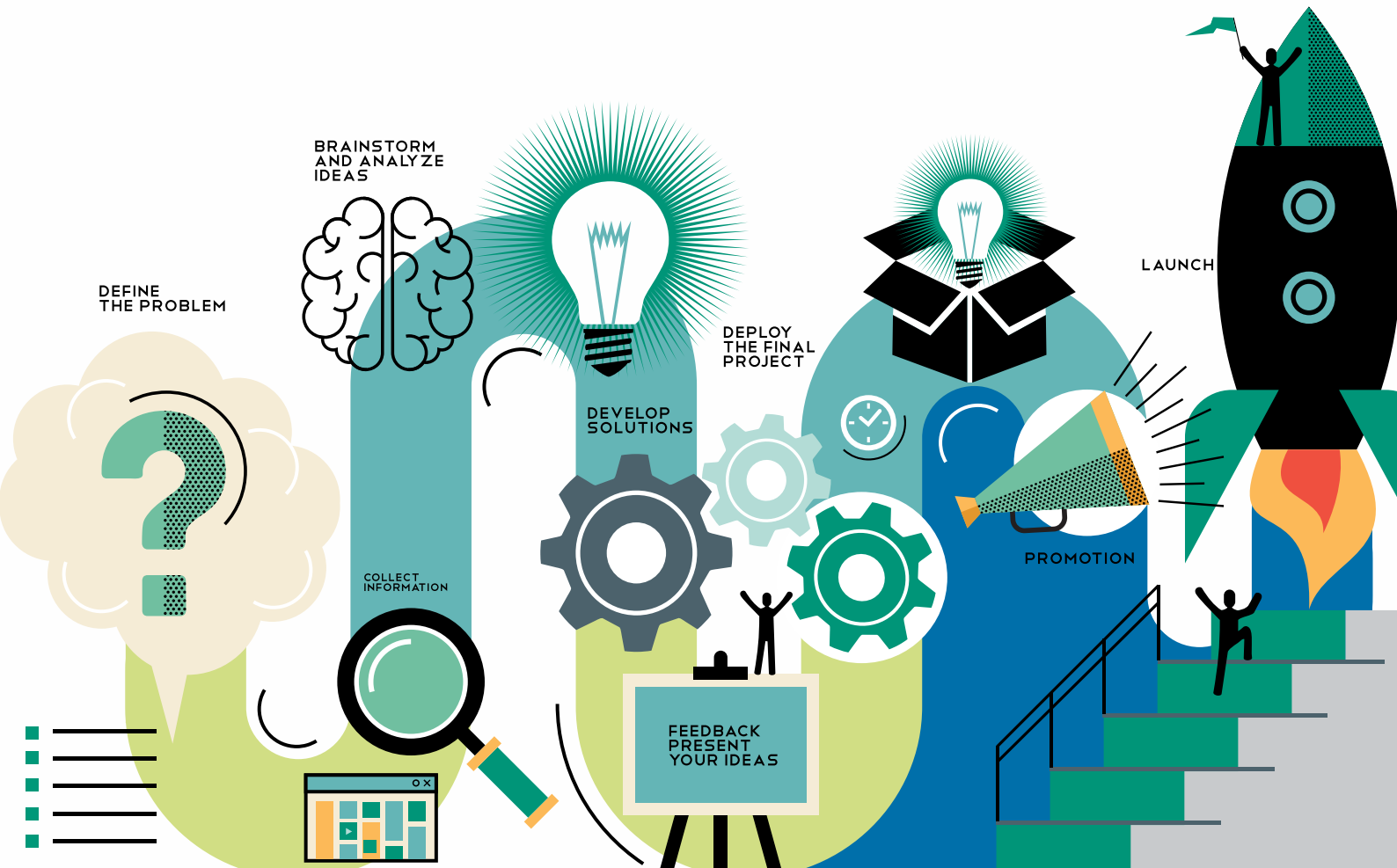


TRANSFER CONCEPTS FOR APPLIED RESEARCH PROJECTS

Market Discovery



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MARKET DISCOVERY

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1 INTRODUCTION

Beyond academic advances within scientific disciplines, in recent years an increased emphasis is being placed on the impact arising from research and the demonstrable contributions that research can make to society and the economy¹. **Knowledge and technology transfer**² – involving the creation and sharing of new scientific knowledge between universities, research institutions and industry – lays the foundation for groundbreaking innovations with high economic or social impact³. Such innovations come in the form of new products, services, processes, business models, firms and are crucial for the creation of new jobs as well as for the improvement of the quality of life and health. The realization of economic or social impact that can manifest throughout the innovation cycle and beyond, represents a crucial function of the research process. Achieving such impacts beyond science and technology necessitates a clear understanding of the context, applications as well as potential users and relevant stakeholders benefitting from scientific advances. In addition, a range of critical levers and decision points relating to the valorization of research results emerge from the onset of the innovation process and continue to shape the chances of success. Given the complex nature of these decisions, the prospects of economic and social impact can be enhanced by systematically planning and assessing the various pathways for transfer activities beginning from the early stages in the innovation process – starting from fundamental research. Such planning is an integral part of the development of **transfer concepts**.

Even in early stages of research projects, pivotal and often irreversible decisions relating to the valorization of research results need to be made. Such critical decisions relate to the choice of applications and transfer channels (e.g. publishing vs. patenting) for research results, among other things. Before choosing a specific path, it is critical to clearly understand their ramifications and the application scope as well as user needs in particular.

¹ European Commission (2013); Bundesregierung (2018); RCUK (2014)

² Hereafter, technology transfer or transfer activities

³ Innovation is understood here as the commercial (economic gain) or societal (social improvements) use of both technical and non-technical inventions that have been made available to users (product or service) or brought into use (process).

To this end, early engagement with potential users and relevant stakeholders (e.g. suppliers, regulatory authorities or public administration) is key to delivering envisaged benefits and impacts. As part of the development of transfer concepts, research project members may

- identify and actively engage with the potential users of the research results and other relevant stakeholders to gain a clear understanding of the user needs and the solution to be developed in the research project,
- assess whether the suggested solution matches the identified user needs and problem in order to enhance the chances of success.

This publication is designed as a practical "how-to" guide to support the development of effective transfer concepts building on modern innovation management and agile development frameworks. Besides giving an overview of central components that form the basis of transfer concepts, this guide introduces a selected set of tools and methods to discover and assess potential markets for research results (**Market Discovery**). This guidebook is structured as follows. Chapter 2 provides a brief overview of the innovation process. Chapter 3 introduces central components of transfer concepts and discusses some of the potentials and pitfalls. Chapter 4 contains a selection of methodologies and tools for Market Discovery.

2.1 INNOVATION AS AN ITERATIVE AND INTERACTIVE PROCESS

Innovations can be new products, services or new and significantly improved processes as well as novel business models. As such, innovations are based on new ideas or inventions (which may include patents) that have been made available to potential users and adopted in the economy. By definition, innovations can be based on a certain degree of novelty. On the other hand, market uptake turns an invention into a practical solution and is hence a prerequisite for innovation. In practice, innovations differ markedly with respect to their degree of novelty, risk and the time and resources needed for their development (see incremental and radical innovations).

In the traditional understanding of the innovation process, research & development (R&D) results were assumed to seamlessly spillover into practical applications in the economy. However, the translation of scientific discoveries into practical applications and the delivery of key societal and health-related solutions is actually much more complex and involves a range of activities depicted in Figure 1 that go well beyond pure R&D activities. In fact, a key success factor for transfer activities has been identified in performing further supplementary steps in the innovation process commencing shortly after the initiation of research. Among these activities are the engagement of relevant stakeholders including users and potential beneficiaries, the exploration of market opportunities as well as the early development and testing of prototypes. Rather than a linear process, innovation occurs in iterative steps and involves several feedback loops and active involvement of various stakeholders. This includes designers, engineers, users and other beneficiaries in the economy that may yield important insights for the applicability of the research being performed. The transfer of R&D results into practical applications and societal uses thus calls for an active planning and management of the innovation process.

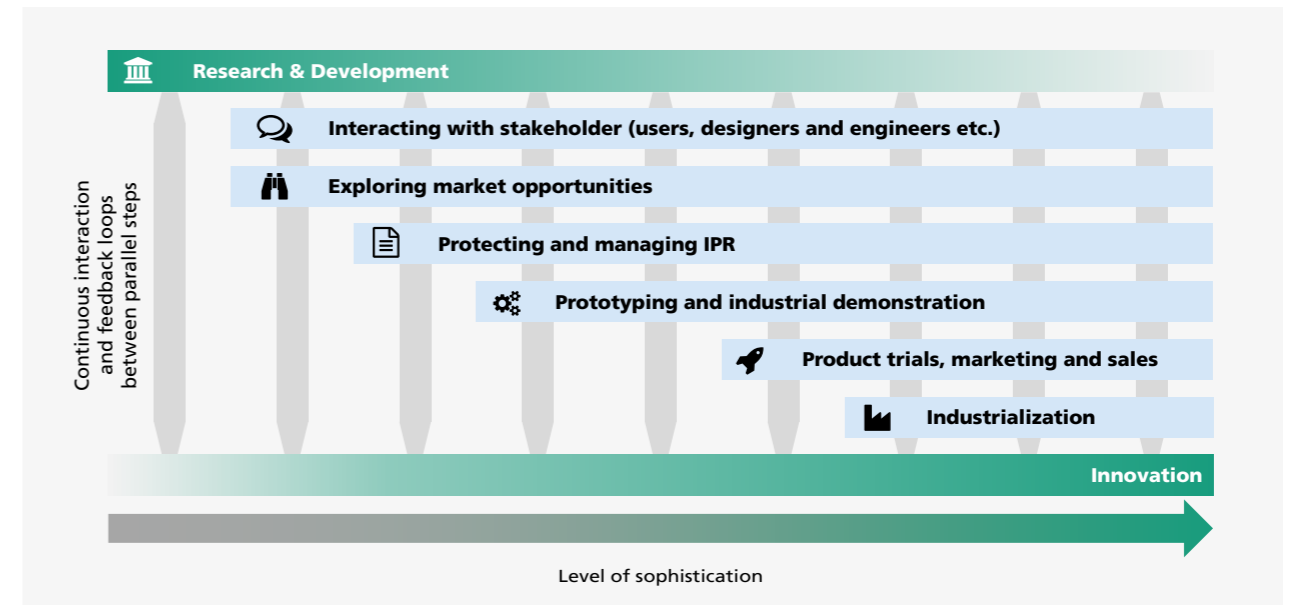


Figure 1: Innovation as Iterative Process

Source: Adapted from European Commission (2013)

DEFINITIONS

Innovation

Creation of (significantly) new and better value to users in the economy in the form of new products or services and / or new and enhanced processes (e.g. techniques of production). Simply put, innovation equals to an invention (e.g. a new idea, patent) times commercialization (creation of value in the marketplace). As a consequence, an idea or patent per se do not represent innovations. Market uptake is required for innovation to occur.

Innovation = Invention + commercialization

Incremental Innovation

Innovations that make a relatively minor change from existing practices (e.g. cost or feature improvements in existing products, services and processes). Such innovations involve a relatively low degree of novelty in the marketplace and are comparatively low-risk. Most innovations fall into this category.

Radical Innovation

Innovation that is very new and different from prior solutions (products and / or processes). Radical innovation often requires the extended exploration, e.g. of a new technology, while potentially yielding high-returns. While few innovations fall into this category, the ones that reach the marketplace may be transformative in scope and form the basis for new industries or the disruption of existing ones.

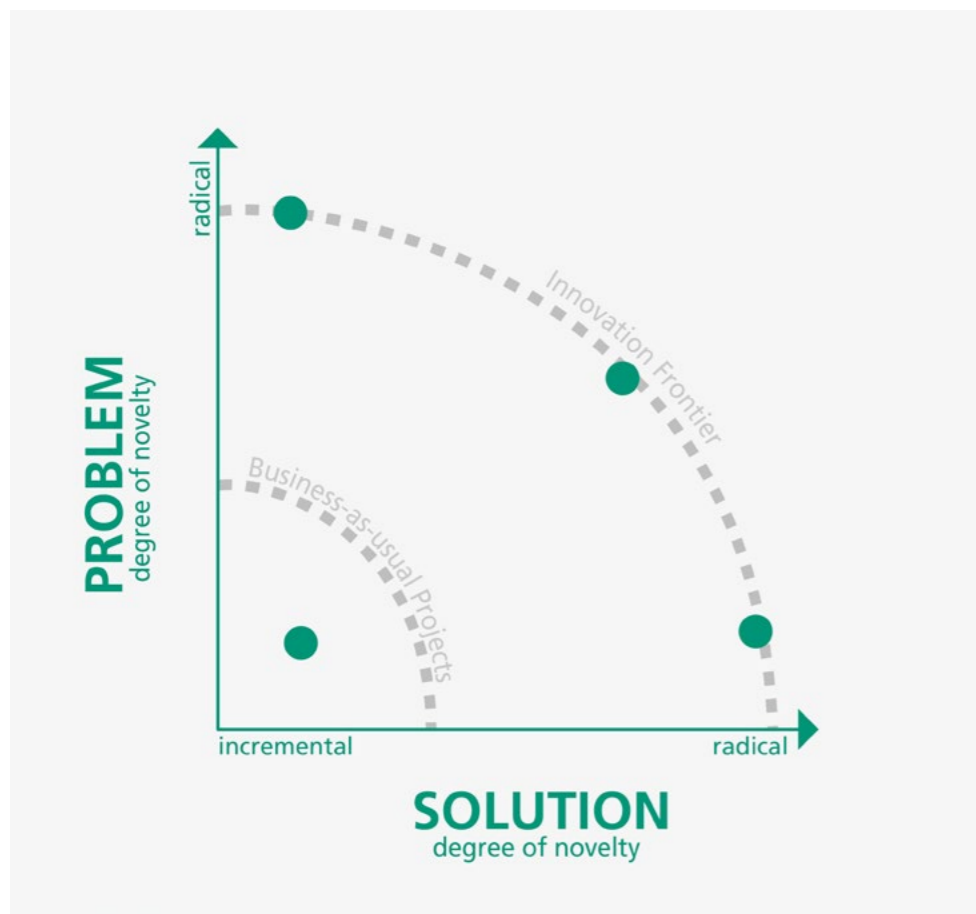


Figure 2: Problem/Solution-Matrix

Source: Adapted from Budden and Murray (2018)

Ideas represent the foundation for any innovation. As such, ideas set out assumptions relating to the match between a problem and a solution. Problems include any potential user's functional, symbolic or emotional need, whereas a solution represents a specific technical implementation, design or process. In general, the better the match between problem and solution, the more likely the idea is to have impact in the world. In the beginning of the innovation process, the match between both sides is often hypothetical or even imagined. There is often little empirical evidence supporting such conjectures at early stages of the innovation process. Indeed, organizations often approach innovation processes either from the problem-side or the solution-side. Research organizations, for instance, often commence the innovation process from the solution-side – which is also referred to as “technology-push”. While there is no tangible advantage relating to the starting point, it is important that throughout the innovation process, the match between both sides is achieved with high confidence (problem/solution-fit). From this perspective, the innovation process is about refining the precise nature of the problem as well as the solution, while constantly probing the quality of their match¹. Figure 2 overlays the spectrum from incremental to radical innovations with the discussed starting points for innovation (problem and solution). It illustrates that the greatest potential for impact at the innovation frontier is located at the intersection of radically new solutions and real-world problems. Such innovations incur the greatest risk and uncertainty, yet also involve the highest pay-offs and potential for impact. By contrast, business-as-usual projects involve less novelty on the problem-side and the solution-side mitigating the potential for impact.

¹ Budden, Murray, (2018)

2.2 DIFFUSION OF INNOVATION: A PRECONDITION FOR ACHIEVING IMPACT

In order for innovations to be impactful, they must be widely adopted in the economy. However, the **diffusion of innovation** is dependent upon user's attitudes, expectations and willingness to engage with new solutions and technologies as well as their perception of the advantages and costs associated with the respective innovations¹. New ideas, technologies and inventions must accommodate these characteristics if the aim is to achieve widespread adoption. How and at what rate new ideas and technologies spread across markets over time is explained by the diffusion models of innovation (Figure 3). Roger's Diffusion Model describes the adoption of innovations over time across five different adopter categories. Each adopter type is characterized by a certain psychographic profile and their unique responses to innovations (see Table 1).

As new ideas, technologies and products move through the adoption life cycle, the value that users expect of innovations changes accordingly. While in the early phase of adoption (including innovators, early adopters), adoption decisions are made on the basis of novel solutions and specific features, users in the mainstream market (early and late majority as well as laggards) will require fully-built products, services or processes. **Early adopters** are characterized by their willingness to engage with new solutions and technologies at early stages of the life cycle. They are visionaries and are willing to take a certain amount of risk regarding the adoption of new ideas and technologies. Often, they are also actively trying to solve the problem the innovation efforts are targeting and seek new solutions in their respective fields. They are considered as opinion leaders by other potential adopters. They may also be characterized as open-minded and find it easy to imagine, appreciate and understand the benefits of new technologies. Unlike innovators, they are not scientists or technologists active in the field. Finally, they are willing to base their adoption decision on their intuition and vision and do not rely on well-established references. By contrast, the early majority consists of pragmatists, who are willing to experiment with new solutions. For instance, many high-technology products display rather low compatibility and relatively high complexity making them difficult to operate and understand.

¹ Rogers (1962)

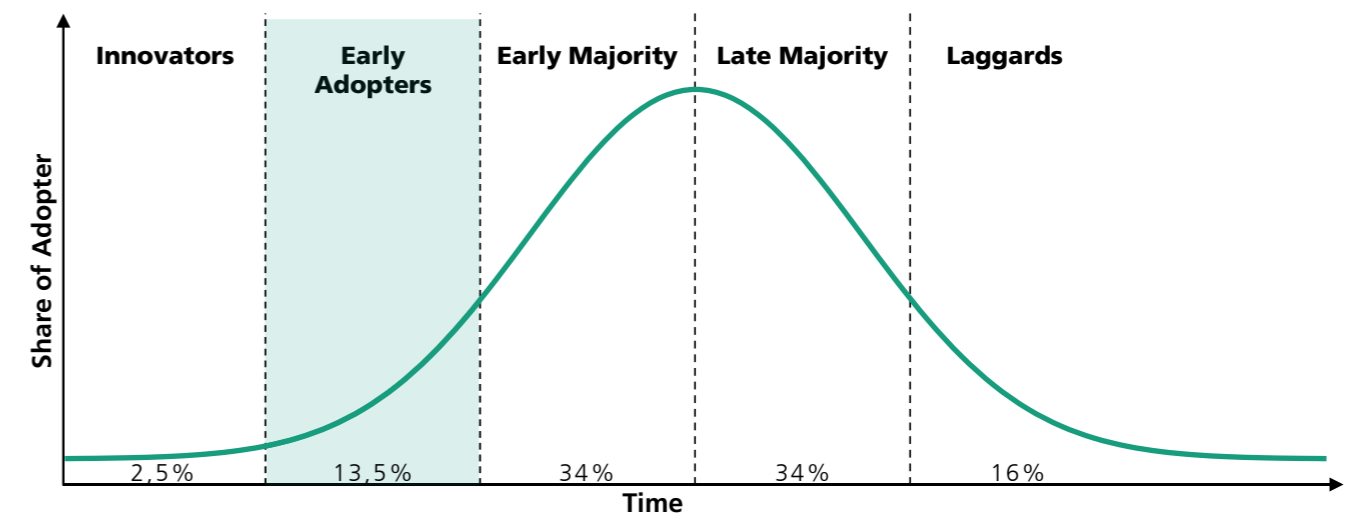


Figure 3: Roger's Diffusion Model

Source: Adapted from Schilling (2013)

DEFINITIONS

Diffusion of Innovation

The process of how innovations spread through a population of potential users.

Minimum Viable Product (MVP)

Is a concise summary of the smallest possible group of features that will work as a stand-alone prototype/product while still solving at least the 'core' problem and demonstrating a solution. Early adopters represent an important user group that may support the identification of the basic features of MVPs as well as their rigorous testing.

CATEGORY	DESCRIPTION
Innovators	<ul style="list-style-type: none"> Eager to try new solutions either technical or non-technical. Innovators have the ability to work with complex and often underdeveloped ideas.
Early Adopters	<ul style="list-style-type: none"> Represent visionaries that are more integrated with later potential adopters than innovators and have the greatest degree of opinion leadership. These users have the problem the innovation efforts are targeting and are actively seeking solutions to it. Early adopters provide later adopters with advice and information about innovations.
Early Majority	<ul style="list-style-type: none"> Pragmatists that adopt just ahead of the average population. Their adoption signals the phase of rapid diffusion through the population. They are often unaware of the existence of a specific problem targeted by an innovation. While having the problem the innovation efforts are targeting, they are not actively seeking new solutions to it.
Late Majority	<ul style="list-style-type: none"> Adopting innovations because of economic or social necessity and pressure from peers. Tend to be more conservative in their decision to adopt new ideas, technologies or solutions. Notwithstanding that members of the late majority have the problem the innovation efforts are targeting, they tend to be unaware of the fact or face challenges in implementing the innovation.
Laggards	<ul style="list-style-type: none"> Relatively isolated from the rest of the adopters with a focus on past experience and traditions. Most skeptical regarding the use of new ideas, technologies or practices and often unwilling to adopt a technology until it becomes a necessity.

Table 1: Five Categories of Adopters of an Innovation

Source: Byers, Dorf, Nelson (2015)

While appealing to early adopters, they require would-be users to learn how to employ new solutions. Even though they may be aware of the problem a given innovation is seeking to remedy, they are less likely to actively seek novel solutions. Users in the late majority as well as laggards are more conservative in their choices to engage with innovations and are often unaware of the problem the innovation is targeting. Laggards only adopt new technologies and solutions when it becomes a necessity.

In general, most users are not well prepared to foretell their future needs, which is why it is not sufficient to simply survey this group of adopters. It is often worthwhile to look further afield to adjacent industries, practitioners, experts and early adopters in particular. Early adopters are particularly important for the successful introduction of an innovation because of their willingness to experiment with new ideas, technologies or practices. They are crucial for enhancing and co-creating practical applications for ideas and technologies by:

- assessing the nature and scope of a problem (feedback),
- helping to identify the right features and functionalities of a solution under development (co-creation),
- testing whether early versions of a solution in the form of prototypes or **minimum viable products** serve to remedy the problem,
- spreading the word about the targeted innovation as opinion leaders.

KEY TAKEAWAYS

- Innovation occurs in iterative steps rather than a linear process and involves several feedback loops from various stakeholders including designers, engineers, users and other beneficiaries in the economy depending on the respective innovation. Starting from the beginning of the innovation cycle, performing key activities in parallel (including research, exploration of market opportunities, prototyping) enhances the chances of success.
- Engaging into a constant dialogue with early adopters beginning in early stages of the R&D process is crucial for understanding what value future innovations will need to provide. Therefore, an important first step in identifying and assessing the market potential for an invention can be facilitated by actively engaging with early adopters.

3.1 AN OVERVIEW

From the onset of the innovation process, important decisions pertaining to the valorization of R&D results must be made. Given the complex nature of these decisions, transfer activities should be carefully planned even in early stages of the innovation process¹. Such planning efforts form an integral part of the development of **transfer concepts**. This chapter will lay out the different building blocks that form part of such concepts. They typically involve five thematic fields grouping together 13 building blocks, all of which are captured in the **transfer canvas** (Figure 4):

- **Transfer Basis:** Starting with the R&D results that form the basis for future transfer activities, this thematic field sets out the overall objectives for valorization and the way in which impact will be achieved. Moreover, it defines the transfer channels and actions related to the use of the intellectual property associated with the innovation.
- **Applications:** Overview of potential applications of the R&D results in different thematic areas (e.g. "mobility" or "energy") and defining the practical application addressed by the R&D project.
- **Inputs:** This thematic field addresses the resources and inputs required for the realization of the practical solution. In addition, it sets out whether the required resources and competencies are available within the project team or whether and which partners and stakeholders may be needed to realize the innovation.
- **Value Proposition:** The value proposition sets out the specific problem the innovation is targeting, its users and benefits as well as the solution itself. This includes the specification of the unique value the innovation will be providing to its users.
- **Competition:** Finally, outlining alternatives and the competitive situation in relevant sectors of the economy for the application will be important to evaluate potential threats to the successful valorization of R&D results.

¹ European Commission (2013)

DEFINITIONS

Transfer Concept

A transfer concept constitutes a framework to systematically design and plan the process of the valorization of R&D results.

Lean Innovation Frameworks

Lean innovation frameworks are hypothesis-driven and empirically-based. Continued build-measure-learn cycles allow for the validation of key assumptions and the minimization of risk.

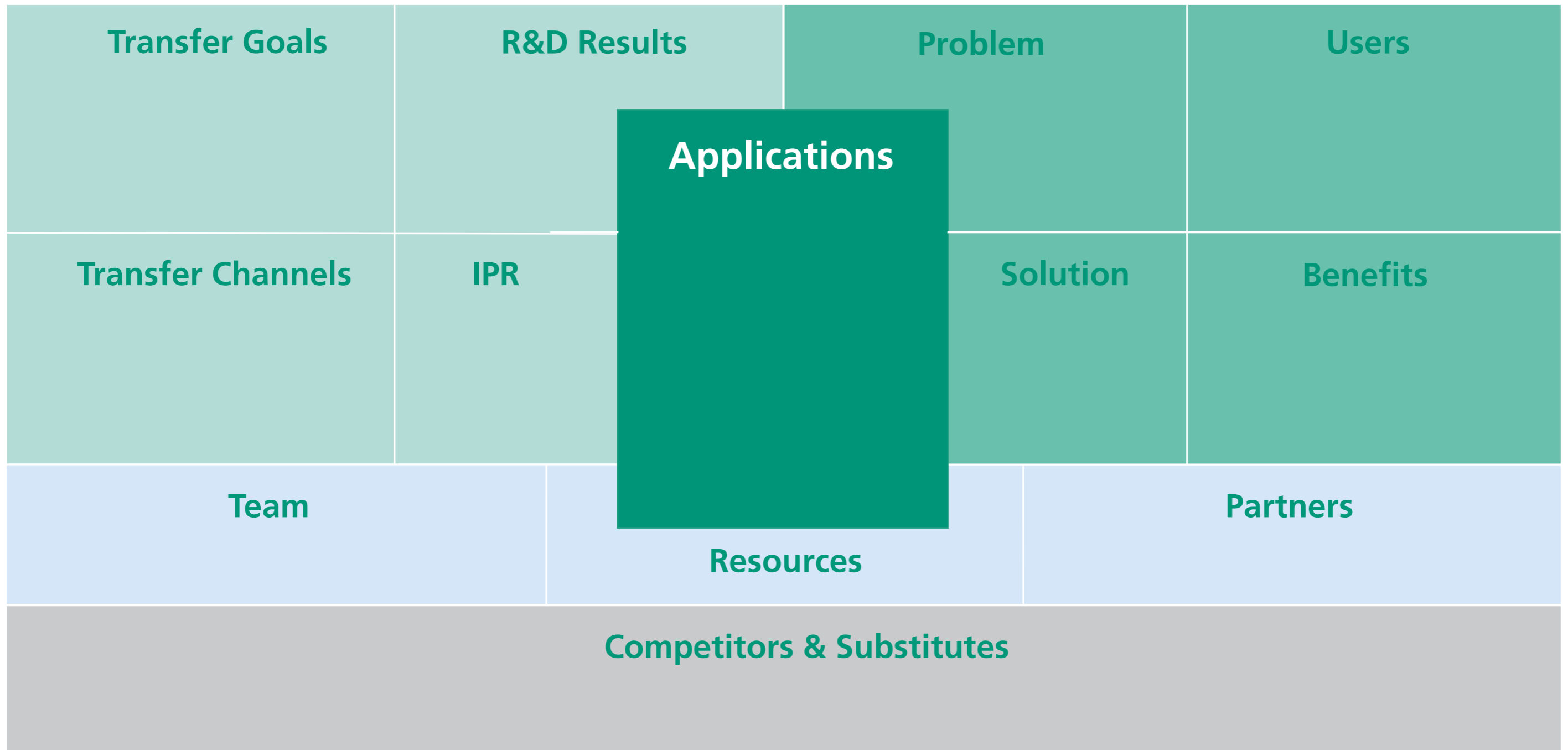


Figure 4: Transfer Canvas

Transfer Basis Value Proposition Input Competition

The current state of the planned valorization of R&D activities is captured in the transfer canvas containing all of the aforementioned building blocks. Rather than a static documentation, the contents of the transfer canvas may be regarded as hypotheses that require further empirical validation – a core component of **lean innovation**. For instance, at the beginning of the innovation process, knowledge relating to the problem and the benefits to be provided to users, tend to be limited. Throughout the innovation process, as more information is collected, more is learnt about the problem and possible solutions, which allows for validation of such initial hypotheses. These learnings may be incorporated into the R&D process improving the applicability and relevance of the R&D results for potential users. The development of transfer concepts may thus be regarded as a learning process offering guidance for research planning and project implementation. In the following, the individual building blocks will be introduced.

3.2 TRANSFER BASIS

An initial step in the development of transfer concepts involves the assessment of the **transfer basis** for further valorization as well as an outline of potential **impacts**. Despite significant scientific, societal or environmental advances, not all research results will have potential for commercial exploitation. Accordingly, as laid out in Figure 5, a basic decision involves whether to pursue commercial exploitation of R&D results or disseminating research results in channels typical to science (e.g. publications or lectures). Rather than scientific dissemination, here the focus will be on the commercial exploitation of R&D which includes prompt commercialization (in the form of new or significantly improved products, processes and services) as well as patenting / licensing, start-up creation and industry collaborations. Determining which basic route to pursue is specific to the R&D results, the nature of the research field itself as well as the sector of economy it will be applied to. Regardless of the valorization process, it is important to set out the overall transfer goals that will be pursued and the impact to be achieved (e.g. generating scientific, social or commercial impact). The unique combination of transfer goals, suitable channels and measures to manage the intellectual property define the basis on which to build the transfer concept. Below the different elements of the transfer basis will be addressed and the pitfalls and potentialities are shown in turn.

R&D RESULTS

Key Questions

- What are the expected R&D results of the research project?
- How do you rate the scientific and technical feasibility of achieving the R&D results?
- Do the results have potential for commercial exploitation?
- Which parts of the expected R&D results are suitable for commercial exploitation?

Not all results generated in research projects will be relevant or suitable for commercial exploitation. From a practical viewpoint, the identification of the most promising R&D results represents an important starting point in exploring the intended impact and development of a transfer concept. Project members should assess the results jointly to identify those results with transfer relevance and to determine which of the results matches their interests and strategy. Usually the outcomes of R&D projects can be classified in one or several result categories such as knowledge (e.g. theories, models, methods etc.), technology (e.g. technical prototypes, demonstrators etc.), data (e.g. generated by measurements, experiments and surveys), services (e.g. consulting, capacity building, instructions, and manuals) as well as stand-alone products. Irrespective of the nature of R&D projects, the results may have broad potential for practical applications in a wide range of application fields.

TRANSFER GOALS AND IMPACTS

Key Questions

- What is the specific impact each involved organization is expecting?
- Are the interests of the involved organizations aligned?
- What are the overall goals and objectives for the valorization of R&D results?
- What targets, if any, are there for the delivery of the transfer goals and impact?

Having identified R&D results that are relevant for commercial exploitation, transfer concepts should clearly define goals for the valorization of R&D results as well as the specific impacts to be created by the R&D results. An important step for the alignment of interests involves agreeing on a common purpose for the valorization of R&D results amongst all project members. To that end, an ideal outcome should be defined by all members of the team or project with an emphasis on identifying outcomes in which all interests are aligned. Beyond the alignment of the interests among project members, transfer concepts should clearly define how the research being performed benefits society or the economy. In other words, the expected **impact** the project is aimed at achieving should be expressed succinctly and explored throughout the lifecycle of the project. The realization of the full potential for impacts requires a meaningful discourse with relevant stakeholders as well as connecting to the "outside world". The practice of technology transfer is an interactive, reciprocal process involving manifold feedback loops between science and application sectors (including businesses or politics).

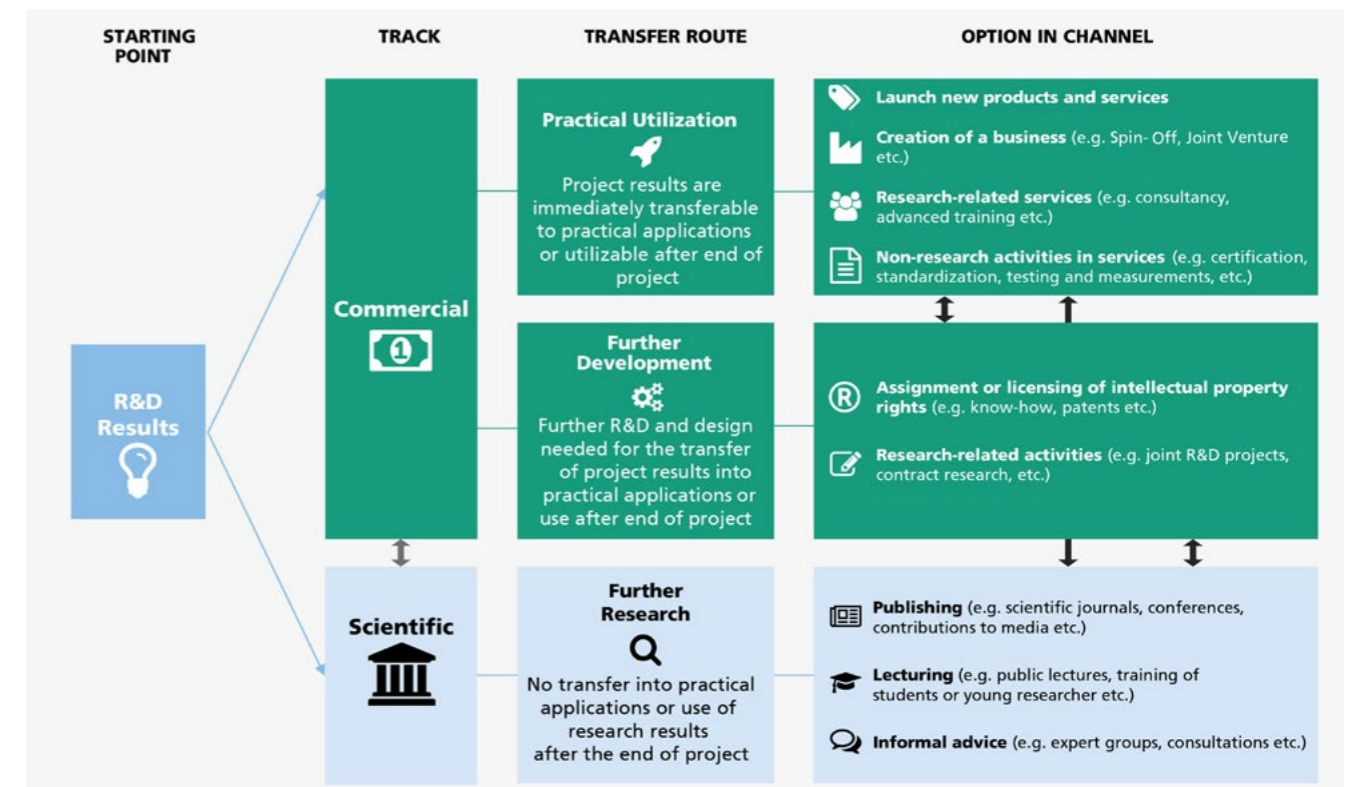


Figure 5: Transfer Routes for leveraging R&D Project Results

DEFINITIONS

Transfer-relevant R&D Results

Expected or achieved R&D results from a specific project with commercial, social or ecological impact that may be exploited as stand-alone products, services or processes or require further development for commercialization.

Impact

Demonstrable contributions that research makes to society and the economy through the creation of new knowledge and innovation, generation of new jobs and firms or enhancing the quality of life and health.

R&D RESULT	DESCRIPTION	EXAMPLES
Knowledge	Generalized knowledge explaining specific phenomena, causes, effects and potential solutions	Theories, models, methods and processes
Technology	Technical objects to solve specific technical or social problems	Prototypes, devices, units and apparatuses, software
Data	Evidence that serve as a source for future insights or solutions	Measurements, experiments or surveys, databases
Service	Practical support to solve specific technical and social problems	Instructions, expert reports, consulting, trainings
Products	Stand-alone products that are ready for commercialization	

Table 2: Categorization of R&D results

Source: Adapted from Thimm (2017), Klessova (2015)

It necessitates a meaningful exchange of perspectives among those stakeholders. In addition to the exchange with the scientific community, researchers should actively engage and communicate with potential users and relevant stakeholders.

While the specific value to be created for potential users and other stakeholders will be set out under the thematic field "Value Proposition", it is important to define – on a high level – what the foreseeable impacts will be and what broad group of users and stakeholders will be targeted. Impact involves the demonstrable contributions that research makes to society and the economy through the creation of new knowledge, technologies and practical applications, the generation of new jobs and firms or enhancing the quality of life and health. Defining impacts helps to communicate how research will make a difference to society or the economy and who the beneficiaries will be. Finally, defining realistic targets for the realization of impacts and transfer goals will allow for an objective assessment of success and will enhance accountability.

TRANSFER CHANNELS

Key Questions

- What channels are available for the commercialization of R&D results?
- What potentials and drawbacks are associated with these channels?
- What is the most feasible channel considering the aim and scope of the R&D project?

A range of channels are available for the transfer and commercialization of R&D results. Among these channels, there are significant differences with respect to the requirements for implementation as well as risk and reward. Choosing the "right" channel that is aligned with the organization's strategy, capabilities and risk preference of the involved organization is essential. In the following, a brief overview of the available transfer channels will be provided and several factors that should be carefully considered will be outlined.

The commercial exploitation of R&D results may occur through transfer channels that can be subsumed under either **practical utilization** or **further development**. The former involves potential outcomes in mature projects in which final results are directly transferable into practical applications (Table 3). Outcomes include a product or service, a business, marketable research-related services or non-research activities as the table below shows. While theoretically possible, only a few publicly funded R&D projects are immediately ready for commercialization directly after the conclusion of an R&D project.

Practical utilization of project results

TRANSFER CHANNEL	DESCRIPTION	ADVANTAGE	DRAWBACKS
Product or service launch	Launching a new innovative product or service in the market which is based on previous R&D results.	Direct (potential) recuperation of R&D expenditures.	Not applicable to publicly funded research organizations and universities. May require upscaling from laboratory to large scale production, marketing and sales
Creation of new business	Creation of a private company (e.g. Spin-Off or Start-Up) that aims to exploit the R&D results. Often research organizations transfer IP to the firm as a direct sale, license, royalty or a combination thereof.	Commercial transformation of (academic) R&D results into a private entity with potentially high financial returns.	Researchers become entrepreneurs involving higher personal financial risk and need for a new skill set (management, financials, legal, sales, marketing). New ventures have high failure rates and often take years to become successful.
Research-related services	Activities that target transfer and are based on (tacit) knowledge that cannot easily be protected by formal methods such as patents.	(Additional) revenue stream for academic institutions and businesses.	Protection of relevant intellectual property (IP) is difficult.
Non-research services	Transformation of knowledge into a standardized service.	(Additional) revenue stream, increases reputation and prestige	High competition from specialized organizations, standardization associated with relatively high costs with uncertain and/or unknown revenue streams.

Table 3: Transfer Channel "Practical Utilization": Advantages and Drawbacks

Further development of project results

TRANSFER CHANNEL	DESCRIPTION	ADVANTAGE	DRAWBACKS
Sale of IPR	Transfer of all intellectual property rights (IPR) connected to the R&D results to the buyer.	Significantly less risk than other transfer channels. Receive all revenue at once. No further maintenance necessary.	Seller may lose all rights to the invention including the right to further use the IP for the seller's own research; possible returns are lower compared to other transfer channels. This channel may require previously granted IPR such as patents, trademarks, trade secrets etc.
Licensing of IPR	Permission granted to another party to use IPR under agreed terms and conditions (e.g. timeframe, royalties), exclusivity or non-exclusivity, fall-back option when success thresholds are not reached.	Ownership remains with the licensor. Flow of royalties for the use over an agreed period. Leverages the expertise, resources and market know-how of companies already active in the field.	Costs incurred for the maintenance of IPR (e.g. patent application and maintenance fees) and legal protection. Commercializing licenses requires a sound knowledge of the marketplace and most academic patents do not seem attractive to companies.
Industry-funded R&D	Establishing an R&D cooperation with industry for the further development of IP (often involving a licensing or sale of IP).	Enables researchers to focus on core competency (R&D); involves relatively low risk; returns generated by sale or license fee and / or R&D service fees.	Requires a strong service-orientation among research institutions and meeting requirements of industrial product development (e.g. scheduling, certification).
Publicly funded R&D	Setting up or expanding existing research activities that follow-up on present R&D results	Further development of existing technology or concept.	No direct and prompt revenue generation.

Table 4: Transfer Channel "Development": Advantages and Drawbacks

Further Development on the other hand, refers to transfer channels applicable for R&D results in earlier stages of the innovation process that require further actions for the commercialization of marketable products, services or technologies. Table 4 provides a basic overview of the advantages and drawbacks to be considered.

While licensees – often companies – are first and foremost responsible for the commercial success and marketing of the innovation for transfer channels such as the sale or licensing of **Intellectual Property Rights (IPR)**, licensors – often research organizations and universities – should still have a detailed understanding of the relevant industry and markets. This market knowledge is important to adequately assess the value of the invention in the market for the sale of IPR to potential licensors on the one hand. On the other hand, such market knowledge is a precondition for the development of new techniques and technologies and knowledge-based services that provide solutions to existing user problems.

As shown in Figure 5, R&D results may be transferred on the basis of scientific channels. These transfer channels represent obvious options for academic researchers, which is why they will not be discussed at length. However, those options may also appeal to companies, policymaker, associations and other relevant stakeholders.

IPR

Key Questions

- Which organization in the project brought IP into the collaboration (background IP)?
- Which organizations within the project contributed to the generation of the R&D results?
- What actions are planned to protect the R&D results?
- In terms of IPR, what steps are necessary to prepare for the use of the selected transfer channel (patent application, sale of IP, etc.)?

R&D projects may result in a broad range of new knowledge (e.g. methods, techniques, data) with potential economic value. Assigning intellectual property rights turns such knowledge into assets. Applying a property right for project results (intangible or tangible) allows for the transfer of research results e.g. to companies as well as enforcing property rights. However, commercializing intellectual property requires a sound understanding of the marketplace and most academic patents, for instance, do not seem attractive to companies. It is thus worthwhile to consider the set of new knowledge components being created in a project as a portfolio of potential assets with dissimilar value. Even if

project results will not be exploited commercially, it is useful to consider IPR protection to prevent research results being used in an inappropriate way or allow other actors to further valorize that intellectual property and develop marketable products or services.

Indicating which partners contributed to the generation of IPR as well as setting out rights and obligations of the R&D results within the project (e.g. ownership of IPR) marks a crucial step in the development of a transfer concept. In doing so, it is important to distinguish major sources of intellectual assets: Background IP and foreground IP. Background IP includes know-how, patents, copyrights, trademarks and in some jurisdictions trade secrets developed in prior R&D projects. The foreground IP comprises all R&D results which are generated within the project – whether or not protectable.

DEFINITIONS

Intellectual Property Rights (IPR)

The World Trade Organization defines intellectual property rights as the rights given to persons and organizations over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time.

Trademark

Protects graphically representable means of identification, must be distinguishable and non-descriptive. Protection is granted indefinitely if mark continues to be distinctive.

Copyright

Protects literary and artistic works as well as computer programs often for the lifetime of the creator. It requires originality.

Patents

Protect technical functions and require patentable subject matter, novelty, inventive step, industrial applicability. Granted for normally up to 20 years. During this time the IP is the sole property of the owner preventing others from using, selling or importing the technology claimed in the patent.

Design

Protects form/appearance of a product for up to 25 years. Requirements are novelty and individual character.

Trade Secret

Protects unique processes, formulas, patterns or devices. Maintaining secrecy with regards to the specifications is required.

Further scientific research

TRANSFER CHANNEL	DESCRIPTION	ADVANTAGE	DRAWBACKS
Publishing	Publication of R&D results in the form of books, articles and research papers etc. as an input for further research activities. In addition, communicating project results outside the scientific community, e.g. contributions to media.	Increasing reputation and awareness in the scientific community and non-scientific community.	No direct revenue generation. May interfere with and preclude patent application process.
Lecturing	Dissemination of R&D results in a formal presentation.	Increasing reputation and awareness in scientific and non-scientific community.	No direct revenue generation.
(Informal) advice	Informal conversation on R&D results without formal contracts or legally binding agreements.	Fast and effortless exchange on a particular subject.	No direct revenue generation. Going into detail without confidentiality agreement might not be sufficient.

Table 5: Transfer Channel "Research": Advantages and Drawbacks

3.3 APPLICATIONS

APPLICATIONS

Key Questions

- What are potential application fields for the key results of your collaborative R&D project?
- What are potential applications within each application field?
- Which application field(s) and potential application(s) will be selected for the development of the transfer concept?

Research results often yield a range of potential practical uses that may fall into different thematic areas, referred to as **application fields**. Such application fields are often broadly defined (e.g. "mobility" or "energy") setting out areas in which future products, services or new processes may be devised on a high level of aggregation. For the further development of the transfer concept, it is important to focus on one or two application fields that will be explored in more detail. Indeed, gaining a better understanding of the potential applications as well as the prospective value and benefits the innovation is likely to generate, is a key component of the remaining steps that underpin the development of transfer concepts. A potential result from those steps may be that the application field needs to be refined or even potentially discarded. While there is an extended range of tools and literature available to gauge the potential of application fields of new ideas, technologies and practices, here a focus will be on empirical and hypothesis-based approaches that guide the exploration of an application's market potential.

DEFINITIONS

Application Fields

Thematically defined areas or fields in which products, services and processes will be developed in the future and the project results make specific contributions to their realization.

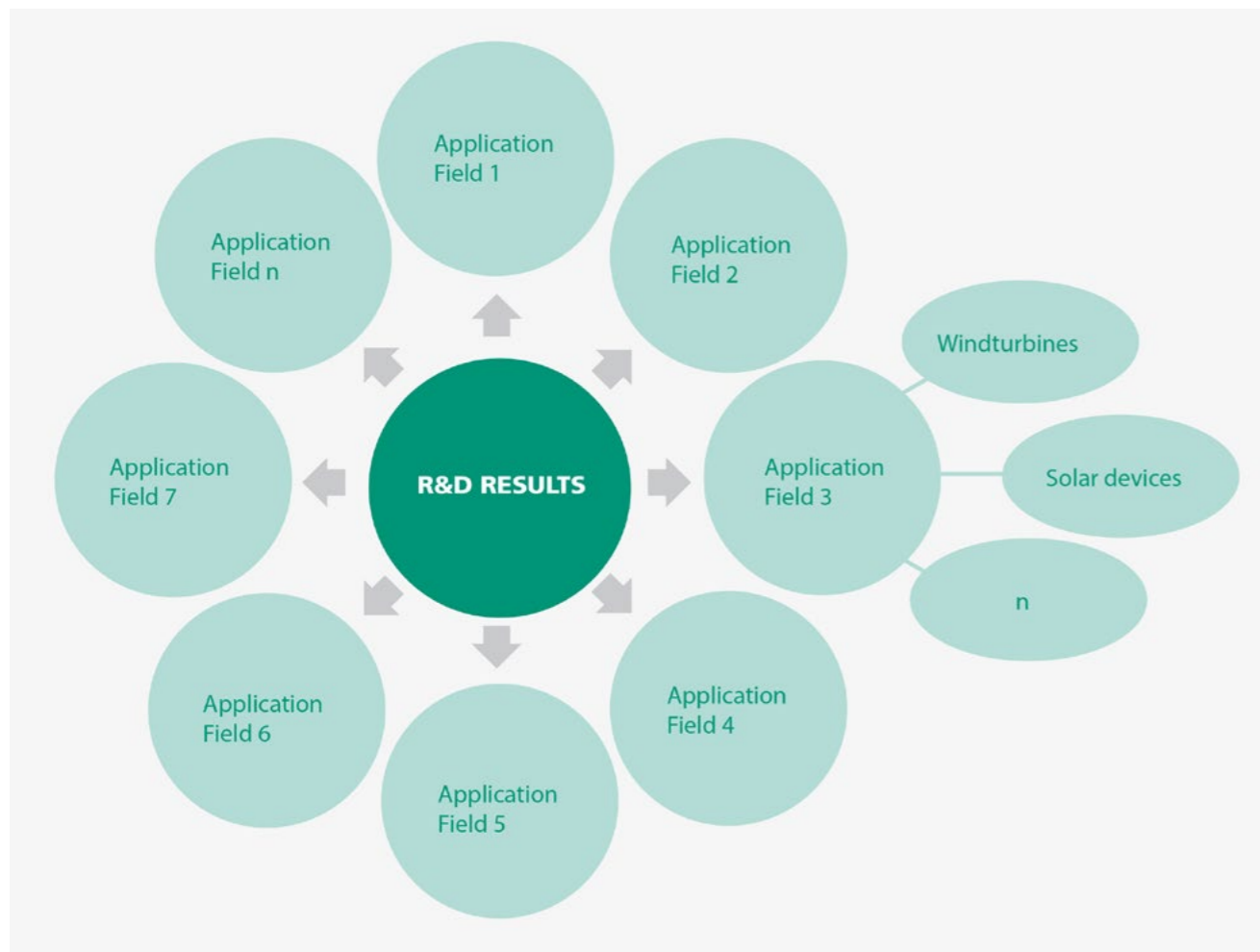


Figure 6: Application Fields and Practical Applications

3.4 VALUE PROPOSITION

The further specification of practical applications, including specific requirements, unknowns and marketplace hypotheses an R&D project may address, requires the development and testing of a value proposition. A value proposition sets out the value and benefits an innovative offering (e.g. a new technology) provides to its prospective users. It elaborates 'why' users should choose to utilize the respective innovative offering over others and what the respective advantages are. A value proposition should define a unique benefit, build on verifiable user problems and define solutions that help to remedy those problems. To that end, effective value propositions clearly define the prospective users as well as the unique benefits that the innovative offering will generate. Value propositions should thus address four relevant building blocks including problem, user, solution and benefits. An innovative offering is well defined, when each of the following building blocks of the value proposition and the respective guiding questions can be answered with high confidence and as detailed as possible: Answers to these questions may be seen as hypotheses which should be tested against user feedback in the field rather than fixed targets. This involves 'connecting to the outside world' and discovering how users actually experience the problem and if and how much it matters to them¹.

PROBLEM

Key Questions

- What is the specific problem that users have?
- Why do users have this specific problem?
- Given this problem, is there an underserved need among users for alternate solutions?

Gaining a deeper understanding of the problem that users encounter is key to crafting a well-designed value proposition. Problems may include performance and usability gaps, health-related conditions as well as symbolic and emotional needs, among other

¹ Blank, Dorf (2012)

things. For the viability of practical applications, it is essential that the solutions under development as well as the benefits and functionalities they provide accommodate specific user problems.

A good starting point for the further specification of a practical application is to draft a short presentation that lays out a concise description of the envisaged problem. This short description of the problem may be used to guide interviews with prospective users and to elicit information from them.

USERS

Key Questions

- Who exactly is the user targeted by the innovation?
- Are there different types of users and user problems? If that is the case, what types are there? Which user segment is most attractive?
- Is this a problem affecting many users? What is the magnitude of the problem?

Devising a value proposition requires the specific definition of prospective users. On the basis of market segmentation as well as other tools laid out in Chapter 4, it should be assessed what types of users there are and the extent to which users report similar problems (for instance on the basis of user testimonials). In addition, throughout the innovation process it will be important to gauge the prevalence of the user problem and its context conditions to gain a more precise understanding of the market environment within which a new product or service must operate and the institutional environment required to realize the innovation opportunity.

BENEFITS

Key Questions

- What benefits, value or functionalities would serve to remedy a user problem?
- Are the bundle of benefits to be provided unique?
- What benefits are most relevant for the users?

Having laid out the specific users and the addressed problem, it should be clarified what benefits a solution should offer. More than the features and functions of an innovative

offering, benefits capture the advantages a user of an innovation gains. Value (see Figure 7) can be created in the form of higher-performance or a less expensive and convenient offering as well as in delivering a benefit in new or different, faster or cheaper way. Benefits may also have a specific social or emotional value, among other things. In order to compile or assess a list of prospective benefits, it is worthwhile to describe the solution through the user's eyes and to develop a **user story** as well as setting out the **Jobs-to-be-Done** of the solution. Such narratives explain what job a prospective solution should do from the perspective of users – rather than from a scientific or technical point of view. How will it solve a problem that users are keen on fixing? What exact benefit should be created (solving a mission-critical problem, delivering a compelling consumer benefit, addressing an unserved need)?

SOLUTION

Key Questions

- What features should the solution contain?
- What are the key features and functionalities the solution must deliver?
- How will the benefits and value be provided to the user?

The solution should set out how the application will enable the benefits laid out above (including the features and functionalities) as well as the components needed for its realization. At this stage, it is worthwhile to consider which features of the solution should be included in a first **prototype** or **minimum viable product**. While user feedback is crucial, it is often difficult to elicit feedback from users with regards to their specific problems and the benefits they would seek. Prototypes make ideas tangible and allow for more rigorous testing of a solution as well as for the collection of valuable feedback for the R&D process.

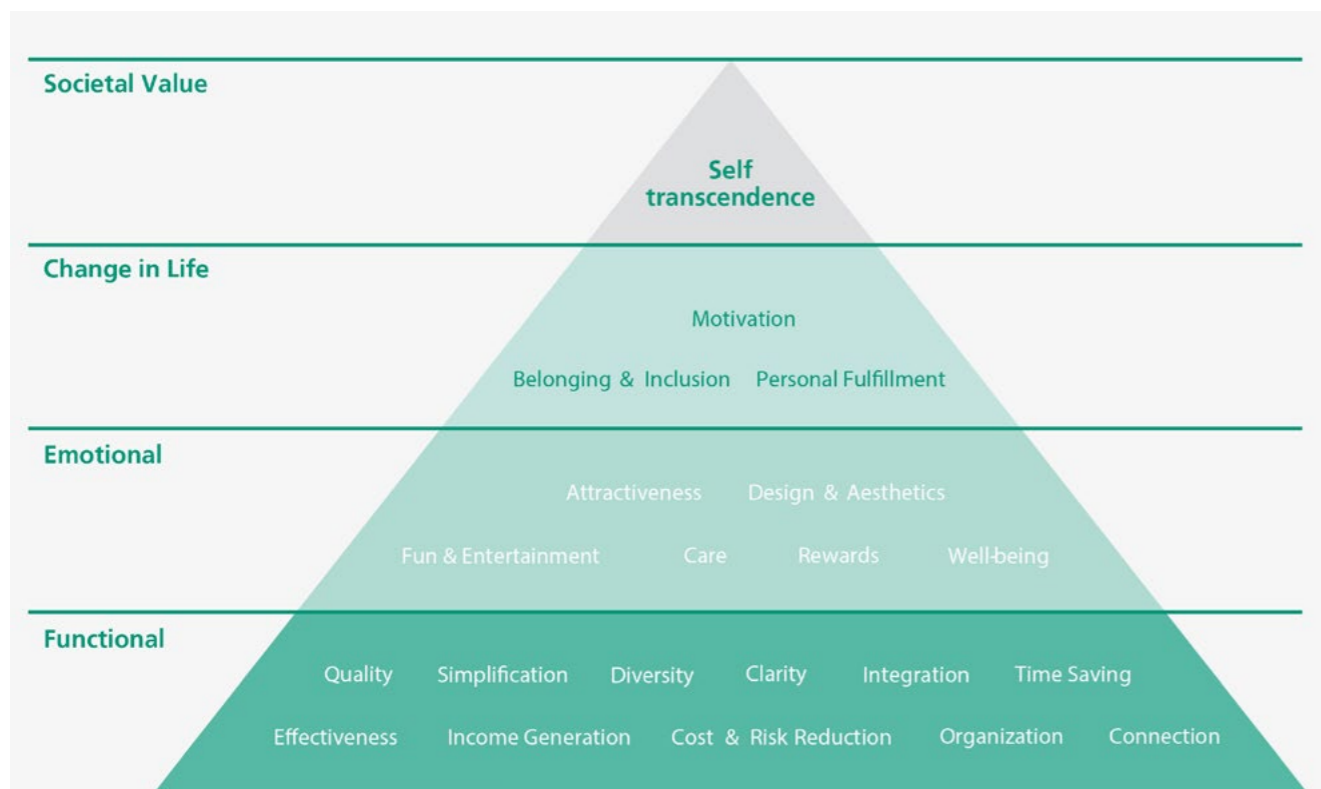


Figure 7: Values and Benefits

3.5 INPUTS

Having defined a practical application area and the value proposition, it is important to identify what **resources** and inputs are necessary to accomplish practical utilization or other types of commercial exploitation. This will be highly dependent upon the transfer goals as well as the chosen transfer channel (e.g. licensing vs. product innovations) and varies strongly across research fields and areas addressed in the economy – among many other factors.

RESOURCES

Key Questions

- Which resources, technologies and capabilities are needed to realize the solution?
- How much additional R&D is needed for exploitation (time and money)?
- What resources and competencies are missing?

A first step involves the assessment of which resources, technologies as well as R&D and market-related capabilities are needed to realize the purpose defined by the transfer goals. In addition to available resources, it is crucial to understand what further competencies are necessary to upscale, produce and ultimately launch the solution on the market.

TEAM

Key Questions

- Who can contribute resources, technologies and capabilities (technical and non-technical) needed for the realization of the solution?
- Why do project team members contribute to the further realization of the solution and what are potential limitations in the process?
- If there are any foreseeable gaps or limitations, what further steps would be necessary to close them?

After having laid out the resource requirements, it is important to assess whether all resources needed for the realization of the transfer goal can be accessed internally or whether there are any missing resources that cannot be obtained within the project team or the organizations involved in the R&D project. How can team or consortium members contribute to the further realization of the solution going forward? If there are any foreseeable gaps, what further steps would be necessary to close them? Depending on the state of development of the solution, this may relate to further funding programs, grants or private funding to bridge the identified gap. For experimental development and upscaling additional funding may be sourced from potential users, pilot customers or venture capitalists. Public funding programs may be applicable for collaborative R&D projects with small and medium-sized enterprises.

PARTNERS

Key Questions

- Which resources, technologies and capabilities, if any, need to be procured from partners external to the team / consortium to realize the solution?
- Who exactly are the partners and stakeholders needed to realize the solution?
- Why are those partners and relevant stakeholders interested in realizing the solution?
- Which resources, technologies and capabilities, if any, would those partners and relevant stakeholders contribute to the realization of the solution?

The realization of a specific transfer goal may require access to resources or technical and non-technical capabilities thus far unavailable in the team. Partners beyond the team may be important to close these resource gaps. This may include suppliers, distributors and firms with strong market positions in application fields relevant to the transfer goal, but also regulatory authorities and non-governmental organizations. Partners may contribute expertise, financial resources, managing skills as well as an existing user base.

DEFINITIONS

Resources

Resources are tangible or intangible goods that are used to carry out project tasks, to pursue project objectives and to cope with respective requirements in the process. Resources can be people, materials, equipment, facilities, IPR, funding or anything else to deliver the work.

3.6 COMPETITION

A further integral part of the development of a transfer concept is the careful assessment of competition. Rather than focusing on markets, it will be important to observe closely which organizations are offering or developing solutions to the user needs that your solution is targeting.

COMPETITION

Key Questions

- Are there solutions that create similar or superior benefits to the solution under development?
- Who are the key players in this market that create similar or superior benefits to the solution under development?
- Why are users engaged with existing solutions and – would they be reluctant to switch to new solutions?
- How is the solution under development likely to rank against these alternatives?

Monitoring potential competitors and their respective offering and positioning in the market allows for the identification of potential threats to the successful valorization of R&D results. Importantly, by observing competition it should become clear whether the envisaged value proposition in fact represents a unique offering compared to competitors and on what dimensions unique positions can be captured. Competitive analysis may be performed before or in parallel to formulating a value proposition to pinpoint relevant information. Alongside industry and market reports, trade fairs as well as practitioner conferences, information on potential competitors and market prospects can be gathered in face-to-face meetings with companies and organizations in adjacent markets, industry analysts or key influencers and visionaries. Publication and patent analyses serve to assess the state of the art in the scientific and technology environment, to identify potential competitors as well as partners. However, publication and patent analyses clearly do not provide sufficient information to assess the market prospects of the addressed solution.

4 | MARKET DISCOVERY TOOLS



TOOLBOX FOR MARKET DISCOVERY (SEE CHAPTER 4)

Value Proposition

A value proposition sets out the value and benefits an innovative offering provides to its prospective users in ways that differentiate it from alternate offerings in the targeted user segment.

User

A set of related customer needs or problems among a specified set of users. As such, markets are not tied to specific solutions. Applications are displaced from markets, when new solutions emerge that better capture market needs and serve to remedy user problems.



Personas



Market Segmentation



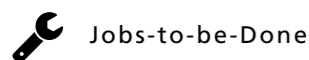
User Story

Benefits

More than the features and functions of an innovation or new product, benefits capture the advantages a user of an innovation gains.



User Story



Jobs-to-be-Done

Problem

Problems refer to simple functional needs (e.g. performance and usability gaps) among users as well as less transparent symbolic and emotional needs.



Personas



Market Discovery Interviews



Problem Presentations

Solution

Represent a specific implementation or design to address a user need.



Prototypes



MVPs

Competition

Monitoring potential competitors and their respective offering and positioning in the market, allows for the identification of potential threats to the successful valorization of R&D results.



User-Centric Assessment

4.1 AN OVERVIEW

The following chapter will layout several tools to pinpoint market signals to develop and assess core assumptions of the value proposition. Market Discovery Tools provide guidance for the compilation and evaluation of empirical feedback and data in areas relevant to the value proposition of the transfer concept. Market Discovery is completed when a problem/solution fit is found. A problem/solution fit is achieved when there is significant evidence that the solution under development solves an existing user problem. More specifically, it requires an alignment of a valuable user segment and an underserved need on the one hand with a value proposition on the other. In summary, Market Discovery Tools elicit information in core dimensions of the value proposition as well as the market segment under scrutiny.¹

An appropriate starting point for the search of problem/solution fit are early adopters. Honing in on their needs and expectations allows for the further development of initial ideas as well as testing of early hypotheses and solutions. These specific users may be regarded as a springboard from which expansion to adjacent user segments or other types of adopters can be planned (beachhead). While such diffusion and growth will require the development of more fully fledged market offerings along the way (e.g. marketing strategy, fully developed products) – which are not considered here – validating value propositions on the basis of Market Discovery will pave the way for such activities.

After the identification of the initial target user segment – i.e. early adopters – it is important to investigate their needs. An informative and cost-efficient way to gather such insights is by running **Market Discovery Interviews** in face-to-face meetings. Market Discovery Interviews represent the most basic step in gathering market insights (refer to 4.2) and allow for an initial completion of the **Market Discovery Template** laid out below. There are a range of further (optional) tools available that allow for more robust probing of the hypotheses developed as part of the transfer concept.

¹ Blank, Dorf (2012)

The Market Discovery Process

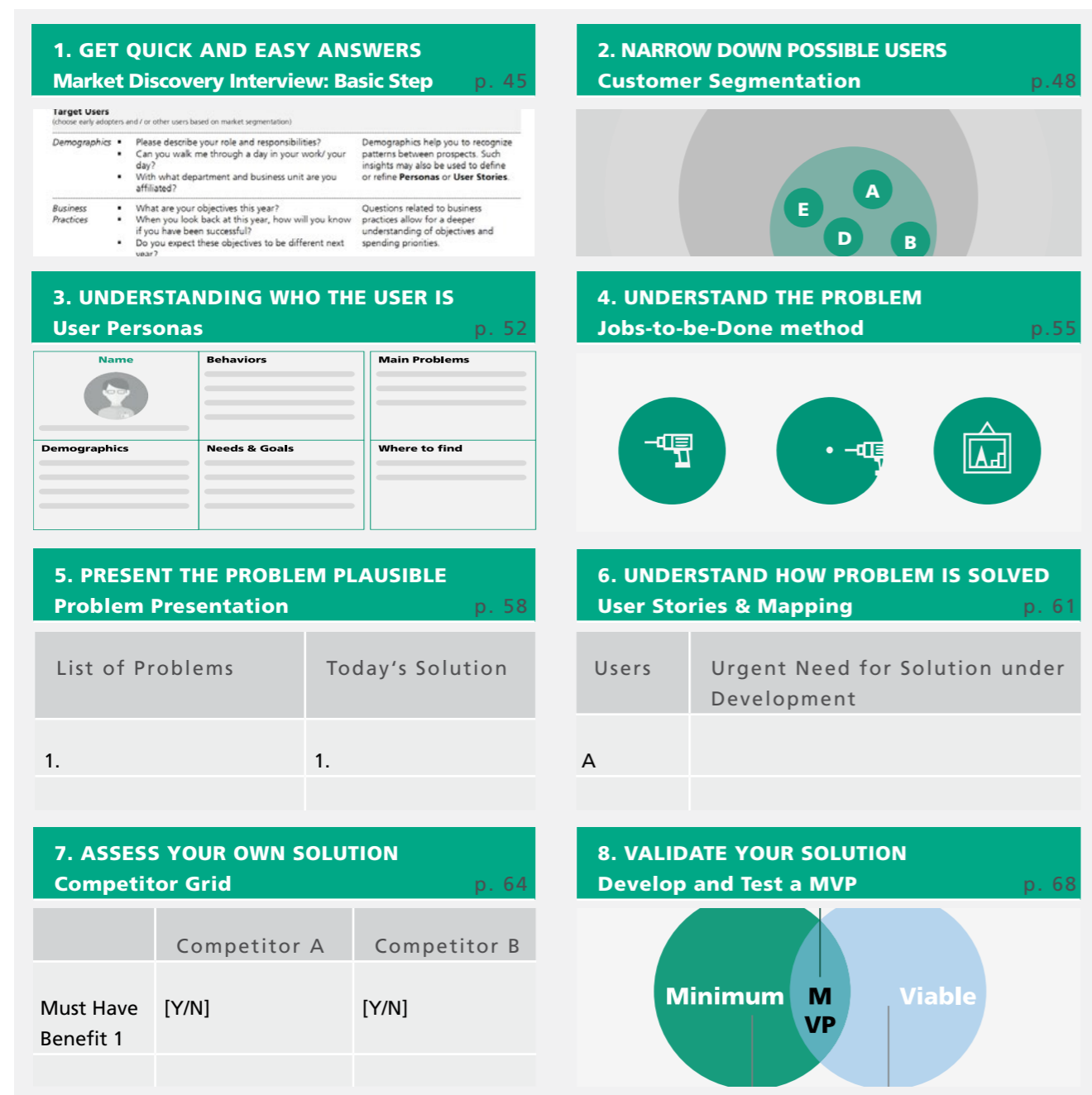


Figure 9: Overview of Market Discovery Tools

4.2 MARKET DISCOVERY INTERVIEWS:
BASIC STEPS

Market Discovery Interviews represent a simple, cost-efficient and informative way to elicit feedback for the development or assessment of a value proposition. Rather than trying to sell a solution, the purpose of Market Discovery Interviews is to reveal more about the problem context by listening carefully to users, who may give deeper insights into the benefits and functionalities that resonate with them. By focusing on ‘why’ specific problems arise for users, the core problem that users are trying to remedy can be harnessed. Alongside pinpointing those core problems, it is important to become familiar with the specific wording and language of users, because this may support building and emotional connection when designing the solution. In order to later assess feedback from early adopters, it is useful to adhere to a unified structure as well as asking similar questions¹. Below a sample interview questionnaire is provided that may be used for that purpose. When running interviews, try to circumvent polite validation by users. Attempt to create an atmosphere where honest feedback is desired. This works best when prospective users are given tangible mock-ups or prototypes of the solution addressed by the research project. Moreover, beyond the scientific-technical aspects that a solution may solve, it is important to focus on the underlying (user) problem. This involves honing in on the ‘why’ underpinning the problem as well as ‘how’ the problem should be solved from the perspective of its users. However, such prototypes do not represent a precondition for running Market Discovery Interviews.

How to use the Tool

Sample questions to compile feedback from early adopters in the fields relevant for the value proposition are listed below. While providing some guidance, clearly interviews questions must be adapted to the specific requirements of the respective idea or concept under investigation. Further steps include:

¹ Blank, Dorf (2012)

1. PREPARE

- Before starting conversations with potential users, you should define clearly what you are attempting to learn and align your objectives and approach with the team.
- Prepare by documenting your expectations about what prospective users care about and what problems they have. A "skeleton" and a rough idea in your mind will help you to keep the conversation on track and to address important points.
- Involve all team members in the preparation and streamline aspects that are of particular importance to them. Encourage the team to think beyond their immediate R&D activities to include practical applications as well as transfer-related aspects in particular.

2. CONDUCT

3-5 interviews with early adopters / stakeholders

- Instead of trying to sell a solution or product, talk about practices routinely carried out in an organization (e.g. industry or government agency) relevant to your solution or in the daily routines among relevant users. Focus on trying to learn about constraints and the solutions prospective users have found so far.

3. REVIEW

- Reviewing the outcomes with your team is as important as a good preparation and the conversation itself. It will be worthwhile to explore the ramifications for R&D departments (or research institutions) as well as for the innovation, marketing or sales departments (or industrial partners).
- Fill out the [Market Discovery Template](#) with the information you have compiled. To drill deeper into individual thematic fields, you may choose to apply further methods listed in the toolbox.

4. COMBINE

- Adjust your idea/prototype/MVP according to your learnings. Reflect on the significance of the results from Market Discovery Interviews for innovation as well as research activities.

Topic	Sample Questions	What it tells you?
Users Please choose early adopters and / or other users based on market segmentation		
Demographics	<ul style="list-style-type: none"> ▪ Please describe your role and responsibilities? ▪ Can you walk me through a day in your work? ▪ With what department / business unit are you affiliated? 	Demographics help you to recognize patterns between prospects. Such insights may also be used to define or refine Personas or User Stories.
Business Practices	<ul style="list-style-type: none"> ▪ What are your objectives this year? ▪ When you look back at this year, how will you know if you have been successful? ▪ Do you expect these objectives to change next year? 	Questions related to (business) practices allow for a deeper understanding of objectives and priorities.
Problem Interviewers may choose to use Problem Presentations to support the process		
Identifying a Problem / Opportunity	<ul style="list-style-type: none"> ▪ What are your top three challenges and problems? ▪ Why do you bother? ▪ What would be the first thing you would change about your work / or daily routines? 	Identifying problems and their prioritization among users creates an emotional connection with potential users.
Examining the Problem	<ul style="list-style-type: none"> ▪ Why is this a significant problem? ▪ How are you currently solving this problem? ▪ Do you expect this problem to improve, worsen or stay the same in the upcoming year? 	Further examination of the problem allows for a deeper understanding of the needs from the user's perspective as well as the underlying root cause.
First assessment of Market Size	<ul style="list-style-type: none"> ▪ What would be the impact of solving this problem? ▪ How many people are affected by the problem? ▪ What percentage of day/week do you spend fixing/working around problem X? ▪ How much do you invest solving problem X? 	Questions relating to the magnitude and prevalence of the problem among users allow for an initial assessment of the market size.
Benefits and Reasons to use		
Jobs and Core Functionalities	<ul style="list-style-type: none"> ▪ Relating to problem X, why do you want to solve it? ▪ What exactly do you want to achieve by solving the problem? ▪ How would a solution be implemented in your organization or daily routines? 	Questions relating to the benefits allow for a deeper understanding of the underlying motivation for the use of a solution as well as potential implementation.
Alternatives / Competition		
Differentiation and Competition	<ul style="list-style-type: none"> ▪ How are you currently handling problem X? ▪ How satisfied are you with current solutions? ▪ Which additional functionalities and features would you expect? ▪ Are there, in your perspective, ways that alternate technologies can help with problem X? 	Questions regarding existing solutions and user satisfaction may pinpoint unique positions for your solution.
Solution Interviewers may choose to present their solution (max. 3-5 minutes), the presentation may include concepts, mock-ups, prototypes or MVPs		
Research Project and Expected Results	<ul style="list-style-type: none"> ▪ What is your opinion on ___ (describe solution)? ▪ How would you rate it compared to alternatives that you know? ▪ Would you be willing to use / and / or purchase the solution? 	Investigating the solution with early adopters allows for informative feedback on valuable features.

Figure 10: Guideline for Market Discovery Interviews

4.3 MARKET SEGMENTATION

In an early phase of the innovation process, neither the innovative offering itself is completely defined, nor can the users be limited to a distinct customer group. If your user(s) are not clearly defined, you may be confronted with an overwhelming amount of feedback and options that do not support the development of a unique solution. Users differ with respect to behavior as well as demographic aspects, among other things, which is why they typically demand different features and benefits. Market segmentation is about grouping potential users in homogeneous segments. Effective market segmentation identifies an attractive market segment that can be effectively addressed by the solution under development.

As shown in Chapter 2.2 early adopters are of particular importance for the development and assessment of new ideas, concepts and technologies. These visionaries are eager to engage with novel solutions and are often seen as opinion leaders. That makes them a perfect sparring partner for developing a solution with high problem-solution fit. For that reason, targeting early adopters first is a natural starting point for Market Discovery.

How to use the Tool

Identifying a market segment and pinpointing early adopters in that segment involves the following steps:

1. SEGMENTATION OF USERS	
Users can be segmented according to several criteria:	
Category	Description
User characteristics: Who uses or buys what?	Demographics, geographic features, business or organizational characteristics, socioeconomic features.
Product features: What do they use or buy?	User types, user problems, brand loyalty, price sensitivity.
Characteristics of sales / interaction channels	Payment method, purchase and distribution channel.
Benefits: Why do they buy or use these products?	Perceived benefits, requirements, consumer behavior, lifestyle.

2. EVALUATION OF USER SEGMENTS
 After identifying promising segments, segments should be reviewed

Category	Description
Accessibility	How can you reach/get access to your users? Be specific for every segment.
Measurability	Can you quantify the segment regarding size and product use?
Profitability / Attractiveness	Does the segment create high economic, social or environmental benefits in light of the expected expenditures?
Defensibility	Can your organization defend this segment against attacks from strong competitors?

3. IDENTIFY EARLY ADOPTERS

- Market segmentation narrows down the search for potential early adopters.
- In a next step, an initial list can be created that includes 10 to 20 potential early adopters within a relevant industry, technology and / or application field. These adopters tend to be visionaries with a strong track record in the field and / or actively seeking a solution to the problem that the innovation is targeting. Since they are characterized by industry-specific solution seeking behavior, early adopters tend to be identifiable in places where solutions to those problems are currently offered.
- Convening with early adopters (e.g. Problem Presentation) and / or running Market Discovery Interviews may also be useful to pinpoint further early adopters.

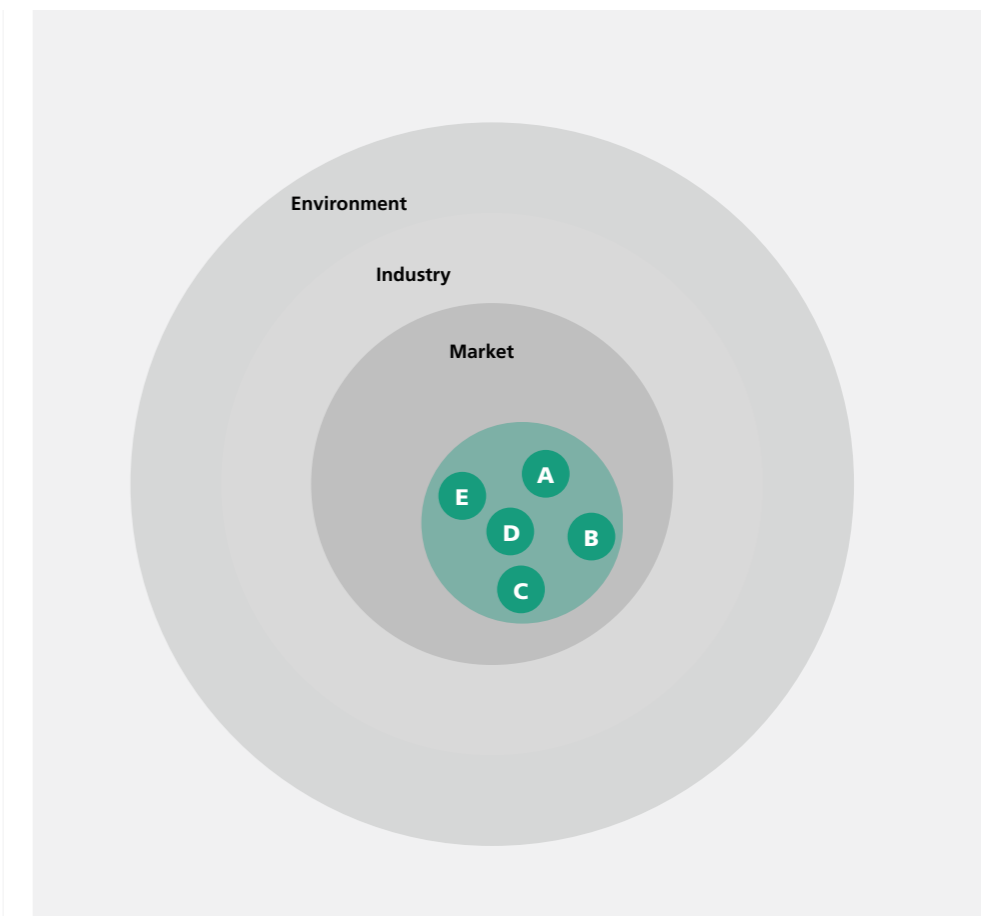


Figure 11: Customer segments

4.4 PERSONAS

A common tool for developing an enhanced understanding of would-be-users are **Personas**. Personas are fictional presentations that reflect the characteristics of people in a target group (a segment), and are used to understand user characteristics, needs and goals and to gain valuable insights into that specific target group. When developing a novel solution, it is crucial to have a clear problem statement in mind. Personas will help you to understand your users and their needs which in turn allows for a clearer understanding of the user problem.

Personas are also an excellent tool to communicate Market Discovery findings to a broad audience. Personas should not be considered as static descriptions, but rather as snapshots to be refined over the course of the Market Discovery process. While you may not be able to fill out all sections of the Persona template in the early stages of the process, blanks may be filled in over time as more information is collected on prospective users.

How to use the Tool

Devising Personas requires prior research on prospective users. Once enough (qualitative and quantitative) data to accurately represent your users is compiled:

- 1. FORM PERSONA GROUPS**
 - Organize the information you have gathered in persona groups along major needs. Focus on the most important needs and the main motivating factor, also referred as "Jobs-to-be-Done"


<p>Name</p>  <hr/>	<p>Behaviors</p> <hr/> <hr/> <hr/> <hr/>	<p>Main Problems</p> <hr/> <hr/> <hr/>
<p>Demographics</p> <hr/> <hr/> <hr/> <hr/>	<p>Needs & Goals</p> <hr/> <hr/> <hr/> <hr/>	<p>Where to find</p> <hr/> <hr/>

Figure 12: Sample Persona
Source: Adapted from leansteps.wordpress.com

2. ADD A HEADER

- The header is a fictional name, a title or a quote that summarizes what is represented by the persona. This could relate to what matters most to the persona or reflect the most important need. A catchy header and a (fictional) image improves memorability and helps your project members to stay focused.

3. ADD DEMOGRAPHICS

The demographic profile should be based on user research and may include information about:

Category	Description
Personal background	Age, gender, education, family status.
Professional background	Occupation, income level, work experience.
User environment	Describes how savvy users are in terms of technology and the physical and social background of the user.
Psychographics	Describes attitudes, interests, motivations and pain points and helps you to better understand why a user behaves in a certain way.

4. EXTENSION: ADD A SCENARIO

- Devise a "day-in-the-life" narrative written in the perspective of the persona. The narrative should include how the persona would react in a certain context, when and where this situation takes place and what the main problems those personas would encounter are likely to be. Finally, such narratives may layout what changes (e.g. functionalities) a user would expect to improve a given situation and to remedy that problem. Essentially, this reveals the job and core functionality upon which to further build an innovative offering.

4.5 JOBS-TO-BE-DONE METHOD

The Jobs-to-be-Done method focuses on user behavior and sheds light on the mechanisms by which a prospective user comes to adopt an innovation. The basic assumption of the Jobs-to-be-Done method is that users primarily engage with (new) products and services to get a job or task done. The method unpacks the process that users go through whenever they seek to alter or improve a given situation or condition into a preferred one and hones in on the constraints that users encounter along that way. Rather than focusing on solutions and product features, the Jobs-to-be-Done method reveals the benefits users seek to gain and the tasks they seek to obtain. Of course, those benefits can be generated by a range of alternate solutions. In fact, markets can be defined on the basis of the jobs that users seek to have completed as opposed to product-centric approaches. In addition to providing a clearer understanding of user needs, the method offers an alternative way of thinking about the composition of an industry as well as potential competitors and substitutes.

"Customers don't just buy products, they hire them to do a job." (Christensen)

The method serves several purposes such as developing an understanding of the customer problem, developing an alternative market segmentation as well as revealing the root problems that future solutions should target as well as the core functionalities. Among the Jobs-to-be-Done, core jobs (functional jobs) and side jobs (related/emotional jobs) can be distinguished. The latter could be, for instance, safety, security, health, integration, trust etc.

How to use the Tool

1. START WITH "WHY "

- Write down answers to the following questions on separate cards: What task do my prospective users want to fulfill or get done? It is important to understand not only what the problem is but also why prospective users face this challenge: Why do my prospective users seek alternative solutions? Consider functional, social and emotional needs of your prospective user.

2. COLLECT, ARRANGE AND DISCUSS ANSWERS

- Discuss your answers with your project partners and arrange responses in clusters. Develop a common understanding of user needs amongst team members.

3. CONDENSE

- Draft brief and explicit descriptions of the job(s). Summarize all jobs in a table. Indicate what kind of needs are addressed within the research project and which requirements are not. This helps you to communicate the potential and limitations of your solution vis-a-vis alternatives.

4. TALK TO USERS

- The purpose of Jobs-to-be-Done interviews is to reconstruct and evaluate the process that users go through whenever they seek to alter or improve a given situation or condition into a preferred one and to hone in on the constraints that users encounter along that way. In Jobs-to-be-Done interviews, all steps from the existing need (the job) to the experience and satisfaction with existing solutions, technologies, products and services that may be of relevance to your team can be assessed.
- An important aim of the interviews is to reveal user's experiences relating to the first utilization of the solution, product or service. A focus can be on reconstructing the „first thought" that triggered the search for the solution. Interviews may also emphasize how those solutions are incorporated into (daily) routines, business or social practices.
- In order to concentrate on the needs of users, interviews are usually conducted independently of the use of products and interfaces.

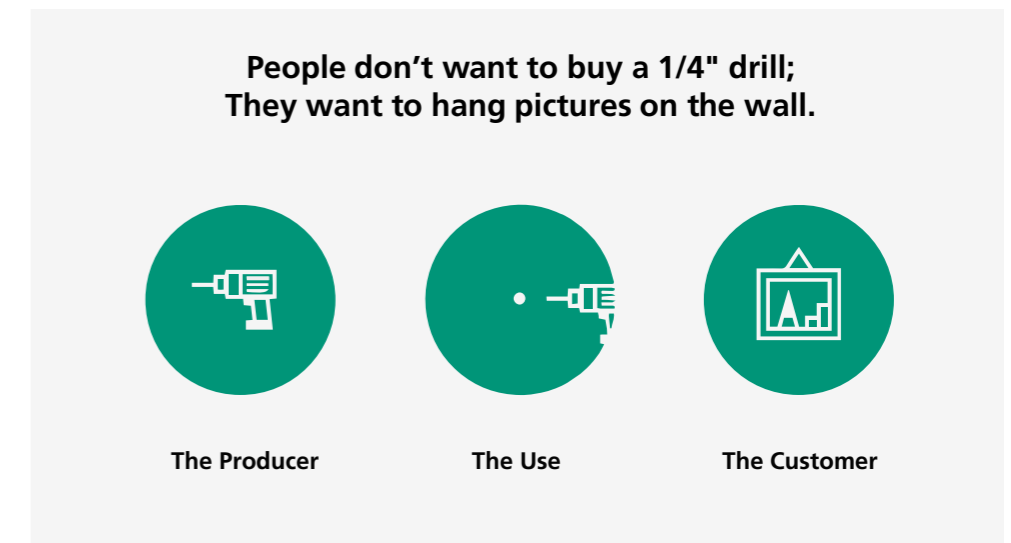


Figure 13: Understanding customers' real Motivation by asking why
Source: Adapted from Intercom.com

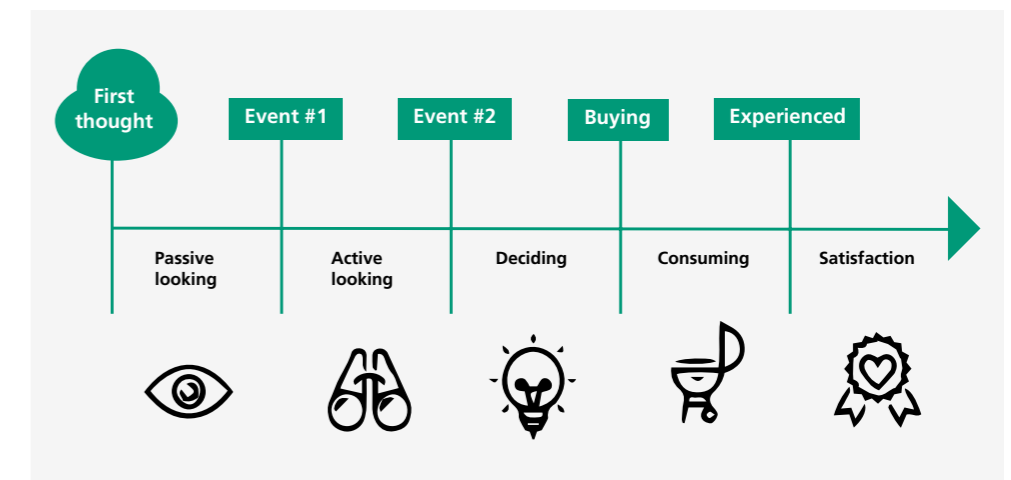


Figure 14: Steps of the Jobs-to-be-Done Interview
Source: Adapted from diefirma.de

4.6 PROBLEM PRESENTATION

Building on the insights gained in Market Discovery Interviews, a short **problem presentation** may be developed to elicit further more directed information from users. Such presentations summarize the assumptions regarding the user problems and how the problem is solved today. Problem presentations may also be integrated into Market Discovery Interviews. To safeguard valuable feedback, arranging face-to-face meetings is advisable. The feedback collected from users may thus serve to test whether some of the assumptions hold. The presentation should be kept very brief (3-5 minutes). It could include three columns¹.

List of Problems	Today's Solution	Your Solution
1.	1.	1.
2.	2.	2.
3.	3.	3.

Figure 15: Template for Problem Presentation

The purpose of this presentation is to elicit responses with regards to the importance of the problem as well as the extent to which your solution is perceived as valuable.

¹ Blank, Dorf (2012)

How to use the Tool

1. PRE-FILL LIST OF PROBLEMS

- Present a list of perceived problems based on prior interviews or other data points.

2. INCORPORATE FEEDBACK

- Ask potential users what they believe the problems are and whether the list is complete. Add problems to your list if necessary.

3. LET USERS RANK PROBLEMS

- Ask users to rank the problems and which problems are must-solve rather than nice-to-solve. A key question to ask is: How would you rank these problems as they affect you/your organization?

4. ASK FOR EXISTING SOLUTIONS

- Having agreed upon a final set of problems, questions regarding existing solutions may be asked. The objective is to obtain an enhanced understanding of how user solve problems. A first impression may also be gained with regards to how widespread this problem is. Add current solutions if applicable.

5. PRESENT OWN SOLUTION

- As a last step, the solution under development is presented very briefly (column 3). Rather than focusing on detailed specifications or features, highlight the general idea or benefits or even the vision.

6. SCORE USER FEEDBACK

- A simple way to assess user feedback is to score the received responses on a scorecard.

Users	Urgent Need for Solution under Development	Likelihood of Adoption
A		
B		
C		
D		
E		
...		
Average		

Figure 16: User Score Card

For instance, the scorecard may rate users' views on a score from 1 to 3 assessing the urgency expressed for the solution under development or the likelihood attached to their adopting the solution under development. Of course, the dimensions rated must be adapted to the particular solution under development.

4.7 USER STORIES AND STORY MAPPING

User Stories provide a deeper understanding of the routines and practices of individual users in solving a specific problem. They offer a narrative of how a given solution is actually implemented by a set of prospective users. A User Story describes the user itself (user description) as well as the user behavior (description of use) – for instance over a day or year. Based on that, several scenarios can be derived. For instance: Daily routine of a working adult with children in a small town. This case can be broken down into scenarios such as "Taking the kids to school", "grocery shopping", etc. Each scenario will have different requirements for the solution under development and may demand further features or functionalities. Those scenarios are documented in User Story Cards. Essentially, user stories elicit important information on the benefits users seek as well as the features a solution should provide. They also offer a simple way to communicate user needs and facilitate a shared understanding of requirements among project members.

How to use the Tool

1. FILL OUT USER STORY CARD

- **Who:** Refers to the type of user. Be as specific as possible. In case you are uncertain about your user, you may refer to Customer Segmentation and Personas.
- **Why:** Refers to the benefit or value. Describe what the user expects from his action. Capture the solution's functionality from the users' perspective.
- **What:** Refers to an action, a goal or a wish of the user. In case you are uncertain about what user needs, you may refer to the Jobs-to-be-Done method.

2. REPEAT THE PROCESS

- Fill out as many User Story Cards as necessary to cover all requirements / features.
- Discuss among team members to develop a common understanding.

3. MAP USER STORY

- While the result is useful itself, the process of mapping is even more important.
- Create a User Story Map with all team members.

Group	After writing down the User Stories, you will have several cards. Merge cards that refer to the same thing and group cards that refer to a similar thing (to the same feature).
Benefits	Write down on a separate card what the user wants to achieve ('get done').
Order	Arrange benefits according to a plausible ranking based on group discussions and empirical user insights.
Narrative	Build a narrative around the cards and fill gaps in between if necessary.

4. PRESENT AND VALIDATE USER STORY MAPS WITH EARLY ADOPTERS

- User Stories may be incorporated into interviews and presentations addressing early adopters. That will allow to refine and validate those users stories as well as key features of the solution and the problem (e.g. the users' routines before and after the solution).

5. DEDUCT FEATURES AND FUNCTIONALITIES FOR PROTOTYPES

- User Stories – validated by early adopters – represent an appropriate means to deduce the functionalities and features a prototype or MVP should have.

User Story Card

As [who]
a _____

I [what]
want _____

so that [why]

Figure 17: Template of a User Story Card

4.8 USER-CENTRIC COMPETITOR ASSESSMENT

Once you have developed a more comprehensive understanding of your user base and the problem you are tackling, it is important to assess whether your solution will be unique compared to competitors. Defining your competitive position is a crucial part. Hence, this tool will help you to further sharpen your value proposition compared to similar solutions. The aim is to identify and hone in on unique differentiators that lead to a high user satisfaction by – of course – fully meeting the needs of the user. An example is provided below¹.

	Competitor A	Competitor B	Your Solution
Must Have Benefit 1	[Y/N]	[Y/N]	[Y/N]
Must Have Benefit 2	[Y/N]	[Y/N]	[Y/N]
Must Have Benefit n	[Y/N]	[Y/N]	[Y/N]
Performance Benefit 1	[low/med/high]	[low/med/high]	[low/med/high]
Performance Benefit 2	[low/med/high]	[low/med/high]	[low/med/high]
Performance Benefit n	[low/med/high]	[low/med/high]	[low/med/high]

Figure 18: Example for User-Centric Competitor Assessment Tool

¹ Blank, Dorf (2012)

How to use the Tool

One way of assessing the value proposition for a new solution is to contrast the benefits of your own solution with those of similar approaches. The necessary information may be obtained from industry reports, databases, company publications, official websites as well as from interviews with industry experts, practitioners, early adopters or competitors. In addition, users that are familiar with alternate solutions (such as competitor's offerings) will be of particular importance.

1. FILL IN BENEFITS

- In interviews with early adopters, other users, industry analysts, experts in the relevant field, it is important to elicit information on how these stakeholders gauge the benefits provided by alternative solutions compared to your solution.
- To that end, list the performance or other types of benefits provided by your competitors and direct interview questions at those benefits.

2. RATE SOLUTIONS

- Score empirical user data on a scale from low, medium, high.

3. MARK UNIQUE DIFFERENTIATORS

- Having scored the empirical data, the comparative advantages and disadvantages of your solution should be discernible.
- Mark areas in which your solution is markedly outperforming competition. This may be the basis for your differentiation and value proposition.

4.9 BUILDING AND TESTING A MINIMUM VIABLE PRODUCT

Minimum Viable Products (MVPs) are used to test solutions under realistic conditions. MVPs represent a concise summary of the smallest possible group of features that will work as a stand-alone prototype/product while still solving at least the 'core' problem and demonstrating a solution. The required features and functionalities can be derived from the steps laid out above in Market Discovery.

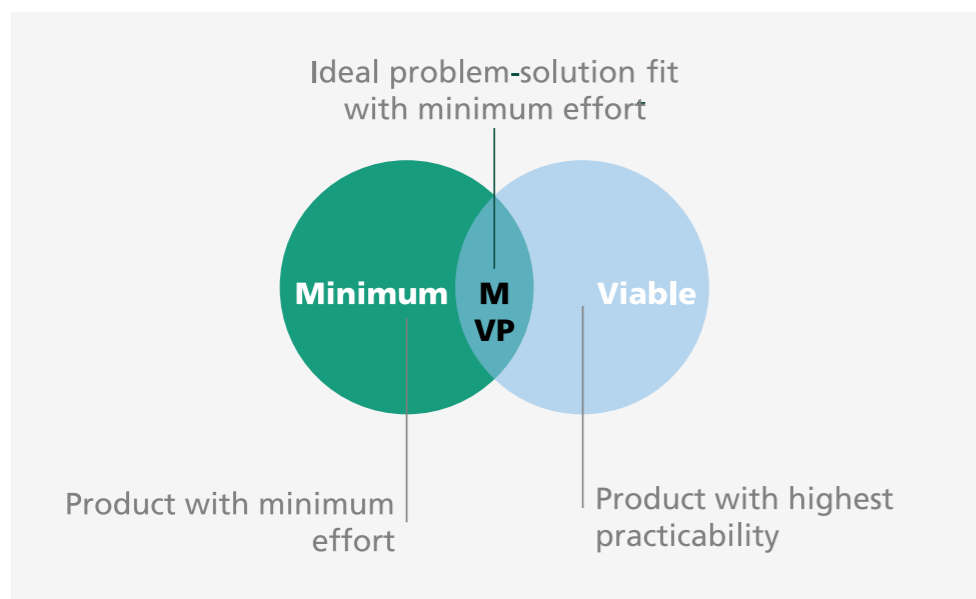


Figure 19: The Minimum Viable Product

Source: Adapted from Ries (2011)

How to use the Tool

1. BUILD A MVP

- Initial requirements for a MVP can be obtained from User Stories, the Value Proposition and Market Discovery Interviews, among other things.

2. TEST THE MVP

- MVPs may be tested with a small set of initial users (early adopters). Harnessing their feedback to evaluate the functionalities as well as early adopter's perception of the way that it serves to solve a specific problem is crucial.
- User Stories provide further insights into the practical application of MVPs. Alternatively, User Stories set out before may be validated or refined on the basis of MVPs. Moreover, User-Centric Competitor Analysis may be performed to gauge the MVP's relative performance.

3. LEARN

- The feedback compiled from early adopters should be systematically assessed and used to evaluate the value proposition of the solution under development. Furthermore, specific requirements and functions gathered by the user's feedback may be incorporated into the project design and may require adjusting the project planning.
- In case some of the assumptions made cannot be verified, the value proposition may have to be adjusted accordingly. Alongside a refined value proposition, this may trigger a new cycle of building a new prototypes / MVPs, measuring results and validated learning.

5 REFERENCES AND FURTHER READINGS

- Blank, S., Dorf, B. (2012): *The Startup Owner's Manual*. Pescadero: K&S Ranch.
- Budden, P., Murray, F. (2018): *Innovation Ecosystems: A New Approach to Accelerating Corporate Innovation and Entrepreneurship*. MIT Sloan School of Management: Cambridge, MA.
- Bundesregierung (2018): *Die Hightech-Strategie 2025. Forschung und Innovation für die Menschen*. Berlin: Bundesministerium für Bildung und Forschung.
- Byers, T.H., Dorf, R.C., Nelson, A.J. (2015): *Technology Ventures. From Idea to Enterprise*. New York: McGraw-Hill.
- CB Insights (2018): *The Top 20 Reasons Startups fail*. <https://www.cbinsights.com/research/startup-failure-reasons-top/> [accessed on 13.08.2019].
- Cleveland, B. (2019): *Traversing the Traction Gap*. New York.
- European Commission (2013): *How to convert Research into Commercial Success Story? Part 3: Innovation Management for Practitioners*. Brussels: European Commission - Directorate-General for Research and Innovation.
- Friedman, L. (2002): *Go to Market Strategy: Advanced Techniques and Tools for Selling More Products to More Customers More Profitably*. Burlington: Routledge.
- High-Tech Gründerfonds (2019): *Product-Market Fit: The Main Reason for Failure of Industrial Tech Startups within the HTGF Portfolio*. <https://high-tech-gruenderfonds.de/en/product-market-fit-the-main-reason-for-failure-of-industrial-tech-startups-within-the-htgf-portfolio/> [accessed on 13.08.2019].
- Klessova, S. et al. (2015): *Innovation Strategy in R&D Projects. A Step by Step Guide – Health-2-Market*. Vienna.
- Kline, S., Rosenberg, N. (1986): *An Overview of Innovation*. In: Ralph Landau und N. Rosenberg (Hg.): *The positive Sum Strategy. Harnessing Technology for economic Growth*. Washington, D.C.: National Academy Press, S. 275–305.
- McKinsey (2013): *The Eight Essentials of Innovation Performance*. London: McKinsey.
- Moore, G.A. (1991): *Crossing the Chasm. Marketing and Selling Disruptive Products to Mainstream Customers*. New York: Harper Business.
- Olsen, D. (2015): *The Lean Product Playbook: How to innovate with Minimum Viable Products and Rapid Customer Feedback*. Hoboken: Wiley.
- Patton, J. (2014): *User Story Mapping: Discover the Whole Story , Build the Right Product*. O'Reilly Media.
- Pisano, G. (2015): *You Need an Innovation Strategy*. In: *Harvard Business Review*, Vol. 93(6): pp. 44–54.
- Research Councils UK (2014): *Impact through Knowledge Exchange. RCUK Position and Expectation* [accessed on 10.10.2019 <https://www.ukri.org/innovation/excellence-with-impact/>].
- Ries, E. (2011): *The Lean Startup. How constant Innovation creates radically successful Businesses*. London: Penguin Random House.
- Ries, E., Dillard, S., Eisenmann, T. (2014): *Experimenting in the Entrepreneurial Venture*. Harvard Business Publishing.
- Rogers, E.M. (1962): *Diffusion of Innovations*. New York: Free Press.
- Schilling, M.A. (2013): *Strategic Management of Technological Innovation*. New York: McGraw-Hill.
- Schuh, G., Kreutzer, R. (2019): *Chief Technology Manager. Effective Innovation and Technology Management*. Aachen: Fraunhofer IPT, RWTH International Academy INC Invention Center.
- Schuh, G., Lenders, M., Hieber, S. (2011): *Lean Innovation – Introducing Value Systems to Product Development*. In: *International Journal of Technology Management*, Vol. 8(1): 41-54.
- Still, K. (2017): *Accelerating Research Innovation by Adopting the Lean Startup Paradigm*. In: *Technology Innovation Management Review*, Vol. 7(5): 32-43.
- Thimm, D. (2017): *Verwertung wissenschaftlicher Forschungsergebnisse. Zusammenführung von Angebot und Nachfrage auf elektronischen Forschungsmarktplätzen*. Cottbus: Technische Universität Cottbus-Senftenberg.

The Innovation Policy and Transfer Design unit analyzes, evaluates and designs instruments in the fields of innovation policy as well as knowledge and technology transfer. Therefore, our team develops methods and tools to analyze and assess local and global innovation and knowledge networks, to support knowledge and technology transfer and contributes to the design of national and international innovation instruments.

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