



Creating Continuous Smart City Innovations

This article highlights how a continuous innovation process can be applied to transform a city into a smart city, using Eindhoven as an exemplar case.

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Synopsis

The Netherlands, and especially Eindhoven, features in the top of most entrepreneurial, technology, and innovation rankings worldwide. Not only are its companies and universities successful in innovation, but also the municipality of Eindhoven can be seen as an exemplar for other cities. The Eindhoven tender provides an interesting leading example of how to use the public lighting infrastructure in a smarter way to go beyond illumination within an urban context. This white paper will describe the innovative context, the unique procurement approach of the city of Eindhoven, as well as the successful enrollment of the Philips/Heijmans consortium with its Smart City Continuous Innovation Process (SCCIP). We hope that by sharing our experiences from the Eindhoven case others can learn from them and be inspired to apply these to their own smart lighting or smart city context.

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Introduction

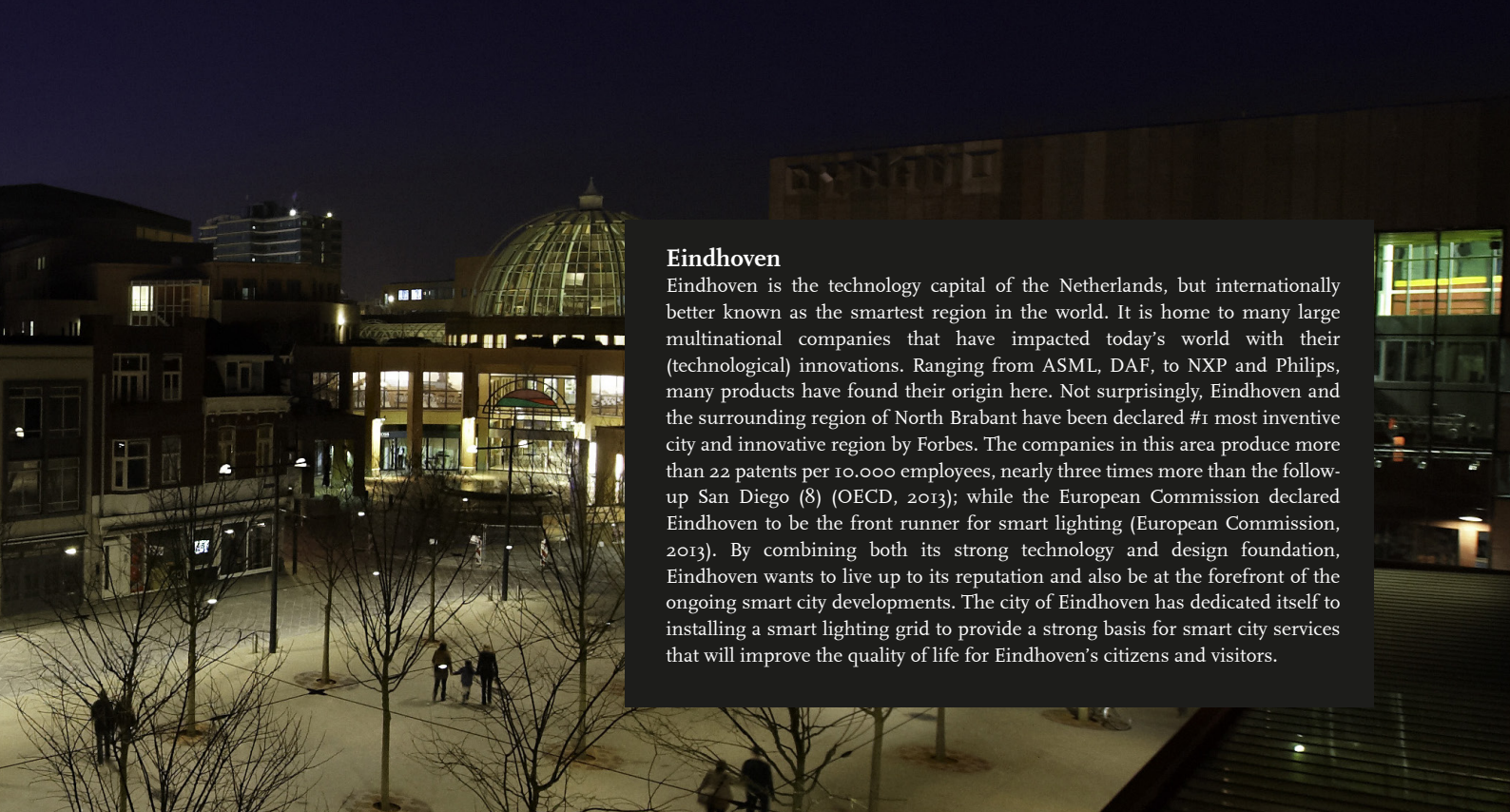
Some industry experts have predicted that within 10 years, energy savings through LED will deliver more environmental and economic benefits than any other clean technology, including electric vehicles and renewable power (Zhu, 2013). This LED revolution, with which it is already possible to achieve between 50-70% energy savings, could even result in up to 80% savings when combined with smart controls (The Climate Group, 2015). Not only is LED more energy efficient than other conventional street lighting, but it also limits light pollution, simplifies maintenance and can easily be connected digitally to other sensors. This provides a glimpse of how important it will be to incorporate LED in a public urban context, where efficient public lighting has a huge impact on a city's budget, with lighting consuming almost one fifth of global electricity and between 20-40% of a city's energy budget. These developments demonstrate the potentially profound role the lighting infrastructure can play in the context of smart cities. It is possible to state that LED has disrupted the lighting industry and has significantly impacted traditional procurement processes of municipalities as well as challenged the prevalent industry business models (Nylen & Holmström, 2015; Porter & Heppelmann, 2014). Besides energy savings, there are two additional arguments for the importance of public lighting in a smart city network: (1) the city-wide infrastructure of public lighting makes it possible to create a dense network of sensors and actuators on which smart city services can be based, and (2) public lighting is interwoven with a city's identity and character, which, with the smart city developments, has only become more important for a city to be able to distinguish itself. The market has shown that lighting can be functional and innovative, while providing a strong emotional impact through influencing atmosphere and moods of a particular streetscape or building. It provides support and a starting position for safety, health, communication, while being

*“A smart city is a developed urban area that creates sustainable economic development and high quality of life by excelling in multiple key areas; economy, mobility, environment, people, living, and government. Excelling in these key areas can be done so through strong human capital, social capital, and/or ICT infrastructure.”
(Business Dictionary, 2016)*

broadly accessible. Therefore, public lighting can be seen as a stepping stone for smart city services and new business models (den Ouden, Valkenburg, Schreurs, & Aarts, 2015).

Next to the disruption of LED, the shift towards urbanization that demands ubiquitous, resilient as well as publicly available communication networks, has a major impact on public lighting. By 2050, nearly 70% of the world's population will live in urban areas (UNESA, 2015). This rapid urbanization poses a lot of opportunities as well as challenges to today's municipalities and industries. Future cities will move from linear data collection, analysis, and reaction, to embedded, real-time data processing to initiate action across urban services and functions (Barrionuevo, Berrone, & Ricart, 2012). The dispersion of the street lighting infrastructure across the whole city allows for communication layers to be added to the existing street lighting systems or can be introduced with the installation of new street lights. Therefore, the importance of a sustainable infrastructure as a foundation for smart city services, places the public lighting urban network and its technology in a special spotlight.

'Smart cities' has been one of the most dominant digitization trends in recent years (Gaskell, 2016). Many cities have positioned themselves as a smart city by attracting and collaborating with industry and knowledge institutions, ranging from London, Dubai to Los Angeles. At the same



Eindhoven

Eindhoven is the technology capital of the Netherlands, but internationally better known as the smartest region in the world. It is home to many large multinational companies that have impacted today's world with their (technological) innovations. Ranging from ASML, DAF, to NXP and Philips, many products have found their origin here. Not surprisingly, Eindhoven and the surrounding region of North Brabant have been declared #1 most inventive city and innovative region by Forbes. The companies in this area produce more than 22 patents per 10.000 employees, nearly three times more than the follow-up San Diego (8) (OECD, 2013); while the European Commission declared Eindhoven to be the front runner for smart lighting (European Commission, 2013). By combining both its strong technology and design foundation, Eindhoven wants to live up to its reputation and also be at the forefront of the ongoing smart city developments. The city of Eindhoven has dedicated itself to installing a smart lighting grid to provide a strong basis for smart city services that will improve the quality of life for Eindhoven's citizens and visitors.

time most businesses are trying to be part of a smart city to ensure their share in this emerging multibillion-dollar smart city domain, including IBM, Huawei, Accenture, among many others (Barrionuevo, Berrone, & Ricart, 2012). Frost & Sullivan (2014) have estimated that this global smart city market will reach a value of \$1.565 trillion by 2020. However, most smart city initiatives hardly go beyond the pilot project phase and are only partly able to fulfill their promise of a better quality of life for a city's citizens and visitors. Connected lighting, on the other hand, can provide a city with a fundamental foundation towards becoming a 'smart' city. Yet we see that the traditional public lighting procurement approach does not consider this societal and technological evolution and its accompanying challenges. Traditionally, a public lighting procurement procedure would publish strict product and technology specifications to which a company taking part in the tender has to adhere to. With this approach there is no room for collaboration and innovation. This means that a municipality will miss the advantages of connected lighting and smart city opportunities and will require additional investments to upgrade to connected lighting at a later stage, which is far more costly. So, in order to benefit from these disruptive developments, both the municipality and businesses need to take action, if they want to compete in the emerging smart city market; the procurement approach and as well as the current business models need to change.

In the following sections we will share our experience of the Eindhoven tender from both a municipality as well as a Philips Lighting perspective and how both parties took a different approach to smart lighting and smart city public procurement processes. In section two, we will provide deep insights into the unique example of Eindhoven and how they changed the traditional public lighting procurement process to go beyond illumination moving towards smart cities. In section three, we will describe the smart city continuous innovation

process, designed by Philips Lighting, together with its consortium partner Heijmans and the Eindhoven University of Technology, to enable smart city propositions, going beyond pilot projects. Finally, in section four, we discuss the key findings and conclude with recommendations for the future.

Context

The Eindhoven tender is a unique example of how the municipality of Eindhoven adopted a different mind-set and approach, while at the same time challenging the companies involved to think beyond lighting products and illumination. From the beginning onwards, the municipality stated that the ultimate goal is to improve the quality of life in their city through continuous innovation in lighting and smart city applications. Philips Lighting, together with its consortium partner Heijmans, has carefully listened to and discussed with the municipality of Eindhoven. This open dialogue played a pivotal role in overcoming the hurdles of the Eindhoven tender. In collaboration with Heijmans and the Eindhoven University of Technology, Philips Lighting was able to design a long-term oriented process that will enable continuous innovation in Eindhoven using a quadruple helix construction. The people and citizen of Eindhoven are central to this innovation process and their needs form the starting point for any smart lighting or smart city application. Before publishing and awarding the Eindhoven tender several steps were necessary to ensure a successful innovative procurement process (EPEC, 2010). These steps can be split into four main phases, which will be described below: (1) opportunity identification, (2) creating vision and roadmap urban lighting 2030, (3) implementing roadmap urban lighting 2030, and (4) initiate public procurement procedure. While the first three phases are more municipality-centric, phase four was focal to Philips Lighting and its consortium partners.



Figure 1 Visualization of the vision of the future for Eindhoven based on the Roadmap Urban Lighting 2030 (den Ouden & Valkenburg, 2012).

Opportunity identification

The lighting department of the municipality of Eindhoven was facing the end of the (economic and technological) lifecycle of the luminaires in their city and were planning for a city-wide luminaire replacement approach. In the process of familiarizing themselves with recent lighting developments they realized that more was possible with LED than only lighting up the city. Additionally, the city of Eindhoven wanted to continue building on their legacy and strengthen their position as the 'city of light'. Realizing that more is possible the municipality set out to explore future opportunities for the municipality, the citizens, as well as (local) businesses. They entrusted experts from the technical university to dig deeper into possible (future) implementations of LED and what the impact of that could be on the city of Eindhoven.

Vision & Roadmap Urban Lighting 2030

The municipality challenged Lighthouse, the solution partner of the Intelligent Lighting Institute of the Eindhoven University of Technology, to fuse their smart city ambitions with existing and upcoming projects to create a vision of the future with the accompanying roadmap for public lighting in Eindhoven for 2030 (den Ouden & Valkenburg, 2012). Overall, the municipality of Eindhoven had two primary goals in mind that were formulated at the beginning of the project:

1. A smart lighting grid should facilitate data and services that will stimulate creative applications to improve the quality of life in the city, while continuous innovation results in new insights and services.
2. For the economic viability of the city the municipality wants to stimulate an ecosystem that develops new lighting solutions, including hardware and services that will be ultimately developed and realized by existing and new companies.

Key to achieving these goals is the implementation of a quadruple helix construction. Traditional procurement processes and ecosystems, which have worked in a triple helix construction, leave out the customer and/or end user. However, in a smart city setting, where the improvement of the quality of life is central, the demand side (i.e. the citizen) takes on a key role, which the traditional triple helix construction is unable to exploit. Therefore, working in a quadruple helix is essential for the development and deployment of smart city services.

For a more detailed overview of the key elements and suggestions of the roadmap we refer you to the publicly available roadmap document.

“[In] a quadruple helix model, government, industry, academia and civil participants work together to co-create the future and drive structural changes far beyond the scope of what any one organization or person could do alone. This model encompasses also user-oriented innovation models to take full advantage of ideas’ cross-fertilization leading to experimentation and prototyping in real world setting.”
(European Commission, 2015)

Implementing Roadmap Urban Lighting 2030

The roadmap, co-created with experts from the Eindhoven University of Technology, knowledge institutes and companies, was received very positively by the municipality and the other parties involved. However, the opportunities identified remained at a theoretical level at that point in time. To implement the roadmap opportunities the municipality needed an innovative procurement approach that would go beyond current practice. Two important decisions needed to be made: (1) cover the whole city lighting infrastructure at once or focus on specific areas first and (2) how to integrate the aspect of innovation in a public lighting tender. To answer both decision points the municipality team chose for a

competitive dialogue phase, a procedure ideal for complex tasks, and combined it with a best value procurement (BVP) approach in the final phase of the dialogue phase. This procedure can be linked to the notion of Public Private Partnerships (PPP), while the focus here is on joint value creation and less on joint value appropriation (Burnett, 2009).

Public Procurement Procedure

A competitive dialogue procedure can be defined as followed: "Contracting authorities undertake a pre-qualification process and then invite short-listed candidates to participate in a dialogue process during which any aspects of the project may be discussed and solutions developed. The contracting authority can continue the dialogue until it identifies one or more solutions that are capable of satisfying its requirements. It then closes the dialogue and invites final tenders. Only limited discussion and clarification is permitted once the dialogue stage has closed which does not amount to 'negotiation'." (EPEC, 2010).

Essentially, this competitive dialogue procurement involves three key stages: (1) pre-dialogue activities, such as project set-up, planning and preparation before the contract is advertised; (2) the dialogue phase, which includes how to manage the dialogue meetings, organization and resource requirements, and prepare for the closure of dialogue; (3) the post dialogue phase which covers the call for final tenders, competition issues and the scope for clarification of bids at the final tender, and the preferred bidder stages. Each phase will be described in the following part.

Pre-Dialogue Activities

This phase has been covered throughout the development of the roadmap. Additionally, the municipality organized a market consultancy session that was open to any interested party. A large range of companies participated, including international (lighting) companies. After the consultation session eight parties were invited to a one-on-one meeting with the municipality. All were very positive about the innovative approach of the municipality of Eindhoven and in the end four consortia qualified and were selected for the dialogue sessions. However, many parties did not follow through and were not involved in the following dialogue activities. The general impression of the municipality is that the threshold probably was too high for (smaller and international) companies to join, as this tender goes beyond their current budget and/or (language) capabilities.

Dialogue Phase

The municipality's main aim was to develop and give form to the roadmap vision through interacting and exchanging with knowledge institutions, industry and citizens, acknowledging that they do not hold all the necessary knowledge themselves to execute such a large scale ambition. One of the key elements of a 'Best Value Procurement Project', used by municipality of Eindhoven, was the dialogue phase. All three consortia subscribed to the Eindhoven procurement project were invited for a separate competitive dialogue session with the municipality in which implications of legal, financial, and organizational issues were discussed in more detail. The intended goal of the dialogue phase was to focus on the 'why' and the 'what' questions and less on the 'how'

questions. More specifically the goal was to (1) optimize the scope of the requested products and services provided by the consortia, which resulted in the final scoping of the project, (2) concretize and decide on the final assessment framework that will be used for the awarding phase, (3) determine the Key Performance Indicators (KPIs) for the performance contract for quality assessment, (4) determine and define the terms and principals for collaboration between the contracted consortia and municipality, (5) gain insights into the relation between the offered solutions and the consequences on legal, financial, organizational and technical aspects. Information sharing, determined beforehand by the municipality, was done through formal contact moments. In total there were three official dialogue sessions between each consortia and the municipality, covering a timespan of one and a half years. All information was sent to the municipality four weeks prior to the dialogue session. Three key elements were taken into account during the dialogue sessions: innovation, organization and market potential (business potential). After these sessions the consortia received feedback from the municipality to sharpen their offer. Next to this, also expert meetings were planned focusing on specific topics such as 'open data' and 'governance' to get more detailed information on what was not covered during the dialogue sessions or which needed more clarification. This process helped the municipality to learn from the different consortia, while the consortia got the opportunity to understand the needs of the municipality in greater depth. Through this open sharing approach both parties were clear on each other's expectations and reached an additional level of understanding.

Post Dialogue Phase

After finalization of the dialogue phase with the remaining three consortia (one consortia dropped out), the municipality applied the award criteria that were defined in the previous phase to assess the final bid documents of the parties involved. The bid documents were assessed on four performance criteria and three quality criteria:

Performance Criteria:

1. Upgrade public lighting grid to a smart lighting grid (15%)
2. Steering the quadruple helix (15%)
3. Exploitation of smart lighting grid (10%)
4. Sustainable solutions (15%)

Quality Criteria:

1. Risk document (15%)
2. Additional future opportunities (15%)
3. Key staff involved (15%)

After a careful consideration of the three bid documents, the Philips/Heijmans consortium scored the best overall and was awarded the Eindhoven tender contract. Next to the high quality product and service offering of the Philips/Heijmans consortium, the consortium stood out with its smart city continuous innovation process, or in short SCCIP. This process provides a foundation for rolling out a smart lighting grid on which smart city applications are based on. We describe this process in detail below.

Solution

Working in a quadruple helix construction and providing continuous innovation is very different from anything most municipalities and Philips Lighting have done in the past, especially in a lighting context. Before being able to work and implement propositions that leverage the smart lighting grid, Philips Lighting designed a process, together with Heijmans and the Eindhoven University of Technology, to help structure the often fuzzy front-end of innovation. The SCCIP captures the different stakeholders, their roles, and how the quadruple helix can go from identifying needs, to open innovation and finally implementation.

Stakeholders

All four primary stakeholders of the quadruple helix construction are crucial, bringing each their own experience and expertise to the table. Therefore, they are all given a specific role in the SCCIP.



GOVERNMENT



BUSINESSES



BUSINESSES

Municipality

The municipality plays the facilitator role in the SCCIP, providing the context and a basic set of resources, and the guardian role, balancing individual and public interest. They are responsible for ensuring the quality of life and providing a safe and vibrant environment for their citizens. Additionally, they want to differentiate themselves from other (competing) cities and are keen on setting a clear vision and image for their city. The challenge for the municipality lies in developing innovations and joint financing mechanisms across different silos. This asks for significant internal and external alignment and collaboration, which at the same time requires a different mind-set and way of working.

Eindhoven case: Both the public lighting and the innovation department of the municipality of Eindhoven worked closely together to initiate this procurement process. At a later stage, other departments from the municipality of Eindhoven can be involved, depending on the smart lighting/city propositions that are developed through the SCCIP. By designing the roadmap a clear vision was defined for the city of Eindhoven, to ultimately position itself as 'the city of light'.

Consortium

A consortium consists of two or more parties that complement each other. Due to the long-term nature of these public procurement processes and the large investments upfront, incumbents are in a more favorable position to sign up compared to start-ups and SMEs, as they simply have more resources (both financial and human) with a higher guarantee for a municipality of seeing such a project successfully to the end. Within the SCCIP, the consortium has the leading role. They facilitate the process and involve the relevant stakeholders that can contribute to smart city services, while being legally and financially responsible.

Eindhoven case: For the Eindhoven case Philips partnered up with Heijmans, an incumbent in the field of infrastructure installation and maintenance, complementing Philips Lighting's core capabilities, making it possible to create a diversified bid document for the procurement phase.

Local SMEs

In an era of open innovation, co-creation, crowdsourcing, public-private-partnerships, etc. it becomes clear that one company alone will not reach the impact that innovations created from and with the crowd do. Other companies, and especially start-ups and SMEs, are able to innovate faster and sometimes more in depth, than any consortium could do, as they know their local market better than anybody else. Therefore, local SMEs play an important role in developing and implementing smart city propositions, stimulating the local economy and achieving growth.

Eindhoven case: While the consortium will be responsible for providing the smart lighting infrastructure and grid, including a platform, (local) SMEs will create additional services and solutions that matter for specific city areas, improving the quality of life.



BUSINESSES

Incumbents*

Incumbents play a similar role as the local SMEs. With their expertise and possibly already existing propositions they can enrich the smart city environment in a specific city. At the same time, living lab constructions enable incumbents (as well as other stakeholders) to test propositions before scaling them to other cities and vice versa. Interesting new partnerships and business models can result from such a collaborative approach.

Eindhoven case: Incumbents from Eindhoven and the area around it will also be able to test and implement existing and new propositions based on the smart lighting grid; first in the living labs and then throughout the whole city.

* An incumbent is referred to as a company that is powerful and has a large amount of market share and is typically the largest player in a given industry.



CITIZENS

Citizens

Citizens and their needs are central to the SCCIP by playing a pro-active role through co-creation and co-development. It is the responsibility of the consortium to include the citizens throughout all phases of the SCCIP. Their insights and ideas provide inspiration in the need identification phase, while during the open innovation phase they are actively involved in creating and shaping smart city propositions. In the implementation phase citizens provide valuable feedback for improving and developing follow-up propositions.

Eindhoven case: The citizens of Eindhoven were involved from the beginning onwards. During the roadmap creation and the dialogue phase citizens were actively participating by providing input and evaluating solutions. They will have a similar role in the SCCIP process, where they can both propose solutions for the smart lighting grid as well as provide feedback on solutions and services being tested (both in the living labs and throughout the whole city). Their input is key for the iterative process of the SCCIP.



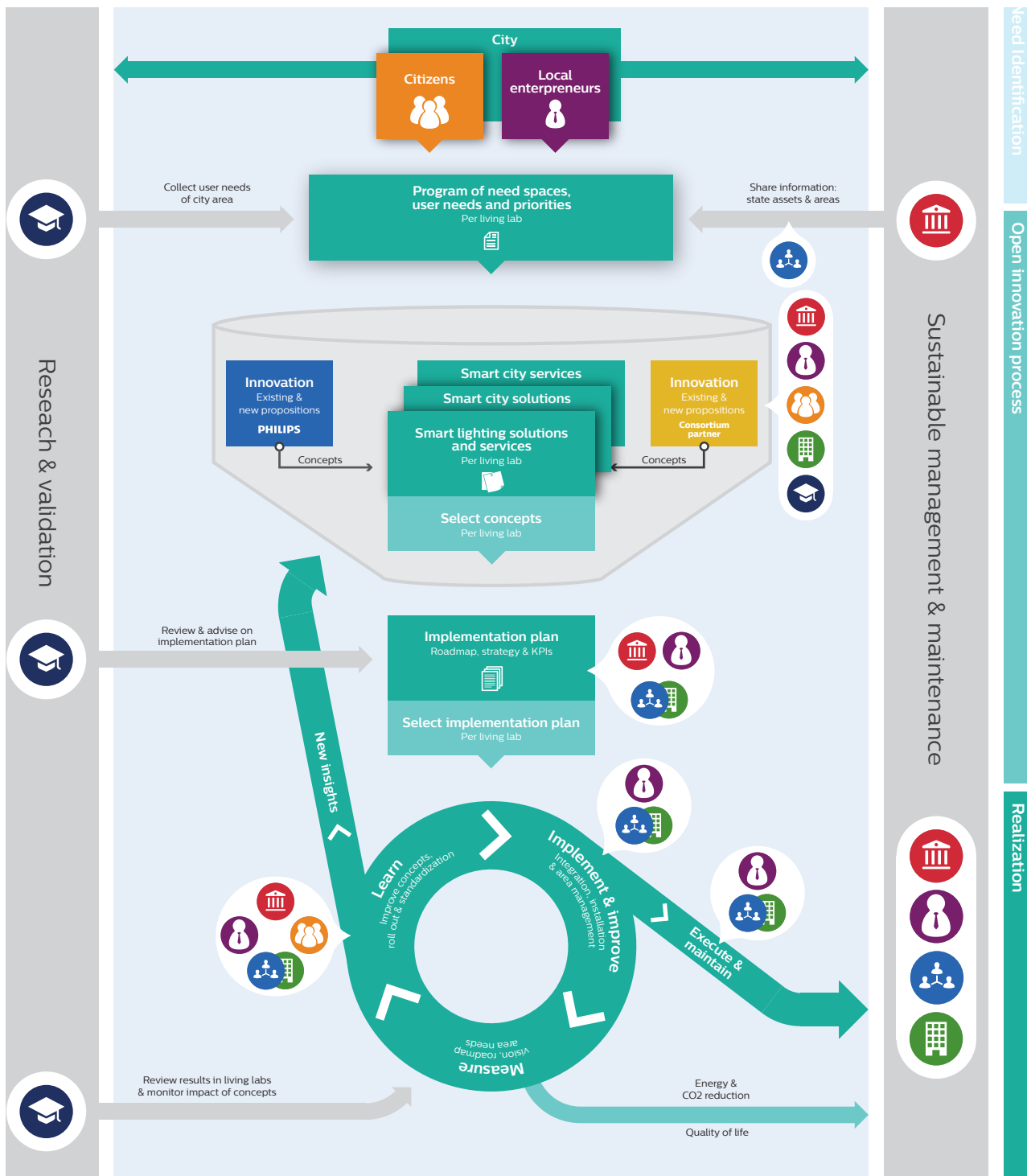
KNOWLEDGE INSTITUTIONS

Knowledge Institutions

Knowledge institutions have a dual function within the quadruple helix model of a smart city context. First, they provide feedback on what kind of smart propositions are valuable and how to implement them, based on their own research and findings. Second, they are an independent party and are, therefore, responsible for objectively measuring and evaluating the effectiveness of realized smart city propositions. This feedback is very valuable for the improvement and development of propositions.

Eindhoven case: The Intelligent Lighting Institute of the Eindhoven University of Technology was responsible for creating a shared vision for Eindhoven 2030 on urban lighting. Their knowledge and expertise on past developments and future trends related to public lighting and smart cities provided in depth insights for the municipality, without which the public procurement approach would not have been initiated. Furthermore, the Eindhoven University of Technology will be responsible for identifying needs within the 10 living labs selected by the municipality and also for monitoring the success of propositions within these living labs, providing challenging opportunities and projects for students, while giving the consortium and the municipality interesting insights in specific city areas.

Smart City Continuous Innovation Process (SCCIP)



Phases in SCCIP

Within this continuous innovation process there are three main phases: (1) Need identification phase, (2) Open innovation phase, and (3) Realization phase. These three will be described in detail below.

Need identification phase

The goal of the SCCIP and the Eindhoven case in general is to create new services and solutions, based on a smart lighting grid, that matter to the people living in the city. Key to creating highly relevant services are identifying needs of potential stakeholders (e.g. citizens, visitors, local entrepreneurs, etc.). An independent party (i.e., a knowledge institution) will be responsible for collecting and analyzing insights and translates these into needs. These needs can be combined with additional meta data from the municipality or other institutes active in this area (think of for example social housing cooperations, insurances, central bureau for statistics, etc.). This will result in a program of need spaces/ requirements and priorities per area (i.e., living lab).

Open innovation phase

To move from needs/requirements and priorities to implementable solutions that meet these needs, three phases were created that can run in parallel.

1. Smart Lighting Solutions & Services: Already existing or envisioned solutions from the innovation roadmaps of the consortium partners that meet a certain need can be introduced as soon as possible in specific areas. Additionally, insights generated from phase one can be used for an inside-out approach.

2. Smart City Solutions: New propositions will be developed together with commercial partners during co-creation sessions. These could be existing solutions or new solutions that can be enabled through the smart lighting grid (or beyond). These proposed solutions also fit the need/ requirements of that particular living lab.

3. Smart City Services: Through co-creation, e.g. during a hackathon organized by the consortium, all interested stakeholders (including citizens, knowledge institutes, municipality, local businesses, etc.) can be involved to develop new services based on the smart lighting grid that answer to specific needs.

Realization phase

The final phase of the process focuses on two activities:

1. Implementation plan: together with the quadruple helix partners a strategy, roadmap and KPIs are defined for implementing potential services and solutions. These measures will be used to assess the effectiveness of the implemented solutions in the living lab areas. When these results are positive it will be possible to roll out the solution throughout the whole city.

2. Execution and maintenance of the implementation plan: While services and solutions are being tested in living labs, an independent party (in this case the Eindhoven University

of Technology) will closely monitor the effects of a specific solution, based on energy savings, CO2 reductions and improving the quality of life. After a pre-defined amount of time the quadruple helix partners will define the next steps and which innovations will be rolled out. All insights will be captured and used as input during the open innovation phase.

As this process stays on a high level, an additional step-by-step approach, including a timeline, was developed. Due to space limitations this approach is not included in this white paper, but can be shared upon request.

Discussion & Conclusion

The promise of a better quality of life combined with the estimated smart city market potential provides an attractive playing ground for many (potential) stakeholders. At the center of the smart city developments and the associated quadruple helix construction lies the citizen or user and his/her needs. Key to successful implementations of relevant smart city services are public-private-partnerships or quadruple helix constructions that share knowledge and expertise between the different stakeholders. In this white paper we specifically explore the Eindhoven case and extrapolate our key findings from both the municipality as well as the Philips/Heijmans consortium perspective. While we observe a change in mind-set and way-of-working for both, there are two separate key learnings for each of the two.

For the municipality this whole project was a search for the optimal approach and process for creating and implementing smart lighting and smart city solutions for Eindhoven going beyond mere pilot projects. Especially the first part of the process, including developing and co-creating the roadmap and identifying the appropriate public procurement process for such a large scale project, provided the greatest insights. More specifically, the municipality had to organize internally across silos and take an open dialogue approach, while putting the emphasis on learning from each other. A municipality should be open and transparent in its procurement approach, even beyond lighting projects, and should take a pro-active attitude in sharing their experience with other cities. The dialogue phase enabled open communication between the municipality and the consortia, where the municipality of Eindhoven had a clear facilitator responsibility. During this phase an open exchange took place, where all parties involved were able to shape and steer the discussion resulting in key criteria and learnings for all stakeholders. Through this open discussion, the consortia were able to develop an innovative offering going further than any company could have developed on its own. It is safe to say that this procurement procedure was key in the development of the continuous innovation process, which will facilitate innovations beyond lighting. Overall, it remains a challenge for all stakeholders to balance asking open questions while at the same time demanding specific answers. While topics, including open data, data ownership, competitive procedures, and aligning all parties involved in a consortium, among others, remain challenges that need to be dealt with on a regular basis.

From a Philips Lighting perspective it became clear that smart city services can only be achieved through internal alignment and external collaboration. More specifically, Philips Lighting needs to innovate across the sales, business and R&D departments and open up to external partners (such as Heijmans and the Eindhoven University of Technology) in a consortium setting. Traditional silo thinking does not cover the breadth, depth and complexity of smart city services. On the contrary, the organization needs to have one common goal to be able to deliver on the promise of smart cities. At the same time, we see a shift from the prevalent product mindset of Philips Lighting, which finds its origins

in more than 120 years of product sales, to a more process and service oriented approach. Innovation should become a more value-driven process, facilitated through an open innovation and co-creation approach. In line with this, value appropriation within smart city services demands a more long-term orientation, as opposed to the more short-term oriented product appropriation focus. Organizations and especially incumbents need to learn to be more open, both towards consortium partners as well as to other stakeholders in a smart city ecosystem. In these settings, there needs to be a balance between offering locally tailored solutions and scalability on a global level. Municipalities, and also other customers, are not always aware of what is possible and implementable, so part of the challenge is to also educate them and show them the opportunities as well as the limits for smart city services.

All in all, we see that the Eindhoven case, which challenged the traditional public procurement approach and changed the mind-set towards focusing on improving the quality of life, is not a one-of-a-kind case. Many other municipalities, on a global basis, feel limited by the current product-oriented procurement procedures and traditional product business models of companies. Municipalities are, therefore, challenging businesses, and all potential stakeholders, to go beyond products by leveraging their technological knowledge to create and deliver smart city services that will improve the quality of life in their respective city.

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