

A Review of an Urban Living Lab Initiative

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4 A Review of an Urban Living Lab Initiative

5 In 2016, with the goal of exploiting and focusing on the bottom-up innovation  
6 efforts of citizen communities and business organizations, the city of Turin, Italy,  
7 launched the Torino Living Lab initiative. Via the use of the urban Living Lab  
8 research approach, where firms, public bodies, universities and communities of  
9 users collaborate to co-create innovation catered to human and societal  
10 challenges, the city of Turin aims to engage and include citizens in the innovation  
11 processes and to encourage, attract and foster a growing innovation environment.  
12 This article describes the efforts that the city has made to design the Torino  
13 Living Lab initiative and presents a structured methodology designed to assess its  
14 results and successes. The expectations and objectives of the initiative's utilizers  
15 and the characteristics, impressions, habits and behaviours of the citizens were  
16 collected before the initiative through a series of semi-structured interviews and a  
17 survey. By comparing the obtained results with similar post-mortem  
18 measurements, it is possible to assess the results and success of the initiative and  
19 to evaluate its impacts. Finally, from the results of the initiative's assessment and  
20 the collection of the stakeholders feedback and impressions, it is possible to draw  
21 policy takeaways for cities that have the aim of implementing urban Living Labs  
22 and to identify best practices for the design, implementation and management of  
23 similar initiatives.

## 24 **1 – Introduction**

25 Cities throughout the world are seeking innovative solutions to reduce the risks and take  
26 advantage of the opportunities created by growing populations in urban areas (UN,  
27 2014; UN, 2017). In order to mitigate issues such as pollution, traffic congestion,  
28 unemployment and social inequalities (Lee, 2014; Nam and Pardo, 2011; Dameri, 2013;  
29 Anthopoulos, 2017), city administrators are developing and fostering socially  
30 innovative solutions (Edwards-Schachter, Matti and Alcántara, 2012) through the

31 implementation of the “Smart City” (SC) concept, a multi-disciplinary and multi-  
32 objective urban development paradigm (Dameri, 2013; Monfaredzadeh and Bernardi,  
33 2015; Stratigea et al., 2015).

34 As a broad definition, a city becomes smart when “investments in human and  
35 social capital and traditional (transport) and modern (ICT) communication infrastructure  
36 fuel sustainable economic growth and a high quality of life, with a wise management of  
37 natural resources, through participatory governance” (Caragliu et al., 2011, pp. 70). By  
38 using new innovative technologies in combination with human capital, cities are  
39 developing projects and initiatives (Michelucci, De Marco and Tanda, 2016) with the  
40 goal of reducing their environmental footprint, improving their global competitiveness  
41 and their citizens’ quality of life, thereby becoming a central force of regional  
42 development, and driving innovation and local cooperation (Battaglia and Tremblay,  
43 2011) (Tanda and De Marco, 2018a). However, while city administrators are  
44 developing and implementing top-down strategic SC plans (Walravens, 2015; Breuer et  
45 al., 2014), the main driver of SC innovation comes from the city’s interconnected  
46 bottom-up ecosystem of people, communities, businesses and industry, collaborating  
47 and working together to foster creativity and social innovation (Edwards-Schachter,  
48 Matti and Alcántara, 2012; Cosgrave et al., 2013; Townsend, 2013; De la Peña, 2013).  
49 Hence, fostering social innovation and creativity to improve the quality of life,  
50 competitiveness and sustainability must be the main goal of a city’s strategic SC plan  
51 (Cosgrave et al., 2013; Battaglia and Tremblay, 2011; Tanda and De Marco, 2018b).

52 This is the case for the city of Turin in Italy. In 2009, the city created the Turin  
53 Action Plan for Energy (TAPE), with the goal of reducing the city’s CO2 emissions by  
54 40% by 2020, as one of the major milestones included in the Covenant of Mayors, a  
55 multi-city action platform promoted by the European Commission. TAPE’s main

56 objective is to improve Turin's sustainability in different city domains by implementing  
57 solutions aimed at fostering local energy production, improving public lighting  
58 efficiency, reducing public transport emissions, and raising the sustainability of public  
59 and private buildings (Città di Torino, 2009). In 2011, in order to reach its smart urban  
60 development and strategic renovation program goals, the city of Turin expanded the  
61 TAPE initiatives by taking on the challenge of the European Commission's "Smart City  
62 & Communities." As a result, the Torino Smart City Foundation (TSCF) was created.  
63 The vision driving the TSCF strategy is to create a more sustainable, environmentally  
64 friendly and livable city, where citizens are welcomed and engaged in the city's  
65 innovation processes (Torino Smart City, 2015). To this end, TSCF has been working in  
66 close collaboration with a multitude of stakeholders, from start-up ventures to major  
67 technology players to public offices.

68         The main challenges that emerge from these numerous collaborations are about  
69 understanding how citizens can be engaged and included in innovation processes, and  
70 how to encourage, attract and foster a growing SC innovation environment. In 2015, in  
71 order to reach its goals, TSCF started working on an initiative to engage citizens and  
72 interface them directly with the innovation processes of private companies and start-  
73 ups. Furthermore, TSCF seeks to find ways to attract private companies' and start-up  
74 businesses' innovation efforts by lessening bureaucratic burdens and helping develop  
75 their collaborations, partnerships and networks. The result has been the creation of an  
76 urban Living Lab (LL) initiative named Torino Living Lab (TLL). The LL approach  
77 was chosen because of its ability to foster and encourage innovation, facilitate  
78 integration and the engagement of citizens in the innovation process, and test innovative  
79 solutions in real-life contexts (Westerlund and Leminen, 2011).

80           This paper describes the design steps that TSCF has taken in structuring,  
81   implementing and managing the TLL initiative, and presents a structured  
82   methodological LL assessment approach which combines LL design theory with the SC  
83   evaluation literature. The goal of this approach is to measure TLL’s results, impact, and  
84   critical lessons, from which it is possible to draw several key policy takeaways, while  
85   also highlighting best practices for the design, implementation and management of  
86   similar initiatives.

87           To this end, this paper is structured as follows: first, a brief overview of the  
88   literature on the LL research approach is presented, and TLL’s design and development  
89   efforts are detailed and contextualized. The paper then presents the methodology for  
90   assessing the initiative and presents and discusses the results. Finally, the paper  
91   discusses implications and takeaways from the initiative, as well as considerations for  
92   future improvements, and presents several conclusions.

## 93   **2 – The Living Lab Approach**

94   William J. Mitchell first introduced the term living laboratory, or LL, as the concept of  
95   research conducted in real home environments (Eriksson, Niitamo and Kulkki, 2005).  
96   This definition is related to the “American” vision of LLs, where users are presented  
97   with solutions and products to test, but earlier phases of the innovation process are not  
98   included (Zhong *et al.*, 2006). Within this conceptualization, LL is considered “an  
99   extension of laboratory experiments” (Schuurman *et al.*, 2012, pp. 1).

100           On the other hand, the European approach to LL research is more focused on  
101   involving the users in the innovation process by studying them in their everyday  
102   environment (Schuurman *et al.*, 2012; Niitamo *et al.*, 2006). LLs are defined as  
103   environments where it is possible to gather a deeper understanding of new services and  
104   technologies by “confronting (potential) users with (prototypes or demonstrators) of

105 early technology early on in the innovation process” (Ballon, Pierson and Delaere,  
106 2005, p. 16), and where “technology is given shape in real-life contexts in which (end)  
107 users are considered ‘co-producers’” (Ballon, Pierson and Delaere, 2005, pp. 15).

108 Involving users in the development of new products and services by collecting their  
109 ideas and feedback, and having them play the role of co-generators of the innovation  
110 process (Edwards-Schachter, Matti and Alcántara, 2012) has become a strategic need  
111 for firms that want to strengthen their competitive advantage (European commission,  
112 2009). Customer and user integration provides more than just access to the right market  
113 information (Levén and Holmström, 2008). Indeed, opening the internal innovation  
114 process can be considered a direct form of value creation (Wikström 1996; Gassmann,  
115 2006). This shift from more traditional vertically integrated innovation processes is  
116 forcing firms to invest time and resources in altering their research and development  
117 processes and move toward a co-creation and open-innovation approach (Schuurman  
118 and Marez, 2013). Almirall and Wareham (2008) defined the LL approach as a type of  
119 open-innovation network that acts as a mediator between users, public organizations  
120 and private firms. This allows the users’ knowledge to be identified and made explicit  
121 by means of exploring, capturing benefits from external sources of knowledge,  
122 exploiting and leveraging existing knowledge, as well as retaining, storing and reusing  
123 knowledge over time (Almirall and Wareham, 2011; Schuurman and Marez, 2013;  
124 Lichtentahler and Lichtentahler, 2009). The LL approach is also considered a  
125 methodology that can involve users in the development process and to bring different  
126 stakeholders together in a co-creative way (Følstad, 2008). This is the notion described  
127 by the European Networks of Living Labs (ENoLL, 2011), which identifies five main  
128 dimensions of an LL, namely: an open innovation environment; real-life settings; user-  
129 driven innovation and co-creation processes; user engagement; and expected outcomes.

130 However, co-creation may in some cases be more ambition than reality, as argued by  
131 Mirijamdotter et al. (2006) and Niitamo et al. (2006), who pointed out that many  
132 modern LLs are closer to “sources of (predefined) technology use,” rather than “sources  
133 of innovation” (Niitamo et al., 2006, pp. 3)

134 One of the elements that is instrumental to a successful LL initiative is the  
135 creation and fostering of close relationships between the multitude of stakeholders  
136 involved in an LL (Leminen and Westerlund, 2012; Shaffers and Santoro, 2010).  
137 Collaborations between producers, users and other parties allow change to be simulated,  
138 and facilitate the creation of improved processes, services and business models (Möller,  
139 Rajala and Westerlund, 2008; Edwards-Schachter, Matti and Alcántara, 2012). Lander  
140 (2014) highlighted how collaboration, especially between different sectors, is vital for  
141 fostering innovation. Schuurman (2013) also argues that, in an LL approach, all the  
142 stakeholders of a product or service must participate in its development, with the  
143 stakeholders collaborating and creating partnerships in order to co-create new product  
144 and business models. Furthermore, ENoLL (Følstad, 2008) described LLs as  
145 “‘functional regions’ where stakeholders have formed a Public-Private-Partnership  
146 (PPP) of firms, public agencies, universities, institutions and people, all collaborating  
147 for creating, prototyping, validating and testing new services, products and systems in  
148 real-life contexts” (Følstad, 2008, pp. 3). Eriksson, Niitamo and Kulkki (2005) argued  
149 that an LL approach allows products and services to be created and validated through a  
150 collaborative effort, and that by creating relationships between different stakeholders,  
151 the LL approach is able to focus on value creation and retention instead of technology.  
152 Shaffers et al. (2007) argued that networks are a key part of an LL. The multi-  
153 stakeholder nature of the LL approach has been highlighted by several other authors  
154 (Almirall and Wareham, 2008; Følstad, 2008).

155           The stakeholders in an LL research approach can take on one of the following  
156 main roles (Leminen and Westelund, 2012): *Users*, the actors that will use the product,  
157 service or technology tested in the LL and who help co-develop it; *utilizers*, non-  
158 producers that outsource their knowledge in order to improve the LL, while not being  
159 producers themselves; *enablers*, organizations that provide the necessary resources to  
160 the LL participants, such as physical space, facilities or utilities; and *providers*, private  
161 companies that join the LL to develop or co-develop new technologies, products and  
162 services.

163           These stakeholders collaborate and create partnerships in order to contribute to  
164 the innovation, creation and development processes. These collaborations can have  
165 different purposes, depending on the scope of the LL. Følstad (2008) argued that there  
166 are mainly five contributions of the LL approach to the innovation and development  
167 process:

- 168       • *Context research*: research on the context of use, users and their environment;
- 169       • *Discovery*: research aimed at gathering knowledge and insights on unexpected  
170       uses and new services by “uncovering new issues and opportunities” (Abowd et  
171       al., 2000).
- 172       • *Co-creation*: initiatives aimed at including users in the innovation and  
173       development process;
- 174       • *Evaluation*: research aimed at evaluating and validating new technological  
175       solutions in direct contact with the users;
- 176       • *Technical testing*: technical tests conducted in a realistic home environment,  
177       (closer to the previously discussed more “American” LL concept (Eriksson,  
178       Niitamo, and Kulkki, 2005)).



179 Leminen, Westerlund and Nyström (2012) also discussed the purposes and  
180 contribution to the innovation process provided by an LL, arguing that LLs have  
181 different purposes and objectives, depending on which actor is the main driver of the  
182 initiative. Using the classification of LL actors presented in Leminen and Westerlund  
183 (2012), the authors of this paper classified LLs into four main categories: *user-driven*,  
184 *utilizer-driven*, *enabler-driven* and *provider-driven*. Each of these categories presents  
185 differences in terms of purpose, type of partnerships and collaborations. *User-driven*  
186 LLs are focused on solving everyday problems through the co-creation of innovation  
187 mostly within the community itself and without formal coordination mechanisms.  
188 *Utilizer-driven* LLs, on the other hand, are more structured, with collaborations and  
189 relationships centered around the utilizer actors and focused on developing or testing  
190 new products and services. *Enabler-driven* LLs are organized around local-development  
191 public bodies and focus their research efforts on societal needs and issues. Finally,  
192 *provider-driven* LLs focus on improving users' everyday lives, while at the same time  
193 exploiting the knowledge created for the benefit of all the stakeholders partnered around  
194 the knowledge creators.

195 All these considerations highlight the complexity of conceptualizing the LL  
196 research approach and the difficulties involved in providing a consistent description,  
197 due to its multiple relationships and collaboration networks. However, most of the  
198 academic literature agrees that fostering innovation, co-creation, and user involvement  
199 and engagement are the central goals of the LL approach (Chesbrough, 2003).

200 Schuurman et al. (2012) attempted to conceptualize the “ideal” LL as an approach that  
201 “aims at medium- or long-term research co-creating innovations with the users in a  
202 familiar and real-world context, taking into account the ecosystem surrounding the  
203 innovation” (Schuurman et al., 2012, pp. 5). Westerlund and Leminen (2011) defined

204 LLs as public-private-people partnerships of firms, public bodies, universities and  
205 communities collaborating to create new products and services in real life contexts.  
206 Eriksson, Niitamo and Kulkki (2005) stated that LLs are human-centric systems of  
207 innovation that create a research platform on different social and cultural issues. Kusiak  
208 (2007) defined LLs as co-creation ecosystems for research and innovation centered on  
209 human and societal issues and contexts, and Higgins and Klein (2011) defined them as  
210 “platforms for user-driven innovation” (Higgins and Klein, 2011, pp. 31). According to  
211 Følstad (2008), LLs are “environments for innovation and development where users are  
212 exposed to new ICT solutions in (semi)realistic contexts, as part of medium- or long-  
213 term studies targeting evaluation of new ICT solutions and discovery of innovation  
214 opportunities” (Følstad, 2008, pp. 116).

### 215 **3 – The Torino Living Lab Initiative**

216 The TLL initiative was designed and implemented in an attempt to find ways to engage  
217 and direct different stakeholders in the city in and toward the SC innovation process.  
218 The City of Turin’s objective in promoting this initiative was twofold: first, to harness  
219 the innovation efforts of private companies by identifying the most promising SC  
220 technologies, systems and applications, and to ensure the possibility of testing them in a  
221 real-life environment (Tanda, De Marco and Rosso, 2017); second, to foster local  
222 innovation and entrepreneurship and include and engage citizens in the innovation  
223 process (Torino Living Lab, 2016). In order to achieve these goals, the development  
224 process the TSCF undertook for the TLL initiative followed the five-step LL  
225 development procedure presented by Schuurman et al. (2012) and Shamsi (2008):

- 226 • *Contextualization*: exploration and investigation of the technology or service and  
227 its implications;
- 228 • *Selection*: identification of potential users or user communities;

- 229       • *Concretization*: preliminary measurement of the selected metrics in order to  
230           understand the characteristics, behaviours and perceptions of the targeted users.  
231           (To be performed before the start of the experimentation as a pre-measurement);
- 232       • *Implementation*: kick-off of the LL operations;
- 233       • *Feedback*: final measurement of the same metrics used in the Concretization  
234           step. (To be performed as a post-measurement at the end of the  
235           experimentation.)

236       The *Contextualization* phase started in January 2016 and involved the releasing  
237       of a public call in which the participation and selection rules and the main objectives of  
238       the TLL were defined (Città di Torino, 2016). A board of referees evaluated each  
239       proposal on the basis of its ability to fulfill eight main requirements. The proposed  
240       projects were required to: (i) have no direct cost for the municipality; (ii) have  
241       objectives consonant with the overall objectives of the TSC plan; and (iii) they needed  
242       to create synergies with other SC solutions implemented by the city; while (iv)  
243       providing an innovation element, whether in the technology, the processes, or the  
244       services provided. The projects also needed to: (v) have an impact on the citizens, (vi)  
245       be replicable and scalable to the whole urban environment, and (vii) be technically  
246       feasible, which means TSCF should be able to facilitate the start of the proposed  
247       project. Finally, the projects had to (viii) be accompanied by a preliminary business  
248       model in order to guarantee their economic feasibility and sustainability.

249       In order to promote participation and support the proposals, TSCF guaranteed its  
250       help in facilitating the paperwork processes with other public offices, through actions  
251       such as expediting permits and authorizations and waiving all fees and taxes involved in  
252       the use of public assets, while facilitating networking and communication between the  
253       proposing firms and other private entities that may have been instrumental in setting up

254 the projects, such as utility or transportation firms. In order to engage citizens and the  
255 local community in the innovation process, TSCF also guaranteed each initiative  
256 exposure through all the communication channels available to the city, such as city  
257 websites, social media pages, local newsletters, flyers and posters. It further organized  
258 several events in which the TLL initiative was presented. In addition to this exposure  
259 and advertising campaign, the city also guaranteed it would make considerable efforts in  
260 mediating and engaging citizens and communities directly in the innovation process, by  
261 giving each utilizer the opportunity to meet with the local population to present and  
262 explain their solutions.

263 Each proposal was evaluated, and only those that satisfied all eight of the  
264 requirements were included in the initiative. Out of 37 proposals received, five failed to  
265 meet one or more of the requirements. The initiative entered into operation in July  
266 2016. Most of the projects finished by January 2018, although two of them, due to  
267 unforeseeable problems, had to withdraw.

268 During the *Selection* phase, the city decided to narrow the test field to a limited  
269 neighborhood area called Campidoglio. This area, with 14.889 citizens living in just  
270 under one square kilometer (Torino Living Lab, 2016), was chosen because of its  
271 diverse population (as measured by age, job status, and social background) and because  
272 of its limited geographical dimensions.

273 From this brief description, it is possible to see how the city, and in particular  
274 TSCF, placed itself in the role of the enabler of the LL, by taking on the role of main  
275 organizer, facilitating the development of networks and collaboration around the  
276 institutional boundaries of the TLL initiative, and steering the innovation process  
277 toward social issues and societal improvements (Leminen, Westerlund and Nyström,  
278 2012). According to the urban LL responsibility framework proposed by Juujärvi and

279 Pessa (2013), TSCF, in its role of enabler, sought to provide the vision and strategic  
280 leadership, as well as promote networking by creating a multi-stakeholder and multi-  
281 objective initiative to facilitate the establishment of a prolific environment for  
282 innovation, citizen participation and co-creation. However, from its inception and  
283 conceptualization, the TLL initiative suffered from a relative structural weakness.  
284 According to Juujärvi and Pessa (2013), one of the main tasks of the utilizers within the  
285 context of an urban LL is to produce place-based knowledge and suitable products and  
286 services, which is why the TLL call for proposals required each participant to propose  
287 projects that would create synergy with the city's SC plan, so as to focus and direct the  
288 innovation efforts toward the city's and community's social needs.

289         However, this criterion had not been taken into account during the evaluation  
290 process. This resulted in the inclusion of projects that were less focused on social and  
291 local issues. Furthermore, while engaging and including citizens and communities in the  
292 innovation process was of paramount importance for the success of the TLL initiative,  
293 and indeed are key for the success of any LL (Leminen Westelund and Nyström, 2012),  
294 none of the proposals was evaluated considering how to engage the users in the  
295 innovation process.

#### 296 **4 – Methodology**

297 When designing the initiative, TSCF decided not to exert any form of control or  
298 supervision over the utilizer's choice of methodology to implement their projects during  
299 the *Concretization, Implementation* and *Feedback* steps of the LL's development  
300 framework (Schuurman et al. 2012; Shamsi 2008). However, because of the lack of a  
301 standardized methodology for the implementation and evaluation of the projects, TSCF  
302 needed to develop its own methodology to evaluate the results, successes and impacts of  
303 the initiative. To this end, the authors of this paper were tasked by TSCF to act as

304 external third-party observers and to design a methodology that would be able to draw  
305 up an exhaustive picture of the initiative. Given TSCF's role as the enabler and center  
306 of the LL networks (Leminen Westelund and Nyström, 2012), the authors' efforts had  
307 to focus on assessing the impacts of the initiatives on both the utilizers, i.e. the private  
308 firms and start-ups participating in the TLL, and the users, in particular the citizens.  
309 Before kicking off the initiative, an ex-ante set of indicators was established to  
310 understand the expectations and objectives of the utilizers, and to evaluate the  
311 characteristics, behaviours and perceptions of the users. After the TLL initiative, a  
312 second set of ex-post measurements allowed TSCF to understand whether the utilizers  
313 had managed to satisfy their initial expectations and objectives and if, by participating  
314 and being engaged in the innovation process, the users had undergone a significant and  
315 meaningful change in their characteristics, behaviours and perceptions.

#### 316 ***4.1 – Impact measurements on the Torino Living Lab utilizers***

317 The authors designed the evaluation methodology to gather feedback and assess the  
318 experience from the utilizers' point of view. In particular, the authors sought to  
319 understand whether, by the end of the initiative, the utilizers were able to satisfy their  
320 original expectations and objectives.

321 An ex-ante round of semi-structured interviews was conducted, from April to  
322 June 2016, before starting the initiative, to assess the initial expectations and goals of  
323 the utilizers, by asking two main questions:

- 324 1. What are your objectives for participating in the TLL initiative?
- 325 2. Who are your main users?

326 Thirty-two interviews, each lasting from 15 to 30 minutes, were recorded.

327 To help gauge the impact and success of the initiative, the 30 utilizers that  
328 concluded their projects were then re-interviewed after the initiative, with the goal of

329 understanding whether they had managed to achieve their initial objectives and their  
330 participation had been in any way beneficial. Finally, they were asked to give feedback  
331 on how the TLL initiative had been structured and managed. To this end, from January  
332 to February 2018, they were asked the following questions:

- 333 1. What results were you able to achieve through your participation in the TLL  
334 initiative?
- 335 2. Was your company able take advantage of the TLL initiative?
- 336 3. Do you have any feedback or comments on how the initiative was structured and  
337 managed by the TSCF?

#### 338 ***4.2 – Impact on the Torino Living Lab users***

339 The first step for assessing the impact of the TLL initiative on the population of users  
340 was identifying a set of measurable indicators capable of representing the citizen's  
341 characteristics, impressions, habits and behaviours. To this end, the authors started with  
342 a review of the literature on evaluating and ranking SCs. This literature includes  
343 comprehensive sets of metrics and indicators developed specifically to evaluate the  
344 “smartness” level of a city. The following works were chosen as foundations for  
345 evaluating the impact of the TLL initiative: Giffinger and Pichler-Milanović (2007),  
346 Cohen (2014), Lazaroiu and Roscia (2012), and Lombardi et al. (2012). All the  
347 indicators from the literature related to macro-economic dimensions were discarded, as  
348 the chronologically and geographically limited nature of the TLL initiative meant there  
349 would be negligible impacts on such indicators as the city's GDP, the employment level  
350 and/or the immigration level, renderings these metrics useless to assess the TLL  
351 initiative. After discarding the macro-economic indicators and purging any duplicates,  
352 the four sets were joined together, resulting in 42 unique indicators. Finally, by looking  
353 at how the 32 selected projects in the TLL initiative affected these 42 indicators, it was





379 participate in the ex-post assessment and received the same survey from January and  
380 February 2018. However, out of the 71 original people that had been contacted, only 19  
381 responded, while the remaining 52 decided either to ignore the request or refused to  
382 participate in this second set of measurements. In order to understand the reasons  
383 behind this fall in participation, the authors asked respondents to participate in a semi-  
384 structured interview that was aimed at investigating their experience in the TLL  
385 initiative and at collecting their feedback and impressions on its perceived impacts and  
386 management. Three of the 19 respondents agreed to do so.

## 387 **5 – Results and Discussion**

### 388 ***5.1 - Impacts on the Torino Living Lab's utilizers and results of the initiative***

389 Interviewing the TLL utilizers at the start and end of the initiative allowed the authors  
390 assess the users' experience and evaluate the initiative's results, benefits and  
391 weaknesses.

#### 392 *5.1.1 – Ex-ante interviews*

393 The two questions proposed during the preliminary ex-ante interviews with the TLL  
394 utilizers allowed us to understand the differences and highlight the similarities between  
395 the 30 proposed SC projects. The goal of the first question was to understand the  
396 utilizers' objectives and motivations for participating in the TLL initiative.

397 *Please insert here Table 2*

398 From the data shown in Table 2, it is possible to note that, out of the 30 projects  
399 included in the TLL initiative, 14 are clearly different from the others, in that the  
400 solutions implemented in these projects were already commercially available. Hence,  
401 the participation goals for those 14 projects are different from those of the remaining 16

402 projects, in that they consisted of creating a demand for the product or service they  
403 present. Users' engagement and inclusion in the innovation process is of secondary  
404 importance for these utilizers. In order to analyze and categorize the different objectives  
405 and research approaches undertaken by the remaining 16 utilizers, the authors employed  
406 the LL research contribution framework presented by Følstad (2008). Out of these 16  
407 projects, four aimed to conduct a *Technical Testing* of their solutions. These projects  
408 aimed to test the technological solutions in a real-life home environment and gather  
409 valuable insights from their final users at an extremely early stage of development. On  
410 the other hand, the main priority of the remaining 12 projects of those 16 was to engage  
411 the users in their innovation process. For all 12 projects, this engagement translated into  
412 an effort to *Evaluate* and validate the solution and for nine of them, the aim was to use  
413 TLL participation as a way to assess and evaluate the validity and sustainability of their  
414 business models. Engaging the users in a direct and structured effort of *Co-Creation*  
415 was a major objective of eight of these projects, while five utilizers also had aimed to  
416 use their participation in *Context Research* to observe and study how the users  
417 interacted with their solutions. Finally, two projects were aimed at using the insights  
418 gathered from the users' engagement to *Discover* new use cases and opportunities.  
419 From the answers to this first question, it is also possible to highlight another significant  
420 difference: out of the 30 utilizers, 26 had market commercialization as their final  
421 objective, while the remaining four had the creation and dissemination of knowledge as  
422 their final goal, without any commercial implication.

423         The second question in the interview allowed us to understand the main targeted  
424 user groups. Most of the projects had multiple final users, that is, citizens, other  
425 businesses or the public administration.

426

*Please insert here Table 3*

427 As can be seen from Table 3, of the 30 projects, 18 targeted other business and  
428 private organizations, while 14 were directly addressed to the city's public  
429 administration. The presence of such a large number of projects that directly targeted  
430 the public administration highlights the pre-existing need to create more direct and less  
431 cumbersome communication channels between public administrations and private  
432 companies and of streamlining the public procurement processes. Finally, 13 projects  
433 had citizens as their primary user target, while one utilizer planned to use this  
434 participation purely for academic purposes.

#### 435 *5.1.2 – Ex-post interviews*

436 The 30 utilizers that participated in the entire TLL initiative were also interviewed at the  
437 end to evaluate and assess their experience. From the responses to the first question, it is  
438 possible to address the first criticism: out of the 30 utilizers, only 15 reported they had  
439 achieved a major result. Eight took advantage of the possibilities created by the  
440 initiative to improve their solution and provide a better product or service for their  
441 users. Moreover, eight utilizers stated that, by participating in the TLL, they were able  
442 to attract new clients. Finally, thanks to their participation in the initiative, six utilizers  
443 have been able to release their product or service onto the market. These data are shown  
444 in Table 4.

445 *Please insert here Table 4*

446 It is worth noting how the success of these projects appears to be related to the  
447 type of research approach planned at the outset. Only five out of the 14 already  
448 commercially available projects were able to achieve a major result. Therefore, the less  
449 commercially mature projects are the ones that were better able to take advantage of  
450 their participation in the initiative. Out of the 12 projects that had planned to extensively  
451 include the users in the research process, eight managed to achieve significant results.

452 Moreover, it also appears that successful participation is related to the type of user  
453 targets. Out of the 18 projects that targeted private firms and organizations, 11 reported  
454 a certain degree of success, while only six out of the 14 projects targeting public  
455 administrations, and six out of the 13 projects directly targeting citizens found the  
456 participation successful. Nevertheless, half of the utilizers did not achieve any  
457 meaningful benefit from participating in the TLL initiative.

458 *Please insert here Table 5*

459 However, the responses to the second question, displayed in Table 5, show how  
460 the majority of utilizers—that is, 27 out of 30—*reported* benefits from participating in  
461 the initiative. One of the most appreciated benefits of participating is the possibility of  
462 collaborating and interacting with a network of firms, organizations, public entities and  
463 communities in a way that would have been difficult to achieve outside an LL  
464 framework. Thirteen utilizers reported the creation of new collaborations and  
465 relationships with other commercial partners as a major benefit, and ten utilizers  
466 reported the creation of such collaborations and relationships with citizens as a major  
467 benefit. Sixteen utilizers stated that participating in the TLL helped them set up  
468 synergetic relationships with other firms. Furthermore, 18 participants reported that  
469 participating in the TLL initiative had been beneficial in that it allowed them to obtain a  
470 better understanding of the mechanisms behind the public administration’s bureaucracy.  
471 Finally, for 18 utilizers, participating in the initiative improved their firms’ market  
472 visibility.

473 The third question allowed the utilizers to express their criticism on how the  
474 TLL initiative had been structured and managed by TSCF; these data are shown in  
475 Table 6.

476 *Please insert Table 6 here*

477 Four utilizers highlighted the LL's lack of a narrow focus and coherent scope,  
478 arguing that including projects in so many different SC domains reduced the  
479 opportunity for creating synergies and the effectiveness of communication efforts.  
480 Furthermore, five utilizers mentioned that because the initiative not allocate any  
481 dedicated financial resources, the projects had to be scaled down and their effectiveness  
482 was thus weakened. Helping create fruitful relationships with the public administration  
483 and public entities, and helping firms navigate the public bureaucracy were two of the  
484 objectives pursued by TSCF within the TLL initiative. However, seven of the utilizers  
485 argued that these efforts could not achieve these goals in a significant way. Finally, the  
486 utilizers' main complaint was about the inadequacy of TSCF efforts to promote the  
487 initiative and engage users. Eight utilizers complained that the promotion efforts were  
488 not adequate for the scope of the initiative, while 10 argued that efforts undertaken to  
489 engage users, and particularly citizens, were insufficient--especially for projects that  
490 required longer and continuous engagement and collaboration.

## 491 ***5.2 – Impacts on the users***

492 In order to assess and evaluate the TLL initiative's potential impacts on the population  
493 of the Campidoglio neighborhood, two surveys were conducted, one at the outset of the  
494 initiative and one at the end, investigating the characteristics, impressions, habits and  
495 behaviours of the population.

### 496 ***5.2.1 – Ex-ante survey***

497 The demographic distribution of the ex-ante survey respondents, according to their  
498 gender, age and profession, is presented in Table 7.

499 *Please insert here Table 7*

500           The results of the first survey present a preliminary picture of the characteristics,  
501 impressions, habits and behaviours of the citizens living in the Campidoglio  
502 neighborhood. The degree of agreement was measured for each question as the  
503 percentage of positive votes (4 or 5) over the total. These results are reported here with  
504 reference to the measurement indicators presented in Table 1:

- 505       • *Economy*: citizens' purchasing choices are mostly driven by quality of product  
506           (77%), then by cost (55%) and last by place of origin (44%).
- 507       • *People*: a minority of citizens are engaged in civic activities (15%).
- 508       • *Governance*: most digital services and applications used by citizens are related  
509           to transportation and mobility (42%) and civic activities (48%), although their  
510           use is quite limited (14%). Furthermore, their use is predominantly passive, and  
511           presents a very low level of user engagement as a content co-generator.  
512           Opinions about the usefulness and ease of use of these services were also low  
513           (24% and 28%, respectively).
- 514       • *Mobility*: the citizens' preferred means of transportation is public transport  
515           (49%), followed by automobile (24%), bicycle (23%) and alternative means  
516           such as bike- or car-sharing (20%). The main factor in transportation choice was  
517           necessity (68%), followed by speed and travel distance (63%), and finally cost  
518           (49%). The environmental impact of the chosen method was less important  
519           (45%).
- 520       • *Environment*: relatively few of the respondents reported knowledge about the  
521           amount of air pollution in the area (14%) and their energy consumption (34%).  
522           On the other hand, they considered themselves to be relatively well informed  
523           about best practices for reducing their energy and environmental footprint (42%  
524           and 45%, respectively). They also practiced and encouraged environmentally

525 friendly and sustainable behaviours (66% and 58%, respectively), and put efforts  
526 into preserving green public spaces (54%). However, the degree of participation  
527 in civic activities aimed at environmental protection was quite low (15%).

528 • *Living*: citizens in the neighborhood considered themselves relatively safe  
529 (42%). Their use of public spaces was also relatively high (46%). However,  
530 engagement in cultural and social activities was, once again, quite low (20% for  
531 both).

532

533 It should be noted that, in general, the citizens reported a major lack of  
534 engagement in civic activities and initiatives, regardless of purpose. They also reported  
535 a considerably limited use of digital services and applications. Their awareness of  
536 environmental topics was quite high; however, while they reported that they were  
537 relatively well informed on actions and behaviours that needed to be taken to be more  
538 environmentally friendly, they did not feel informed about the actual level of pollution.

### 539 5.2.2 – *Ex-post survey and interviews*

540 Out of the 71 people that participated in the ex-ante survey, only 19 decided to respond  
541 to the survey conducted after the TLL initiative finished. Hence, it is not possible to  
542 compare the results of both surveys in a statistically significant analysis. However, it is  
543 possible to highlight some findings, as per Table 8.

544

*Please insert here Table 8*

545 The quality of the digital services provided by the city appears to have  
546 improved from 23% to 37%, respectively. The citizens' mobility habits appear more or  
547 less the same, although environmental considerations became more influential in their  
548 choice of transportation (from 45% to 68%). The new survey reports an increase in  
549 awareness about actions and best practices to reduce the environmental impact of their

550 activities (from 45% to 63%), but does not show any significant improvements in the  
551 awareness of pollution levels or energy consumptions. Finally, in the ex-post survey,  
552 fewer citizens reported using public spaces (from 46% to 26%).

553 As stated earlier, three out of the 19 people who responded to the ex-post survey  
554 agreed to be interviewed. During the semi-structured interviews, the citizens were  
555 asked:

- 556 1. Did any of the projects that were part of the TLL initiative have an impact on  
557 your impressions, habits and/or behaviours?
- 558 2. Why or why not?

559 The three interviewees basically responded negatively to the first question,  
560 providing several reasons why. While the proposed projects were reportedly quite  
561 interesting, the respondents lamented a lack of focus and criticised the lack of a  
562 coherent scope for the initiative. Several utilizers made a similar criticism, noting that  
563 the lack of a coherent scope decreased the effectiveness of the promotion campaigns  
564 and user engagement. The citizens also highlighted engagement as lacking, arguing that  
565 the efforts of both TSCF and the utilizers were not adequate. They felt, in particular,  
566 that both promotion and engagement efforts, after a quite active initial phase, decreased  
567 dramatically. Again, utilizers made a similar criticism, complaining about lack of  
568 citizens engagement.

569 Finally, two out of three citizen interviewees argued that, while the projects  
570 were overall interesting and topical, it would have been better for the initiative to  
571 involve the citizens directly from the outset in both the scope definition and project  
572 selection processes. They argued that by doing so, citizens would have been more  
573 involved in the initiative results.



## 574 **6 – Implications**

575 The methodological approach used to evaluate the city of Turin’s experience with the  
576 TLL initiative combines LL design theory with a review of the literature on SC  
577 evaluation and assessment techniques. It provides a theoretical contribution to improve  
578 critical success factor metrics that can be used when evaluating other urban LL  
579 initiatives.

580 Furthermore, the results of the TLL case study evaluation have several policy  
581 and practical implications that could be useful for both scholars and practitioners in the  
582 design, implementation and management of similar initiatives.

### 583 *6.1 – Policy implications*

584 The TLL initiative’s success and shortcomings suggest several policy takeaways. The  
585 literature suggests that complex problems, such as pollution and environmental  
586 protection, can best be tackled when cities and municipalities are able to engage citizens  
587 and communities in their innovation and policy making processes. Indeed, in their study  
588 on the success of implementation [of what?], the Covenant of Mayors of Spanish cities,  
589 Pablo-Romero, Sanchez-Braza, and Gonzalez-Limon (2015), highlighted that the  
590 engagement of local communities is a key requirement for the successful  
591 implementation of environmentally related initiatives. Edwards-Schachter, Matti and  
592 Alcántara (2012) argued that citizen engagement and participation is a key priority for a  
593 city that wants to innovate its quality of life, social justice and ethics, and in general  
594 develop “innovations that are social both in their ends and in their means” (Edwards-  
595 Schachter, Matti and Alcántara, 2012, pp. 677). In general, the active participation of  
596 citizens and communities, while often expensive, can be beneficial for policy and  
597 decision makers as they can provide “more comprehensive information on all aspects of

598 the policy process” (Kweit and Kweit, 1984, pp. 273). The initial success of the TLL  
599 initiative, both in terms of participation and the engagement of citizens and  
600 communities, and in terms of open and social innovation proposals, highlights the  
601 potential of urban LLs as cost-effective initiatives that are able to drive public  
602 engagement toward local and community issues and innovations, and to engage citizens  
603 and communities in innovation processes. The focus on social problems, the alignment  
604 with the city’s strategic objectives, the relationship with the local community, and the  
605 focus on citizens’ engagement have been the key factors behind the initial success of the  
606 TLL. Hence, cities whose objective is to foster open and social innovation and citizen  
607 and community engagement can replicate the here presented TLL by designing an urban  
608 LL initiative focused on local problems, needs and innovations, as well as on citizen  
609 and community engagement. On the other hand, as pointed out in the previous sections,  
610 such initiatives also need to avoid the TLL’s shortcomings and explicitly introduce and  
611 enforce citizen participation and community engagement, while focusing on local and  
612 social innovation from the start of the initiative contextualization phase and throughout  
613 its execution.

614 Not only is the urban LL approach a cost-effective way of engaging citizens and  
615 communities and of fostering social innovation, but it also offers cities a relatively  
616 cheap source of innovative solutions. Indeed, municipalities can drive efforts of  
617 citizens, communities and private organizations toward the development of innovative  
618 solutions focused on the city’s needs, and create a workaround for the often more rigid  
619 and expensive classic public procurement process. That said, Johnson, and Robinson  
620 (2014), in relation to civic hackathons, argued that this kind of crowdsourced public  
621 procurement may result in issues related to the adoption and maintenance of the  
622 solutions developed through these channels, and in general cast doubt on the actual

623 value delivered by these kinds of initiatives. The TLL experience suggests that the  
624 inclusion of projects participating in order to be purchased by the city can be  
625 problematic. Indeed, although the presence of several commercially available projects  
626 has highlighted the need to streamline public procurement processes, their contribution  
627 to the overall success of the TLL initiative was quite limited. Hence, in the  
628 contextualization phase of an urban LL, a city needs to select projects and initiatives  
629 carefully and focus predominantly on open and social innovation and citizen  
630 engagement, while carefully considering whether to include projects with a clear  
631 commercial side.

632 In sum, the TLL experience shows that urban LLs are a compelling and cost-  
633 effective approach for cities whose policy priorities are to foster open and social  
634 innovation, drive public engagement, and tackle local and community problems. Urban  
635 LLs can be successful as long as they are designed and executed with such policy  
636 objectives as the overall priority, while their value as a replacement for traditional  
637 procurement processes is, at best, limited.

## 638 *6.2 – Design implications*

639 Gathering feedback from both utilizers and citizens makes it possible to highlight some  
640 design takeaways and best practices. Future organizers of urban LLs may in particular  
641 wish to consider three main improvements. First, the initiative's enabler, such as the  
642 city council or other equivalent public entity, will need to ensure citizens' engagement  
643 directly from the design step onward to improve the citizens' commitment and  
644 engagement in the initiative from the offset. This may be achieved by including citizens  
645 in the design phase, for example by having them collaborate in the choice of themes and  
646 in the project selection process. Furthermore, these engagement efforts must be

647 sustained throughout the entire initiative in order to maintain a high level of engagement  
648 and inclusion.

649           Second, and closely linked to the first suggested improvement, is the need for  
650 the project selection process to evaluate project proposals on the basis of their strategies  
651 to include and engage their users, and to penalize projects that do not have a structured  
652 research approach and whose goal is primarily to increase their demand and user base.  
653 This is necessary to avoid including projects that just intend to use the initiative as a  
654 way of improving their market position, without contributing to the creation of  
655 synergies and links between the various stakeholders, or the engagement of users in the  
656 co-creation process—the main objectives of any LL (Schuurman *et al.* 2012;  
657 Westerlund and Leminen 2011). Finally, in order to improve the communication,  
658 promotion and engagement efforts of both the utilizers and the enabler, the initiative  
659 should be narrowly focused, and all projects should adhere more closely to the chosen  
660 scope of the LL.

661           The city of Turin itself was able to learn from some of these lessons before  
662 designing its next LL initiative: “TLL AxTO Economia Collaborativa e Circolare,” for  
663 which the call for proposals was published in May 2018. The city defined the scope of  
664 the initiative, and limited participation to innovative projects on the collaborative and  
665 circular economy. To participate in the new initiative, project were to be 3-9 months in  
666 duration, be innovative, beneficial, and grounded in Turin’s social and economic  
667 territorial reality. To this end, proposals were to be evaluated not only on the basis of  
668 their innovation and feasibility, but also on their coherence with territorial needs and on  
669 how the projects plan to engage and include users in the innovation and co-creation  
670 project. Furthermore, in addition to communication and promotion efforts, and  
671 assistance navigating bureaucracy, each accepted project was to receive financial

672 support equal to 50% of the total investment, up to a total of €15.000, thereby  
673 addressing one the criticisms expressed by the TLL utilizers (Città di Torino, 2018).

## 674 **7 – Conclusions**

675 With the TLL initiative, the city of Turin aims to engage and include citizens in the  
676 urban and social innovation process by encouraging, attracting and fostering a growing  
677 SC innovation environment in the city. These main objectives are pursued through the  
678 implementation of the LL research approach, whereby public-private-people  
679 partnerships of firms, public bodies, universities and communities collaborate to co-  
680 create innovation centered around human and societal issues and contexts (Westerlund  
681 and Leminen, 2011; Kusiak, 2007). This paper describes the city's efforts to design the  
682 TLL initiative and the work of the authors in designing a structured methodology to  
683 evaluate its impacts, assess its results and successes, and gather feedback and  
684 impressions.

685 Two separate sets of measurements were taken. Ex-ante measurements of the  
686 utilizers' expectations and objectives taken through a series of semi-structured  
687 interviews, and an initial user survey, which gathered the characteristics, impressions,  
688 habits and behaviours of citizen users. Ex-post measurements were also taken,  
689 evaluating the results and success of the utilizers' participation and assessing the  
690 initiative's impact on the users' habits and behaviours.

691 Half of the utilizers reported that they were able to achieve one or more major  
692 result, while the vast majority of the utilizers reported beneficial participation.  
693 However, these successes have not translated into a meaningful impact on the citizens.  
694 The majority of users who participated in the ex-ante survey decided not to take part in  
695 the ex-post one, and those who did just reported some very marginal behaviour changes.

696           The main criticism of the initiative, from both the utilizers' and the citizens'  
697 points of view, was that too little effort and too few resources were dedicated to  
698 engaging the citizens in the innovation process, despite the fact that citizen engagement  
699 was one of the major objectives of the initiative and one of the key elements for the  
700 success of any LL (Leminen, Westerlund and Nyström, 2012).

701           This study has several implications. First, the methodology developed in this  
702 work provides scholars with a structured approach grounded in both the LL design  
703 theory and SC evaluation literature to assess the impact and success of urban LLs.  
704 Furthermore, the citizen engagement that drives municipal policy and the use of  
705 innovative techniques to address municipal challenges is a timely and ongoing  
706 conversation currently taking place in many cities around the world. The results of the  
707 case study presented in this paper suggest several policy takeaways that both scholars  
708 and practitioners can use to study and implement urban LLs. In particular, these  
709 initiatives emerge as a compelling and cost-effective approach for any city whose  
710 strategic goals are to foster open and social innovation and drive citizen and community  
711 participation and engagement in both innovation and policy making processes.  
712 Nevertheless, cities need to be wary of using such initiatives as a replacement for  
713 traditional procurement processes. Finally, it is possible to draw some more practical  
714 implications on the best practices of designing an urban LL. The citizens' and utilizers'  
715 feedback in fact suggest three possible actions that could be adopted to address the  
716 criticisms of the TLL initiative and design a more effective urban LL: (1) citizens must  
717 be included from the design phase onward and be sustained and supported throughout  
718 the initiative's duration; (2) the proposal selection should evaluate the user engagement  
719 strategy of each project and, (3) the initiative should have a narrower and more focused  
720 scope.

## 721 Bibliography

- 722 Abowd, G.D., G.D. Atkeson, A.F. Bobock, I.A. Essa. B. MacIntyre, E. Mynatt, T.E. Starner. (2000).  
723 Living Laboratories: The Future Computing Environments Group at the Georgia Institute of Technology.  
724 Paper presented at the CHI '00 on Human Factors in Computing Systems. The Hague, The Netherlands.  
725 April 01-06.
- 726 Almirall, E. J. Wareham. (2008). Living Labs and Open Innovation: Roles and Applicability. *eJOV: The*  
727 *Electronic Journal for Virtual Organization & Networks*, 10, 21-46.
- 728 Almirall, E., J. Wareham. (2011). Living Labs: Arbiters of Mid-and Ground-level Innovation. *Technology*  
729 *Analysis & Strategic Management*, 23(1), 87-102.
- 730 Anthopoulos L.G. (2017). The Rise of the Smart City. In *Understanding Smart Cities: A Tool for Smart*  
731 *Government or an Industrial Trick?* edited by Anthopoulos L.G., 5-45. Switzerland: Springer, Cham.
- 732 Ballon, P., J. Pierson, S. Delaere. (2005). Test and Experimentation Platforms for Broadband Innovation:  
733 Examining European Practice. Paper presented at the 16th European Regional Conference by the  
734 International Telecommunications Society. Porto, Portugal, September 4-6.
- 735 Battaglia, A. and Tremblay, D.G. (2011). 22@ and the Innovation District in Barcelona and Montreal: a  
736 Process of Clustering Development Between Urban Regeneration and Economic Competitiveness. *Urban*  
737 *Studies Research*, 2011.
- 738 Breuer, J., Walravens, N. and Ballon, P. (2014). Beyond Defining the Smart City. Meeting Top-down and  
739 Bottom-up Approaches in the Middle. *Tema. Journal of Land Use, Mobility and Environment*.
- 740 Caragliu, A., Del Bo, C. and Nijkamp, P. (2011). Smart Cities in Europe. *Journal of Urban Technology*.  
741 18(2), 65-82.
- 742 Chesbrough, H.W. (2003). The Era of Open Innovation.” MIT Sloan Management Review, April 15.  
743 Accessed 15 November 2017. <https://sloanreview.mit.edu/article/the-era-of-open-innovation/>
- 744 Città di Torino. (2009). Piano d'azione per l'Energia Sostenibile. Retrieved from:  
745 <http://www.comune.torino.it/ambiente/bm~doc/tape-2.pdf>
- 746 Città di Torino. (2016). Avviso pubblico per la ricerca di soggetti interessati alla promozione, lo sviluppo,  
747 il testing e la sperimentazione di iniziative e soluzioni tecnologiche innovative in ambito "Smart City"  
748 sull'area del quartiere campidoglio. Retrieved from: [http://torinolivinglab.it/wp-](http://torinolivinglab.it/wp-content/uploads/2016/01/Campidoglio_Avviso_torino-25-01-2016_Def.pdf)  
749 [content/uploads/2016/01/Campidoglio Avviso torino- 25-01-2016 Def.pdf](http://torinolivinglab.it/wp-content/uploads/2016/01/Campidoglio_Avviso_torino-25-01-2016_Def.pdf)
- 750 Città di Torino. (2018). Avviso Pubblico “Torino Living Lab Axto – Contributi Per Sperimentazioni  
751 Innovative Applicate All'economia Collaborativa E Circolare Per Le Periferie Torinesi”. Retrieved from:  
752 [http://torinolivinglab.it/wp-content/uploads/2018/06/Avviso\\_TLL\\_SCE\\_prorogato.pdf](http://torinolivinglab.it/wp-content/uploads/2018/06/Avviso_TLL_SCE_prorogato.pdf)
- 753 Cohen B. (2014). Smart City Index Master Indicators Survey. Smart Cities Council, October 2014.  
754 Accessed 19 November 2017. Retrieved from: [http://smartcitiescouncil.com/resources/smart-city-index-](http://smartcitiescouncil.com/resources/smart-city-index-master-indicators-survey)  
755 [master-indicators-survey](http://smartcitiescouncil.com/resources/smart-city-index-master-indicators-survey)
- 756 Cosgrave E., Tryfonas T., Crick T. (2014). The Smart City from a Public Value Perspective. Paper  
757 presented in the 2nd International Conference on ICT for Sustainability. Stockholm, Sweden, August 24-  
758 27.
- 759 Dameri, R.P. (2013). Searching for Smart City Definition: a Comprehensive Proposal. *International*  
760 *Journal of Computers & Technology*. 11(5), 2544-2551.
- 761 De la Peña B. (2013). The Autocatalytic City. In *T.E.D. Books City 2.0: The Habitat of the Future and*  
762 *How to Get There (Ebook)*. T.E.D. Conferences.
- 763 Edwards-Schachter, M.E., C.E. Matti. E. Alcántara. (2012). Fostering Quality of Life Through Social  
764 Innovation: A Living Lab Methodology Study Case. *Review of Policy Research*. 29(6), 672-692.
- 765 Eriksson, M., V.P. Niitamo, S. Kulkki. (2005). State-of-the-art in Utilizing Living Labs Approach to  
766 User-centric ICT Innovation-a European Approach. *Lulea: Center for Distance-spanning Technology*.  
767 *Lulea University of Technology Sweden: Lulea*.
- 768 European Commission. (2009). *Design as a Driver of User-centred Innovation. Commission Staff*  
769 *Working Document SEC(2009)501*. Belgium, Brussels: European Commission. Retrieved from:  
770 <http://ec.europa.eu/DocsRoom/documents/2583/attachments/1/translations/en/renditions/native>
- 771 Følstad, A. (2008). Living Labs for Innovation and Development of Information and Communication  
772 Technology: a Literature Review. *Electronic Journal of Organizational Virtualness*. 10, 99-131.
- 773 Gassmann, O. (2006). Opening Up the Innovation Process: Towards an Agenda. *R&D Management*.  
774 36(3), 223–228.
- 775 Giffinger, R. and N. Pichler-Milanović. (2007). Smart Cities: Ranking of European Medium-sized Cities.  
776 Centre of Regional Science, Vienna University of Technology.
- 777 Higgins, A. S. Klein. (2011). Introduction to the Living Lab Approach. In *Accelerating global supply*  
778 *chains with IT-innovation*, edited by Y. Tan, N. Björn-Andersen, S. Klein, B. Rukanova, 31-36. Berlin,  
779 Heidelberg: Springer.

780 Johnson, P. and Robinson, P., 2014. Civic Hackathons: Innovation, Procurement, or Civic Engagement?  
781 *Review of Policy Research*, 31(4), 349-357.

782 Juujärvi, S., K. Pessa. (2013). Actor Roles in an Urban Living Lab: What Can We Learn from Suurpelto,  
783 Finland? *Technology Innovation Management Review*. 3(11), 22-27.

784 Kusiak, A. (2007). Innovation: the Living Laboratory Perspective. *Computer-Aided Design and*  
785 *Applications*. 4(6), 863–876.

786 Kweit, M.G. and Kweit, R.W., 1984. The Politics of Policy Analysis: The Role of Citizen Participation in  
787 Analytic Decisionmaking. *Review of Policy Research*, 3(2), 234-245.

788 Lander, B. (2014). The Role of Institutions and Capital in Intersectoral Collaboration: Infection and  
789 Immunity Research and Development Collaboration in Vancouver. *Review of Policy Research*, 31(5),  
790 390-407.

791 Lazaroiu, G.C. and M. Roscia. (2012). Definition Methodology for the Smart Cities Model. *Energy*.  
792 47(1), 326-332.

793 Lee, J.H., Hancock, M.G. and Hu, M.C. (2014). Towards an Effective Framework for Building Smart  
794 Cities: Lessons from Seoul and San Francisco. *Technological Forecasting and Social Change*. 89, 80-99.

795 Leminen, S. M. Westerlund. (2012). Towards innovation in Living Labs networks. *International Journal*  
796 *of Product Development*. 17(1-2), 43-59.

797 Leminen, S., M. Westerlund, A.G. Nyström. (2012). Living Labs as Open-innovation Networks.  
798 *Technology Innovation Management Review*. 2(9), 6-11.

799 Levén, P., J. Holmström. (2008). Consumer co-creation and the ecology of innovation: A living lab  
800 approach. Paper presented at the 31st Information Systems Research Seminar in Scandinavia. Are,  
801 Sweden, August 08-13.

802 Lichtenthaler, U., E. Lichtenthaler. (2009). A capability-based framework for open innovation:  
803 Complementing absorptive capacity. *Journal of management studies*. 46(8), 1315-1338.

804 Lombardi, P., S. Giordano, H. Farouh, W. Yousef. (2012). Modelling the smart city performance.  
805 *Innovation: The European Journal of Social Science Research*. 25(2), 137-149.

806 Michelucci, F.V., De Marco, A. and Tanda, A. (2016). Defining the Role of the Smart-City Manager: An  
807 Analysis of Responsibilities and Skills. *Journal of Urban Technology*, 23(3), 23-42.

808 Mirijamdotter, A., A. Ståhlbröst, A. Sällström, V. Niitamo, S. Kulkki. (2006). The European Network of  
809 Living Labs for CWE-user-centric Co-creation and Innovation. *Exploiting the Knowledge Economy:*  
810 *Issues, Applications and Case Studies*. 3, 840–47.

811 Möller, K., R. Rajala, M. Westerlund. (2008). Service Innovation Myopia? A New Recipe for Client-  
812 Provider Value Creation. *California Management Review*. 50(3), 31–48.

813 Monfaredzadeh, T. and Berardi, U. (2015). Beneath the Smart City: Dichotomy Between Sustainability  
814 and Competitiveness. *International Journal of Sustainable Building Technology and Urban Development*.  
815 6(3), 140-156.

816 Nam, T. T.A. Pardo. (2011). Conceptualizing Smart City with Dimensions of Technology, People, and  
817 Institutions. Paper presented at the 12th Annual International Digital Government Research Conference:  
818 Digital Government Innovation in Challenging Times, College Park, Maryland, USA, June 12-15.

819 Niitamo, V.P., S. Kulkki, M. Eriksson, K.A. Hribernik. (2006). State-of-the-art and Good Practice in the  
820 Field of Living Labs. Paper presented at the 2006 International Technology Management Conference  
821 (ICE). Milan, Italy, June 26-28.

822 Pablo-Romero, M.D.P., Sánchez-Braza, A. and Manuel González-Limón, J., 2015. Covenant of Mayors:  
823 Reasons for Being an Environmentally and Energy Friendly Municipality. *Review of Policy Research*,  
824 32(5), 576-599.

825 Schaffers, H. R. Santoro. (2010). The Living Labs Concept Enhancing Regional Innovation Policies and  
826 Instruments. Paper presented at the 2010 International Technology Management Conference (ICE).  
827 Lugano, Switzerland, June 21-23.

828 Schaffers, H., M.C. Cordoba, P. Hongisto. T. Kallai. C. Merz, J. van Rensburg. (2007). Exploring  
829 Business Models for Open Innovation in Rural Living Labs. Paper presented at the 13<sup>th</sup> International  
830 Conference on Concurrent Enterprising (ICE). Sophia-Antipolis, France, June 4-6.

831 Schuurman, D., B. Lievens, L. De Marez, P. Ballon. (2012). Towards Optimal User Involvement in  
832 Innovation Processes: A Panel-centered Living Lab-approach. Paper presented at the PICMET '12:  
833 Technology Management for Emerging Technologies. Vancouver, Canada, July 29-31, August 1-2.

834 Schuurman, D., L. De Marez, P. Ballon. (2013). Open Innovation Processes in Living Lab Innovation  
835 Systems: Insights from the LeYLab. *Technology Innovation Management Review*, 3(11), 28-36.

836 Shamsi, T. A. (2008). Living Labs: Good Practices in Europe. In *European Living Labs - A new approach*  
837 *for human centric regional innovation*, edited by J. Schumacher, V. Niitamo, 15-30. Berlin, WVB.

838 Stratigea, A., Papadopoulou, C.A. and Panagiotopoulou, M. (2015). Tools and Technologies for Planning  
839 the Development of Smart Cities. *Journal of Urban Technology*. 22(2), 43-62.



840 *Studies*. 3: 840–47.  
841 (ENoLL) The European Network of Living Labs. (2011). Living Labs Definition. Accessed March 03,  
842 2018. Retrieved from: <https://enoll.org/about-us/>  
843 Tanda, A., De Marco, A. and Rosso, M., 2017. Evaluating the impact of smart city initiatives. Paper  
844 presented at the 6th International Conference on Smart Cities and Green ICT Systems. Porto, Portugal,  
845 April 22-24.  
846 Tanda, A. and De Marco, A., 2018a. Drivers of Public Demand of IoT-Enabled Smart City Services: A  
847 Regional Analysis. *Journal of Urban Technology*, 25(4), 77-94.  
848 Tanda, A. and De Marco, A., 2018b. Business Model Framework for Smart City Mobility Projects. Paper  
849 presented at the 3rd World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium.  
850 Prague, June 18-22.  
851 Torino Living Lab. (2016). Torino Living Lab. Accessed November 17, 2017. Retrieved from  
852 <http://torinolivinglab.it>  
853 Torino Smart City. (2015). La Vision. Accessed November 14, 2017. Retrieved from:  
854 <http://www.torinosmartcity.it/torino-smart-city/>  
855 Townsend, A.M. (2013). *Smart cities: Big Data, Civic Hackers, and the Quest for a New Utopia*. New  
856 York, NY: WW Norton & Company.  
857 United Nations, Department of Economic and Social Affairs, Population Division. (2014). *World*  
858 *Urbanization Prospects: The 2014 Revision, Highlights*. New York, NY: United Nations Department of  
859 Economic and Social Affairs. Retrieved from: [https://esa.un.org/unpd/wup/Publications/Files/WUP2014-](https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf)  
860 [Highlights.pdf](https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf)  
861 United Nations, Department of Economic and Social Affairs, Population Division. (2017). *World*  
862 *Population Prospects: The 2017 Revision, Volume I: Comprehensive Tables*. New York, NY: United  
863 Nations Department of Economic and Social Affairs.  
864 Walravens, N. (2015). Qualitative Indicators for Smart City Business Models: The Case of Mobile  
865 Services and Applications. *Telecommunications Policy*, 39(3-4), 218-240.  
866 Westerlund, M. and Leminen, S. (2011). Managing the Challenges of Becoming an Open Innovation  
867 Company: Experiences from Living Labs. *Technology Innovation Management Review*, 1(1), 19-25.  
868 Wikström, S. (1996). Value Creation by Company–consumer Interaction. *Journal of Marketing*  
869 *Management*. 12(5), 359–374.  
870 Zhong, X., H.H. Chan, T.J. Rogers, C.P. Rosenberg, E.J. Coyle. (2006). The development and eStadium  
871 testbeds for research and development of wireless services for large-scale sports venues. Paper presented  
872 at the 2nd International Conference on Testbeds and Research Infrastructures for the Development of  
873 Networks and Communities. Barcelona, Spain, March 1-3.

Domain (Giffinger and Pichler- Milanović, 2007)	Indicator
Economy	Components of domestic material consumption
People	Civic engagement activities
Governance	Usage and perception of applications based on open data
Governance	Usage and perception of institutional digital services
Mobility	Frequency of use and perception of bicycles and/or bike-sharing
Mobility	Frequency of use and perception of car-sharing and/or car-pooling
Mobility	Frequency of use and perception of public transportation
Mobility	Assessment of the extensiveness of efforts introduced to increase the use of cleaner transport
Environment	Perception of the total residential energy consumption
Environment	Perception of particulate matter emissions and air quality
Environment	Individual efforts to protect nature and the environment
Environment	Assessment of the extent to which citizens are willing to participate in environmental decision making
Environment	Assessment of the citizens' engagement in environmental and sustainability-oriented activities
Living	Perception of public safety
Living	Participation in cultural initiatives and events

Living	Use of public and green spaces
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875 Table 1: list of indicators used to assess the impacts of the TLL initiative.

Research approach	Number of projects
Create demand	14
Technical testing	4
Evaluation	12
Co-Creation	8
Context research	5
Discovery	2

876 Table 2: Distribution of the projects per research approach.

Target group	Number of projects
Private companies	18
Public administration	14
Citizens	13
Academia	1

877 Table 3: Distribution of the projects per target group.

Results achieved	Number of projects
No major result	15
Project improvements	8
New clients	8
Market commercialization	6

878 Table 4: Distribution of the projects per achieved results.

Benefits achieved	Number of projects
No major benefit	3
New relationships with commercial partners	12
New relationships with citizens	10
New commercial synergies	16
Knowledge on the public administration structure	18
Market visibility	18

879 Table 5: Distribution of the projects per type of benefit.

Complaints	Number of projects
Lack of focus	4
Lack of financial resources	5
Ineffective efforts to include utilizers in the public administration processes	7
Ineffective promotion efforts	8
Ineffective citizens' engagement efforts	10

880 Table 6: Distribution of the projects per type of benefit.



Gender		
Female	32	45%
Male	39	55%
Age		
18 - 25	7	10%
26 - 35	12	17%
36 - 45	19	27%
46 - 55	11	15%
56 - 65	11	15%
More than 65	11	15%
Profession		
Employee	24	34%
Self-employed/entrepreneur	8	11%
Student	7	10%
Retired	11	34%
Other/unemployed	21	30%

881 Table 7: demographic mark-up of the ex-ante survey respondents

Indicator	Ex-ante survey (%)	Ex-post survey (%)
Usage and perception of institutional digital services	23	37
Assessment of the extensiveness of efforts to increase the use of cleaner transport	45	68
Individual efforts to protect nature and the environment	45	63
Use of public and green spaces	46	26

882 Table 8: Comparison between the ex-ante and ex-post survey.