Open Innovation: A Typology of User Involvement in the Context of the Web 2.0-paradigm

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Abstract: Within this paper a typology of user involvement is proposed based on the degree of user involvement and on the nature of the innovation process. This typology is illustrated with six case studies of open innovation projects. Costs and benefits are analysed from the perspective of participating users as well as the instigators of the innovation process. This paper offers a framework to classify different forms of user involvement practices. This should facilitate further research in the application of Web 2.0-principles for open innovation purposes.
Key words: open innovation, user involvement, user innovation, living labs.

With more than one third of the world's population being online (ITU, 2012), the Internet has increasingly become part of modern living. Web 2.0-sites enable Internet users to interact with unprecedented levels of richness, affording them to easily consume, share, communicate, facilitate and create online (BEER, 2009; SLOT & FRISSEN, 2007). Although the phrase Web 2.0 is characterised by its conceptual vagueness, most authors agree that Web 2.0-sites employ notions of collective intelligence, network-enabled interactive services, and user control (SONG, 2010), pointing to the importance and significance of participation and engagement.

In this article, we understand Web 2.0 as a large-scale shift towards a participatory and collaborative version of the web, supporting collective intelligence and added-value for each participant (HOEGG *et al.*, 2006). In contrast to web environments that use proprietary data sources (HUDSON-SMITH *et al.*, 2009), users can create content themselves (JAKOBSSON & STIERNSTEDT, 2010). Web 2.0 is based on supporting the desire of individuals to affiliate, enabling computer-assisted coordinated activities

carried out by groups of collaborating individuals. In short, we can frame Web 2.0 as a medium that creates a new degree of agency in constructing engagement with online resources, with Internet users and with 'collective creativity' (HARGADON & DECHKY, 2006). As Web 2.0 "[…] can be used to put users in control and co-create better and richer products in a reduced timeframe" (HINCHCLIFFE, 2007), its principles can be applied to a lot of industries for new approaches to innovation. This links Web 2.0 to the open innovation paradigm which emphasizes the need for companies to open up their innovation processes with increased collaboration between different stakeholders as a major consequence (CHESBROUGH, 2003). Therefore, Web 2.0 provides a huge potential for open innovation systems, especially for end-users as stakeholders and collaborators in the innovation process.

Although literature tends to focus on the advantages, there are also some downsides linked to open innovation efforts by companies. BIRKINSHAW *et al.* (2011) identified the underestimation of time and effort for setting up and following up open innovation-efforts. In terms of costs, practical challenges in resolving intellectual property (IP) ownership issues, lack of trust between internal and external actors, and the operational costs involved in building open innovation-capabilities are mentioned. Other issues relate to the participation/non-participation decision by users and the possibility, in any particular case, that the potentially most valuable participants are precisely those who have decided that the net benefits are not sufficient for them to devote their time to. In that respect BUGHIN (2007) argued that only a fraction of Internet users creates the majority of online content (so-called seeders); figures show that less than 3% of the Wikipedia users are responsible for about 60% of the articles or that, on YouTube, 6% of the members post 90% of the videos (BUGHIN, 2007).

In this article, we will propose a typology of user involvement in open innovation, based on an exploration of novel practices in the domain of media and ICT. We will illustrate this typology by means of a multiple case study analysis. Main research questions are:

- What are the dimensions of user involvement in innovation processes?

- How can these dimensions construct a typology of user involvement in innovation processes?

- What are the main costs and benefits for the instigators of the open innovation process and for the participating users from the perspective of the developed typology?

We believe that this typology can be used as a framework for future research into the opportunities and threats for Web 2.0 as a facilitator for user involvement in open innovation as within the present literature, a clear distinction between the various user involvement practices is still missing.

■ Towards an open innovation paradigm

Inherent to a traditional innovation process is the firm belief in the top-down nature of innovation development. In practice, this implies that innovations are developed internally by a company's R&D department, in cooperation with designers (to fine-tune the outlook) and the marketing department (to set the path to the market). Supporters of this top-down approach consider end-users as superfluous in this process, because they have little to no knowledge about the technical possibilities nor about the market (LEONARD & RAYPORT, 1997; SCHULZE & HOEGL, 2008). In this 'technology push' paradigm, often used to describe the post-war period to the mid-1960s, innovation is approached as a linear process from internal scientific discovery to market commercialization, while the end-user is not involved at all (ORTT & van der DUIN, 2008). Because of the high flop rates of such technological innovation processes, a shift occurred towards the market during the sixties, also referred to as the era of 'market pull'. Customers and end-users are now subjected to market research methods and techniques in order to abstract apparent user needs for which an internal team of professionals creates solutions (GRIFFIN & HAUSER, 1993). A major downside of this 'voice of the customer'-approach was the resulting flood of incremental innovation (MOWERY & ROSENBERG, 1979). This gave way to a combined innovation approach from the late 1970s to the early 1990s, when a combination between both stances was adopted, referred to as 'interactionism' (BIJKER & LAW, 1992).

The different views on innovation management mentioned above all entail a firm 'top-down' approach to innovation. This approach gives an organization much more control on the intellectual property of the developed products and services, and results in a better fit of the solutions into the strategic plans of the organization (POETZ & SCHREIER, 2012). However, more and more research indicates that this top-down approach has a lot of limitations. Firstly, some authors suggest that the more innovations are being generated internally, the less successful they are (KATILA & AHUJA, 2002). Secondly, the linearity of innovation processes was being challenged

by authors who stressed the importance of the actual usage of the innovation and the role of the social environment in which the innovation is being developed and introduced (FLECK, 1988; WILLIAMS *et al.*, 2005).

In order to overcome some of these limitations associated with the top-down innovation paradigm, a growing number of alliances and collaborations between companies started in the nineties. This culminated in the so-called era of 'open innovation', a model for 21ˢᵗ century innovation, characterized by a non-linear, or even cyclical, innovation process, and by an increased cooperation between the internal R&D department and the outside world (CHESBROUGH, 2003). Despite the groundbreaking work by Von Hippel, who pioneered the user innovation literature already in the seventies, the open innovation paradigm did not explicitly include end-users as possible sources of innovation. Innovation processes were still mostly top-down in nature but they no longer took place in-house. Instead, they became the result of a collaboration effort between different companies. When the end-user is considered an equal stakeholder in the innovation process, innovation can be referred to as 'open innovation with customers'. This paradigm holds the belief that end-users can make relevant contributions to the development process of innovative products and services. Therefore, they are being actively involved in the ideation, design and development of solutions to their own needs and problems (MATTHING, SANDEN & EDVARDSSON, 2004; VON HIPPEL, 1976, 1986, 2001).

ICT applications have played an important role as an enabler and driver for end-user participation and co-creation. As described in the introduction, 'Web 2.0'-applications, for instance, facilitate the collaboration between large groups of people (BONABEAU, 2009). Open source projects such as the free and open source software operating system Linux and the free software community Mozilla, best known for producing the Firefox web browser, have already proven that users are able to produce highly innovative products without the help of professional organizations (LAKHANI & VON HIPPEL, 2003; VON HIPPEL, 2001). On the other hand, these new types of open innovation stress the need for reconceptualizing and (re)structuring different forms of user involvement in the broad open innovation paradigm. In the next section we will take a closer look at the nature of user involvement in open innovation.

◼ Dimensions of user involvement in innovation

A first dimension on which user involvement can differ is the *degree*. KAULIO (1998) distinguishes design *for users*, design *with users* and design *by users*. This is in line with the work of PILLER *et al.*, (2010) who also see the degree of freedom of the user-collaborator as an important aspect.

Design for users denotes a product development approach where products are designed on behalf of the customers. Data on users, general theories and models of customer behavior are used for design and development. This type of user involvement coincides with the 'market pull' paradigm as the user remains a passive stakeholder in terms of input to the innovation development. The manufacturer firmly holds the steering wheel during the innovation process and decides which user input to take into consideration and how to translate this into the actual innovation.

Design with users refers to a product development approach that focuses on the customer and utilizes data on users' preferences and their needs and requirements. In addition, this also includes presenting different concepts to users, so they can react to different proposed design solutions. User input is clearly more active which often results in an iterative fine-tuning of the innovation.

Design by users allows for the highest degree of end-user freedom. It denotes a new product development approach which actively involves and includes users in the design and development. End-users are actually developing the products themselves. This holds out advantages not only for the quality of the technology, product or service, but also for the sales and marketing of the innovation (ALMIRALL, 2008).

The second dimension on which to map user involvement in open innovation relates to the *nature of involvement*. LETTL *et al.* (2006) identify more passive roles, such as *claim* or *problem formulator*, *tester* and *evaluator*, while the roles of the user as an *inventor* and *developer* are seen as more active. JESPERSEN (2008) discerns five possible user roles that differ on two dimensions (interaction control and task/social orientation):
- user as a resource (unstructured interaction and task oriented);
- user as a co-creator (structured interaction and task oriented);
- user as a product (unstructured interaction and socially oriented);
- user as a buyer (structured interaction and socially oriented) and;
- user as a 'user' (in the middle of both dimensions).

She positions these roles in relation to specific stages in the New Product Development (NPD) process, although these positions are partially overlapping. While the user as a resource and as a co-creator (in line with the roles of the user as 'inventor' and 'developer') are NPD 'input roles', the user as a 'user', a product and a buyer (in line with the roles of the user as 'problem formulator', 'evaluator' and 'tester') are NPD 'output roles. Considering the 'input roles', user input deals with existing products or services (suggestions or complaints) or envisions ideas for new products or services. These user roles can be defined as exploratory. With regards to the 'output roles', user contributions are based on an innovation in development. Therefore, we propose to call this form of user involvement evaluative. Although these roles often appear in combination and are therefore not mutually exclusive, they provide insight for structuring user involvement in open innovation.

■ A typology of user involvement in open innovation

Based on these theoretical insights, we created a two-dimensional framework for types of user involvement in open innovation. The first dimension is based on KAULIO's (1998) distinction between innovation for, with and by users. The second dimension distinguishes evaluative and exploratory user involvement and is based on the user roles of LETTL (2006) and JESPERSEN (2008).

Table 1 – Typology of user involvement

	Evaluative	Exploratory
Innovation for users	Market research	Ideation
Innovation with users	Co-shaping	Co-design
Innovation by users	User toolkits	User innovation

The framework identifies six types of user involvement:

• *'Market research'* refers to practices associated with the market pull paradigm. In this approach, users serve as passive respondents, and do not actively participate in the innovation process. As the product or service is already well-defined, this type of involvement is evaluative in nature.

- *'Co-shaping'* implies a more active and two-way interaction between user and developer. Because the product or service has already taken concrete form, this kind of user input is evaluative. By enabling the product or service to be fine-tuned based on user input, this innovation process can be considered as an innovation process with users.

- *'User toolkits'* enable thorough user involvement. All the elements or building blocks are well-defined but the user can configure them the way he wants. The user is in the driver's seat of the innovation process, but only within the well-defined limits the instigator has set.

- *'Ideation'* is exploratory in nature as it gathers user ideas by means of different methods and techniques. This approach is most appropriate in the early stages of the NPD process and is very open-ended.

- *'Co-design'* entails the active involvement of users during the innovation development process. Users are not only allowed to express their ideas, needs and wants, but can also put these into practice. To enable true end-user impact on the core of the new product of service, co-design must be implemented in the early to mid-stages of the NPD process.

- *'User innovation'* refers to the users taking complete control of the innovation process. Users can fully utilize their creativity and turn this into concrete products or services, tailored to their own needs and wants. This approach allows for a more ad hoc cooperation between users.

■ Methodology

We will illustrate our proposed typology with six case studies. Because of the novelty of some of the user involvement practices and the lack of a clear and unified definition, this research approach is the most appropriate (EISENHARDT, 1989). Moreover, this method enables case-analysis on multiple levels (YIN, 1984). All open innovations will be compared on:
- degree of user involvement,
- nature of innovation process,
- nature of user role,
- costs and benefits for users,
- costs and benefits for instigator.

The six cases that will be presented and discussed in the next section differ widely in terms of scope, methodology, funding and scale. However, they all adhere towards an open innovation approach and are connected to

the iMinds research institute. These cases were chosen because of the authors' first-hand experience in these projects as iMinds researchers. For the projects using user toolkits and an open data innovation contest, in-depth interviews were carried out with other researchers involved. Additionally, data was collected through desk research and studying the project documents and publications.

■ A comparative case study analysis of user involvement in open innovation

Market research

A fitting example of this type of user involvement is the mobile TV-trial called 'Maximizing DVB-H usage in Flanders' (MADUF). This project started in 2006, facilitated by IBBT (nowadays called iMinds), an independent research institute founded by the Flemish government to stimulate ICT innovation. Goals of the project included the optimization of network development and deployment, and the creation of new business models and introduction strategies. MADUF is an example of a project with a strong 'open innovation'-character. It is a horizontal cross-sectorial research project including both private and public partners joining forces to assess the feasibility and opportunities of an ICT-innovation by means of multiple research methodologies such as expert panel surveys, trial results meta-analysis, adoption potential estimation, diary study, focus groups and photo elicitation (SCHUURMAN *et al*., 2009). As the predicted market potential was not satisfactory for the involved parties, the mobile TV-project was not followed up afterwards.

In more general terms, the benefits for the user in market research are rather related to extrinsic motivations. The main benefit is the incentive and to a far less extent the benefits related to intrinsic motivations such as task enjoyment and the effective influence (which is low). The cost, on the other hand, is low to medium, depending on the methods used. As this type of research only involves the users once, only a limited amount of time and effort is expected (e.g. filling out a survey, attending a focus group).

Table 2 – Market research analysis

Analysis levels	Case study analysis
Degree of user involvement	The users were seen as passive respondents. They had no influence whatsoever on the technology or the content. The degree of user involvement is a clear example of innovation for users.
Nature of user involvement	The innovation process was evaluative since the technology of that time was being assessed (and eventually rejected).
Nature of user role	Users strictly served as resource. They had to evaluate the technology without any room for modification or iteration.
Costs & benefits for user	The costs of online surveys is very low for users since there is only a small amount of time that needs to be invested. The benefit, on the other hand, was the chance to win the incentive that was being rewarded randomly. Other research methods such as diary studies require a higher effort, since these techniques presuppose participation over a longer period of time. Focus groups also have higher costs for users (they need to leave their houses for a longer duration). Overall, users' impact on the innovation process was very low since the innovation (mobile TV) was almost fully developed and could not be adapted or changed.
Costs & benefits for instigator	We notice that the costs and benefits for the instigator were fairly low, especially for online surveying and diary studies, whereas the benefit for the instigator of the open innovation process was rather high. Online surveying provided rigorous quantitative data while the focus groups and diary studies provided deeper insights of a qualitative nature. Although the innovation was almost fully developed, this helped the instigator not to put the innovation on the market, preventing a potential bad investment. However, because there was also a field trial involved, which included rolling out transmission equipment, handing out specific user devices and enabling content on these devices, the costs for the private project partners were nonetheless very high. Given all user data were simply used as data for a go/no go decision, all these efforts did not really pay off.

For the instigators, the benefits are hypothesized to be rather low as the user input is limited and only evaluative in nature. However, the instigator holds full control over the innovation trajectory. Representativeness and the amount of participating users can be controlled, allowing also for participation of larger groups of users. The cost for instigators remains rather low and controllable, as classical market can be easily planned and carried out. The main costs are the incentives for the participating users and the manpower to recruit respondents and to analyze the data. However, these costs can grow significantly if the desired user group is larger or more difficult to find.

Co-shaping

An example of co-shaping is the "Mediatuin" Living Lab-project [1] (SCHUURMAN & DE MAREZ, 2012) that focuses on an online radio recorder called Streemr. Respondents were first surveyed on their interest and willingness-to-pay for the concept. Based on the survey data, a variety of users were invited to test a beta version of the online application. Usage data was gathered through logging. Users could also provide spontaneous feedback on the beta version and a select set of users participated in a co-creation session. These activities resulted in an iteratively fine-tuned concept ready for market launch.

Table 3 – Co-shaping analysis

Analysis levels	Case study analysis
Degree of user involvement	Users had an active role in the innovation process: they could evaluate and make concrete suggestions regarding functionality and design of the service. These suggestions and evaluations were incorporated in the iteratively enhanced service. The degree of user involvement can thus be labeled as innovation with users.
Nature of user involvement	The general design of the service was already determined before the project, although room for improvement and modifications was definitely provided. This makes the nature of involvement evaluative.
Nature of user role	Users were conceptualized as resources. However, because of their actual usage and by participating in co-creation sessions, their role surpassed that of a 'pure' resource, enabling them to actively contribute to the outlook and functionality of the service. Users served as resource, user and co-creator.
Costs & benefits for user	Costs for the users were medium to high since they were involved in several research methodologies (quantitative survey, field trial…) on different moments in time. Next to the incentives that were handed out to the participating users, they benefited by having a high impact on the product that eventually suited their needs and wants. They could also use the innovation to their own ends, which is an extra benefit.
Costs & benefits for instigator	Because of the iterative flow and frequent feedback loops, the instigator of the open innovation process had to be constantly involved and needed to make adaptations each time fresh user input was provided. In this case, the instigator iterated the initial Streemr-concept a first time based on the survey results and a second time after the co-creation session. This is a rather high cost, but it also enabled the validation of each adaptation and ensured that the innovation development was going in the right direction. The cost of this type of user input is rather high for the instigator, but it results in a product which is fully supported by the end user, rather than having a simple go/no go decision at the end of the innovation trajectory.

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[1] www.mediatuin.be

From a broader perspective, co-shaping holds several benefits for the users. Similar to market research, incentives play an important role to convince users to participate and to show appreciation for their effort. In a co-shaping approach, however, we notice an increase in intrinsic motivations. The benefits are especially higher in terms of task enjoyment, as the users can effectively use the innovation and see direct results from their previous efforts. In order to stimulate this perception, it is important to 'close the loop' by communicating the outcomes of the users' input. The costs for the users is higher compared to classical market research as they are required to participate in multiple stages of the innovation trajectory. This long-term engagement is a heavy load and risks losing respondents during the innovation process.

For the instigators, the user feedback is more actionable and might lead to an improved innovation. By having multiple evaluations, these improvements can be assessed. The information output of this approach contains more value and allows for a deeper understanding compared to classic market research. The costs, on the other hand, are higher as well, as it is required to keep users motivated to participate in multiple research phases and over a longer period of time. This induces the need to have a more rigorous user selection, as the participating users need to be more motivated (intrinsic motivation) or need to be kept motivated over a longer time (extrinsic motivation). The instigator keeps control over the innovation trajectory, but needs to build in a certain degree of agility and 'leanness' in order to be able to respond to the user feedback. Compared to market research the instigator must have a higher level of 'openness'. They must be willing to listen actively to the user input and to communicate transparently on the impact on the innovation process. It also requires the instigator to build a working and testable prototype.

User toolkits

A compelling example of a user toolkit for open innovation which was used in the ITEA project ('Do-it-yourself' Smart Experiences [2]) is called SenseTale/MAX. This is an Alcatel Lucent platform that enables lead users and innovators to retrieve and process data – in a very user-friendly and intuitive manner – gathered from sensors or other real-time sources, thus

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[2] Cf. http://www.itea2.org/project/index/view/?project=1122

enabling stakeholders in the open innovation process to rapidly create highly interactive and personalized (smart media) applications. In short SenseTale/MAX supports the creation and deployment of new applications that require scalable, reliable and distributed computing to deliver Internet-enabled services. The project allowed users to develop their own applications on a very user-friendly platform. The main goal of the project, however, was to evaluate and fine-tune the underlying technical engine.

Table 4 – User toolkits analysis

Analysis levels	Case study analysis
Degree of user involvement	Users themselves could develop and innovate freely with the data available through the platform. The degree of user involvement is clearly an example of innovation by users.
Nature of user involvement	The innovation process was evaluative because the available data types were limited. Also, the application development environment was very delineated and the eventual goal of the project was not to generate the user applications themselves, but generating knowledge on open sensor data usage and on the implications for the network infrastructure.
Nature of user role	Users were both co-creators and innovators, although the abstracted lessons learned for the project partners were more on a meta-level than on the pure application-level. Therefore, the users as user-role is also applicable in this case.
Costs & benefits for user	Costs for end-users were very high. They were asked to be present during brainstorm, co-creation and rapid-prototyping sessions and reported that a lot of the tasks were mentally challenging, sometimes even stressful. However, only a drop-out rate of 15% occurred over close to ten sessions, which also included some tasks to be completed in between the sessions. This is an indication that the task enjoyment was high. There were some material benefits for the users, such as coverage of travel expenses and some presents related to the research, but it seems that intrinsic motivations to participate were dominant.
Costs & benefits for instigator	The costs for the instigator are very high as all the sessions with the end-users had to be carefully prepared and followed up. Gained insights had to be spread through the organization and developers had to put the user innovation into practice through mock-ups that would enable the users to 'play' with their own innovative application. There were also high costs associated in keeping everyone motivated during the project. The outcomes, on the other hand, were very valuable. Although the developed applications themselves were not used for further development, the instigator believes that this kind of 'rich information' is only achievable through this approach.

Thus, in general, user toolkits can provide benefits for users because they are enabled to create and customize an innovation according to their own needs, which makes them dedicated to this innovation. The cost for the users consists mainly of a substantial amount of time that has to be dedicated in order to effectively customize the innovation. It also requires

certain skills to use the toolkit and creative effort and ideas need to be given 'away' to the instigator.

While the end user plays freely on their platform, the instigator gathers valuable information on how to fine-tune the innovation, even when the innovation is still in a conceptual stage. This approach provides insights in use-cases and pushes the technology to the limit. The costs for the instigators in this approach is the development of the toolkit and the assessment of the relevant dimensions in which the toolkit allows variation. Another potential disadvantage or cost is the insecure and undeterminable nature of the outcome(s) of the innovation process. This type of innovation process also implies that certain developments appear to be superfluous. Finally, this approach needs to find the 'right' users to participate in order to generate useful research outcomes.

Ideation

An example of ideation can be found in the EU CIP SMARTiP project on 'smart' city engagement. In this project, a crowdsourcing platform, 'My Digital Idea for Ghent', was used to enable open, user-driven innovation for the city of Ghent. This platform was based on proprietary software [3] which provided hosted feedback forums, allowing users to create, discuss, and vote for ideas. It encompassed an online forum structured around users providing actionable ideas and users 'voting up' the best ideas to the top (with an extra constraint of having a limited number of votes to spend, thus focusing people on what is really important to them). This platform was successfully used to generate 'wild' ideas on smart engagement, but also on smart mobility and smart city environments (cf. MECHANT *et al*., 2012).

With ideation, the benefits for the users are that they can be highly creative. Users have no boundaries and there is no right or wrong. Concerning the costs for the users, the methods used allow for at least a moderate intellectual effort. Users also 'freely' give their ideas away to the instigator without knowing in what they will result. The overall time-effort, however, is very low.

The main benefits for the instigators are that this user involvement type captures actual user needs, potentially 'out-of-the-box' ideas and new

[3] www.uservoice.com

opportunities. The 'right' users need to participate which can be quite time- and cost-intensive. Also, the assessment of ideas remains problematic (cf. SCHUURMAN *et al*., 2012).

Table 5 – Ideation analysis

Analysis levels	Case study analysis
Degree of user involvement	The voice of the user was heard through the ideation exercise, but further user involvement was limited, so this is a clear example of innovation for users.
Nature of user involvement	The outcome of the ideation process was not defined at all. Users were able to submit all kinds of ideas, and other users acted as 'gatekeepers' by voting up the 'best' ideas, so the user involvement was exploratory in nature.
Nature of user role	Users were strictly considered resources: they could provide ideas, but after the ideation they were no longer involved anymore.
Costs & benefits for user	The cost for the users was low: they only had to visit the online crowdsourcing platform and submit their idea and/or vote on the already submitted ideas. The benefit for the users depends on the continuation of this project. If none of the ideas are being used, the benefit is low to non-existent. If the ideas are being translated into real actions the benefits could be very high, although this is also linked to the way the idea is being put into practice.
Costs & benefits for instigator	The costs of setting up such online platforms is low. The benefit depends on the amount of responses on the platform (quantitative) and on the quality of the submissions (qualitative). Outcomes are thus highly uncertain. In the case of SMARTiP, both the amount of ideas and the amount of votes were positively evaluated. Overall, the project provided the city of Ghent with an inspiring list of ideas which were taken into account in several departments and projects. Thus, the benefits of this project were relatively high, given the low cost.

Co-design

The "LeYLab"-project [4] (SCHUURMAN & DE MAREZ, 2012) is an example of co-design as a specific type of user involvement in open innovation. Users were recruited for an ideation and a co-design session in order to develop a second-screen tablet application for a regional broadcaster's quiz program. The selection of users was based on their experience with second-screen applications, social media and their interest in quiz programs. This way, a relevant group of people was gathered for the co-design session in which the application developer and a representative from the quiz program actively participated. A paper mock-up was created

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[4] Cf. www.leylab.be

from which the actual application was developed later on in the project. Because of their user expertise, participants were able to confront the developer's ideas with their own use experience and provide concrete suggestions and comments that were directly implementable. Their knowledge also aided in co-designing the user interface of the application.

Table 6 – Co-design analysis

Analysis levels	Case study analysis
Degree of user involvement	Users actively participated in defining the outlook and the features of the application in development. However, they did not perform any technical tasks themselves, so their involvement can be defined as innovation with users.
Nature of user involvement	A basic direction was set for the innovation process (developing a second screen app), but the outlook, features and functionalities were not set at all. The first ideas were in fact rejected and substituted by user suggestions, which makes the user involvement exploratory.
Nature of user role	Users were clearly considered a resource as they could evaluate features and elements for the app. They also served as co-creator as they actively participated in co-designing the outlook and functionalities of the app.
Costs & benefits for user	The users, who had experience and expertise with second screen applications, tablets and smartphones, could express all their needs and wants, resulting in a paper mockup of what the app would look like. The costs for the users were not much higher than those of a focus group, and the task enjoyment during this session was rather high as the session lasted a lot longer than initially planned because the users kept on coming with ideas and suggestions. All users were also rewarded with a small incentive and were able to test an actual prototype of the app afterwards.
Costs & benefits for instigator	The costs for this co-design session were higher than for a 'regular' focus group as the participants needed to have more innovation-related characteristics. However, because this project was carried out in a Living Lab context with profiled test users, the 'right' profiles were quite easily found and were motivated enough to participate without having to hand out a large incentive. In terms of development effort, a prototype could immediately be developed after the session including the 'right' features.

The users benefit because they can articulate their needs and wants and they can be creative. The costs for the users consists mainly of quite some intellectual effort, as next to 'need-information' they are also asked to provide 'solution-information'.

The main benefit for the instigator is the collection of needs as well as solution information in a very open way. The main costs for instigators relate to finding users with the right need and solution information in order to have an effective co-design session. This means that a lot of time and effort is spent on user detection and selection, although innovation intermediaries such as Living Labs can facilitate and enhance this process (cf. e.g. SCHUURMAN & DE MAREZ, 2012).

User innovation

The final type of user involvement in open innovation discussed is the event 'Apps For Ghent'. This event, organized by the Flemish city of Ghent, research group iMinds Multimedialab and OKFN [5] wants to stimulate the use of open data provided by the city of Ghent. By doing so, the city hopes to create governmental transparency. The idea is that by providing both professional and amateur developers with data, they will fuel the creation of innovative applications. The event itself is a so-called 'hackaton' where developers are challenged to create the best application. All participating teams are brought together and allotted a fixed timeframe to develop a prototype or mock-up of an innovative application within a city context.

Table 6 – User innovation analysis

Analysis levels	Case study analysis
Degree of user involvement	Users were at the steering wheel of the innovation process. They themselves actively created and developed innovative applications which makes this a prototype of innovation by users.
Nature of user involvement	Focus was on the applications themselves, not on the underlying network infrastructure as was the case in the 'toolkits for innovation'-case, so the user involvement is exploratory.
Nature of user role	Users were co-creators and innovators as they developed innovative applications based on the open data sets provided by the city.
Costs & benefits for user	Users had to do everything themselves, so costs were very high. The user-developers had to put a lot of effort in the development of the application, but only within a limited timeframe. The benefits for the users were the application itself, the opportunity to enhance their portfolio, the chance to win one of the prizes and the possibility of being noticed by the programming community. However, the instigator believed that intrinsic motivations were the most important: according to them the participants especially enjoyed the networking and the collaboration dynamics.
Costs & benefits for instigator	The costs for the instigator were opening up and standardizing the datasets, facilitating the hackaton, the communication around this project and the prizes. Communication and marketing for this project were essential because the right users (able to develop apps and prepared to dedicate time and effort) needed to participate in this event. The benefits for the city were the apps themselves, which offer services to citizens and visitors of the city, and the stimulation of the digital creative industry in the city. Although the apps were not immediately usable, as the limited time allowed only mock-ups or prototypes, it helped the city to identify interesting users and create a network of user-developers. An unexpected benefit was the positive impact on the efficiency of the internal organization.

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5 http://www.okfn.be/

The winning team of the 2012 edition created an application which connects neighborhoods to cultural activities. On a general level, the main benefit for participating users is that they can be creative and express and carry out their own ideas and solutions. They can also improve their professional network and career chances. Nevertheless, this kind of open innovation requires a lot of time and effort of the users. Because this kind of innovation process attracts highly engaged user-developers, however, this cost is perceived as rather low.

For the instigators, the main benefits are getting insight into actual user needs and also into (potentially unexpected) solutions for these needs, often building on ideas and developments of others. The cost for the instigators, on the other hand, is the openness of the innovation trajectory, as it cannot be predicted how users will start innovating. It entails a certain loss of control. Also with this approach, the 'right' users need to be found, activated and motivated.

■ Conclusion

Over the last decades, innovation processes have evolved from a closed top-down approach towards a wide variety of approaches which involve end-users. Although they all start from an open innovation-perspective, we argued that they all do this in a very different way. Both the positioning of their user-collaborators, the goal of the user-involvement as well as the way they cede control to user-collaborators differs greatly. Uncertainty, loss of control and ambiguities over intellectual property rights play a prominent role in how intelligence is harnessed outside the organization. We argued that each technique has advantages and disadvantages. Therefore a combination of different methods seems to be most appropriate.

With this in mind, future research might look at the type of instigator that is best suited to decide what type of user involvement suits what type of innovation development process. Would this be the R&D department, the marketing department or should this rather be outsourced to independent organizations?

Because innovation with users is most meaningful when end-users interact with each other, the social dimension is very important. Most collaborative innovation processes, however, fail to include a large group of participants, both because of organizational and financial reasons. This

could be tackled by combining existing innovation methods and implementing them on Web 2.0 platforms, both opening them up to a larger group of people (allowing more quantitative research and large scale collaboration) and exploiting the social dimension. Therefore, it would be interesting to gain deeper understanding on the possibilities of tapping into existing social networks to involve end-users, how existing methods of user involvement can optimally make use of Web 2.0 benefits (both from a technical as from a social point of view) and if this actually results in better innovation processes and outcomes.

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