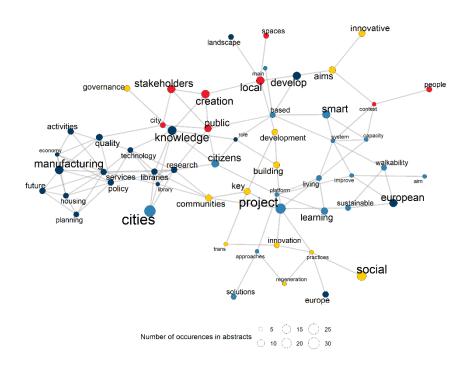


Figure 8: Network of terms in the project abstracts. Words that appear more frequently together in an abstract are located closely together. The size of the node shows the frequency a term occurs across all abstracts. The colour of the node is based on a clustering algorithm that highlight frequently co-occurring terms.

4 Conclusion

The ENSUF projects have challenged "business as usual" in urban infrastructures and governance by reflecting on "smart urban futures" and how learning, narratives, and place development is currently practiced in European cities. In their activities, projects address a wide range of overarching policy objectives such as the UN Sustainable Development Goals.

An explicit goal of the ENSUF call was to stimulate researchers, practitioners, innovators, and other stakeholders to join forces with municipalities, their relevant business entities and industrial suppliers to address the urban challenges at hand. Moreover, it encouraged collaboration between partners from across Europe with broad geographical spread. 100 organisations from 17 countries were official project partners in the 15 ENSUF projects and many more directly or indirectly involved.

Parts of the projects' achievements manifested in concrete project outputs such as 75 published outputs, 32 project reports and 13 websites which were created by the 15 ENSUF projects. The analysis of outputs highlighted the breadth and interlinked nature of the addressed topics and targets. While a large proportion of outputs focus on making cities and human settlements "inclusive, safe, resilient, and sustainable", other areas such as establishing resilient societies or ending poverty were within the scope of the projects' activities.

5 Appendix

5.1 List of published outputs

	Catagorius	
BRIGHT	Category	URL
FUTURE	IT Applications and Tools	http://zrc.maps.arcgis.com/apps/webappviewer/index.html?id=f24f79df67634159bca5f303fd877f6d
BRIGHT	10015	http://zrc.maps.arcgis.com/apps/webappviewer/index.htmiriu=iz4i/9ui0/054159bca5i505iu6/7f0u
FUTURE	Case Study	https://jpi-urbaneurope.eu/wp-content/uploads/2019/10/Bright-Future-Synthesis-report.pdf
BRIGHT	Case Study	https://jpi-urbaneurope.eu/wp-content/upioaus/2019/10/Bright-Future-Synthesis-Teport.pur
FUTURE	Case Study	https://jpi-urbaneurope.eu/wp-content/uploads/2017/06/Bright-Future-for-Black-Towns-WPII-report.pdf
BRIGHT	cuse study	The position of the state of th
FUTURE	Poster	https://jpi-urbaneurope.eu/wp-content/uploads/2017/06/Project-posters-2017-BRIGHT-FUTURE.pdf
BRIGHT	Guidelines and	infrattille and the season for the season of the state of the state of the state of the season of th
FUTURE	(Policy)	
	Recommendations	https://jpi-urbaneurope.eu/wp-content/uploads/2017/06/Strategic-guide-ONLINE_L-Cercleux_D-Bole.pdf
CAPA.CI		
TY	None of the Above	https://jpi-urbaneurope.eu/wp-content/uploads/2020/11/AL-VILLESVIVANTES_BOOKLET-2020.pdf
Cities of		
Making	Case Study	https://citiesofmaking.com/wp-content/uploads/2018/05/CoM_CityReport-0523-HR.pdf
C3Place	Methodology or	
S	Framework	https://c3places.eu/sites/default/files/page-files/C3Places_D1_1%20Methodological%20Framework%20for%20LIVING%20LABS.pdf
C3Place		
S	Case Study	https://c3places.eu/sites/default/files/page-files/C3Places%20eBook.pdf
FloodCit	IT Applications and	
iSense	Tools	https://jpi-urbaneurope.eu/news/project-result-the-floodcitisense-app-for-pluvial-flooding/
FLOODL	Peer-reviewed	
ABEL	Journal with an	
	Impact Factor	https://www.iwra.org/wp-content/uploads/2020/05/IWRAWIPB15_FloodResilientCities_final.pdf
FLOODL	IT Applications and	
ABEL	Tools	https://floodlabel.net/
FLOODL	Peer-reviewed	
ABEL	Journal with an	
	Impact Factor	https://www.mdpi.com/2073-4441/11/7/1501
FLOODL	Peer-reviewed	
ABEL	Journal with an	
	Impact Factor	https://www.tandfonline.com/doi/full/10.1080/02508060.2019.1663825

FLOODL	Popular Science	
ABEL	Publication	https://www.nrc.nl/nieuws/2018/12/05/hogere-dijken-beschermen-ons-niet-tegen-het-water-a3059617
FLOODL	Popular Science	
ABEL	Publication	https://www.uu.nl/sites/default/files/20170328-uu_geo_sgpl_nieuwsbrief09-01.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/09/WP6-Report-Scotland.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/09/WP6-Report-Italy.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/06/WP6-Report-Sweden.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/06/WP6-Report-Cyprus.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2019/05/Italy-Accommodation.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2019/02/Scotland-Accommodation.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2019/07/Sweden-Accommodation-1.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2019/07/Sweden-Accommodation-1.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2019/09/Cyprus_Language.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2019/09/Italy_Language.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2019/09/Scotland_Language1.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/02/WP4-Report-Sweden_final.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/04/WP5-Report-Sweden.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/03/WP5-Report-Scotland-1.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/03/WP5-Report-Italy-1.pdf
GLIMER	Case Study	https://www.glimer.eu/wp-content/uploads/2020/08/WP5-Report-Cyprus.pdf
LOOPER	Methodology or	https://leanannaiset.or/.un.eantent/unleads/2020/40/husehung.ndf
LOOPER	Framework	https://looperproject.eu/wp-content/uploads/2020/10/brochure.pdf
	Poster	https://jpi-urbaneurope.eu/wp-content/uploads/2017/06/Project-posters-2017-LOOPER.pdf
PLACED	IT Applications and Tools	https://drive.google.com/file/d/1hcr91Zt-L6HMXnz9ehAKRwz32YFvO3eO/view
SoHoLab	Guidelines and	
	(Policy)	
Smart	Recommendations	http://www.soholab.org/publications/soholab-guidelines-for-the-regeneration-of-large-scale-social-estates
Pedestri		
an Net	Poster	https://jpi-urbaneurope.eu/wp-content/uploads/2017/06/Project-posters-2017-Smart-Pedestrian-Net.pdf
Smart	Popular Science	·
Urbl	Publication	http://www.smart-urban-intermediaries.com/wp-content/uploads/2019/11/Social-Transformation-in-Urban-Neighbourhoods-Policy-Brief-2019.pdf

SMART-		
U-		
GREEN	Poster	https://jpi-urbaneurope.eu/wp-content/uploads/2017/06/Project-posters-2017-SMART-U-GREEN.pdf
	Postei	Tittps://jpi-drbanedrope.ed/wp-content/upioads/2017/00/Project-posters-2017-3WAKT-O-GKEEN.pdf
3S	Cara Charles	https://pagedocom/2044040
RECIPE	Case Study	https://zenodo.org/record/3841919
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RECIPE	Case Study	https://zenodo.org/record/3842998
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RECIPE	Case Study	https://zenodo.org/record/3939722
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RECIPE	Case Study	https://zenodo.org/record/4064391
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RECIPE	Case Study	https://zenodo.org/record/3842835
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n Live	Poster	https://jpi-urbaneurope.eu/wp-content/uploads/2017/06/Project-posters-2017-Urban-Education-Live.pdf
C3Place	Methodology or	chellip and the state of the st
S	Framework	https://c3places.eu/sites/default/files/page-files/C3Places_D4.1%20UserManual%2012072019.pdf
C3Place		
S	None of the Above	https://c3places.eu/sites/default/files/page-files/C3Places_D6.1%20Diss&ComStrategy.pdf
C3Place		
S	Case Study	https://c3places.eu/sites/default/files/publications/EJML2018_Almeida%20et%20al_C3Places.pdf
C3Place	Peer-reviewed	
s	Journal with an	
	Impact Factor	https://c3places.eu/sites/default/files/publications/Maciuliene_systems-06_2.pdf
C3Place	Conference	
S	Proceedings	https://c3places.eu/sites/default/files/publications/52_Aletta_Van%20Renterghem_Botteldooren_2018.pdf
C3Place	Peer-reviewed	
S	Journal with an	
	Impact Factor	https://www.mdpi.com/1660-4601/15/6/1118/pdf
C3Place		
S	Case Study	https://c3places.eu/sites/default/files/publications/Relatorio%20Oficinas%20Urbanismo%20240718.pdf
C3Place	Peer-reviewed	
S	Journal with an	
	Impact Factor	http://www.cegot.org/ojs/index.php/GOT/article/view/2018.15.006/pdf
C3Place	Peer-reviewed	
S	Journal with an	
	Impact Factor	https://c3places.eu/sites/default/files/publications/pizzi-2018-ijca-918228.pdf
C3Place	- 11. 13.71	
S	Edited Volume	https://c3places.eu/sites/default/files/publications/Batista%20et%20al%20C3Places%20Living%20Lab%20Lisbon%20WoK.pdf
C3Place	Peer-reviewed	
S	Journal with an	https://www.asianasdinast.com/asianas/article/aha/nii/5005407F144004C0200;is0/2Dih.uh
Caplaga	Impact Factor	https://www.sciencedirect.com/science/article/abs/pii/S0264275118316020?via%3Dihub
C3Place	Peer-reviewed Journal with an	
S		https://c3places.eu/sites/default/files/publications/GEOTEMA_62_04_Menezes_Smaniotto-Costa.pdf
Caplace	Impact Factor Conference	intps.//copiaces.eu/sites/ueraun/ines/publications/GEOTEWIA_02_04_INIENEZES_SINAMOLIO-COSta.pui
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