Review of Research Findings generated under JPI Urban Europe's Strategic Research and Innovation Agenda 2013–2018

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1. Introduction

Over the last five years, JPI Urban Europe has supported, through several joint calls, a number of inter- and transdisciplinary research and innovation joint actions with the involvement of a variety of European academic institutes, local governance/city administrations, commercial actors, and civil society actors. This work has been chiefly guided by the Strategic Research and Innovation Agenda (2015), whose update (SRIA 2.0) is currently being prepared.

Therefore, in order to take stock of the work produced so far in preparation of setting the new research agenda for the coming period, the JPI Urban Europe Management Board has asked a team of three academics, prof. Martin de Jong from Erasmus University Rotterdam, prof. Simon Joss from the University of Glasgow and dr. Daan Schraven from Delft University of Technology, to undertake the present review. The authors have been asked in particular to take stock of the documents listed in *Annexe A*, which represents a mixture of project progress reports, final reports, synthesis reports, academic articles, and project proposals relating to the joint calls funded by JPI Urban Europe in the period 2012-2018.

Within the limited scope of this consultancy work, it was agreed to carry out a general high-level qualitative content analysis with a focus on key concepts as they appear in the reports, followed by a more numerical study into the appearance of these key concepts in the academic literature. The latter would include their co-occurrence with other related concepts in academic search engine Scopus and a brief preview of what these findings imply for JPI's future research agenda. This report is the sublimation of this study.

The remainder of this document will first, in section 2, present the key concepts as found in JPI's Urban Europe's Strategic Research and Innovation Agenda (SRIA), to be followed, in section 3, by an analysis

of headline findings as they are found in the various progress and final reports conducted within the remit of SRIA 2015. Section 4 will then present the findings taken from the bibliometric analysis of the academic literature, after which section 5 will provide the future research recommendations as the authors see them.

2. Key concepts across SRIA 1.0 (2015) and SRIA 2.0 (2018)

In the Strategic Research and Innovation Agenda for JPI Urban Europe, a variety of themes relevant to the analysis of making cities vibrant and sustainable are prioritised. In the case of **SRIA 2015**, six research themes (one overarching) were highlighted as guidance for funding a series of research calls as well as supporting activities:

- Sustainable transition pathways
- Vibrant urban communities
- Welfare and finance
- Urban environmental sustainability & resilience
- Accessibility & connectivity
- Urban governance & participation

A glance at the research themes picked up in the projects based on these themes demonstrates that many of them deal with and/or revolve around technological progress (partly through digitisation), economic vitality (especially through innovation), urban metabolism (both as resource consumption, carbon emissions and various other forms of pollution), social inequality and exclusion, functional separation and mixing in urban neighbourhoods and urban resilience (mainly as adaptation and mitigation measures).

In comparison, **SRIA 2.0**, currently under consultation, centres upon four 'dilemmas' (see below). The rationale for formulating the new set of themes in the form of dilemmas is to accentuate the interdependences across thematic strands and to achieve better integration. Furthermore, the posited dilemmas highlight action areas for which new sophisticated policy and practice instruments are called for.

The four five dilemmas (currently under development) are:

- **Digital transitions and urban governance**: How can high-quality public service delivery and citizen empowerment through complex ICT become combined with inclusiveness of these services for a broader audience, partly not so well trained in complex technologies?
- **Urban robustness and well-being**: How can a solid and productive industrial structure promoting economic development be combined with high quality of life through entertainment, greenery and other social and environmental functions that generate well-being without being immediately financially beneficial?
- **Land-use and urban infrastructures**: How can the preservation of vulnerable spatial functions such as natural areas and agricultural land be secured while at the same time realising required new infrastructure networks, such as for transport, energy, waste disposal etc.?
- **Public/private space and inclusive urban neighbourhoods**: How can the rise and growth of exclusive neighbourhoods with facilities restricted to those entitled to these services be

combined be curbed and kept open and areas open to those with fewer resources and wealth? In other words, how can urban space accommodate a variety of social groups and secure broad social, political, economic and environmental inclusion?

Taken together, the above themes and dilemmas are relatively broadly defined, but nevertheless cut at the heart of many societal problems (or 'wicked issues') as they emerge in cities today. Tackling them, while imperative, is however also inherently complex. And if these interrelated issues are to be handled concurrently and in combination with one another, then, deploying integrated and holistic approaches are an urgent necessity. In section 3, the current work in progress is assessed and clues will be found to move future research projects in that direction. There is a compelling case, and demonstrable need, for policy packages where a variety of policy instruments controlled by different stakeholders in the urban environment are matched and creative, intelligent package deals are struck. If these are chosen carefully and implemented well, sustainable urban transition pathways can be set in motion and potentially conflicting interests pacified for the long-term. The obvious though still open question, then, is how this is to be realised. The review below, then, focuses on what tangible evidence has emerged in this respect from the various progress and final reports published under JPI Urban Europe's SRIA to date.

3. Analysis of the progress and final reports produced within the SRIA remit

To generate the content analysis below, the following documents resulting from the two Pilot Calls, ENSCC and ENSUF, were examined:

- 45 progress and final reports of research programmes undertaken within the remit of JPI Urban Europe
- 15 project proposals submitted to JPI Urban Europe for funding
- 7 synthesis reports produced to demonstrate the findings as generated in joint calls
- 4 academic articles produced by members of the research community related to JPI Urban Europe.

The full list of all documents analysed and the dates on which they were issued is presented in the annex to this document.

An overview read of this substantial number of documents leads to the conclusion that a wide spectrum of topics is covered: ranging from industrial redevelopment of the urban space, to discrimination and stigmatisation of particular social groups in the city; from choosing locations for intermodal freight hubs, to living labs for appropriate utilisation of all forms of water; and from building decision processes for pervasive participation, to mobile devices, applications and games for smart and efficient mobility handling. Most of the reports discuss research investigations that touch on one or several of the aforementioned themes and dilemmas. Between them, they offer both a conceptual description of the issues at hand, as well as practical suggestions and tools to deal with them. Most projects were completed successfully, or are well on their way towards successful completion. As such, they offer useful knowledge and information on the range of problems that exist in cities, while also making some tangible suggestions on what solutions might be found. This review, therefore, indicates that in that respect a satisfactory level of critical mass has been achieved to date, and useful critical

insights generated to inform and benefit the urban studies community (both academia and practitioners) in Europe.

That said, we cannot avoid the conclusion that there still remain significant knowledge gaps. It would be preferable in the next stage to go beyond confirming what is already known in the literature, and proceed to producing significantly new, cutting-edge knowledge while using that were generated in the first phase as building blocks for the second phase.

Certainly, the majority of reports analysed readily acknowledge the urgent need for, and concurrent persistent difficulty of, framing and treating urbanisation challenges in a comprehensive fashion by cutting across administrative boundaries through so-called 'silo crossing'. However, the research produced moves in that direction by pointing at the need to do this, but often falls short of sufficiently demonstrating, through new empirical knowledge and/or practice solutions, how this dilemma can be addressed and overcome.

Arguably, the complexity of the urbanisation challenges addressed by JPI Urban Europe's SRIA requires a similar and concomitant complexity in the arsenal of policy making tools and instruments to be designed and used to the array of urban challenges. In short, more sophisticated coordinated governance is required through which the resources of various public and private policy actors and stakeholders are pooled together and deployed in symbiotic ways. In this respect, while the cumulative research outputs produced under SRIA 2015 provide useful reviews of and conceptual reflections, we have now reached the stage where policy packages need to be established and tested to find out what such package deals may look like, how things can move beyond lab settings and how performance holistic performance can be boosted.

Positively, a significant proportion of reports focus on the potential for integrated and innovative solutions of 'Urban Living Labs' (ULLs). As a particular form of urban experimentation, ULLs are special test-bed settings and/or spatial arenas designed to bring together diverse stakeholders with a view to jointly solving complex area-based problems. Such problems are characterised by the concurrency of social, economic, environmental, and other facets for which joint coordinated action is a *sine qua non* if comprehensive and meaningful solutions are to be found in response. Some of these ULLs analysed were found to be both innovative and integrated, in as much as they provide relevant decision-makers with useful approaches to understanding how the various facets can be combined in constructive ways through policy packages to which different actors each contribute their own policy resources (legal, financial, material, knowledge, staffing) towards a comprehensive (re)development. At the same time, however, other complications emerge: in many cases, there appears to be a significant disconnect between, on one hand, the laboratory situation in which these policy packages are conceived and, on the other, the possibility or willingness of the ensemble of policy actors in the regular decision-making process to adopt the solutions developed in the Urban Living Labs. Put differently, innovative solutions found in experimental settings often have a hard time being adopted in the wider decision-making setting where they have to be made effective for the real world. This aspect too, deserves additional attention.

A further observation relates to the problem-solving potential of the solutions proposed with regard to environmental sustainability. Much of the gain in reducing resource consumption and harmful emissions is seen in the promotion of smart devices and applications through which citizens and users

can keep track of their own consumption patterns. Some of these may well, if applied at a large scale, lead to more efficient use of energy, materials and water. At the same time, however, widespread adoption of such tools is likely to give the false impression that ecological problems can and will be resolved technologically, even though empirical evidence and practice experience may suggest otherwise (De Jong et al 2015). Such 'solutions', rather than translating into actual absolute reduction in resource consumption and emissions, may end up having only marginal benefits contrary to what users/consumers may assume or be led to believe and thus constitute a convenient and comfortable illusion of 'doing good' while the actual problems are left largely untouched. This phenomenon is well-known both through the 'rebound effect' but also as shifting the 'problematique' to other areas or locations. Hence, only more profound sustainable consumption patterns may make a real difference in improving environmental performance; these, however, are indeed more painful (in that they require significant behavioural changes) and, as such, likely to be less palatable to politicians and citizens alike. Unsurprisingly, the studies and reports analysed present attractive solutions for improving the natural environment, but developing truly effective ones in the second phase would require a strong focus on asking consortium partners to focus on making trade-offs across various interests and public values explicit, encouraging them to highlight what the necessary sacrifices are and how they can be made politically and administratively tractable.

4. Findings derived from the bibliometric analysis

In this section, we will find a brief overview of the findings from a bibliometric survey we conducted to assess the thematic position of published work under the funding scheme of the Joint Programming Initiative Urban Europe (JPI UE). The findings are part of the overall analysis of the SRIA 2015 and the two packages of projects funded under it. Details can be found in annex 2, which contains the full text of this bibliometric analysis. More specifically, we attempted to answer three questions:

1. How does published work relate to the thematic focus and projects of JPI Urban Europe?

The published work funded by JPI UE has been reported in a period in which the strategy of JPI is re-oriented from SRIA 1.0 (2015) to SRIA 2.0 (2019); the latter will cover the approximate period of 2020-2025. The SRIA 1.0 and SRIA 2.0 have some overlap in the following topics, for example on digital transitions and urban governance (see below).

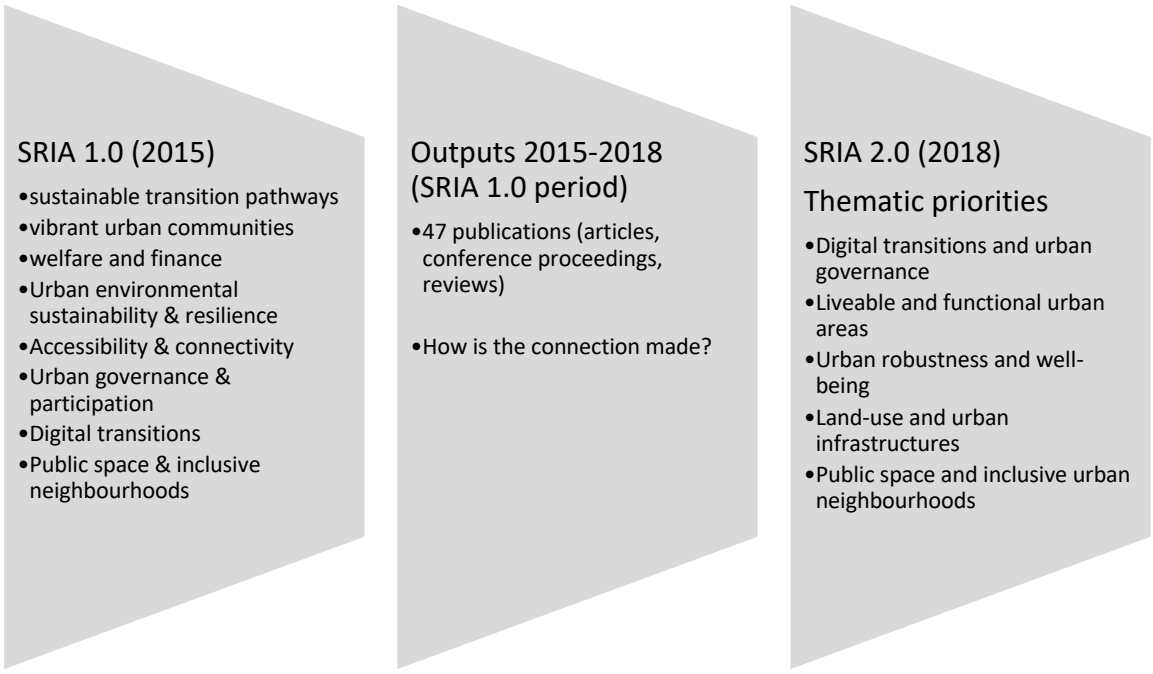


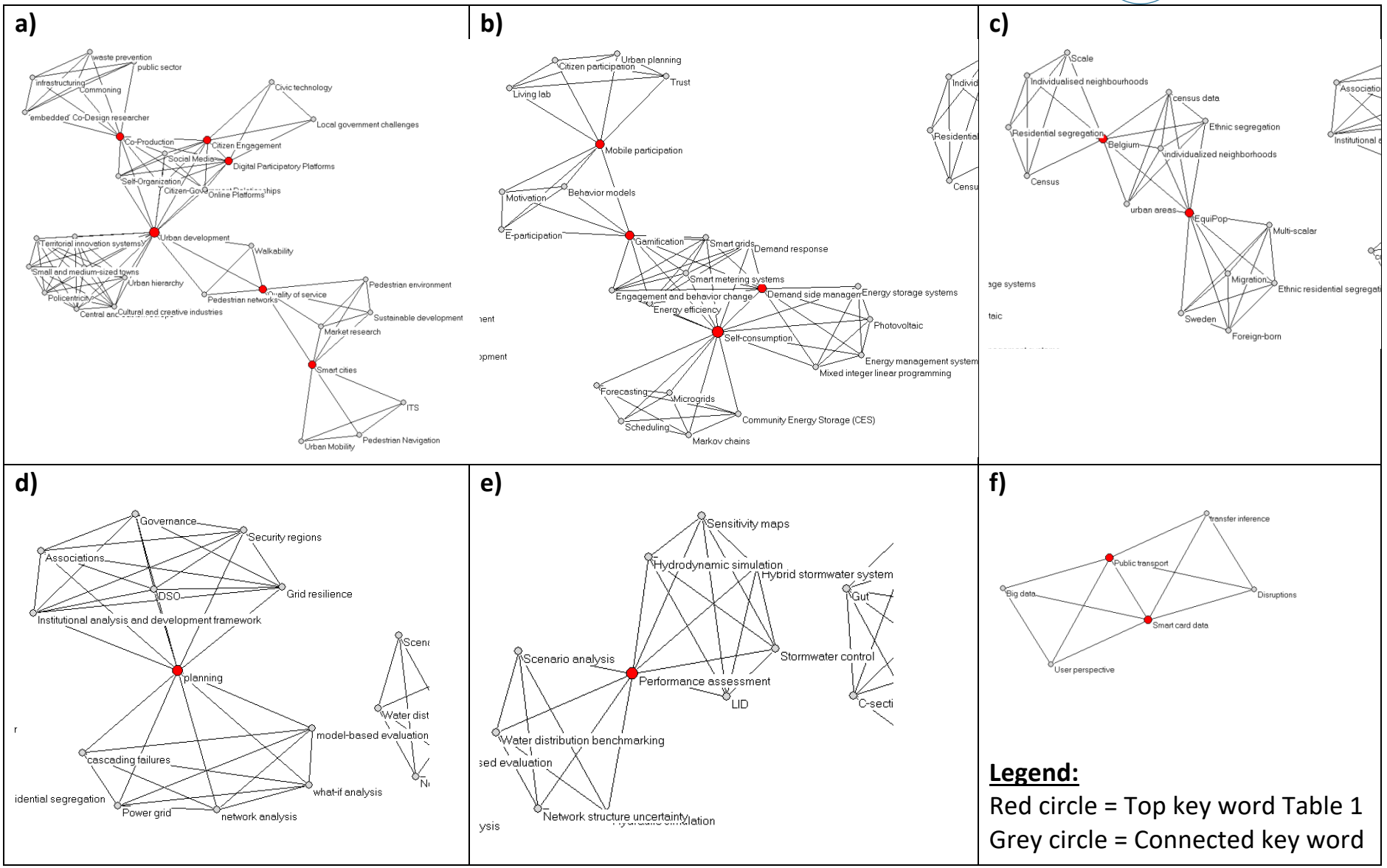
Figure 1. Refocused strategy themes SRIA 1.0 and SRIA 2.0

The published work has been determined by searching for the publications by means of a query[1] with synonyms for JPI Urban Europe in all the information in the Funding section of the bibliometric data stored in the article database Scopus. This delivered 47 articles consisting of journal articles, in which social science, computer science and environmental science are well represented in the JPI body.
In order to relate the publications in the light of the two strategies we applied a so-called key word occurrence analysis. It appears that urban development and self-consumption are two recurring topics in the publication set that has been currently published until November 2018 under the first funding scheme under SRIA 1.0 (2015). In order to appreciate the underlying structure better, we examined co-occurrence of the key words among the JPI UE articles more deeply. The results are shown Figure 2 which contain observations about published JPI UE research until 16th of November 2018. The largest set of connected key words is network 3a. This network carries the smart city label. The research project that uses the smart city label further looks at quality of service, urban development and engaging citizens through digital platforms. This latter might explain the smart city label. The largest network therefore noticeably addresses the digital transition and urban infrastructure due to the connection with pedestrian networks, environments and navigation. The second largest one network is 3b). This network looks at self-consumption. It researches this concept mostly by means of energy-related consumption, because it mainly includes key words like community energy storage, smart metering, gamification and mobile participation. This network noticeably addresses the digital transition (thanks to smart metering), accessibility and connectivity (thanks to community energy) and vibrant urban communities (thanks to mobile participation and gamification). Network 3b) is the only network of the evolved debates that uses “living lab” as a key word in its network. This is interesting, as the JPI UE is especially interested in living labs and urban experiments. The third largest is the network 3c). It looks at residential and ethnic segregation and individualized neighbourhoods. The

[1] Query executed on 16-11-2018: (FUND-ALL ("JPI UE") OR FUND-ALL ("JPI Urban Europe") OR FUND-ALL ("Joint Programming Initiative UE") OR FUND-ALL ("Joint Programming Initiative Urban Europe"))

research project seems to map these phenomena with census data. This network noticeably addresses the public space & inclusive neighbourhoods. The smaller networks are 3d), 3e) and 3f), which look respectively at public policy matters such as planning, performance assessment and public transport. 3f) does so by looking at smart card data, while networks 3d) and e) focus clearly on urban environmental sustainability & resilience.

In summary, in SRIA 2.0 the theme digital transitions & urban governance is clearly connected by the same themes from SRIA 1.0 by the two clearly connected networks 3a) and 3b). Public space and inclusive urban neighbourhoods is also clearly connected between SRIA 1.0 and SRIA 2.0 by the network 3c). Resilience and sustainability seem far less prominent in SRIA 2.0.



Legend:

Red circle = Top key word Table 1

Grey circle = Connected key word

Figure 2. Connected network of Publications by author key words

2. How does the published work position among the broader debate on Urban Sustainability?

For this analysis we first analysed the known city labels that promote urban sustainability. We base this on an initial list that we have uncovered from De Jong et al. (2015) to produce Figure 4 from that publication anew, to plot the city label debate in an overview. Figure 4 is the newly updated figure from the De Jong et al, with update in two ways:

- We included 6 additional city labels: Compact city; Circular city; Sponge city; Inclusive city; Sharing city; and Virtual city;
- We included publications 2014 until 2017, which were not yet added in De Jong et al. (2015).

In Figure 4 we see all the city labels by size of the circle (indicating number of articles in science that use the word in the title-abstract-keyword) and their connections by the line thickness (indicating the number of times that articles have mentioned them in combination in the title-abstract-keyword). We see that Smart city is topping the debate, followed by Sustainable city. The thick lines run at least to either of those two, signalling that cities both deal with a sustainability transition and to a digital transition. In Figure 4 we have drawn a red circle between resilient city, low carbon city and smart city. When we look at the titles, abstracts and keywords of the 47 JPI UE publications, then we signal that only these three city labels are mentioned. They only connect Smart cities 3x, and resilient city 1x and low-carbon city 1x. An interesting follow-up observation that warrants extra attention was made by reading the abstracts. We noticed that the Smart cities publications of JPI UE did not mention living labs in their study. However, the sustainability transition publications did mention this. This underscores even more that the living lab concept is currently adopted by JPI UE publications under the sustainable transition flag with city label connections of low carbon city and resilient city.

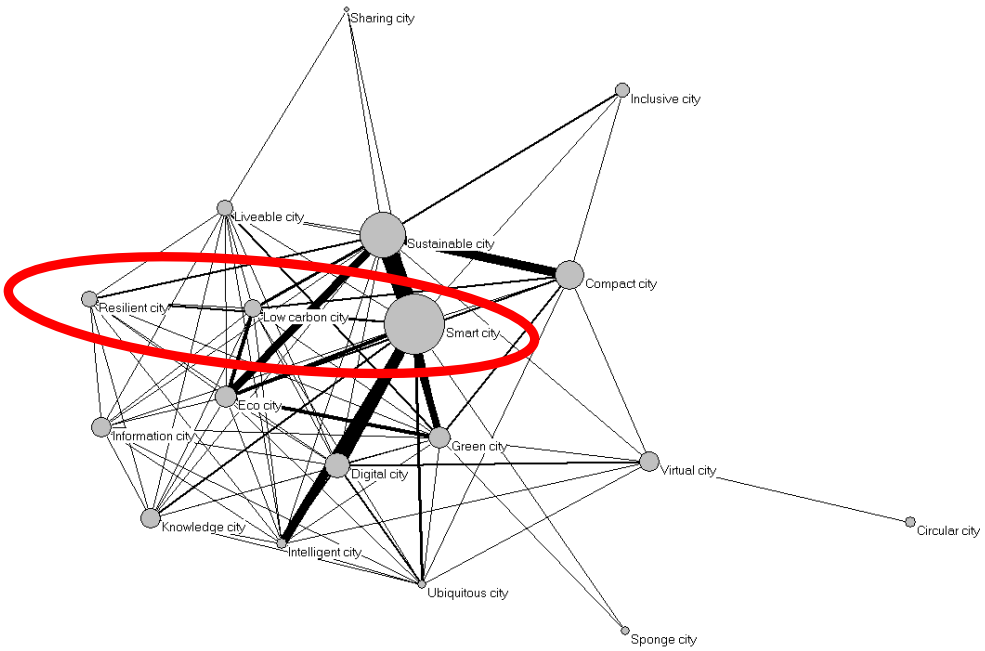


Figure 3. Co-occurrence of 18 categories in titles, abstracts and key words

3. What can we gage from the living lab debate in relation to the JPI UE?

We have attempted an extra analysis to gage how living labs have been used in the broader academic debate. A brief comparison of these insights with known thematic published work under JPI UE reveals an interesting mishap, which supports relevance for the SRIA 2.0.

We have collected articles in Scopus of any year by the word “living lab”. We retrieved +1200 articles from this exercise. A lot of words that are connected to the digital transition, like smart city, internet of things, future internet, ICT, ICT4D, smart home and interoperability. We also recognize a lot of words on collaboration and integrated solutions, by words such as open innovation, co-creation, participatory design, collaboration, co-design, user involvement and experimentation. To a lesser degree we see sustainability represented in this list. Noticeably, this underscores the finding that we had with the previous two analyses, where we noticed that SRIA focuses more on digital transition, and seemingly less on sustainable transitions.

5. Recommendations

This review of the complete set of progress, final and synthesis reports produced in the wake of SRIA 2015 have shown that, taken together, the selected themes and dilemmas which were relatively broadly defined, nevertheless cut at the heart of many societal problems (or ‘wicked issues’) as they emerge in cities today. Suggestions have been made for dealing with them through living laboratories, technical devices, win-win solutions, stakeholder engagement and a number of other modes. Tackling them profoundly, while imperative, is however also inherently complex and painful. If all interrelated urban issues are to be handled concurrently and in combination with one another, then, deploying integrated and holistic approaches are an urgent necessity. In other words, there is a compelling case, and demonstrable need, for policy packages where a variety of policy instruments controlled by different stakeholders in the urban environment are matched and creative, intelligent package deals are struck. If these are chosen carefully and implemented well, sustainable urban transition pathways can be set in motion and potentially conflicting interests pacified for the long-term. But this is definitely not always easy and palatable for all parties involved. In many cases, adjustment in consumption patterns are required or physical caps need to be imposed ad such measures may well be painful. The still open question, then, is how this is to be realised among a broad selection of actors, which packages of policy tools are involved, how their deployment can/should be distributed, which unattractive measures are unavoidable and how these can be introduced. The present review, then, focuses on what tangible evidence has emerged in this respect from the various progress and final reports published under JPI Urban Europe’s SRIA to date. Our conclusion is that valuable insights were dug up on the safe and attractive side of liveability and sustainability of urban development and what options exist, but that the harder part is still remaining: what unattractive but necessary steps are due and how can we go beyond finding ideas towards effectively implementing them mainstream.

More specifically, we suggest the following two major recommendations:

<u>Increasing and improving critical mass of research</u>

The knowledge generated so far is useful and informative, albeit comparatively descriptive and uncritical of existing practices. Much of the research seems to be covering well-known theoretical ground and highlights more detailed conceptual insights or elaborate on practical applications while

accepting the dominant and mainstream political assumption that the great variety of public values and interests can be dealt with at the same time at no real cost. In that sense, the new knowledge produced is incremental rather than game-changing. In our assessment, there is somewhat limited evidence of the research either methodologically or empirically breaking new ground and findings come across as 'safe' and occasionally predictable. This is admittedly our own personal (albeit) professional standpoint, but we believe that had it been cutting edge it would have introduced new concepts, approaches and provoked controversy more than it has done.

Consequently, the next rounds of funding should seek to 'up the game' by being highly selective in picking projects that are (1) at the forefront of innovative critical thinking and demonstrate where interests and values intersect with each other and painful policy choices appear, (2) deploy sophisticated methodologies suitable for interrogating the complexities of these policy dilemmas and which choices have which consequences, and (3) produce original empirical findings to significantly advance our knowledge on how controversial choices can be made tractable.

A further, related recommendation concerns the coordination between individually funded projects: in order to derive proper synergies among projects, thought should be given to how best to roll out funding, for example by requiring cooperation across projects and carrying out consecutive reviews with a view to accumulating and integrating new knowledge (practice).

Focusing on cross-boundary innovation and integration

While the outputs reviewed readily acknowledge the need to overcome siloed approaches to urban development and management, there is limited evidence of substantial progress having been made to date in addressing the following key issues:

- **Transition** to more sustainable outcomes: while much attention is on conceptualising transitions and discussing/researching related designs and processes, not enough evidence is produced concerning what actual SD outcomes are enabled through the arrangements studied. So, future research should focus on determining substantive outcomes (and linking this to processes – i.e. what arrangements actually managed to produce what positive outcomes)
- **Infrastructure as 'consumptive amenities'** (CASUAL report): the linkage between 'hard' urban infrastructure and 'soft' behavioural and consumption issues remains weak and underexplored. While the CASUAL report investigates this to some extent (using transport and housing as case examples), it concludes that not much progress has been made. Here, our work on linking economic-industrial development profiles to policy arrangements could be helpful (de Jong et al. 2018, Han et al. 2018).
- **Upscaling (of urban experiments)**: while the need for upscaling policies and practices (from niche to mainstream) is readily acknowledged, the research knowledge generated to date on how this should work out in practice and what is known about mainstreaming desirable policies while taking institutional and practical contexts of each city into account is still too limited. The article by Bulkeley et al (2016) is useful in this respect, providing a conceptual framework for thinking about 'new institutional integration', and analysing experiments (ULL) as part of 'wider socio-material

configurations'. However, this only provides a literature review; no real testing of this conceptual framework.

- **Social resonance (of urban experiments)**: urban experimentation remains largely conceptualised in technocentric terms, with focus on 'laboratories', technology, products and services etc. While nods are made towards citizen participation, the dominant socio-technical framework does not sufficiently engage with wider social and political aspects. This, too, is a dimension of (lack of) upscaling
- **Governance deficit**: taken together 'upscaling' and 'social relevance' issues point to a persistent governance deficit = i.e. urban experiments (posited as THE new urban governance arena, and ULLs as main practical manifestation) face a challenge of upscaling and social legitimacy. As Voytenko et al (2015) rightly note, ULLs are a 'problematic social platform' (simply inviting some citizens to engage as users is not enough). This is further compounded by a lack of accountability – i.e. no critical public monitoring going on of what ULLs do and deliver; this should be delivered/enabled by the next round of JPI Urban Europe funding. I.e. we need critical evaluation studies, not just glowing reports and anodyne manuals.

Annex 1 List of JPI Urban Europe projects, project documents, synthesis report and academic article output studied (this list does not include all ENSUF full proposals which were also briefly examined)

Building Pervasive Participation (no 839740), partners AIT Austrian Institute of Technology (project coordinator 01 January 2016 – 31.December 2016), FTW Telecommunications Research Centre Vienna, Austria (coordinator 01-April 2013 – 31 December 2015), University of Turku, Department of Social Research, Finland, Örebro University, Centre for Urban and Regional Studies, Sweden. Progress report 1, Final report (for the whole project duration) and Project end report.

Co-creating Attractive and Sustainable Urban Areas and Lifestyle: Exploring new forms of inclusive urban governance (CASUAL) (no 43812458), partners Nordregio (project coordinator), Austrian Institute for Regional Studies and Spatial Planning (OIR), Delft University of Technology (TU Delft). Progress reports 1, 2 and 3 and project synthesis report.

Consolidation and Coordination in urban areas (CONCOORD) (no 43812426), partners Eindhoven University Of Technology (coordinator), University of Twente, Technical University Denmark, Middle East Technical University, Vienna University of Economics and Business, Proctor and Gamble, Blue Rock Logistics, Heineken, Binnenstadservice. Progress report 1 and final report.

Get together without Barriers (G@Together) (no 839691), partners INSET Research & Advisory GmbH (coordinator), ZARA Zivilcourage und Anti-Rassismus-Arbeit and IBU Istanbul Bilgi University. Progress report 1, final report, and annex to the final report.

Practices and policies for neighbourhood improvement: towards 'Gentrification 2.0' (PNIG) (43812425), partners Radboud University Nijmegen (coordinator), University of Vienna (UNIVIE), Middle East Technical University (METU), Raumdaten GmbH (RD). Progress reports 1, 2 and final report.

Green/Blue Infrastructure for Sustainable, Attractive Cities (GreenBlue Cities) (no 201204568), partners Luleå University of Technology (coordinator), Universität Innsbruck, Austria, TU Delft, Tekniska Verken I Kiruna AB. Progrss reports 1, 2 and final report.

Interethnic Coexistence in European Cities: A comparative and applied oriented analysis of neighbourhood-related policies (ICEC) (no 839723), partners Institute for Urban and Regional Research, Austrian Academy of Sciences (coordinator), University of Amsterdam, Municipality of Amsterdam, Royal Institute of Technology, Stockholm County Council, Klerings Architekten Ziviltechniker Gesellschaft mbH, Wohnbauvereinigung für Privatangestellte Gemeinnützige
Gesellschaft mit beschränkter Haftung, HuB Architekten ZT KG. Progress report 1, 2, 3 and final report.

Urban Implications and Governance of CEE migration (IMAGINATION) (no 43812412), partners Erasmus University Rotterdam (Institute on Citizenship, Migration and the City, CIMIC) (coordinator), Austrian Academy of Sciences (Institute for Urban and Regional Research, ISR), University of Göteborg, Özyeğin University, University of Warsaw (Center of Migration Research, CMR), Platform 31 / European Urban Knowledge Network (EUKN), Charles University Prague (CUNI). Progress reports 1, 2, 3 and final report.

Incubators (no 847352), partner isn GmbH & neurovation GmbG. Progress reports 1, 2

Playing with Urban Complexity; Using co-located serious games to reduce the urban carbon footprint, Urban Europe.

Towards new forms of urban governance and city development:
learning from URBan Experiments with Living Labs & City Labs (URB@Exp), (no 4220697), partners International Centre for Integrated assessment and Sustainable development (ICIS), Maastricht University (coordinator), City of Maastricht, Lund University, Pantopicon, City of Antwerp, Malmö University, City of Malmö, Graz University, City of Graz, City of Leoben. Progress report 2 and synthesis report 'Guidelines for Urban Labs'.

City Labs as Vehicles for Innovation in Urban Planning Processes, Christian Scholl and René Kemp, Urban Planning (ISSN: 2183–7635) 2016, Volume 1, Issue 4, Pages 89–102

Integrated Data Visualisation and Decision Making Solutions to Forecast and Manage Complex Urban Challenges (UrbanData2Decide) (no 847511), SYNYO GmbH (SYNYO) Research and Development Department (coordinator), University of Oxford (OXFORD) Oxford Internet Institute, Malmö University (MU) Department of Urban Studies Open Data Institute (ODI), Research Department IT University of Copenhagen (ITU) Software Development Group, ZSI Centre for Social Innovation (ZSI), Department of Knowledge and Technology.

Urban Living Labs as arenas for co-creation in urban areas, partners Tekes, Vinnova, Urban Europe. Synthesis report

Models for Ecological, Economical, Efficient, Electric Car Sharing (e4-share), University of Vienna (coordinator), AIT Austrian Institute of Technology GmbH – Dynamic Transportation Systems, Université Libre de Bruxelles – Département d'informatique, University of Bologna – Department of Electrical, Electronics and Information Engineering, iC consulenten Ziviltechniker GesmbH. Progress report 1.

The Emerging Landscape of Urban Living Labs: Characteristics, Practices and Examples, Governance of Urban Sustainability Transitions, Urban Europe.

Urban living labs: governing urban sustainability transitions, Harriet Bulkeley, Lars Coenen, Niki Frantzeskaki, Christian Hartmann, Annica Kronsell, Lindsay Mai, Simon Marvin, Kes McCormick, Frank van Steenbergen and Yuliya Voytenko, Current Opinion in Environmental Sustainability 2016, 22:13–17

Living labs: Users, citizens and transitions, Gabriele Schliwa and Kes McCormick, chapter 12 of a book Evans et al.

Urban living labs for sustainability and low carbon cities in Europe: towards a research agenda,
Yuliya Voytenko, Kes McCormick, James Evans, Gabriele Schliwa, Journal of Cleaner Production 2015 (1-10)

Annex 2 Bibliometric analysis on JPI Urban Europe funded research and related themes

In this supplement a short bibliometric survey is reported for the purposes of assessing the thematic position of published work under the funding scheme of the Joint Programming Initiative Urban Europe (JPI UE). The findings are part of the overall analysis of the transition of the first and second package of funding. We attempt to answer three calls in this supplement.

1. How does published work relate to the refocused strategy of JPI Urban Europe?
2. How does the published work position among the broader debate on Urban Sustainability?
3. What can we gage from the living lab debate in relation to the JPI UE?

1 Relation between published work and refocused strategy of JPI UE

The published work funded by JPI UE has been reported in a period in which the strategy of JPI is re-oriented from SRIA 1.0 (2015) to SRIA 2.0 (2018). Just before the SRIA 2.0 will be decided the published work is used to see the extent in which SRIA 1.0 (2015) has been on point and what SRIA 2.0 (2018) needs to adopt in order to better help achieve the urban sustainable transition. The context is provided in Figure 1 below. The SRIA 1.0 and SRIA 2.0 have some overlap in the following topics, for example on digital transitions and urban governance.

Figure 1. Refocused strategy themes SRIA 1.0 and SRIA 2.0

The published work has been determined by searching for the publications by means of a query[2] with synonyms for JPI Urban Europe in all the information in the Funding section of the bibliometric data stored in the article database Scopus. This delivered 47 articles consisting of journal articles, conference proceedings and reviews. To acquire a feel for the cross-boundary character of this set of

[2] Query executed on 16-11-2018: (FUND-ALL ("JPI UE") OR FUND-ALL ("JPI Urban Europe") OR FUND-ALL ("Joint Programming Initiative UE") OR FUND-ALL ("Joint Programming Initiative Urban Europe"))

publications, we first counted # of publications per discipline in Scopus (see Figure 2). This shows that social sciences, computer sciences and environmental sciences are well represented in the JPI body.

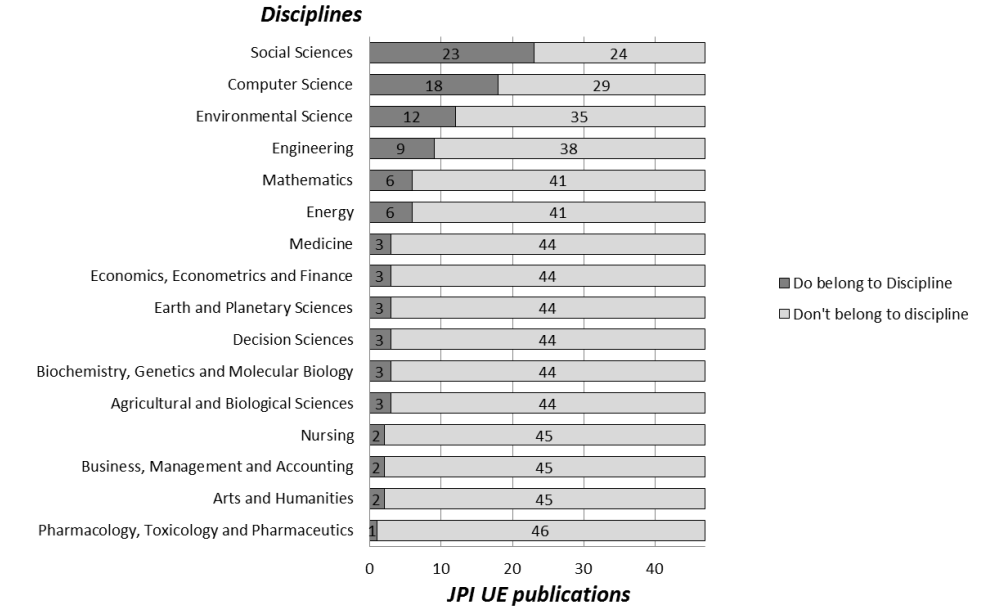


Figure 2. JPI UE publications per Discipline (duplicates possible)

In order to relate the publications in the light of the two strategies we first applied a key word occurrence analysis. We found 200 unique key words in total among the 47 publications. Table 1 shows the results of the top occurring key words with a cut-off at two occurrence or higher, resulting a top 16. It appears that urban development and self-consumption are two recurring topics in the publication set that has been currently published until November 2018 under the first funding scheme under SRIA 1.0 (2015). Yet, these key words among themselves, don't give a satisfying picture yet with regards to the underlying structure.

Table 1. Top Key word usage in JPI UE publications

Rank	Author Key-word	# occurrences
1	Urban development	3
2	Self-consumption	3
3	Demand side management	2
4	Gamification	2
5	Belgium	2
6	EquiPop	2
7	Citizen Engagement	2
8	Co-Production	2
9	Digital Participatory Platforms	2
10	Quality of service	2
11	Smart cities	2
12	Performance assessment	2
13	planning	2
14	Public transport	2
15	Smart card data	2
16	Mobile participation	2

In order to appreciate the underlying structure better, we undertook a co-occurrence analysis of the key words among the JPI UE articles. For this analysis the top key words in Table 1 are important to see the evolved structure among the 47 articles. More particular, if a word has 2 occurrences, it connects to articles in one network of key words that might explicate a similar researched theme under a financed project. Looking at these connected networks of key words we were able to recognize 6 connected networks of publications. The results are shown Figure 3.

Figure 3 is to be red by means of the circles and lines that form structures of the author key words per author. The red circles resemble the top occurring key words from Table 1. The grey circles resemble the connected key words that come from the same articles out of which the red circled key words come from. This has formed 6 structures that form clear evolved debates that the JPI UE funded projects have developed.

Observations about published JPI UE research until 16th of November 2018 are the following:

1) The largest set of connected key words is network 3a). This network carries the smart city label. The research project that uses the smart city label further looks at quality of service, urban development and engaging citizens through digital platforms. This latter might explain the smart city label. The largest network therefore noticeably addresses the digital transition and urban infrastructure due to the connection with pedestrian networks, environments and navigation.
2) The second largest one network is 3b). This network looks at self-consumption. It researches this concept mostly by means of energy-related consumption, because it mainly includes key words like community energy storage, smart metering, gamification and mobile participation. This network noticeably addresses the digital transition (thanks to smart metering), accessibility and connectivity (thanks to community energy) and vibrant urban communities (thanks to mobile participation and gamification).
3) Network 3b) is the only network of the evolved debates that uses “living lab” as a key word in its network. This is interesting, as the JPI UE is especially interested in living labs and urban experiments.
4) The third largest is the network 3c). It looks at residential and ethnic segregation and individualized neighbourhoods. The research project seems to map these phenomena with census data. This network noticeably addresses the public space & inclusive neighbourhoods.
5) The smaller networks are 3d), 3e) and 3f). These look respectively at public policy matters such as planning, performance assessment and public transport. The latter does so by looking at smart card data. Network 3d) and e) focus clearly on urban environmental sustainability & resilience, because of the words like grid resilience in 3d) and stormwater control in 3e). Network 3f) focuses on urban governance & participation, because of words like public transport and smart card data.

In summary, in SRIA 2.0 the theme digital transitions & urban governance is clearly connected by the same themes from SRIA 1.0 by the two clearly connected networks 3a) and 3b). Public space and inclusive urban neighbourhoods is also clearly connected between SRIA 1.0 and SRIA 2.0 by the network 3c). Resilience and sustainability seem to lack in SRIA 2.0, although some smaller networks show an evolved debate on these topics through the published work on SRIA 1.0.

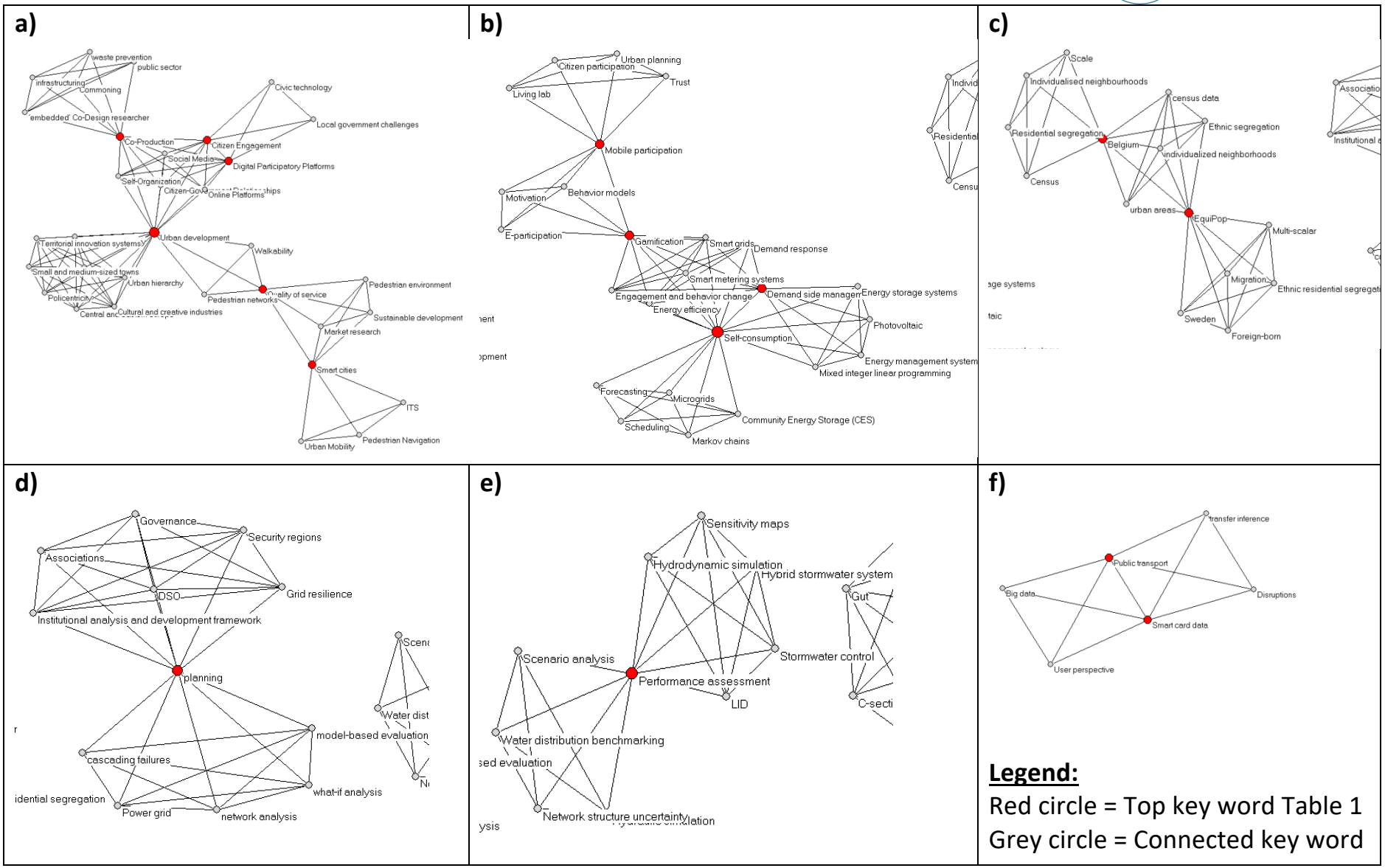

a)
waste prevention
public sector
infrastructuring
Commoning
Civic technology
embedded Co-Design researcher
Local government challenges
Co-Production
Citizen Engagement
Social Media
Digital Participatory Platforms
Self-Organization
Online Platforms
Urban development
Territorial innovation systems
Walkability
Small and medium-sized towns
Urban hierarchy
Policentricity
Pedestrian networks
Pedestrian environment
Sustainable development
Market research
Smart cities
ITS
Urban Mobility
Pedestrian Navigation
b)
Urban planning
Citizen participation
Trust
Living lab
Mobile participation
Motivation
Behavior models
E-participation
Gamification
Smart grids
Demand response
Smart metering systems
Engagement and behavior change
Demand side management
Energy storage systems
Energy efficiency
Photovoltaic
Self-consumption
Energy management system
Mixed integer linear programming
Forecasting
Microgrids
Community Energy Storage (CES)
Scheduling
Markov chains
c)
Scale
Individualised neighbourhoods
census data
Residential segregation
Belgium
Ethnic segregation
individualized neighborhoods
Census
urban areas
EquiPop
Multi-scalar
Migration
Ethnic residential segregation
Sweden
Foreign-born
d)
Governance
Security regions
Associations
DSO
Grid resilience
Institutional analysis and development framework
planning
Water dist
model-based evaluation
cascading failures
what-if analysis
Power grid
network analysis
e)
Sensitivity maps
Hydrodynamic simulation
Hybrid stormwater system
Gut
Scenario analysis
Performance assessment
Stormwater control
LID
C-secti
Water distribution benchmarking
Network structure uncertainty
f)
transfer inference
Public transport
Big data
Disruptions
Smart card data
User perspective
Legend:
Red circle = Top key word Table 1
Grey circle = Connected key word

Figure 3. Connected network of Publications by author key words

2 The position of the published work position among the broader debate on Urban Sustainability?

For this analysis we first analyse the known city labels that promote urban sustainability. We base this on an initial list that we have uncovered from De Jong et al. (2015) to produce Figure 4 from that publication anew, to plot the city label debate in an overview. Figure 4 is the newly updated figure from the De Jong et al, with update in two ways:

- We included 6 additional city labels: Compact city; Circular city; Sponge city; Inclusive city; Sharing city; and Virtual city;
- We included publications 2014 until 2017, which were not yet added in De Jong et al. (2015).

In Figure 4 we see all the city labels by size of the circle (indicating number of articles in science that use the word in the title-abstract-keyword) and their connections by the line thickness (indicating the number of times that articles have mentioned them in combination in the title-abstract-keyword). This informs how cities that promote urban sustainability are associated by researchers. We see that Smart city is topping the debate, followed by Sustainable city. The thick lines run at least to either of those two, signalling that cities both deal with a sustainability transition and to a digital transition.

In Figure 4 we have drawn a red circle between resilient city, low carbon city and smart city. When we look at the titles, abstracts and keywords of the 47 JPI UE publications, then we signal that only these three city labels are mentioned. They only connect Smart cities 3x, and resilient city 1x and low-carbon city 1x. This way we are able to position the debate of JPI UE at a high abstract level in the ranges of the centre, looking both at the sustainability transition through the resilient and low carbon city literature, and the digital transition, by means of its publications that mention smart city.

An interesting follow-up observation that warrants extra attention was made by reading the abstracts. We noticed that the Smart cities publications of JPI UE did not mention living labs in their study. However, the sustainability transition publications did mention this. This underscores even more that the living lab concept is currently adopted by JPI UE publications under the sustainable transition flag with city label connections of low carbon city and resilient city.

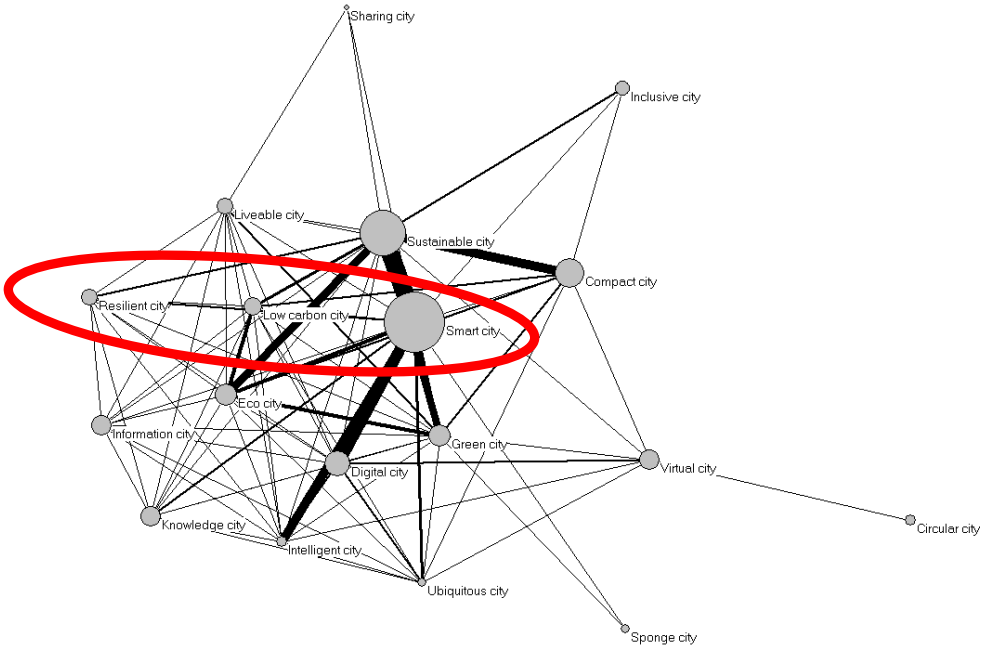


Figure 4. Co-occurrence of 18 categories in titles, abstracts and key words

3 Extra analysis: Gaging the living lab debate in relation to the JPI UE

As we have noticed that JPI UE has particular attention in the future SRIA 2.0. We have attempted an extra analysis in the available time, to gage how living labs have been used in the broader academic debate. A brief comparison of these insights with known thematic published work under JPI UE reveals an interesting mishap, which supports relevance for the SRIA 2.0.

We have collected articles in Scopus of any year by the word "living lab". We retrieved +1200 articles from this exercise. We were able to count the author key words and perform a quick occurrence analysis for this. Table 2 summarizes the top occurrences with a cut-off below 9 occurrences.

Table 2. Key word occurrence analysis of Living Lab query

Rank	Author Key-word	# of occurrences
1	Living lab	302
2	Living labs	167
3	Open innovation	62
4	Innovation	53
5	Co-creation	39
6	Smart city	32
7	Participatory design	25
8	Ambient assisted living	24
9	Smart cities	23
10	Sustainability	23
11	User experience	22
12	collaboration	22
13	co-design	21
14	evaluation	18
15	Education	17
16	Internet of things	14
17	User involvement	14
18	smart home	12
19	ICT	12
20	Future Internet	12
21	Design	11
22	ICT4D	11
23	Experimentation	10
24	Methodology	10
25	usability	10
26	Interoperability	10

We recognize a lot of words that are connected to the digital transition, like smart city, internet of things, future internet, ICT, ICT4D, smart home and interoperability. We also recognize a lot of words on collaboration and integrated solutions, by words such as open innovation, co-creation, participatory design, collaboration, co-design, user involvement and experimentation. To a lesser

degree we see sustainability represented in this list. Noticeably, this underscores the finding that we had with the previous two analyses, where we noticed that SRIA focuses more on digital transition, and seemingly less on sustainable transition.