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DOI

[10.1016/j.respol.2019.04.013](https://doi.org/10.1016/j.respol.2019.04.013)

Publication date

2019

Document Version

Submitted manuscript

Published in

Research policy

[Link to publication](#)

Citation for published version (APA):

van Winden, W., & Carvalho, L. (2019). Intermediation in public procurement of innovation: How Amsterdam's startup-in-residence programme connects startups to urban challenges. *Research policy*, 48(9), [103789]. <https://doi.org/10.1016/j.respol.2019.04.013>

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Intermediation in public procurement of innovation: How Amsterdam's startup-in-residence programme connects startups to urban challenges

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ARTICLE INFO

JEL classification:

A130
O31
O33
O35
O38

Keywords:

Innovation intermediaries
Public procurement of innovation
Conversations
Smart city
Startups

ABSTRACT

This paper analyses Amsterdam's Startup-in-Residence (SiR) programme as new type of policy to engage startups in the development of urban innovation through a challenge-based public procurement of innovation (PPI) process. The programme is being mimicked by other cities and government agencies, but so far there has not been a rigorous, theoretically-informed analysis of the approach. In this paper, we specify and focus on the role of city-based, public-affiliated intermediaries as initiators, moderators and influencers of conversations between startups and the local government. The main contribution of SiR as a PPI intermediation programme has been to launch new types of fruitful conversations on several levels, that lead to institutional innovations rather than direct solutions for urban problems or startup development. In this sense, SiR fulfils a role inquiring and ascribing urban challenges with values and notions of "worth" that preceded and shaped innovation directions. We also suggest that engaging startups is effective for only a limited bandwidth urban challenges; different types of intermediation are required to foster collaborative innovation in more complex settings.

1. Introduction

A growing number of city administrations are exploring how to engage startups in the development and implementation of new solutions for urban challenges, ranging from reducing air pollution, separating waste streams more effectively, to promoting tourism beyond the city centre, etc. (Cohen et al., 2016; Kirby et al., 2016; Wood, 2013). By tapping into local entrepreneurial ecosystems, they hope to improve urban quality of life, and simultaneously promote the local entrepreneurial scene, namely by opening procurement budgets and experimentation opportunities to innovative startup companies. Cities like San Francisco, Amsterdam or Barcelona have been frontrunners in this type of policy, but many others are following suit (de Coninck et al., 2018). The topic has gained a preeminent place in urban and regional innovation agendas and groups of local authorities have been partnering to develop new ideas, exchange experiences and propose recommendations for (supra-) national innovation policy agendas and procurement legislation (e.g. Partnership on Public Procurement, 2017).

The growing resources and expectations regarding the role of

startups in urban innovation open up new arenas for the wider academic and policy debate on public procurement for innovation (PPI). As one of the major forms of innovation-oriented public procurement policy (Lember et al., 2014; Edquist and Zabala-Iturriagoitia, 2015), the literature on PPI has long been dealing with the question on how governments can induce suppliers to deliver innovative solutions – or co-create innovation with them – towards better products, efficiency gains and the creation of competitive advantage for firms and countries (Edler and Georghiou, 2007). Yet, as most of the literature focuses on national governments and larger agencies that co-innovate with larger firms or knowledge institutes, there is still a limited understanding of what PPI can achieve at other levels of government (Pickernell et al., 2011) and its potential role in local and regional competitiveness (Lember et al., 2011). Namely the role of cities and local administrations in PPI is still weakly specified (Ferreira da Cruz et al., 2013; Uyarra et al., 2017), or considered limited due to their smaller scale, thin budgets and technical competence (Carvalho et al., 2012; Lember et al., 2011).

Yet, with local and regional government procurement accounting for about 30% of all public procurement in OECD countries – rising to

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47% in Sweden and 62% and 68% in Denmark and Canada, respectively (OECD, 2015) – there has been a renewed interest in the role of sub-national entities promoting innovation, in general, and PPI in particular (Dale-Clough, 2015; Caloghirou et al., 2016). Cities are increasingly understood as locales where innovation challenges emerge and where new knowledge is co-created to address grand challenges such as ageing, climate change, and energy transition (Coenen et al., 2015). Uyarra et al. (2017) frame cities as central sites where rich and fluid “conversations” between buyers and localized entrepreneurial systems occur – a critical precondition for successful PPI (e.g. Edquist and Zabala-Iturriagoitia, 2012). Such conversations are understood as socially-infused arenas of knowledge creation which help bridging cognitive, social and institutional gaps (Rutten, 2017) between buyers and suppliers, but they do not emerge spontaneously: intermediation is pivotal to induce productive conversations (e.g. Boon et al., 2011; Howells, 2006). Recent studies started to specify the role of intermediation in PPI (Edler and Yeow, 2016), but call for further elaboration on the agents and processes that contribute to link supply and demand in the thorny process of (local) public sector innovation.

Building on the previous, this paper critically assesses how and to which extent municipalities can use PPI to tackle contemporary urban innovation challenges and engage with local entrepreneurial ecosystems – namely by focusing on the role of intermediation forging new conversations between startups and the city administration while shaping interpretations of what innovations “should” be. The empirical setting is Amsterdam’s Startup-in-Residence Programme (SiR), a city-driven attempt to open procurement budgets and induce startups to develop “smart-city”-related innovations in Amsterdam, nudging co-creation between city agencies and departments. SiR is run by an intermediation structure bridging between city departments and local startups, charged with collecting and (re)defining relevant city challenges, organising a competitive process in which startups bid to develop effective solutions, and guiding the selected startups to co-develop and implement these solutions in connection with the relevant city department (as launching customer). From 2015–2017, the City of Amsterdam formulated 30 challenges to be tackled; 260 startups applied, and 27 were awarded to co-create a solution. Since then, several Dutch cities (The Hague, Groningen, Haarlem), a province (North Holland), and national government agencies have been replicating the approach.

With this analysis, we intend to make three main contributions. First, building on Stewart and Hyysalo (2008), we elaborate on three different roles – facilitating, configuring and brokering – fulfilled by government-related intermediaries in PPI (Edler and Yeow, 2016), hence contributing to further specify the social interaction processes latent in buyer-supplier PPI conversations at the sub-national level (Uyarra et al., 2017). Second, in line with the call by Timmermans and Zabala-Iturriagoitia (2013), we discuss how PPI is embedded in knowledge-intensive entrepreneurial ecosystems in concrete places, and identify emerging tensions between solving local issues while targeting broader innovation upscaling. Third, and related with the previous, we sketch some of the contours and limitations of an emergent city-based innovation referential highlighting the role of startups in technology-driven smart-city urbanism (Evans et al., 2016; Karvonen et al., 2018), framing the scope of possibilities for startup-targeted policies vis-à-vis large vendor-oriented procurement contracts (Carvalho, 2015).

The article is organised as follows. Section 2 briefly summarises literature on innovation-oriented public procurement, and PPI in particular; it zooms in on the role of innovation intermediaries in the process, highlighting their roles in shaping multi-dimensional conversational spaces between buyer and supplier. Section 3 discusses the research setting – the Startup-in-Residence programme in Amsterdam – and the research methods. Section 4 presents the empirical case along different PPI stages and intermediation roles. Section 5 concludes by discussing findings and their implications for innovation policies and

further research.

2. Conceptual background

2.1. Public Procurement for Innovation: a brief overview

In its simplest formulation, Public Procurement for Innovation (PPI) consists in using public budgets and government’s demand to purposefully enact and diffuse sought innovations in society. Complementing supply side measures (e.g. R&D subsidies, innovation vouchers, venture capital), PPI has been regarded as an effective demand-side lever to promote innovation-driven economic development (Edler and Georghiou, 2007; Edler et al., 2005) and, more recently, to tackle societal challenges related with climate change and several other urbanization-related tensions (Coenen et al., 2015; Mazzucato, 2018). Although the day-to-day government procurement of general products and services can also spur innovation without seeking for specific solutions or technologies (Uyarra and Flanagan, 2010), targeted PPI has long been associated with technological experimentation and new market creation for technologies and solutions. It contributes to reduce risks and uncertainty, namely by facilitating new knowledge development, connecting potential users and suppliers, creating ground for experimentation and legitimizing existing yet immature technologies to move from prototypes towards more consolidated market solutions (Edler and Georghiou, 2007; Uyarra et al., 2017; Lember et al., 2014).

A closely related albeit different form of innovation-inducing public procurement is called pre-competitive or pre-commercial procurement (PCP). Along with PPI, PCP schemes are currently in use in Europe, largely inspired by the Small Business Innovation Research (SBIR) programs pioneered in the United States (Lember et al., 2014; Wallsten, 2000). As stressed by Edquist and Zabala-Iturriagoitia (2015), PPI and PCP represent analytically distinct innovation procurement policies. Under PCP, public authorities and industry share the risks and returns of the R&D but, contrarily to PPI, there is no inbuilt purchasing option or follow-up strategy for prototypes that may result from R&D procurement. To be sure, PPI schemes may also support R&D-related efforts; yet, in those instances, R&D is not central to the policy scheme and tends to target technology adaptation (e.g. new algorithms within a software prototype) or production capabilities (e.g. buying a new machine), thus focusing on supporting commercialization. The resulting solution of a PPI process may also not be ultimately procured, but the focus of the whole processes (contrarily to PCP) is on transforming emerging technologies and prototypes into concrete and articulated market solutions (Edquist and Zabala-Iturriagoitia, 2012, 2015).

Policies like PPI – (and PCP as well) are not only instrumental to improve public services or address societal challenges, but also as an economic development instrument, namely when it leads to innovations that firms can further commercialize beyond the original assignment. Yet, several studies point at the problem that particularly small suppliers and startups face many barriers engaging with public procurement schemes (e.g. MacManus, 1991; Flynn et al., 2015; Flynn and Davis, 2016). Dealing with government’s bureaucracy and large contract’s size are key hurdles, a reason why regulators like the European Commission have proposed measures to split large contracts into smaller lots, the so-called “coordinated unbundling” (Timmermans and Zabala-Iturriagoitia, 2013). Yet, procuring organizations still face the challenge of stimulating startups to engage with concrete challenges and to develop “out-of-the-box” solutions through the right incentives, defining monetary rewards, patent protection and other commercialization schemes.

To define PPI, Allman et al. (2011) make a distinction between triggering and responsive demand in relation to innovation. In the case of responsive demand, the buying organisation responds to innovations on the market (new to the buyer). Alternatively, triggering demand happens when the buying organisation actively evokes market players to develop a specific innovation that services its needs; the innovative

solution can be developed in-house by suppliers, or in cooperation between the public organisation (as user) and the suppliers, where it may lead to user-producer interactions to actually co-produce the solution – as explained by several studies on user-driven innovation (e.g. Prandelli et al., 2008). Yet, such a process requires public organisations to be able to understand, define and clearly express future needs, interact with potential suppliers in a way that stirs market interest, and several barriers lie ahead. Lember et al. (2015) underline that public procurement is often decentralised and fragmented: each department or government agency has its own, relatively small budget and enjoys a relatively high degree of autonomy. This results in a lack of scale, making an effective triggering of innovation more difficult as companies are less willing to make specific investments to create an innovation for a small, one-off assignment – even if this may be less of a restriction for early stage startups, as having a launching customer to improvise and explore new business/innovation pathways can be important (e.g. Baker et al., 2003).

In their seminal paper, Edler and Georghiou (2007) identify a number of conditions required for the successful implementation of PPI. First, there is a need for coordination across government, to avoid fragmentation and to capture and value the social returns that are not necessarily within the ambit of the purchasing department; in other words, is the public sector ready to pay a premium cost or bear some efficiency losses in return for better addressing societal needs such as sustainability or social inclusion? (McCrudden, 2004; Edler and Georghiou, 2007). Second – as elaborated below – there must be an effective process of interaction and co-creation between buyer and supplier prior to and during the innovation process. Third, there is a need for a changed practice of procurement professionals: they must be ready to accept more risk as there is a higher chance of failure compared to traditional “off-the-shelf” purchasing, and they must have competences and skills to engage in co-creation (Edler and Georghiou, 2007). Additionally, a complicating factor hindering PPI, namely in Europe, is that public sector purchasers consider overall regulations and directives as complex and difficult to interpret) and thus have a tendency to play it safe in order to avoid court appeals (Knutsson and Thomasson, 2014).

The aforementioned issues are relevant across multiple stages of a typical PPI process, which include (adapted from Edler et al., 2005) i) the identification of a challenge and its formulation in terms of lack of satisfaction of a human need or unsolved societal problem; ii) the translation of the identified challenge into broad specifications; iii) tendering, iv) the assessment of tenders and awarding of developing propositions and v) the final delivery process, including prototyping/product development, production and delivery to the buying organisation. As said, unlike in traditional purchasing processes, PPI assumes that the purchasing organisation is able to specify in general terms what it needs but leaves the technical specifications and concrete propositions to be elaborated by the supplier; also, there is a failure risk, meaning that the supplier may not see a final delivery or implementation contract go through (Edquist et al., 2015).

Therefore, triggering an innovation through PPI requires dense modes of interaction, learning and knowledge creation between buyer and supplier. As in many other dimensions of contemporary capitalism, instead of a well-defined hierarchical relation (Boltanski and Chiapello, 1999), buyer-supplier relations and learning evolve through more horizontal architectures and socially-dense projects ecologies (versus e.g. “regular”, off-the-shelf procurement), in which connecting and aligning buyer and supplier’s worldviews is pivotal. This is more so as PPI increasingly targets technologies and solutions that challenge the status quo and rely on socio-technical experimentation (Coenen et al., 2015; Reeger et al., 2016). Drawing on Rutten (2017); Uyarra et al. (2017) introduce the notion of “conversations” to conceptualize the fluid and purposefully created social spaces through which rich alignments between the variegated social worlds and innovation frames of buyer and supplier occur. Conversations are of utmost relevance since

socio-cognitive frames and markets for triggered innovations hardly exist or are highly immature, being in fact often purposefully proto-created during the process. During the initial stages of PPI, conversations are pivotal to structure and frame what the concrete challenges are, namely as those are fraught with ambiguity and may rely on different social conventions and values – e.g. different understandings of “sustainability” (e.g. Kebir et al., 2017), or “smart” (Carvalho, 2015). In later stages of PPI, conversations underpin the choices made and the rationales behind what innovations “should be”, thus involving social processes of value ascribing that precede innovation and prototyping efforts per se (Huguenin and Jeannerat, 2017).

Uyarra et al. (2017) also argue that PPI-related conversations entail a dialectic between place and distance dynamics, which interact with one another and influence PPI results. On the one hand, conversations tend to be ‘spatially sticky’ (p. 15) as they evolve in concrete places, anchored in specific local challenges and drawing on local knowledge, entrepreneurial systems and cultural features; yet, on the other hand, the wider economic ambitions behind PPI require conversations to bridge between more idiosyncratic local needs towards wider economic, social and environmental challenges of other places and social contexts, which may lead to tensions when it comes to upscale innovations beyond its original locus, whether to a new place or to a new application field assuring producers enough market size (e.g. van Winden and van den Buuse, 2017).

2.2. Innovation intermediaries in PPI

The aforementioned social dimensions involved in PPI call for a better specification of the actors and the intermediaries that shape “conversation spaces”. In fact, PPI processes resonate with many other contemporary architectures of learning organized around temporary projects (Grabher, 2004), in which intermediation became valued as the “art” of connecting cognitive and socially distant actors (Boltanski and Chiapello, 1999). In the context of sustainability-related experiments, Reeger et al. (2016) describe intermediaries as “boundary people” that “bridge or create alignments between different worlds” (p. 16) thus becoming a locus of reflection and evaluation of experiments in their own right, and namely in the light of the project’s innovation and capability-building ambitions. Indeed, although conversations and interactions buyer-supplier can be direct, more often they are intermediated through a dedicated organisation or policy programme that contributes to shape the interaction environment.

The literature on innovation intermediaries (e.g. Boon et al., 2011; Howells, 2006) is instructive in gaining a deeper understanding of the role of intermediaries in linking the purchasing organisation with the innovator/supplier (e.g. Edler and Yeow, 2016). It has been long recognized that innovation intermediaries (consultants, technology brokers, public sector agencies) play important roles in innovation processes in general, and in cities in particular (Simmie and Strambach, 2006). Stewart and Hyysalo (2008) define intermediaries as “actors who create spaces and opportunities for appropriation and generation of emerging technical or cultural products by others who might be described as developers and users”, (p. 296). Initially, intermediaries were predominantly seen as “middlemen” connecting users and suppliers of new technologies or innovations. But increasingly, with linear innovation models being replaced by more interactive ones, emphasising uncertainty and complex interactions between multiple actors resulting in innovation (e.g. Van de Ven et al., 1999), the functions of intermediaries are recognised as interwoven in the innovation process itself, co-shaping innovations along various stages and cycles.

The literature describes several roles and activities played by intermediaries within innovation processes: the articulation of client needs and requirements; technology assessment and evaluation; arbitration and brokering; facilitating learning and collaboration in networks; managing and allocating financial and human resources; prototyping and piloting; accreditation and setting standards; investment

appraisal and business planning, and training, education and communication (Bessant and Rush, 1995; Howells, 2006; Klerkx and Leeuwis, 2009). Kivimaa (2014) specifically speaks about government-affiliated intermediaries fostering sustainability-related experimentation, and highlight their roles attracting attention and resources, articulating expectations and visions, building new constituencies and dialogues, etc. – which are all relevant processes for PPI as well (Edler and Yeow, 2016). Following from the work of Stewart and Hyysalo (2008), we discern three key activities of innovation intermediaries – *facilitating, configuring and brokering* – hinting to their potential relevance to structure and influence conversations between buyers (e.g. city administrations) and suppliers (e.g. startups) along PPI processes.

Stewart and Hyysalo (2008) speak about *facilitation* as a process of creating opportunities to others and new environments to ignite innovation. Facilitation consists of a set of activities contributing to “taking headache(s) out” (p. 306) of involved parties, namely by developing and providing access to multiple “spaces”. Those spaces can revolve around physical objects (including e.g. equipment for startups), but may also include access to networks and communities, to funding sources or to broad types of knowledge – including e.g. expertise and knowledge about the other party’s mindsets, interests and behaviours. Facilitation may also involve promotional efforts to widen the visibility of innovations within and outside organizations – e.g. through logos and certifications –, as well as the creation of flexible regulatory spaces that reduce uncertainty and facilitate experimentation (Regeer et al., 2016; Lember et al., 2014). In this sense, facilitation contributes to open up conversations between involved parties, shielding them from several types of social, cultural and institutional pressures (see also Smith and Raven, 2012) that may hinder PPI processes to unfold.

Although a PPI process between buyer (e.g. city administration) and supplier (e.g. startup) requires the former to give enough creative leeway to the latter (de Coninck et al., 2018), it may also involve *configuring* activities, that is, efforts by intermediaries to adapt, arrange, or adjust innovations and products with a view to specific applications or uses (Stewart and Hyysalo, 2008). Configuring involves active listening and influencing work to shape the perceptions of both users and sponsors about a certain technology, contributing to its appropriation. It also involves prioritization work, e.g. to identify the most relevant uses of a technology for a specific challenge, both for the organization and for the market overall (Edler and Yeow, 2016). Importantly, as stressed by Stewart and Hyysalo (2008), configuration is highly symbolic: beyond adjusting technologies, it is about (re-) interpreting and framing products and innovations to the views and expectations of relevant audiences and stakeholders, while ascribing value – and values – to them (Huguenin and Jeannerat, 2017; Carvalho and van Winden, 2018).

Finally, considering the different social and institutional “worlds” of buyers and suppliers, *brokering* can be pivotal. Stewart and Hyysalo (2008) speak about brokering as a process of communication and negotiation between the involved parties represented by the intermediary, to align and decide on multiple issues related e.g. to contracts, technology functionalities, implementation. Brokering is an important activity to build trust (e.g. Boltanski and Chiapello, 1999), secure old and

new resources and to maintain the interest in the innovation, helping to raise new constituencies (also Edler and Yeow, 2016). For example, for PPI, brokering may be fundamental to access resources across e.g. administrative levels and navigate complex hierarchies and power structures of buying organizations.

Intermediaries fulfil the role of moderators throughout the different stages of the PPI process, removing eventual hurdles that could prevent rich and fluid conversations to unfold (e.g. between local administration and startups) and, thus, mediating between PPI strategies and outcomes. Citing a metaphor from Lester and Piore (2004); Uyerra et al. (2017) speak about their role as “cocktail party” hosts, with the task to “choose the guests, initiate the conversation, keep it going and refresh it with new ideas” (p. 7). Yet, beyond being simple middleman, Stewart and Hyysalo (2008) make the point that intermediaries, in performing their three roles, strongly influence the evolving shape of conversations and, thus, of innovations. The choices they make and roles they take in facilitation, brokering and configuration activities are a manifestation of their values and preferences for certain options or trajectories, which, in turn, are often anchored in the challenges, entrepreneurial dynamics and social-institutional features of concrete places.

3. Research setting and methodology

3.1. Amsterdam’s startup-in-residence programme (SiR)

In the remainder of the paper, the aforementioned conceptualisations of intermediaries’ roles in relation to PPI are explored through the case of the Startup-in-Residence programme (SiR) in Amsterdam. SiR was launched in 2015, both as a policy programme and intermediation structure under the umbrella of the Chief Technology Officer (CTO) of the City of Amsterdam. As part of an extensive “smart city” and urban innovation agenda, SiR was tasked with inviting startups (from the Netherlands and beyond) to turn their ideas and/or prototypes into innovative solutions to manifold city challenges during a 5-month “in-residence” period working with different City departments (Table 1, for some examples). Among others, SiR was charged with the tasks of i) collecting and (re-) defining relevant challenges from the City departments; ii) organising a competitive process in which startups could bid to develop solutions and; iii) actively supporting the (single) selected startup for each challenge to co-develop and implement its proposed solution in connection with the relevant department. By doing so, SiR aimed at developing better solutions for city problems while promoting the local startups scene (e.g. giving startups a head start by becoming a launching customer) and infusing the public administration with an innovation and startup culture.

SiR is a textbook example of “coordinated unbundling” (Timmermans and Zabala-Iturriagagoitia, 2013). In line with the European regulation (Directive 2014/24/EU), the City of Amsterdam launched a European-level PPI procedure divided in different lots – each corresponding to different “city challenges” – with calls open to “startups only” as suitability requirement. Based on broad city challenges and a limited set of flexible specifications, selected startups – one per challenge (versus many per challenge as in most PCP schemes) –

Table 1

Challenges of the 2017 edition (Examples).

Source: Selected by the authors as illustration from SiR.

Title	One-liner Specification
ENERGISE AMSTERDAM	Find an innovative way to inform and motivate people to get physically active, using Amsterdam sports activities and facilities.
MAKE AMSTERDAM BREATHE AGAIN	Develop an innovative solution to improve the air quality in Amsterdam by reducing nitrogen emissions.
NO FOOD TO WASTE	Find a smart solution to counter food wastage by Amsterdam households.
CIRCULAR PUBLIC SPACES	Develop an innovative solution that helps Amsterdam’s public spaces become part of the circular economy.
WILD PEEING, NO MORE!	Find an innovative way to diminish public urination of the visitors in and around the Rembrandt Square area.
HELP WANTED!	Develop an innovative tool to encourage victims of discrimination to seek help sooner in an easily accessible manner and to gain access to the appropriate professional organizations.

Table 2
 Figures of SiR.
 Source: SiR.

	No. of challenges	No. of startups applying to SiR	No. of awarded startups
2015	7	85	7
2016	10	90	7
2017	13	85	13
Total	30	260	27

were assigned to build on a prototype during the in-residence period, while the City gets a preferential buying option for the final solutions (immediately after the in-residence period or up to three years afterwards). SiR is managed on a daily basis by a small structure of two persons within the CTO Office, who run the whole process and make the connection between startups and the city departments, supported by an external group of startup mentors, primarily concerned with business development issues and wider commercialization potentials of solutions. At the time of this writing, SiR had three open calls/editions, and 27 startups had been selected to go through the PPI programme (Table 2).

SiR was chosen as a case study for two major reasons. First and foremost, compared with most European Municipalities, Amsterdam has strong in-house competences on public procurement, innovation and startup development, as well as higher than average purchasing budgets and dedicated staff allocated to these functions (e.g. through the CTO office); this allows to somehow control for the competence and budget barriers pointed to PPI in smaller administrations (e.g. Ferreira da Cruz et al., 2013; Lember et al., 2011.) and focus on the PPI design and intermediation variables as explananda behind PPI outcomes. Second, SiR represents one of the first attempts in Europe to specifically engage startups in the development of urban innovation through a wide-scope, challenge-based PPI process (see de Coninck et al., 2018, for similar initiatives).

3.2. Research methodology

For this study we adopted a nested case study approach (e.g. Yin, 1994; George and Bennett, 2005), analysing the programme as a whole and, within it, focusing on five challenges and associated innovations co-developed by five different startups (Table 3). The aim was not to compare and contrast across the five cases but to identify empirical regularities and better understand processes and results associated with the SiR programme and how intermediation activities impact upon the “conversational space” across different PPI stages, bridging between the buying department, startups and other stakeholders.

Qualitative data was collected through desk research – including extensive analyses of available programme documentation, reports, startup material, videos and websites – and through 23 in-depth semi-structured interviews, covering intermediaries and proponents of the innovations under analysis, including startup founders, city departments, programme managers and startup mentors, as well as other contextual informants involved with Amsterdam’s entrepreneurial ecosystem and urban innovation. Most Interviews were carried out during August-September 2017, lasted for about one hour and were transcribed afterwards. They focused on topics such as general aims of the programme; incentives and barriers to participate; learning processes, perceptions and activities carried out by each of the involved parties during each stage of the PPI process (startup, department, mentors, SiR staff, etc.); and rollout potential. Data was coded along the key variables of interest – namely city-startup relations and actors in the conversational space, intermediation roles and outcomes – and structured along four major stages in the PPI process, as adapted from Edquist and Zabala-Iturriagoitia (2012): designing the programme (4.1), the needs articulation (Section 4.2); competitive tendering (4.3);

Table 3
 Analysed cases.
 Source: SiR and fieldwork. * Startup names are pseudonyms.

Challenge Title	One-liner specification	Proposed innovation	Startup*	Client/City Departments(s)
<i>Traffic flows on waterways</i>	<i>Develop a tool to enable canal users to contribute to a smooth passage and safe sailing, even at peak times</i>	Boat tracking sensor and dashboard system	BoatSystems	City Water Company
<i>Wayfinding</i>	<i>Create a solution so that visitors adapt their behaviour and/or plan their routes from public transport hubs in a way that they use the routes designated for foot traffic</i>	Visitor navigation app to explore randomness	GO-Around	Traffic and Public Space Department
<i>Strengthen waste objectives with benefits for the social domain</i>	<i>Help us find a smart approach regarding waste prevention, separation and re-use that also creates jobs for vulnerable groups</i>	3D-printing and art design with recycled plastic	VanRecycle	Public Waste and Environment Department
<i>Rembrandtplein bike parking</i>	<i>Find an effective reward system for cyclists to encourage them to park their bikes a bit further from their destination in designated spots.</i>	Bike parking gamification app	Enjoy Life	Program Rembrandtplein (Public Space, Traffic and Maintenance Departments)
<i>The Wild Card!</i>	<i>Do you have a great solution for a social issue that we did not define? Please apply for the wildcard!</i>	App to integrate and customize data from several IoT devices in the city	IoTeggi	Chief Technology Officer

co-design “in-residence” (4.4) and implementation of solutions (4.5).

4. The PPI process and the role of intermediation

4.1. Designing the programme

SiR draws inspiration from San Francisco’s “Entrepreneurship-in-Residence” programme. In 2013, a delegation from Amsterdam visited the city, and the responsible alderman decided to implement a similar initiative in Amsterdam, under the auspices of the city’s Chief Technology Officer (CTO). Yet, to make it work locally, the original programme had to be adapted and several tweaks were necessary, giving rise to the first conversational round. To this effect, intense interaction and dialogue took place between the appointed SiR team (within the CTO office) and the City’s legal department, in particular about if – and to which extent – SiR would need to comply with European procurement legislation. This was seen as necessary by the legal department, namely in case a startup would be ultimately awarded a contract of an amount in excess of the threshold for which European tendering rules apply.

While SiR’s staff primarily wanted to make the process as lean as possible and target Amsterdam’s startups, both parties reached consensus to set up a fully-fledged European-level PPI process – the key challenge being, in the words of the legal officer involved, “to deal creatively with the current [European and national legal] possibilities and not be too afraid”. Therefore, SiR was ultimately designed in such a way that the startups would not be confronted upfront with the complex PPI tendering burden. The constructed solution involved e.g. splitting a larger tender into different lots (challenges) and setting specific suitability requirements to allow tenders from startups only (vis-à-vis well-established companies). The financial dimension of the programme had to be discussed at the political level within the Municipality (e.g. between alderman and CTO), namely because the ultimate procurement of a resulting innovation – which was inbuilt in the programme since the beginning – would have to come from each department’s own budget, and not from the CTO department.

4.2. Needs articulation

Once the core tenets of SiR and the legal procedures were defined, city departments were invited by the SiR structure to formulate the urban challenges they wanted to see addressed (e.g. Tables 1, 3). Although some departments and municipal agencies (e.g. the Municipal Water Company) were used to work with technology providers (e.g. to deploy sensors in the water infrastructure), most had little to no experience engaging with startups. Hence, a key challenge during this stage was to convince department leaders that working with startups could add value, namely in the form of out-of-the-box solutions and overall “contagion” with the innovative and agile culture of startups. To this effect, an internal-to-the-municipality communication campaign to raise awareness about the programme was launched – e.g. through newsletters and internal communication channels; moreover, the recently formed SiR team put effort to talk personally to representatives of the various departments in order to explain the programme, the CTO’s vision and its “nuts-and-bolts”.

While some city departments showed interest in SiR from an early stage, defining the urban challenge to be addressed was not always easy for the departments themselves. Therefore, the leader of SiR helped them to (re-) formulate and re-configure their initial ideas, striving to make the challenge open enough (to let room for startups to innovate), but also not too vague and of such a magnitude that it could be realistically expected that startups could deliver results within a limited time frame. The interaction between SiR and the city manager for the Rembrandtplein project (a popular city centre square) is illustrative. The city manager hoped that SiR could bring a novel approach to tackle the problem of bike wrecks and wrongly parked bikes at

Rembrandtplein in a more friendly and efficient way (the “normal” solution being to have bikes removed by a municipal maintenance team). The initially proposed challenge – “make Rembrandtplein bike-free” – was yet considered too vague and ambitious, and thus jointly narrowed down towards the “design of a reward system for cyclists [to correctly park their bikes]”. This conversation contributed not only to better understand what the core problem was, but also to think about it in new ways and on what a “quality” solution would look like under Amsterdam’s overall citizenship values (i.e. a reward system versus an imposing solution). Further on, an Israeli startup (Enjoy Life) presented an unexpected solution to develop an app for bikers, giving them gifts (i.e. a free drink in a coffee house) if they would do something positive (i.e. park their bike correctly).

Over time, the SiR programme gained popularity among senior decision makers in municipal departments and the number of innovation challenges increased (Table 2), with the SiR team actively co-creating and re-configuring them. Yet, and despite the intermediation efforts, at least two unexpected issues emerged later on. First, some of the challenges were not raised by single departments but by cross-departmental programmes – e.g. a city programme on crowd management, or the so-called “waste team”, that combined several departments dealing with waste. These programmes co-ordinate actions of many departments under one single umbrella but have no legal status or procurement budget. Although this was not a barrier – on the contrary – to rightly articulate city challenges in a flexible manner, it made it harder for the startups to understand whom their “client”/buyer actually was. Second, and related to the previous, some challenges were seen by the departments as simple “add-ons” at the margins of the department’s critical operations and duties, thus limiting the time and effort put on co-creating solutions with the assigned startup.

4.3. Competitive tendering

Once defined, urban challenges were published online and startups actively encouraged to submit proposals to tackle them in an innovative way. After pitching their ideas or concepts, the “best” startup for each challenge was picked up by a selection committee. Legally speaking, the chosen startups got an assignment to elaborate their ideas and prototypes to address a specific urban challenge (with an option of purchase if it fits). However, the steps involved in this process were far from linear and multiple conversations and intermediation efforts took place along the way.

As the detailed European-level procurement procedure could hinder the appeal of the programme for startups, it was decided by SiR that the standard official tendering regulation would be used “in the background” only: startups would hardly notice the heavy bureaucratic jargon but the programme would still comply with all the legal obligations. Upon removing those perception, cost and complexity hurdles, the next step was to actively attract startups into the programme. Hence, external communication campaigns were set up by SiR to make the programme known, especially within the local startup community. This included the development of promotional materials that would “speak the language” of startups, fully devoid of unnecessary detail, resembling the communication of regular incubation and acceleration programmes (Fig. 1). The SiR programme was heavily promoted within (online and off-line) communities and “bootcamp” initiatives – personally by the city’s CTO and the SiR team – resulting on an average of nine competing startups per challenge during 2015-17 (Table 2).

As a result, some startups tended to perceive SiR not as a structured and regulation-infused PPI process but as an incubator programme, with the “plus” that the City of Amsterdam could even become a launching customer. Interviewed startups described SiR as a relatively flexible “light type” of incubator, with a “chill-out vibe and welcoming atmosphere” compared to other well-known commercial, “pressure-cooking” acceleration programmes they also considered to apply, in Amsterdam and other cities like Barcelona or London. Unlike the latter,



Fig. 1. SiR: call for tenders.
Source: Startup-in-Residence programme.

SiR made it clear from the onset that it would take no startup equity, and progress was monitored in a relatively more relaxed way. Also, the chances of being accepted were higher – an average of less than nine startups per challenge vis-à-vis hundreds of competitors for the most popular acceleration programmes. Moreover, beyond developing the innovation per se, most startups valued the possibility to just further develop their business proposition, to make new contacts, and to learn about the organisational culture of the public sector.

At this stage, SiR expanded the programme's management – actually intermediation – team in order to heighten their expertise on the “startup world” and enrich the “conversational space” between SiR and the involved companies. To this effect, a locally respected startup mentor (from Amsterdam's Startup bootcamp programme) was hired to oversee and discuss startup pitches and support SiR with his own “startup spectacles”, spotting key issues that could pass unnoticed by the SiR team. Startup pitches have been described as moments of discussion, in which startups pitched their propositions to a jury composed by the SiR staff, the head of department (challenge owner) and the programme startup mentor. This network made for broad-based discussions, in which not only the city challenge but also the business potential of the innovation proposition was discussed – e.g. the application of crowd management solutions both in Amsterdam and other cities around the world.

At the same time, SiR team and the CTO office kept brokering and negotiating within and outside the Municipality. For example, beyond “regular” city challenges, SiR opened a “wild card” slot (in 2016) for startups proposing to solve a challenge for an issue not initially considered. To this effect, SiR and the CTO itself actively looked for startups within their networks with interesting technologies and propositions that could also make a difference for the city. The slot was ultimately taken by a startup (IoTiggi) developing an “internet-of-things” integrator software to connect several “smart home” appliances (e.g. heating, lightning, domestic appliances) into a single app. The SiR team and the startup jointly discussed adaptation possibilities and their mutual interests, leading the company to expand its original solution to integrate city appliances and infrastructure, such as waste collectors and electric charging poles to appeal to new (potential) business streams, testing it in Amsterdam.

4.4. Co-design in-residence

After the selection stage, startups entered a 5-month period in which they elaborated their proposed solution. This was the core stage of the whole process, in which fully-fledged conversations between buyer (city department) and supplier (startup) took shape. Yet, conversations were actively mediated by the SiR team and a newly built network of startup mentors, assigned by the programme's management. Beyond influencing the shape and the nature of the innovation, intermediation involved discussing the startup business proposition for Amsterdam and other cities, namely as no established markets existed for many of the solutions.

During this period, one purposefully devised “conversational space” took the form of a training programme for all the involved startups. It took place twice per week, with seasoned entrepreneurs, business experts and city staff, involving training on general startup issues (legal, finance, business plan, marketing), but also discussions on business model development and the functioning of the local government. Moreover, startups received mentoring (every two weeks), during which the startup, SiR and one assigned mentor – and, whenever necessary, also the department representative – would discuss progress several issues pertaining to the process. While there is evidence that these spaces facilitated dialogue and the creation of a friendly environment to keep conversations going (also between startups), being in-residence was still described by a mentor as a “bumpy road, in which there is not really a blueprint and one has to learn along the way”. In this respect, mentors and the SiR team describe their role as middleman, “bringing stakeholders together and getting the energy flowing”. Yet, in practice, their roles as conversation intermediaries were often more pronounced.

First, mentors and the SiR team were key in facilitating access to additional resources to move from early prototypes and ideas to workable solutions. Whether startups could access seed money to conduct experimentation and develop production capabilities¹ – which was planned in the tender but not intentionally communicated beforehand – was negotiated between the SiR team and the parties according with specific needs as they would reveal themselves along the way. Startups had to defend their position to get funding – e.g. to buy antennas to test a real-time water traffic monitoring system (Boat-Systems); to develop and adapt software to new crowd-management business propositions (GO-Around); or to build an industrial 3D-printer for recycled plastic (VanRecycle); during these negotiations, the direction of the innovation started to gradually crystallize, namely as a fine-tuned business idea became linked to concrete physical artefacts.

Yet, in other situations, the influence and the resources facilitated by SiR consisted in the access to a wide user base and the “right” contacts in the city. This was the case of IoTiggi, to which getting access to the right people within the municipality was fundamental and facilitated “by having the SiR stamp”; yet, even so, many meetings and demonstrations had to occur before the waste department ultimately gave the company access to a network of 700 “bin ambassadors” and encouraged them to use IoTiggi prototype. As explained by the SiR leader, “[the department initially] saw the idea as sort of a threat, they felt a bit policed and kept asking what is in it for us (...); only latter they started making questions and giving positive contributions”.

Second, intermediation involved narrowing down, but also re-

¹ The proponents of SiR called/interpreted these monies as “R&D funds”, but their actual application only very partially falls within the remit of “R&D” as generally defined in the policy and scholarly literature (e.g. Edquist and Zabala-Iturriagoitia, 2015): within SiR, when applicable, they targeted small experimental activities linked to the production of “0-series”, but most frequently customization and improvements in existing products, thus with a clear market and business orientation (contrarily e.g. to PCP, in which R&D is *raison d'être* of the whole scheme)

orienting and re-configuring the initially proposed solution in many ways. While in some cases the city challenge was already well aligned with the core business of the startup and the adjustments were small (e.g. developing a few new algorithms to cater for the city challenge and context), in others the core proposition had to change considerably to meet the city demands and their perspectives of what a valuable innovation would be. One example is VanRecycle, a startup aiming to transform plastic waste into new objects and furniture, thus contributing to waste separation and recycling savings; during the in-residence period, the SiR mentor and the city department encouraged them to offer recycling workshops at schools on plastic reutilization, which they saw as a new business proposition with interest for Amsterdam and other cities. Another case is GO-Around, which (before SiR) were developing a tool to show authentic, “off-the-beaten-track” places to visitors in Amsterdam, including an hardware device (a compass); yet, upon engaging with the city, the conversation led to a new problem-solution interpretation, and the innovation (an app) moved into spreading tourists in Amsterdam and focused on software development only.

Third, intermediation involved bridging between mindset differences to deal with the many tensions and dissonances that emerged along the way. In some cases, issues were solved through direct dialogue between department and startup. For example, one startup used heavy gamification tools in their app, and the department leader did not like it; moreover, there were intercultural misunderstanding and ambiguities, e.g. contrasting perceptions between City and startup on whether a pitch to potential users had been “perfect” or “terrible”. Another issue was related to speed, with startups wanting to move “superfast”, e.g. “putting stickers and sensors on the city square the day after, which is not how [the city] works”. However, in some situations, the dialogue and intermediation endured, with city managers feeling uncomfortable and ultimately denying startup requests. One telling example involves a data ownership discussion between a startup and the buying department (e.g. on collected boat circulation data); in another case, the startup wanted the municipality to make upfront payments and sign a letter of intent to use the technology later on. In other cases, startups felt “abandoned” by the department, namely as it was not clear who the project owner was and the department’s commitment to co-development proved limited. In these cases, intermediaries (SiR, mentors) actually replaced the department in the conversation influencing the innovation direction (e.g. with GO-Around), but the co-creation dynamic was jeopardized.

4.5. Implementation of solutions

The tenets of the SiR programme assume that startups work to (co-) develop an innovation during the in-residence period, and then will likely enter into a contractual relation with a city department. Hence, at this stage, the relation between startups and departments became much less mediated, and SiR’s staff largely withdrew. Although it is too early to fully assess the ultimate solution procurement results (as referred, there is a 3-year period in which the final solution can still be acquired), the practice so far proved rather nuanced. BoatSystems is thus far one of the few startups that got a fully-fledged procurement contract; others (like Enjoy Life) are, at the time of this writing, in a negotiation process. These solutions were perceived as useful and already mature enough to tackle the challenge as posed by the City; moreover, interviewed city departments suggest that an emotional reason became intertwined with the technology’s fit: as explained, during the in-residence period, the departments at stake “felt a bit responsible for the startup and wanted to make it a success”. Moreover, whether or not they got a contract and developed a fully-fledged innovation, startups gained the “SiR stamp” as legitimation device which they retain after the programme, facilitating further interactions within the municipality and beyond.

In fact, for many of the challenges-startups, there was no department buying the new solution. For example, VanRecycle stopped

running workshops for schools – as it turned out that schools have no steady funding for this service – and now re-focused on producing 3D-printed recycled furniture for private clients; another city department invited VanRecycle for a large contract to supply recycled waste bins, but the startup had no installed capacity to do it and the relation with the municipality wandered. Other startups struggled to develop their apps in a way that would appeal to wider user bases beyond Amsterdam and the public sector overall. For example, in the case of IoTiggi, urban data is only one part of the app, and it still seeks to get more useful data from the city; for GO-Around, crowd management is potentially useful for the city, but less so for wider consumer markets and for startup venture capital investors.

Overall, and despite active intermediation, there is no strong evidence yet of structured, continuing exchanges with the city departments, and the roll out potential of the co-created proposition was at hindsight perceived as questionable by startups – namely as they work for one city client/department only, and there is no built-in mechanism in SiR to scale up the solutions even within the Municipality itself. On the one hand, this reflects a natural outcome of open-ended PPI, in which new experiments and solutions many times fail; in this case, the city and startup don’t need to carry on being locked in a sub-optimal or unfit solution any longer. Yet, on the other hand, evidence from the interviews also suggest that the implementation and roll out ambitions of SiR may only work when other conditions are in place, namely the involvement of a really committed buyer who wants to have an urgent problem solved, and who does not see it as something experimental or a small “add-on” to already well-established solutions.

Table 4 summarizes the results of our analysis; for each stage and the programme as a whole, it illustrates the actors involved in it, the roles of intermediation, and the “conversation” outcomes.

5. Conclusions, implications and challenges ahead

Intermediation is increasingly understood as a vital factor in innovation processes, and in PPI in particular (Edler and Yeow, 2016). Our analysis of the SiR practice in Amsterdam confirms and extends recent insights on the role of intermediation in PPI in sub-national entities, highlighting and detailing the multifaceted roles of intermediation – facilitating, networking, and brokering, while organising “conversations” (Uyarra et al., 2017) –, thus shaping knowledge creation directions between city departments and startups. Also, it sheds light on the question whether and how the much-hailed innovative energy of startups can be capitalised to renew public purchasing practices and to produce innovations for enduring city problems – namely as alternative to tech-driven smart city models dominated by large technology suppliers (e.g. Carvalho, 2015).

Overall, SiR launched and intermediated new types of fruitful conversations on several levels, contributing to gradually bridge the social worlds of startups and local government. A conversation with participating municipal department managers led them to abandon their traditional approach of setting exact specifications or service-level agreements for tenderers (“we know what the problem is and what the solution should be”), but instead invite them to consider wider problem and solution spaces, allowing startups to come up with unexpected frames and interpretations. In the problem definition stage, SiR staff entered into direct conversations with department managers to (re) formulate the challenge; in later stages, they steered the on-going engagement between city managers and startups, reducing language barriers that would prevent a fruitful conversation. During the co-creation process, SiR mediated discussions between startups, city departments and mentors on solution design and alternatives, fulfilling a configuring role while brokering connections between startups and other partners they would otherwise have difficulty to reach (i.e. the “right” people within the municipality; citizens willing to test new solutions). SiR also evoked alternative conversations on risk taking, increasing the willingness of managers and politicians to accept a higher

Table 4
Analysis.
Source: Own elaboration.

PPI stage	(Designing SiR)	Needs articulation	Competitive tendering	Co-design	Implementation
Actors involved in conversational space	SIR/CTO, legal department, alderman (s)	SIR, city departments	SIR, city departments, lead mentor, startups	SIR, city departments, mentors, startups	City departments, startups
Intermediation roles	Facilitation (Create flexible regulatory spaces) Brokering (Budgetary and legal decisions within the municipal administration)	Configuring (Listening to departments; opening-narrowing down urban challenges) Brokering (Showing the value in cooperation; bringing new departments on-board)	Facilitation (Removing tendering disincentives and narrowing cognitive distance; creation of friendly conversational spaces) Brokering (Getting in startup mentors; enticing startups to tender and participate)	Facilitation (Training, mentoring, expertise, money for prototyping, users, friendly conversational spaces) Configuring (Shaping technology propositions, priorities and perceptions) Brokering (Solve challenges and tensions department-startup)	Facilitation (Maintaining the "SiR stamp"; accessing networks when needed)
Main outcomes	Design adaptation from San Francisco to the Dutch/Amsterdam context EU-level PPI tender with a number of "creative" tweaks, simplifications and suitability requirements	Collection of fine-tuned urban challenges, linked to local ethos (e.g. reward systems)	Several applicant startups and pitches Early conversations among buyer-supplier on local-global testing and upscaling possibilities	Multiple experiments, upgrades from ideas and prototypes to semi-operable solutions and selection of technology-business trajectories Ad-hoc co-creation processes relying on individuals	Final procurement contracts co-exist with failures and discontinued exchanges

risk of failure as a consequence of working with startups.

Yet, the direct economic outcomes of SiR have been limited, with only a few contracts awarded three years after the programme's inception. This raises at least four points of discussion, as well as challenges – both for research and policy – associated with SiR-like programmes. First, because few contracts were awarded, it could be argued that SiR turned, in practice, into a PCP scheme, supporting firm's R&D and technological experimentation without actual procurement². While this occurred to a certain extent, we would not interpret SiR as an R&D, supply-side procurement programme as depicted in the literature (Edquist and Zabala-Iturriagoitia, 2015). "R&D" was not core in the programme and, when supported, it focused on the development of small production facilities and infrastructure to adapt existing products/prototypes to the City's demand (e.g. a 3D-printer, or hardware to collect data); Moreover, the whole legal design (inbuilt buying option) and conversational practices of SiR focused on business development, aimed at a successful and commercially-ready solution (at least for the City of Amsterdam) – not a new technology *per se*. All in all, the practice of SiR illustrates the emergence of hybrids between PPI and PCP, that support "light" development work to promote pragmatic, technically not highly complex urban innovations.

A second, related point of discussion is how to assess and evaluate initiatives like SiR. It could be argued that rather than measuring success as the number or volume of contracts awarded, an assessment would also need to include the density and quality of relations, "ethos" contagion and knowledge developed during the process. As shown, SiR hardly led to quick fixes because the programme involves a high degree of experimentation, both for developing the solution and for aligning interests, socio-cognitive frames and mindsets; as such, SiR's main contribution lies in the accumulation of learning and experiences over a number of editions and projects (Boltanski and Chiapello, 1999), slowly triggering change in the way city departments look for innovations and frame their challenges. Evidently, such an understanding of success (or failure) calls for a deeper re-interrogation of the ways in which innovation-oriented public procurement schemes – and PPI in particular – are evaluated. In line with Regeer et al. (2016), SiR's experience suggests that such an endeavour would require broader notions of accountability, not only in relation to funders but to also to other stakeholder groups (project managers, startups, etc) and their learning needs. Such a new conceptualization could configure an important tool for assessing and re-thinking contemporary PPI initiatives (ex-ante, during and ex-post) and would benefit from wider theoretical engagement at the interface of evaluation studies and innovation-oriented public procurement research.

Third, an observed tension in SiR relates with the multi-local dialectic of PPI conversations, or the need to simultaneously engage with place and distance dynamics in PPI (Uyarra et al., 2017). SiR's intermediaries searched for co-created solutions for specific local challenges, assuming that the solutions could be "sold" to other places with similar challenges and thus a larger market would be opened for startups. However, with an eye to wider challenges beyond Amsterdam – and the public city sector overall –, several dissonances emerged along the way. Some startups' (and their investors) endemic "need for speed" and their search for wider user bases conflicted with the longer maturation required to deal with entrenched city challenges and the inherent narrowness of local government markets. In these cases, it can be argued that SiR failed to clearly articulate demand for well-defined solutions. Yet, from another angle, SiR conversations contributed to a deeper inquiry into urban challenges and to ascribe values to urban innovations (Huguenin and Jeannerat, 2017). Hence, besides diffusing and exporting procured "solutions", the case of SiR hints that demand articulation and upscaling can also be framed as the articulation and diffusion of frames and value assignments of what specific urban

² We thank one of the reviewers for making this point.

challenges are and what innovations “should” be (e.g. based on the local “ethos” and other symbolic dimensions), opening up new research avenues linking innovation upscaling, PPI studies and recent approaches to territorial valuation processes (Huguenin and Jeannerat, 2017; Carvalho and van Winden, 2018).

Finally, this study suggests that SiR-like policy approaches are adequate for a certain bandwidth of urban problems which are not too simple but also not too complex. It is thus questionable whether its single focus on startups is suitable to tackle larger, more complex urban challenges – e.g. air pollution, traffic congestion, health and cohesion issues – currently framed under “smart city” policies and social innovation agendas (Karvonen et al., 2018). In these domains, better and more innovative solutions are required, and a startup attitude could be beneficial. But in these types of challenges, the time frame extends well beyond the few months that SiR firms have to co-develop a solution, and typically, problems can only be solved as a collaborative venture of many public and private actors. SiR and other similar programmes (e.g. de Coninck et al., 2018) have been assuming a one-on-one situation (one challenge/one startup), but in larger urban innovation processes there is a many-to-many situation, requiring a co-production process in which many city departments and a variety of private actors are involved. In this set-up, startups are only one element. A different type of intermediation is likely required to stimulate the engagement of startups in such processes.

Declaration of interests

- The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
- The authors declare the following financial interests/personal relationships which may be considered as potential competing interests.

Funding

Portuguese Foundation for Science and Technology (FCT), grant no. SFRH/BPD/103707/2014.

References

- Allman, J., Edler, L., Georghiou, B., Jones, I., Miles, O., Omidvar, R., Ramlogan, J., Rigby, J., 2011. Measuring Wider Framework Conditions for Successful Innovation: A System's Review of UK and International Innovation Data. NESTA Report. London.
- Baker, T., Miner, A.S., Eesley, D.T., 2003. Improvising firms: bricolage, account giving and improvisational competencies in the founding process. *Res. Policy* 32, 255–276.
- Bessant, J., Rush, H., 1995. Building bridges for innovation: the role of consultants in technology transfer. *Res. Policy* 24, 97–114.
- Boltanski, L., Chiapello, E., 1999. Le nouvel esprit du capitalisme. Gallimard, Paris.
- Boon, W., Moors, E., Kuhlmann, S., Smits, R., 2011. Demand articulation in emerging technologies: intermediary user organisations as co-producers? *Res. Policy* 40, 242–252.
- Caloghirou, Y., Protogerou, A., Panagiotopoulos, P., 2016. Public procurement for innovation: a novel eGovernment services scheme in Greek local authorities. *Technol. Forecast. Soc. Change* 103, 1–10.
- Carvalho, L., 2015. Smart cities from scratch? A socio-technical perspective. *Cambridge J. Reg. Econ. Soc.* 8, 43–60.
- Carvalho, L., van Winden, W., 2018. Making waves: the valuation of innovations in San Sebastian's surf economy. *Eur. Plan. Stud.* 26, 75–93.
- Carvalho, L., Mingardo, G., Van Haaren, J., 2012. Green urban transport policies and cleantech innovations: evidence from Curitiba, Göteborg and Hamburg. *Eur. Plan. Stud.* 20, 375–396.
- Coenen, L., Hansen, T., Rekers, J.V., 2015. Innovation policy for grand challenges. An economic geography perspective. *Geogr. Compass* 9, 483–496.
- Cohen, B., Almirall, E., Chesbrough, H., 2016. The city as a lab: open innovation meets the collaborative economy. *Calif. Manage. Rev.* 59 (1), 5–13.
- Dale-Clough, L., 2015. Public procurement of innovation and local authority procurement: procurement modes and framework conditions in three European cities. *Innov. Eur. J. Soc. Sci. Res.* 28, 220–242.
- de Coninck, B., Viaene, S., Leysen, J., 2018. Public procurement of innovation through increased startup participation: the case of digipolis. Proceedings of the 51st Hawaii International Conference on System Sciences, 2–6 January 2018.
- Edler, J., Georghiou, L., 2007. Public procurement and innovation – resurrecting the demand side. *Res. Policy* 36, 949–963.
- Edler, J., Yeow, J., 2016. Connecting demand and supply: the role of intermediation in public procurement of innovation. *Res. Policy* 45, 414–426.
- Edler, J., Ruhland, S., Hafner, S., Rigby, J., Georghiou, L., Hommen, L., Rolfstam, M., Edquist, C., Tsiouri, L., Papadakou, M., 2005. Innovation and Public Procurement. Review of Issues at Stake. EU no ENTR/03/24. Fraunhofer ISI, Karlsruhe.
- Edquist, C., Vonortas, N.S., Zabala-Iturriagoitia, J.M., Edler, J. (Eds.), 2015. Public Procurement for Innovation. Edward Elgar Publishing, Cheltenham.
- Edquist, C., Zabala-Iturriagoitia, J.M., 2012. Public procurement for innovation as mission-oriented innovation policy. *Res. Policy* 41, 1757–1769.
- Edquist, C., Zabala-Iturriagoitia, J.M., 2015. Pre-commercial procurement: a demand or supply policy instrument in relation to innovation? *R&D Management* 45, 147–160.
- Evans, J., Karvonen, A., Raven, R. (Eds.), 2016. The Experimental City. Routledge, London.
- Ferreira da Cruz, N., Simões, P., Marques, R., 2013. The hurdles of local governments with PPP contracts in the waste sector. *Environ. Plann. C Gov. Policy* 31, 292–307.
- Flynn, A., Davis, P., 2016. Firms' experience of SME-friendly policy and their participation and success in public procurement. *J. Small Bus. Enterp. Dev.* 23, 616–635.
- Flynn, A., McKeivitt, D., Davis, P., 2015. The impact of size on SME public sector tendering. *Int. Small Bus. J.* 33, 443–461.
- George, A.L., Bennett, A., 2005. Case Studies and Theory Development in the Social Sciences. MIT Press, Cambridge, Mass.
- Grabher, G., 2004. Temporary architectures of learning: knowledge governance in project ecologies. *Organ. Stud.* 25, 1491–1514.
- Howells, J., 2006. Intermediation and the role of intermediaries in innovation. *Res. Policy* 35, 715–728.
- Huguenin, A., Jeannerat, H., 2017. Creating change through pilot and demonstration projects: towards a valuation policy approach. *Res. Policy* 46, 624–635.
- Karvonen, A., Cugurullo, F., Caprotti, F., 2018. Inside Smart Cities: Place, Politics and Urban Innovation. Routledge, London.
- Kebir, L., Crevoisier, O., Costa, P., Peyrache-Gadeau, V. (Eds.), 2017. Sustainable Innovation and Regional Development: Rethinking Innovative Milieus. Edward Elgar Publishing, Cheltenham.
- Kirby, M., Robinson, M., Hawes-Hewitt, J., 2016. Cities reimaged: crucibles for innovation. Outlook – Accenture's J. High-Perform. Bus downloaded on 15 June 2018 from. <https://www.accenture.com/us-en/insight-outlook-innovation-cities>.
- Kivimaa, P., 2014. Government-affiliated intermediary organisations as actors in system-level transitions. *Res. Policy* 43, 1370–1380.
- Klerkx, L., Leeuwis, C., 2009. Establishment and embedding of innovation brokers at different innovation system levels: insights from the Dutch agricultural sector. *Technol. Forecast. Soc. Change* 76, 849–860.
- Knutsson, H., Thomasson, A., 2014. Innovation in the public procurement process: a study of the creation of innovation-friendly public procurement. *Public Manag. Rev.* 16, 242–255.
- Lember, V., Kalvet, T., Kattel, R., 2011. Urban competitiveness and public procurement for innovation. *Urban Stud.* 48, 1373–1395.
- Lember, V., Kattel, R., Kalvet, T., 2014. Public procurement and innovation: theory and practice. In: Lember, V., Kattel, R., Kalvet, T. (Eds.), *Public Procurement, Innovation and Policy*. Springer, Berlin, Heidelberg.
- Lember, V., Kattel, R., Kalvet, T., 2015. Quo vadis public procurement of innovation? *Innov. Eur. J. Soc. Sci. Res.* 28, 403–421.
- Lester, R., Piore, M., 2004. Innovation—The Missing Dimension. Harvard University Press, Cambridge, Mass.
- MacManus, S., 1991. Why businesses are reluctant to sell to government. *Public Adm. Rev.* 51, 328–344.
- Mazzucato, M., 2018. Mission-Oriented Research & Innovation in the European Union: A Problem-solving Approach to Fuel Innovation-led Growth (downloaded on 12 March 2018 from Directorate-General for Research and Innovation, European Commission, Brussels. https://ec.europa.eu/info/sites/info/files/mazzucato_report_2018.pdf).
- McCrudden, C., 2004. Using public procurement to achieve social outcomes. *Nat. Resour. Forum* 28, 257–267.
- OECD, 2015. Government at a Glance 2015. OECD Publishing, Paris.
- Partnership on Public Procurement, 2017. Orientation Paper – Urban Agenda for the EU (downloaded on 16 April 2018 from Partnership Innovative and Responsible Procurement, Brussels. https://ec.europa.eu/futurium/en/system/files/ged/orientation_paper_public_procurement_0.pdf).
- Pickernell, D., Kay, A., Packham, G., Miller, C., 2011. Competing agendas in public procurement: an empirical analysis of opportunities and limits in the UK for SMEs. *Environ. Plann. C Gov. Policy* 29, 641–658.
- Prandelli, E., Sawhney, M., Verona, G., 2008. Collaborating With Customers to Innovate: Conceiving and Marketing Products in the Networking Age. Edward Elgar Publishing, Cheltenham.
- Reeger, B.J., de Wildt-Liesveld, R., van Mierlo, B., Bunders, J.F., 2016. Exploring ways to reconcile accountability and learning in the evaluation of niche experiments. *Evaluation* 22, 6–28.
- Rutten, R., 2017. Beyond proximities: the socio-spatial dynamics of knowledge creation. *Prog. Hum. Geogr.* 41, 159–177.
- Simmie, J., Strambach, S., 2006. The contribution of KIBS to innovation in cities: an evolutionary and institutional perspective. *J. Knowl. Manag.* 10, 26–40.
- Smith, A., Raven, R., 2012. What is protective space? Reconsidering niches in transitions to sustainability. *Res. Policy* 41, 1025–1036.
- Stewart, J., Hyysalo, S., 2008. Intermediaries, users and social learning in technological innovation. *Int. J. Innov. Manag.* 12, 295–325.
- Timmermans, B., Zabala-Iturriagoitia, J.M., 2013. Coordinated unbundling: a way to stimulate entrepreneurship through public procurement for innovation. *Sci. Public Policy* 40, 674–685.

- Uyarra, E., Flanagan, K., 2010. Understanding the innovation impacts of public procurement. *Eur. Plan. Stud.* 18, 123–143.
- Uyarra, E., Flanagan, K., Magro, E., Zabala-Iturriagoitia, J.M., 2017. Anchoring the innovation impacts of public procurement to place: the role of conversations. *Environ. Plan. C Politics Space* 35, 828–848.
- van de Ven, A., Polley, D., Garud, R., Venkataraman, S., 1999. *The Innovation Journey*. Oxford University Press, Oxford.
- van Winden, W., van den Buuse, D., 2017. Smart city pilot projects: exploring the dimensions and conditions of scaling up. *J. Urban Technol.* 24, 51–72.
- Wallsten, S.J., 2000. The effects of government-industry R&D programs on private R&D: the case of the Small Business Innovation Research program. *Rand J. Econ.* 31, 82–100.
- Wood, C., 2013. San Francisco Launches Entrepreneurship in Residence EIR Program. September 2013 (downloaded on 25 April 2018 from. *Government Technology magazine*. <http://www.govtech.com/local/SF-Launches-Entrepreneurship-in-Residence-EIR-Program.html>).
- Yin, R.K., 1994. *Case Study Research: Design and Methods*. Sage Publications, Thousand Oaks, California.