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Open Innovation Accelerator Survey 2009

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The Market for Open Innovation

Increasing the efficiency and effectiveness of the innovation process

A market study of intermediaries facilitating the integration of external actors and information from the firm's periphery in the innovation process

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Preface

Recently, the term open innovation has become a major buzzword in innovation management. But behind the buzz is a sustainable message: Successful innovation is not solely performed internally within a firm, but in a cooperative mode with other external actors. Sources of external input for innovation are plentiful, including market actors like customers, suppliers, competitors; the scientific system of university labs and research institutions; public authorities like patent agents and public funding agencies; and mediating parties like technology consultants, media, and conference organizers. The core idea of a new era of open innovation is the integration of these actors in a flexible and informal way beyond the traditional notion of innovation alliances or contract research. New forms of organizing distributed problem solving like crowdsourcing have become a leitmotif for many innovation departments.

Especially small and medium size enterprises (but also many large corporations), however, face the challenge of creating the internal ecosystem that allows them to profit from external input in an efficient and effective way. This challenge is twofold:

1. Firstly, companies have to know which new and established models and tools exist to tap into external knowledge for innovation in a flexible way. They have to gain knowledge how to operate these approaches and learn about their success factors.
2. Secondly, companies have to identify and reach the external partners which can help them in their open innovation process. They require an overview of methods and possible partners who are specialized in applying these methods.

This report wants to address these challenges. For the first time, it provides a comprehensive analysis of the providers and platforms for open innovation. These intermediaries can help SMEs to accelerate their open innovation initiative. That is why we call them **Open Innovation Accelerators** (OIAs). In the following sections, we take a detailed look on the methods, sectors, cost, and project structures for open innovation. Our purpose is to deliver a basis for strategic decisions when planning an open innovation venture.

This market study shall provide managers advice …

- to identify possible methods existing in practice to collaborate for open innovation,
- to understand the market of companies offering help with an open innovation process,
- to identify different approaches when outsourcing an open innovation initiative,
- to gain an overview of the actors available for open innovation from a global perspective,
- and finally to address potential partners for an open innovation project in a directed way.

The authors thank the ***Stiftung Industrieforschung*** for their generous support to conduct this study and to survey almost 50 intermediaries for open innovation in a rigid way. We hope that this study may help managers from SMEs and large enterprises alike to profit from open innovation.

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1 Open Innovation: A New Approach to Increase the Efficiency and Effectiveness of the Innovation Process

Managing uncertainty can be regarded as a core practice of successful innovation management. Firms face various sources of uncertainty with regard to their technological and managerial capabilities and their target markets. Thomke (2003) differentiates uncertainties of an innovation project into technical, production, need, and market uncertainty. To reduce these uncertainties, firms need to access and transfer different types of information (Cassiman and Veugelers 2006). In a generic framework, this information can be divided into two groups (Ogawa 1998; von Hippel 1998):

- **Information on customer and market needs ("need information"),** i.e. information about preferences, needs, desires, satisfaction, motives, etc. of the customers and users of a new product or new service offering. Better access to sufficient need-related information from customers is increasing the effectiveness of the innovation activities. It reduces the risk of failure. Need information builds on an in-depth understanding and appreciation of the customers' requirements, operations and systems. This information is transferred by means of market research techniques from customers to manufacturers.
- **Information on (technological) solution possibilities ("solution information"),** i.e. information about how to apply a technology to transform customer needs into new products and services best. Access to solution information is primarily addressing the efficiency of the innovation process. Better solution information enables product developers to engage in more directed problem-solving activities in the innovation process. The more complex and radical an innovation is, the larger in general the need to access solution information from different domains.

All innovations are characterized by both types of knowledge, although their relative proportions may vary (Nambisan, Agarwal, and Tanniru 1999). **Need and solution information** may be located physically in different places which are often external to the firm's innovation process (Nonaka and Takeutchi 1995). It is necessary to transfer at least a certain amount of each type of information from one place to another as successful innovation requires a combination of the two. Caloghirou, Kastelli, and Tsakanikas (2004) conclude after a study of information exchange in new product development projects that "[…] both internal capabilities and **openness towards knowledge sharing are important for upgrading innovative performance." The innovation process thus can be seen as a continuous interaction between internal actors of a firm and external actors in its periphery** (Allen 1983; Berthon et al. 2007; Blazevic and Lievens 2008; Brown and Eisenhardt 1995; Chesbrough 2003; Freeman and Soete 1997; Reichwald and Piller 2009; Szulanski 1996). Along all stages of this process, need and solution information has to be transferred from various external actors into the innovation function of the firm. One of the fundamental sources of information for innovation is the customer.

Today, the common understanding of the innovation process builds on the observation that firms rarely innovate alone and that the innovation process can be seen as an interactive relationships among producers, users and many other different institutions (Laursen and Salter 2006). Mansfield (1986) showed that **innovation projects which are based to a**

large extent on external developments have shorter development times and demand less investments than similar projects based solely on internal research & development. As a result, the early Schumpeterian model of the lone entrepreneur bringing innovations to markets (Schumpeter 1942) has been superseded by a richer picture of different actors in networks and communities (Laursen and Salter 2006). These actors are seen to work together in an interactive process of discovery, realization and exploitation of a new idea. Innovative performance today is seen to a large extent as the ability of an innovative organization to establish networks with external entities.

The **main effect of including external information** is to enlarge the base of information that can be utilized for the innovation process. In a conventionally "closed" system of innovation, only information about needs and solution information that is in the domain of the manufacturer can be used as creative input for the innovation process, a problem that has been called the "local search bias" (Lakhani et al. 2007; Stuart and Podolny 1996). In an innovation system more open to external input, the need and solution information of the firm is extended by the large base of information about needs, applications, and solution technologies that resides in the domain of customers, retailers, suppliers, and other external parties. Thus, just by increasing the potential pool of information, better results should become possible.

Recently, the term **open innovation** has been used to characterize a system where innovation is not solely performed internally within a firm, but in a cooperative mode with other external actors (Fredberg et al. 2008; Reichwald and Piller 2009). Open innovation is opposed to closed innovation, in which companies use only ideas generated within their boundaries, characterized by big corporate research labs and closely managed networks of vertically integrated partners (Chesbrough 2003). **Open innovation** is characterized by cooperation for innovation within wide horizontal and vertical networks of universities, start-ups, suppliers, and competitors. Companies can and should use external ideas as well as those from their own R&D departments, and both internal and external paths to the market, in order to advance their technology. Sources of external information for the innovation process are plentiful, including market actors like customers, suppliers, competitors; the scientific system of university labs and research institutions; public authorities like patent agents and public funding agencies; and mediating parties like technology consultants, media, and conference organizers (Hauschildt 1992; Knudsen 2007; Tether and Tajar 2008).

Box 1: Open Innovation as a new approach for innovation management

The open innovation mechanism allows organization to acquire, integrate and process external information more efficiently and effectively.

It is a new form of interacting and collaborating with the external environment of a company including various potential external actors (beyond suppliers, customers, universities etc).

By applying methods of open innovation an organization can overcome its local search bias and acquire precise need information and therefore innovate more successful and cost efficient.

2 Methods of Open Innovation – A Description of the Three Major Approaches

In this section, we introduce three methods that help to put open innovation into practice. While consultants and companies often announce fancy new methods of open innovation, all of them can be brought back onto these three basic approaches which have been described in the literature. In this chapter, we take the perspective of a manufacturer who actively wants to create and stimulate the process of open innovation. All methods focus on either accessing need or solution information, or on providing a combined access to these factors. Some instruments are designed for an active integration of innovative users and customers into an innovation process. Other instruments focus on the transfer of solutions from external experts answering an open call for cooperation.

In particular, we will describe the following clusters of methods:

- The **lead user method** first identifies innovative users. In a second step, these users are then integrated by means of innovation workshops. Although the focus here is primarily on accessing need information, the lead user method also is a proven practice when it comes to accessing innovative (technological) solutions.
- **Toolkits for open innovation** are Internet-based instruments which aim at supporting users in transferring their needs into new product concepts. When accessing need information, toolkits should help overcome the problem of "sticky" information.
- **Innovation contests** aim at the generation of input for all stages of the innovation process. Competitions between users and customers aim at encouraging innovative ideas at the frontend of the innovation process. Innovation contests can also begin in a later stage in the innovation process; usually in searches for innovative approaches to a technical problem within a broad field of problem solvers.

2.1 The Lead User Method

The lead user method is a qualitative, process-oriented approach. It aims at the active integration of selected users to generate ideas and concepts for new product or process innovations. Lead users have, before others, within a target market a personal need for a specific solution (a product, a process, a certain type of material, etc.). They expect a very high personal benefit from the new development fulfilling their need. Lead users thus anticipate early on innovative characteristics, which are relevant only much later for other customers. Lead users additionally have the ability to develop a fully functional solution for their needs. They, hence possess not only need information, but equally also solution information (von Hippel 1986, 1988).

An example of a lead user could be a master technician in a factory who is the first to use a new material. The master technician realizes that the machine does not fulfill certain

requirements for processing this material. The factory's sales department has asked him to process the material in a certain way so that new security regulations on an export market are fulfilled. However, the master technician cannot properly process the material using the existing machine. Because of the pressure coming from the sales department, he experiments, for example, with different settings or makes modifications to the machine which enable him to process the new material in the required way. These activities take place autonomously in the domain of the user and remain unknown to the manufacturer (in our case, the machine builder of the processing machine). This example demonstrates that a lead user does not have to be a single person, but can also be a group of different actors in the user's domain (in our example, the need information lies in the sales department; the problem solving competence, however, with the master technician).

Although the lead user method has already been described in the past (Urban and von Hippel 1988; von Hippel 1986), there is still some confusion over what this method is exactly about. Therefore, we distinguish between two procedures how companies can profit from lead users:

- Searching for existing lead user innovations in the user domain and transferring these to the company.
- Searching for people with lead user qualities and integrating them into an innovation workshop organized for solving a given technical problem

2.1.1 The search for existing lead user innovations

As an initial strategy, manufacturers can look for existing lead user innovations within their sector. This idea supports the common view on lead users as independent innovators. On one hand, the general consensus is that these users become active and innovate because of an unsatisfied need. On the other, lead users become active and create new applications because they want to benefit from the solution themselves. But their solutions must be transferred to the manufacturer's domain. Here, the focus is on accessing need information. Lead users innovate autonomously and to a great extent not in cooperation with a manufacturer. A manufacturer's job is to "merely" recognize the finished innovation and convert the idea into a marketable product, which then becomes readily available to other customers. Consider the example of the sporting goods industry. Since discovering the lead user phenomenon, many sporting goods manufacturers today systematically observe customers who are active in extreme sports, and the equipment they use when competing. In this way, manufacturers stay on top of developments occurring within the user's domain (Baldwin, Hienerth, and von Hippel 2006 provide a good documentation of this development in the extreme sport of rodeo kayaking). In a narrower sense, however, sheer observation is not enough. The lead user approach goes further and builds on an intensive interaction and cooperation with the user.

Manufacturers can support customers while they are innovating. Stata Corp., a leading manufacturer of statistical software, sets a good example. The company counts on users to interactively co-develop their products. In the process, they have also found an acceptable way to deal with the resulting output, which closes the gap between an "open" and "closed" system. Stata's customers are often scientists or industrial quality controllers, who use the

software for a large number of statistical tests. In case the applications provided within the software cannot solve a certain task (elegantly) enough, new tests can be programmed simply. Therefore, Stata has divided its software into two modules. One module contains basic features developed by the company and is protected by proprietary rights (sold over a traditional software license). The second part is open. A user community contributes new statistical algorithms and tests. Stata supports these expert users by providing a development environment and a forum on the Internet where users trade tests, ask questions, and expand the developments of others. But since not all users are well-versed in, or have sufficient programming knowledge, Stata has developed a procedure in which the "best" or most popular developments from the user community are regularly selected by the company and made part of the next commercial release. This decision is made entirely by Stata's software developers, who take and improve user applications and integrate them smoothly into the standard software. This additional value created by Strata is also an incentive for users to make their personal developments available to the company without asking for monetary return (simply because their motives for developing a new application were using it in their own scientific work in the first place).

In this understanding of the lead user method, the company's sales force takes an important role. Sales employees should be made aware of and given incentives to look out for innovative solutions coming from customers, who "think outside of the box". Alternatively, a separate department within the company can also search directly for innovative customers. For this purpose, the stages 1 to 3 of the lead user process, as described in Section 2.1.3, can be used to search for people with lead user characteristics. However, this understanding of the lead user method basically falls back on those lead users who have already created innovative solutions. Because of this, for many manufacturers the lead user method often appears unsystematically and its outcome left to chance.

2.1.2 The search for actors with lead user qualities

The second interpretation of the lead user method counts on a far more active role of the company and is based upon developing new solutions interactively with internal and external actors (Herstatt and von Hippel 1992; Lettl, Hienerth, and Gemuenden 2008; Lüthje and Herstatt 2004; von Hippel, Thomke, and Sonnack 1999). This idea is based upon the realization that there are people with lead user characteristics, who may not yet have become actively involved in a problem solving activity. If suitable methods are available for identifying and convincing these people to cooperate, then a given problem could be solved cooperatively and innovatively with internal and external developers. Accessing solution information and broadening the field of search for innovative alternatives is at the center of attention here. A typical indicator for this type of approach is lead user workshops. An ideal structure for this method follows four phases, which will described closer in the following passages.

Still, another important point needs to be made. Lead users found through this method are often not users in the manufacturer's domain, but come from analogous industries. They have the same basic problem, but often at a higher, extremer level. Or they have already dealt with it under conditions in the past, which needed a solution more urgently. Since they are not users (or even customers) from the manufacturer's point of view, they are also called

"lead experts." A well-known example comes from the development of the antilock brake system (ABS) in the car industry (repeated here in a simplified version). In dangerous situations, the tendency of wheels to block through strong braking pressure is counteracted by regulating brake pressure in short intervals. The idea originated in the field of aviation. Already in 1920, the French aviation pioneer Gabriel Voisin used a hydraulic anti-blocking system. Mechanical systems prevented the wheels from blocking, so that when the airplane landed, it remained safely in the track. In 1936, Bosch received a patent for a device, which prevented wheels from blocking on an automobile. The machines existed of about 1,000 analogous parts and were very unwieldy and slow. Digital technology reduced the amount of parts to about 140 pieces, which allowed ABS to go into mass production. It was first presented in 1969 at the International Motor Show by the American company ITT Automotive. In this example, the lead users were members of the aircraft industry, where the same problem (the prevention of wheels blocking and therefore getting off track) was more common, but at a higher extreme than in the vehicle industry. Therefore, the search for a suitable solution started in the field of aviation first, was found and then used. Thus, the search for a solution to the problem of wheels blocking in the car industry profited from a search for solutions in another area.

In the following, we outline a way for companies to find lead users or lead experts in order to receive access to innovative solution information. The first two steps are rather general in nature and are typical activities in many innovation management projects. The pivotal phase lies in the identification of lead users or lead experts. The last phase, developing a common concept together with identified lead users or lead experts in a workshop, builds on the idea of an interactive value creation process, in which an innovative solution is developed collaboratively between manufacturer and customers.

2.1.3 Stages of a lead user project

Phase 1: Initializing the Project: In the first phase, the company assembles an internal project team, which is responsible for the method's implementation. As required for many tasks in innovation management, this team should consist of experienced employees from the areas of research and development, production, and marketing. When choosing team members, time restrictions should be kept in mind. Case studies report that each team member commits an average of about 20 hours per week to a project lasting from four to six months (Herstatt and von Hippel 1992; von Hippel, Thomke, and Sonnack 1999). Through interviews with decision makers, team members first evaluate, which product range is especially suited for the lead user method: Is there a high amount of pressure to innovate within a specific product area? Is the product's management persuaded by the method and ready to invest time and financial expenses? Are innovative customers already known to the product management or does good access to the customer base exist?

Phase 2: Trend Analysis: The lead user process starts with a trend analysis. A trend defines a basic, measurable social, economic, or technological development. Different options are available to identify these types of trends. Commonly, first definitions of trends come from studying sector and technology reports, publications by external research institutions as well as applying methods of interpolation and historical analogy. In addition, internal experts from research and development or sales can deliver first clues on new

trends. Furthermore, qualitative techniques like the Delphi Method or scenario analysis assist in forecasting trends (de Lurgio 1998; Hanke and Reisch 2004). There is always a divergence between the forecast and the time when the actual event occurs. To minimize at least the amount of mistakes in forecasting, trend research requires special care, attention and methodological knowledge. While the activities in phase one and two are common activities in many innovation projects, they are very important in relation to the lead user method and therefore, should be carried out by the same team which is also responsible for the following steps – so that the contributions and ideas of lead users can be interpreted within one context determined by the company.

Phase 3: Identification of Lead Users and Lead Experts: Now it is a matter of identifying innovative users and experts who are leaders in the defined trends. The main challenge is to find the characteristics of innovative users represented in the population of all potential users in order to separate lead users from less innovative users.

Especially with radical innovations and market innovations, defining the basic population is often difficult. Further, empirical studies have shown that innovative users exist not only in the real target market of the innovation, but also in analogous markets (Pötz and Franke 2005; von Hippel, Thomke, and Sonnack 1999). An analogous market resembles the target market with regards to customer needs and/or the technology used, but often belongs to another industry. Especially lead users coming from these markets can contribute to an innovation in an interactive value creation process decisively, because they permit a combination of knowledge from various domains and therefore, often broaden the solution space (an example would be using military experts as lead users in the evaluation of satellite pictures for defining an innovative solution for the automatic interpretation of X-ray pictures). However, the identification of analogous markets is often not easy, and no textbook methods exist in this area.

To identify innovative users, a range of methodological possibilities are available to companies. "Screening" and "pyramiding" are the two search techniques that are most often discussed (von Hippel, Franke, and Prügl 2005). *Screening* for lead users resembles the procedure of a dragnet investigation. A defined group of people are checked against a list of characteristics and requirements. Those who match with the listed criteria are selected as lead users. The *pyramiding* approach describes a networking between actors. The approach follows the idea that experts regarding a certain topic are able to nominate another person with even more expertise than themselves (von Hippel 2005). During the search, the lead user team starts with asking people "whom would *you* ask to solve this problem". The identified target is asked the same question. Experience shows that after some iteration, a few experts are named frequently. Pyramiding draws back on the fact that most radical innovations come from lead users in advanced analogous fields. Those experts face a problem similar to the one of the target market but to a higher extreme and with different constraints. Such conditions force the lead users to come up with new solutions (von Hippel 2005). In general, experts in a certain field dealing with leading-edge problems need to pursue a search across boundaries to find relevant solution information. Thus they tend to know specialists with even more knowledge in advanced fields. This process of networking from one innovator to a more advanced one has been identified in studies as an efficient and effective way to identify lead users (von Hippel, Thomke, and Sonnack 1999).

Both procedures require first that the characteristics of innovative users are transferred to a set of questions pertaining to the innovation project. The way interviewees answer the questions gives insight on whether a person is likely to be selected for participation in a lead user workshop. Whereas screening describes a parallel search method, pyramiding is a sequential search. Which search method is most suitable in identifying innovative customers cannot be exactly determined. However, the following assumptions may be considered.

- *Pyramiding* is particularly suitable when the future population of potential innovative customers is hard to separate (technical and radical innovations) within the area to explore, a strong social network among the interviewees exists, and the questionnaire for identifying innovative customers consists of a few simple questions to be answered.
- *Screening* is suitable when the population of potential customers can be well separated (incremental and market innovations) or only a very weak social network among the interviewees is assumed, and the questionnaire for identification is extensive and complicated (see Lang 2005 for a current example taken from industry).

At this point, it should be clear that there is no "right way" of identifying innovative users. Each method has its advantages as well as its disadvantages and in some cases, it might be sensible to combine different methods. For example, after successfully applying pyramiding conducting a screening as a follow-up for more information about the suitability of selected users. In the end, this phase results in a pool of innovative people from which to choose from.

In many cases, however, lead users become active out of their own accord without a manufacturer animating or identifying them. Therefore, manufacturers can select users, who have already shown innovative behavior. Many lead user innovations are discovered by manufacturers by chance, (and are often at first classified as unimportant), or are brought by the lead user to a manufacturer. In this way, the company also receives access to lead user information without a formal process. Users, who already have brought innovations to the market independently in the past, often represent a bundle of potential for future company-defined innovation projects. Building a relationship with a successfully identified lead user becomes thus an important task.

Phase 4: Concept Design in Lead User Workshops: In this phase, the identified innovative users and experts are invited by the manufacturer to attend an innovation workshop, in which ideas and concepts are further developed for the defined project. All preliminary steps served basically as a means to carry out the workshop successfully. The quality of the workshop's results determines the success of the lead user project. Even if there is no exact, fixed way of successfully executing a lead user workshop, there are some elements in particular that we want to talk about in the following.

A workshop is made up of approximately 10 to 15 users, the company's internal "lead user team," and an experienced moderator, who monitors the workshop. Workshops last between a half-day and two days (depending upon the complexity of the problem). The role of the (usually external) moderator is to mediate the contributions made by the participants. The moderator also performs important methodological support in stimulating and structuring participant contributions. Besides professional exchange, workshops are also marked by

social exchange between the participants. A moderator should work at dispelling possible tension and use the group's heterogeneity to activate a productive solution-finding process.

Workshops usually begin with a briefing led by the internal team, a presentation of the basic product range, a definition of the problem as well as the problem to be solved. It is important to formulate exactly, which results are expected by the end of the workshop. Afterwards, the participants are stimulated to generate their own ideas for solving the problem in several rounds through the use of well-chosen creative problem solving techniques. Creative problem solving techniques are methods that accelerate the flow of ideas in groups, get rid of mental blocks, extend the search direction, and formulate the problem more precisely (Hornung 1996). There is a distinction between intuitive and discursive techniques. Intuitive methods are designed to promote thought associations, while discursive methods aim at a systematic, logical process-oriented solution search.

Ideas and suggested solutions generated in this way are, if possible, presented during the workshop by the company's experts and – if a simulation with rapid prototyping is possible – are realized in order to integrate the participants in their evaluation. The workshop's results are documented and assessed by the company. Market potential, the degree of innovation as well as an idea's "fit" with the company's product program and resources are criteria for assessment, for example. Ideas that are rated positively are then taken into other workshops for further development or are fed into the company's internal innovation process.

The lead user method has proven itself in practice in two fields:

- In the search for new applications in a company's existing business segment. This is the form of the lead user method as described in the often cited case study based upon the method's application in 3M's medical technology division, (Thomke 1999; von Hippel, Thomke, and Sonnack 1999), and the way it is presented in videos on the method. This field is about the combined search for needs and solution knowledge.
- The search for single technological solutions for a given question, for which access solution information is required. This is, in our judgment, the most widespread use of the method today.

Concluding an important note: In our opinion, the lead user method is currently in great demand. There are countless offers made by consultancies which offer "lead user workshops" as part of their service package. In many cases, however, these consultants have only renamed focus group discussions, which have absolutely nothing in common with the goals of the real lead user method. Also, the term is not universally defined. For example, pilot customers are often called lead users as well. Pilot customers can play an essential role in market launches, but have completely different characteristics than lead users. From a practical point of view, lead user workshops are a successful, but expensive procedure in open innovation. Their success depends upon the right choice and recruitment of suitable participants as well as on the organization and moderation of the workshop itself. Even if the success of the lead user method is impressively documented in many books and articles (Gruner and Homburg 2000; Herstatt and von Hippel 1992; Lilien et al. 2002; Lüthje, Herstatt, and von Hippel 2005; von Hippel, Thomke, and Sonnack 1999), only a few companies really carry out lead user projects regularly and systematically in practice.

2.2 Toolkits for open innovation

A completely different procedure in open innovation is the employment of toolkits for open innovation (also known as toolkits for user innovation and co-design; von Hippel 2001; von Hippel and Katz 2002; Franke and Piller 2003). Toolkits are focused on integrating customer input in the innovation process. The primary goal of toolkits is to access need information in a more efficient manner than possible through traditional means. They also aim at interacting with a large number of customers which often are "average" customers, i.e. including also those that do not obtain lead user characteristics. Toolkits can be placed in the development stage of the innovation process. Here, customer inputs have to be more concrete and elaborated in order to be valuable for firms. A higher degree of elaboration often requires a more structured approach for the interaction with customers.

In order to obtain an adequate solution for an innovation problem, firms needs to combine need information from the customer domain with their own solution information. As first solutions are not always best, firms usually repeat this process several times and evaluate possible solutions for an innovation problem in an iterative process. This process of trial and error is very expensive, because it fosters a steady flow of iteration and communication between the user and manufacturer. Because of the “stickiness” of (location-dependent) needs and solution information, the exchange between both parties is often tedious and accompanied by high transaction costs (von Hippel 1998).

Toolkits for open innovation are based upon the idea of handing over the trial and error process to customers (Franke and Piller 2004; von Hippel and Katz 2002; Thomke and von Hippel 2002). A toolkit is a development environment, which enables customers to transfer their needs iteratively to a concrete solution – often without coming into personal contact with the manufacturer. The manufacturer provides users with an interaction platform, where they can make a solution according to their needs using the toolkit’s available solution space.

In order to operate efficiently, toolkits should fulfill five basic requirements (von Hippel and Katz 2002): (1) *Trial and error learning*: Toolkit users should receive simulated feedback on their solution in order to evaluate it and to improve on it in an iterative process. In this way, learning by doing processes are facilitated. (2) *Solution space:* A toolkit’s solution space defines all variations and combinations of allowed possible solutions. Basically, the solution space only permits those solutions, which take specific technical restrictions into account and are producible from the manufacturer’s perspective. (3) *User friendliness:* User friendliness describes how users perceive the quality of interaction with the toolkit. Expenses influence the user’s perception of quality, (time, intellectual effort), as well as the perceived benefit, (satisfaction with the developed solution, fun), of interacting with the toolkit. (4) *Modules and components library*: Modules and components libraries allow users to choose from predefined solution chunks for their convenience. Such libraries may also contain additional functionalities such as programming languages, visualization tools; help menus, drawing software, etc. (5) *Transferring customer solutions*: After users have developed the best possible solution for their needs, it should be transferred to the manufacturer. A transfer over toolkits allows for perfect communication of the customer's solution, which is conveniently translated into the manufacturer’s “language”.

Following Franke and Schreier (2002), we distinguish two types of toolkits according to the degrees of freedom that the underlying solution space provides to customers: (1) *toolkits for user innovation* and (2) *toolkits for user co-design and customization*.

(1) Toolkits for user innovation resemble, in principle, a chemistry set. Their solution space or, at least some of the product's design parameters, is boundless. Toolkit users not only combine the manufacturer's standard modules and components to create the best possible product for themselves, but they also expend a tremendous amount of effort in experimenting through trial and error processes on new and up to now, unknown solutions for their needs. The manufacturer's toolkit provides the necessary solution information in the form of, for example, programming languages or drawing software. A good example comes from the semiconductor industry where firms equipped customers with toolkits for custom development of integrated circuits and computer chips (von Hippel and Katz 2002).

(2) On the other hand, **toolkits for user co-design and customization** are used for product individualization and adoption, rather than developing new goods and services. It can be compared to a set of Lego bricks. Toolkits for user co-design offer users more or less a large choice of individual building blocks (modules, components, parameters), which can be configured to make a product according to the user's individual requirements. Therefore, the toolkit's solution space is limited and can be modified only according to its predefined "building blocks." These building blocks lie within the range of a manufacturer's economic and technological capability. Well-known examples of these types of toolkits are Dell's product configurator and configurators found, for example, in the automobile industry. Another well-know example is the strategy of toy-maker LEGO and its LEGO Factory, an advanced toolkit for user innovation targeting the children market.

2.3 Innovation contests and "broadcast search" platforms

The previously discussed methods of open innovation assume that an innovative user will either be innovative independently or in cooperation with a company. A decisive impulse and motivation for users to cooperate is the prospect of using the results of an innovation immediately – either through a self-built prototype, as in the case of the autonomous lead user, or by building a specific good that satisfies a particular need over a manufacturer's toolkit. The method introduced in this section extends the previous approach by a new perspective. In an innovation contest, a company calls on its customers, users, or experts in the general public either to disclose innovative ideas and suggestions for product improvement, or it asks for a very specific solution for a dedicated (technical) innovative task. The contests come in different types. They can be a very broad call for contributions directed at all (potential) customers of the company and/or a very dedicated question to a smaller team of specialists. Their common objective is to increase the spectrum of a solution as well as the scalability of participation. We will take a closer look on the organization of innovation contests in the following.

Many manufacturers today have set up in-house suggestion boxes to collect ideas and suggestions for improvement from their employees. They are generally hosted over the company's Intranet platform. Likewise, **idea contests** provide a structure for giving suggestions and new ideas. Usually, a private or public entity organizes an idea contest as

an invitation to the general public or a specific target group to submit their contributions within a certain period of time. Submissions are evaluated by a committee with help of an assessment scale, and prizes are awarded. In the context of open innovation, idea contests can serve to integrate customers or users into the early phases of the innovation process (idea generation). The idea of a contest is to stimulate creativity and the quality of submissions, while providing an additional incentive to participate through competition. Idea contests come in many forms (Ernst 2004), ranging from continually open platform addressing a general question ("send us 1,000 ideas how to improve our products") to focused tasks like finding solutions to specific technological problems. Idea competitions resemble open calls for cooperation in its purest form. They seek to receive input from actors a company does not know. Although idea contests are highly popular, there is not much systematic research on the topic (Lakhani et al. 2006; Piller & Walcher 2006; Walcher 2007). The following will describe the components making up an idea contest.

Contest organizers: Every innovation contest has an organizer who formulates the problem, lays down the rules for participation, usually collects the contributions, evaluates them, and then chooses the winner. Innovations, however, are a part of all areas of life, which is why idea contests are announced not only by private enterprise companies and private individuals, but also by non-profit organizations and public institutions. For example, Germany's Federal Center for Health Education seeks innovative ideas for illustrations for a HIV prevention campaign. The Technische Universität in Munich (TUM) organizes an ongoing idea contest called "Academicus," which looks for creative contributions on improving studies and the learning environment. In the meantime, some companies have specialized in acting as an intermediary by organizing idea contests for other organizations. Some good examples include the companies *Hyve AG* or *Idea Crossing* (see profiles of *Hyve* and *Idea Crossing* in the appendix, p. 101).

Focus, breadth, and target groups of posed problems: Idea contests differ from one another in their breadth and width. A competition with very wide focus is *Dell's Idea Storm*. The company broadly asks its customers for all possible improvements and suggestions. In general, idea competitions can span from a broad tapping of need information to dedicated collection of innovative procedures up to a specific technical problem. The target group of an idea contest depends upon the topic's specificity because often special qualities or competencies are a prerequisite for participation. Thus, the announcement of the Federal Center for Health Education is directed at the general public, while the idea competition of the Technical University Munich addresses students, employees, scientists, professors and alumni of this university. For both idea contests, however, participants do not require any special pre-knowledge or information. Contests in the sciences or engineering and architecture, however, often require comprehensive knowledge and a long-standing preoccupation with the subject as a prerequisite for participation in the competition. This can often limit the number of possible participants extremely.

As already mentioned, idea competitions can also take place within a firm. Today, many companies have an Intranet portal on which employees can submit their ideas and suggestions for improvement. However, most of these actions are often very broad and not consistently integrated into the innovation process. In our opinion, however, an idea contest should not simply be a type of virtual mailbox that is open for every kind of input possible. It should grasp specific input for a specific innovation project. IBM's "Innovation Jams" provide

a good example of focused competitions, which are directed at a very wide internal target group: the company's employees worldwide. With the help of a Web-based platform, thousands of employees are being activated for a relatively short period of a few days to develop broad solutions for a specific problem. IBM was so successful with this solution internally that the company now sells the "Jam" idea as a consulting service to other companies (see the profile of *IBM* in the appendix).

Platforms for transferring ideas: In order to support interaction between organizers and participants as well as among groups of participants, idea contests are mostly internet-based today. They offer an "open channel" into the company. Some of these platforms resemble simple, virtual "pin boards," on which users can merely post their contributions. Others permit a higher degree of interaction by providing other functions like:

- The possibility for users to take up on the ideas of others and to develop them further.
- The possibility for users to evaluate ideas and to comment on them.
- The provision of suggestions, creative problem-solving techniques or background information to stimulate brainstorming and to steer users specifically in the direction of the problem.
- The provision of solution tools like, for example, drawing software or libraries with which users can transfer their ideas purposefully.
- The integration of the platform with the firm's internal idea management software.

Time period: Idea contests usually set a period of time in which the participants' efforts must be accomplished. The time period varies according to the task at hand. In this way, the time for working out an idea can be reduced to only a few minutes down to even seconds like, for example, in contests testing spontaneous creativity (drawing, painting, composing verse, making music, rapping, etc.). Here, the user has to perform directly after the task has been described. In company innovation departments as well as in science and architecture competitions, processing times from several weeks up to several months are common.

Assessment committees and evaluation methods: After ideas or solutions have been submitted, they have to be screened, evaluated, and ranked. No matter how popular idea contests in practice are, filling the seats of the assessment committee often occurs unsystematically and arbitrarily. The choice and use of suitable evaluation methods suffer under these conditions as well. A number of reliable methods exists for assessment in the creative arts, in which particulars like the jury's size and composition and categories for assessment are listed. The "Consensual Assessment Technique (CAT)" is a practical method based upon the subjective judgments of experts, which was tested and developed by the psychologist Amabile (1996). Within the last three decades, CAT has been steadily developed further (Walcher 2007). The assessment's quality is determined by the number of jury members in agreement. Based upon a large number of studies in which creative achievements were evaluated in artistic and linguistic areas as well as in the context of company innovation, researchers recommend that jury members be real experts, who distinguish themselves through close proximity to the topic. In tests with inexperienced jurors, or performers mutually assessing creative achievements themselves, the rules for quality

were regularly not fulfilled. Depending upon the task, at least three to a maximum of ten people should belong to the expert jury.

A big challenge for research at this point is the task of developing scalable methods for assessment. Although there are a large number of methods available for the assessment of innovative ideas, these are all based upon cooperation with an expert committee, which evaluates ideas through an assessment commission. This form of evaluation may still work in assessing up to 100 ideas, however, not for assessing ideas numbering in the thousands. Assessment methods for large quantities of ideas are still not available, which opens an exciting field of research.

In reference to assessment categories, Amabile (1996) found that assessing achievements only from the perspective of creativity falls too short of its goal. In order to show the different facets of creativity, adequate constructs should at least evaluate the categories of novelty, appropriateness, and realization. In addition, the supervisor is free to add complementary assessment categories corresponding to the creative task. An assessment system (scoring model), in which for every assessment category a specific number of points is awarded, can help selecting the best idea. The winning idea would be identified by a high total score.

Rewarding ideas: Basically, the incentive to participate in an idea contest lies in receiving an award. Awards can be material or monetary. In other cases, only the winner's names are publicized, hence using reputation and peer-recognition as the sole form of award. In the idea contest sponsored yearly by the ski manufacturer Salomon, the participant, who sends in the most creative proposal for a snowboard, receives a cash prize amounting to one thousand Euros and a professional snowboard (artworkcontest.com). The amount of this cash prize seems quite low, especially if one looks at the premiums offered on *Innocentive*, a company that specializes in idea contests (see profile of *Innocentive* in the appendix). *Innocentive*'s idea is basically providing an Internet-based platform on which companies announce their innovation problems to the public, or to specified scientists, which are to be completed within a certain period of time. Innocentive, as an intermediary, takes over all coordination and management tasks. The solutions are evaluated and rewarded by the seeker company, whereas cash prizes of up to USD 100,000 are paid out (Innocentive.com).

Defining the right kind of incentive and its value is a field that has not yet been discussed in larger detail in either the practice of open innovation or in scholarly research. We predict, however, that with the growing popularity of innovation contests the choice of the right award will become a core success factor. While in the early ages of open innovation consumers may have been motivated by a t-shirt and the sheer opportunity to get into contact with a company, today there has to be the promise of a "fair" and "valuable" award to trigger participation. We urge managers considering an innovation contest to thoughtfully plan and discuss the appropriate award.

Identifying innovative users: In addition to collecting creative contributions, contests also are a method for identifying innovative customers (lead users). Basically, a two sided selection process takes place in an idea contest. First, customers taking part in the competition differ from customers who do not take part in their decision to participate (*self-selection*). Second, a selection occurs based upon the results of the evaluation of the contributions by the evaluation body (*performance selection*). Walcher (2007) proves in his research on idea contests conducted in the area of sports that participants differ from non-

participants the same way that innovative customers differ from less innovative customers. In his study, approximately ten percent of the contributions sent-in were evaluated by the jury as completely new (radical) ideas. The originators of these highly innovative contributions did not completely conform to traditional views on lead user characteristics. However, they proved to be especially creative. Further measures for accessing customer innovation potential include organizing innovation workshops or building an internet-based developer community, open exclusively only to these types of customers. Unlike methods for identifying lead users in which suitable people must be found through cost-intensive measures and external selection even before creative work begins, voluntary self-selection takes place in idea contests, followed by selection through jury of experts on the basis of the creative work performed. There is also the advantage that the selected customers already have brought evidence of their creativity, whereas the selection of lead users often rests on purely theoretical grounds.

Box 2: Core principles of open innovation

Open innovation describes new forms of collaboration between a firm and various external actors (customers, users, experts etc.). It builds on different methodological approaches (lead user method, idea contests, toolkits etc.) to integrate those external parties.

The methods can be distinguished by the type of information they generate (need vs. solution information), the type of actor they integrate (experts vs. non-experts), and by the degree of control a company has over the knowledge acquisition and integration process (high company involvement vs. low involvement).

3 Intermediaries in the innovation process

Note: *This chapter will shed some light on the origin and development of intermediaries and brokers in the innovation process. We will analyze their evolution and roles and provide a classification of different functions and contributions of intermediaries for the new product development process. This chapter is rather conceptual. If you are predominately interested in the study results and the real landscape of open innovation accelerators today, we recommend skipping this chapter and jumping directly to Section 4.*

Often, established organizations lack the experience and knowledge to apply open innovation methods. Thus, in the last decade a large number of entrepreneurs created firms focused on generating knowledge by using open innovation methods. These companies serve as **intermediaries in an open innovation process**. These intermediaries match the general outsourcing trend (Chatterjee 1996, Howells 1999a).

The term **intermediary** denotes **different kinds of agents performing a variety of tasks within the innovation process** for their clients. A rich literature describes and analyzes the role of intermediaries as third parties mediating between suppliers and customers. Called *intermediary firms* (Stankiewicz 1995), *bridgers* (Bessant and Rush 1995; McEvily and Zaheer 1999), *brokers* (Hargadon and Sutton 1997; Provan and Human 1999), *information intermediaries* (Popp 2000) or *superstructure organizations* (Lynn et al. 1996), these intermediaries are associated with a great range of functions. To shed some light on the complexity of intermediation in the innovation process, we will first outline the development of intermediaries for innovation, followed by a discussion of the functions and activities performed by an intermediary. Finally, we will focus on different types of intermediaries that can be distinguished by a distinct set of functions and activities.

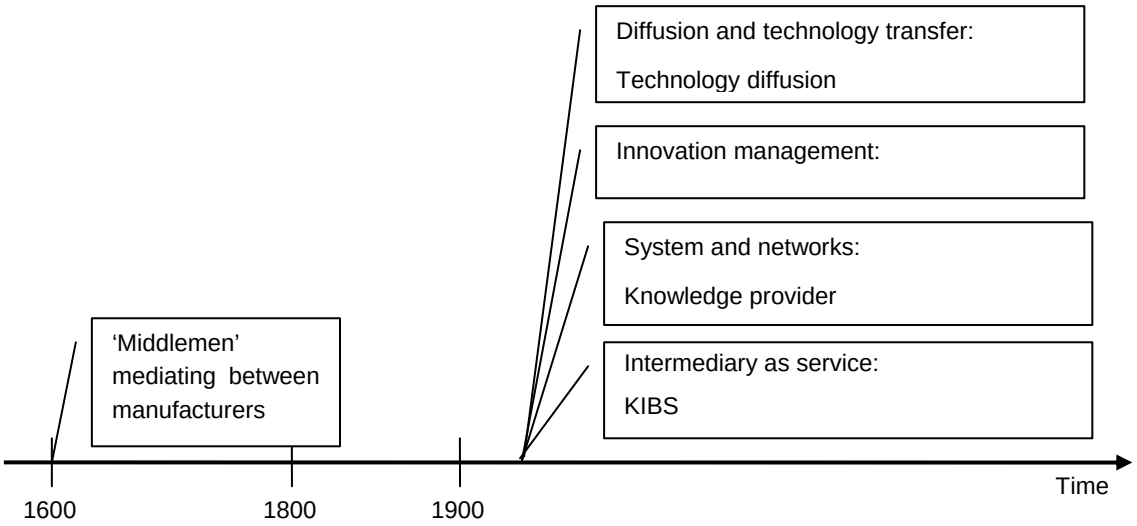
3.1 Evolution and notion of intermediaries

The role of an intermediary for innovation and technology development was already performed by the so called ‘middlemen’ in agriculture, wool, and textile industries in Great Britain in the 16th century. These ‘middlemen’ were important informal disseminators of knowledge for technological improvements in sectors (Howells 2006). From the early 1980s to the early 1990s, capabilities of intermediary firms were utilized beyond sheer information brokering and included strategies regarding technology, manufacturability and managing the development time. Since the mid 1990s, the intermediary role included collaborations in R&D, the development of new business models, and monitoring R&D phases of innovation (Lopez-Vega 2009).

The literature has investigated the development of intermediaries from diverse perspectives. The objective was to get a clear picture of their role and function as mediators in the innovation process. As shown in Figure 1, four major fields of research can be identified by an intensive literature review (Howells 2006):

- *Focusing on diffusion and technology transfer,* the intermediary firm is relevant to an organization in terms of speed of diffusion and new product uptake (Hägerstrand 1952; Rogers 1962) as well as negotiation and contractual skills (Shohert and Prevezer 1996).
- *The literature on innovation management* focuses on activities of the intermediary and how to integrate them into an organization's innovation process. The main interest is on the role of intermediaries as facilitators of the knowledge transfer process between the actors taking part in the innovation process (Hargadon and Sutton 1997).
- *Literature on systems and networks* investigates the influence of intermediaries with respect to the entire innovation system. Intermediaries are seen as linking and transforming relations within the network or innovation system, supporting the information flow (Lynn et al. 1995).
- A very own research aspect is analyzing *intermediaries in the context of service innovation* (Knowledge Intensive Business Service – KIBS). The focus here is on the continuous interaction between the intermediary firm and an organization (Howells 2006).

Figure 1: Evolution of Intermediaries



Across centuries and diverse fields of research, one thing never has changed – knowledge as the trading good of an intermediary. Sufficient knowledge management is required by any successful organization. It is mandatory for firms to identify, mobilize, and apply knowledge for economic returns (Stewart 1997; Eisenhardt and Martin 2000; Gupta and Govindarajan 2000). Thus nearly any organization has a sophisticated process for knowledge transfer. The convergence of industries and markets ask for more diverse sources of knowledge (Prahalad and Ramaswamy 2004). Since knowledge management gets more complex and cannot take place in a vacuum, a broad variety of agents join the knowledge transfer process. These agents act as relatively autonomous entities and perform intermediate tasks on the behalf of their client organizations (Datta 2007). The key role of the intermediaries is to connect, transform, translate, and consequently support the fragility of knowledge (Nonaka and Takeuchi 1995). From a network perspective, **intermediaries connect an actor with different sources of knowledge**. This is the essential activity of a mediating agent.

Collaborating with an intermediary can consequently decrease the time for developing a new technology. Searching for adequate knowledge for innovating is time consuming for nearly any organization. Intermediaries can provide a more efficient and effective search, resulting from their position in the 'middle' – an intermediary interacts with many different sources (e.g. other organizations, universities, suppliers, customers etc.). This, in turn, supports the formation of a large knowledge pool including highly specialized knowledge and translated 'tacit knowledge'. Interacting with an intermediary can hence increase the likelihood to receive the required knowledge and the chance to find and use the right channel of bringing a technology to market (Chesbrough 2003a).

3.2 Roles and functions of intermediaries

The brokering job of an intermediary is rather complex. It requires the translation of information, coordination, and the alignment of different perspectives. An intermediary has to hold enough legitimacy to influence the development of technology. Thus, for an organization an intermediary provides multiple value-added services (Datta 2007):

- The *mediating position* allows agents to create a shared and stable syntax to ensure reliable communication between sources and destinations in knowledge management – they establish a common language of reference as a template for knowledge management activities (Shannon and Weaver 1949)
- In order to achieve common interpretations, intermediaries *align different styles of thinking* and incongruent understandings (Dougherty 1992).
- Intermediaries making the organization's localized and *embedded "knowledge stock" actionable* (Choo 1998) because they operate across multiple clusters of specialization and practice to transform interpretations through innovation and its diffusion.

In the previous literature on intermediaries for the innovation process, we find quite a variety of roles and functions. These specifications are usually combined with a certain definition of the intermediary term. Howells (2006) provides an overview of these terms and understandings. His table can be seen as a good starting point to identify core functions of intermediaries for innovation (Table 1).

Table 1: Intermediaries in the scientific literature (building on Howells 2006)

Term	Definition / role	Study	Year
Intermediaries	**Support** technology **transfer** to small firms	Watkins and Horley	1986
Third parties	Person or organization **intervening** in adoption decisions of others	Mantel and Rosegger	1987
Brokers	**Facilitating** diffusion in a system of new ideas from outside	Aldrich and von Glinow	1992
Intermediaries	Role in technology **exploitation**	Seaton and Cordey-Hayes	1993
Intermediary agencies	Role in formulating research policy	Braun	1993
Intermediaries	**Effecting change** within science **networks** and local collectives	Callon	1994

Term	Definition / role	Study	Year
Consultancy as bridge builders	**Bridge builders** in the innovation process	Bessant and Rush	1995
Intermediary firms	**Adapt solutions** available in market to needs of individual user	Stankiewicz	1995
Intermediaries	Public / private organizations acting as agents **transferring** technology between user and host	Shohert and Prevezer	1996
Bricoleurs	Seeking to **develop new applications** for new technologies **outside** their **initial field**	Turpin et al.	1996
Superstructure organization	**Facilitate and coordinate** information flow	Lynn et al.	1996
Knowledge broker	**Combining** existing technologies in new ways	Hargadon	1998
Intermediary level bodies	**Help orient** the science system to socio-economic objectives	Van der Meulen and Rip	1998
Innovation intermediaries	Proactive role of **service firms** within an innovation system	Howells	1999
Technology broker	**Filling gaps** in information and knowledge in industrial networks	Provan and Human	1999
Regional institutions	Functional substitute for firms lacking 'bridging ties' – providing '**surrogate ties**'	McEvily and Zaheer	1999
Boundary organizations	Role of **boundary organization** in technology transfer an 'co-production' of technology	Guston	1999
Boundary organizations	Role of boundary organization in technology transfer	Cash	2001
Knowledge intermediaries	**Facilitates** recipient's measurement of intangible value of knowledge received	Millar and Choi	2003

Functions performed by innovation intermediaries vary from facilitating technology transfer, technology diffusion, brokering information flows, and measuring the value of knowledge as well as building bridges, filling information gaps, or combining existing technologies. This list is in line with the wide range of roles and functions observed by Bessant and Rush (1995). They regard intermediaries as specialized in articulation and selection of new technology options; scanning and locating of sources of knowledge; building linkages between external knowledge providers; development and implementation of business and innovation strategies. Howells (2006) identified ten functions intermediaries can perform. Lopez-Vega (2009) clustered these functions into three categories: (1) facilitating collaboration, (2) connecting, and (3) providing service. This structure allows us to differentiate the functions performed by innovation intermediaries in larger detail.

The first category (Table 2) includes a set of **functions which facilitate the collaboration between organizations**. It involves services at the front end of innovation as well as in the stage of commercialization. The main focus here lays on articulating needs, forecasting technology to complement a firm's technology intelligence, and searching for appropriate information to start the generation and (re)combination of new knowledge. During commercialization, the intermediary supports the marketing and sales of the innovator by using its network.

Table 2: Function cluster 1: Facilitating the collaboration between organizations (Lopez-Vega 2009)

Foresight and diagnostic	Foresight and forecasting
	Articulation of needs and requirements
Scanning and information processing	Scanning and technology intelligence
	Scoping (selecting information) and filtering
Knowledge processing and (re)combination	Combine knowledge of different partners
	Generating new knowledge and than combine
Commercialization	Marketing, support and planning
	Sales network and selling
	Finding potential capital funding and organizing funding

The second cluster (Table 3) of **functions involves connecting services between an organization and its environment**. The gatekeeping and brokering function links the firm with its external environment. Here, intermediary service is associated with deal and match-making. Therefore intermediaries are more focused on inter-organizational knowledge transfer processes in terms of connecting the right information sources. A related function is technology assessment and evaluation as 'post innovation' service (Howells 2006). This also can form the starting-point for a continuous interaction with an intermediary.

Table 3: Function cluster 2: Connecting actors like users, science, policy initiatives (Lopez-Vega 2009)

Gatekeeping and brokering	Matching and brokering by negotiating and deal making
	Contractual advice
Evaluation of outcomes	Technology assessment
	Technology evaluation

Service for stakeholders is a third set of functions directed towards special tasks in the innovation process (Table 4). Intermediaries can support an organization in testing and validating a new technology as well as in specifying standards or giving advice regarding the management of IP.

Table 4: Function cluster 3: Providing service for stakeholders (Lopez-Vega 2009)

Testing and validation	Testing, diagnostics, inspections and analysis
	Prototyping and pilot
	Scale-up
	Validation
	Training

Accreditation	Specification setter or standard advice provider
	Formal standard setting and verification
Validation and regulation	Regulation
	Self-regulation
	Informal regulation and arbitration
Protecting results	IPR advice regarding outcome of collaboration
	IP management for clients

When combining all functions on a more general level, **two main roles** of an intermediary can be extracted:

- Scanning and gathering information,
- Facilitating communication and knowledge exchange.

Another aspect in which intermediaries seems to differ is the **focus of** their **service**:

- Focus on the process stage: Mediating services in a certain stage of the innovation process (evaluation, validation, exploitation, adoption, diffusion),
- Focus on the actor: Providing services for a certain stakeholder group (SMEs, science networks, consumers).

The role of innovation intermediaries has been changing recently especially with regard to their function as a provider of information. By applying new methods of search and brokerage, utilizing new information and communication technology, companies in many industries have been enabled to perform intermediary functions like information scanning and gathering on their own with high efficiency. At the same time, the increasing opportunities to network on a large scale, as facilitated by social network technologies like *LinkedIn* or *Facebook*, has strongly decreased the effort to find new contacts or interesting new sources of information. At the same time, however, these technologies have increased the number of possible transaction partner tremendously. This makes it difficult for companies to keep an overview over the market. There is a growing need for intermediaries for structuring the possible interactions and for creating more transparency. . Further, the intermediary function of providing trust is especially of importance because of the general trend of fewer contacts in the physical environment. A future trend can be seen that especially in markets with great numbers of consumer and irregular purchases. Here, the meaning of intermediaries will grow. Vice versa, in markets with clear overview over participants, the importance of intermediaries will decline. The next section sketches a map of different types of intermediaries. We select the dominant types which are found in the literature and assign them to their major function.

3.3 Classification of intermediaries

The previous literature provides several classification schemes of intermediaries (Sawhney et al. 2003, Howells 2006, Verona et al. 2006, Nambisan and Sawhney 2007, Lopez-Vega 2009). Yet the field of intermediaries is broad and diverse, and no unified typology of intermediary firms exists. Reviewing these studies revealed some approaches that could form a plausible categorization.

The literature mainly distinguishes two main categories of agents mediating between participating parties – software and human agents. **Software agents** are able to embody complex functions. They scan, collect, and structure data into visual depictions (e.g. cross tabs, pivot tables, plots etc.). Software agents do not require the user to learn the complex algorithms used in translation. **Human agents** on the other side allow other parties to speak in their own language without having to worry about the complexities of translation. Both categories cover one fact – the existence of explicit and tacit knowledge. Articulation and codification are valuable objectives in the creation of knowledge. Software-based intermediaries deal with explicit knowledge which is rational whereas human intermediaries transfer tacit knowledge which is cognitive and experiential (Datta 2007). The intermediaries work on the basis of different mechanisms. Rule-based reasoning allows software agent to extract non-redundant information and aggregates explicit knowledge across several sources (Nonaka 1994). In the role of a translator human intermediaries use their social embeddedness to capture tacit knowledge and convert it into explicit knowledge (Nonaka and Takeuchi 1995). By socializing, extracting and interpreting across several tacit knowledge sources the intermediary gains a deeper insight and understanding. Through the connection of diverse knowledge domains beyond functional and practice aspects the intermediary automatically shifts the locus of certain knowledge.

Software-based intermediaries in comparison to human agents can be easily picked and applied by an organization. Regarding human-based intermediaries the **firm** has always to **decide based on** its **recent situation** if they **collaborate with an intermediary** and **when** they **do so which characteristics or service** does the intermediary need to provide. In the next chapter, we want to take a closer look on the diversity among human agents and their classification by characteristic.

3.3.1 Specific characteristics of intermediaries

Environmental characteristics: Verona et al. (2006) find differences between knowledge brokers working in a physical environment in comparison to those using virtual environment. The internet seems to have an impact especially on the reach and quality of generated knowledge. Knowledge brokers working in a virtual domain are able to create direct ties with a larger number of actors without comprising the quality of interaction (Evans and Wurster 1999). Granovetter's (1973) concept of ties regarding knowledge transfer becomes a new shape on the internet. Weak ties support an efficient knowledge search and strong ties help transferring complex and interdependent knowledge. Whereas in a physical environment switching from one tie modality into the other one is cost-intensive, switching-costs in virtual

environments are reduced by the increased flexibility of networks (Verona et al. 2006). It is much easier to transform weak ties into strong ties and vice versa.

Content specification of traded knowledge: Another reasonable feature to categorize intermediaries appears to be the modality of content specification regarding the traded knowledge. Winch and Courtney (2007) find in their review of different intermediaries that they seem to vary in their focus on knowledge of either a special sector or in operating across industries. Intermediaries differ with regard to the kind of knowledge they exchange and the characteristics of the partners with whom they interact. The concepts of Co-operative Technical Organizations (CTOs; Rosenkopf and Tushman 1994) and Innovation Brokers (IBs; Winch and Courtney 2007) describe intermediaries operating within a specific industry. These types provide complex and broad expert knowledge from collaborating with organizations of the same field rather than building a bridge between otherwise disconnected fields. Their role is more directed towards the network relations on a continuous and intensive basis. On the contrary, intermediaries like consultancies or patent brokers bridge between industries and thus provide access to a diverse knowledge-stock on an ad-hoc basis. They can transfer solutions found in earlier clients' projects from one sector into an other sector (Winch and Courtney 2009).

Type of funding: A final criterion to characterize intermediaries is the type of their funding. They can be either private or public funded organizations (Lopez-Vega 2009). To distinguish intermediaries by their funding makes sense because it indirectly covers the nature of their business and therefore their intentions of acting. Private funded intermediaries foster interaction and collaboration by leveraging their network position to their clients. Those intermediaries charge a fee for providing their service and therefore operate clearly on a profit basis. For example, knowledge broker apply modified ideas from one source in a new and different context without letting the source know (Winch and Courtney 2007). The public funded types include intermediaries that try to reduce search and bargaining costs for all parties intending to collaborate on a joint venture. They provide a neutral space for interaction and are usually non-profit organizations. Public funded intermediaries like research institutes or research associations describe themselves as an instrument of public policy. For example, most university research projects are supported by the government which indirectly states future research foci by formulating open calls for funding including desired research objectives. Engaging a public funded intermediary has the advantage that search and bargaining costs are reduced (Winch and Courtney 2009).

Combining all three features results in a three-dimensional table with eight categories of intermediaries (Table 5). The concepts of intermediaries which could be found in literature can be clearly assigned to one category. Two fields remain empty (marked with a star). We could not identify intermediaries who are clearly public funded and operate in a virtual environment. Imaginable could be a platform for trading special knowledge in terms of problem broadcasting and solution seeking which is hosted by a public institution like a National Science Foundation. A government could then clearly profit from better knowledge transfer between research and industry. In the following, we will describe these types of intermediaries distinguished in Table 5 in larger detail.

Table 5: Classification of intermediaries

Environment	Content specification	Funding type	
		Private funding	*Public funding*
Non-virtual environment	*Within industry sector*	Co-operative Technical Organizations e.g. an industry association	Innovation broker e.g. a lab for basic research
	Across industry sectors	Knowledge Intensive Business Service e.g. Consultancy firms like McKinsey etc.	Business incubators, e.g. Cambridge science park, DFG research association
Virtual environment	*Within industry sector*	Virtual Knowledge Broker e.g. Customer Network Operator, Customer Community Operator, Innovation Market-Place Operator	*
	Across industry sectors	Virtual Knowledge Broker e.g. Customer Network Operator, Customer Community Operator, Innovation Market-Place Operator	*

3.3.2 Types of intermediaries

The classification of intermediaries as shown in Table 5 allows us to distinguish between six basic kinds of intermediates.

The term **Co-operative Technical Organizations (CTO)** was introduced by Rosenkopf and Tushman (1994). These are collaborative organizations that bind together diverse actors in an innovation network. They perform a role as facilitator of innovation and reduce the uncertainty around new ideas by establishing either temporary or permanent relations. Rosenkopf and Tushman (1998) grouped CTOs in three types: **technical committees** (established by professional societies), **task forces** (established by industry trade association), and **standards bodies**. For example, the German federation of the machinery industry (VDMA) creates a platform for organizations of this industry sector to discuss, share or collaborate on ideas and technology development. The federation is funded by a certain percentage of the annual revenue of all joining organizations.

Knowledge Intensive Business Services (KIBS) in comparison operate across industry sectors (Winch and Courtney 2007). KIBS are characterized by their structural position between sources of ideas and potential implementations. Applying existing ideas to new solutions is a typical brokering task. These intermediaries use their network position and a wide range of contacts to combine incongruent technologies. In general, KIBS tend to have close and continuous relationships with their client organizations (Bessant and Rush 1995). Typical examples for KIBS are consultancies offices like McKinsey & Co. They use their accumulate knowledge stock to solve problems of their clients. KIBS profit here from the mechanism of distributed knowledge and their weak ties within the network.

An intermediary of the physical environment, which is publicly funded, is the **Innovation Broker (IB).** IBs are defined as "… an organization acting as a member of a network of actors in an industrial sector that is focused neither on the generation nor the implementation of innovation, but on enabling other organizations to innovate" (Winch and Courtney 2007). This type of intermediary solely focuses on facilitating the generation and implementation of new ideas by other parties. For example, they help shaping research problems and providing resources for the solution. They provide a neutral space for development and are therefore usually of non-profit nature. Trust in being independent of any particular interest seems to be a vital essence for innovation brokers (Winch and Courtney 2007). This characteristic also creates the main difference to the previous introduced intermediaries. A typical representative of this category is the technical licensing office of a research institution like the Max-Planck Institute for Physics. Both public funded types fulfill rather the medium-term need of a firm directed toward an applied research agenda (Winch and Corutney 2007) and progress in technological development whereas private funded intermediaries cover the firm's short-term completive need in near-to-market research.

New types of intermediaries originate in the possibilities of digitized communication, allowing for a broader and more efficient integration of external actors (Arora et al. 2002). This leads to the manifestation of the classical knowledge broker in a virtual environment (Verona et al. 2006). **Virtual knowledge brokers (VKBs)** take advantage of the internet. Communication and interaction becomes more cost-effective and also seems to diminish the trade-off between richness and reach of information. Operating in a virtual space allows connecting with a great number of actors and also gathering complex information (Evans and Wurster 1999). Sawhney et al. (2003) classified their virtual innovation intermediaries in **„Customer Network Operator" (CNO), „Customer Community Operators" (CCO) and „Innovation Market Place Operators" (IMPO).**

> The *Customer Network Operator* works as an online market research organizations. It extracts information of diverse user panels. CNOs support innovation of firms by providing them with access to special user segments for feedback. Usually happens this kind of user integration in the stage of concept testing to evaluate how the customer's reaction on a new product. The generated knowledge bases on surveys and observations and is therefore explicit knowledge.
>
> The *Customer Community Operator* is an intermediary who is specialized on building communities to connect business with people on the basis of common interests. The main objective of these communities is to accelerate diffusion by identifying unmet needs or opinion leaders. COOs operating mostly in the stage of ideation and product design. The company *Elephant Design* (see profiles of *Elephant Design* in the appendix) for example operates as an OCC. It creates an internet platform where it provides virtual space for different groups like users, designers, or business corporations to discuss product ideas, designs, and technology. Because of its neutral position between these different groups *Elephant Design* can therefore link up those parties for possible further collaborative work.
>
> The *Innovation Market Place Operator* instead connects sellers with potential buyers. Trading good is usually intellectual property. IMPOs take advantage of the distributed mechanism which is well-known success factors for open-source projects. InnoCentive is a well known representative of this type (see profiles of *InnoCentive* in the appendix). The

company provides an internet platform where solution seekers meet potential solvers of a pre-described problem and trade technical solutions for a monetary incentive.

When comparing the types of virtual knowledge brokers the criterion of content-specification does not seem to be able to distinguish between them. We assume other characteristics for further differentiation. One purpose of our *Open Innovation Accelerator Survey* was to identify new features of VKS in an open innovation process.

3.4 Summary – What to know about intermediaries

The term 'innovation **intermediary'** refers to **different kinds of agents performing a variety of tasks within the innovation process**. Intermediaries are bridging structural disconnected knowledge pools caused by the lack of diversity within a firm. Following Bessant and Rush (1995), we define **intermediaries** as actors specialized in the **articulation and selection of new technology options;** in **scanning** and **locating of sources of knowledge;** in **building linkages** between external knowledge providers; and in **developing and implementing** business and innovation strategies.

Collaborating with intermediaries is an interesting option especially for small and medium sized enterprises. SMEs usually are limited in their capacity to scan the entire breadth of available knowledge and thus are restricted in filtering the relevant information. Access to an intermediary service has therefore the potential to compensate that disadvantage because mediating agencies possess a well connected network of different knowledge sources. Intermediaries take over the filtering job and select the required information.

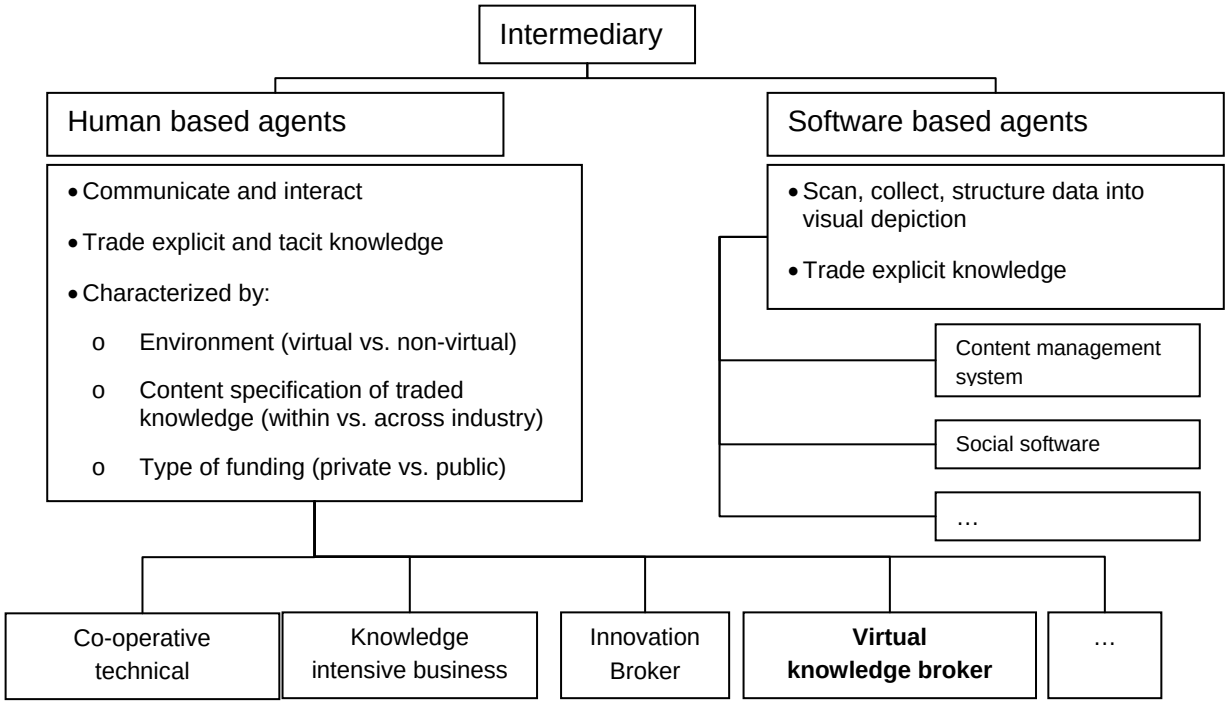
But also for large enterprises those mediators can provide value added service. Big companies often have various stakeholder groups which differ in their size and strength of ties to the company. For example the group of users or consumers is broad and heterogeneous. They are characterized by a rather weak connection to the manufacturer, even though they are an important group to integrate in the innovation process. Intermediaries running platforms for consumers of certain products can strengthen this loose connection. They are able to transfer user generated content which is relevant to the company for innovating. Thus, large enterprises take advantage of the independent status of intermediaries to receive precise and process relevant knowledge.

In the end, collaborating with an intermediary can decrease the time and costs of developing a new technology. Engaging the additional capabilities in knowledge generation and acquisition brought by intermediaries accelerates the new product development process. Intermediaries can provide a more efficient and effective search, resulting from their position in the ‘middle’. For companies, this can result in a quality improvement of acquired new knowledge. They can access larger talent pools with special intellectual properties and wider experiences. Simultaneously, organizations enhance their own innovative capacity. Intermediaries as external knowledge service providers can supplement limited in-house capacity for product innovation. Organizations also indirectly profit from the intermediaries' economies of scale and scope. Since knowledge acquisition and generation are the intermediaries’ core competences, they offer operational best practice that might be difficult and time consuming to develop internally. Furthermore, organizations have the option to benefit from the intermediaries’ synergies they achieve by using their network for different

innovation problems. Besides possible positive effects of an intermediary engagement, the issue of trust is central for a successful and beneficial cooperation between an organization and an intermediary. The general tendency towards fewer contacts in the physical environment brought by new information and communication technologies specifically elevates the importance of the intermediary's function in providing such trust.

Basically, for an organization planning to cooperate with a mediating agency, it is necessary to know its choice. **Software-based** intermediaries like all kind of information processing software programs (in comparison to human agents) can be easily picked and applied by an organization. They do not involve the constant coordination and contracting with another party. Their advantage is that they are able to **embody complex functions**. Software-based intermediaries scan, collect, and structure data into visual depictions (e.g. cross tabs, pivot tables, plots etc.). They **do not require the user to learn** the complex algorithms used in translation. They **deal with explicit knowledge** which is rational. **Human intermediaries**, on the contrary, **transfer tacit knowledge** by communicating and interacting with different parties. Regarding human-based intermediaries firms have to decide, based on their recent situation, the point of time for collaboration and the type of service the intermediary need to provide. This type of mediator is further structured by three major characteristics – **environmental characteristics** (virtual vs. non-virtual), **content specification** of traded knowledge (within vs. across industry), and **type of funding** (private vs. public). The differentiation results in six types of human agents, as shown in Table 5 above. Four types are the most common used ones: co-operative technical organisations (e.g. technical committees, task forces), knowledge intensive business service (e.g. consulting), innovation broker (e.g. public funded institutes like Max Planck Institute for Physics), and virtual knowledge broker (e.g. consumer networks, communities, virtual market places). Figure 2 summarizes this classification of intermediaries.

Figure 2: Classification of Intermediaries in the innovation process



For our market study, the virtual knowledge broker is of special interest. This class represents a younger form of intermediaries. By utilizing new ICT companies can expand their knowledge through a better integration of external actors (Arora et al. 2002). This leads to the manifestation of the classical knowledge broker in a virtual environment (Verona et al. 2006). The finding that successful innovation is not solely performed internally within a firm, but cooperatively with other external actors, leads to the development of various tools for integration. Therefore many virtual knowledge brokers focus on methods for helping companies to design their organizational boundaries permeable and benefit from different knowledge sources (e.g. customers, suppliers, competitors, the scientific system of university labs and research institutions, and public authorities etc.).

Consequential we can observe the advent of a new market for intermediaries. So far a systematically overview of this market did not exist. Our objective is to paint a clearer picture by surveying and analyzing mediators guided by the following two main questions:

- What kind of methodological approach do the intermediaries use to integrate external actors?
- What type of external actor do they integrate, or subsequently,
  what kind of knowledge are they generating?

Subject of research in this study are intermediaries that offer different kinds of open innovation methods.

Box 3: What are intermediaries in the innovation process?

Intermediaries are agents performing a variety of tasks within the innovation process for their clients. They mainly connect an actor with different knowledge sources.

Intermediaries differ in their role (information scanning, gathering, communication and exchange) and focus of their service (process stage and stakeholder group) in the innovation process.

4 The Open Innovation Accelerator (OIA) Survey: Mapping the Landscape of Intermediaries for Open Innovation

Nowadays a great variety of methods and tools exists for integrating external actors in an open innovation process. Many of these approaches have been focused on the customer or user as a source for collaboration and value creation (Prahald and Ramaswamy 2004; von Hippel 2005). Today, however, we can also observe a further class of emerging internet-based tools which integrate different kinds of external actors. The objective of this chapter is to provide an overview of all methods available in the marketplace today and on the intermediaries and service providers offering these methods. For this purpose, we surveyed all OIAs we were aware of at the time of our study. By specializing and applying open innovation methods, these intermediaries intend to accelerate the innovation process. Hence, we coined the term ' Open Innovation Accelerator (OIA)' to name this special class of intermediaries in the innovation process.

Box 4: What are open innovation accelerators (OIAs)?

> Open Innovation Accelerators (OIA) are intermediaries that operate on the behalf of companies seeking to innovate in cooperation with external actors from the periphery. OIAs offer one or several methods of open innovation and, partly, supporting and complementary services for the innovation process.
>
> These methods (e.g. lead user, idea contest, toolkit etc.) are especially focused on the integration of external actors. In consequence, OIAs facilitate a new form of collaboration between an innovating company and its environment.

In the following sections, we present the results of our survey. We take a detailed look on the methods, sectors, cost, and project structures of 43 OIAs (appendix[1]). Our purpose is to deliver a basis for strategic decision making while planning an open innovation venture. This market study shall provide managers a first indication …

- to identify the possible measures existing in practice to collaborate for open innovation,
- to understand the market of companies offering help with an open innovation process,
- to identify different approaches and time frames when outsourcing parts of an open innovation initiative,
- to gain an overview of the actors available for open innovation from a global perspective,
- and finally to address potential partners for an open innovation project in a directed way.

[1] The appendix also includes profiles of OIAs which came to our awareness only after closing the sample of the survey.

4.1 Methodology: The OIA Questionnaire

Our survey included two major steps. In a first step, we used a written questionnaire to get basic information about the OIA. After we received the response, a telephone interview was scheduled to verify and clarify answers and gather further information if necessary in a second step. By this procedure, we tried to fully understand the working concept of each OIA.

The questionnaire consisted of five parts.

- A first part asked for information about the company's business model and the stage of the innovation process they target.
- The second part asked for specific information about their service offerings and the methods to integrate the input of external actors in the innovation process of their clients.
- The third part of the questionnaire was intended to provide us information about the structure and management of a typical client project.
- In the fourth part we focused on the external actors and their integration in the process.
- The last part surveyed the market the OIA is operating in and asked some additional questions on its business model.

All questions were either coded by pre-defined answer sets or had free answer space. As most of the OIA are rather small companies, the survey was addressed to the CEO, who often also was the founder of the company. The follow-up interview was conducted by one interviewer and took between 30 and 240 minutes each, with a mean of 60 minutes. The interviewer went over all questions and answers the interviewee had given. Often the interviewee completed the answers and explained their meaning, especially at those questions with a free answer space. Data was collected between October 2007 and June 2009.

4.2 Sample Composition

To identify OIAs for our sample, first of all we used a **(1) broad online research**. An intermediary who claimed to offer a method or service to support an organization's intention for open innovation was selected as an Open Innovation Accelerator (OIA). We decided for a very low threshold of being classified as an OIA, because getting a large variability in the data set supported our objective of mapping the open innovation landscape. We further applied **(2) a networking approach**, asking key informants to name companies helping others with "open innovation". This search generated a set of 36 OIAs. Once we identified a new OIA, we also asked its managers for main competitors or complementors to identify further candidates for our study.

In addition we kept searching for new accelerators. This allowed us to finally survey 47 OIAs. Of those, **24 intermediaries fully completed our survey form**. That equals a response rate of 51.1%. About 15 (31.9%) of them also joined **(3) the follow up interview**. These response rates would have been acceptable if we would already have a deeper

understanding of our research topic. But due to its explorative character, we needed to improve the data quality. Therefore we started **(4) a second round of internet research** and self-completed the survey forms of the remaining 23 research objects in our sample, based on the information they share on the internet, whitepapers, company documentations, company blogs, or public information like press reports or research papers. Based on this information we created profiles including key figures and a brief description of business for each intermediary. For an additional evaluation of the sample we sent out those **(5) profiles for confirming the correctness of company presentation**. We received 20 (42.6%) modified or confirmed profiles. By the end of our search period in June 2009, we had a list of 43 selected OIAs (Table 6).

A detailed description of all 43 OIAs can be found in the Appendix.

Table 6: OIAs surveyed for this study

No.	Open Innovation Accelerator	Homepage
1	**99 Designs**	www.99designs.com
2	**Big Idea Group***	www.bigideagroup.net
3	**Brain Reactions***	www.brainreactions.com / brainreactions.net
4	**Brainfloor***	www.brainfloor.com
5	**Brainstorm Exchange***	www.brainstormexchange.com/
6	**Cassiber***	www.corporate.cassiber.com/de/home
7	**Communispace***	www.communispace.com
8	**Crowdspirit***	www.crowdspirit.com
9	**Crowdspring***	www.crowdspring.com
10	**Elance***	www.elance.com
11	**Elephant Design***	www.elephant-design.com
12	**Elephant Design + Strategy**	www.elephantdesign.com
13	**Favela Fabric***	www.favelafabric.com
14	**Fellow Force***	www.fellowforce.com
15	**Fronteer***	www.fronteerstrategy.com
16	**Future Lab Consulting**	www.futurelab.de
17	**Gen 3 Partners**	www.gen3partners.com
18	**Guru**	www.Guru.com
19	**Hype***	www.make-ideas-work.com
20	**Hyve***	www.hyve.de
21	**IBM***	www.collaborationjam.com
22	**Idea Crossing***	www.ideacrossing.com
23	**Idea Connection***	www.ideaconnection.com

No.	Open Innovation Accelerator	Homepage
24	**Ideas To Go***	www.ideastogo.com
25	**Idea Tango***	www.ideatango.com
26	**Ideawicket***	www.ideawicket.com
27	**InnoCentive***	www.innocentive.com
28	**Innovation Framework***	www.innovation-framework.com / innovation-framework.fr
29	**Invention Machine***	www.invention-machine.com
30	**Kluster***	www.kluster.com/home/people
31	**LEAD Innovation Management**	www.lead-innovation.com
32	**NineSigma***	www.ninesigma.com
33	**Openad**	www.openad.net
34	**Redesign Me**	www.redesignme.org
35	**Rent-a-coder / Top Coder***	www.rentacoder.com
36	**Sitepoint**	www.contests.sitepoint.com
37	**Spigit***	www.spigit.com
38	**Venture2***	www.venture2.net
39	**Verhaert**	www.verhaert.com
40	**VOdA***	www.vo-agentur.de
41	**Wilogo**	www.Wilogo.com
42	**Yet2.com***	www.Yet2.com.com
43	**Your Encore***	www.yourencore.com

Note: OIAs marked with an asterisk (*) participated in the survey, the follow-up interview, and profile check. For the remaining OIAs, information was collected from the internet, the company's websites and press reports about their activity. However, no self-reported data could be used for the analysis of all intermediaries not marked with an asterisk.

Box 5: Survey approach and data sample

Basis for the analysis are 43 intermediaries offering services in the field of open innovation. That is why we call them Open Innovation Accelerators (OIAs).

OIAs were selected in a five-step procedure, a combination of two internet research phases, a survey, interviews and follow up assessment.

4.3 Analysis: The structure and market of open innovation offerings

In the following sections we report the results from our OIA survey. A more detailed analysis of the self-perception (4.3.1) of the OIAs shall provide a better understanding about their business vision. In a next paragraph, we take a look on their development, their geographical distribution and the industrial sectors in which the OIAs offer their services. Afterwards, we analyze the kind of open innovation approach the intermediaries perform (4.3.2) to understand the differences between them. In a last step we take a closer look at how intermediaries structure their processes and their underlying cost structure (4.3.3).

Following this analysis, we integrate our findings on a more abstract level to gain a better understanding of the intermediaries' services. We finally will advise on choosing an OIA for further collaboration in your own innovation process.

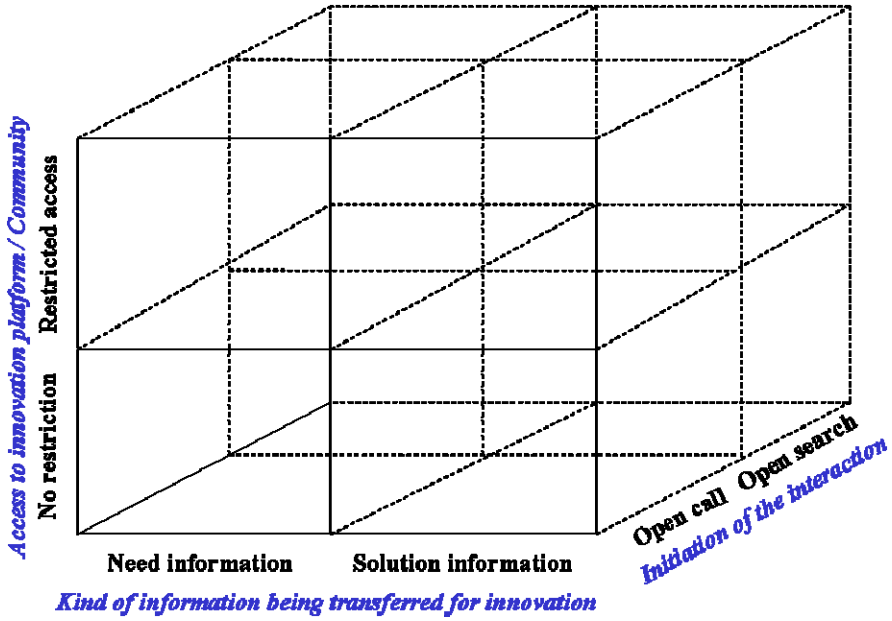
4.3.1 Self-understanding and positioning of the OIAs

4.4 The OIA-Cube: A conceptual model to map the collaboration between an organization and its external environment

This section summarizes the results of our open innovation accelerator (OIA) study. In the Appendix, all 43 OIAs are portrayed with in larger detail with key information about their approach, method, external actors, etc. Here, we want to **synthesize our findings**. Looking on our data we could **derive a number of different types of OIAs**, each representing a business model of an open innovation intermediary. The first section presents the theoretical background and a conceptual model to structure different types of OIAs. The second section applies this model in the context of our survey and describes four basic forms of OIAs. This structure also shall help managers to quickly identify an OIA that fits to their innovation problem.

To map the landscape of open innovation, we introduce a framework which allows us to classify the OIAs. Our conceptual figure, dubbed the **OIA Cube**, models the collaboration between an organization and its external environment. As shown in Figure 13, our model is a 3-dimensional cube. Its dimensions describe the collaboration between an organization and its external environment.

Figure 13: OIA Cube: A Framework to map the activities of an open innovation accelerator



Based on a **theoretical background about knowledge transfer** (von Krogh and Koehne 1998) and absorptive capacity (Cohen and Levinthal 1990; Zahra and George 2002), we focus on **three central aspects**:

(1) **Initiation:** The initiation of the interaction between the seeking organization and its environment. We find that the design of his specific phase influences the entire open innovation process with regard to the constitution of the collaborating group; the actual

process of collaboration and information flow and depth; and finally the type of output generated and how intellectual property rights are being protected.

(2) **Type of information:** The type of information that is intended to be generated, need or solution information.

(3) **Access:** The **rules** of how **to join the collaboration**, i.e. how access to participate is regulated.

From our survey, we find the following characteristics along these three dimensions:

- The **initiation stage** of an open innovation project is characterized by t**wo different kinds of starting the collaboration**: *open search or open call*. ***Open search*** is one mechanism to start the collaboration. It refers to a broad search for needed information and sources. Laursen and Salter (2006) consider the width of search as a crucial aspect regarding open innovation. An organization doing open search performs a wide search in the internet for certain information and sources. Neither pre-assumptions about concrete information nor the source of it is clear to the initiator of the collaboration. An example could be the broad search for lead users within an analog market. Another example for broad search is screening internet forums for interesting product modifications reported there.

  An ***open call*** is another possible sub-activity to start the collaboration. Here, problems and tasks are broadcasted by an organization to an unknown (rather large) group of potential recipients. Potential contributors screen the task and self-select whether they want to become engaged in the collaboration (Benkler and Nissenbaum 2006; Lakhani et al. 2006). An example is the Netflix Prize, a DVD rental service who wanted to improve the algorithm for its DVD recommendation system. The objective was to increase the accuracy of the predictions about movie preferences for its individual customers. In 2007, Netflix started a challenge, promising one million dollar to the person who first submitted an algorithm that would improve the present prediction accuracy by at least 10%. Already in the first year of the contest, participants achieved an 8.43% improvement. In September 2009, the 10% mark was finally reached (netflixprize.com//leaderboard). Netflix paid $1 million for a solution which is multiple worth it. Interestingly, the solution came from a group of outsiders not working on recommendation systems before. The open call for participation enabled the company to overcome its current perception of may hold a solution and opened the process to anyone who felt qualified and motivated.

- The **second important aspect** in knowledge transfer refers to the **type of knowledge** which needs to be acquired. The kind of information required determines the target group for the collaboration. We differentiate between ***need*** and ***solution information***. Representing these kinds of information are the two main participant groups – **experts** bearing solution information and **non-experts** bearing need information. Per definition, providing solution information requires special knowledge and expertise about the field of interest. In the Netflix example it was asked for an algorithm improvement which demanded at least analytical and programming skills from the participants. Thus, participants of the Netflix Prize are seen as experts. In contrast, the computer firm Dell hosts a website for its community where the participants can post ideas regarding certain

Dell topics (www.ideastorm.com). Average community members are Dell customers who use this channel to communicate their product needs and ideas for “incremental” product improvement. They are regarded as non-experts.

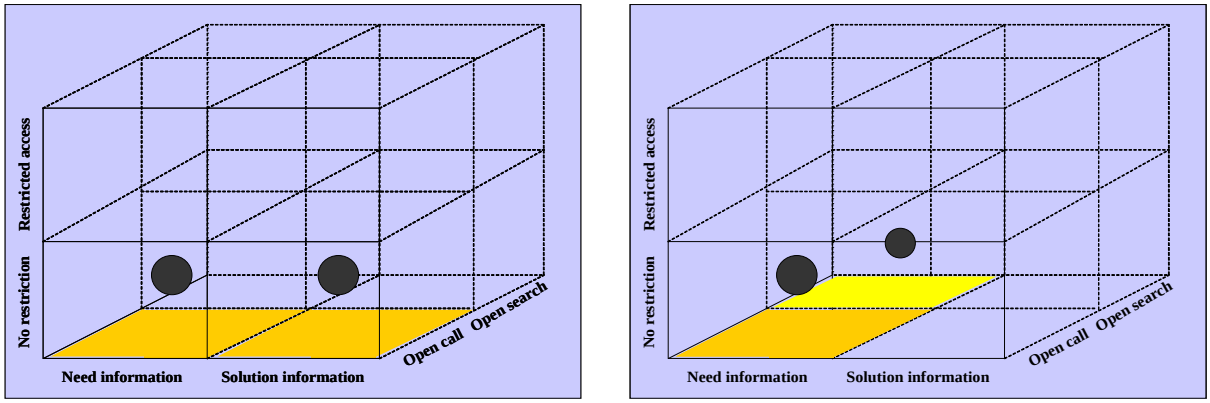
- An additional mechanism to **shape the collaboration** form between an organization and its external environment is the **instrument of access regulation**. Regulating the participation is one possibility for the firm to determine how much control in the knowledge transfer process they want to keep. This especially includes the stage of knowledge generation and stage of exploitation. A community access with *no restriction* stands for an open community. Here, every potential user can sign up without additional qualifications. In contrast, platforms that *regulate the access* pre-select the group of external actors. Most of the accelerators leave it up to their clients to define recruitment criteria. Compare for example the OIA *InnoCentive* and *Your Encore*. Both accelerators offer expert communities for problem solving. Whereas it is easy to become a community member at *InnoCentive* by simple registration at their website, *Your Encore* decides who will join the community based on pre-defined criteria. Every potential member has to send in a full application for review and approval.

In the following, we will explain the grid figure that will be used to summarize the positioning of each accelerator and its main service features. The **horizontal axis** displays the kind of information such collaboration is aimed to generate. We distinguish between *need and solution information*. The **vertical axis** displays the *forms of community access*. The **last axis** describes the type of approach how the collaboration is initiated – *open call* or *open search*. Figure 14 shows two examples how to read and understand the information in the OIA cube.

The intermediary in the left cube (a) offers a method that generates both need and solution information. In both cases, the OIA pursues a wide community approach and has no access restrictions. Every potential user can sign up and join the innovation platform. Furthermore, the intermediary follows the broadcast search method. Usually either questions for generating need information or problems for seeking a solution are posted on the website. The mechanism of *self selection* allows a potential contributor to decide on his or her own whether to become engaged in a task or problem solving activity. Self selection usually happens not in the domain of the initiator of the collaboration, but in the domain of potential participants. Individuals either select a task based on their previous expertise in the field, giving them a cost advantage in working on the task, or based on their intrinsic motivation to become engaged in this task (Benkler and Nissenbaum 2006).

The second example (b) shows an intermediary that offers two different methods of open innovation. On the one hand, the accelerator offers a platform to post questions for an idea contest to generate need information regarding a certain topic within a heterogeneous community. On the other hand, the accelerator offers a second method that focuses on searching the web (discussion forums, communities etc.) for information the client company needs for its innovation process. Usually this approach is used to perform trend analysis in the ideation stage of the innovation process to generate general ideas.

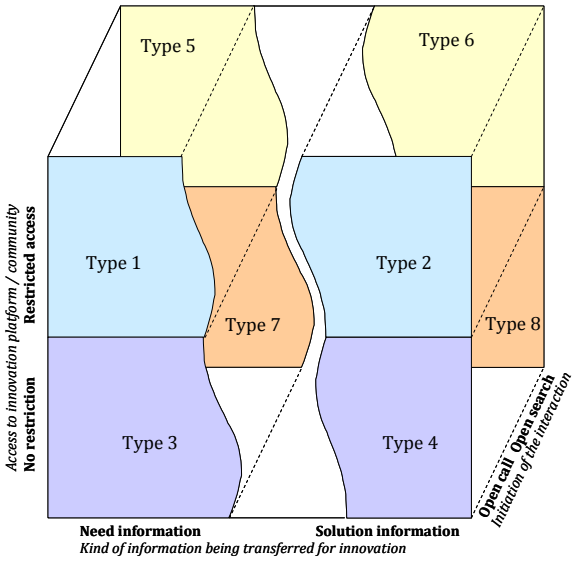
Figure 14: Mapping an OIA in the cube: Two examples



4.5 Clustering the market of OIAs

Considering the possible combinations along the three dimensions of the OIA cube, eight different types of OIAs can be distinguished (Figure 15). Two main clusters derive from the option how to initiate the collaboration. The **first cluster** (Types 1-4) represents the types that start cooperation by pursuing an **open call**. The **second cluster** (Types 5-8) includes the types using **open search** as basis for interaction.

Figure 15: Types of OIA cluster



The first OIA cluster represents the methodological approach of an open call. This category represents the type of open innovation discussed predominantly in the literature. A characteristic here is the initiation of collaboration by **using an open call in form of problem broadcasting**. An organization decides to give away a certain innovation task. However, the question to which community the task is outsourced remains in the domain of

the organization. A company can chose between **four different types of this cluster**. Basis for a reasonable decision are the characteristics of the other two specifications, access regulation and information type. The following boxes display the types 1-4 of open innovation approaches. For each type, a short description of the strategy is presented. Note that some OIAs follow more than one model.

This classification into eight types shows that most accelerators represent more than one form of collaboration with their external environment. The majority of OIAs pursues two different types (48.8%). Most OIAs follow *Type 4* (48.8%), followed by *Type 3* (32.2%). There are only a few instances of *Type 7* with 4.7%. This might be because searching for future trends is usually performed by conventional market research institutes. *Hyve* and *Spigit* are the only OIAs that offer an open approach to identify trends.

Box 13: Open innovation approaches and their forms of collaboration

The core differences between various type of OIAs is the form how collaboration with external actors is initiated – open call or open search. Another core factor to distinguish between different business models of OIAs is the focus on the kind of knowledge brokered – need or solution information The way how participation is regulated finally determines how the contributing community is composed.

Combining these three factors. we can distinguish eight types for collaboration with the external environment in an open innovation manner. Types 3 and 4 are the most frequent forms of collaboration in an open innovation setting.

5 Collaborating with Intermediaries: Managerial Implications

Especially for small and medium size enterprises, **collaborating with intermediaries** is a **feasible way to accelerate open innovation**. From the perspective of an organization, however, it still is a tough decision to enter such cooperation. Just focusing on open innovation exposes many different ways to shape this process. In our survey we looked at intermediaries for open innovation (OIA) and found a wide range of approaches and methods to innovate with external partners. We found OIAs providing access to raw ideas, while others generate detailed product concepts. There is not “one best way” to perform open innovation. Depending on the information required and the task to be solved, different methods of open innovation are suited best – and hence different OIAs specializing in the particular method. The purpose of this study was to structure the market for open innovation and to provide guidance which OIA to pick for a particular innovation project.

In general, there are several advantages engaging OIAs to acquire innovations along the external sourcing continuum (Nambisan and Sawhney 2007):

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Appendix: Profiles of the Open Innovation Accelerators

The following pages list all OIAs that have been evaluated for this study in alphabetical order. As mentioned before, some OIAs were included in a more detailed analysis as they participated in the survey and / or an interview. Those are marked with an asterisk (*) after their name on the profiles. Information about the other group of OIAs was identified via web research, analysis of the OIA's website, and by analyzing press reports etc. For a description of the OIA cube that provides a graphical summary of each OIA, please refer to Chapter 0.

All information in the table is either based on self-reported information provided by the accelerator (OIA*) or stems from their website or blog news. This information is about to change regularly. The displayed information is taken from our survey and data research in 2008.

Overview

Stiftung Industrieforschung – Sponsor of the OIA survey

This study is based on a research grant provided by Stiftung Industrieforschung. **Stiftung Industrieforschung** is a German foundation based in Cologne which supports research projects in business and economics as well as in organizational science and technology with special focus on fields relevant to SMEs. The criterion for success is to put study results into practice. Stiftung Industrieforschung emphasizes the funding of applied research projects in close industry cooperation. Key objective is to achieve a high reach for results among SMEs. More than 85% of the funding regularly goes into various research projects. Nearly 675 research projects have been supported since 1974. During the last ten years 1,400 SMEs participated in research cooperation and covered circa 20% of the costs for development. In return these companies were able to reduce costs for new product development and development time.

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