ENIGMA

ENLIGHTENMENT AND INNOVATION, ENSURED THROUGH PRE-COMMERCIAL PROCUREMENT IN CITIES

Report on the potential benefits of open innovation processes for PCP

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SEVENTH FRAMEWORK PROGRAMME

Public report

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About ENIGMA

The goal of the European-funded ENIGMA project is to bring radical improvements to the quality and efficiency of public services by supporting the development and validation of breakthrough solutions in the field of public lighting through a joint Pre-Commercial Procurement (PCP). The partners also aim to demonstrate how PCP can be used in a transnational context to tackle common city challenges across the EU and improve the quality of life of their citizens.
After analysing local lighting needs in its five partner municipalities, ENIGMA will translate these common challenges into an open call for solutions. Businesses and consortia applying at this stage (phase 1) will be selected against the call criteria and the best proposals will receive funding to develop those initial ideas into functioning prototypes (phase 2) and a limited number of test products to be deployed in the partner cities (phase 3).
While this procedure will bring visible changes to the urban environment in the 5 partner local authorities, the project also aims to help other public purchasers in Europe to use this methodology in their domain of choice. Face-to-face training and exchange events, as well as guides and e-learning materials on how to successfully implement this innovative procurement methodology, are the key tools to effectively support take-up candidates in overcoming real or perceived barriers to implementation. ENIGMA includes a broad portfolio of dissemination activities that are aiming for high visibility.

About this report

This is a report on the potential benefits of open innovation processes for PCP.

Open innovation has the potential to significantly contribute to the success of PCP processes. For this reason, ENIGMA compiles here a report describing this potential and outlining recommendation for future reference by other actors engaging in PCP processes, to stimulate open innovation processes, and cooperation among stakeholders, including bidders.
It discusses the notions of Open Innovation, of Pre-Commercial Procurement and the potential of open innovation to contribute to successful PCP processes.

Content

1. Pre-Commercial Procurement

Pre-commercial procurement is a special purchasing method that can be used when the services/ products that are needed do not exist yet. It allows the buyer to specify the needs the required service/product should respond to, afterwards allowing businesses to compete to provide a solution. PCP usually follows a step approach, where companies initially apply with ideas to an open call; subsequently, they must develop proposed solutions, prototypes and a small batch of products that will allow the purchasing authority to select the most promising ideas that respond to their needs.

1.1. PCP as an innovative public procurement tool

Regarding public procurement and PCP, we can discuss the demand perspective (in this project the cities' joint ambition) and PCP as a procurement tool. The aim is to achieve innovation through innovative friendly procurement.

Public sector is a large buyer of a broad range of services and goods. In the literature on innovation the demand side is regarded as being important since a large demand for new products spurs research and development as well as product and process innovation (Uyarra and Flanagan, 2010; Aschoff and Sofka, 2009). Since the public sector plays a significant role in the economy in many countries around the world, this would mean that the public sector could influence the supply side (Uyarra and Flanagan, 2010; Aschoff and Sofka, 2009). Public procurement could therefore be seen as a demand-side oriented tool for stimulating innovation (Uyarra and Flanagan, 2010; Aschoff and Sofka, 2009). However in order for demand-driven innovation to work, the procurement process in the public sector needs to be innovative friendly. The concept of innovative friendly procurement refers to the ability to through the procurement process be able to enlarge the market for a certain type of product or service, to facilitate the emergence of new standard technology or to change the market structure by making it attractive for new entrances (Uyarra and Flanagan, 2010).

With the size and scope of public sector procurement public procurement could potentially have, through the demands they have in the procurement process, a substantial impact on the market. This however requires the ability for public authorities to re-think the procurement process and learn how to demand different things from the suppliers. This is a challenge that requires a break with the traditionally risk-averse public sector culture. Especially challenging is it probably for local authorities that often are small and therefore do not have access to the same resources and competences as do larger organisations.

It is not only the public purchasing process that needs to be reconsidered, also actors in the market need to re-think the procurement process and its purposes and the relationship between

supplier and buyer needs to be re-shaped. Pre Commercial Procurement (PCP) can play an important role as a tool for accomplishing this.

As mentioned above innovation in the procurement setting could refer to two things, i) the goods and/or services to be contracted do not exist and may therefore not be pre-defined, ii) the way the procurement process is executed, i.e. the process is new in one or more parts. Either way, potential sellers may be challenged, PCP as a tool works with both these things. That is, PCP enables for buyers to ask for something new at the same time as it is a way to re-shape the procurement process.

PCP is a tool that enables demand driven innovation, meaning that the purchaser does not buy a product, but instead articulates a need or a problem that products and/or services that already exist on the market does not solve. By articulating this need or problem the purchaser invites the actors on the market to create a solution that in a better way than existing products correspond with their needs. To use the public sector as a driver of innovation was also the purpose behind the decision by the EC commission in 2006 to introduce PCP as a tool (Edquist and Zabala-Iturriagagoitia, 2014). What needs to be kept in mind is that PCP as a procurement tool is new and the knowledge and research regarding how well it actually works in practice is scarce (Edquist and Zabala-Iturriagagoitia, 2014) and it is therefore difficult to make any statements regarding the actual effects of PCP.

The PCP methodology differs from traditional public procurement since what is being purchased is an innovation. Furthermore, the PCP procurement process differs from that of traditional public procurement. PCP usually follows a step approach, containing three different steps (Edquist and Zabala-Iturriagagoitia, 2014). The first step concerns an evaluation of solutions. Among the offers that was handed in a, in the tendering, pre-defined number of suppliers that will proceed to the second step, should be selected. The second step is the prototyping phase; during this phase the selected suppliers develop prototypes of their proposed solutions. The prototypes that are regarded as having the most potential will be selected to proceed to the third step. The third step finally is called the testing phase and the focus here is to test the developed solutions in the field. Each of these three steps contains an evaluation of the proposed solutions and a screening process. The number of proposed solutions that will be selected for each phase as well as the evaluation criteria need to be defined in the call for tender. After the end of the third phase and if the product/service developed and tested is regarded as interesting, there can be a regular procurement with the goal to purchase the product/service developed (Edquist and Zabala-Iturriagagoitia, 2014). It could be the same public agency that conducted the PCP or another organization interested in the product/service developed that initiate such a procurement process. Alternatively the company/companies that developed the product/service could make an effort to commercialize the innovation on their own (Edquist and Zabala-Iturriagagoitia, 2014).
Before a call for tender could be issued there is however a need for a purchaser to articulate the actual needs or problem for which a solution is sought, for this knowledge about the services as well as a new way of thinking regarding purchasing is required. What is needed is to move focus away from existing products and/or services and start thinking in terms of articulating problems and/or needs. Further the problem or needs, needs to be articulated in a way that is comprehensible and tangible enough for potential bidders to understand, but that is not so

detailed that it inhibits innovation and creative thinking and opens up for new market constellations. There is also at this stage a need for the purchaser to get to know the market and to make potential bidders see the value of engaging in a PCP process.

The above shows that PCP is aiming for dialogue between suppliers and users.

Within the ENIGMA project, the PCP methodology and application has been elaborated in four trainings:

1. www.enigma-project.eu/en/Learning/Trainings/Training-on-PCP-needs-assessment/
2. www.enigma-project.eu/en/News/ENIGMA-discusses-PCP-business-cases-in-Stavanger/
3. www.enigma-project.eu/en/Learning/Trainings/Training-on-PCP-functional-specifications/
4. www.enigma-project.eu/en/Learning/Trainings/Training-on-PCP-legal-and-IPR-issues/

www.enigma-project.eu/en/Learning/Videos/Videos/

1.2. PCP from the ENIGMA perspective

There are two dimensions of development challenges that ENIGMA deals with:

1. The development challenge that has been articulated as a joint ambition by the WP1 deep dives in combination with the WP1 scouting of the solution space. The joint and city specific ambitions, development desires and the related circumstances are summarised in the Challenge Brief.
2. A procedural challenge to make the wanted development process happen, considering the application and business context where the ENIGMA project has been set up. One basic precondition is that lighting is a time-honoured business sector that has been used to a stable technical foundation. At present the lighting technology and also the knowledge about and interest in light is changing. This is one background for why ENIGMA is aiming to open up for new kinds of border-crossing collaboration.

From development and innovation point of view, the PCP methodology in itself is aiming for an open mind-set, open dialogue and open collaboration. In this project, the ENIGMA procurement is also aiming to facilitate combined application of a variety of products and knowledge from a broad range of suppliers, for a variety of Smart City development goals. The first two phases of the procurement process are aiming for innovative development of an ICT-based smart city platform and then the functionality of this innovative platform shall be demonstrated by innovative implementation at the five pilot sites, in phase 3. One particular procedural challenge is to grasp the connection, similarity and simultaneous distinction between the project's ambition to develop

a generic innovative platform and the forthcoming diverse implementations of this platform, which will be exemplified in the phase 3 demonstrations.

There is a need for one kind of open collaboration to develop an ICT-based innovation platform and another kind of collaboration to make full use of the implementation platform that will be developed in phase 1 and 2 of ENIGMA, see also figure 1 below.

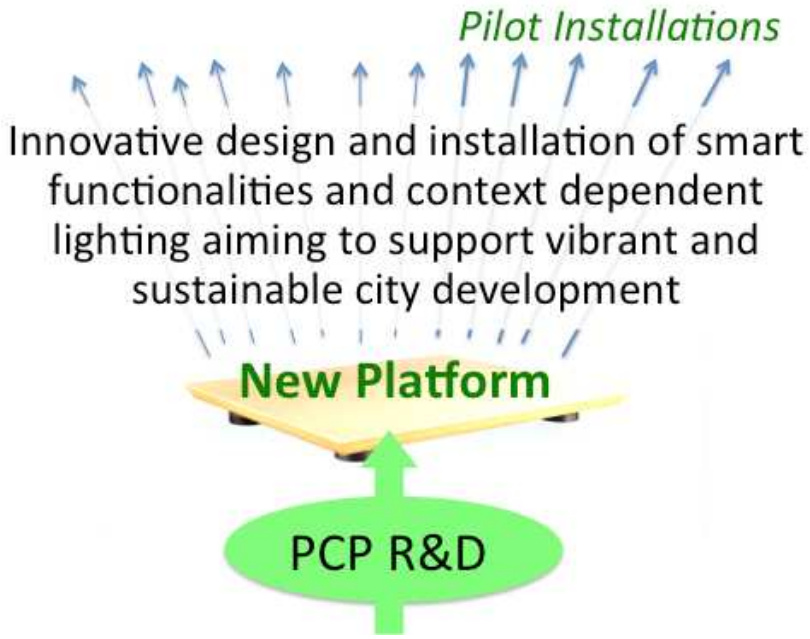

Figure 1 The ENIGMA structure from a start in generic developments to the phase 3 pilot implementations.

The development of the "platform" is likely to take a starting point in ICT-related developments. The utilization of the platform has to engage a broad set of different application oriented actors, more related to the value chain actors that are procuring, designing and installing the various lighting implementations, where the "platform" will be used.

To make the Figure 1 platform truly useful, for various context dependent solutions and implementations, it is vital to relate to the implementation and value chain knowledge perspective already in the initial development of the platform.

1.3. Summary of the procedural challenges

One background challenge for the ENIGMA PCP is that the technical foundation for lighting related business is changing quite dramatically. The new SSL and the ICT of today are enabling a new level of freedom of action for innovative implementation of ICT in synergy with development of smart lighting. Furthermore, new lighting related knowledge is evolving and starting to catch more attention. This means that the conceptual framing is changing and this is a challenge for renewal oriented value chain collaboration and developments, both from content point of view and also from process point of view.

2. Open Innovation

Open innovation (OI) is a business paradigm that assumes that firms grow stronger by being open with their ideas and on-going development work. The openness enhances the possibility for value-creating cross-pollination between different kinds of ideas and knowledge. A firm that is open with its development ambitions has a better chance to be a magnet for constructive feedback, competent collaborators and to attract employees with a true interest in what the firm actually is trying to achieve. To catalyse relevant open dialogue it is vital to mobilize sufficient concerted "investments" in "real life experiments" with new creative ideas.

2.1. Open Innovation from a business perspective

The focus of contemporary questions on business growth is no longer revolving around why innovation is important since it has been shown to drive business prosperity and high profitability. It is rather focusing on how to innovate and how innovation processes can be managed.

The notion of open innovation was first proposed by (Chesbrough 2003a; 2003b) as a model for the management of innovation based on the need for companies to open up their innovation processes and combine internally and externally developed technologies to create business value. (Tobias Fredberg, Maria Elmquist & Susanne Ollila - Chalmers University of Technology 2008)

There are many OI processes that firms can follow. Some examples are: (Enkel and Gassmann 2007)

- customer and supplier integration
- listening posts as innovation clusters
- applying innovation across industries
- buying intellectual properties
- investing in global knowledge creation

Collaboration across the value chain as well as within and trans-sectorial appears to be a fruitful open innovation practice. The same applies to participation in external challenge-driven innovation processes as it has been shown that a central part of innovation process is to organize search for new ideas that have commercial potential (Laursen & Salter, 2006).
Amongst the various OI principles identified in research (Chesbrough, 2003a; 2003c) there are some that appear most relevant to our focus.

- Not all smart people work in-house – need to tap into external knowledge
- External R&D can generate significant value to us
- A strong business model is more important than first to market

- Internal as well as external ideas are essential to win

OI has a significant implication to business models (Chesbrough 2004, 2007):

- it enables companies to be more efficient in creating and capturing value
- increases the importance of co-development partnerships for innovation
- increases the sources of ideas

If we consider the cities in the role of companies in this respect, the above has a significant implication to the challenge that the cities are posing in ENIGMA. We may say that the cities are using the OI model to gather external ideas/value propositions/R&D, to enable their vision to come true. This is achieved through the PCP process, which is a completely open and transparent call with a challenge description and some general assessment criteria instead of concrete specifications.
This allows the cities to stimulate the offer of an innovative solution:

- through R&D investment for value creation new ideas which may not have materialised otherwise due to the rising costs of technology development and the shortening product life cycles which make it harder for companies to justify innovation investments.
- through stimulating business collaboration in innovation activities as no one company may be able to satisfy the PCP.

It is vital to consider:

- The notion of open innovation
- Business models
- Organizational design and boundaries of the firm
- Leadership and culture
- Tools, technologies
- IP, patenting and appropriation
- Industrial dynamics and manufacturing

Open innovation also provides possibility for:

a. Risk limitation
b. Cost sharing
c. Faster process

3. The Case of ENIGMA

3.1. PCP in the framework of ENIGMA

The PCP in this project aims for customer-initiated market-based innovation with the ENIGMA cities as public customers that articulate vital societal sustainability needs and provide engaged constructive feedback on various kinds of business propositions. We aim for an open innovation process that takes a main starting point in what the pilot cities need and want. To build true public motivation to really engage in renewal oriented innovation, it is important to elucidate the human sustainability advantages that can be created as a result of more knowledgeable and innovative implementations of ICT.

One key to make things happen is to attract and engage entrepreneurs and enable them to start to do experiments with new value enhancing solutions. To build interest in the PCP dialogues and to get relevant feedback it is vital to make real life demonstrations of at least parts of the new opportunities as early and clearly as possible. This task will explain how learning's from triple-helix and open innovation can be used in PCP-based collaboration.

3.2 Open Innovation in the framework of ENIGMA

Open Innovation in this project is used as a model for a process that is aiming for open dynamic dialogue and cooperation among a variety of actors and stakeholders, with a focus on potential bidders in PCP process and their interaction with the ENIGMA cities and other participants. As such, Open Innovation has potential to significantly contribute to the success of the ENIGMA PCP process while driving innovation and business growth for the activated companies.

With this focus in mind we are not concerned in this report in the analysis of all aspects of open innovation but rather the ones that are relevant for the accomplishment of the above potential in order to satisfy the procuring cities' joint ambition.

Potential of Open Innovation in the success of PCP

As Open innovation provide possibilities for amongst others risk limitation, cost sharing, faster innovation processes, these goals seem well aligned with the purpose of the PCP. In this section we explore why and how this can be achieved in a PCP process.

The background reason for the need of open-minded (cooperation, dialogue) innovation is that the ENIGMA project is trying to catalyse consortia initiation to open up for a rethinking among the lighting sector actors, at all levels from the one-person light-design consultants up to large manufacturers, and also including public sector lighting procurers.

One aspect of the needed rethinking is that the disruptive change (the change in freedom-of-action) is so large that it is likely that it will be actors with new business models and that are used to short product cycles that take new strong positions on the new smart system market.

Established actors with vested interests that try or keep their position of control (power) and only engage others (e.g. ICT-actors) as sub-suppliers are likely to take a large risk. We knew this before from the ICT-sector where vested players because of closed system innovations where eventually ousted by new innovative, open innovation players that share and co-create. It is these kind of business models that the lighting industry is moving to. The failures of the pilot projects as described in ENIGMA deliverable D1.1 (state of the art) are a clear signal that new ways of cooperation are needed to create new products and services based on open innovation methods.

Discussions in the ENIGMA project team, such as held during the Malmö/Lund meeting in January 2014, with participants from the Lighting Clusters and public procurers have typically mentioned the way in which actors from different sectors perceive the speed of change and impact of these new business models. There is an inherent drive for change but guidance by procurer seems needed to focus on credible demands from public procurers. Participants in Lighting clusters (often SME's) can then focus in creating these innovations by themselves or with others.

However a second line of reasoning can be detected. Intentionally or due to their mental models the Lighting people want this to be a Lighting project. They seem to feel that it is a threat when we suggest that this is an ICT-based field of development, i.e. that is a field of development were we think that ICT-actors can take important parts of the development leadership. These inherent barriers need to be broken down in a process to allow them to gain confidence and trust and to make them start to work together in an open way.

The ENIGMA projects profits directly and indirectly by the close alignment with the SSL-erate project in which capability building of both lighting industry actors and public procurers are trained in ways to create green business opportunities; public procurers are trained to become more aware of different approaches to innovation and can spot their benefits. In this way the mind-set for open innovation has been brought to key players in the SSL-erate project; allowing them to grasp the full potential for the ENIGMA-project; not only to define the PCP-call for tenders, but also in preparing the industry to create successful partnerships that are able/capable to responds to a challenging, cross-domain call for innovations.

Key question here is how does the PCP process intervene as a guiding principle for the needed open innovation outcomes?
Traditionally the PCP process has been divided up in three phases. In the main bulk of literature all emphasis has gone in these three phases. In report 2.1 (report on PCP knowledge base) and the training sessions held early 2014; we have identified that it is actually phase 0 where the foundation for a successful PCP is created. It is in this phase, where in relative freedom and without formal constraints participants are invited to share visions, ideas ad dreams and are confronted with practicalities, barriers and limitations to possible technologies. Key here is to map out what is the right ambition level, without asking for solutions that are too advanced or complex for a PCP-development call.

Referring to the dialogues held in Malmö; the following InterOperability based structure was mentioned to create a bridge between partners on different levels:

A. Mutual understanding
B. Organisational cooperation
C. System coherence
D. Component compatibility

Transferred to the ENIGMA domain this would look like this:

A. Mutual understanding about goal of ENIGMA; step change to improve cities with added value and create new business opportunities for companies
B. The effect of the solutions is coherent with the ambition level of cities
C. Solution produces the correct technical outputs as requested by cities
D. Parts/components fulfil the technical standards/legal requirements

The meeting concluded that the A level (understanding) is crucial. It was even suggested that the PCP Call for tender process ought to include criteria to evaluate which level of understanding the different tenderers have. The tenderers should demonstrate that they have proper understanding of the framing around the basic ambition of the call. There also is a need to be able to assess which level of mutual understanding is feasible, i.e. realistic to aim for during the market consultations.

It was also noted that mutual understanding is important for development of trust as the works involved would inherently create a need for long term cooperation; not only during the PCP-call but possibly also afterwards.

Interestingly enough from a PCP point of view the emphasis for a market consultation (in written form or as a meeting) contributes to the vision of open innovation as the market engagement, involves a number of actions that have a distinct purpose. To be effective, the purpose of each step needs to be understood by those undertaking the actions (the customer) and those receiving the actions (suppliers). It is at phase 0 that Open innovation plays a major role and we try to elaborate next on the types of actions and their alignment with Open Innovation.

Communication: 'Communication' is the act of conveying information. In market engagement communication is seen as the transferring of information from the customer to the supply chain. This is also called disclosure (Winch, 2002). Von Hippel (1986) suggests that an accurate understanding of user needs is essential for the development of commercially successful products. Edler & Georghiou (2007) furthermore state that it is important that suppliers are given early signals regarding future public demands.

This coincides to a large extent to the four levels of understanding within Interoperability/Enigma in the previous page

Sounding: 'Market sounding' provides a framework and opportunity for potential suppliers to respond to the requirements of the customer. Winch (2002) calls this form of information transfer

'feedback'. Although the customer has identified and formulated its requirements, it does not know if the market can satisfy these requirements. Sounding enables the customer to check if suppliers are able to deliver the required outcomes, if their requirements are formulated appropriately, and if suppliers are interested in the upcoming procurement project. The feedback from the market-sounding phase enables the customer to assess the Tendering process, including assessment of tenders and awarding of contracts.

The feedback from the market-sounding phase enables the customer to assess the capacity, capability and willingness of the supply chain to deliver a solution based on the information it has provided. It also enables the supply chain to comment on the requirement, which will contribute to the customers' refinement of the requirement. Aligning customers' needs and market capabilities is an important factor in the success of PPI (Edler & Georghiou, 2007). If alignment is necessary (public demand and market capabilities do not match), the project, approach or requirement may need to be refined (see refining the requirement below).

Sounding may also provide public procurers with information about other required actions. For instance, information may be gained about regulatory and other barriers that suppliers face, and help to determine the procurement strategy that is most likely to deliver the desired outcomes.

Refining the requirement or 'market demand'; In the first stage of market engagement the market is informed about an upcoming project (communication), and is asked to respond to a number of questions (sounding). The sounding informs customers of the market situation and, on the basis of this information, customers may adjust the scope of the project or adjust their requirements. This helps to reduce any gap between customer needs and market capabilities. If this gap is too large, innovation may not be feasible (Edler et al., 2006) or will take too long.

Sign-posting demand: Signposting a larger future market is a way of increasing market pull by indicating the availability of a wider market, and helping suppliers to assess if the market is of sufficient scale to warrant their investment. This is not to be confused with 'joint procurement', where demand is aggregated in the form of joint purchase. There are disadvantages associated with joint procurement. Examples are an increased complexity of the purchasing process and loss of flexibility and control (Schotanus, 2007), and potentially a 'dumbing down' of the requirement to the lowest common denominator.

In determining the applicability and value (e.g. economies of scale) of such formal aggregation of demand, the needs, requirements or specifications need to be similar among procuring agencies (Schotanus, 2005). This is much easier when procuring a commodity than in cases where innovation is required. In many cases, the value of aggregating demand is overstated. The difficulty and complexity of a formal aggregation may outweigh the benefit and arguably increase risk. In many cases simply signposting larger demand is adequate as sophisticated suppliers can anticipate the advantage of first mover into a nascent market.

Facilitating networking: In PPI, it may be necessary for several supply-side organizations to cooperate and jointly develop a new product or service to meet the customer's requirement. By facilitating networking the public sector organisation attempts to stimulate networking among different suppliers and across supply chains and supply sectors. This is exactly one of the goals of

open innovation.

Edquist & Hommen (1999) state that firms almost never innovate in isolation. Inter-organisational cooperation thus enables innovation. Such cooperation can be forced (Bossink, 2007) as physical and human resources, subsystems, components, technologies, skills, information and knowledge can be dispersed among various organisations (Rutten et al, 2009). The first steps in cooperation concern discovering and exploring opportunities (Bossink, 2007). PCP aims to create the opportunity (the requirement) and then encourage cooperation through facilitating networking amongst and between supply chains. The more open innovation dialogues are to be found in phase 0 of the PCP-methodology

Aligning the procurement strategy: A pro-innovation procurement strategy sets out a procurement pathway designed to support and enable innovation and achievement of the required outcomes through the procurement process. Several choices have to be made; for example regarding the procurement procedure, selection criteria and award criteria. It can also be used to set out attitudinal parameters to align the approach taken by the team engaged in the procurement process. The procurement strategy is developed after the market engagement phase is concluded, in order that the information gained through the market engagement can be used to develop the most suitable procurement strategy.

The key to managing risk in the PCP process is that the PCP provides an incremental framework meaning that both customers and suppliers can approach innovation procurement in a staged process from phase 0 to phase 3, whereby at each stage the level of uncertainty and transaction bounded investments can be assessed as manageable or unmanageable, rewards are deemed at the right level for the effort that has been put in. It is reassuring for both parties to know that they can withdraw at any stage in the process having incurred only the justifiable 'opportunity costs'.

The close of this merger of these two processes PCP & open innovation) takes place during the formal tender procedure (the three PCP-phases); although we are communicating; it is not freely expressing in an open way; but it is more or less institutionalized already (within the boundaries and restrictions by procedures). The real focus for open innovation as experienced (so far) within the ENIGMA project has been utilizes to a maximum extent.

4. Conclusions

There are good reasons to relate to Open Innovations thinking already in the first phases of PCP. In ENIGMA, the open project dialogues have built mutual understanding about the need for a readily comprehensible description of the new desired functionality, somewhere between the ICT-related criteria and the vibrant sustainability dream.

The open dialogue among the various project participants has stimulated mutual learning's and ENIGMA now has a mental model that include an open innovation mind-set as one aspect of the framing for the PCP-call for tenders.

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Appendix A: Calendar of Training Sessions

1. First training session on PCP Needs Assessment:
   Gent, Belgium 27 November 2013

2. Second training session on the Business Case:
   Stavanger, Norway 16 January 2014

3. Third training session on Functional Specifications:
   Eindhoven, Netherlands 25 February 2014

4. Fourth training session on Legal and IPR issues:
   Brussels, Belgium 28 March 2014