FS/User Driven Open Innovation Foundations

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1 Executive Summary

In order to understand better the limits and possibilities of leveraging an “user driven open innovation” approach for the design and development of flexible services, the Foundations of User Driven Innovation document reviews and maps current and future conditions of innovation environments, with particular emphasis on those developments where users act not only as "sources of feedback" but also as active creators of services. The objective of the analysis done through this work is to link these insights to current discussion in open innovation environments, to the specific design strategies required for this, and to the new legal and regulatory tools that need to be developed.

The document starts by clarifying some terminology relevant to UDOI. It is followed by a review of different research strands that contribute insights to the approach. The insights are condensed in a preliminary framework for analysis of UDOI cases. In order to illustrate possible conditions of future UDOI environment we introduce two external case examples and make use of Chesborough’s initial comparison of closed and open innovation principles to develop hypothetical UDOI principles of community innovation. To aid work on planning case interventions we sketched a vision for a possible ecosystem where UDOI could drive and analyze legal issues concerning UDOI environments with a particular focus on the legal status of user communities.

Work and analysis tools documented in this deliverable are iterated every six months, with this being the version 1.0 of the document.

UPDATE 10.11.2009: Some of the materials of this document have been expanded and updated since the release of this document. We suggest the reader to look also for the following publications

Botero A; Vihavainen S; Karhu T. (2009) From closed to open to what? An exploration on community innovation principles. In Proceedings of Academic Mindtrek. Tampere, Finland September 7 2009. ACM

Karhu T; Botero A; Vihavainen S; Tang T, Hämalainen M (2009) A Digital Ecosystem for Boosting User Driven Service Business. In Proceedings of ACM MEDES 2009 Conference

Botero A, Marttila S, Kommonen K-H (forthcoming) Mapping design spaces in the use-creation continuum. In Design & Complexity 2010, Montreal

2 Introduction

The classical, manufactured centric model of innovation assumes that an innovation starts –usually- from insights created from research and development unit which are then developed into a product (offering), marketed and further on 'diffused' to end users (Williams 1986). This classical manufacturer centric model has shown its limits to accurately describe how innovations actually unfold. In recent decades research in diverse fields as Science and Technology Studies, economics, management, marketing and design and engineering have shed light on a new understanding of innovation as a distributed, non-linear and dynamic process. It has also become increasingly clear that these processes involve changes at different stages (not only in technology) and that there are more active roles for stakeholders, like users, who previously have been assumed to embody mainly reactive roles.

This document is to be iterated and updated every 6 months according to the UDOI cycle. Therefore this first version of the document (v1.) intends to set the stage for the main concepts and areas for further research in order to draw implications and analysis frameworks to understand and guide the evolution of UDOI cases. The document leaves some placeholders for themes to be developed in future versions of the document and certain aspects are certainly treated only superficially. All those however will evolve during the course of the project.

During the course of the project we intend to explore issues related to the following questions:

> What are the key elements of best practices for service development process and its variations; based on successful cases (e.g. Lego, Habbo, Facebook based user created services, etc)
>
> What are the emerging and changing roles of users, designers and producers in this context?
>
> What implications does emerging digital practices like hacking, gluing, peer-production, and related concepts have to the development of flexible services?
>
> What are supporting software solutions and strategies for design of sustainable and user designable software service ecosystems? What can be leveraged from existing experiences (e.g. OtaSizzle)?
>
> What issues in the legal and regulatory framework need to be taken into account to support and ensure user's involvement in development processes in practice?
>
> How these are manifested in the UDOI FS cases?

2.1 Opening up some UDOI concepts

The following section contains a short and focus review of some existing terminology and how it relates to UDOI in order to clarify what is new and what builds on existing, established or emergent ideas.

2.1.1 Innovation (vs. invention)

There are several different views for *innovation* depending on the context. Innovation can be related for example to technology, social systems, or policy construction. In this section we describe some of the definitions and also how innovation is seen as different to and related to *invention*.

Roger defines innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption.” He also states: “The perceived newness of the idea for the individual determines his or her reaction to it. If the idea seems new to the individual, it is an innovation.” (Rogers 1995). Norman on the other hand defines innovation as “the selection or creation of a new alternative which leads to improved

performance in a goal-directed behavior" (Norman 1992). Thus, based on the definitions, in a nutshell innovation is a new way of doing something.

Innovation is often confused with invention (McKeaown 2008). Fagerberg et al (2006) defines the relation as follows: "Invention is the first occurrence of an idea for a new product or process. Innovation is the first commercialization of the idea" (Fagerberg et al 2006). Norman (1992) on the other hand defines invention as "a new manmade device or process". When discussing the relationship between innovation and invention Norman states: "generally, an innovation is required in order to make an invention profitable". He gives an example: "The invention of spreadsheet software became profitable as businessmen innovated a large number of applications for spreadsheet analysis." However, Norman states that innovation is not necessarily based on invention. "For example, the development assembly line in manufacturing is an innovation which is based on the organization of production rather than a specific invention."

2.1.2 Open Innovation

The concept of Open Innovation describes an emergent model of distributed innovation in which companies leverage purposefully inflows and outflows of knowledge to accelerate innovation. The model was described first by Henry Chesborough after studying successful cases in real world settings, the phenomena has grown into a vibrant research community. The basic insight gained from the original case studies followed by Chesborough is that in a world of widely distributed knowledge, successful companies can not rely only on their own research, but instead constantly search and incorporate, by buying or licensing, processes or inventions from other companies. In addition, internal inventions, which cannot be used in the firm's own business, are taken advantage of through licensing, joint ventures and spin-offs also outside the boundaries of the firm (Chesborough 2003).

Relationship to UDOI: Even though Chesboroug's initial conceptualization of this paradigm concentrated in the role of company-to-company partnerships and did not address the role of users and user communities directly; this aspect has been permeating the discussions lately due to the need to recognize another important stream of research coming form the sources of innovation literature that have shown the important role played by users (as opposed to manufacturer) and communities and networks (Tuomi 2002). From UDOI perspective it is important specially those insights that highlight the need of an agenda that creates not only value for the company, but that harmonizes as well with the values and needs of the (user?) community in general (cf. Chesborough and Appleyard 2007). Along the same lines Open Innovation paradigm has confirm the need not only of reviewing linear models of innovation but also to reconsider -a new- the wider networks of change that need to be in place for innovations to flourish (cf Maula, Keil, Salmenkaita 2006).

2.1.3 User driven and user centered?

In most cases in the literature the terms "driven " and "centered" are used interchangeably and do not have a very strict definition. The most recent uses of the driven adjective as in *User Driven Innovation* describe those processes where true understanding of customer needs drives the design and development processes (Rosted 2005, Wise and Høgenhaven 2008) or where there is a deep involvement of the user in the service, where service users work with service practitioners and professional to "co-produce" the service (PASC 2008, Commission of European communities, 2009). Conversely it has been used to refer to the involvement of users that are in a position to play active roles as (co)-developers and to some extent even initiators of the process (Von Hippel 2005, Lettl 2007).

For the purposes of this paper we will consider User Centered (design and Innovation) those developments where user and/or customer needs are acknowledged and purposefully explored[1]. In a *centred* position (end) users knowledge, feedback and involvement in the innovation and design process are considered important and could even "drive the development" when seen from the company point of view. However in a centred position user might not necessarily be in the same "actor" level as others (company or else) therefore user's ability to influence development also in use (freedom) and obtain benefit (other than access) from it is not

[1] More on this will be elaborated in section 3.1.1 of this document

necessarily acknowledged or explicitly discussed. In this sense most of the *User Driven Innovation* definitions in literature are more closed to "centred" approaches and not "driven" in the particular sense we will use it in this document.

A *User Driven Open Innovation* approach will need to consider users as full fledge subjects, users innovate by themselves or for themselves and are in a position to influence the developments since they are "potentially" equal partners (benefit not only from use), or are adequately supported. Furthermore the service is not "ready-made" for them.

3 From users to producers and from consumers to co-creators

As stated in the introduction, the widely criticized linear model of innovation claims that innovation starts with basic research, is followed by applied research and development, and ends with production and diffusion (Benoit 2006, Bijker 1989). Therefore the purpose of this section is, based on earlier research, to point out and remind how technological innovation process do not follow the linear model of innovation but are more complex, locate some of the discussions centred around user roles, and collect relevant concepts that each of these tradition could bring to understand and develop potential UDOI approaches.

3.1 Contributing strands

Understanding the role that users and use situations play in innovations has been the focus of a wide variety of research fields, some of which are included in Figure 1[2]. As reaction to the fact that end users have been mostly side-lined in development processes entire fields have been created to understand and influence the issue. One example is the Human Computer Interaction field (HCI) contributor to many of the User Centered design approaches (top left corner) that have complemented similar initiatives in design, information systems, etc. Another field born from the need of making visible a related gap was Science and Technology Studies (STS) who set to explore society's role on innovation processes, traditionally described as technologically determined (top right corner). On the other hand economics and management traditions have contributed important streams of research where users have been identified as important sources of innovation and value co-creation (right down corner). Furthermore, recent trends in software development and digital media have been a concrete demonstration of the practical viability of users as innovators (left right corner).

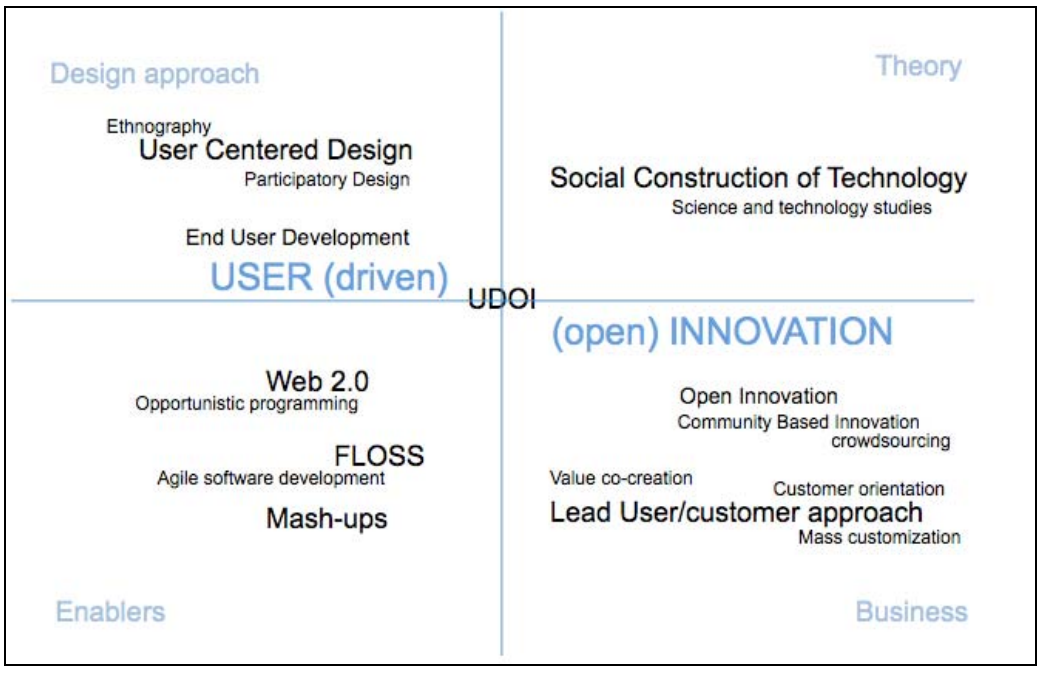

Figure 1 Tentative mapping of fields that contribute to UDOI understanding

[2] It should be noted that there are many other potential fields that can contribute important insight to UDOI work. Since work needs to proceed form somewhere this is the choice we have made at the moment.

An important challenge for developing UDOI approaches is precisely to explore the constructive tensions and cross-fertilization possibilities that exist between different strands (Buur and Matthews 2008). Since most of the fields differ on their goals and rationale, little cross-fertilization exists. This has resulted in a situation in which best practices and insights gained in one community rarely make their way into another.

3.1.1 User Centeredness and Participation (Design approaches)

Frameworks for involving users or customers in design and development process, and for understanding the conditions of use are nothing new. In here we will review briefly central aspects brought by two approaches that have been heavily influenced by practical challenges in the development of information and communication technologies starting from the early 70's: User Centred Design (UCD) and Participatory Design (PD).

User Centred Design can be considered a design approach that aims to ensure usability and represent users interest in the design of efficient and usable systems (Norman and Draper 1986, Bekker and Long 2000). (Bit more on the origins should be included here). These approach contributes to UDOI a breath of methods to collect, analyze and bring forth end-user or customer information in design process. Practitioners have also provided sets of guidelines to plan, review and evaluate user involvement. For example the ISO standard 13407 (ISO 1999) defines human-centred design in terms of four principles: 1) *active involvement of users and clear understanding of user and task requirements*, 2) *an appropriate allocation of functions between user and system*, 3) *iteration of design solutions*, and 4) *multidisciplinary design*.

Further refining to address ambiguity was introduced by Gulliksen at.al. that have propose a set of twelve emerging principles to understand and initiate UCD processes 1) User focus including goals of the activity, domain or context of use, task and needs should early guide the development. 2) Active user involvement 3) Evolutionary system development 4) Simple design representations 5) Prototyping 6) Evaluate use in context 7) Explicit and conscious design activities 8) A professional attitude 9) Usability champion 10) Holistic design 11) Process customization – any UC process must be specific to the local conditions where it is implemented 12) Establishment of user-centred attitude. (Gulliksen et. al. 2003). The approach can be considered incomplete in certain important aspects, as it does not cover all aspects of system design and development (Iivari and Iivari 2006) and has had little focus on the "boundary conditions of design" (Svanæs and Gulliksen 2008).

The second tradition we will include in this short review is closely related to the previous tradition, but emerged under a set of different circumstances during the late 60's in Scandinavia and is usually referred to as Paticipatory Design (Schuler and Namioka 1993 Greenbaum and Kyng 1991). Among the most prominent focus of the movement has been on developing strategies for people to participate in the design process as co-designers, and in the process encounter (or at least anticipate it or envision it) *use before it actually has taken place* (Redström 2008, Ehn 2008). Because of its focus on understanding and anticipating new use and work practice situations, lessons from the PD experiences are directly applied to UDOI in for example how to include participants' current and future "tacit knowledge" as a resource, since future use can never be fully anticipated and new services most likely will imply *new emerging (work) practices*.

The original standpoint of the movement was rooted in the simple premise that those affected by new developments in technology (particularly at the workplace) should have a say in the design process. The peculiar political commitment of some of the original PD projects that placed *conflicting agendas and organizational issues* in the centre of the concerns to address provides for important connections and working methods to tackle organizational change that might also be at the centre of UDOI activities.

3.1.2 Socially constructed model of innovation (Theory)

The Social construction of technology (SCOT), which is one of the most prominent theories of technological innovation in Science and technology studies (STS), suggests that both technical processes and social processes shape technological innovations. Thus according to SCOT, technologies (innovations) can be developed differently based on the social circumstances of the environment. SCOT includes three main components: *interpretive flexibility*, *relevant social group*, and *stabilization*. (Pinch 1996)

In a nutshell the three can be described as follows. Interpretive flexibility states that any technology can mean different things to different groups. There is no "one best way" for creating new technologies, but different groups have their own views, based on their *interpretation of the problem* the technology is meant to solve (Bijker 1989). This also reproduces to the Norman's (1992) definition of innovation discussed earlier, where he states that innovations are a product of goal-directed behavior. Thus different groups have different problems (goals) to solve with technology and they innovate to solve that problem in a more efficient way.

Second component, relevant social group, means that there are different groups with different goals, and that "technology development is a process in which multiple groups, each embodying a specific interpretation of an artifact, negotiate over its design, with different social groups seeing and constructing quite different objects."(Klein et al 2002)

Third component, stabilizing, means that over time the system becomes complete in such a way that it fulfils the needs of the relevant social groups. Eventually use of the technology becomes more like a routine and from the relevant user groups' point of view there is no need to further development the technology. (Bijker 1989)

In relationship to UDOI project we think that SCOT insights clarify the user driven open innovation process by conceptualizing different factors affecting on innovation, and shows that innovation process is not linear but socially constructed. In UDOI the user is in fundamental role in design process. SCOT's interpretative flexibility says that systems can be built more or less flexible for users to find new ways to use the build technology (i.e. innovate) to complete their goals. This also includes the often mentioned "miss use", where users use technology differently to the designer's original idea.

Relevant social groups suggests that in UDOI process it is crucial to design to find the relevant user groups so that there are enough different goal-driven objectives to be achieved by using the designed system. Those user groups have to be kept in close collaboration with the other design actors during the design (innovation) process. By this it is possible that "design ceases not because the artifact works in some objective sense but because the set of relevant social groups accepts that it works for them (Klein et al 2002)."

Eventually in stabilization phase, through a multi group process, where in UDOI different user groups are heavily involved in innovation/design process, negotiation leads to the state where no further design modification occurs and the technology stabilizes to its final form. However, as (Klein et al 2002) states, stabilization can also occur when unsolved problems are redefined so that they do not pose a problem to social groups. Often in software world it happens when people say "That's not a bug, it's a feature!"

3.1.3 Users as value co-creators and functional sources of innovation (Bussiness opportunities)

In the field of strategy there has been a shift in the recent decades away form linear models of value creation towards the ideas of co-production and co-creation. An important antecedent comes from the work of Norman and Ramirez (1993) who argued that value creation could not be understood as a chain in which value is "added to things" but rather as *constellations*, where there is a system that needs to be understood beyond the role of a single company or product (ibid). In their studies of strategies of several companies Norman and Ramirez describe for example the new role of IKEA customers, compared to the roles of other customers of furniture manufacturers, that where being *mobilized and supported to do things* "they have never done before" (like: assemble their own furniture and transporting it). In this understanding customers are not only consuming objects or services but *actively taking part in their production*. Updating these discussions, in later work Prahalad and Rmashwamy (2004) argued for the model of co-creation. The co-creation model includes a more encompassing idea- from the management perspective – of the role of customers not only in producing value but actively participating in creating it. They outline that consumers are changing form being isolated to connected, from being unaware to informed, and form passive to active.

These changes result in consumers that take more *informed decisions*; possessed *a global view* on matters, can *network with others*, and are able to *experiment with and develop* new products and services. There is no

doubt that from the company management perspective the idea of co-creation has have more rapid diffusion and acceptance than those of UCD or PD, as they have been formulated in a language that matches more business plans and company strategy, though some of the insights can be claimed to be compatible and been elaborated in more detailed at the practice level of how to actually do it in some UCD activities which have lacked possibilities to address strategic levels.

A parallel strand of research in a related area has been developing since the 70's around the functional sources of innovation, where Eric Von Hippel and his collaborators have been following and demonstrating that users, those that benefit mostly form mere use, have been a significant *source of innovation* (von Hippel 1994, 2005). The conditions under which this happens have been summarized under the "lead user" approach that has developed methods for finding and benefiting from initiatives developed by "lead users". In this framework "lead users" are considered to be better *predictors of future market conditions*, than what the insights provided by more traditional market research do. In contrast to UCD, the lead user approach does not necessarily aims at eliciting the right requirements but actually *probe users for solution ideas*, some which might have been already developed or can be elicited through appropriate support. Useful ideas to locate the right users have been suggested with the concepts of *advanced analogue field*, but that remains an important limitation of the approach, as finding and engaging the appropriate kind of users is not always straightforward.

3.1.4 Enabling technology infrastructures and new programming practices

New forms of collective organization of innovation have been most visible in the areas of digital technology where computer users and developers are probably the most visible and discussed user-innovators in the literature (Tuomi 2003). The increasing ability to1) tinker with a wide *available pool of resources* –usually licensed with a free/libre and open source software (FLOSS) scheme; 2) the incremental proliferation of open API's that allow the capabilities of *different services to be combined* 3) and the ability to make use of and contribute to *collective repositories and shared conversations* are among others pave the way to new alternatives and understandings of the way technology design and production happens today (Floyd et. al. 2007).

We will come back to this more on detail in chapter 3 where we will expand the elements described in this section to propose an alternative ecosystem in which UDOI type of approaches could thrive.

3.2 A preliminary framework for analysis and development

In order to create a shared object for discussion that could allow us to develop understanding of UDOI characteristics and problematic we started developing a simple framework for analysis. This was done by looking at existing examples of "benchmark" flexible services and combining some of the key ideas presented by the above-mentioned strands of research (see Figure 2). The current version is constructed along 2 main dimensions. The longitudinal axe describes a continuum from USE to CREATION, in order to be able to map users changing roles from consumers or informants to more actively and explicitly acknowledge contributors that also create. In here it will be important to note that we are not only referring to the "initial" design stage, or how much or deeply the users are involved in the conceptualization phase. Specific issues of how much they are heard as customers are not necessarily mapped but rather to the possibilities of creation that are available also after the product or service is released (whole lifecycle). For this the categories of adaptation, reinterpretation, misuse and reinvention (Eglash 2004) are included in the upper area.

The vertical axe includes different kinds of strategies that are available for users to be able to act as effective "co-designers". Un the upper section are grouped a set of strategies that are related more to social practices (workarounds to by pass inflexible structures, social agreements created to implement things that are not supported by the service, etc) and in the lower section concrete interfaces that are more related to the enabling infrastructures (things like specific toolkits to design all the way to availability of the source code of the implementation). The expanding blue cone is meant to convey the idea that al those strategies might be potentially present always (e.g. ability to change the source code is potentially available if one is a good

hacker and able to reverse engineer anything) but the more UDOIness exists, the more explicitly they will be made available.

The framework does not describe the ideal path from not being UDOI to being UDOI, nor it is meant to realize judgements of value of weather it is better to let users create (by e.g. hacking) or how much user involvement is needed for what type of case. Rather the objective is to stretch the conditions so that an extreme UDOI case could be outlined

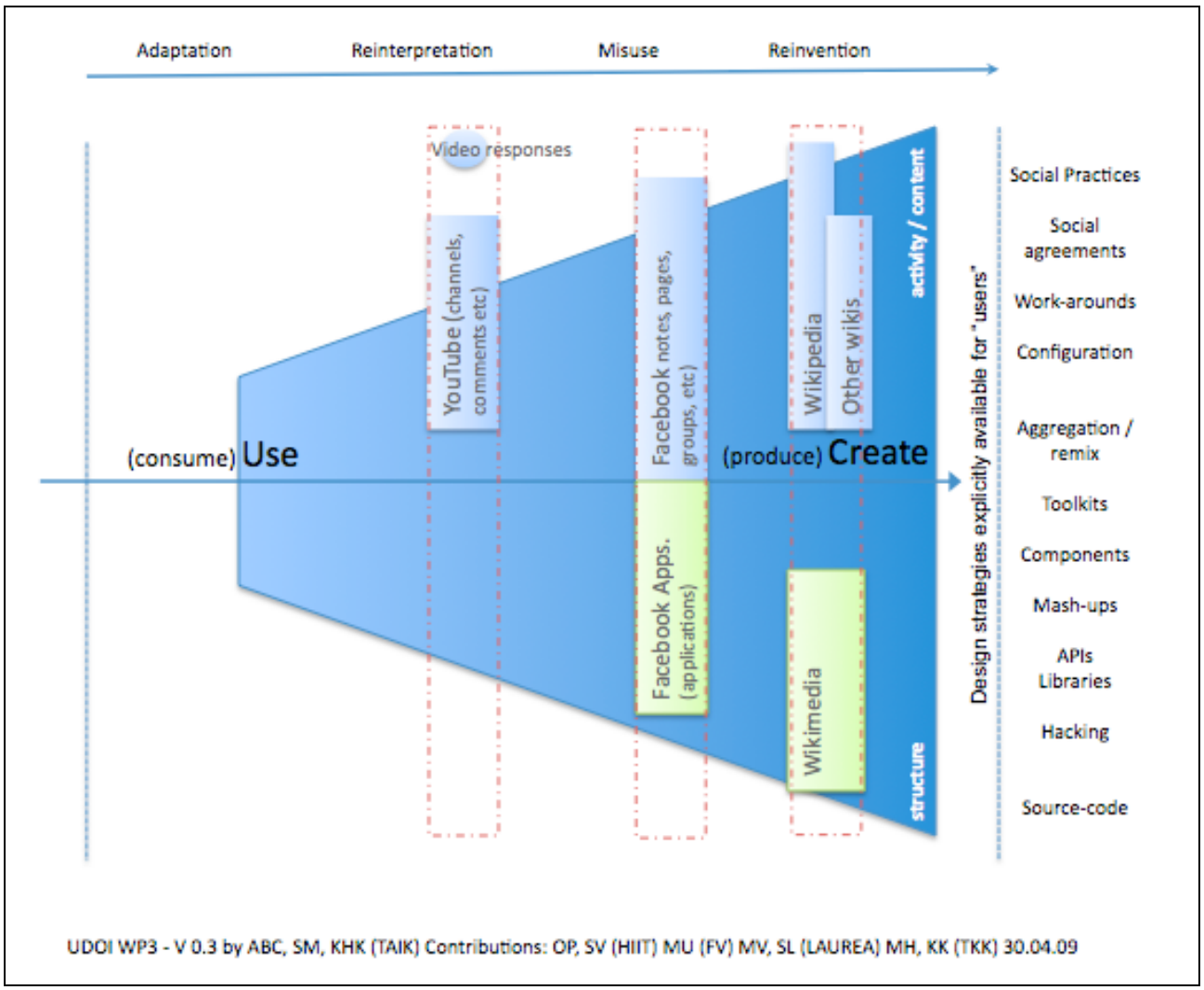

Figure 2 From use to creation, availability of new design strategies for "users"

In order to clarify the elements of the framework three popular services are placed and compared in the framework: YouTube, Facebook and Wikipedia.

a) YouTube occupies a position much closer to use because even though it does offers many customization possibilities and content creation (video responses) is very varied, the basic tools of remixing, aggregating etc are not supported well by the platform that is also closed.

b) Facebook is much closer to the right as it provides certain infrastructures to interact and contribute to the service. Closer to the right we have placed

c) Wikipedia, who present a very sophisticated development of social practices and agreements for content creation and who's underlying engine can powered many other similar services and its developed by a distributed network of contributors.

In principle none of these services (or the processes by which they are being developed) can be considered UDOI but they do illustrate some important aspects of it.

The framework needs still some iterations and feedback from the rest of the UDOI partners, as it does not capture yet all required dimensions. It has worked well though to spark the discussions and clarify understandings.

4 Seeds of UDOI

Ideal conditions of User driven Open Innovation environments can be explored through lessons learned form a selection of existing cases. UDOI will collect and summarize a collection of relevant cases to aid in the creation of a research an intervention framework for FS projects. Version 1 of the documents includes 2 initial cases describing some of the elements that support user creativity in the Habbo Hotel service and introducing ideas and resources to look at Lego's innovation strategy based on Mindstorm and Lego Factory. In subsequent versions of the document more cases will be added and best practices will be identified.

4.1 Habbo

Habbo is a virtual environment where teenagers meet, socialize and play all kinds of games developed by Sulake corporation. The service was first launched in August 2000 in Finland as Hotelli Kultakala ("Hotel Goldfish"), based on the developers' two earlier online services. At the time of writing, there are Habbo hotels in 30+ countries, and close to 12 million users visit Habbo each month[3]. Instead of an entrance or a monthly fee, the profit model is based on micro-payments in the hotel. Virtual furniture, mini-games, and membership in the Habbo club are bought with so called Habbo credits. These credits can be purchased with pre-paid cards, bank transactions, or special text messages that add a specified amount of money to the customer's mobile phone bill.

Encouraging user creativity

Habbo developers have followed two important rules to support for user creativity and innovation: the Habbo platform allows for *many ways to the pieces together* and *users can choose their own incentives* to participate. By combining elements from pre-defined sets, the Habbo visitors are able to choose their own clothing styles. In the same line many lines of furniture support the decoration of Habbo hotel guest rooms. These are similar enough to support users' goals, but different enough to make fashion, trends, and distinction possible. In Habbo, users can choose to do what they like: collect Habbo furniture, meet friends, play games, invent own games, become rich, join a group, create a group, or test boundaries, and so on. In addition, Habbo supports an unlimited number of user-created hotel rooms, and safe trading of furniture. These features are important for the scalability of Habbo and the economics & value creation in Habbo.

User innovations

A common way of talking about Habbo avatars is through a their profession. Some Habbo *visitors pretend to have a profession in Habbo*, which involves decorating their room and behaving according to the selected profession. Some fansites have written articles on this role-playing phenomenon and discussed the following professions: journalist, nurse, tv-show host, bartender, pharmacist, actor, police, doctor, fireman, postman, veterinarian.

Imitating TV-show formats is another popular way of creating a hotel guest room theme. For instance Habbo Idols and Habbo Bachelor (Unelmien Poikamies in Finnish). We have also found mentions of other tv-shows such as Greed, Do you want to be a millionaire, Big Brother, Survivor, America's Next Top Model, and different Dating-formats. The diversity of the popular Habbo activities is very large, however one way to compare activities is to look at the their characteristics over time. For instance, an activity can be open to everyone, or only for selected visitors (closed). It can be fleeting, or continue over a longer time period. Group activities can also be characterized as hierarchical vs. democratic, or visible vs. underground. Such group characteristics are important when thinking about target user segments in the service.

[3] Source: Sulake Press Release April 2009. http://www.sulake.com/press/

There are a lot of small but important innovations by users in Habbo that have shaped the service. For instance:

- using a bar desk as a room divider (highlights the importance of letting users redesign the synthetic places)
- using many rugs as grass (highlights how repeated use of a simple object can make an interesting larger whole)
- using a dice to make a casino (highlights how users can use a small object that enables "the element of chance" in larger unexpected contexts)
- using a door and a teleport to facilitate entrance fees inside Habbo (highlights how the combination of smaller items can be used to make rudimental capitalistic logic possible in a system)

User involvement in different service lifecycle phases

During the first year of the development, the designers were active users themselves and they had easy access to user created content. User feedback early on relied on volunteer moderators, fansite articles, weekly competitions, beta testing. Later, as the company grew larger and more resources were available, cross-cultural user research was conducted. When the service expanded internationally in 2004-5, still other methods were used: user panel, usability evaluation, playability testing. Usability and user experience design is now integrated with agile development.

Key Messages

- User creativity can be supported: make it possible for users to put the pieces together in many ways and let users choose their own incentives.

- Groups and sub communities: user research need not start from the individual – and if the service becomes largely used – user groups shape the service more than single individuals.

- Open-ended design and fuzzy user representations leave room for user innovations

- Static stereotypical user descriptions (Personas) and customer segmentation models may be a sign of distant relation to users – in an active developer-user dialogue, developers tell anecdotes of what do users do – this might be key user knowledge sharing. => Tools for user knowledge and representations need to be sensitive to the forms of user participation.

- Users have important roles in the production – but differently in different service lifecycle phases

- An incomplete understanding of the users does not hinder service design, but failing to let the users participate and create content is a showstopper.

4.2 Lego

Lego group's[4] experimentations with user innovation trends are one of the most well documented cases of co-creation, mass customization and lead user involvement available so far. Commentators seem to agree that the experiences gathered by the company around the Mindstorm product have been the basis of the companies reborn in the last decade (Prahalad and Ramaswamy 2004, Seybold 2006, Beloe 2006).

Mindstorm

Mindstorm is a robotic toolset aimed at supporting amateur robot builders and fans in robot development, The toolkit and the product range was launched around 1998 with considerable success not only in Lego's

[4] http://www.lego.com

traditional children oriented market but also in more adult hobbyist oriented one. The product and its related services have been developed iteratively in a large distributed setting that started as collaboration with a university research lab at MIT (Martin et. al. 2000). Early development included extensive user involvement, feedback and testing through real school projects with the participation of children and teachers. Latter stages of the innovation process have also embrace constant interactions and learning form different user groups of their products[5]. These groups, borne around the Mindstorms platform where not necessarily supported by Lego. Through mutual engagements and sharing the community hacked the software on their own extending its capabilities (Keegan 2001), on the other hand same communities where use as sources to identify and engage lead users that have ideate and influence more directly the subsequent releases of the product (Koerner 2006).

Lego Factory

One of their latest experimentation is embodied in LEGO factory, a web-base service launched in 2005 that allows any Lego customer to 1) download into a PC a software construction toolkit called "Digital designer" to visualize and create their own Lego models (using virtual bricks), 2) upload renderings of them to the site, 3) share them with other users and 4) eventually buy the actual pieces to build the models. The environment embodies important ideas that where developed first by the Lego user community -especially in the Lugnet adult user group- who developed already the practices of sharing pictures of models inside the community, building a software simulation environment to visualize them and produce instructions, as well as sell and exchange custom made reused Lego packages. The companies own implementation extends these practices to more Lego customers (children and teachers not necessarily involved in the more advance hobbyist groups) while creating also a direct channel to the companies manufacturing processes and mass customization strategy (Piller 2005).

As it happened with Mindstorsm, Lego Factory's Digital Design application was also extended (hacked) by unsatisfied (advanced) users not happy with the official implementation. In this case Lego's Digital Designer application way of calculating the needed Lego pieces was considered wrong, and highly expensive from the point of view of a customers wanting to by the materials to construct their models (Terdiman 2005). The assembly line at the company shipped only a combination of standard bags with preset amount of pieces, but the application used an abstract level of a "material's pallete" that resulted in wrong combination of bags that lead customers to end up buying more pieces than what they needed. In record time a group of enthusiastic fans where able to figure out a much more efficient strategy to calculate inside the application the right amount of bags needed by creating a workaround. They joined efforts to collect a parallel database list of the stock bags and their real contents, and made that accessible by the Digital Designer application. The hack enable users to create their models basing their decision on the actual bag contents (which is what Lego sold them) and thus get a more realistic view of its costs.

Key Messages:

Based on these experiences Lego group has started to formulate an innovation strategy and an infrastructure to

- Surround their traditional construction kits with complementary software toolkits for (advanced) users that extend the reach and influence of users creative inputs and in some cases its influence.

- Recognize its strategic advantages, as Lego is not necessarily a software company some of those solutions are not developed by Lego but by partner organizations - like National Instruments in the case of Mindstorms - (Seybold 2006)

- Nurture active and diverse user (customer) communities (Beloe 2006) which could channel creative inputs and allow the company to learn more efficiently

[5] There are many fan and user group sites around Lego like lugnet http://www.lugnet.com

- Customer communities do not only teach Lego but they support themselves actively and to some extent are able to co-create between them (Prahalad and Ramaswamy 2004).

- Company's product design capability is more dispersed than ever, it is even selling Lego sets which are designed by other Lego users, with some experiments on profit sharing (Piller 2005)

- Embrace misuses and tolerate hacks in their offerings. Analyze how they improve the offerings: but create a position towards unsolved issues like the possibility of the trademark being diluted and need for disclaimers. (Tomas 2001)

4.3 Contrasting principles of close innovation, open innovation and udoi

To actualize our lessons learned from the UDOI project so far and to probe the ideas and characteristics of hypothetical extreme UDOI context, we use Chesbororugh's initial comparison between Closed innovation and Open innovation to explore possible UDOI principles (Figure 3).

In a nutshell our still hypothetical UDOI principles say that innovation happens in a distributed or networked matter where users' knowledge and creativity is valued not only by input in the process but also in the possibilities the end service offers to them. For example, when a principle of Open Innovation is that: "not all of the smart people work for us so we must find and tap into the knowledge and expertise of bright individuals outside our company", UDOI principles suggest that: "not all the people need to be smart, is enough that they are connected".

Closed Innovation	**Open innovation**	**User driven Open innovation (hypothetical)**
The smart people in our field, work for us.	Not all of the smart people work for us" so we must find and tap into the knowledge and expertise of bright individuals outside our company.	Not all people need to be smart, is enough that they are connected. (Community of dump people can potentially replace a smart one)
To profit from R&D, we must discover, develop and ship it ourselves	External R&D can create significant value; internal R&D is needed to claim some portion of that value.	Distinction becomes irrelevant. R&D is distributed by nature (value is in the orchestration?)
If we discover it ourselves, we will get it to market first.	We don't have to originate the research in order to profit from it.	All should get some appropriate profit
If we are the first to commercialize an innovation, we will win.	Building a better business model is better than getting to market first.	Business model is provided
If we create the most and best ideas in the Industry, we will win	If we make the best use of internal and external ideas, we will win.	Try out all ideas
We should control our intellectual property (IP) so that our competitors don't profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.•	Sharing IP is more widespread as there is an increasingly large information commons available or there are more degrees of closed/freedom possibilities where to choose from

Figure 3 Contrasting principles of CI, OI (Chesbororugh 2003b) expanded with some emerging UDOI working principles.

5 Digital Ecosystem for advancing UDOI

In this section we will study and sketch a conceptual model for a digital ecosystem where user driven open innovation and service creation could possibly flourish. We will first introduce some concepts related to this field. After that, we will present some technologies and strategies that support user driven open innovation. Finally, a hypothetical model for a digital ecosystem is presented.

5.1 Definitions of concepts

5.1.1 Digital Ecosystems

Digital ecosystems is an emerging research field that studies socio-technical digital counterparts of natural ecosystems. Briscoe and Wilde (2006) define digital ecosystem “to be the digital counterparts of biological ecosystems, exploiting the self-organizing properties of biological ecosystems, which are considered to be robust, self-organizing and scalable architectures that can automatically solve complex, dynamic problems”. This definition emphasizes the problem solving and architectural view. In the context of this project it is more useful to see it as a digital business ecosystem as defined by Nachira (2002) as “a 'digital environment' populated by 'digital species' which could be software components, applications, services, knowledge, business models, training modules, contractual frameworks, laws, ...”. In the following chapters we will look at this type of digital ecosystems more closely to identify the players that are involved and to understand how user driven service business could be fostered in it.

Nachira (2002) identifies three different layers for the digital business ecosystems:

1. The generic ecosystem infrastructure (basic services such as payment)
2. The sector specific ecosystems (for example: tourism, manufacturing)
3. The instances of sector specific ecosystems in a geographical area supported by local communities

In this text we will mainly address the first layer by focusing on the generic infrastructure but in a way we will also cover the second layer when studying the ecosystem in a specific context of user driven service business. The last layer will be somehow touched in the last part of this document when we analyze the cases from the WP1 to see how they fit into the presented ecosystem.

5.1.2 Living Labs

Another similar concept to digital ecosystems is Living Labs. Følstad (2008) has done a thorough literature review on Living Labs and defines them as “environments for innovation and development where users are exposed to new ICT solutions in (semi)realistic contexts, as part of medium- or long-term studies targeting evaluation of new ICT solutions and discovery of innovation opportunities”. As this definition reveals, user studies are integral part of Living Labs. Both of these terms, digital ecosystem and Living Labs have their use in the context of this project. If user study is of importance then one might want to talk about Living Labs and respectively if one is instead more looking at the composition of the ecosystem then digital ecosystems may be more suitable term.

5.1.3 Web 2.0

During the last years we have seen the rise of a new digital ecosystem, web 2.0, where end-users become co-creators and software turns into services. Web 2.0 is not very well defined concept. It is loosely used buzzword that can easily be thought to cover almost any new phenomena in the web. O'Reilly (2007) has listed the core competencies for web 2.0 companies that can be used as a one characterization or definition for Web 2.0:

1. Services, not packaged software
2. Control over unique, hard-to-recreate data sources
3. Trusting users as co-developers
4. Harnessing collective intelligence
5. Leveraging the long tail through customer self-service
6. Lightweight development and business models
7. Software above the level of a single device

Web 2.0 can be seen as a phenomena, that introduces some interesting developments that support user participation and open innovation and thus many of the characteristics presented above are used as an input for our model.

5.1.4 Services and web services

In general, a service can be seen as a form of product that consists of sequence of activities or benefits that are essentially intangible and do not result in ownership of the outcome. In the context of digital ecosystem, we will mainly see service as a web service as defined in the following.

Web services are defined by the World Wide Web Consortium (W3C) as “a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL)”. In the conceptual model, we do not assume all services to be web services that have a WSDL (Web Service Definition Language) interface. Some of them might instead simply expose a REST API (representational state transfer) or some other more flexible and lightweight interface. However, typically many basic services adhere to web services standard as it provides a good basis for combining them to create a higher level, cross-organizational processes as will be described in the web service orchestration and choreography subchapter.

5.2 Enabling software and other technologies

In this section we will look at the various enabling technologies and software strategies that support user participation, open innovation and business development in the ecosystem.

5.2.1 Open source software (OSS)

Wikipedia defines open source software as “computer software for which the source code and certain other rights normally reserved for copyright holders are provided under a software license that meets the Open Source Definition or that is in the public domain”. Open source software concept and definition is derived from the Free Software Philosophy and it's freedoms to run, copy, distribute, study, change, and improve the software, originally presented by Richard Stallman (2002). Open source and free software thinking has fundamentally changed the software development field by providing users a way to share their works to the community and letting others re-use and build upon the previous work. These fundamentals match very well with the context of user driven open innovation and thus will be in an important role in the conceptual model for the digital ecosystem.

5.2.2 Mash-ups

As part of Web 2.0 phenomena new style of mash-up applications are appearing that draw upon content from external services. Technologies such as AJAX and REST have paved the way for mash-ups providing a way for easy and flexible service composition. Mash-ups style development make new service composition easier

by supporting reuse and remix of existing data and leveraging web as the tool for doing the service design, composition and customization in run-time. Merrill (2006) lists several popular genres for these applications:

1. Mapping mash-ups
2. Video and photo mash-ups
3. Search and Shopping mash-ups
4. News mash-ups

Mash-ups fit very well into UDOI world where user is seen also as a co-creator. In our model, we have illustrated the mash-up concept by showing it as one possible source of data for the user created services.

5.2.3 Cloud and grid computing

To lower the barrier for service development and composition doesn't help alone. There needs to be an easy way to deploy the service and make it available for others. LAMP (Linux, Apache, MySQL, php/perl) architecture has greatly simplified the service deployment by providing a uniform and open-source platform for service development, deployment and hosting. Recently, the introduction of cloud computing services such as Amazon EC2 have taken this development a step further by providing an elastic computing infrastructure where you can easily increase or decrease the capacity in minutes and by offering an inexpensive payment model where you only pay for the actual capacity consumed.

Wikipedia defines cloud computing as “a style of computing in which dynamically scalable and often virtualized resources are provided as a service over the Internet”. Grid computing is another related concept but as Buyya (2008) et al clarify it is more “for solving large scale resource-intensive problems” and thus cloud computing is more suitable concept for this paper.

In the context of web services, the most needed resources are computing and storage resources. We have added cloud-computing service into the diagram to cover both of these. Amazon Elastic Compute Cloud (EC2) and Simple Storage Service (S3) are some examples of the recently emerged providers of these resources.

5.2.4 Web service orchestration and choreography

To produce a specific service to a customer, typically several related activities are required such as payment processing, providing computing resources, etc. This collection of activities is called business process. Management of interactions between these sub activities is an essential part of a business process and in the context of web services this coordination is called web service orchestration and choreography (Peltz 2003). Peltz provides a clarifying distinction between orchestration and choreography by explaining that “orchestration always represents control from one party’s perspective. This differs from choreography, which is more collaborative and allows each involved party to describe its part in the interaction. Choreography tracks the message sequences among multiple parties and sources—typically the public message exchanges that occur between Web services— rather than a specific business process that a single party executes”. Separation between these two activities has to be done case by case and thus in the conceptual model we have simplified it into a one process managing both the orchestration of each individual service and the choreography between these services.

5.3 Conceptual model for a digital ecosystem

In this chapter we will summarize the discussion from the previous chapters and present a conceptual model for the digital ecosystem. The presented model is one example of a digital ecosystem that could support and advance User Driven Open Innovation and service business as well. The model is based on the discussion of the concepts in the earlier chapters and some input has also been taken from the cases presented in the

chapter 3. In the forthcoming versions of this document we will further elaborate the model based on the case experiences and add new concepts into it.

5.3.1 Background for conceptual modeling

Wand and Weber (2002) describe conceptual models as mostly graphic models that are used to represent both static (e.g., things and their properties) and dynamic phenomena (e.g., events and processes) in some domain. We chose to use Microsoft Visio to sketch a graphical model for illustrating the main stakeholders, their relationships and flow of information between them. A more formal diagram such as UML activity or interaction diagram could have been chosen as well, but because they are more geared towards software engineers and in this paper we aim at explaining the concepts to a wider audience we decided to choose a less formal and instead more informative and easier to understand model that serves our purpose better.

5.3.2 Description of the model

A conceptual model for the proposed digital ecosystem is illustrated in Figure 4. The digital ecosystem is built around a user community that is illustrated in the top-left corner. It must be noted that typically, participation in online communities is not equally divided. According to Nielsen (2006), “in most online communities, 90% of users are lurkers who never contribute, 9% of users contribute a little, and 1% of users account for almost all the action“. We have illustrated these different roles with different colours as listed in the following:

- End-users (“lurkers”) with green colour
- Synthesizers or contributors (“contribute a little”) with beige colour
- Service developers or co-creators (“account for almost all the action”) with green colour

To make it easier to understand the model we have also separated the main activities of these roles with same colors; the creation and contribution to service development is illustrated with green color and the usage of a service with red color. In the next paragraphs, we will walk through and describe the steps of both of these activities.

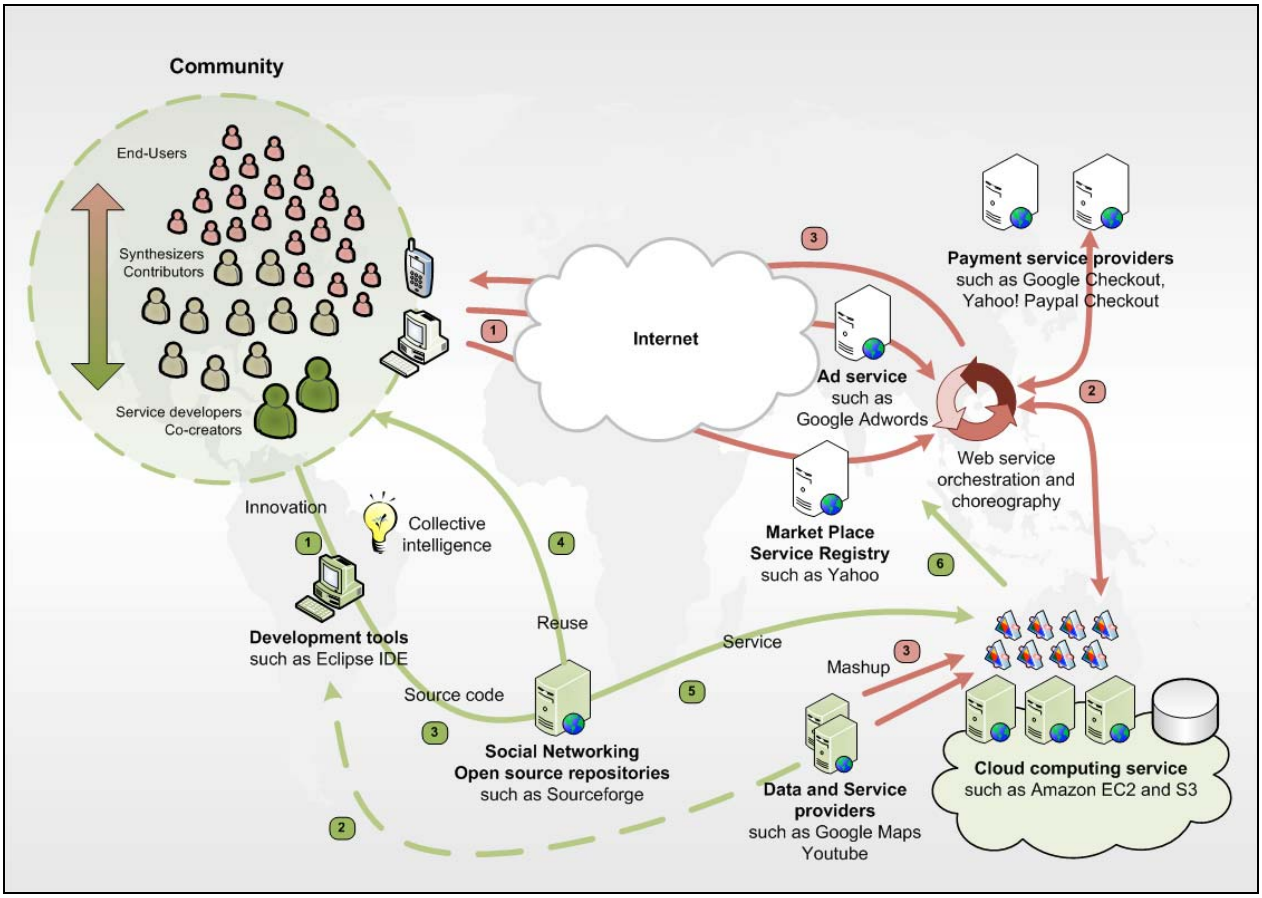

Figure 4 A proposal for Digital ecosystem for advancing UDOI

Development and creation of a service (green colour)

1. All starts from a user having an innovation or idea of a new service that he starts developing further with some development tool.

2. In Web 2.0 world user may typically use mash-up approach to combine data from existing services to form his/her service.

3. User decides to publish source code as open source into an existing open source repository.

4. Other users might re-use the source code to create their own service as explained in the steps 1-3.

5. After being finished with the development, user deploys the service into the dynamic cloud-computing environment.

6. User might also register the service into a market place or use some advertisement service to promote it.

Usage of a service (red colour)

1. Customers might find the service, for example, from a market place or from an online advertisement.

2. To produce the service for a customer some orchestration and choreography is needed. This might involve payment transactions and requesting resources from a cloud-computing environment.

3. Finally, the service (response) is delivered to the customer by integrating data from all the mash-up sources.

6 Legal issues related to User-Driven Open Innovations

In relation to User-Driven Open Innovations, it is essential that service providers and users co-produce services and applications in complex and dynamic ecosystems and formations. Research and development environments for User-Driven Open Innovations mimic real life settings in which different actors in service systems have diverse interests. They are governed by various laws. The actors can be businesses (corporations for profit), consumers (individuals), public entities (government, state officials, etc), or communities (informal groups of individuals, usually not for profit). In each service relationship, there are at least three kinds of legal interest that are of particular importance for the User-Driven Open Innovation studies:

- To properly protect information concerning the customer or end user and their needs,
- To promote competition by appropriately protecting the service provider's competitive advantage including information concerning the provider's skills and inventions, and
- To secure the terms and conditions of the service, and to address liability issues.

In the following, each of these interests is discussed in more detail.

6.1 The Legal Setting of the User Community

The term 'community' often refers to a group that is organized around common values and social cohesion within a shared geographical location. Yet, with respect to the Internet, it is increasingly possible also to form 'virtual communities' that are not defined by a geographical location. Anyway, from the psychological viewpoint, the members feel 'sense of community', i.e. membership, influence, integration and fulfilment of needs, and shared emotional connection. In our context, however, the formation of communities is not primarily based on these human psychological or social needs, but on the requirements that evolves from the Open Innovation process. Therefore, the term 'user community' simply refers here to the group of users that participate in a User-Driven Open Innovation process.

It is tempting to think that one could have a permanent, adequately instrumented user community that could be availed of every time, when user-driven approach is needed in service development. How about having a real user community, a Living Lab that companies, public entities, and other service providers could use, when they want to develop something with real users? A community that would be there always available for anyone who needs it? Sounds fascinating, but hardly realistic.

One of the basic problems with user communities is their legal vagueness. User communities are usually not legal persons. In general, they do not have competence to make binding decisions or contracts. If someone wants to make an agreement with a community, one has to either agree with each and every member of the community or there could be somebody, a natural person or a legal entity that has a right to represent all the members. The latter option usually requires that the proxy has made a contract with all the members and thus got the authorization to represent them. (Pitkänen 2007)

So, it is technically possible, although not easy, to build a community and authorize someone to represent all the members. For example, there could be a "Living Lab Service Provider", a company that has recruited a more or less permanent group of people and agreed with all of them that the company may provide the community for outsiders as a User-Driven Open Innovation Environment. But there are still problems left. Let us go through some specific legal areas that are heavily related to User-Driven Open Innovations and see what issues are still to be solved.

6.2 Privacy and data protection

From the legal point of view, the information on the end user is mostly related to privacy and data protection. The European Union has been leading the development of the data protection law, which has arguably resulted sometimes even too strict rules. However, with respect to new kind of services, the laws may still fail to cover them adequately.

In Europe, data protection is extensively regulated by directives and regulations. The two most important in this context are Data Protection Directive (95/46/EC), which is about the protection of individuals with regard to the processing of personal data and about the free movement of such data, and Directive on Privacy and Electronic Communications (2002/58/EC), which applies to the processing of personal data in connection with the provision of publicly available electronic communications services in public communications networks.

In addition, numerous national laws include rules that affect data protection. They may stipulate more in detail and more strictly how personal information is to be handled in certain situations, or they may authorize certain usage of private information more freely than general rules would allow. Privacy is also protected by penal codes. Consequently, the legal construction of data protection rules is quite complex. Unfortunately, the rules governing privacy cannot be found in one law, but they are spread out in numerous statutes (Kosta, and Dumortier 2008).0

In general, the law restricts the processing of private data. For example, there has to be an acceptable purpose to process personal data and it is not allowed to use the data against that purpose. However, if the person gives consent, then almost any processing is allowed, but the consent needs to be specific and informed. Thus, it is central what the end-user knows and understands about the processing of the personal data (Kosta, and Dumortier 2008).

It is important to realize that the data protection law is not prohibiting businesses and services to avail of personal data. On the contrary, it tries to define a legal framework, which enables business. It is quite possible to develop services in a way that they comply with the data protection law. However, the rules are quite complex, and it is also easy to develop services that do not follow the law, if the data protection law is neglected while designing the new service. This is especially true in cases, which required the transfer of personal data from one organization to another. The law stipulates that usually the transfer is only possible if the person has given a specific and informed consent in advance. Therefore, the developer of a new service should be aware on where personal data are to be transferred in order to make proper agreements with users prior to the usage of the service.

6.3 Intellectual property rights

Intellectual Property Rights, especially copyright and patents play a central role in User-Driven Open Innovation processes. Yet, the basic ideas behind the copyright and patent systems have their origins in a very different world. In the early era of industrializing printing houses and phonorecord companies it certainly made sense to give protection against unauthorized copying. In relation to emerging innovations that are studied in User-Driven Open Innovations, it is no longer clear whether copy-protection is the key-factor to promote creativity or patents the right way to advance inventions. Still, those are the legal regimes that we have to live with today.

Copyright provides not only economic rights, but also moral rights. For many people, especially amateurs, it is not so vital to make money from the works they have created, but to get credited as an author. Thus, copyright can be important for non-profit communities, also. These aspect needs to be explored further in future versions of this document.

User-Driven Open Innovation studies could provide us information on what makes people to create works, and why they sometimes want to share those works with others and sometimes not. What motivates creative

people especially in relation to those innovations that are studied? How to make them even more motivated? How to improve the copyright system in a way that it better supports that motivation?

The patent system was developed to protect inventions that are related to tangible industrial products. Because of this history, it is often difficult to apply patent law to intangible services. The subject matter of patent law has been gradually extending: computer programs are already largely patentable and many countries, most notably the United States, also allow business method patents. Therefore, it seems that regardless of problems, it is increasingly possible to patent service-related inventions. Arguably, the patent system has many flaws, and some opponents claim that the system as a whole is mostly harmful and hinders development. However, provided society considers it useful to promote inventions with such a system, there should be no reason not to introduce a similar protection for new innovations. It should nevertheless be used to promote competition and not to develop unnecessary monopolies.

The basic problem with user communities, open innovations, and intellectual property rights is the fact that intellectual property right law assumes that there is an author, an inventor, or an identifiable person that has significantly contributed to the inception of the intangible property. In user communities it is often very difficult to point out, who that person was. Copyright in community created content, for example, seems to belong to the whole community, which from strictly legal perspective is most uncomfortable situation. No-one can, for instance, grant licenses to the content since nobody has that right alone.

6.4 Contractual relations and consumer protection

New information and communication technologies introduce new kinds of contractual challenges. In a typical User-Driven Open Innovation Environment, users are moving, they have various wireless devices, and it can be increasingly challenging to securely identify the users. From the contractual viewpoint it is troublesome if one contracting party is not able to be sure who the other party is. This can be addressed by using, for example, digital signatures that are certified by a trusted third party.

Consumer protection laws protect individuals against unfair trade and credit practices. They ensure not only the safety of goods and services, but also the economic and legal interests that will enable consumers to shop with confidence. It will be challenging for a consumer to determine which providers are trustworthy and with whom it is safe to transact. Consumer protection law stipulates stricter than normal contract law, which terms and conditions are acceptable in consumer contracts. For example, usually it is possible to agree that liabilities are effectively limited. In consumer contracts however, the trader can hardly limit its liabilities. In case a contract that is made between the users in a community and a company that operates the User-Driven Open Innovation Environment is to be considered as a consumer contract, then the company has only a few possibilities to limit its liabilities.

6.5 Summary

To form a permanent user community and to provide that community as a User-Driven Open Innovation Environment for others, it is required that the one who operates the Environment has agreed with all the users that it has a right to

- Disclose all the necessary personal information for any purposes for any outsiders,
- Assign enough intellectual property rights to outsiders so that the outsiders are able to utilize the innovations in their services,
- Make other agreements with outsiders considering e.g. services' terms of usage, liability limitations, and so on.

It is hardly possible to make such general agreements with the users. The contract law stipulates that the terms and conditions of an agreement need to be unambiguous enough so that the contracting parties can understand the consequences of the contract in advance. Moreover, some special laws, like data protection law has even stricter rules. The consent that a person gives to allow the processing of personal information needs to be specific and informed. A general authorization to allow any disclosure of any personal information hardly fulfils this requirement. In practice, since the cases can be vey different, some of the issues must be agreed separately for each instance of the process to make the contract binding.

Therefore, from the legal point of view, it is quite unrealistic to build a permanent user community that anyone could avail of. Instead, it is much easier, but less tempting to have a user community that does not reveal any personal data on the users and is not bound to assign any intellectual properties rights. Yet, the most feasible User-Driven approach is to recruit the user community each time a development process takes place and then make a specific agreement with all the users on how their personal data is processed, how the intellectual property rights are divided, and how the other rights and liabilities are managed.

7 Case Analysis

In the future versions of this document we will in this section analyze the cases against the UDOI foundations presented in the previous chapters. As an input for the analysis we will use the case descriptions and other materials that will be made available after the first year. We will look at the cases from the following three aspects:

1. **How UDOI the cases are?** We will do this analysis based on the criteria and principles presented in the chapter 3.

2. **Analysis of the digital ecosystem of each case**. We will sketch a specific digital ecosystem for each case similarly as was done in the chapter 5.

3. **Legal issues related to cases**. We will use the legal foundations presented in the chapter 4 to point out relevant legal UDOI issues raised up by the cases.

Each of these aspects will be explored separately in the following three sub-chapters.

7.1 How UDOI the cases look?

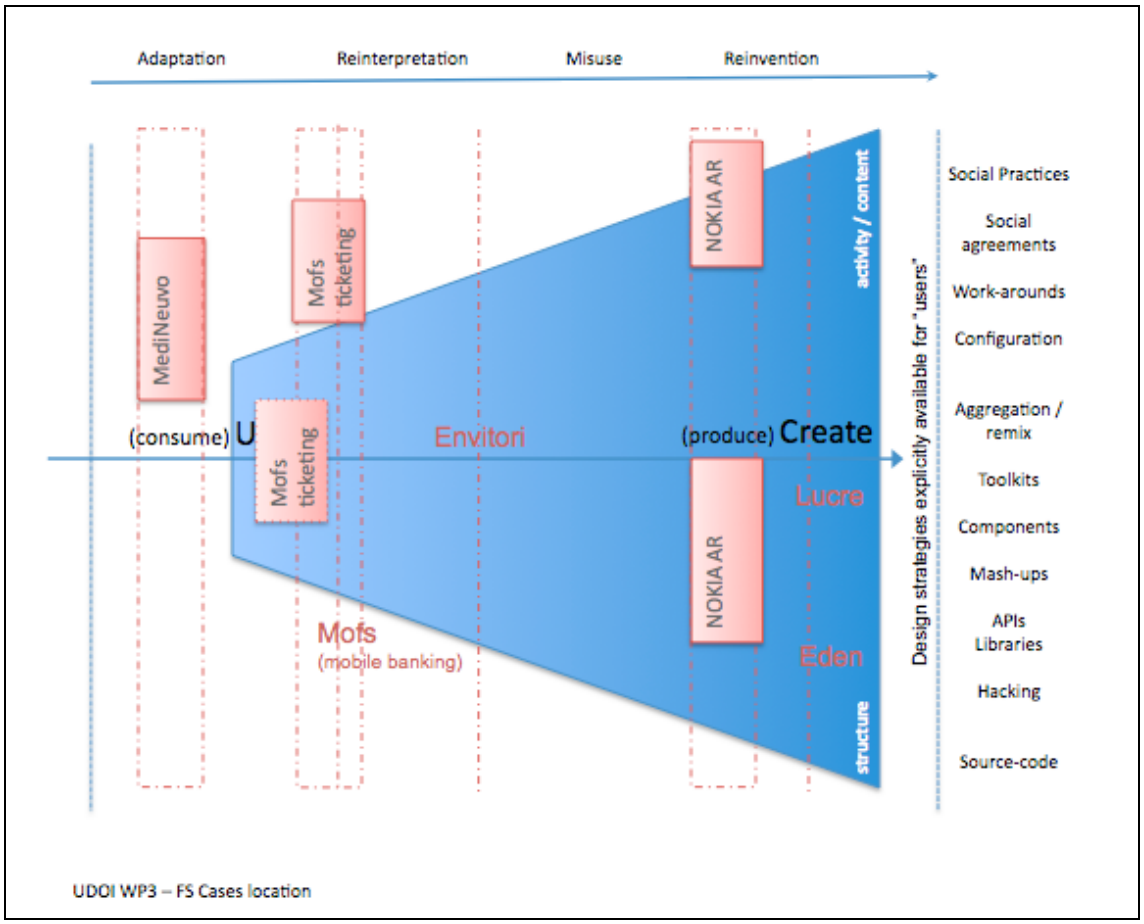

Figure 5 preliminary locations of various FS Cases at the onset of the project

7.2 Analysis of the digital ecosystem of each case

To be expanded

7.3 Legal issues related to cases

To be expanded

8 Summary and Future steps

In this document we have looked the UDOI space mostly from a theoretical point of view aided with preliminary outside case analysis. We started by defining the central terms related to the main topic of the project and presented a preliminary mapping of relevant strands of research. Based on these we condensed some insights into a preliminary analysis framework that will be further developed. In order to illustrate possible conditions of future UDOI environment we have expanded Chesborough's initial comparison of closed and open innovation principles to include hypothetical UDOI principles, and sketched a vision for a possible ecosystem where UDOI could drive. We will continue the work by further refining the thinking and analysis tools so that we could develop good intervention agendas and closely analyzing and contributing to the FS-UDOI cases and other tasks of the project.

Contributions:

a) Clarification of the concepts UDOI needs to work with and define better

b) Mapping of contributing strands of research to locate further references and tools

c) Defining a preliminary framework for analysis and intervention

d) Collecting case examples

e) Expanding Principles of Closed and Open Innovation towards Community Innovation

f) Mapping of User Community legal issues as related to UDOI

WP3 worked has included also developments on the CUSTOM model (CKIR) and a Service User Experience –SerUX- model (TUT) that have been applied in the practical planning of the cases (see deliverables D1.1 and D2.1) but have not been reported in this document. Those will be documented and incorporated.

8.1 Acknowledgments

Event though the authors are responsible for the content and possible omissions in this document some of the ideas discussed here and the analysis presented has benefited from input and feedback from WP3 participants. During the last months some of these ideas have been worked out in the WP3 working sessions with participation from Kari-Hans Kommonen, Sanna Martila and Jenna Sutela (TAIK) Matti Hämalainen (TKK) Kari Mikela (CKIR) Jari Halonen (TUT) Mati Vedenkangas and Seppo Leminen (LAUREA) as well as Mia Uronen (FV) Maria Antikainen (VTT) Merja Haveri (NOKIA)

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