



Guidelines

Open Innovation in Photonics

Foreword

Are you a member of a network or cluster, and do you participate actively in networking events such as expert meetings, collective stands at tradeshows, technology or knowledge directories? Congratulations, you are already active in Open Innovation!

Do you develop new products or services according to your customers' requirements? This, too, counts as open innovation.

But sure, there must be more to this hyped expression? What about idea competitions, innovation platforms and crowdfunding? Those are tools for open innovation, too. But as with every toolbox: It is good to know that there are sophisticated tools, but for 90% of your projects, a hammer, Allen key, and screwdriver are all you need.

Photonics is a cross-sectional technology as well as being an industry of its own. Innovation increasingly occurs at the intersection of various technologies. In Europe, SMEs, microenterprises and start-ups in particular require special support in order to keep up with ever-shorter innovation cycles and overcome the so-called "valley of death".

The promotion of innovation – that is, the successful implementation of ideas into new products, services, processes and business models – is a key objective of the European Union-funded project "Photonics4All", especially for the future-oriented technology of photonics.

This very objective is also pursued by OptecNet Germany, the federal association of eight regional innovation networks for optical technologies in Germany. With the help of the guidelines created under this project, OptecNet Germany would like to contribute to the facilitation of innovation.

The innovation methodology is based on the “open innovation” approach, extended by experts from research institutions, companies and business incubators in six “Photonics Workshops for Innovation”, and has been adapted to European requirements and photonics industry-specific needs.

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1. Motivation

The development of new products, services and processes, especially in photonics, is subject to ever-shorter cycles and leads to the increasing interaction of various high technologies. This creates the need to optimize innovation methodology and to establish an open culture of innovation.

Approaches such as “open innovation” are therefore becoming increasingly important for innovation management. Open innovation refers to the systematic inclusion of the business environment in the innovation cycle, from ideation to implementation in the form of new products, services and processes, as well as business models. In addition, through its flexibility and versatility the approach offers for SMEs in particular a way to help shape current market trends and to respond to customer requests in a more flexible manner.

The aim of this guide is to provide assistance for SMEs, microenterprises and start-ups in the field of optical technologies to integrate open innovation into their own innovation process. By encouraging continuing innovation and thus product and/or business development, the handbook aims to provide a bridge over the “valley of death”.

Why Open Innovation in Photonics?

Photonics is a knowledge-intensive high-tech industry. Its 9 % R & D ratio is well above that of the rest of the manufacturing industry. This means that behind most product innovations there is a great deal of research and development effort. Companies can either try to do this themselves or cover the needs by cooperating with research institutions.

As a so-called key enabling technology, advances in photonics have an impact on a wide range of industries. It may also be that potential users of a technology are not known to the provider. One example of this is the first surprising request from the cosmetics industry to a manufacturer of light measurement technology to measure the gloss of hair.

Conversely, innovations in photonics are also created by the combination of complementary technologies - e.g. Software or application industries.

Small and medium-sized enterprises account for a large proportion of the industry – 56 % of companies have between 1 and 49 employees. For these, to an even greater extent and to large companies, their resources are limited. Thus, few SMEs feature a research department and the majority of the manpower is reserved for day-to-day business. Innovation management happens alongside.

Another special feature of SMEs is their close proximity to the customer. Many developments arise directly on behalf of a customer.

In the context of innovation management, Domötör has extracted the following characteristics from the literature as typical for many SMEs [0]: high flexibility due to flat hierarchies and short decision-making processes, the dominant influence of entrepreneurial personality, the low degree of division of labor, the often lack of financial and personnel resources, low willingness to cooperate, the lack of strategic and operational planning.

The principle of open innovation meets these specifics of the photonics industry. Here “open” does not mean to disclose all business secrets and share everything with everyone. But it means recognizing that good business ideas arise outside the company as well, and that one can benefit from the ideas or resources of others in different ways.

For cross-section technology like photonics, which can benefit greatly from complementary technologies, cooperation is essential. This enables competencies to be bundled and better use of external resources. In order to be able to transfer current research results into marketable products, cooperation with research facilities is the key. For example, for the development of prototypes.

The content of this guide is based on a Europe-wide assessment of needs, current research and management literature, complemented by the experience of experts in business and science. The individual sources are listed in the appendix.

Current Practice in European SME

A Europe-wide survey, conducted as part of the development of these guidelines, determined the general need for innovation (6.1). A total of 44 participants from the photonics industry, mostly from Germany (37), provided information about the organization of their innovation management and the tools that they apply for idea generation and utilization. The structure of respondents shows an increased interest in the subject on the part of SMEs, microenterprises and start-ups.

According to the participants, well-established innovation management exists in more than 50% of the surveyed institutions. However, innovations could be implemented more efficiently in more than 50% of the organizations, and in almost half of the organizations innovations emerge without any solid structures.

Tools for Idea Generation

According to this survey, the most common forms of idea generation continue to be classical tools such as relying on the ideas of one's own employees. It is a lot more remarkable, however, when ideation occurs with the help of a suggestion scheme that is not limited to the

ideas of the internal development department. In addition, more than 70% of respondents are actively involved in networks or clusters, and over 20% make use of innovation platforms and license acquisition. Approximately 15% use crowdsourcing for external idea generation. Furthermore, cooperation across organizations, e.g. collaboration with customers and research institutions, takes place in more than 80% of the cases. Cooperation with competitors in the pre-competitive area continues to act as a deterrent – only a little over 25% of the institutions tend to make use of it.

Tools for Idea Realization

About half of the surveyed companies regularly or occasionally participate in competitions or tenders for external idea realization. Licensing is still quite common in 40% of the organizations. More than 25% have created business areas through spin-offs. However, over 40% of the companies have not yet used or do not intend to use these tools.

The results of the survey indicate clearly that most companies are essentially already implementing open-innovation processes. Customer requirements are taken into account, cooperation with suppliers and customers is being expanded and research projects are awarded to universities or research institutes or are worked on cooperatively. Current topics and trends are discussed in network meetings or at conferences. Licenses are used and corporate investments are made. Ideas competitions are also advertised in part.

Similarly, the organizations' own knowledge is marketed through participation in tenders or competitions, licenses are granted and start-ups are created.

What is new about open innovation is not the “what” but the “how”: the systematic inclusion of the business environment in the innovation process.

For members of Photonics BW – the innovation network for optical technologies in the German state of Baden-Württemberg – the biggest motivation to use external ideas is to be able to rapidly integrate new technologies as well as to cover missing internal competencies. Identifying new markets, compensating the company’s lack of capacities and focused product development are also important reasons. By contrast, the improvement of customer satisfaction, organization, control of the development process and especially cost management play only a minor role [4].

The survey clearly shows that the basic outlines of the innovation methodology are widely known, and that they are already being applied. However, it also points to insufficient or completely missing structures in innovation processes, to the limited use of some instruments, and to a lack of efficiency when it comes to applying the known methods. All of this underpins the need for an optimized innovation methodology in companies across Germany and in other European countries.

The next pages of this brochure shall clarify the terminology of open innovation and present the basic concept and major challenges before a practical approach towards Open Innovation is addressed in more detail.

2. Basic Concepts

Before dealing with open innovation, it is advisable to examine the basic principles of innovation and open innovation.

2.1 Innovation

The term “innovation” is heavily used as a buzzword, often inaccurately. In specialist literature, however, there is some consensus that innovation is the successful implementation of a new idea or invention into a product, a service, a process or a business model.

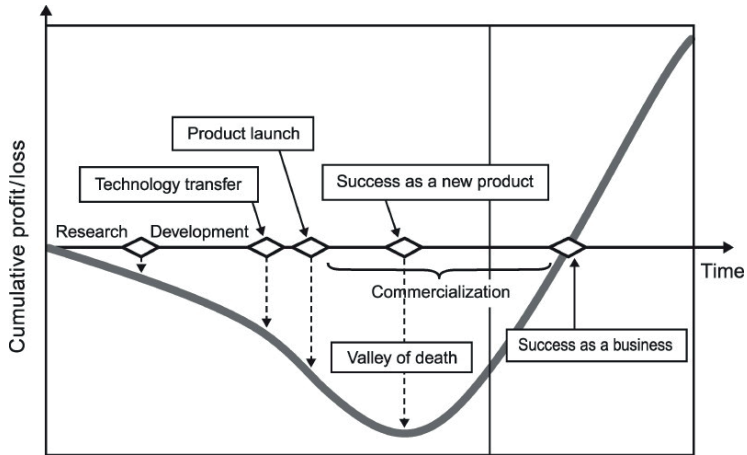


Innovations are new ideas that have been successfully implemented in the market.

2.2 Necessity/Importance of Innovation

Technical and scientific innovations are considered to be a guarantee of economic as well as social advancements [1]. Due to the acceleration and increasing complexity of developments, companies, research institutions and policymakers are ascribing a growing importance to innovation. Particularly for SMEs, microenterprises and start-ups, an efficient innovation process is required to overcome the so-called “valley of death”.

The “valley of death” shows the negative cash flow in the early stage of the commercialization of a product, service or process [2].



*Main stages of an innovation process from research to market
 (© Osawa and Miyazaki [3])*

2.3 Closed Innovation

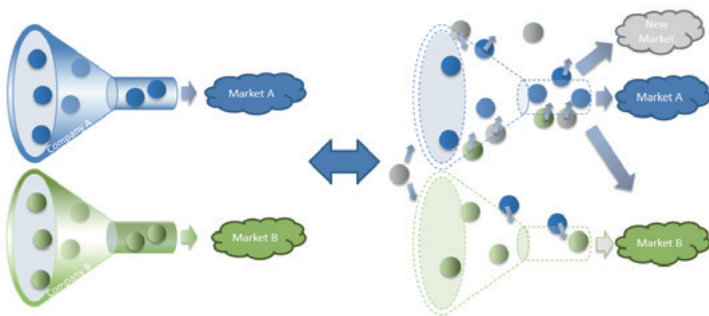
In classical organizations, ideas are generated in-house in the respective research and development departments; some of those ideas are converted into products or services and then brought to market. This process is referred to as classical or closed innovation. Ideas that have not been implemented are generally wasted. Back in 2002, for example, Procter & Gamble utilized only 10% of its patents.

2.4 Basic Principle of Open Innovation

When companies and institutions permit not only the use of their own ideas, development processes and distribution channels, but also bring expertise from outside to solve the organization's own specific innovation issues, this is called open innovation.

Open innovation is thus not a completely new approach, but the consistent application as well as partial restructuring and enhancement of existing business practices. What is new is the systematic integration of open innovation into the innovation process and, at least in the case of large companies, the conscious use of resources.

While the original model of closed innovation was strongly oriented towards large corporations with extensive departments for research and development, open innovation also allows smaller companies to play an increasingly important role in the field of innovation.



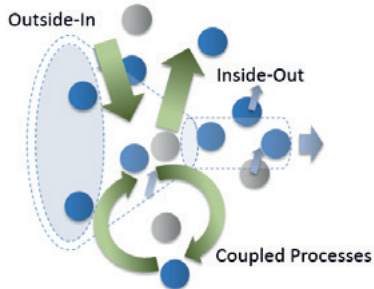
Comparison: Closed and open innovation

2.5 Core Processes of Open Innovation

According to the flow of ideas, the innovation process can be divided into two main processes or directions:

- Outside – In: integrating external ideas in your own company
- Inside – Out: using own ideas outside the organization

If both ideas from outside the company are used internally, and the company's own ideas are exploited outside the organization, this is referred to as a coupled process.



Core processes of open innovation

2.6 Challenges in Terms of Open Innovation

Apart from the advantages of the use of open innovation, there are also a number of issues that must be paid particular attention to.

These include:

- commercial protective rights
- confidentiality
- possible loss of competence
- increasing complexity and rising administrative expenses through collaboration with external partners
- barriers within the company, and
- mutual management of intellectual property.

Many of these problems can be avoided in advance, however, through careful planning and appropriate arrangements. The appendix of the guidelines contains a template for a confidentiality agreement.

An investigation among European SMEs [7] has shown that the greatest obstacles for the implementation of open innovation activities are in the field of corporate culture. Whether it comes to venturing activities, the inclusion of customers, external networking or external investments, or the outsourcing of development work: the balance between innovating and daily work, communication problems, the coordination with partners and the organization of innovation processes are a challenge for most companies.

Frequently the opening of the company to the outside world is seen as being high risk, for example in case of loss of competence. If, however, there is a well-established innovation culture and interconnectedness of all fields of innovation, this is hard to copy (compared with product knowledge, for example) and thus counterbalances the risk of the opening.

2.7 Reasons for Implementing Open Innovation

“If the smart people within your company are aware of, connected to, and informed by the efforts of smart people outside, then your innovation process will reinvent fewer wheels. What’s more, your internal efforts will be multiplied many times through their embrace of others’ ideas and inspiration.” (Henry Chesbrough)

For SMEs, microenterprises and start-ups in particular, open innovation is a way to:

- create competitive advantages
- meet customer requirements
- improve growth
- increase sales
- gain market share, and
- multiply resources.

2.7.1 Requirements for the Successful Implementation of Open Innovation

Implementing open innovation requires more than merely looking for new ideas. The entire company must be aligned with an open innovation culture. Existing structures and processes must be questioned (or it should be permitted to question them); and new approaches to research, development and distribution must be checked.

An open culture of innovation also requires that external idea-generation services are recognized as such or even searched for specifically. Errors must not only be permitted up to a certain extent, but be seen as a prerequisite for quick experience-building and a way to strike new paths. The respective research and development department has to discuss ideas and develop promising approaches. Thus management has to define and analyse the overriding reasons for the innovation process and, in addition to the existing operations, provide sufficient resources and freedom for new activities within the company.

Principles of Closed Innovation

The most capable people from our field are working for us.

To profit from research and development, we have to discover, develop and market everything ourselves.

What we discover first, we bring first on the market.

The company that first brings an innovation to the market, wins.

We win when we have the most and the best ideas in the industry.

We protect our IP so that our competitors do not benefit from it.

Principles of Open Innovation

Not all capable people are working for us. We need to work with smart people inside and outside our company.

External R & D can create significant value; with internal R & D, a portion of that value can be tapped.

We do not need to have invented something to benefit from it.

To have a better business model is better than to be the first in the market.

We win when we make the best possible use of internal and external ideas.

We should benefit when others use our IP, and we should buy others' IP when that advances our own business model.

Comparison of the principles of closed innovation and open innovation according to H. Chesbrough [5]

However, organizations frequently lack the necessary resources, methodical expertise and points of reference. Networks and clusters can facilitate the start of an open innovation culture through workshops, advice and contact mediation, and can support companies and research institutions in efficiently generating and utilizing ideas.

3. Open Innovation Toolbox – Three Steps to Open Innovation

To profit sustainably from endeavours in open innovation, companies should be aware of the following main issues:

The Basis: Innovation culture

Is the company ready for innovation? Are ideas from outside accepted in the company? Is someone able to judge external ideas?

Step 1. Strategy for business and position in the market

What will earn bring the cash in 5, 10 and 15 years? Where are the products and services situated in the value chain? Who are the competitors, who are the customers, who are the suppliers, what might substitute products and services, who might enter the market?

Step 2. Structures for innovation management

Where do the ideas come from? How are decisions on developments made? Who decides? How are projects carried out – usually in time, with the expected costs and the targeted outcome? Who judges external expertise? How is the communication culture? What are the goals for open innovation?

Step 3. Filling the open innovation toolbox

What tools are available? Which fit into the companies' strategy? Which tools are already in use?

Various tools for the Three Steps to open innovation are presented here as brief examples – without offering an exhaustive account. They are not generally applicable to all companies, but rather depend on the objectives and the resources available to an organization. As a quick reference we have developed a checklist that you can find in Appendix 1.

3.1 Innovation Culture (according to Alexander Sonntag [6])

Procedures and structures are important as they give innovation processes a frame. Nevertheless, processes and structures cannot innovate. It is the people in an organization, in partner institutions and networks that develop ideas and commit to promoting them – sometimes even despite considerable opposition.

Whether they are willing, able and allowed to do so, and how strong the opposition is, depends mostly on the corporate climate and the organization's network culture. Innovation culture is one of the top success factors in the innovation process and should therefore be understood not as a subculture but as the dominant culture.

Corporate culture consists of all organically-grown and currently effective values, codes of practice and ways of thinking that every employee complies with and that he or she has ideally fully internalized. Being part of corporate culture, innovation culture informs the way in which an organization deals with ideas and innovations.

Important key elements for a positive culture of innovation are:

- trust
- creativity
- appreciation
- openness
- tolerance
- common objectives, and
- identification.

Open Innovation culture involves the management's and employees' willingness, ability and freedom to innovate.

The willingness begins with the management's readiness to innovate and thus to change. If this is missing, it is almost impossible for employees to give innovative suggestions. Employees' willingness to innovate can be encouraged, for example through open information, participation, various monetary and non-monetary incentives and personnel development measures.

Each and every employee should be informed about the importance of innovation for the company's goals and strategies. With the help of fair individual target agreements it should then be determined which innovative contributions can and should be made by the individual associate. Since a precise objective can not only motivate but also increase pressure for employees, this instrument should be used with caution. It must be ensured that certain mistakes are not penalized and that the innovation culture is not disturbed. Similarly, the development of existing ideas can be rewarded.

Such incentives systems can help overcome the so-called "not invented here" syndrome, i.e. the negative attitudes of the employees when

it comes to external knowledge as well as cooperation with external partners.

Being allowed to be innovative and not just having to be innovative is a basic requirement. This is reflected in freedom, which is granted by the management as part of the corporate culture and structure. Otherwise innovations are regarded in a rather distrustful way: they interfere with the well-rehearsed daily routine and established power structures.

Variety in the daily routine, for example with the help of distraction and communication during breaks, increases creativity, while promoting productivity and strengthening the community.

Mixed and intercultural teams facilitate the development of new ideas and new markets and contribute significantly to the acceleration of development processes. Depending on the task the team can, for example, be assembled in an interdisciplinary and cross-departmental manner. It is also advisable to consider selecting team members with diverse skills and experience (technical, analytical, creative, emotional).

Freedom in innovation is not a matter of budget. Innovations can be developed successfully even for small budgets. If there is less money available, however, market signals must be considered early on in order to make a conscious decision about going along with the development and in order to implement it despite limited resources.

The qualification and continuous professional development of all employees of a company brings about the ability to innovate. In addition, the availability of sufficient tools for brainstorming, structuring, evaluation, selection, planning, implementation, marketing, control and advancement of ideas into successful products, services and processes

is a central aspect of innovativeness. Conveying these techniques to all employees must be a key goal of personnel development, which thus takes on an important role in building an innovative company.

The said list of instruments includes specific techniques of communication, creativity teaching, project management, knowledge management, controlling and marketing.

Starting Points for an Open Innovation Culture

Freedom and resources: How much time do the most innovative employees take for actual innovation activities? Usually the proportion is not very high, because they are mostly busy with everyday business. However, innovation requires sufficient financial and time resources. This sometimes entails temporary relief from other duties and concentration on activities that generate innovation.

Suggestion system: The employee suggestion scheme is an essential part of modern ideas management. It is designed to facilitate employees' contribution and to ensure orderly evaluation and processing of their suggestions. Important in this context is fast and transparent processing as well as continuous feedback on ideas during the course of the process.

Incentives and appreciation: How to motivate employees to develop special ideas? Ideally, the motivation springs from a strong identification with the customer experience, a meaningful task or pride and passion for their own products. Additionally, many companies rely on rewards. Here, one first thinks of monetary rewards, training or gifts. The actual effect of monetary incentives is, however, controversial. Depending on the employee, public recognition or special favors can also be an effective means to increase motivation.

Error-friendly culture: Not every error is a failure. What should by all means be avoided in many lines of business, especially in production, can at least be tolerated in innovation projects. On the one hand, innovation processes are always subject to uncertainty. Fear of making mistakes can greatly cripple the innovation process; it rewards the idle ones at the worst. On the other hand, errors always provide opportunities for learning.

Further education and training: Unusual ideas and their successful implementation are no coincidence. At their core is solid methodological and technical knowledge.

Communication and networking: Innovation is no longer the work of a solitary genius beaver away in his quiet chamber. Open and networked communication across departmental and company boundaries is required increasingly.

(Source: Alexander Sonntag, <http://www.rkw-innovationsblog.de/2014/05/27/innovationskultur-vom-duerfen-wollen-und-koennen/>, retrieved on 8 August, 2014.)

3.2 Business Strategy and Market Position

Whether you follow the classical management approach or rather use the entrepreneurial approach of effectuation, you do need a strategy. In its core, this should comprise at least three components: your objective, a list of your business activities and an overview of your business relationships.

Further questions to be answered are:

Where are my products and services situated in the value chain? Which are my strengths and weaknesses? Who are my competitors, who are my customers, who are my suppliers, what might substitute my products and services, who might enter the market?

Before you worry about innovation, make sure that you know your market position and overall strategy. Otherwise, how can you determine success?

Formulation of goals

What are the objectives of your enterprise? Those are usually pinned down in your Vision and mission statements. All tools and methods can only be applied successfully if the objective is clear to everyone in the company and if there is an established and functioning innovation process. An additional focus should be on your innovation efforts. What do you want to achieve through innovation as such. What should be achieved through open innovation? As with all stated objectives, these should also be clearly defined, measurable, achievable and relevant to the company and with clear timing (SMART principle: Specific, Measurable, Achievable, Relevant, Time-bound).

SWOT analysis

Illustrates the strengths, weaknesses, opportunities and risks of a business or a business model. The SWOT analysis forms the basis

of any strategic decision. With regard to your open innovatin toolbox, you can also use it, to determine areas, where you might profit from partnering with other businesses, research institutions or other organisations.

Porters Five Forces analysis

Five Forces Analysis assumes that there are five important forces that determine competitive power in a business situation. These are Supplier Power: how easy it is for suppliers to drive up prices; Buyer Power: how easy it is for buyers to drive prices down. Competitive Rivalry: number and capability of your competitors. Threat of Substitution: Can customers find a different way of doing what you do. Threat of New Entry: How easily can others enter your market.

Value Chain Analysis

Helps you identify the ways in which you create value for your customers, and then helps you think through how you can maximize this value: whether through superb products, great services, or jobs well done. First, you identify the activities you undertake to deliver your product or service. For each activity, you think through what you would do to add the greatest value for your customer. Finally you evaluate whether it is worth making changes, and then plan for action.

Functional analysis

Breaking down the products and technologies into their basic functions provides the basis for finding new applications for the company's strengths.

Market analysis

Consists of the analysis of procurement markets for raw materials, tools, prefabricates, energy, the labour market, the financing markets (capital, money, foreign exchange market), and the analysis of the

markets for primary products, by-products and waste products. Similar to functional analysis, this can supplement the product portfolio and thus innovate the respective market through the development of new strengths.

Competition analysis, e.g. benchmarking

(Continuous) comparison of products, services and processes and methods with those of other companies in order to potentially distinguish oneself from the competitors or to close performance gaps systematically. The basic idea is to determine the existing differences, the reason for their existence and opportunities for improvement.

→ Filling your open innovation toolbox:

Start with your market relationships according to Porter. Is it possible to get more information from your customers about their needs? Or do your suppliers offer other materials or components you might use to improve your portfolio?

Do you make regularly use of your customers' and suppliers' feedback?

Business activities

Create an overview of your projects and processes. Characterise them according to their status – idea, in development, product launched and successful product.

Business relationships: Networking

Who do you know as a company? Starting with your customers and suppliers, list all your business partners. List your contacts to science. List your memberships in networks and associations. Add a short description of your partners and the key benefits for your business. If you notice a gap in the ranks of your relationships, ask your cluster management for help.

Are you a member of a cluster or network? If so, use it as an innovation tool!

Customers and end users

Existing customers and end users are an important source of ideas for further development of products and services. The customers should be involved in the development, for example, through active market research (customer survey, sales feedback) or through customised developments.

Suppliers

Similar to customers, suppliers can also provide valuable information on new development trends.

External development contracts

When using the expertise of research institutions and companies, the clear communication of expectations and definition of objectives is of fundamental importance for successful cooperation.

Cooperations

When cooperating with research institutions and other companies, one can benefit from each other's knowledge and use it efficiently and effectively.

Shareholding

Financial contribution to new or established businesses gives access to their knowledge and potentially provides additional synergies.

Founding a new company

Promising ideas that do not fit into the actual business model can, for example, be successfully implemented as part of a spin-off.

Licensing

Protected knowledge can be made available to others whilst also benefiting from it, as through royalties.

Basic Tool for Open Innovation: Networking

The starting point for cooperation is the question: How can I find suitable partners?

A good starting point is the trustworthy environment of a network or cluster. Actors in existing networks already demonstrate their willingness to cooperate and their interest in long-term partnerships by actively participating in the network. On the basis of network services and through network management, the search for partners and contact with potential cooperation partners is made easier.

Working Groups

Themed and unthemed events as well as innovation boards serve the personal interaction with experts and encourage the development of ideas.

In regularly scheduled meetings of working groups from various disciplines, experts from industry and academia meet to exchange experiences and discuss current issues. Personal contact and direct transfer of knowledge serves as a basis for the initiation of collaborations and joint projects. For interdisciplinary exchange and valuable contacts, there are so-called cross-cluster events, which emerge from the close cooperation of high technology networks from different disciplines.

Besides those important networking events, networks and clusters may offer even more intensive partnering events. OptecNet

Deutschland for example has assessed the following networking techniques:

Crosscluster Events

Events which include talks and participants of at least two clusters, for example one technology network and one application oriented cluster. This opens the spectrum of potential partners on a different scale.

Business Speed Dating

Participants are assigned by lot to each other. Within five minutes, they are to get to know the main points about each others activities, find out common interests and if possible come up with a possible common project.

The benefit for the participants is, that they are encouraged to get in contact with someone, they don't know yet.

This works very well as part of a themed event, where the participants already have a common interest.

BarCamp

Meeting in a relaxed atmosphere, all participants have the opportunity to present a theme in just 5 minutes. As a result, the lecture program develops during the event and the exchange between the participants is stimulated.

Business Model Canvas

A strategic management and lean start-up template for the development of new or the improvement of existing business models by a visual chart with elements describing a firm's or product's value proposition, infrastructure, customers and finances.

Speakers' Corner

A slot in the agenda of a themed event, where all participants have the opportunity to present innovation offers or requests.

Technology Sourcing

The core processes of open innovation need appropriate resources, such as qualified personnel or a critical mass, which often do not exist in microenterprises. Respective resources can therefore be compensated through network services such as technology sourcing conducted by the network. This takes place in particular by bringing together potential partners, information on open innovation (especially in regard to microenterprises and the reduction of fear of contact), providing technology information to generate ideas (with the involvement of research institutions) and initiating collaborations.

3.3 Innovation Process

The basic prerequisite for the successful use of open innovation is an established and functioning innovation process. This does not require the hiring of an innovation manager. However, it should be clear whether there are consistent, invariable processes for the development and establishment of new products and services, and what these procedures entail.

Communication

Clear communication is the basis for successful cooperative innovation. Always make sure you and your partners have a good and common understanding of the expected outcome of any activities and both sides know important deadlines and cost limits.

Project Management

Good project management is characterised by adherence of schedule, target oriented planning and work and cost efficient delivery. This is also the foundation for any good innovation management process.

Stage gate

An interdisciplinary innovation process that integrates all functions involved such as technology, production, marketing and sales. The decision as to whether to continue the process is taken across functions based on pre-defined milestones (gates) and other criteria.

Design thinking

“Thinking like a designer can transform the way you develop products, services, processes - and even strategy” (Tim Brown). Design thinking is a user-based approach, which can be inspired by versatile innovation methods and applied on a small scale [8].

InnoSME

Procedure for the evaluation and innovation capacity-building of producing SMEs. In order to set the goals, it is important to identify all business units involved [9].

Employees

Colleagues from outside the development department, for example from sales, marketing or production, are an important source of ideas.

External development contracts

When using the expertise of research institutions and companies, the clear communication of expectations and definition of objectives is of fundamental importance for successful cooperation.

Cost-Benefit-Analysis

Estimate the effort each tool needs to be established on a scale from 1-5. Estimate the benefit you expect from the tool on a scale from 1-5. Plot the tools in a cost-benefit graph. Tools with low cost of implementation and high expected benefit should be addressed first, tools with medium to high cost and high benefit should be given a closer look and tools with high cost and low benefit should be kept for later analysis.

3.4 Additional Tools for Open Innovation

In addition to the various tools already mentioned above, there are a couple of tools “typical” for and linked with the expression of open innovation.

Crowdsourcing/crowdsolving platforms

Open innovation can, for example, be supported through the use of a web-based crowdsourcing platform that is based, among other things, on the experience and the feedback from members and users. Without disclosing comprehensive knowledge, object-oriented work can be resolved by a community in the form of subtasks in a cost-effective and timely manner.

The designation is based on the concept of outsourcing – the outsourcing of corporate tasks and structures to third-party companies. The crowdsourcing platform should facilitate systematic interdisciplinary exchange between researchers, manufacturers and users in order to drive new product developments.

Examples for research and development platforms are Innocentive, IdeaConnection, PRESANS and NineSigma. There are several other platforms in this field, as well as those for open innovation software, for product ideas and for freelancers.

Social media and crowdfunding

The use of “social networks” provides new opportunities for the implementation of open innovation. They can be used, for example, as an innovation platform (e.g. special LinkedIn and XING groups), for the development, testing and establishment of new ideas and their utilization and as a way of financing innovations (e.g. crowdfunding).

Ideas portals, virtual knowledge broker

In such portals companies can advertise concrete issues to be solved. Online providers are, for example, Innocentive, Ninesigma, Idea Bounty, Yet2, Your Encore or brainfloor.

Competitions

Advertising awards for the solution of concrete problems creates a strong incentive. The organization of the competition, however, must be well planned and managed.

Innowave

Approach to use impetus from outside the sector for own innovations (so-called cross-industry innovation) through the specific search for partner companies and product items from different industries. As a rule, foreign-industry knowledge can be used without competition conflicts [10].

Participation in competitions

Participating in competitions or tenders is a good opportunity to promote one's own ideas profitably.

Best Practice – Innovation Culture: i-Flash Community

Swarovski's i-Flash community has developed into an indispensable tool for generating and pursuing ideas for the company. A web application combines an ideas platform with a social network. Employees from all divisions and locations use the application in order to jointly develop new product ideas and concepts.

The actively supervised i-Flash community promotes intellectual diversity and entrepreneurial thinking as well as interaction amongst all employees. Meanwhile, almost 70% of Swarovski's market-ready innovations have originated in the i-Flash community [11].

4. Outlook

Presenting a demand-oriented innovation methodology, these guidelines assist the establishment of an innovation culture that is difficult to replicate, as well as bridging the "valley of death". Technological and social change creates ever-new opportunities and instruments for open innovation.

Taking into account the cross-linking of strategy and process, man and society, as well as technology and market, the holistic approach of open innovation demands being open and up-to-date.

Please feel free to contact us for an individual consultation. We wish you a lot of success and hope you enjoy the implementation of open innovation practices in your organization.

5. Appendix

5.1 Three Steps to Open Innovation at a Glance

Preparation:

- Innovation Culture
- Strategy and Market Position
- Innovation processes and Project Management

Open Innovation Assessment

Innovation Goals

Innovation Goals	Importance	Target
Idea generation		
New products		
New markets		
External exploitation of ideas		

List of Business Activities – balanced between successful products and pipeline?

Business activities	Description	Status: idea/development/ prototype/product launch/ successful product
BA 1		
BA 2		

List of Business Relationships with a short description and note the key benefits current and possible for your business, add your current degree of exploitation of these opportunities

- Customers
- Suppliers
- Competitors
- Researchers

Business Relationship	Description	Key benefits current?	Benefits possible?
BR 1			
BR 2			

- Memberships – active participation?

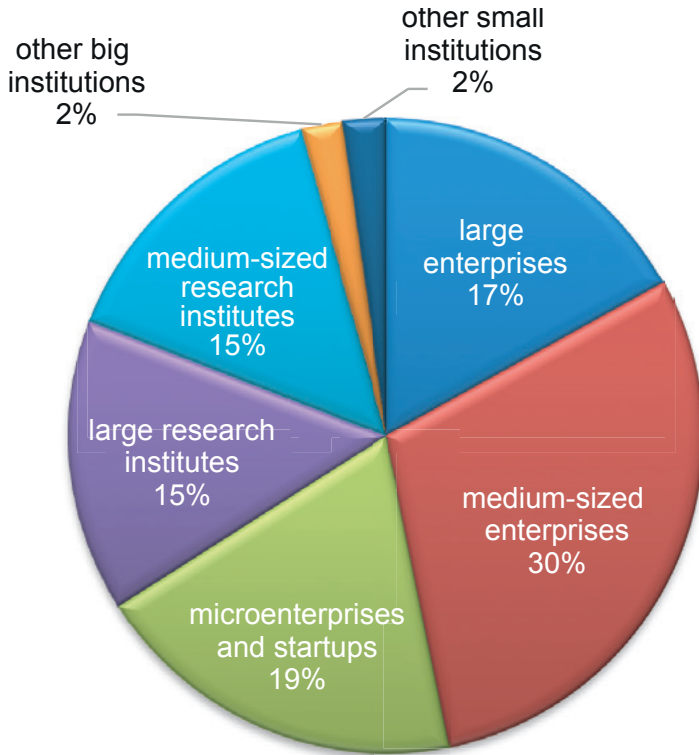
Experiences with open innovation tools?

Open Innovation Tools	Description	Rating (repeat, abandon)
OIT 1		
OIT 2		

Cost-Benefit Analysis

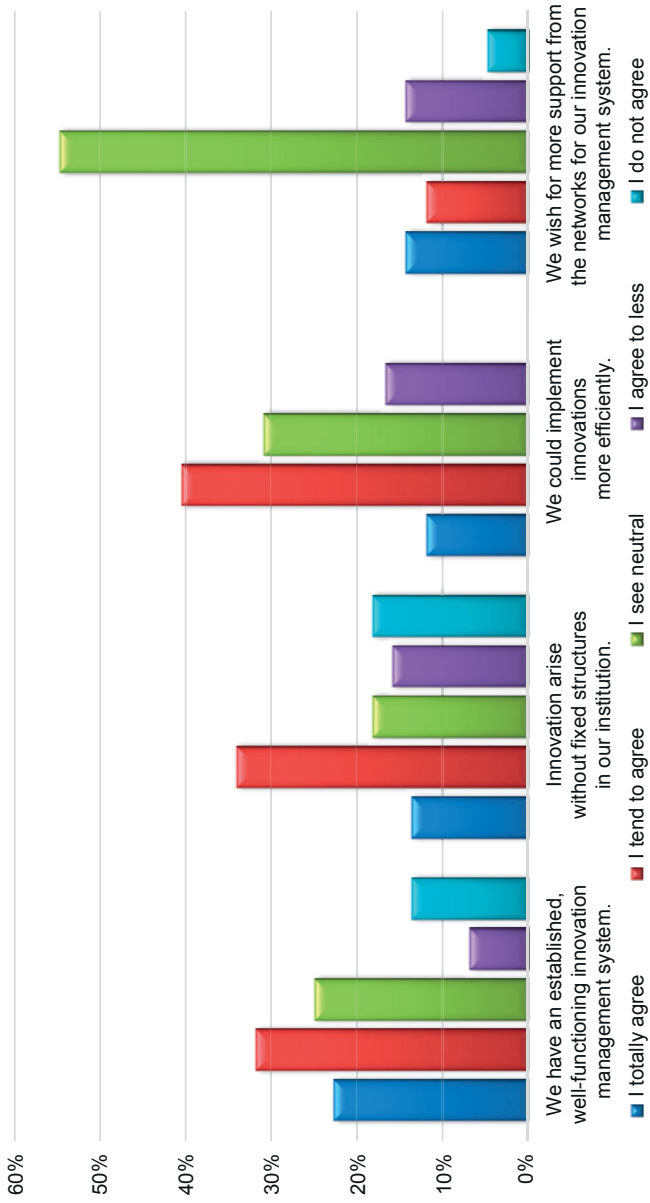
Open Innovation Tools	Description	Cost (est.)	Benefit(est.)
OIT 1			
OIT 2			

5.2 Survey Results

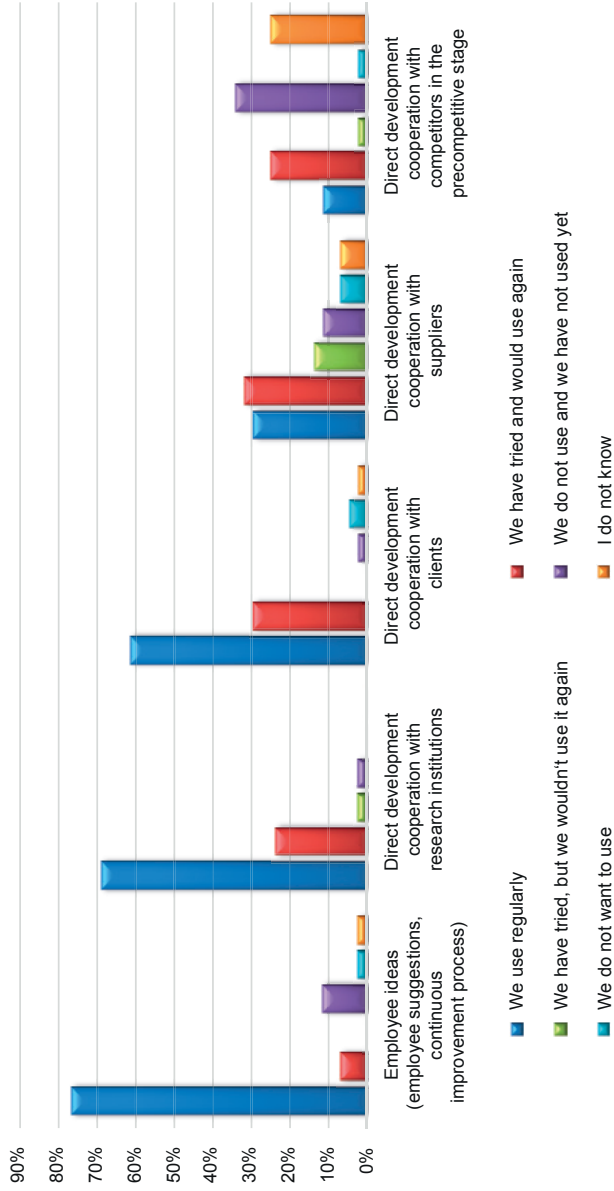


Structure of respondents

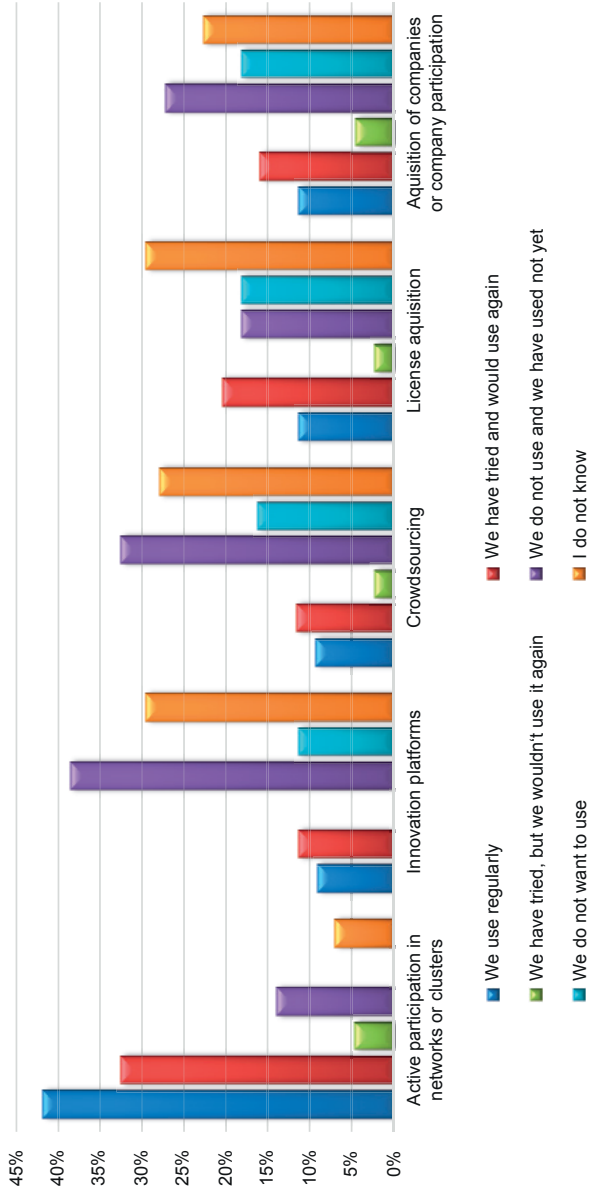
How does your company/institution organize innovation management



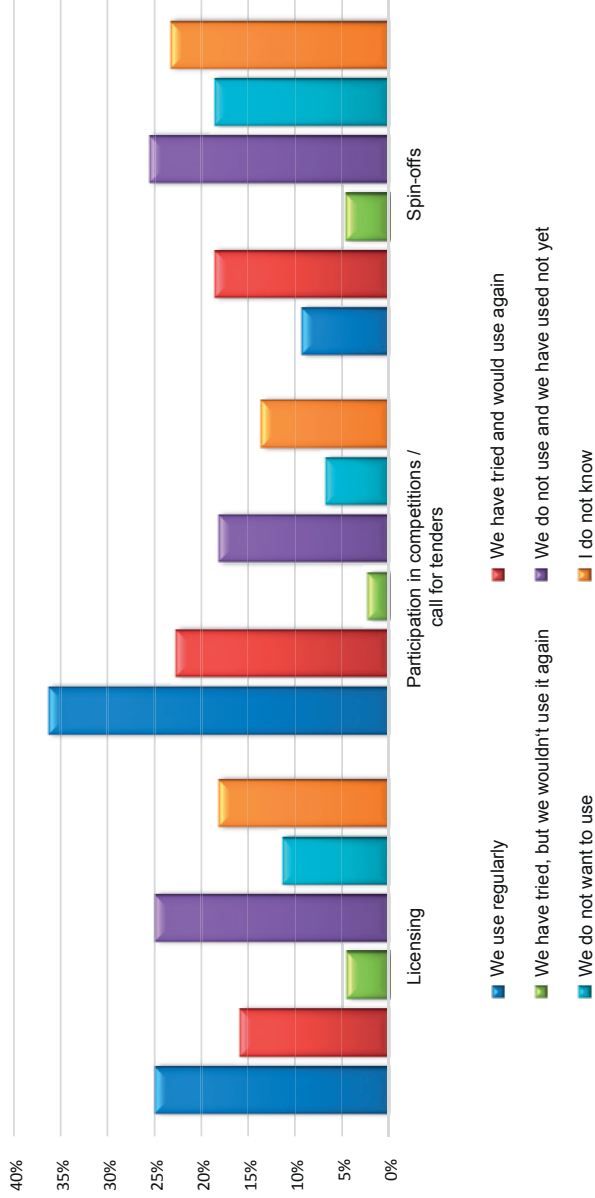
To what extent does your company/institution use instruments for external idea generation?



To what extent does your company/institution use instruments for external idea generation?



To what extent does your company/institution use instruments for external idea utilization?



5.3 Non-Disclosure Agreement

A non-disclosure agreement (NDA), confidentiality agreement (CA), secrecy agreement (SA), confidential disclosure agreement (CDA) or proprietary information agreement (PIA) is an agreement that codifies reticence about negotiations, negotiation results or confidential documents. The obliged party agrees to keep secret the information made available to them. Unlike the trade secret, which is enshrined in law, the confidentiality agreement implies contractual freedom.

Confidentiality agreements are often signed in the course of patent negotiations, usually in the process of licensing. Signing an NDA precedes drawing the license agreement, as this can only be done by disclosing partially sensitive data. Confidentiality agreements are also used in takeovers or companies mergers.

Typical contractual items:

- Contracting parties
- Definition, designation of the information to be kept secret
- What is not part of the secrecy agreement? (State of the art of patent documents/the obligor has already acquired knowledge from other sources.)
- Penalties
- Duration of confidentiality (if it differs from legal dealines)

(Source: Wikipedia) https://en.wikipedia.org/wiki/Non-disclosure_agreement

<Institution name> Non-Disclosure Agreement and Security Agreement for External Partners

The following agreements are hereby concluded between

<Client name>

and

<Contractor name>,

<Contractor address>, represented by

<...>,

within the framework of the cooperation between <> and <> with regard to the project <topic / project name>:

Non-Disclosure Agreement

In this agreement, the term „confidential information“ refers to:

- all oral or written information and materials that the contractor directly or indirectly receives from <Client name> for the completion of the project and that are labelled as confidential due to their subject matter or other circumstances
- the services commissioned and other work results.

The contractor undertakes to treat all confidential information of which he/she becomes aware as strictly confidential and to not use this information or disclose it to third parties without the prior written consent of the client.

The contractor will take all suitable precautions to ensure the confidentiality of the information provided. Confidential information shall only be disclosed to employees or other third parties who require the information for their work. The contractor will ensure that the individuals who use the information also sign this non-disclosure agreement.

The obligation to maintain absolute confidentiality will also continue to apply after the end of the cooperation. Any documents provided, including all copies of these documents and any procedure documentation and materials, must be returned on demand.

The contractor shall be fully liable for all damages incurred by <Client name> as a result of violation of these contractual obligations.

The non-disclosure agreement also applies to the legal successors of the parties. Any amendments or additions to this agreement must be made in writing.

This agreement is subject to German law. The place of jurisdiction is <...>.

Security Agreement #<optional>

In order to complete the project <...> and to the extent agreed for the project, the contractor will be given the opportunity to register in the <Client name> communications network. The contractor is only authorised to <...>.

In order to meet the requirements of data protection and information technology security, the contractor undertakes to observe the following security measures:

1. To only use the hardware and software approved or licensed by the client
2. To only use the communication links approved by the client
3. To only use hardware, software and information to complete the agreed tasks
4. To only use data media that have been checked for malware
5. To use secure passwords (alphanumeric passwords with a minimum length of eight characters). The client will be given a copy of these passwords in a closed envelope
6. To only exercise the rights assigned within the framework of the agreed service
7. To immediately report any security vulnerabilities identified to the client
8. To comply with all IT security regulations of which the contractor has been informed

Signature < Client name>

Name / Signature

Place / Date

Signature <Contractor name>

Name / Signature

Place / Date

Contractor employee:

Name / Signature

5.4 Sources and Further Reading

The innovation methodology is based on the “Guidelines: Open Innovation for SMEs and Micro-Enterprises in the Field of Optical Technologies”, which was created under the program “go-cluster” of the project “Open Innovation”, funded by the Federal Ministry for Economic Affairs and Energy. It was further developed in three innovation workshops and adapted to the European requirements.

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Photonics4All

Photonics4All is a European Outreach project, funded by the European Commission to promote photonics and light-based technologies to young people, entrepreneurs and the general public across the EU.

Providing an excellent consortium of eight photonics-related partners from eight different European countries (The Netherlands, Sweden, Austria, Slovakia, France, Italy, Germany, Great Britain) and coordination by Steinbeis-Europa-Zentrum enables a wide European approach.

A number of educational tools are being developed as part of the project: a Photonics app, a game and an animated video – all to explain photonics and promote its study and use.

Special events are also being provided for each target group: a business start-up challenge, innovation workshops, activities for children at schools and universities and public photonics events to make photonics more popular.

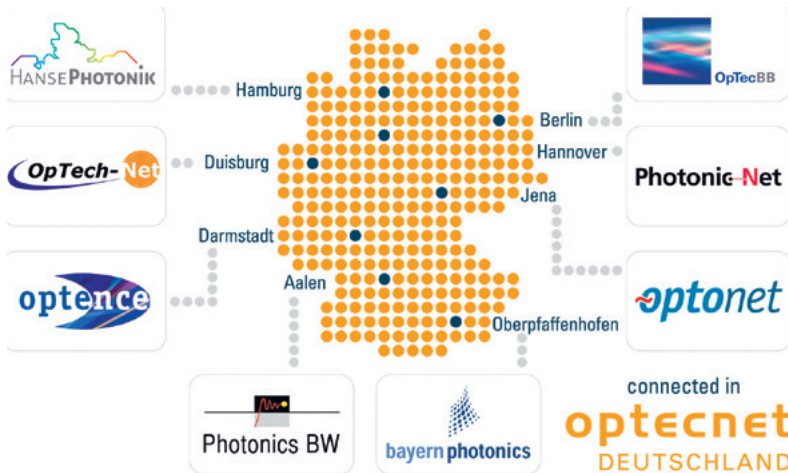
www.photonics4all.eu

OptecNet Deutschland e.V.

OptecNet Deutschland e.V. is an association of regional innovation networks for optical technologies in Germany. These networks combine business, science, education, consulting and finance to promote the key technology “photonics” in their regions. In the eight regional innovation networks there are currently around 500 closely interconnected companies and research institutions, covering with their skills the entire spectrum of „Optical Technologies Made in Germany“.

www.optecnet.de

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