ORCHES-TRATING INNOVATION

TNO innovation for life

Orchestrating Innovation increases the probability of success, minimizing the probability of failure of technological innovations by creating sustained societal and economic value. Orchestrating innovation propagates to take into account and actively involve all relevant stakeholders of the (future) ecosystem in which the innovation will, can or has to be adopted.

COLOFON

EARLY RESEARCH PROJECT ORCHESTRATING INNOVATION
2015

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DATE
October 2015

INTRODUCTION

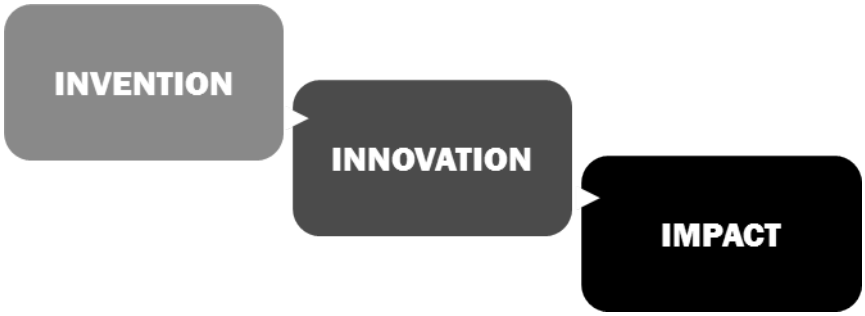
Have you got the next brilliant technology? A technology that can help solve one of the Grand Challenges? The solution for renewable energy, health, big data, quantum computing, safety? Then this guidebook will help you to create the value you are hoping for.
Increasingly innovation and entrepreneurship transcend the boundaries of individual organizations and take place in so-called business ecosystems consisting of local communities, SMEs, large corporations, NGOs, and governments. This guidebook provides an overview of the knowledge about how innovation in ecosystems should be started, shaped, managed and expanded to create value for the actors involved and society at large. This overview is intended to familiarize entrepreneurs, firms and policy makers with this broad range of relevant concepts and concrete tooling for Orchestrating Innovation.

FROM INVENTION TO INNOVATION

Innovation starts with an idea, and can slowly develop into an invention (typically R&D): a prototype or project plan. There are several reasons to consider intensive collaboration with partners and the wider group of stakeholders: world-class innovation (R&D) requires massive investments; industries converge and innovations are rarely stand-alone anymore. A focus on ecosystems thus increases the quality and scale of the invention, helps to identify and overcome risks and primes its future adoption. Through interactions ideas are tested, plans are improved and the innovation will become more adapted to stakeholder requirements. As a result it creates more value for these stakeholders.

FROM INNOVATION TO IMPACT

The more value the innovation creates for different stakeholders, the more support can be expected and the greater the impact the innovation can achieve. For instance, governments may support the innovation with subsidies as it can help reduce CO2 (solar panels, e-cars). NGOs or associations may back the innovation because it helps them achieve their goals (for instance WWF-company collaborations) and businesses are expected to be cooperative if their current and future positions are expected and risk is well addressed.



WHO?

This guidebook is for those people that want their innovation to become a success. With success defined as maximum economic, societal and environmental impact. These people are for example:

- **Project leaders** (and members) want to guide their team with a broad eye on the external environment that they depend on (e.g. companies, entrepreneurs). For this group, the book gives concrete tools on what to do on ecosystem, organisation and team level, in order to create successful innovations.
- **Partners** that want to co-create the innovation so that it creates maximum value for them (e.g. buyers, suppliers, co-developers). For this group, the book gives concrete leads on how the innovation and the partner group can realize the innovation.
- **Stakeholders** that want to warrant maximum economic, societal and environmental impact from the innovation (e.g. government, NGOs, citizens). For this group, the book provides insight into the complexity of orchestrating innovation in ecosystems and leads on how to support innovation.

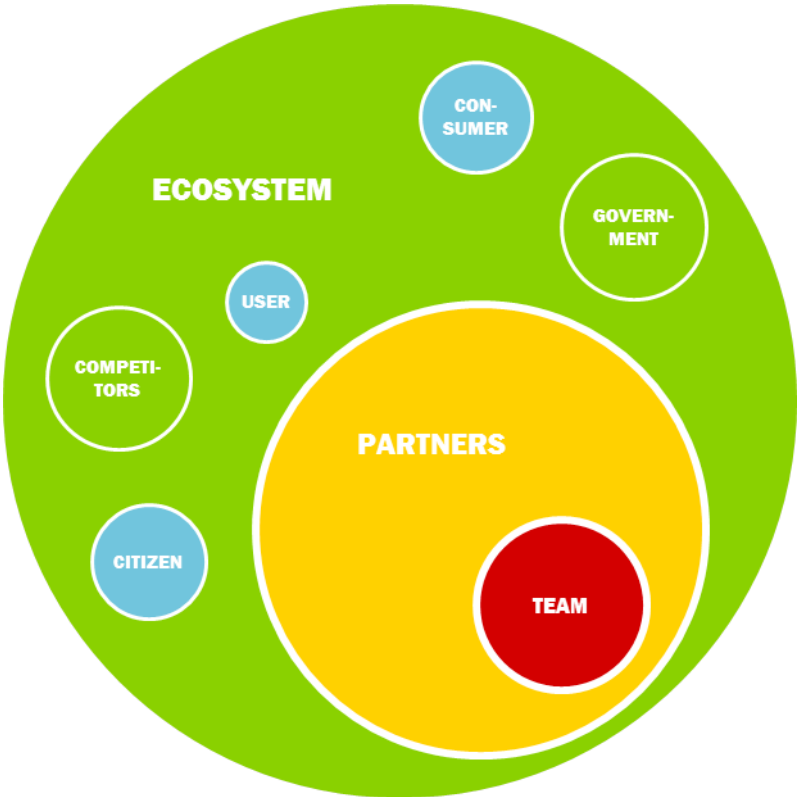
WHAT?

To make innovations more successful, this guidebook offers tools to:

- Map the external environment and develop a unique value proposition.
- Improve the quality of the innovation process.
- Improve collaborative processes with partners and stakeholders.
- Create shared value.

WHICH TYPE OF PROJECTS?

This guide is for projects that are complex: technologies, products and services are still in development, their potential is great for economy, society and environment, and as a result their success is (inter)dependent on a variety of stakeholders.
Especially projects that address one of the grand challenges have many of the complexities mentioned. They innovate both in technology, as in social structures and require collaboration between several organisations to be able to get adopted in the market.



ECOSYSTEM
The ecosystem is the wider set of stakeholders that benefit from, or are negatively impacted by the innovation.

PARTNERS
The partners consist of all organizations that are formally connected to the project goal. They participate actively in the project either in cash or in kind and benefit directly from its success.

USER/CONSUMER/CITIZEN
The user, consumer or citizen is the individual that has to use, buy and/or adopt the innovation.

TEAM
The team consists of those that are working on the innovation on a day-to-day basis. They can be of the own, or a partner organization.

The color of the different chapters refer to the level they address most: ecosystem, partners, user/consumer/citizen or team.

The chapters in this book are organized in four parts. These parts are not necessarily consecutive but address the level of detail of the activities. The first part is an external orientation; in the second part this orientation is detailed. In part three the ongoing processes of learning and adapting to the ever-changing context of the innovation are presented and part four addresses the expansion of the innovation to reach full impact.

PART I: STARTING - MAPPING AND CREATING YOUR OWN INNOVATION ECOSYSTEM

Introducing technological innovations to create societal impact is different from linear innovation processes in which a ready product is sold to a customer. Firstly, the technology is typically not yet fully matured, so additional R&D is still required. Secondly, for this innovation to achieve impact and create societal value it must be adopted by and tailored to the complex system called society. After all, without impact no value. In this part the context in which the innovation will be developed and in which the innovation is designed to achieve its impact in is systematically explored to understand its structure, dynamics, the actors and their interdependencies and identify key drivers and barriers for achieving impact. The way in which the innovation is supposed to create value is designed and key collaborations are set up. These are the foundations for Orchestrating the Innovation; why, what, who and how are defined.

INNOVATION ECOSYSTEM
TECHNOLOGY PLANNING
SHARED VALUE
COLLABORATION
AGREEMENTS

PART III: MANAGING - MAINTAINING INTERNAL AND EXTERNAL RELATIONSHIPS TO WARRANT SUCCESS

One of the key characteristics of the context in which we try to develop and achieve impact by innovation is that of constant change and multiple actors (i.e. a complex system). In this part the processes to interact with and adapt to your context are provided.

TRUST
STAKEHOLDERS
LEARNING

PART II: SHAPING - DEVELOPING YOUR UNIQUE ECOSYSTEM PROPOSITION

innovation creates value when adopted by the market. The chances for success increase when your innovation has value for several stakeholders. This increases the likelihood that for instance the government supports the innovation (or takes away barriers), and that customers want to buy it. In order to achieve a desirable and acceptable innovation the project team must share a common view on how to achieve the objective and it must iterate and test its proposition regularly with the stakeholders. This part thus details the high level design of Part I.

VISION
FOCUS
ITERATIONS
PROPOSITION

PART IV: EXPANDING - CREATING MAXIMUM IMPACT

Orchestrating innovations with societal impact requires different skills: next to technological brilliance, project managers need business sense and the ability to create and guide a network of diverse actors, and a feel for the potential market of the innovation. The success of your innovation is hence not in your hands only! Once the products and services (in the broadest sense) are conceived, the appropriate R&D is planned and processes with all stakeholders are ongoing, there are still a number of challenges on the way to actually achieve impact at the desired scale. That is the scope of Part IV.

FINANCE
ADOPTION
COMMUNICATION

EACH CHAPTER INCLUDES AN 'HOW TO DO IT' PART, IN WHICH METHODS, TOOLS AND ACTIVITIES ARE SHORTLY DESCRIBED. THESE PARE MARKED WITH A SLIGHTLY COLOREDBACKGROUND.

INNOVATION ECOSYSTEM

AUTHORS: Roald Suurs, Guus Mulder **DATE:** October 2015

HOW TO IDENTIFY THE SYSTEMIC DRIVERS AND BARRIERS THAT INFLUENCE YOUR CHANCES ON SUCCESSFUL INNOVATION.

Innovation doesn't stand on itself, but is part of a (dynamic) innovation ecosystem. Knowing what happens around a specific innovation is important to optimize the chances of success, especially for innovations that aim to impact society at large.

TNO innovation for life

THE IDEA IN SHORT

Innovation has long been considered the result of a linear development, starting with basic research, followed by applied R&D, and ending with production and diffusion. The innovation ecosystem approach rejects this model and, instead, stresses the interaction between numerous processes, R&D, production and market formation running in parallel and reinforcing each other.

This chapter enables you to: map the actors of the innovation ecosystem around their project / use case, map the key innovation functions necessary to create conditions in which the project / use case can be successful, identify systemic drivers and barriers underlying the innovation functions and identify which functions are to receive additional support by TNO or by other actors.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

If the systemic drivers and barriers within the innovation ecosystem are neglected, by technology developers, firms or policy makers, this is likely to result in the development of undesirable technologies or absence of technological development altogether.

Most importantly, the innovation will result in a bitter fit in the ecosystem it will or has to land in. Doing an innovation ecosystem analysis beforehand gives you the insights where the ecosystem is enabling the uptake of the innovation, and where it might be blocking the further development and adoption of the innovation. Knowing this allows to act upon them, and taking it into account in the further development of the innovation. This increases chances of success in influencing the ecosystem in the desired direction for the innovation to be adopted by relevant stakeholders. The outcomes support defining key recommendations for the project plan.

WHY IS IT A CHALLENGE TO DO THIS?

or innovations that aim to impact society at large a challenge is posed by the fact that the existing innovation ecosystem typically does not have a logical place for the (radical) innovation. Systemic innovation, in this stage, involves developing the innovation while simultaneously building the ecosystem around it. This will create the place for the innovation and prepares the ecosystem on the entry of a new innovation.

This challenge hinges on a complex interplay of activities carried out by relevant actors to impact the innovation ecosystem itself. This requires a change in the rules of play set by actors, networks, institutions and technologies. This cannot be controlled but it is feasible to ‘step-by-step’ orchestrate the activities of stakeholders in implementing more favorable conditions.

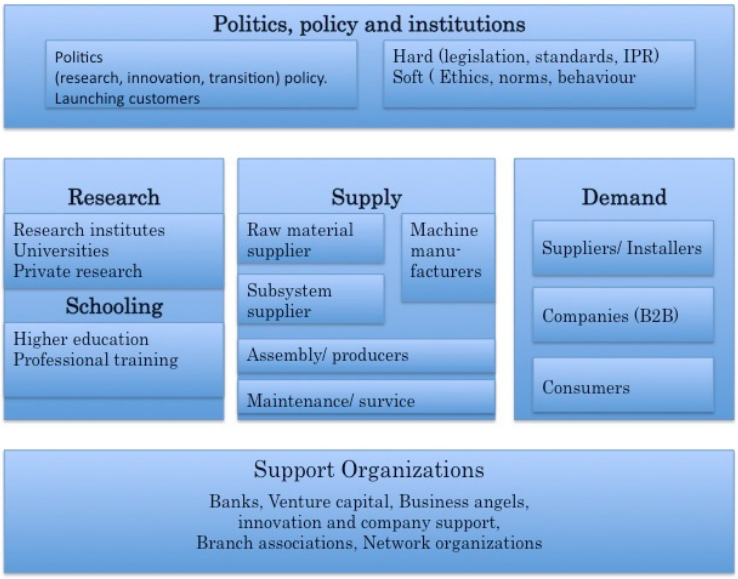
WHEN IS THIS USEFUL IN YOUR PROJECT?

- If the goal of your innovation project / use case is to change the current structure, culture or way of working in a sector or industry.
- If the structure, culture or way of working in a sector, industry or market needs to change for your innovation project / use case to be successful.
- If your innovation project / use case is more complex than making an incremental improvement to existing technology.

WHAT LITERATURE SAYS ABOUT IT: INNOVATION ECOSYSTEMS

The innovation ecosystem perspective has been developed in the past decades as a way, for strategists and policy makers, to better understand and support the conditions necessary for companies to innovate.

The principle insight is that the success of innovations is not only determined by the technological and economic characteristics, but also by the quality of the interactions within the system of actors (companies, governments, research institutions, social groups), institutions (rules, laws, routines) and technologies.



Visual representation of the innovation ecosystem in terms of actors and institutions.

In a well-functioning innovation ecosystem, the various elements aligned. An innovation ecosystem analysis offers insight into the state of affairs. An innovation ecosystem can be described in seven system functions. These system functions should be sufficiently strong to be filled, for innovations to find their way to market application.

- Entrepreneurial activities: Involves projects aimed to prove the usefulness of the emerging technology in a practical and/or commercial environment.
- Knowledge development: Concerns R&D activities in basic science, and learning activities in a practical context.
- Knowledge diffusion: Measures the exchange of knowledge between all the actors.
- Guidance of the search: Refers to activities that shape the needs, requirements and expectations of actors with respect to their (future) support of the emerging technology.
- Market formation: Involves activities that contribute to the creation of a demand for the emerging technology.
- Resource mobilization: Refers to the allocation of financial, material and human capital.
- Support from advocacy coalitions: Involves political lobbies and advice activities on behalf of interest groups.

HOW TO DO IT: INNOVATION ECOSYSTEM ANALYSIS

The insights from theory have been translated into a process model containing several steps and methodologies that help to investigate all relevant aspects of the innovation ecosystem and to identify actions within the scope of an innovation project. All of this is to better accommodate the innovation project / use case results. And especially to create and support a momentum in the ecosystem as desired. The table below provides a process model for project managers to understand the various steps that can be taken in preparation for the development of a new technology to increase the chances of a successful market introduction on the basis of solid understanding of the relevant innovation ecosystem. This leads to:

- identification of constraints to be taken into account in developing the innovation / use case.
- definition of additional actions to be taken to allow successful uptake of the innovation / use case as part of the innovation ecosystem.
- enabling a joint action plan and a coalition for change at the ecosystem level.

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1	SCOPING workshop • ecosystems thinking • ecosystems mapping • skill will matrix • notion of functions	1 day	Core project team	Identification of main issues to be pursued
Step 2	AWARENESS workshop • innovation functions • systemic drivers & barriers • strategic insights	1 day	Core project team Partners	Define actions within project to address main issues and identify 'problem owners'
Step 3	ACTION workshop • joint action plan • problem-owners buy-in • coalition building	1 day (workshop) 2-5 days (interviews)	Core project team Partners Problem owners	A coalition is shaped and mobilized to influence parts of the ecosystem to better accommodate the project results and/or increase the momentum to change the ecosystem in the desired direction

WHO

People are authorities on the subject matter relevant to the innovation project / use case.
People can look beyond the boundaries of their discipline / organization interests.
People are able to think in terms of strategic / policy related matters.

WHEN

This activity is to explore, analyze and understand, make decisions and ensure upscaling. It is done early in the innovation project.

RESULTS

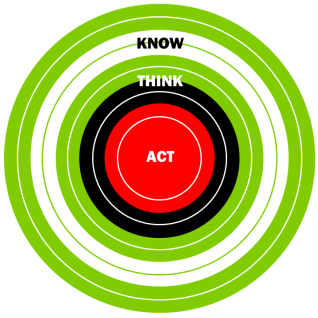
The exact deliverables are to be discussed. Typically these involve:

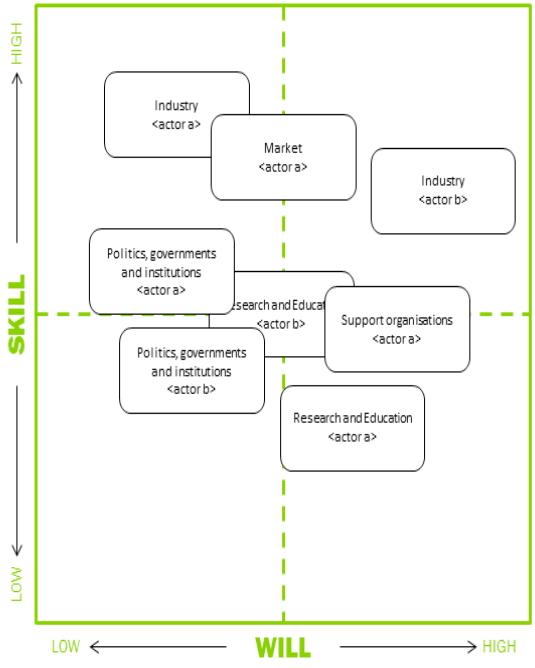
- Interview transcripts
- Filled in templates / other outputs from workshops
- Joint Action Plan with main findings and decisions
- Slide book or presentation with communicable outcomes
- The outcomes will be 'solidified' by collecting key recommendations for the project plan and relevant roadmaps of TNO and other stakeholders.

TEMPLATE: MAPPING KEY ACTORS IN THE ECOSYSTEM

These templates can be used to map the key actors in the innovation ecosystem according to their relative influence and interests. Application of the template is done though the following steps:
Identify the key actors from the blocks below:
For each actor, estimate their 'skill' / 'possibility' to influence the ecosystem a desired direction.
For each actor, estimate their 'will' / 'motivation' to influence the ecosystem in a desired direction.
Explain important conflicts / congruencies.

ACTOR	SKILL	WILL	ACTION
Research and education			
...			
...			
Industry			
...			
...			
Market			
...			
...			
Politics, government and institutions			
...			
...			
Support organisations			
...			
...			

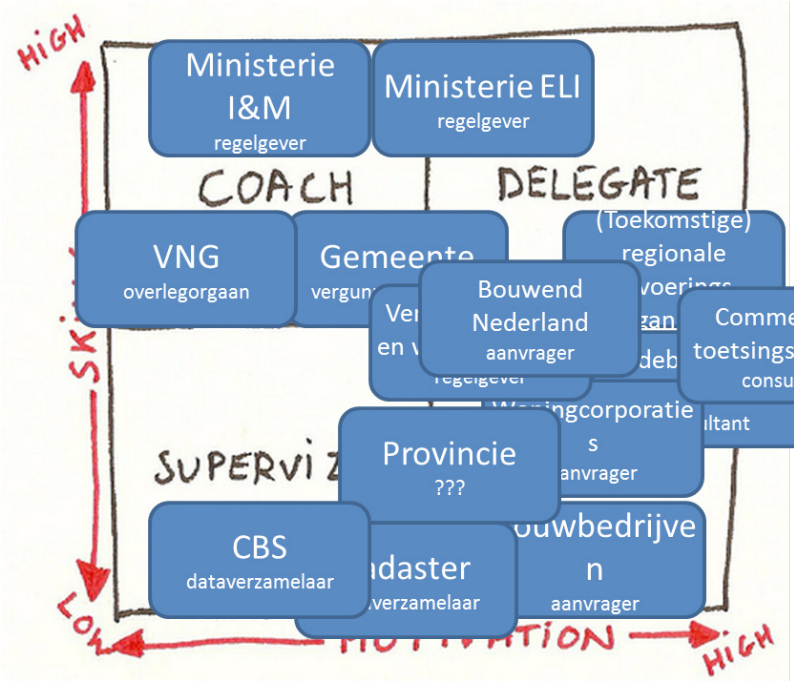




CASE: DIGITAL ASSESSMENT OF BUILDING PLANS

The method for actor analyses has been implemented in the innovation projects Renovation XXL, the installation window and digital assessment of building plans. Based upon the analysis a stakeholder meeting was held to organize support for the digital assessment of building plans. Instead of inviting only the ministry of infrastructure and environment, which should implement the instrument, other stakeholders were invited. Although these stakeholder had little decision power, together they were able to use their influence to sway the decision to their benefit. By understanding the different interests and activating parties with which interests aligned, a larger impact could be achieved.

ACTOR	STAKE	POWER
Ministry Infrastructure and environment	? →how to convince them of the need !!! Have done a pilot in 2007	♦♦♦
VNG	Lobby for municipalities, they have a need	♦♦♦
Association for building and living watch	Try to support civil servants: civil servant gets a clear picture much faster in 3D. Provide work digitally, can save time and work, but how to do this? → assessing digitally, keeping the job employability. Reduce the fear to make mistakes by doing good facilitation. → 3D is on the agenda	♦♦ (strong lobby)
CBS	Needs accesible and accurate information; has a problem when updating BAG data.	♦
Cadastre (BAG)	Already working with 3D, but we don't know why.	♦
Province	No stake, at least not that we can think of	♦
(future) regional implementing organisation	Can take into account the future way of working in setting up the organisation. Can show that they do their work good (innovative/less mistakes) (assessor)	♦♦
Municipality	Assessing construction requests takes a lot of time, some work is outsourced. Legislation: wants construction according to policy. According to the word and spirit of the policy (less interpretation, goes well with outsourcing the assessment) Makes it more clear what the consequences are of policy decisions.	♦♦
Housing corporations	Saves work, process goes much faster	♦
Construction companies	Saves work, process goes much faster	
Urban planning agencies	Introduction generates a lot of work	
Bouwend Nederland (building the Netherlands)	Need to enable members to submit 3D plans. 3D zoning (bestemmingsplan) helps the diffusion of BIM.	♦♦
Commercial testers	Front runners have a temporary competitive advantage. They see the need and necessity of 3D in opportunities. Experience the regional organisation as a threat (by better distribution of work) Already do it, hence have a stake in municipalities making it mandatory to submit 3D plans, to make their zoning plans 3D, for them to assess faster.	
Innovation in construction and building	Communicating about interventions that improve the quality of construction and building.	


HIGH
Ministerie I&M
regelgever
Ministerie ELI
regelgever
COACH
DELEGATE
VNG
overlegorgaan
Gemeente
(Toekomstige) regionale
Bouwend Nederland
aanvrager
Commerciele toetsingsbureaus
consultant
Provincie
???
CBS
dataverzamelaar
aanvrager
LOW
HIGH

LITERATURE

Smits R.E.H.M. (2002) “Innovation studies in the 21st century” *Technological Forecasting and Social Change* 69 pp 861-883.
Carlsson B. & R. Stankiewicz (1991) “On the Nature, Function, and Composition of Technological systems” *Journal of Evolutionary Economics* 1 (1991) 93-118.
Hekkert M.P., R.A.A. Suurs, S.O. Negro, S. Kuhlmann & R.E.H.M. Smits (2007) “Functions of Innovation systems: A new approach for analyzing technological change” *Technological Forecasting & Social Change* 74 413-432.
Suurs R.A.A. (2009) *Motors of sustainable innovation. Towards a theory on the dynamics of technological innovation systems (Thesis)* Utrecht University, Utrecht, the Netherlands.
Bergek A. (2002) *Shaping and Exploiting Technological Opportunities: The Case of Renewable Energy Technology in Sweden (Thesis)* Chalmers University of Technology, Göteborg, Sweden.

LINK TO OTHER CHAPTERS

TECHNOLOGY PLANNING
Technology planning has the focus on team level. Results of the innovation ecosystem analysis can be used to determine the strategy for technology development in the following years.

SHARED VALUE
In this chapter it is more about creating an overview of a network of actors that exchange value. This is most likely a subset of actors that are mentioned in the innovation ecosystem.

STAKEHOLDERS
This chapter can help you further in how to influence the stakeholders in your innovation ecosystem.

ADOPTION
One of the barriers in the innovation ecosystem can be the adoption of end-users or changing behavior of people. This chapter tells you how to deal with that barrier.

COMMUNICATION
This chapter is to define a communication strategy that is tailored to specific groups that are also part of the innovation ecosystem. It can help in deciding how you want to influence (communicate with) the actors in the ecosystem.

TECHNOLOGY PLANNING

AUTHOR: Clara Peters **DATE:** October 2015

HOW TO PLAN THE DEVELOPMENT OF TECHNOLOGY FOR THE INNOVATION.

Structuring innovation activities on different levels; matching strategic goals, functional requirements and research and development helps in deciding what to do now and what to do next.

TNO innovation for life

ROADMAPPING
PLANNING
TREND ANALYSIS

THE IDEA IN SHORT

In order to plan ahead on which technologies to put effort in to realize innovations, you need to know where you stand now, where you want to go and which steps you need to take to get there. Yearly TNO adapts its' own roadmaps in order to keep focus on the technologies that are needed and innovative. What is in the roadmap is often decided on a strategic level and in generic terms, but once you start innovating more detailed aspects can come to the surface that determine which direction the solution and technology development is going, or has to go. Planning and structuring innovation efforts creates a comprehensive overview of all developments taking place, what is planned to be done, and where it all leads to. Aligning the goals on different levels can serve as a decision support tool; does this activity fit into the larger picture?

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

As innovation budgets are always limited, it is important to focus your innovation efforts in the right direction. Although there will always be uncertainty in the level of success of the outcome of innovation activities, a good plan that takes into account multiple aspects in the current and future context of the innovation gives a solid ground on which decisions can be based. One of the most important aspects is knowing what is out there. It helps to focus your work, give inspiration and helps to prevent wasting time and money on pursuing developments that are already out there. If changes happen in the environment it is easier to adjust the plans, or see if they have an impact on the plans you made already. Planning innovations in a structured manner lines up strategic, functional and instrumental goals, making sure that the things you develop, actually fit into your long term business plans.

WHY IS IT A CHALLENGE TO DO THIS?

In planning technology activities it is difficult to keep it focused; it is tempting wanting to create a planning for the whole world or for several technologies. Also as transferring strategic goals into a structured plan with aligned activities creates discussion; on a conceptual level people can agree with each other, but as devils are in the details, discussion is needed to exchange ideas and agree with each other. A third challenge is that the people taking the strategic decisions are often not the experts in the technology. Worlds have to come together and an open dialogue needs to be created to create a realistic plan. Lastly, people have always had difficulty with predicting the future and what will happen. Sometimes too optimistic, the other time too pessimistic, and often both scenarios will not become reality as new developments that were not yet on the radar can have a major impact. Hence be prepared to adjust the plans regularly, depending how fast developments in the technology field are changing.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- If you want to tune strategic goals, innovation and knowledge development to one another
- If there are several stakeholders (on different levels) whose views need to be lined up
- If you need to communicate your comprehensive plan of action in a way that appeals to the different levels of stakeholders
- If you want to know what kind of innovations and technological developments are expected in the coming years and you want to assess whether they can be of value for you (e.g. realizing your strategic goals)

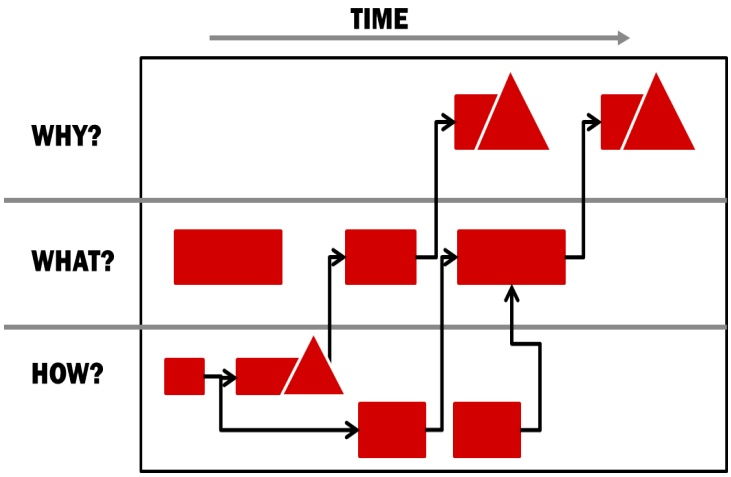
WHAT LITERATURE SAYS ABOUT IT: ROADMAPPING

A common way to plan and structure innovation plans, is to use roadmapping. The (technology) roadmapping method supports (networks of) organisations in exploring, planning and communicating goals on a strategic, functional and instrumental level.

LEVEL	CORRESPONDING QUESTIONS
Strategic	Why do we want to innovate? What do we want to achieve?
Functional	What do we need for this? Which functionalities do we need?
Instrumental	How can we achieve this? What should be developed?

It enables embedding innovation into organisations in a structured way. Roadmaps can be used on different levels; from a project team, to a department, an organization, a number of industries or even national level. The level of abstraction of a roadmap is defined by its goals, focus and scope. The set-up of the roadmap is made-to-measure according to these parameters. This makes it a very flexible method that can be used in many different settings.

The common ground of all these different types of roadmaps is the generic framework through which the information is structured. The flow diagram shows this generic structure, that is determined by two axes: time (on the horizontal axis) and the perspectives or roadmap layers (on the vertical axis). Roadmap elements, and their mutual relations are positioned within this framework. These elements can be (research) activities, technology developments, projects, milestones, etc. They are depicted by the coloured blocks and triangles in the picture.
There is no fixed timeframe for roadmaps; a roadmap for a single research program might cover a



few years and include roadmap elements on a monthly basis, whereas a high level strategic roadmap might cover several decades in much less detail.

The roadmap perspectives, or viewpoints, represent the horizontal layers in the picture. The top layer is the strategic perspective, the middle layer is the functional perspective and the bottom layer is the instrumental perspective.

HOW TO DO IT: ROADMAPPING

When starting up an innovation development, roadmapping can help in planning and structuring your efforts. It ensures that you are aware of goals on different levels and that you can tune your activities in time to these goals. Furthermore, it can be very useful to create a common picture for all relevant stakeholders at the start of your project. Each roadmapping process is tailored to the situation. This chapter provides a guideline for the generic roadmapping process.

ACTIVITY	FORMAT (E.G. WORKSHOP, INTERVIEW, DESK RESEARCH)	TIME NEEDED (IN DAYS, PER WORKSHOP/ INTERVIEW)	PEOPLE TO BE INVOLVED	RESULT
Step 1: Definition phase	Discussion within project team	One day, can be more depending on level of consensus at the start	Project team	Clear boundaries for roadmap
Step 2: Construction phase	Can be a combination of workshops, interviews, and desk research (possibly including an technology scan) for collection of roadmap elements, afterwards fine-tuning is needed between these elements	To be determined during the definition phase, highly dependent on the complexity of the subject and the field of stakeholders. Usually through a number of half-day workshop sessions, with homework in between	Relevant stakeholders	Version 1.0 of the roadmap
Step 3: Implementation phase	No format: Use of the roadmap for communication and decision support, and updating of the roadmap	Ongoing process (frequency needs to be determined in earlier phases)	Roadmap custodian	Updated version(s) of the roadmap. Use of the roadmap for communication and decision support

WHO

The following roles can be defined in roadmapping:

- Initiator; this is the ‘owner’ of the roadmap and will function as its custodian. He or she has an interest in development of the roadmap, is usually in charge of the funding of the roadmap process and the decision making regarding the roadmap.
- Core roadmap team; this is a small team of experts on the content of the roadmap (preferably not more than 6 people, including the initiator) who will be able to sketch the broad outline of the roadmap.
- Greater roadmap team or other stakeholders; these experts will provide more detailed input on the roadmap subject.
- Process facilitator; he or she guides the roadmap team through the process.

WHEN

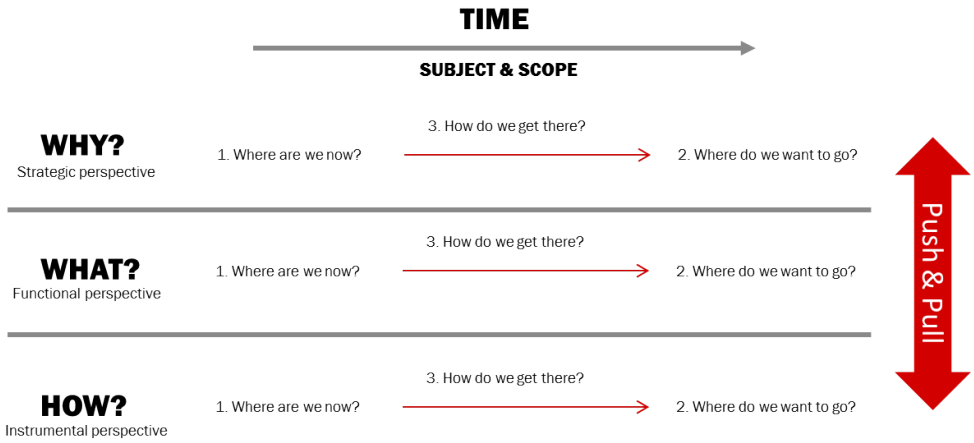
Roadmapping is often used to make decisions on a strategic level, prior to project definition. However it can also be used to plan how the technology needed for the innovation will develop over time and how this is planned in activities of the project. This can help in communicating to higher management what is in scope and what is out of scope for the project.

RESULTS

The result is usually a roadmap document, describing the subject and scope and all the roadmap elements and a roadmap picture that can be used for communication.

TEMPLATE: ROADMAPPING FRAMEWORK

The generic roadmapping framework



The picture shows the generic roadmapping framework, which can be seen as the roadmap template. For each of the three perspectives, the following questions need to be answered to define the roadmap elements:

1. Where are we now?
2. Where do we want to go?
3. How do we get there?

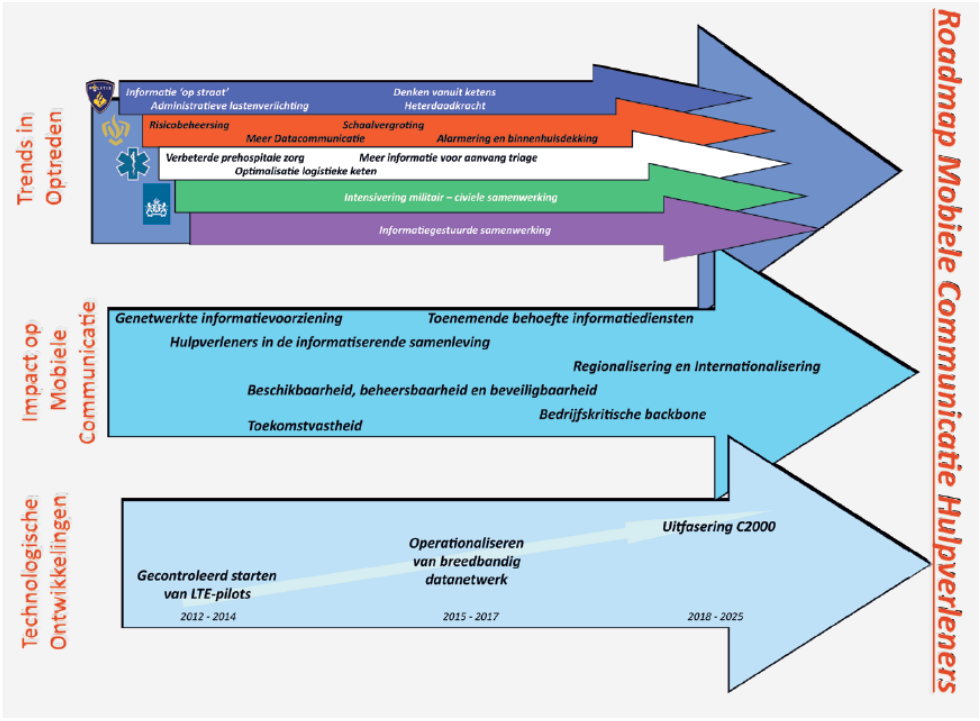
Each question can have multiple answers, that can be placed on different moments in time. Afterwards, the three perspectives (or levels) should be combined into one roadmap. This step involves fine-tuning the planning of the elements. All interdependencies, for instance action B cannot start before action A is finished, should be taken into account. This fine-tuning can be a complex process, but it is key to a good roadmap.

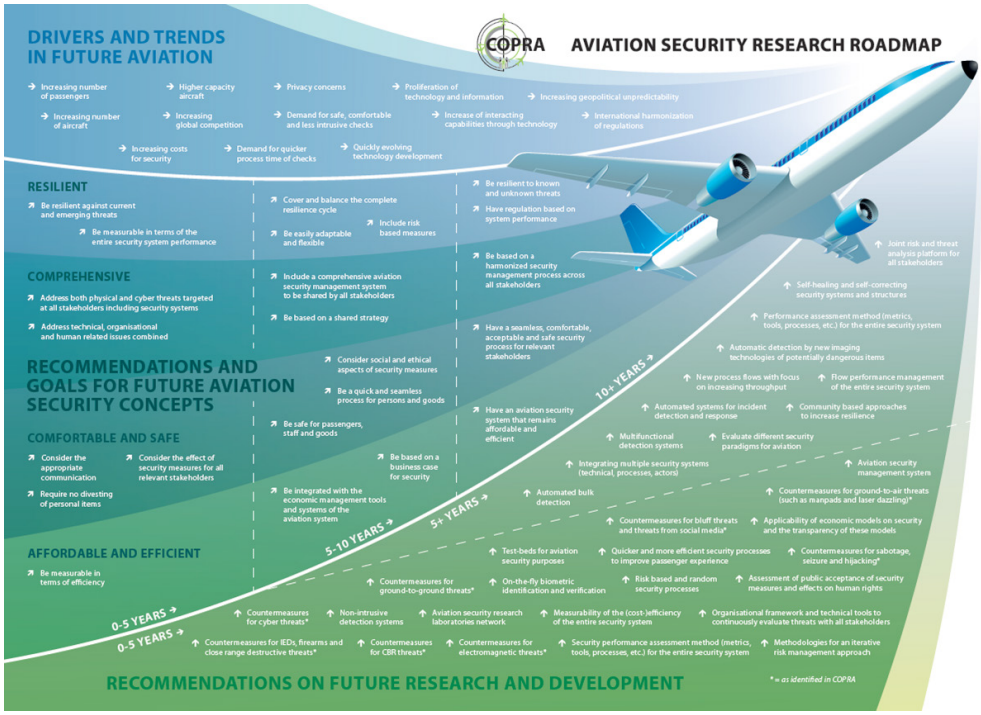
TEMPLATE: INNOVATION SCAN

When instigating innovation, it is important to have a broad view of upcoming innovations or developments in science and technology. An innovation scan will provide a comprehensive picture of the developments in a certain field of research and technology. It can be done as part of roadmapping, or an independent activity. The innovations can be collected in a database, with columns describing relevant properties of the innovation. The table displays an example of categories in the columns.

NO.	NAME OF INNOVATION	EXPLANATION OF INNOVATION	EXPECTED IMPACT	DISRUPTIVENESS	CURRENT TRL	EXPECTED YEARS TO TRL 9	CURRENT SHORTFALLS
1.							
2.							

EXAMPLES


Roadmap Mobiele Communicatie Hulpverleners
Trends in Optreden
Informatie 'op straat'
Administratieve lastenverlichting
Denken vanuit ketens
Heterdaadkracht
Risicobeheersing
Schaalvergroting
Meer Datacommunicatie
Alarmering en binnenhuisdekking
Verbeterde prehospitale zorg
Optimalisatie logistieke keten
Meer informatie voor aanvang triage
Intensivering militair – civiele samenwerking
Informatiegestuurde samenwerking
Impact op Mobiele Communicatie
Genetwerkte informatievoorziening
Toenemende behoefte informatiediensten
Hulpverleners in de informatiserende samenleving
Regionalisering en Internationalisering
Beschikbaarheid, beheersbaarheid en beveiligbaarheid
Bedrijfskritische backbone
Toekomstvastheid
Technologische Ontwikkelingen
Gecontroleerd starten van LTE-pilots
2012 - 2014
Operationaliseren van breedbandig datanetwerk
2015 - 2017
Uitfasering C2000
2018 - 2025


DRIVERS AND TRENDS IN FUTURE AVIATION
COPRA
AVIATION SECURITY RESEARCH ROADMAP
Increasing number of passengers
Higher capacity aircraft
Privacy concerns
Proliferation of technology and information
Increasing geopolitical unpredictability
Increasing number of aircraft
Increasing global competition
Demand for safe, comfortable and less intrusive checks
Increase of interacting capabilities through technology
International harmonization of regulations
Increasing costs for security
Demand for quicker process time of checks
Quickly evolving technology development
RESILIENT
Be resilient against current and emerging threats
Be measurable in terms of the entire security system performance
Cover and balance the complete resilience cycle
Include risk based measures
Be easily adaptable and flexible
COMPREHENSIVE
Address both physical and cyber threats targeted at all stakeholders including security systems
Address technical, organisational and human related issues combined
Include a comprehensive aviation security management system to be shared by all stakeholders
Be based on a shared strategy
RECOMMENDATIONS AND GOALS FOR FUTURE AVIATION SECURITY CONCEPTS
COMFORTABLE AND SAFE
Consider the appropriate communication
Consider the effect of security measures for all relevant stakeholders
Require no divesting of personal items
Consider social and ethical aspects of security measures
Be a quick and seamless process for persons and goods
Be safe for passengers, staff and goods
Be based on a business case for security
Be integrated with the economic management tools and systems of the aviation system
AFFORDABLE AND EFFICIENT
Be measurable in terms of efficiency
Be resilient to known and unknown threats
Have regulation based on system performance
Be based on a harmonized security management process across all stakeholders
Have a seamless, comfortable, acceptable and safe security process for relevant stakeholders
Have an aviation security system that remains affordable and efficient
Joint risk and threat analysis platforms for all stakeholders
Self-healing and self-correcting security systems and structures
Performance assessment method (metrics, tools, processes, etc.) for the entire security system
Automatic detection by new imaging technologies of potentially dangerous items
New process flows with focus on increasing throughput
Flow performance management of the entire security system
Automated systems for incident detection and response
Community based approaches to increase resilience
Multifunctional detection systems
Evaluate different security paradigms for aviation
Integrating multiple security systems (technical, processes, actors)
Aviation security management system
Countermeasures for ground-to-air threats (such as manpads and laser dazzling)*
Automated bulk detection
Countermeasures for bluff threats and threats from social media*
Applicability of economic models on security and the transparency of these models
Test-beds for aviation security purposes
Quicker and more efficient security processes to improve passenger experience
Countermeasures for sabotage, seizure and hijacking*
Countermeasures for ground-to-ground threats*
On-the-fly biometric identification and verification
Risk based and random security processes
Assessment of public acceptance of security measures and effects on human rights
Countermeasures for cyber threats*
Non-intrusive detection systems
Aviation security research laboratories network
Measurability of the (cost-)efficiency of the entire security system
Organisational framework and technical tools to continuously evaluate threats with all stakeholders
Countermeasures for IEDs, firearms and close range destructive threats*
Countermeasures for CBR threats*
Countermeasures for electromagnetic threats*
Security performance assessment method (metrics, tools, processes, etc.) for the entire security system
Methodologies for an iterative risk management approach
0-5 YEARS
0-5 YEARS
5-10 YEARS
5+ YEARS
10+ YEARS
RECOMMENDATIONS ON FUTURE RESEARCH AND DEVELOPMENT
* = as identified in COPRA

LITERATURE

Hasberg M.P., I. Weima and L. van Lier (2012) *Technology roadmapping: Waarom, wat en hoe?* TNO, The Hague.

LINK TO OTHER CHAPTERS

INNOVATION ECOSYSTEM
One of the results can be to focus on a specific area of technology. This can be used as input for an innovation ecosystem analysis to determine the strategy on how to create a good position in that field of technology.

TEAM VISION
This chapter can help the team to come up with potential solutions that can also be included in the roadmap. Furthermore the tools in this chapter support the further concretization of challenges posed in technology planning goals.

FOCUS
When members of the team are clear the long term vision and strategic, functional and instrumental goals help the team to create a first idea of the bigger picture from the technology perspective.

ITERATIONS
In the technology planning also different phases of development and technology maturity can be included. This chapter about iterations supports that way of thinking and can help to plan the different (intermediate) results and milestones.

PROPOSITION
The potential proposition based on the technology depends on what technology is developed when. And it also works the other way around: based on feasible and desirable propositions the focus in technology planning can be directed.

FINANCE
Based on choices made in what technology to develop when, it is possible to make a selection of possible funding mechanisms. It also works vice versa: if you know about certain funding mechanisms that are in line with the ambitions, you can adjust the technology planning accordingly.

SHARED VALUE

AUTHORS: Rosalinde Klein Woolthuis, Frank Berkers, Mirjam Groote Schaarsberg

DATE: October 2015

HOW TO CREATE SHARED VALUE IN AN ECOSYSTEM.

The most successful innovations in the future are those that create value for multiple stakeholders. Hence developing an innovation in collaboration is needed.

TNO innovation for life

CREATING SHARED VALUE
CANVAS
ECOSYSTEM
SUSTAINABLE BUSINESS
SOCIETAL NEEDS

THE IDEA IN SHORT

The most successful innovations are those that create value for multiple stakeholders. Shared Value Creation (Porter & Kramer (2011)) denotes how by rethinking products and markets, real innovations can be created that do not focus on reducing negative externalities, but focus on creating value for multiple stakeholders by addressing real and pressing societal needs (clean water, safety, housing etc.). This leads to the creation of new and growing markets and simultaneous improvement of profit, planet and people. With a design of the future actor network that collaboratively creates value, you ensure to prosper on the long term as an organization, but also as a society; a true win-win situation.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

Whereas previously companies focused on shareholders and profit maximizing, future successes will be much more created in collaboration with stakeholders and be focused on shared value creation. To reap the opportunities of shared value, technological innovations have to be considered in their wider context: For whom can the technology create value? Which Grand Challenge (as defined by the European Commission) does it address? A shared value perspective focuses on expanding value by unlocking real demands: e.g. clean drinking water, healthy food, good housing. Shared value, is not about personal values. Nor is it about "sharing" the value already created by firms (revenue sharing), but is about expanding the total pool of economic and social value. By doing more business, more societal value is created.

An example is a low-priced cell phone in India for which Thomson Reuters (2015) has developed a monthly mobile service for farmers who earn an average of $2,000 a year. For a fee of $5 a quarter, it provides weather and crop-pricing information and agricultural advice. The service reaches around 2 million farmers, and early research indicates that it has helped increase the incomes of more than 60% of them—in some cases even tripling incomes. Both Thomson Reuter as the farmers earn money; productivity increases and local spending increases.

WHY IS IT A CHALLENGE TO DO THIS?

Shared value is a multi-dimensional concept: Whereas Tesla might 'just' be a successful entrepreneur considered from a profit perspective, the company also creates values for other stakeholders: CO2 reduction for cities, cost reduction for taxi drivers, knowledge build-up for the industry. These values cannot be exchanged as in a normal transactional buyer-seller relationship, instead a (complex) network enables the success of an innovation. For some stakeholders the value lies beyond the business transaction; i.e. when the product or service is being used. This requires a better understanding of the usage context and ways to measure the impact. Also some if these values are difficult to quantify. Another challenge is the fact that many shared value innovations rely on prerequisites in the usage context; the availability of mobile phones, or a wifi network. If this is not in place, it should also be taken into account in developing the innovation.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- The innovation is intended to address a Grand Challenge, a societal value and you want to design the possible future actor network in context of an ecosystem in a sustainable way
- The innovation is useful for multiple sectors, and different stakeholders, e.g. both public and private parties
- If you want to understand coherence and risks associated with direct and indirect interdependencies between actors in your targeted ecosystem
- If you want to understand and manage the way value is created with your innovation

WHAT LITERATURE SAYS ABOUT IT: SHARED VALUE CREATION

Shared Value Creation (SVC) is the creation of economic, societal and or environmental value by rethinking product, markets and value chains. The idea was originally coined by Porter and Kramer (2011) as a response to developments in Corporate Social Responsibility (CSR). One of the key differences with CSR is that CSV is engrained in the primary business process.

The basic premise is that fulfilling specific activities is the way to create value. An actor can fulfill these activities all by himself, but to reach his objectives and create value, the actor might need the activities of others (as in input or as a complement). Resources (tangible and intangible) are the necessary inputs for fulfilling the activities and creating value. Also here, the resources can be owned by the actor, but he might also need access to resources of other actors.

Dittrich and Van Dijk (2013) warn for financial tunnel vision in multi-stakeholder innovation projects. They emphasize on uniting those stakeholders on a set of values. In the converging ecosystems of telecoms, internet and digital media, Berkers et al. (2014) analyze the dynamics in an ecosystem by mapping the assets and actors through a chain of (value creating) activities. These two papers formulate our main starting point (basic premise): shared value is created via activities and resources employed by a group of interdependent actors.

The abstract concept of value creation in an interdependent actor network can be depicted in the following questions:

- What activities does the actor fulfill?
- Which value does it create for the actor (internal objectives; stakes)?
- Which value does it create for other actors in the ecosystem (value proposition)?
- What resources (tangible/intangible) are employed by the actor?
- How is value captured by transactions between actors?
- Which resources (or assets) are affected (increased, decreased)?

Note the difference between objectives (internal values; stakes) and value proposition (external values; both objective and subjective). Based on these premises and questions we designed a value creation canvas, which can be used to design the (changing) ecosystem of a (technological) innovation.

The value creation canvas is inspired by the business model canvas of Osterwalder & Pigneur (2010), but it focuses more on shared value modeling rather than business modelling. Note that this intervention is rather new, quantification of values and value alignment is still being researched. For example one can use the value case methodology (Dittrich and Van Dijk (2013)) for aligning values in a multi-stakeholder (investment) decision.

HOW TO DO IT: SHARED VALUE WORKSHOPS

In a Shared Value Workshop, in which representatives of all relevant stakeholders participate, we use the Value Creation Canvas to obtain insights in shared value creation. The goal of these workshops is to answer the following question: How can we collaboratively create shared value for the current (directly involved) stakeholders as well as for society?

The interrelation between resources, activities, values and actors is summarized in the Value Creation Canvas, which will be the main tool during the shared value workshop.

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT	PURPOSE
Step 1: Definition of scope	Discussion in project team meeting	Maximum of one day	Project team, client could also be included	Clear boundaries for technology scan	Preparation, activate domain knowledge of facilitator
Step 2: Scanning literature	Desk research	Depending on scope	Technology experts	Table of technologies / innovations	Prepare individual perspectives
Step 3: Workshop with technology experts	Workshop	Approximately one half day (possibly more workshops needed, depending on scope)	Technology experts, facilitator	Evaluated list of technologies (possibly including some homework for technology experts in adjusting the list)	A common view on the “Ist” situation
Step 4: Assessment of technolo-gies	Workshop (for instance a Disruptive technology assessment game)	Depending on type of assessment	Depending on type of assessment	Selection of relevant technologies	A common view on the “Soll” situation
Step 5: Analysis and collective action	Desk research, interviews, plenary session (or mini workshop)	One day per value network/ case. One extra day for plenary sessions	Same partici-pants and preferably some ‘real’ decision makers.	Realistic value networks and set of actions.	A common view on the “Soll” situation Evaluation and improvement of the innovation; commitment

WHO

The stakeholder organizations are identified either prior to step 1 or in step 1. The stakeholder representatives eligible for participation are typically involved in strategy and/or innovation. The need to be familiar with company strategy and business modeling. Participants should be part of or advisory to company decision making units.

WHEN

When there is some idea about the value creation of the innovation and the possible stakeholders that need to be involved.

RESULTS

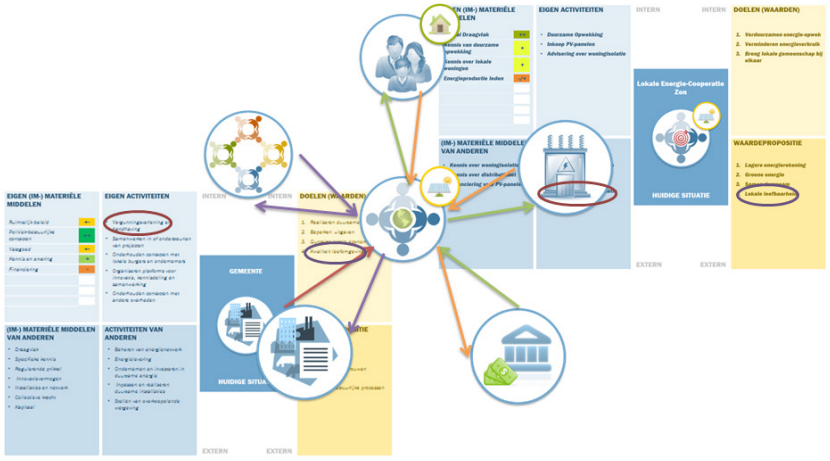
The output of this is an agreed upon design of the collaborative business model that creates shared value, accompanied with an initial evaluation, identification of and commitment to clear next steps.

TEMPLATE: VALUE CREATION CANVAS BASIC TEMPLATE

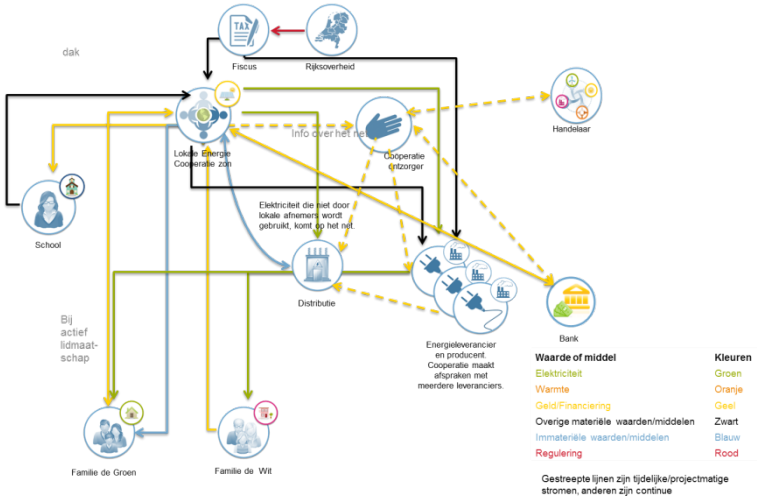
This canvas captures a simplified business model for the current and future situation for the specific actor. It captures activities and resources of both the focal actor as well as from network partners. It expresses the stakes of the focal actor and the value offered to its customers. By comparing what a stakeholder can offer (upper row) with what other stakeholders need (lower row of other stakeholders) and vice versa, a network of stakeholders appears in which different values are exchanged.

CASE: STEM

In the project “energy transition from the bottom-up” the research question how can local sustainable energy initiatives contribute to the transition towards a more energy sustainable Dutch ecosystem? was answered using (amongst others) the concept of Shared Value Creation.
Matching the canvasses with what stakeholders made themselves and what they need from others showed the potential for value exchange bilaterally. Combining all those bilaterial value exchanges resulted in the shared value web (lower picture). This was done for a current and future shared value web in order to identify the main gaps between current and desired situation (only the current situation is visualized on this page).
Stakeholder representatives could easily and cooperatively conclude that for example in the current situation the flow of capital did not match the flow of goods and services on the level of the local initiatives. The visualization, the common language and the ease of comparability were appreciated by the participants.



Potential for value exchange: shared value web



Potential for value exchange: bilateral matching

LITERATURE

Porter, M. E. & M. R. Kramer (2011) “Creating shared value” *Harvard business review* 89.1/2: 62-77.
Dijk, W. van & K. Dittrich. “Value Case Methodology” *TNO Whitepaper.*
Nooren, P. A., et al. (2014) “Regulation in the media-internet-telecom value web: Introducing the Damian method for systematic analysis of the interdependencies between services, organisations and regulation” *No. TNO 2014 R11482* TNO Delft The Netherlands.
Osterwalder, A. & Y. Pigneur. (2010) *Business Model Generation: A Handbook For Visionaries, Game Changers, And Challenger*s Wiley.
European Commission *Societal Challenge*s. Accessible on https://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges
Ntungwe Ngalame E. (2015) *Weather centers to arm Central Africa’s farmers against climate shifts* Reuters. Accessable on http://reut.rs/1FaWMiC

LINK TO OTHER CHAPTERS

COLLABORATION STRATEGY
A shared value analysis is input for what partners might be wise to explore a partnership with. This chapter should be seen for each organization individually, or a group of organizations that is willing to include another partner.

AGREEMENTS
This chapter makes explicit how the value is exchanged and who gets what in return. Negotiations on the terms can be directed by what is determined as the shared value in which the value on organizational and societal level are taken into account.

FOCUS
To determine what shared value organizations would like to develop the big picture should be defined. This chapter can help in determining the big picture.

PROPOSITION
Shared value defines an ambition that is formulated on a system level. This chapter details the shared value ambition to concrete propositions for user groups and customers.

ADOPTION
Having a shared value strategy can greatly benefit the adoption of the innovation by different stakeholders. However also separate activities need to be defined in more detail on how to influence the people and their behavior to ensure they also see and feel the added value that is assumed in the shared value analysis.

COLLABORATION STRATEGY

AUTHOR: Pepijn Vos **DATE:** October 2015

HOW TO DECIDE IF (FORMAL) COLLABORATION WITH EXTERNAL PARTNERS IS THE MOST SUITABLE GOVERNANCE MODE.

Collaboration with external partners is not a goal in itself. It is one of the instruments (a governance mode) which can be used for realizing desired shared value. This could be on a project, business unit or organization level. It is a way to get access to external resources and combine it with internal resources for realizing your goals.

TNO innovation for life

COLLABORATION STRATEGY
ALLIANCE STRATEGY
MAKE
BUY OR ALLY DECISION
GOVERNANCE MODE
SOURCING STRATEGY

THE IDEA IN SHORT

Nowadays, collaboration is seen more and more as thé way to realize desired (innovation) goals and impact. Top management often push project leaders and program leaders to form collaborations. Because of the potential disadvantage, costs and risks of collaboration, it should however be considered if collaboration is the best option for all activities needed for realizing the desired (innovation) goals and impact.

The challenge for each project leader, business unit manager or corporate management is to select the right governance mode(s) for their activities enabling them to realize their goals and impact in a fast, efficient and effective way. This chapter explains the different alternative governance modes and their advantages and disadvantages.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

Collaboration could improve your project outcome and impact. This is because by collaboration you are able to share risks and costs with your partners, to get faster and more flexible access to relevant resources (e.g. knowledge, technology, facilities, networks, access to market) provided by your partner, to get access to resources which are not available by purchase, to learn faster, to create support among your stakeholders and to combine heterogeneous resource enabling you to create more radical innovations. However, collaboration has also a downside (e.g. costs). Not having a clear understanding if collaboration is the best option often results in spending more time, effort and costs in forming a collaboration as well as getting sufficient support from internal stakeholders. Selecting the right governance mode to realize shared value, enables you to create more, faster and better (project) results and impact.

WHY IS IT A CHALLENGE TO DO THIS?

It is not always clear that you have alternative governance modes and what their advantages and disadvantages are. Decisions can be made without a clear understanding about the implicit concession that is made as well as the potential consequences and risks which follows the decision. For example, collaboration could be a good strategy. However people are not always aware of the consequence that forming an alliance is often a costly and time spending process. As there are many successful examples of collaborations, it seems the way forward, although the situation at hand might be different. Also if intuitively making the right decision no questions will be asked. If this decision eventually appears to be wrong, it is more difficult to explain why the decision has been made. This could create resistance and harm the progress of activities.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- When you have limited resources (e.g. knowledge, technology, skills, facilities, network) available for realizing the desired (innovation) goals.
- When management, ask you to form a collaboration.
- When you think collaboration with external could help you to realize your innovation goals faster, better and cheaper.
- To create sufficient management support for and acquire sufficient resources for forming a collaboration

WHAT LITERATURE SAYS ABOUT IT: COLLABORATION GOVERNANCE MODES

Governance modes refers to way resources and activities are structured and managed. Three types of prototypical governance modes are:

- **Make**: i.e. allocate internal resources via hierarchical control. Organization have full control over resources, activities and results. In other words do it yourself or conducting the activities autonomously.
- **Buy** or outsourcing: i.e. leverage resources(e.g. facilities, technology, human capacity) from a supplier by using price mechanism as steering. Your organization makes the decision which supplier will be able to provide the relevant resources based on price/ quality-relationship
- **Collaborate**: i.e. your organization combines own resources and resources from an external partner. The governance is based on mutual coordination. Your organization decide to share resources, costs, risks and results.

Advantage & disadvantage

The three modes are often used in combination with each other. Each governance mode has its own advantages and disadvantages.

	MAKE	BUY	COLLABORATE
Properties	– Very limited dependent on external organizations – Full control of resource (allocation) and process	– Limited dependent on external organizations – Limited control of process and resources	– High dependent of external organizations – Shared control of resources and process
Advantages	– All intellectual ownership – Protection and development of (new) competences – Able to adapt to internal and external requirements quickly	– Quick access to available resources – Negotiations with different suppliers will lead to optimal price – Intellectual ownership is possible via purchase agreement	– Access to resources which are not available by purchasing – Fast and flexible access to resources – Shared investment and risks – Getting to a critical mass
Disadvantages	– Developing own resources is costly and goes slowly – Risk of excessive rules and procedures – Limited resource (knowledge) and innovation possibilities	– Not all resources are directly available – Power abuse and information asymmetry could lead to high prices – Dependency: supplier has after commitment an interest to increase their margins	– Shared results: distribution issue – A common learning process is difficult to organize – Limited influence on process and results – Performance is difficult to measure

Source: Translated from Vos & Tjemkes (2013)

DIFFERENT THEORETICAL RATIONALES

Numerous of theoretical perspectives provide rationales for governance mode-decision (or alliance strategies, sourcing strategies). Contingent on a theory's assumptions and related key constructs, each theory provide different explanations. Some of those theories are 1) transaction cost economics, (2) the resource-based view, (3) resource dependence, (4) strategic management theory, (5) social network theory, (6) the organizational learning perspective, and (7) institutional theory. See Tjemkes et al. (2012) for more information about each theory in relation to the governance mode decision.

HOW TO DO IT: FORMULATING A COLLABORATION STRATEGY

The following steps describe a generic approach to formulate a collaboration strategy. Depending on the importance and relevance for a well-founded decision, the steps can be done in a light or more intensive way.

Step 1: Determine (project) goal, main activities and required resources

To able to choose the right governance modes enabling the organization to realize their desired goals and impact, it is important to formulate the goal and impact as SMART as possible. Hence determine which main activities have to be performed to realize this goal and which resources (kind, quality and quantity, see template: resource sheet) are needed. Keep in mind that this goal could be the collaboration goal. However it is possible that your collaboration partner has another goal. Chapter 4 Shared Value can support in making the shared goal explicit. This step is to determine which activities need to be done to reach that goal (the template Activity Sheet can support this).

Format: Small workshop (1-2 hours)

Step 2: Design your decision making framework

A decision making framework enable the organization to make an informed decision. To develop such a framework, you can use the criteria and norms in the example. However you could change this framework to make it more suitable for your organization and specific activity. By discussing this framework regularly with decision makers, helps you to identify potential risks and disadvantages of the different governance modes better.

Format: A workshop (half day, especially if the framework is new)

Step 3: Collect relevant internal and external information

To be able to make an adequate decision by using the decision making framework, information is needed about the internal and external environment. This could be present already, for example in existing (e.g. organization strategy, market analyses rapport), or by different people (e.g. management, business developers, people from strategy, purchase department, legal-department). Chapter 2 also supports in making an analysis. If not available, relevant information has to be collected, for example, conducting a stakeholder analysis.

Format: A combination of a workshop and interviews/ research (1-3 days, depending how much information is available and how thoroughly the decision has to made).

Step 4: Select governance mode

Against the background of the decision making framework and the collected information, your are able to decide which governance modes suit the best for the different main activities (step 1). The result is often not clear cut, i.e. the score on each criteria is not the same governance mode. If this is the case, use the result of this analysis as input for discussion and dialogue. Determine which mode suits the best and make explicit which concession your have to make and what the consequences and risks are. If the result is not satisfying, you have to revise your decision by reconsidering the first three steps or changing your goals.

Format: A combination of a workshop and interviews/ research (1-3 days, depending how much information is available and how thoroughly the decision has to made)

[..optional..] Step 5 Formulate collaboration plan and or make and purchase plan

Depending on the outcome of the decision for the activities needed to realize the desired goal, you can make this decision explicit in a document; a collaboration plan, make plan or purchase plan. If collaboration is the main governance mode this plan helps the internal organization to organize the process of forming a collaboration.

Format: Writing and feedback (1 day)

WHO

Key participants: the decision makers (project leader, program leader, client/management)
Supportive participants: providing input (e.g. advice): business developers, legal, control, research manager, theme director.

WHEN

Before you have meetings with potential partners

- When you are formulating your program and or project plan
- When you think collaboration could be a suitable for realizing your (project/ program) goals faster, better and cheaper
- When you felt internal and or external pressure to collaborate with external partners

RESULTS

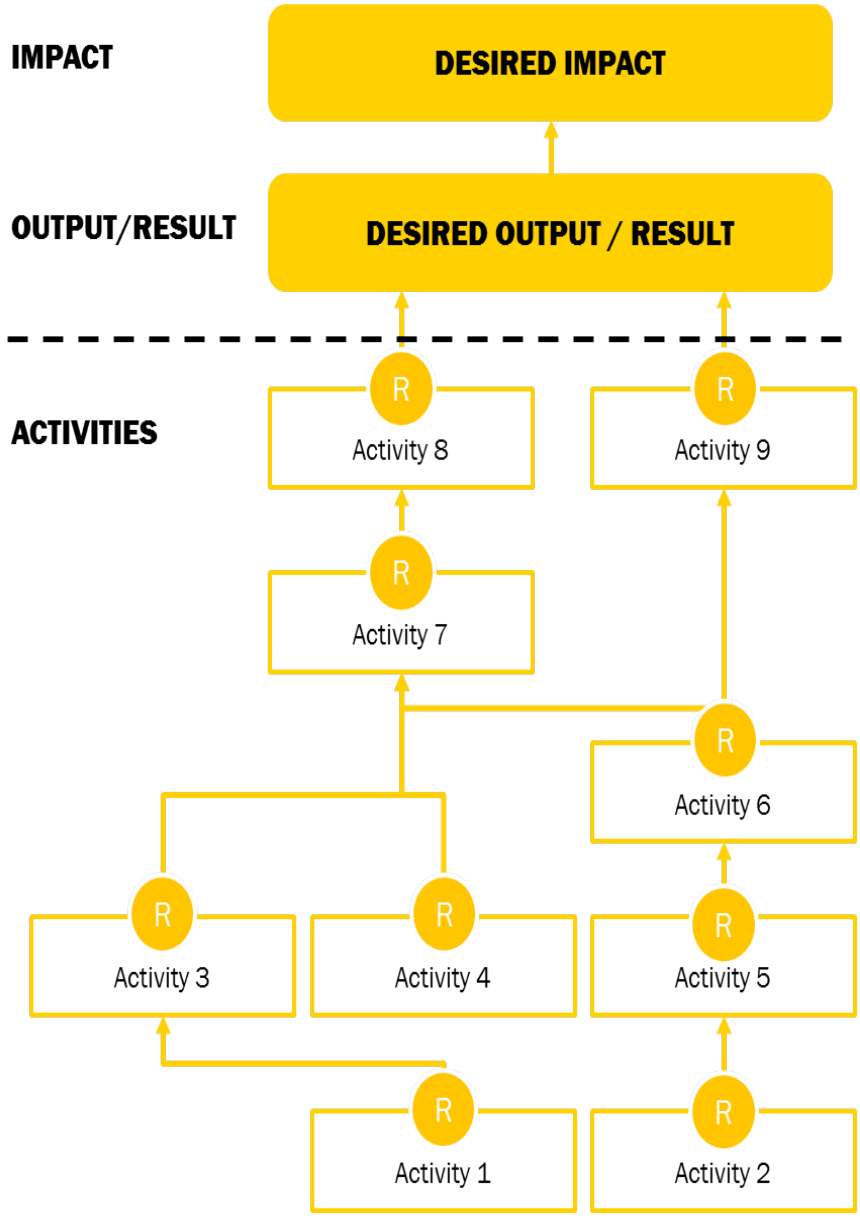
Collaboration-strategy-report

TEMPLATE: DECISION MAKING FRAMEWORK

A decision making framework consists of a set of criteria, a prioritization and norms. By using the decision making framework for evaluating the internal and external situation, you are able to decide and to motivate which mode is most suitable and to identify the (positive and negative) consequences of choosing this mode. It could facilitate the dialogue between the decision makers. This information will guide the process for forming the collaboration. In the table on this page you find an example of a decision-making-framework. The decision maker should develop such a framework for their own situation or organization.

CRITERION	DESCRIPTION	NORM
Core competence	Does this activity belong to the own core-competence?	The "Make" decision (do it yourself) enables the organization to focus on their core activity, while the supportive activities the organization can "buy" or collaborate.
Strategic position	Does collaboration improve strategic position of your organization?	To choose for "collaboration" enhances the position of the organization in its' environment, increase political power and reputation, increases access to financial sources and clients and blocked competitors.
Dependency	To which extent would you be in control over this activity?	The "make" decision provides full control over the resources, activity and results. While purchasing and collaboration lead to dependency of external partners.
Legitimacy	Pressure from external environment to collaborate?	Top choice for collaboration increases legitimacy in the external environment. While "make" and "collaborating"-mode could lead to resistance by external stakeholders.
Internal available resources	To which extent is it necessary that all needed resources are available internally?	The "make" decision is preferred if the organization has to have all needed resources for these activities available.
External available resources	To which extent have external parties needed resources available?	The buy decision prefers if the organization is able to select one supplier out of a group of suppliers.
Learning	To which extent would you like to build specific knowledge and expertise?	The "Make" decision (do it yourself) enables the organization to develop knowledge themselves. While collaboration provides access to existing knowledge, technology, facilities and experts in the market.
Management-costs	Which investment are needed for forming and coordination this activity?	Collaboration is preferred if you expect high management costs (which you can share with your partner), for example by high complexity, risks, repeating activities or long throughput-time.
Harm/risk	Could collaboration lead to unnecessary high risks?	The "make" decision is preferred if the organization creates risks related to integrity, objectivity, positioning, neutrality and image.
Commitment/ engagement	To which extent does the collaboration increase engagement of internal employees?	Collaboration is preferred if it increases engagement (e.g. commitment , loyalty, pride), organization culture and external orientation.
legislation	Is it aloud to collaborate with the legislation in force?	The choice of collaboration is preferred if legislation allows collaboration. Otherwise you have to choose between Make or Buy.
Collaboration competence	Have your organization the competence for forming and managing a collaboration?	The choice of collaboration is preferred if the organization stimulates collaboration and has collaboration capabilities which is available for forming and managing this alliance.

TEMPLATE: ACTIVITY-SHEET



TEMPLATE: RESOURCE-SHEET

ACTIVITY	REQUIRED RESOURCES (*)	PROVIDED/ AVAILABLE BY THEIR OWN ORGANIZATION	NEEDED FROM EXTERNAL PARTNER(S)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
[.....]			

** Specify which kind, qualify and quantify the resources and when (the SMARTER the better)*

LITERATURE

Vos P. & B. Tjemkes (2013) *Samen werken, samen winnen: aanpak voor het organiseren van publiek-private samenwerking* BIM Media BV
Tjemkes B. & P. Vos (2012) *Strategic Alliance Management* Taylor & Francis Ltd

LINK TO OTHER CHAPTERS

SHARED VALUE
This chapter can define which partners are wise to partner with. A collaboration strategy helps in defining the stakes an organisation has when determining its place in creating shared value.

AGREEMENTS
Once it is decided that collaboration is the right way forward, the agreements need to be formulated. Input from factors that were influencing the decision for collaboration shape the way an organization is negotiating the terms and conditions.

TRUST
To collaborate effectively with other organisations trust is needed between the organisations and the individuals that work together. Hence when deciding to collaborate include also activities that can build this trust.

STAKEHOLDERS
Whether you collaborate or not, you have to deal with the partners one way or the other. This chapter explains in more detail how to deal with all the other stakeholders that are not necessarily directly linked to the collaboration, but that you need for example for informal collaboration.

FINANCE
In considering collaboration or not, you also include factors that relate to financing future development. One of the reasons to collaborate can be that you can split resources, which makes a better business case. This chapter can help in creating this picture.

AGREEMENTS

AUTHOR: Pepijn Vos, Rosalinde Klein Woolthuis **DATE:** October 2015

HOW TO FORMULATE THE AGREEMENTS THAT ARE NEEDED WITH COLLABORATING PARTNERS.

Collaborations need to be formalized in an early stage: this helps to clarify individual and joint goals, and prevents disappointments and misunderstandings at a later stage.

TNO innovation for life

FORMALIZATION
COLLABORATION
GOALS AND VISION
CONTRACTUAL CLAUSES

THE IDEA IN SHORT

Formalizing a collaboration is important. Whereas collaborations often start in a fun and creative way, they also have to make sense in the long term. This requires a sound discussion on goals, visions, and work plans, but also on how benefits, losses and risks are shared in a fair way.

Contracting is hence the process in which partners can get to know each other and form a clear idea of their cooperation and each other. Whereas the end product is a contract with specific contractual clauses, the process is perhaps even more important as it helps to build up trust (see also chapter TRUST - How to create trust in multidisciplinary and multistakeholder collaborations) and make the collaboration a success.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

Innovative projects are characterized by high complexity and uncertainty. Therefore, the quality of the relationship is very important. Project goals and outcomes may change and hurdles will have to be overcome. Therefore partners should be able to rely on each other to solve it. The contracting process is essential for making goals and interests clear beforehand, for preventing misunderstandings, and for having guidelines to fall back upon when problems occur or plans change. Such guidelines may include clauses on how to deal with unforeseen circumstances, how to deal with losses or technological failure, or whom to call upon as mediator when misunderstandings occur. In that way the relationship can thrive also when the project is less successful, and partners can continue joint learning and specialization in a their field.

WHY IS IT A CHALLENGE TO DO THIS?

Contracts are often viewed in a negative daylight taking a long time to negotiate and only coming out of the drawer when there is a conflict. When all goes well though, the opposite is true: As partners develop better bonds, their mutual trust will make it easier to also discuss more difficult issues like: What do we do when things go wrong? Who carries the costs when the innovation causes an accident? When partners can openly discuss these issues and come up with collaborative contractual clauses to cover these issues, the contract becomes the ‘crown on their work’. This is a difficult but valuable process and it is recommended to engage of a trusted third party (e.g. an innovation orchestrator) to assist in this process.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- You want to further your technology or innovation and want to openly discuss in what way the partnership can work (individual and joint goals, short and long term).
- Your technology or innovation is going to start and tasks, responsibilities, investments etc. have to be defined.
- The technology has to be protected and clauses of secrecy of information and IP have to be made.

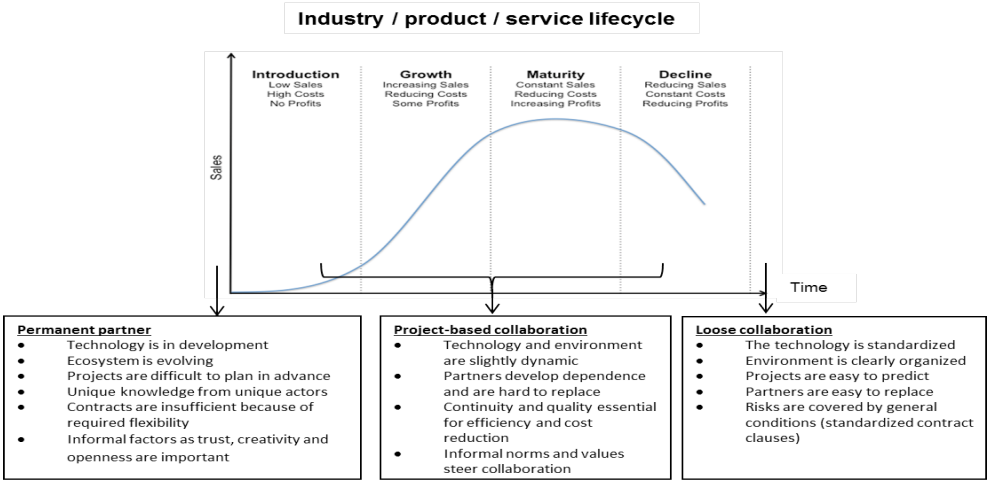
WHAT LITERATURE SAYS ABOUT IT: FORMULATING CONTRACTS

Contracts have to mirror the real relationship (Klein Woolthuis et al. 2005). This means that the contract has to fit with the goals of the partners, the technology, and the context in which the relationship takes place (Klein Woolthuis 2000). For a simple thing like purchasing new computers it suffices to compare partners on price and rely on standardized sales contracts that ensure warranties etc. But for complex new technological developments that involve multiple specialists partners that are mutually dependent, all aspects of the relationship have to be thought through. The more complex and long term the technological development will be, and the more dependent partners are on each other, the more the contract should reflect this.

When an innovation is in a very early stage of development, the uncertainty of technology development will be high, whereas substantial investments are required. This requires special collaboration with dedicated, long-term partners that are willing to jointly learn, be flexible, and share risks projects are hard to predict. Close and trusting partnerships should be formed (preferably contractually, e.g. in a joint venture) with unique specialist partners as this enables the flexibility, openness, and creativity necessary. In this stage, product sales are low, the costs are high and there is no profit yet.

As products and technologies become better defined and the market starts growing, uncertainty declines. Dominant technologies evolve, norms are developed, sales increase, and per unit costs decrease whilst profits are growing. This is the phase in which the profits of the innovation are appropriated. In this growing market, competition will increase and to stay ahead of competitors the quality and efficiency of the partnerships will be crucial. Hence continuity and shared values and commitments are crucial to the relationship. Long term project based relationships are key here.

When the market reaches saturation, the technology that first created a competitive advantage will have become wide-spread. The knowledge is no longer unique, and partners can be replaced quite easily. As margins decrease and sales growth stalls or declines, margins are under pressure and flexibility becomes key to switch to other products, markets and partners. Competition is based on efficiency and costs, and hence the collaboration will be guided more by strict deadlines. Mostly, loose project based collaborations will suffice here, or buyer-seller relationships.



HOW TO DO IT: FORMALIZING THE COLLABORATION

Whereas a contract is characterized by a number of clauses, the process of getting to the clauses is the most important. In this process, partners discuss goals and visions, and in a way visualize their collaboration and potential setbacks and successes before they really take place. This helps to make the collaboration a success. The process can be structured according to the following activities:

Definition of individual and shared goals and visions

A first step is to define individual and shared goals and vision: To what aim do parties want to collaborate? And is there a common ground for collaboration? Under what conditions?
If these questions can be openly discussed partners will understand more about what drives the other, and where joint goals can be formulated. It will help to define the scope of the collaboration and the duration, and contractual clauses can be adjusted to the parties' interests.

Definition of collaborative form

On the basis of the discussion on goals and vision, the parties can decide what collaborative form they want to choose. This form has to fit with their goals, but also with the context in which they operate. If the innovation is in an early phase of development, and the partners aim to develop a long term competitive position in this field together, close collaboration – perhaps formalized in a joint venture – is suitable. In a growing technology field, the high investments in time and money that this takes can be recouped, whereas in a declining industry this is unlikely the case.

Definition of contractual clauses

The eventual contract has to cover the various aspects of the collaboration. The first function is coordination: this is mainly focused on operational topics like what is the goal of the cooperation, who is executing what, who pays for what, how often do we meet, who is the project leader etc. This is to manage the project is a clear and organized manner and to avoid misunderstanding.
A second function is on how to deal with unforeseen contingencies. This refers to conditions that are beyond the control of the partners, but that can still influence the relationship. Examples are technological and market development or bankruptcy of an important supplier. The partners should decide on how to deal with this. The third function of the contract is collaboration or how to manage the long term relationship. How to adjust the relationship over time, and how deal with a situation in which (one of the) partners stops being collaborative or when a conflict arises.

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Determine individual and joint goals and vision	2 meetings	1 day	Project managers, all partners involved, third party	Part 1 Concept agreement: Goals, vision, vision
Step 2: Determine collaborative form	1 meeting	½ day	Project managers, all partners involved, third party	Part 2 Concept agreement: Collaborative form
Step 3: Determine contract clauses	2 meetings	1 day	Project managers, all partners involved, third party	Part 3 Concept agreement: specific clauses
Step 4: Formalizing contract	1 meeting for check draft contract, 1 meeting to celebrate	1 day + Check by legal advisors	Last check + celebratory event	Part 4 Contract

WHO

Representatives of all parties involved (directors or project managers with decision mandate). Preferably also a third party with experience in the contracting process should be involved. This third party can ‘translate’ between technological specialist, and translate operational wishes into concrete contractual clauses. Legal checks are only to be advised after operational agreement has been reached.

WHEN

Each time a new partnership is formed

RESULTS

Contract

TEMPLATE: DEFINITION OF GOALS

A first step is to define individual goals: To what aim do parties want to collaborate?

- Is it of strategic value to the party? Or to reduce operational costs?
- Is it for the long term, and to develop into a joint venture? Or is it short term to make use of a subsidy scheme?

	Operational	Tactical	Strategic
Individual goals	Partner 1 Partner 2	Partner 1 Partner 2	Partner 1 Partner 2 ....
Joint goals	Goal 1 Goal 2	Goal 1 Goal 2	Goal 1 Goal 2 ....
Shared vision			

TEMPLATE: DEFINITION OF ORGANIZATIONAL FORM

	Characteristics of market and technology	Type of partnership
Early stage	Uncertain High investment Complex	Look for permanent partners Contractual arrangements for both project realization and relationship coordination (e.g. process guidance) Invest in informal relationships also
Growth	High pressure efficiency / cost reduction	Long term project based collaboration Switch partners to remain competitive
Market saturation	Low uncertainty Partners can be replaced	Low commitment collaboration

TEMPLATE: DEFINITION OF CONTRACTUAL CLAUSES

Coordination	Goal and outcome of the collaboration Duration of the collaboration Project plan (project leader, meeting frequency, etc) Investments by all parties (who pays for what?)
Unforeseen contingencies	License agreement Pledge of secrecy Ownership of product / technology / method Patent rights.
Collaboration	Arrangement for conflict resolution (e.g. involvement of third party), Accountability for risks Arrangement for relationship adjustments or termination

CASE: QSTEP

The small entrepreneurial company Qstep had a great invention – a new medical device to fight obesity - but no distribution channel nor the manufacturing budget or skills to further develop the innovation and bring it to market. Therefore it sought collaboration with the multinational company InnoPRO.

As the companies were of such different size, and with a large difference in professional experience, an innovation orchestrator in the regional innovation center was involved to assist in the contracting process between parties, Contractor.

First of all parties discussed their individual goals: For Qstep the collaboration was of strategic value. They had already patented their invention and were now looking to become a key player in the growing market of obesity health products. They were looking for the most suitable partner to help them realize this goal. For them the risk was mainly to share their patent rights and loose part of the potential revenues from it.

InnoPRO did recognize this potential, but were at the same time operating in the very competitive and saturated market of general health products. Due to this, they had not been able to invest in promising new technologies in recent years. Their goal was to reposition their company in further specialized growth markets, and saw a good opportunity in the collaboration with Qstep as they could 'buy-in' the innovation they were lacking.

As both parties recognized the potential of the growing obesity related health product market, and saw how individual goals could mutually reinforce each other, they decided to formalize their collaboration. As it involved large investments, and a long term commitment to reposition the company, the partners decided to go through an elaborate contracting process. With help of Contractor, they discussed also how they would deal with unforeseen circumstances, how risks and losses would be shared, and how they would act when conflicts would arise.

	Tactic	Strategic
Goals	Qstep: Buy-in on manufacturing / distribution InnoPRO: Buy-in on innovation	Become key player / grow Reposition company
Joint goal	Develop innovation	Become key player obesity health products
Vision		Obesity growth market

The fact that they got through this difficult process in a constructive manner, helped build trust between the partners and strengthened their will to make the project a joint success. It also helped grow confidence in Contractor and they decided to call upon him as a mediator in case conflicts would arise to prevent having to go to court.

The day the contract was finalized, the partners spoke about it as a marriage and about their joint innovation as a baby. They celebrated the moment with a press release and a joint dinner. There was joy and much positive energy in the collaboration, and the partners were ready for the future.

LITERATURE

Klein Woolthuis, R.J.A., B. Nooteboom & G. de Jong (2013) “Roles of Third Parties in Trust Repair. An Empirical Test in High Tech Industries” in: A. Wick, J. Harris & B. Moriarty (eds.) *Public Trust in Business* Cambridge: Cambridge University Press.
Jong, G. de & Klein Woolthuis, R.J.A. (2009) “The role and content of formal contracts in high-tech alliances” *Innovation: Management, Policy & Practice* 11(1), 44-59.
Klein Woolthuis, R., B. Hillebrand & B. Nooteboom (2005) “Trust, contract and relationship development” *Organization Studies* 26/6: 813-840.
Klein Woolthuis, R.J.A. (2000) *Winnen kan ook samen, handleiding voor samenwerking* Publicatie van het Ministerie van Economische Zaken, Den Haag.

LINK TO OTHER CHAPTERS

TRUST
If it is clear what is in the agreement and all partners act according to what is agreed upon, this greatly benefits the trust between the partners involved. If however this is not the case trust is damaged. Hence be sure to live up to the expectations. And the more of the expectation are made explicit, the less unexpected surprises can happen along the way.

ITERATIONS
If the agreements say something about what should be delivered when, it influences the team planning on iterations. Similarly in formulating agreements it can be agreed what should be delivered when, and the approach of iterative development can be taken into account.

FINANCE
The agreements often also have to say something about how the activities are financed. A clear business case can help in shaping this.

COMMUNICATION
Often when agreements have been formalized it is a moment to communicate about it. Consider already a communication strategy at this point, as you can never make a first impression twice.

TEAM VISION

AUTHORS: Marc Steen, Jenny de Boer **DATE:** October 2015

HOW TO DEVELOP A SHARED VISION IN MULTIDISCIPLINARY TEAMS.

It is critical to develop a shared vision between the people in multidisciplinary teams. Especially if multiple stakeholders are involved. Ideally, the people involved can develop a shared understanding of the current situation, which they are trying to change for the better, and on possible solutions.

TNO innovation for life

UNDERSTANDING
DIALOGUE
CREATIVITY
COHERENCE
PERSPECTIVES

THE IDEA IN SHORT

A shared understanding of both the problem to be solved and of possible solutions, or of directions to look for suitable solutions at least, is critical. Although in setting up the project steps have been taken to clarify the problem and the possible solution, often the people actually doing the work are not the ones that either made the strategic decision to set-up the project, or the ones that have written the proposal. When starting a project, a clear shared understanding of the project brief and possible directions to look for solutions should be done with the team that is actually going to do the work.

The best way to do this, is to start with exploring the different ideas about the problem that is presented, and possible ideas about the solutions that can solve the problem. This is especially critical if the project involves innovation, i.e. that the end-result is unclear at the start, and if it involves multiple disciplines and diverse stakeholders, which is typically the case when working on complex ('wicked') problems. Creative problem solving supports in facilitating this process between team members and creates a shared vision and understanding for the project team.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

Just compare the results of a team that works without a shared vision and a team that works with an explicitly shared vision. The former team is likely to produce results that lack substance and coherence, so that they amount to little. The latter team is likely to produce substantive and coherent results, which are more likely to contribute to positive outcomes and positive impact. Furthermore a shared vision is important for effective communication and collaboration both in the project and even more with stakeholders.

Creativity—or 'creative problem solving' (CPS)—is a tool to organize divergence, collaboration and convergence of the problem and possible solutions. This is not about slippery-woolly-creativity, but about practical-productive-creativity. This can be organized by facilitating the communication process as a creative process, e.g., in one or a limited number of workshops—and by actually and practically developing a shared vision.

WHY IS IT A CHALLENGE TO DO THIS?

Developing a shared vision requires that the people involved engage in an open and creative dialogue, in which they are facilitated to express their ideas and knowledge (divergence), listen to each other (collaboration), and jointly work towards conclusions (convergence). People tend to overestimate their own skills of communication and collaboration and to underestimate the difficulties to communicate and to collaborate. In other words, the people in a project will tend to assume that they understand each other, e.g., that they have similar perspectives and visions, and that collaboration will work out nicely. Or, they know that they do not understand each other and choose to let that be—which is probably even worse.

WHEN IS THIS USEFUL IN YOUR PROJECT?

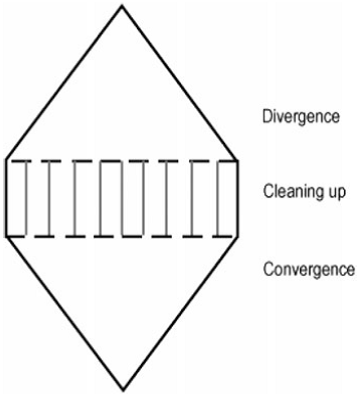
- If the people involved find it difficult to understand each other (or choose not to understand each other, which is probably worse)
- If the people involved find it difficult to understand and communicate what the project is about (or choose not to understand it, which is probably worse)

WHAT LITERATURE SAYS ABOUT IT: CREATIVE PROBLEM SOLVING

Creative Problem Solving (CPS) is beneficial in diverse situations. First, one might think of organizing a workshop in which people explore, develop, prioritize and select solutions. This is indeed a well-known application of CPS. But the same approach can be used in the process of exploring and articulating the problem that will be addressed. In fact, when working on complex (or 'wicked') problems, the process of problem-setting and solution-finding need to go hand in hand (Steen 2013). CPS then solves the problem of unclear vision: 'Which problem should we address in our project?'

Jan Buijs (who, interestingly, worked at TNO's Innovation Consulting Group from 1976 to 1986), pioneered CPS in the context of innovation projects in industry. He proposes that innovation processes consists of four aspects, which need to be understood and managed simultaneously: the contents of the innovation (e.g., the product that is being developed); the group dynamics in the project team and with others outside the team; the creative process, i.e. the process of diverging and converging, which involves a combination both content and groups dynamics; and leadership, which is understood as diverse people's attempts to steer the project (Buijs 2007).

Furthermore, Buijs proposed to understand and organize creative processes as consecutive phases of divergence (e.g., a brainstorm phase, in which people are encouraged to speak freely, to suspend judgement, and to build on other people's ideas), of cleaning up (e.g. clustering similar ideas into categories, in order to interpret the findings so far), and of convergence (e.g., prioritizing and selecting ideas for further development) (see also Buijs et al. 2009). See Figure.



Moreover, the starting point of such a CPS process is key. As is the follow-up.

- The starting point needs to be clear and understood by all participants. Lack of clarity will (always) lead to a meeting that is less satisfactory—on the content level, on the process level, or on both levels. It is advised to reserve, e.g., 15 minutes for making that clear. As indicated (above), it can be worthwhile to organize a CPS workshop just to make the problem more clear.
- Then, regarding the follow-up. A CPS workshop can easily result in 10 or more flip-over sheets filled with ideas. But that will not get the work done. Follow-up, i.e. making clear and specific agreements on what to do next really determines the success of the workshop. Therefore, it is advised to reserve, e.g., 15 minutes to discuss and clarify follow-up actions.

There are several common workshop formats. What many of these have in common is the following build-up: Critique (to discuss the current state of affairs; problem-setting); Fantasy (to explore more desirable situations; solution finding); Action (to articulate, short-term follow-up actions) (Junkt & Müllert, 1996).

HOW TO DO IT: CREATIVE SESSION

A creative session can be organized in several parts of the innovation project. They are short activities, often half day workshops, in which a multidisciplinary group of experts works towards solutions for a certain task. The task can range from creating a vision, to creating a technical solution or defining the target group. The key take-away of a creative session is to structure activities and use time constraints to come to concrete results in a short time period.
The location of a creative session can be of influence on the results. A room where people can walk and move and that stimulates to use different parts of the room, often leads to more possibilities in your creative session. A room full of tables and chairs forces all people to sit down, which make them less activated. Other than that funny objects, some sweets and enough post-its and colouring pencils are used to facilitate creativity in the session.

<table>
<tr><th>ACTIVITY</th><th>FORMAT</th><th>TIME NEEDED</th><th>PEOPLE TO BE INVOLVED</th><th>RESULT</th></tr>
<tr><td>Step 1: Planning the approach</td><td>Interview or desk research</td><td>1 day and preparing materials is needed</td><td>Facilitator, Project manager (problem owner)</td><td>Structure and goal of the creative session</td></tr>
<tr><td>Step 2: Understand the challenge</td><td rowspan="3">Workshop in 4 phases:
– Warm-up/ icebreaker
– Diverging
– Cleaning up
– Converging
– Detailing</td><td rowspan="3">Half day</td><td rowspan="3">Project manager, facilitator and multidisci-plinary team that has something to contribute to the challenge</td><td>Overview of complexity of challenge</td></tr>
<tr><td>Step 3: Generate ideas</td><td>Long list of ideas</td></tr>
<tr><td>Step 4: Preparing for action</td><td>Details about activities that need to be planned</td></tr>
</table>

WHO

- Project leader or the problem owner, mostly acts as an observer.
- Project members that can possibly give an answer to the challenge, or need to get a picture about it.
- A Facilitator to organize the creative session. This can be someone from the team whose expertise is not relevant in generating ideas, and doesn't have a stake in the outcome of the session. It can also be someone that is not in the project.

WHEN

Most creative sessions take place at the start of a project, or at the start of a new task. It can also be applied for specific questions that arise during the process. It can be applied to create technical solutions, as well as non-technical solutions such as a vision, project plan or communication strategy.

RESULTS

Flip charts, post it clustering, preference tables, etc. Depends on the exact workshop format that is chosen for the creative session.

TEMPLATE: COMMUNICATION CHECKLIST

Open communication is critical to collaborative innovation. Obviously, communication has two sides; expressing ideas, concerns and expectations is one side; listening to other people, and their ideas, concerns and expectations is the other. Communication requires efforts from the people involved.

Communication checklist in creative sessions to create a shared vision (from SSL-erate project Open Innovation Toolkit):

Explain interpretations

- Use language that other people can understand, e.g. avoid technical jargon
- If you need to use technical jargoTEAM VISIONn, you need to explain what you mean
- Check whether you have interpreted information correctly

Clarify assumptions

- Express any implicit assumptions, in order to avoid misunderstandings
- Ask for other people to also express their implicit assumptions
- Check whether you understood other people's assumptions correctly

Address problems

- Discuss any problems or challenges—preferably before they 'get out hand'
- Make sure others understand the problem or challenge
- Work together on exploring the problem and on finding solutions

EXAMPLE EXERCISE: POST-IT MAPPING

This exercise allows people to think individually before they share their ideas. The advantage is that everyone can come up with unique ideas and you can make a clustering of all the ideas while doing it.

You start wit a challenge formulated in “how to...”. For example “How to open bottles” or “How to drive safe”. When preparing this exercise also think of follow-up questions in case people can’t generate any ideas anymore. For example: “How to open bottles without any tools” or “How to make sure you passengers are safe while driving”. Allow the people to think of answers to the question for approximately 10 minutes. Ask them to write down each idea on separate sticky ntoes. In the meantime you can start a flip-chart or piece of a wall on which you map two axis. You have to think beforehand what should be the two axes. For example: amount of people that are needed for opening and amount of technology that is needed, or, innovative or conservative and individual or collective.

Then ask one person to tell what is his best idea and map it in one of the four quadrants. If other people have the same or similar idea ask them to stick it on the same place. Then the next person can tell his best idea and the process continues untill all sticky notes are put on the wall or flip chart.

The result can look like the picture you see on this page.

EXAMPLE EXERCISE: BRAINWRITING

Let's say you have a topic which can be divided in four different sub-topics all relating to the over-all goal. You can start generating ideas by:

- Write down each of the topics on separate sheets of paper (A3 is preferred).
- For each of the sub-topics you can specify aspects what you would like to know and write those different aspects in the 4 corners of the sheet.
- Divide the group of people in as many groups as you have sub-topics.
- Each group starts with one of the sub-topics and generates as many ideas on the different aspects as they can, and write that down on the sheet.
- After approximately 5 to 10 minutes the sheets are rotated clockwise between the groups. Each group now gets a sheet where the input of another group is already filled in. Now they have another 5-10 minutes to add to everything that is already on the sheet.
- After every group has seen all the sheets (in 4 rounds of 5-10 minutes), each group gets the sheet where they started of with.
- Now you can ask them to present the sheets to each other and write down the most important keyword per sub-topic.

LITERATURE

Buijs, J. (2007) 'Innovation Leaders Should be Controlled Schizophrenics ' *Creativity and Innovation Management*, 16 (2), PP 203-210.
Buijs, J., F. Smulders & H. van der Meer (2009) 'Towards a more realistic creative problem solving approach' *Creativity and Innovation Management*, 18 (4) pp 286-298.
Jungk, R., and Müllert, N. (1996) *Future Workshops: How to Create Desirable Futures* Institute for Social Inventions, London.
Steen, M. (2013). Co-design as a process of joint inquiry and imagination. *Design Issues*, 29 (2), 16-29.
Steen, M. (2013) 'Doelgericht samenwerken aan het oplossen van maatschappelijke problemen en vergroten van welzijn' *Perspectieven op de kennissamenleving* (34-44) Advisory Council for Science and Technology Policy, The Hague.
Steen, M. & P. Vos (2011) 'Innoveren door dialoog' *Innovatie die Werkt* (179-200) Boom Lemma, The Hague.
For more brainstorming and creativity exercises take a look at www.mindtools.com

LINK WITH OTHER CHAPTERS

Creativity processes can be useful in all kinds of areas, hence it can be applied to generate (part of) the plan or solution that is dealt with in the other chapters.

TECHNOLOGY PLANNING
This chapter can determine the starting point for the shared vision. Certain (longer term) goals set in roadmaps are often the starting point for creating new solutions.

SHARED VALUE
Often the shared value goal is formulated on quite a high level; it is less clear what needs to be done on a day to day basis. In creating the team vision the high level goal can be used as a starting point to create a shared idea of possible solutions, or possible directions to look for solutions.

COLLABORATION
Depending on the partners that are selected for the collaboration, the participants for creating the team vision can be selected. Ideally a multidisciplinary team can be formed in which all partners are represented.

PROPOSITION
Creativity techniques can help in formulating the proposition for end-users. The difference with the chapter for team vision, is that it is only focused on customers and end-users and less on details about the (diversity of) technological solutions.

ITERATIONS
The team vision is also an iterative process. During a project research is done, which creates answers. Based on the answers visions can be changed or more detailed.

TRUST
In creating a shared team vision, team members get to know each other. When applying creativity techniques also a playful and open atmosphere is created, which is good for creating trust. However in creating a team vision the focus is on content and solutions, rather than specific activities to create trust.

FOCUS

AUTHORS: Marc Steen, Jenny de Boer **DATE:** October 2015

HOW TO KEEP FOCUS ON ‘THE BIG PICTURE’ OF INNOVATION.

Articulating goals and monitoring progress regarding societal impact is increasingly important, especially if strategic goals are set to contribute to those challenges in shared value. In developing innovations it can be tempting to get lost in technology, but this should be combined with the focus on the big picture; the meaning and value it should create for individuals and society.

TNO innovation for life

SOCIETAL IMPACT
SHARE VISIONS
COMMON LANGUAGE
CO-DESIGN

THE IDEA IN SHORT

Innovation projects are increasingly evaluated in terms of their contribution to societal challenges, especially when the innovation is creating shared value for private and public organizations. In order to do so, a project team has to see beyond the immediate outputs of a project, by looking at its outcomes and impact; this will involve taking a leap forward to where the technology is adopted in society and individuals can benefit from the innovation.

This means the project team should include activities that provide input and proof to relate the *means*, e.g., a specific technology that is going to be doing some function, to the ultimate goal to enable people to flourish and develop the relevant capabilities to adopt the innovation. This gives the right focus throughout the project duration, and helps in supporting the project results.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

Ultimately, we do our projects in order to realize longer-term, positive impact in society. In shared value creation the societal value is created beyond the business transaction; when people are actually using and applying the innovation in day to day life and work. Making explicit how your project is contributing to the impact in society, and ultimately to human wellbeing and flourishing increases the focus on what we call "the big picture". What will it enable people to do? How will it improve their lives? How will they be better capable of what they want to do, than they were before the innovation had seen the light of day? On the one hand answering these questions helps in keeping focus on the big picture, and on the other hand it also serves as a right to play and it can even work as a big motivation for the project team as they see what their innovation leads to. Even if the technology is only enabling (for example computer chips), they will still have impact on the way we will live our lives a few years from now.

WHY IS IT A CHALLENGE TO DO THIS?

In the context of innovation, there seems to be a tendency to focus on means, on technology. Sometimes with the argument that it is not a technology that will be used by people. However also in these cases the technology eventually will end up in the market and will have an effect on the daily life. When only focusing on the means, it is a challenge to also focus on ultimate ends, and on human flourishing. One needs empathy (to empathize with future 'users' of the technology that is being developed), an open mind (to look beyond the immediate project's outputs, at the impact in society that the project aims for) and a little bit of fantasy (to transfer the enabling technology in new possibilities for people's lives). A beta mind is often not trained to do this. Human behavior and contexts in which the innovation takes place is often complex, with multiple internal and external factors influencing opinions and behavior. In innovation projects it is tempting and to some extent necessary to simplify this reality in order to develop the innovation. However the result should also be related back to this real world, real lives, and real people.

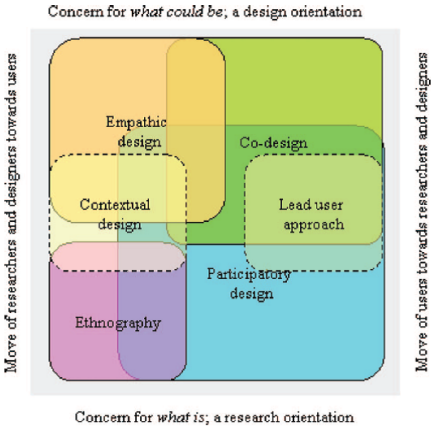
WHEN IS THIS USEFUL IN YOUR PROJECT?

- When you need or want to have a better understanding of how a technology can impact people's lives.
- When you need or want to have a better understanding of its impact in society.
- When you want to determine which markets or sectors can benefit (most) from the enabling technology.
- When you want to test your enabling technology in a real setting where it can make a difference.

WHAT LITERATURE SAYS ABOUT IT

Human-Centred Design

In Human-Centred Design (HCD), researchers and developers analyse human needs in order to shape the products and services which they are developing. Its goal is to develop products or services that fit users' practices, needs and preferences. The term HCD can refer to a range of approaches that share several principles (ISO, 1999): the active involvement of users for a clear understanding of their behaviours and experiences; the search for an appropriate allocation of functions between people and technology; the organisation of iterations of generating and evaluating solutions; and the organisation of multidisciplinary teamwork.

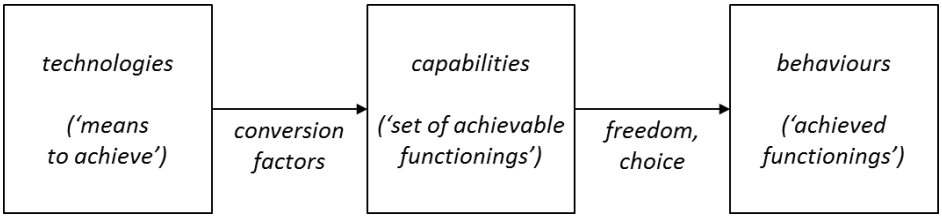


There are various approaches to organizing HCD, ranging from one-off exercises which make use of ethnographic studies to processes in which a constant dialogue is opened with users (co-design); approaches in which project team members move towards 'users', e.g. to learn about their daily lives, as in empathic design, to approaches in which 'users' are enabled to participate in the project, as in participatory design. Furthermore, approaches differ in their starting point or orientation, which can range from understanding present situations, as in applied ethnography, to exploring new possibilities, as in co-design. For details on these approaches, see Steen 2011.

Capability Approach

The Capability Approach (CA) aims to make sure that people have all the relevant capabilities to lead meaningful and fulfilling lives. The CA 'is generally understood as a conceptual framework for: 1) the assessment of individual well-being; 2) the evaluation and assessment of social arrangements; and 3) the design of policies and proposals about social change in society' (Robeyns, 2011). The CA was developed by economist Amartya Sen (e.g., 1999) and philosopher Martha Nussbaum (e.g., 2011).

The CA promotes the development of freedom, conceptualized as human capabilities: 'what people are effectively able to do and be' (Robeyns, 2005), e.g., the capability to eat healthy food, to maintain meaningful relationships, or to engage in recreational activities. On an abstract level, there are several key capabilities, related to: life; health; bodily integrity; senses, imagination and thought; emotions; practical reason; affiliation; other species; play; and control over one's political and material environment (Nussbaum, 2011: 33-34). Capabilities typically combine 'internal capabilities' (bodily and mental capabilities and capabilities realized through training) and 'suitable external conditions' (Nussbaum, 2000: 84-85). The CA helps to avoid two pitfalls common in innovation projects: a tendency to focus on technologies (which are 'merely means') and a tendency to prescribe specific behaviours (where people need freedom instead). See Figure:



HOW TO DO IT: CAPABILITY CARDS

The capability cards facilitate the discussion on which aspects of well-being the project will focus on.

The steps help the workshop participants to start their thinking with an ultimate, practical goal 'in the real world', desirable situations in people's daily lives (Step 1), to discuss relevant human capabilities and their putative relationships (Step 2), and then to reason 'outside-in': the role of organizations, institutes or companies in bringing about this positive change (Step 3), and the specific outputs that the project/program would need to deliver in order to have such an impact (Step 4). And then to summarize the findings in an 'inside-out' manner (Step 5).

STEP-BY-STEP INSTRUCTIONS TO FOLLOW DURING THE WORKSHOP

For creating focus and momentum, please allow 5-10 minutes for each step.

1. Discuss the project/program's overall/ultimate goal to promote wellbeing. Clarify the positive change that it aims to realize, e.g., to promote specific elements of wellbeing in a specific group. What does that look like, practically? Describe or sketch the outcome that the project/program aims to realize—e.g., a practical situation, in a couple of sentences.
2. Discuss which capabilities people need to expand in order to realize this type of flourishing. Use the **CAPABILTY CARDS** for this exercise. Discuss both external conditions and personal resources. Make causal relationships clear, e.g., explicate the assumption that Capability A has a positive effect on Capability B. Discussion which capabilities are instrumental and which are ultimate.
3. Discuss which organizations, institutes or companies need to play a role in bringing about these positive changes. Clarify what needs to change within and between these organizations to make these happen, e.g., to improve the skills of frontline workers in a service organization, to improve collaboration between organizations in a 'chain', or to implement measures for scaling-up.
4. Discuss and clarify which specific output the project/program needs to deliver in order to indeed help these organizations to bring about these changes (step 3), so they can help to improve people's external conditions and personal resources (step 2), so they can indeed flourish, in line with the overall/ultimate goal (step 1). One may iterate these steps, if needed.
5. Summarize, e.g.: "This innovation program/project aims to deliver .... results that will help organizations .... to deliver .... , which will enable people to develop .... capabilities, so they can flourish in the sense of ... ."

WHO

The whole project/programme team, possibly other stakeholders in the ecosystem.

WHEN

Preferably this takes places at the conception stage of a project, for it to be of value in proposal writing and creating a common understanding. It can however also be used at a later stage to align viewpoints and exchange and explore different ideas about the value of the project.

RESULTS

A selection of capability cards and their interrelations regarding the project.

CAPABILITY CARDS

Bodily health

Being able to have good health, including reproductive health, e.g. to be able to visit a doctor or hospital; to be adequately nourished; to have adequate shelter.

Mental health

Being able to be mentally healthy, e.g. the absence of any negative mental states, such as not being able to sleep, worrying, feeling depressed, lonely or restless. Not having one's emotional development blighted by fear and anxiety.

Safety, security

Being able to be protected from violence of any sort and have adequate shelter and to live in a safe and pleasant environment. Also, e.g. privacy.

Integration, participation

Being able to participate in political, economic and legal arenas, also to perpetuate advantages in economic and public life.

Recognition, dignity

Having the social bases of self-respect and non-humiliation; being able to be treated as a dignified being whose worth is equal to that of others.

Social support, relationships

To be nurtured and cared for, to form and enjoy social relations; sharing emotions and feelings.

Equal rights and opportunities

Being free from discrimination on the basis of race, sex, sexual orientation, ethnicity, caste, religion, or national origin.

Meaningful work

Having the right to seek employment on an equal basis with others. In work, being able to work as a human being, exercising practical reason. Also, e.g. fair compensation.

Care for others

Being able to live with and toward others, to recognise and show concern for other human beings, to love those who love and care for us.

Self-determination, self-expression

Being able to be express oneself and to be accepted by others. Having one's bodily boundaries treated as sovereign.

Public and political participation

Having the right of political participation, protection of free speech and association. Being able to participate effectively in political choices that govern one's life.

Education, critical thinking and reflection

Being able to sense, imagine, think and reason, informed and cultivated by an adequate education. E.g. literacy and basic mathematical and scientific training.

Self-awareness, practical reason

Being able to form a conception of the good and to engage in critical reflection about the planning of one's life, e.g. the liberty of conscience and religious observance

Mobility

Being able to move freely from place to place.

Leisure, play

Being able to have pleasurable experiences. To engage in various forms of social interaction. Being able to laugh, to play, to enjoy recreational activities.

Care for the environment

Being able to live with concern for and in relation to animals, plants, and the world of nature.

HOW TO DO IT: CO-DESIGN

Co-design is one of the methods in participatory design. It involves end-users actively in the design and development process. This requires a certain level of transparency about project results as well as the openness to really listen to what end-users say about it and not get distracted by what the project had thought the innovation should look like, or be used for. It furthermore requires to be flexible in the way you organize the follow-up of the co-creation activities.

Besides a method to include people's daily lives, needs and ambitions in the project, it is also used as a means to create ownership and empower future end-users (which will benefit adoption, addressed in the chapter ADOPTION: How to understand drivers of human behavior to promote the adoption of your innovation); as a way to formulate value propositions (PROPOSITION: How to design a valuable proposition for future customers); to evaluate several ideas and generate new solutions based on those ideas (see ITERATIONS: How to evaluate solutions early in the development process) or to create trust (chapter TRUST: How to create trust in multidisciplinary and multi-stakeholder collaborations).

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Formulating the question	Dialogue with(in) project team	Half day	Project team	Co-creation question
Step 2: Sensitizing exercise	Depending on question	Half day	End-users	Awareness about the problem that defined the question
Step 3: Co-creation session	Workshop(s)	Half to 1 day (excl. preparation)	End-users, project team	Co-created solutions that answer the question
Step 4: Follow-up	Dialogue with(in) project team	1 day	Project team	Plan of action on the results can be implemented in the project

WHO

Potential end-users of the innovation. This can be in different domains. It is most useful to have similar end-users in a co-creation session, which might mean that you have to organize different sessions for different groups of end-users.
Also the main innovators of the project should be involved, to ensure the dialogue.

WHEN

In detailing certain elements of the innovation co-creation sessions can help. This can be in all stages. In an early stage it helps in setting the scene, the grand challenge. In a later stage it can detail the exact look and feel. All questions should be related to how it can or should be used in their work or daily lives.

RESULTS

Depends on the co-creation session. It can a cloud of words describing how the innovation should benefit their lives, a scheme of functionalities that should be covered, or sketches of products or screens that the innovation should deliver.

CASE: EMPATHIC DESIGN AT IDEO

In empathic design, researchers and designers attempt to empathise with other people's experiences. Koskinen and Battarbee (2003, p. 47) described empathic design as a range of 'empirical research techniques that provide designers access to how users experience their material surroundings and the people in it'.

In a project for a hospital, world leading design agency IDEO, e.g., had their researchers/designers go through the experience of being wheeled into an emergency room. They documented their experiences and used these to inform their innovation process, which can result, e.g., in recommendations for improving the working processes or methods used in emergency rooms.

CASE: PARTICIPATORY DESIGN IN HOSPITALS

Participatory Design can be defined as 'an approach towards computer systems design in which the people destined to use the system play a critical role in designing it' (Schuler and Namioka 1993, p. xi). One attempts to give future users of a system a role in its design, evaluation and implementation.

In a project for a hospital, Liz Sanders—a proponent of participatory design or co-design, organized workshops in which future users of the rooms in the hospital, e.g., nurses, doctors and cleaning personnel, jointly explored possible solutions, simply by playing and tinkering with mock-up, scale models of furniture. Next steps involved the building and evaluating of full-scale models—similar to TNO's newly opened 'Operation Room' facility in Soesterberg.

LITERATURE

ISO (1999). ISO 13407: Human-Centred Design Processes for Interactive Systems. Geneva, Switzerland: ISO.
Koskinen, I., Battarbee, K., & Mattelmäki, T. (2003). Empathic design: User experience in product design. Helsinki: Edita Publishing.
Nussbaum, M. C. (2000). Women and human development: The capabilities approach. Cambridge: Cambridge University Press.
Nussbaum, M. C. (2011). Creating capabilities: The human development approach. Cambridge, MA: Harvard University Press.
Robeyns, I. (2005). The capability approach: A theoretical survey. Journal of Human Development, 6 (1), 93-117.
Robeyns, I. (2011). The Capability Approach (http://plato.stanford.edu/archives/sum2011/entries/capability-approach/). Zalta, Edward N. The Stanford Encyclopedia of Philosophy. Stanford, CA, Stanford University.
Schuler, D. & Namioka, A. (1993). Participatory design: Principles and practices. Hillsdale, NJ: Lawrence Erlbaum Associates.
Sen, A. (1999). Development as freedom. New York: Knopf.

LINK TO OTHER CHAPTERS

SHARED VALUE
Shared value focuses on business and societal propositions. In the chapter about focus, this is related to an individual and to what effect the final solution has in daily lives of people.

PROPOSITION
In creating propositions for customers and end-users, the direct benefit for the people is made explicit. It goes into more detail than when creating a focus.

ADOPTION
The focus chosen can create implications for behavior change in end-user groups. When choosing a focus, it can be considered if the behavior change that is required is easy to make, or if a lot of persuasion is needed for people to change their behavior accordingly.

ITERATIONS

AUTHORS: Marc Steen, Wolfje van Dijk, Jenny de Boer

DATE: October 2015

HOW TO EVALUATE SOLUTIONS EARLY IN THE DEVELOPMENT PROCESS.

If you want to steer innovation development, it's best to evaluate the solutions you are working on as soon as possible with potential end-users. Fortunately, there are ways to do that, e.g., early prototyping, early user tests, and organizing an iterative process.

TNO innovation for life

STORYBOARD
MOCK-UP
PROTOTYPING
FAIL QUICK

THE IDEA IN SHORT

Innovation depends on accepting—and sometimes even embracing—uncertainty, risk, spontaneous discoveries, creativity, exploration, learning and progressive insight. One way to combine the needs for certainty and the existence of uncertainty is by organizing an iterative process of building, trying-out and evaluating and improving solutions as early as possible.

Innovation development typically follows a number of phases or stages of development. In the early phases, many options are open and there is a need to make decisions in order to move forward, but little information is available to base these decisions on – and so decisions are risky. In the later phases, as things develop and become clearer, information becomes available on which decisions can be based at lower risk but now there is little room left for maneuvering – and so the alterations become costly.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

Innovations eventually end up in real products, hence during the project you will make decisions which will affect the possibilities for productization beyond the project. Also in early research projects with a focus on breakthrough technologies (and not on product development), early testing of potential solutions is important. Testing potential solutions that will be enabled with the technology, and bringing to life the technology in products that end up in the daily life of people, helps in making clear the added value of the technology, and at the same time gives more directions for further development of the technology.

- On a content-level you will need to discover whether specific solutions work or not—to enable project team members to evaluate interim results and tentative solutions vis-à-vis the project's overall goals.
- On a process-level you will need to initiate and facilitate a dialogue with end-users and/or customers (see chapter 9 on how to do this). Early prototyping, early user tests and an iterative process support this dialogue and decreases the uncertainty about a solution's feasibility, which will enable project team members to act and steer the innovation development project and increase the solution's feasibility at the end.

WHY IS IT A CHALLENGE TO DO THIS?

In many organizations there are strong tendencies to work top-down, and to organize a linear development process, from specifying, to developing, to implementing. One reason is that people tend to think analytically, e.g., to divide problems into 'bite-size' sub-problems and to solve these one by one. In such an approach, the overall picture can get lost. Also focus in early research projects can be on the technological feasibility and less on the possibilities the technology creates in the daily lives of people. Testing the assumptions about the added value it can have, once the technology is developed, helps in planning the innovation further.

Another reason is that management goes for certainty: to make plans, define milestones and deliverables. They then expect others to stick to those plans and definitions.

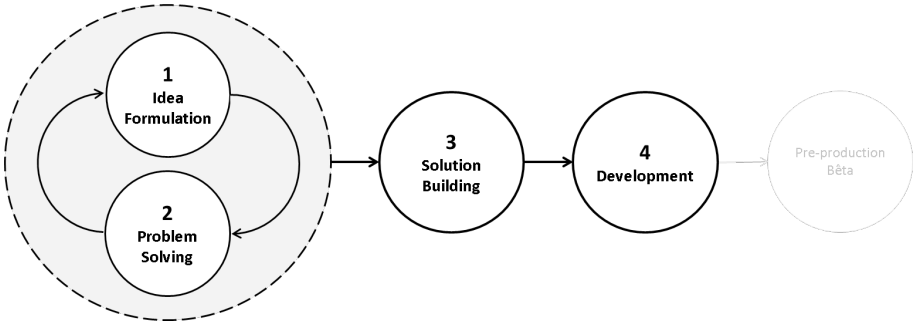
WHEN IS THIS USEFUL IN YOUR PROJECT?

- If your project has a 'waterfall' model of specifying, building and implementing.
- When the project team is too busy developing technology and is uncertain why or how to evaluate interim results.
- When the project team is not quite sure how to best fulfill the end-customer's needs or when the specified end-customer's need are vaguely defined.

WHAT LITERATURE SAYS ABOUT IT: ITERATIVE DEVELOPMENT

Failure is good, from failures the deep insights to truly improve the innovation will be gained and real customer value will be created. When end customers confirm that lessons have been learned when you show them a new design, that will be the definition of your success. Scenarios, demonstrators, visuals and other representations of the possible end result function on a content and process level; to improve the product and to enable a dialogue with potential end-users. The benefit of the scenarios, demonstrators and visuals is that it is something end-users can relate to, and their imagination is triggered. When only presenting technological test results, it doesn't help them to come up with suggestions how it can create value for them and it remains an abstract concept. This means that also in early research projects with a focus on breakthrough technologies (and not on product development), early testing of potential solutions is important. Making visible how the technology can end up in the daily lives of people, and how the technology enables, possibly in different sectors, to do this, creates insights in user acceptance early in the technology development phases.

In innovation projects typically the problem solving and idea formulation (see figure) will have to be repeated a number of times to 'get it right' – Steve Blank would call these pivots. This is where customer feedback can teach you the most valuable lessons. This can be done for example with scenarios, storyboards and with mock-ups.
If after a number of pivots your customers indicate that you got it right you can move on to more concrete solution building and development in prototypes.



	HOW SCENARIOS, DEMONSTRATORS AND VISUALS PROMOTED SHARED UNDERSTANDING . . .	
	. . . ON A CONTENT-LEVEL	. . . ON A PROCESS-LEVEL
Scenarios in the form of short written descriptions (simple 'use cases')	To express, discuss and prioritize ideas for solutions	One or two project members
Scenarios in the form of storyboards (more elaborate 'use cases')	To discuss more precisely and further develop the solutions To discuss and evaluate solutions with users	To discuss the project vision and its ambition to create results—both the project and outside the project
Demonstrators in the form of mock-ups	To explore and practically evaluate possible solutions To conduct evaluations with users, in laboratory tests and trials	To integrate work from different work packages within the project To promote progress and to produce tangible results
Demonstrators in the form of prototypes	To discuss technology options and benefits, within and outside the project To conduct evaluations with users, in their daily lives.	To bring more focus and realism into the project To organize promotional activities outside the project.

HOW TO DO IT: ITERATIVE PLANNING

Following Steven Blanks pivotal approach several steps in iterative development can be identified. Each step is described shortly to indicate activities needed in the project plan. Creative problem solving with your team (chapter 9) or co-design (chapter 7) can support in the process of creating the mock-ups, operational impressions and prototypes together with users and other stakeholders.

Step 1: Idea (Re)formulation and Problem solving → Concept snapshots. These are paper narratives designed to capture the idea of the innovation in a visual concept of the innovation. This can happen through personas, story boards, situation sketches, various canvasses such as value proposition canvas etc. Chapter 11 explains more about how to create personas and canvasses. Do be prepared to create multiple concept snapshots.

Step 2: Problem solving → Mockups. These are a visual tools used to display your work. It will give your target audience an idea of the "look and feel" of the thing. There are a number of different ways to create mockups: from scratch (with pens, paper, card board, glue etc), 3D mockup with software, or using a mockup generator website or use photoshop.
We suggest to use mock-ups in combination with a concept canvas to understand whether or not you've solved a particular problem the customer identified in your previous design. Do be prepared to create multiple mock-ups. When both the canvas and the mock-up meet approval, you're good to go to phase 3.

Step 3: Solution building → Operational impressions. These are quick and dirty operational (or technical) interpretations of the mock-ups which seemed most promising in phase 2. To avoid innovation bias, the conditioning of the project team and target customers, build multiple (>1) impressions. Do interact with end customers on these as well. Do allow them to touch and handle the impressions. In the dialogue focus on both functionality aspects and on technical aspects.

Step 4: Development → Prototype. This is the operational interpretation of the previous 3 phases. Start by making your prototype as flexible as possible and adjust features depending on the functional or technical requirements of the end customers. Use business case input (chapter 13) to make your choices.

WHO

For each step experts are needed to design and develop the materials. Translating into story-boards, personas, situation sketches requires certain skills that are possibly not in the core project team.

WHEN

In multiple parts of the project when key decisions need to be made about the way forward. Often you reach a point where proceeding the work needs a lot of assumptions. These assumptions need to be checked with end-users or customers, to ensure you are taking the right direction.

RESULT

Depending on the phase you are in, you will get conceptual or detailed results. Use the table on the previous page as a reference on what to expect on a content and process level.

HOW TO DO IT: STORYBOARDS

Storyboarding originates from the movie industry. It illustrates a story in a sequence of pictures (sometimes animated), without having to design all the details of the actual product.
In product development and innovation storyboards help to illustrate how future products could be used in the context of end-users or customers. It describes what happens, in which context, and which actions and behavior a person does in interaction with the new product. It is not an illustration of the look and feel of the product or technology, instead it is a visual illustration of the impact it has on the day to day life or work. Sometimes the product is showed as a black box. It can be applied in multiple phases of the project, both on a conceptual level, as well as a more detailed level. The more detail you bring to the storyboards, the longer they get, or (better) the more different storyboards you have to create.

Sometimes storyboards are used to illustrate a sequence (use case) on an interface, in which it is showed where a user taps the screen and what happens next. In that case it is closer to 'wireframing' than an actual storyboard, although similar principles are used.

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Define the stories	Workshop or meetings	1 day	Technology and domain experts, illustrator	Outline of stories
Step 2: Create first version	Design work, detail the outline (including evaluation by expert)	6 days	Illustrator, experts to support in tuning the story.	Detailed outline of stories First draft of the storyboard
Step 3: Validate with users	Interviews or focusgroup	4 days	Facilitator or domain expert, end-users	Evaluated storyboards
Step 4: Create final version	Design work	4 days	Illustrator	Final storyboards

WHO

Technology experts that can explain what the technology does.
End-users or customers that can indicate what they feel about the illustrated stories and validate some of the assumptions made in the storyboards.
Illustrators or graphic designers that can make the storyboard look good.
Domain experts and other stakeholders that have a vision on what they want to achieve with the innovation.

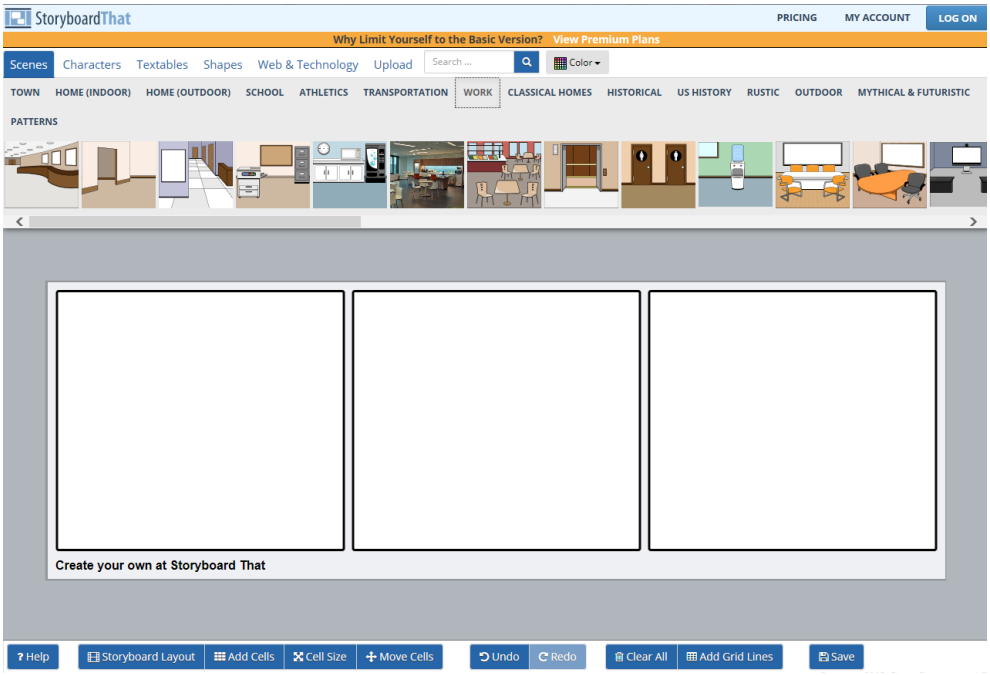
WHEN

When there is not yet much detail of how a product or service looks like, but there is a clear idea on what impact it should have on future customers. It can be used as reference material in the duration of the project (content), as well as a way to test functionality with customers (process).

RESULTS

Storyboards that can be used as reference material, and for communicating with future customers and other stakeholders.

TEMPLATE: STORYBOARD GENERATOR



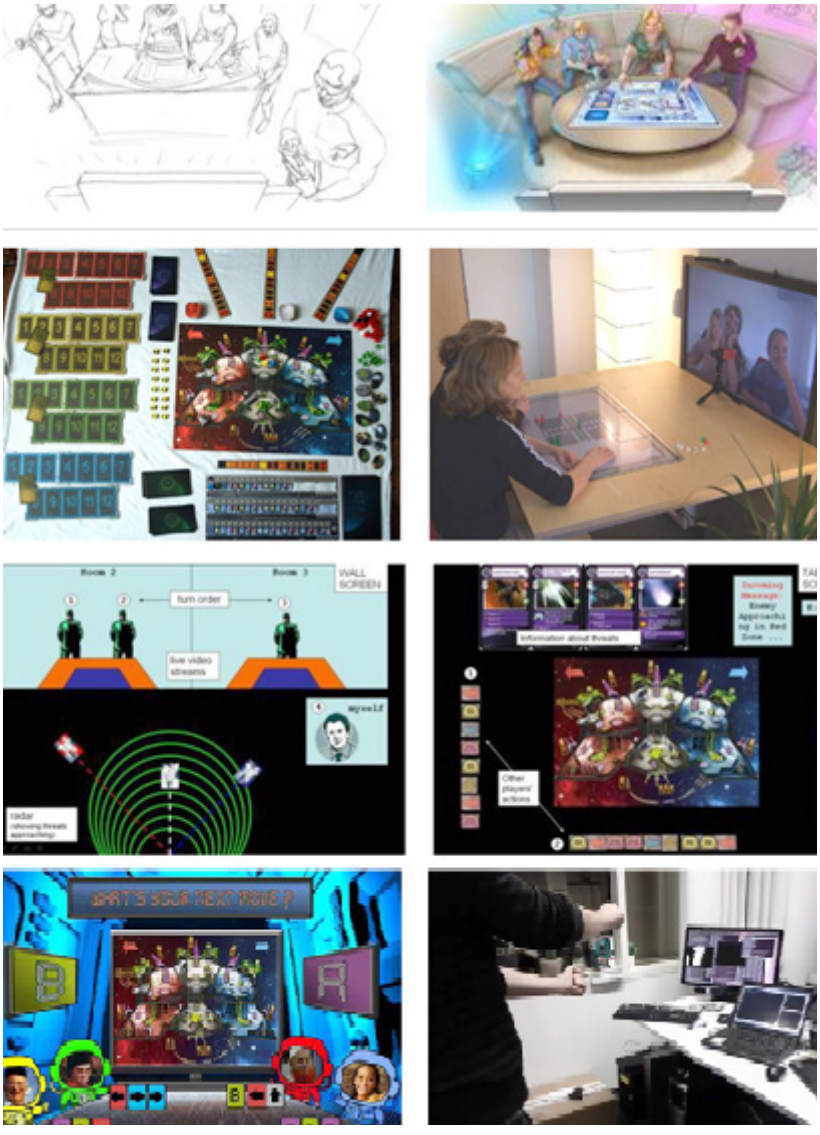
More at: http://www.storyboardthat.com/

CASE TA2 THE FUTURE OF FAMILY INTERACTION

In a multi-year, multi-stakeholder innovation project, it is critical to develop shared understanding, and to organize an iterative process. Below are examples of one such a project (TA2), in which TNO coordinated user involvement, co-design and user experience activities.

There were a number of iterations. Here are examples of several interim results for one of the applications that was developed (an online, multiplayer game, which facilitates people to be together, using multiple TV sets, touch tables and several 'tangibles'): from top to bottom:

- **sketches** (to present, explain and discuss this application, primarily within the project team);
- **hardware mock-ups** (to try-out several elements of the gameplay);
- **software mock-ups** (to integrate software modules and to test gameplay); and
- **prototypes** (to demonstrate outside the project, and to conduct experiments with 'users').



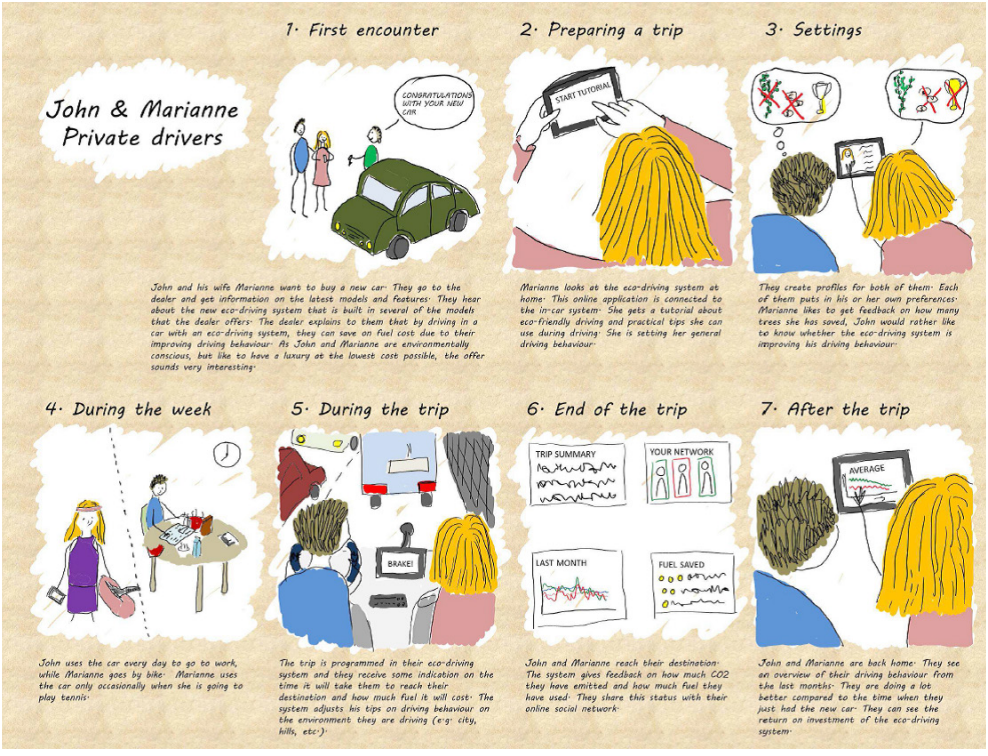
CASE: ECODRIVER STORYBOARDS

For the project FP7 project Ecodriver (www.ecodriver-project.eu) four storyboards were created to illustrate incentive mechanisms for sustainable driving for different types of drivers.
To create the storyboards a first brainstorming workshop with key members of the consortium was organized early in the project. to make a story for each of the envisioned user groups. The following steps guided this workshop:

1. Determine goals and audience
2. Determine starting points: character, setting, activity, domain
3. Select an over-all activity and goal and determine events
4. Combine events into a script (including review)
5. Determine style and medium
6. Rough Storyboard script
7. Create images and screens

Based on this workshop a more detailed outline was created, which was then reviewed by several consortium members to ensure all relevant functionality was in there.
Then the illustrations were created, and this result was discussed with real users. The evaluation results were used to tune and finalize the storyboards.
The storyboards have been used throughout the project as reference material, and have helped the project team to make their different visions about the end-result aligned.

(all storyboards can be retrieved from: Ecodriver project)



LITERATURE

Blank, S. & B. Dorf (2012) *The start-up owner's manual: The step-by-step guide for building a great company using the tested and proven Customer Development process* K&S Ranch Inc, Pescadero US.
Steen, M., J. Buijs & D. Williams 'The role of scenarios and demonstrators in promoting shared understanding in innovation projects' *International Journal of Innovation and Technology Management*, 11, 1 (2014).

Lester, R.K. & M.J. Piore (2006) *Innovation – the missing dimension Harvard University Press*, US.

Open Innovation Toolkit (http://lightingforpeople.eu/open-innovation/) (2014), vanuit het FP7 SSL-erate project.

Neerincx, M. (2010) *Situated Cognitive Engineering and its Design Rationale (draft)* TNO.

Mock-up generator for interfaces: http://mockdrop.io/

LINK TO OTHER CHAPTERS

TECHNOLOGY PLANNING
In a roadmap different milestones are formulated for certain technologies. By means of iterations this can be detailed further for a specific technologies or milestones.
FOCUS
Assumptions and ambitions made on the bigger picture that should be achieved by the innovation can be made tangible in small steps, in iterative cycles.

TEAM LEARNING
Organizing the work in iterative steps, also stimulates team learning. It requires to reflect on results so far and see for example if the right expertise is applied, if enough progression is made, etc.

FINANCE
Coming with intermediate results gives quick insights in the value of the ideas that are being developed. It creates proof that can be used to convince future financers.

ADOPTION
When checking with your end-users and customers early in the process of development, the likelihood for adoption also increases. A project team gets feedback about the value for the customer and end-users and knows how to communicate about it. It also creates insights on what might be the hurdles they see for adoption.

PROPOSITION

AUTHORS: Caroline van der Weerdt, Mascha van Dort

DATE: October 2015

HOW TO DESIGN A VALUABLE PROPOSITION FOR FUTURE CUSTOMERS.

Exploiting an innovation successfully means that you need to know the characteristics of the market, in size and customer profiles and willingness to adopt the innovation. Knowing or getting to know your (future) customer is key!

TNO innovation for life

PERSONAS
BENEFIT LADDERING
VALUE PROPOSITION

THE IDEA IN SHORT

Often the future market is unclear in size and need, because of the novelty of the innovation. Market forecasts are too simplistic, because multiple users (or customers) and multiple user profiles (or customer segments) and their needs are not captured. They are also either too optimistic or too simplistic and hence of not much use when trying to make an estimation of the market size.

To make the market more tangible an innovation should be crafted to a valuable proposition based on actual needs of potential users (and customers) of the innovation. This chapter explains how the needs of those users can be made tangible and used to formulate the proposition(s).

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

In creating shared value, the value is made explicit, but this needs to be detailed in terms of propositions for actual people or individual organizations. For smaller enterprises that can possibly benefit from the innovation, the shared value goal might be too abstract and something they can't relate to. Hence developing value propositions for the different stakeholders in the value web helps in getting them on board.

Unclear value proposition of the innovation most likely leads to a lack of willingness to invest (risk averseness). Prolonged lack of willingness to invest leads to a waiting game and then becomes a self-fulfilling prophecy (if everyone waits, there must be a reason). Hence having a good story about the value proposition, even if the innovation is still in development helps in finding a next round of finance (chapter 14), helps in shaping the innovation or vice versa (chapter 8), as well as helps in targeting behavior change activities needed for the market to reach its' full potential (chapter 15).

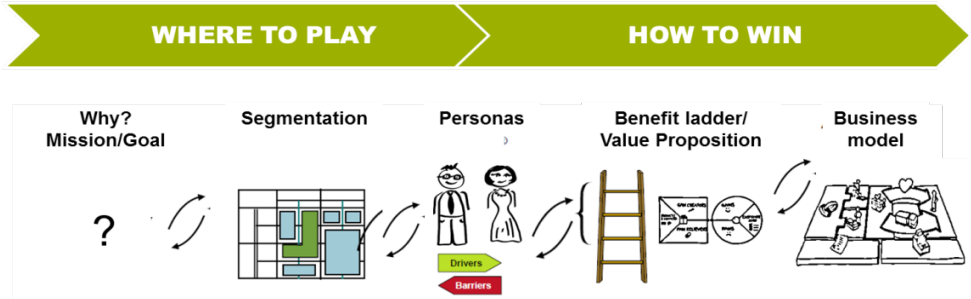
WHY IS IT A CHALLENGE TO DO THIS?

It is needed for marketers and technologists to collaboratively create a value proposition. However these two groups do not always understand each other: Technologist are not able to capture the real value of their technology in consumer or end market perspective, which can be much simpler or only partly technology-driven (technologists do not understand marketers). And Marketers do not understand the essence of a technological innovation in terms of what it can mean for their target markets (marketers do not understand technologists) and have no idea which segment to target.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- Future markets are unclear and still evolving.
- Technology outcome is uncertain and thus it is unknown what the value of the technology will be in the future.
- Project members are not trained to think in terms of market value.
- When you need to detail the shared value into value for different organizations and market segments.

WHAT LITERATURE SAYS ABOUT IT.



To define a mission or goal we refer to the chapters:
FOCUS: How to keep focus on the 'big picture' of the innovation.; VISION How to develop a shared vision on the innovation in a multidisciplinary team.; SHARED VALUE: How to determine with which partners you can create shared value.; and TECHNOLOGY PLANNING: How to plan the development of technology for the innovation.

Personas
A first step is to segment your market or value web into comprehensible (target) groups and make them come to life through Personas. Personas are archetypical representations of a segment. They are not real persons, but are so real that someone can easily relate to a Persona. A Persona makes abstract data about segments come to life by telling a story in which needs, but also emotions such as fear or frustration are shared, resulting in more understanding of designers and innovators of whom they are actually developing for and what they really need (van der Weerdt & Vonder 2013).

Benefit laddering
Once you understand your target market segment thoroughly in terms of needs, go back to to the technology by understanding thoroughly what the technology has to offer in benefits. We do this by exploring values or benefits with benefit laddering. Traditionally benefit laddering is done using focus groups of proposition users. But because in the development phase we often lack a group of users, we use benefit analysis in a different explorative way working with a group of marketers and technologists. Hence we ensure that marketers and technologists start to understand each other and the value of the technology in the market (Vriens & Hofstede 2000).

Value proposition design
Once we know what benefits a certain technology has to offer and with a clear understanding of the needs of the target segment, we are able to draw up the value proposition. In other words; we are able to link the benefits of a certain technology to the needs expressed by the target group. We do this by using the Value Proposition canvas (Osterwalder et.al 2014) which facilitate in delivering the right benefits for the most important expressed need. Using this canvas we come to a minimal viable product, which has just those core features that allow the product to be deployed, and no more. The idea behind a minimal viable product is that this will deliver the highest return on investment versus risk (Robinson 2008).

Business model canvas
From the value proposition canvas it's a small step to create the complete business model using the business model canvas (Osterwalder & Pigneur 2010). The designed business model usually gives a good insight into the business case. If this turns out to be negative, it is easy to take one or two steps back and change business choices; an iterative process. By doing this step-by-step a viable business model is ensured, or if not possible, is methodological evaluated and found not to be possible.

HOW TO DO IT: PERSONAS

Personas are all about making segmentations and (end)users come to life through storytelling. In their stories (supported with names, demographics, and a picture!) Personas share their needs and related thoughts, emotions, drivers and barriers and how these fit into their daily life. The basis of these stories can be desk research (existing research), interviews, quantitative analyses, focus groups, and so on; it is important that Personas are supported by real findings, to make them credible. Chapter 8 helps in creating a good focus on the user needs through human centred design techniques. Of course, Personas represent the more extreme sides of segments to make the differences obvious. And be aware: four Personas are comprehensible for most to remember and distinguish; more Personas do often not serve the purpose and blur the goal of determining specifics!

ACTIVITY	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Gather data on your market and find commonalities on needs, drivers/ barriers and other distinctive characteristics	One week	One or two project members	High-level segmentation
Reflect in your findings with representatives of the segments, either through interviews, focus groups or a survey	Plan at least two months for organization, collecting data and analysis whether you are doing a survey or interviews focus groups.	Representatives of the segments. Someone who can create and deploy surveys. One or two project members for conducting interviews/focus groups and analysis	In-depth analysis for creating Personas based on the earlier segmentation
Turn the data into a story of a person; a Persona. Do this for each segment. Make her or him relatable and believable. Have a workshop on fine-tuning the story	One week	One or two project members and a workshop with the whole project team	Preferably maximum one page per Persona story, describing needs, drivers and barriers in a lively way

WHO

Make sure you involve representatives of the segments at one point, or at least have a workshop with experts on fine-tuning the Personas

WHEN

Personas can be used for many purposes; here they are described to support understanding your market and gathering relevant insights for further development. However, Personas are a well-known instrument for marketing & communication (Chapter 17), and product development, and can be used as one of the iterative instruments (chapter 9)

RESULTS

A document (Word or Powerpoint) with a story per Persona

TEMPLATE FOR A PERSONA

<table>
<tr><td colspan="2">Demographics
(Name, gender, age, hometown, etc)</td><td>Picture</td></tr>
<tr><td>What is something that typically describes this person? What stands out?
(for example a quote, anecdote or motto)</td><td colspan="2"></td></tr>
<tr><td>What are his or her hobbies and interests and values?</td><td colspan="2"></td></tr>
<tr><td colspan="3">Describe a day in the life of this person, related to the innovation at hand.</td></tr>
<tr><td>Morning</td><td>Afternoon</td><td>Evening</td></tr>
<tr><td colspan="2">Drivers</td><td>Barriers</td></tr>
<tr><td colspan="2">What are the success factors for this person in relation to the innovation? What features or functionalities does he/she desire?</td><td>What are the failure factors for this person in relation to the innovation? What features or functionalities does he/she despise?</td></tr>
</table>

CASE: THE NEEDS OF FARMERS IN SMART DAIRY FARMING

The Personas below were made for the project Smart Dairy Farming (SDF). SDF aims to facilitate farmers to make decisions that support a better health and increased lifetime milk production for individual dairy cows. This is realised by giving specific actionable advice to farmers, following from (near) real-time analysis models based on real-time sensor data. A very innovative information architecture has been created to this end. For the design hereof, specific insights were needed into requirements that different user groups would have. Personas, on the one hand, supported the design process by realistically reflecting requirements for a system that did not exist yet; and, on the other hand, made sure all parties were involved and their needs represented by the different archetypes. The Personas were based on 40 interviews with different stakeholders, on the basis of which four 'user roles' were distinguished and elaborated upon in Persona stories and use cases. The findings were refined together with actual representatives of these 'user roles'.

2 examples of SDF Personas (van der Weerdt & Vonder 2013).

HOW TO DO IT: BENEFIT LADDERING

This method brings together marketers and technologists in an explorative exercise to define the value in the future market. It facilitates knowledge transfer from the research laboratory to market deployment.

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Preparing the client workshop	Workshops	2 hours	Research specialists, business developers and business consultants	Preparation of client workshop. Insights into the value a certain technology brings
Step 2: Interacting with clients	Workshops	4 hours	Research specialists, client marketers, client strategists, business developer, facilitator.	Insights into the value of a certain technology linked to the client target market

WHO

The following people should be involved. From the research side: senior scientist, business developer, facilitator, SBA consultant, SBA senior facilitator. From the client side: market director, strategy director, research lead, market segment manager.

WHEN

Benefit analysis should take place in a workshop together with the creation of one or more value proposition and one or more business models. We usually call this a business model workshop.

Benefit analysis is an exploration of the values which a certain innovative technology could bring. Usually a technology can bring more than 5 benefits, the idea is to select the most important benefits to fill in a market segment needs.

Benefit analysis should be done together with business modelling as early as co-fin 50%. The earlier the value of an innovative technology becomes clear in terms of the market the better. When done earlier it can be used to direct development in the most profitable way. When done later, it is used as an exploration as well as a knowledge transfer to marketers.

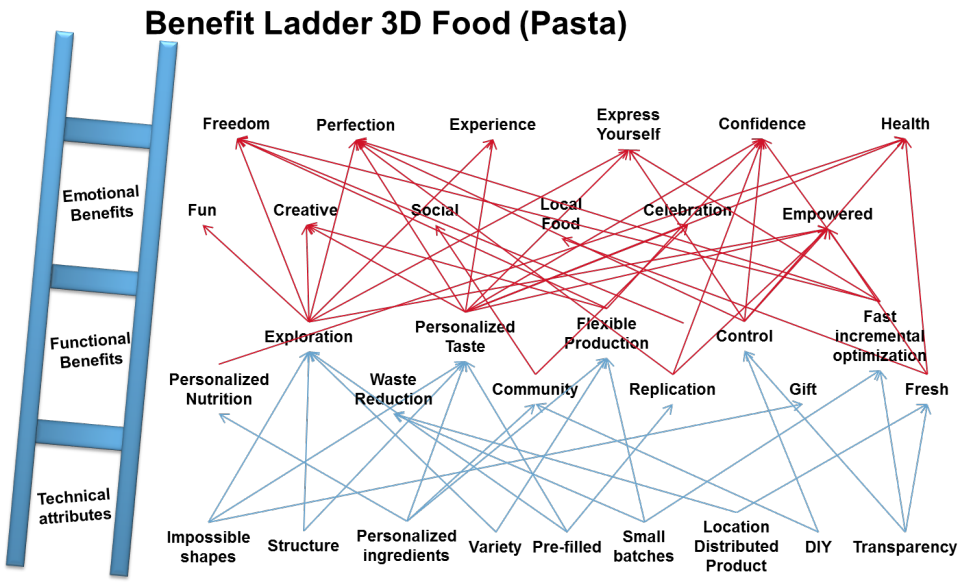
RESULTS

Tangible results are a filled in template with technical, functional and emotional benefits of a certain innovation.

CASE: PRINTING IMPOSSIBLE SHAPES IN 3D FOOD PRINTING

The project 3D Food Printing Pasta for the client Barilla (confidential)(50% co-fin) was focused in a first effort on creating “impossible shapes” of pasta. With impossible shapes we mean printing pasta shapes that are not possible to make with conventional production techniques, such as f.i. two rings joined.

When we were asked to conduct a business model WP, we were first struggling with the value in the market of “impossible shapes”. By doing benefit analysis and working our way up the ladder from technical attributes to emotional benefits, we discovered we could deliver other benefits without the need to first develop upon structures or personalized ingredients. Moreover, it facilitated knowledge transfer from researchers to marketers, where marketers came to see the value of 3D Pasta in the market. This sped up the introduction of 3D printing of pasta very much, and we are now introducing even before finishing the co-fin last phase.



HOW TO DO IT: VALUE PROPOSITION

The Value Proposition canvas is a practical tool that helps business people map, think through, discuss, test, and pivot their company's value proposition in relationship to their customers' needs. It helps you design, test, and build your company's Value Proposition to Customers in a more structured and thoughtful way. Personas can be used to fill in the customer profile and the negative and positive emotions the customer has. Input from chapter 4 about shared value, chapter 8 about human centred design also create a lot of insight in how to fill the canvas.

In a one day workshop with marketers, researcher, technologists and a facilitator we will follow the steps to fill the Value Proposition canvas:

Sketching a customer profile: describing what the customers you are targeting are trying to get done. It could be the tasks they are trying to perform and complete, the problems they are trying to solve, or the needs they are trying to satisfy.
Negative Emotions: describe undesired costs and situations, and risks that your customer experiences or could experience before, during, and after getting the job done. Rank each pain according to the intensity it represents for your customer.
Positive emotions: describe benefits your customer expects, desires or would be surprised by. This includes functional utility, social gains, positive emotions, and cost savings. Rank each gain according to its relevance to your customer. Is it substantial or is it insignificant? For each gain indicate how often it occurs.
Value proposition: list all the products and services your value proposition is built around. Ask yourself which products and services you offer that help your customer get either a functional, social, or emotional job done, or help him/her satisfy basic needs. Rank all products and services according to their importance to your customer.
Value in reducing negative emotions: Describe how your products and services alleviate customer pains. Rank each pain your products and services kill according to their intensity for your customer. Is it very intense or very light? For each pain indicate how often it occurs.
Value in increasing positive emotions: Describe how your products and services create customer gains. Rank each gain your products and services create according to its relevance to your customer. Is it substantial or insignificant? For each gain indicate how often it occurs.
Open slot: Most Value Propositions compete with others for the same Customer Segment. You can think of this as an "open slot" that will be filled by the company with the best fit. If you sketch out competing value propositions, you can easily compare them by mapping out the same variables (e.g. price, performance, risk, service quality, etc.) on a so-called strategy canvas.
Get out of the building: Now it's time to "get out of the building" - to use Steve Blank's terms - in order to verify your customer assumptions.

WHO

Marketers, researchers, technologists should participate in a group workshop conducted by a facilitator. An ideal group consist of 3-5 people. If you have more people split them up in more groups and let the groups present the results to the other groups to learn from each other and improve propositions.

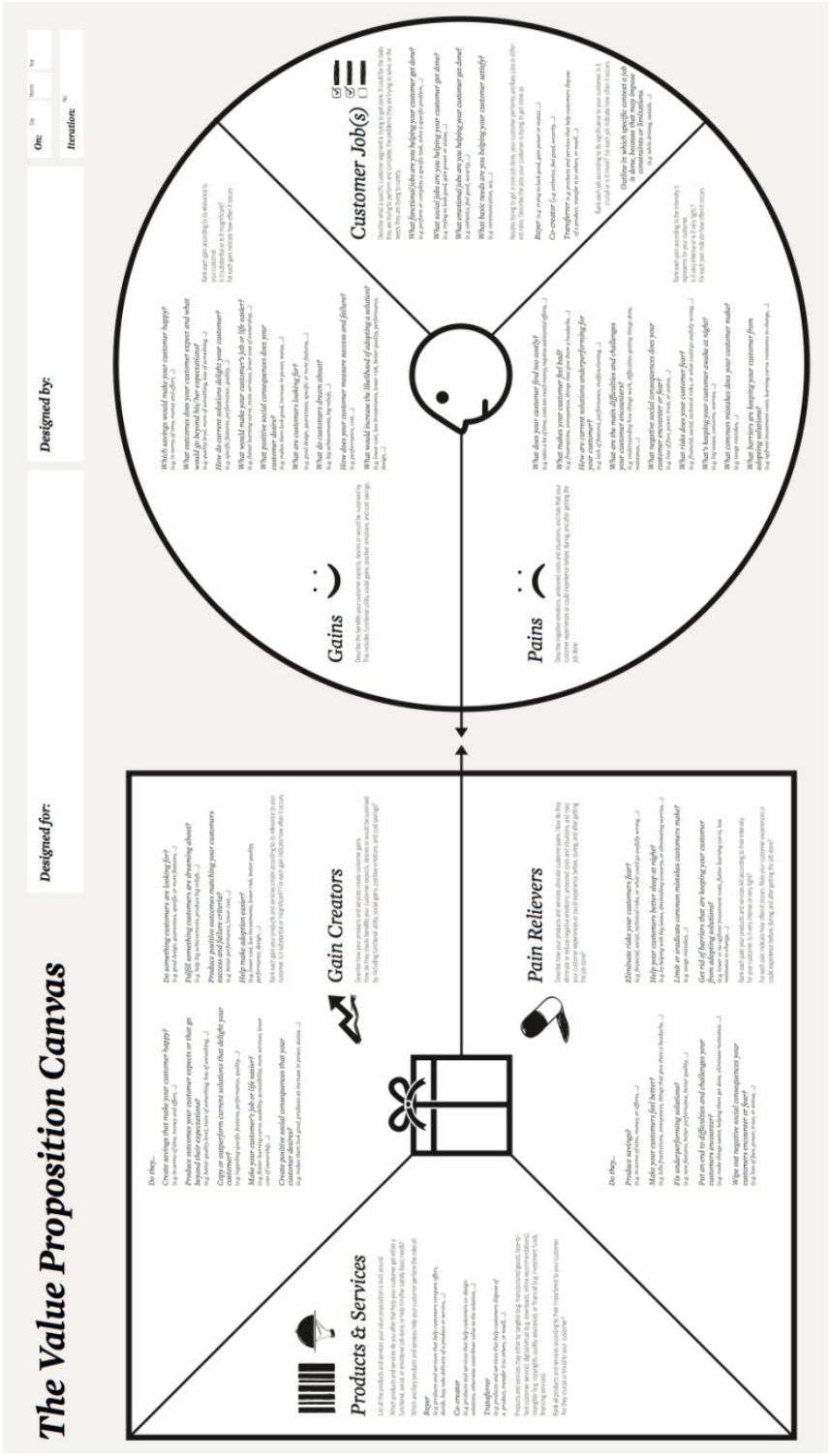
WHEN

This intervention is to generate proposition ideas or product ideas that are designed to fulfil a customer's need.

RESULTS

The result is a filled in template canvas which facilitates business people map, think through, discuss, test, and pivot their company's value proposition in relationship to their customers' needs. In other words the result is a schematic representation of the developed value proposition.

TEMPLATE: VALUE PROPOSITION CANVAS



HOW TO DO IT: BUSINESS MODEL CANVAS

The Business Model Canvas (see template next page), is a strategic management and entrepreneurial tool. It allows you to describe, design, challenge, invent, and pivot your business model.

Start from a blank canvas and add notes with keywords to each building block of the canvas. Do this after filling out the value proposition canvas. This way you already have the customer segment and value proposition filled out. If you use 'sticky notes' for this, you can move ideas around as you fill out each building block in the canvas. You may want to colour-code elements related to a specific client segment. After filling out customer segment and value proposition, start with customer relationships and channel, next Key activities and key resources and after that needed partners. Finally fill out revenue streaming and costs.

However, be careful not to fall in love with your first idea and instead sketch out alternative business models for the same product, service, or technology. Try to fill out more different business models for the same value proposition.

Next evaluate the business model canvas, and change the model, if it doesn't seem to work because it is too costly or overly complex (think lean!).

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Filling the canvas	Workshop	Half a day combined with value proposition workshop	Marketers, researchers, technologists, facilitator	2-4 business models
Step 2: Validating the input	Research	Two days (combined with value proposition)	Marketers	Validated proposition and business model

WHO

Marketers, researchers, technologists should participate in a group workshop conducted by a facilitator. An ideal group consist of 3-5 people. If you have more people split them up in more groups and let the groups present the results to the other groups to learn from each other and improve propositions

WHEN

The Business model canvas can be used to generate business model ideas, detail the business model and do a first evaluation of business models.

RESULTS

The Business Model Canvas is a one page overview and template that lays out both what you do (or want to do), and how you go about doing it; enabling structured conversations around management and strategy by laying out the crucial activities and challenges involved with your initiative and how they relate to each other.

The Business Model Canvas

Designed for:	Designed by:	Date:	Version:

Key Partners

Who are our Key Partners?
Who are our key suppliers?
Which Key Resources are we acquairing from partners?
Which Key Activities do partners perform?

MOTIVATIONS FOR PARTNERSHIPS
Optimization and economy
Reduction of risk and uncertainty
Acquisition of particular resources and activities

Key Activities

What Key Activities do our Value Propositions require?
Our Distribution Channels?
Customer Relationships?
Revenue streams?

CATEGORIES
Production
Problem Solving
Platform/Network

Key Resources

What Key Resources do our Value Propositions require?
Our Distribution Channels? Customer Relationships?
Revenue Streams?

TYPES OF RESOURCES
Physical
Intellectual (brand patents, copyrights, data)
Human
Financial

Value Propositions

What value do we deliver to the customer?
Which one of our customer's problems are we helping to solve?
What bundles of products and services are we offering to each Customer Segment?
Which customer needs are we satisfying?

CHARACTERISTICS
Newness
Performance
Customization
"Getting the Job Done"
Design
Brand/Status
Price
Cost Reduction
Risk Reduction
Accessibility
Convenience/Usability

Customer Relationships

What type of relationship does each of our Customer Segments expect us to establish and maintain with them?
Which ones have we established?
How are they integrated with the rest of our business model?
How costly are they?

EXAMPLES
Personal assistance
Dedicated Personal Assistance
Self-Service
Automated Services
Communities
Co-creation

Channels

Through which Channels do our Customer Segments want to be reached?
How are we reaching them now?
How are our Channels integrated?
Which ones work best?
Which ones are most cost-efficient?
How are we integrating them with customer routines?

CHANNEL PHASES
1. *Awareness*
   How do we raise awareness about our company's products and services?
2. *Evaluation*
   How do we help customers evaluate our organization's Value Proposition?
3. *Purchase*
   How do we allow customers to purchase specific products and services?
4. *Delivery*
   How do we deliver a Value Proposition to customers?
5. *After sales*
   How do we provide post-purchase customer support?

Customer Segments

For whom are we creating value?
Who are our most important customers?

Mass Market
Niche Market
Segmented
Diversified
Multi-sided Platform

Cost Structure

What are the most important costs inherent in our business model?
Which Key Resources are most expensive?
Which Key Activities are most expensive?

IS YOUR BUSINESS MORE
Cost Driven (leanest cost structure, low price value proposition, maximum automation, extensive outsourcing)
Value Driven (focused on value creation, premium value proposition)

SAMPLE CHARACTERISTICS
Fixed Costs (salaries, rents, utilities)
Variable costs
Economies of scale
Economies of scope

Revenue Streams

For what value are our customers really willing to pay?
For what do they currently pay?
How are they currently paying?
How would they prefer to pay?
How much does each Revenue Stream contribute to overall revenues?

TYPES
Asset sale
Usage fee
Subscription Fees
Lending/Renting/Leasing
Licensing
Brokerage fees
Advertising

FIXED PRICING
List Price
Product feature dependent
Customer segment dependent
Volume dependent

DYNAMIC PRICING
Negotiation (bargaining)
Yield Management
Real time Market

Strategyzer
strategyzer.com

LITERATURE

Van der Weerdt C. & M. Vonder (2013) *SDF Aanpak Requirements-analyse (Eisen en Wensen)* TNO 2013 R10857.
Vriens M. & F. ter Hofstede (2000) 'Linking attributes , benefits and customer value' *Marketing Research*.
Osterwalder A., Y. Pigneur, G. Bernarda & A. Smith (2014) 'Value Proposition Design: How to Create Products and Services Customers Want' *Strategyzer.*
Robinson F. (2008) *A Systematic Method to Sell, Design, Build. WHITE PAPER* SyncDevTM.
Osterwalder A. & Y. Pigneur (2010) *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*.

LINK TO OTHER CHAPTERS

SHARED VALUE
This chapter formulates propositions in terms of value. The proposition formulates it in terms of functionalities or activities someone can do in their daily life. It also looks at it in isolation of one customer, instead of the over-all picture. Hence several propositions for the same technology can be formulated.

FOCUS
This chapter focuses more on how individuals can live a better life when the technology is being developed and implemented. In propositions it focuses more on more concrete goals for different target groups.

STAKEHOLDERS
For some stakeholders it can be useful to formulate propositions in order to engage them in the right way. Some stakeholders are or will be the potential customers of the technology, but not all of them are.

ADOPTION
The way a proposition is formulated has influence in the way it is adopted and whether or not people make the required behaviour change automatically. In this chapter on adoption you learn more in-depth about what appeals to people that need to adopt the innovation, and whether possibly more is needed than 'just' formulating the right proposition.

COMMUNICATION
Both in proposition and communication you talk about target groups and user profiles. However in proposition activities, outcomes can have influence on the innovation.

TRUST

AUTHORS: Rosalinde Klein Woolthuis, Lisette de Koning **DATE:** October 2015

HOW TO CREATE TRUST IN MULTIDISCIPLINARY AND MULTI-STAKEHOLDER COLLABORATIONS.

In setting up collaborations, as well as collaborating in teams, giving and getting trust is important to reach your own and your shared goals. The key aspect of building trust is that giving trust leads to more trust.

TNO innovation for life

INFLUENCE
CONTROL
TEAM-TRUST
OPENNESS
KNOWLEDGE SHARING

THE IDEA IN SHORT

Trust is a component that is crucial in the whole process of partner selection, collaboration and doing work in teams. Building trust, or having and giving trust in partners and team members improves the creation and effectiveness of collaborations and team performance and hence indirectly the success of the innovation.

There are different kinds of trust (initial, competence and affective), and they can be created in different ways. It can increase the fostering of creative ideas and openness, and decreases risk avoidance.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

Trust is a component that is crucial in the whole process of partner selection and collaboration and the performance of a project team. Lack of trust may lead to ineffective collaborations and underperformance. This can have consequences for the quality of the innovation. For example; when someone in a meeting has the feeling that something is wrong, but keeps his mouth shut this can back fire at a later stage.

Also, innovation needs a certain level of risk-taking, of stepping into the unknown. A natural response is to avoid risk. Trust enables parties to take 'a leap of faith', not the least because partners believe they can solve problems together.

WHY IS IT A CHALLENGE TO DO THIS?

People are not fond of risk taking. Giving away control, trusting someone, is a certain amount of risk taking, and is therefore hard to take. It requires time and patience to gain the trust, which sometimes doesn't go hand in hand with business goals and deadlines. It also requires a certain level of empathy, willingness to understand the other stakes at the table, insight in what it is that the people you want to gain trust from need, and want to see, before they can trust you.

WHEN IS THIS USEFUL IN YOUR PROJECT?

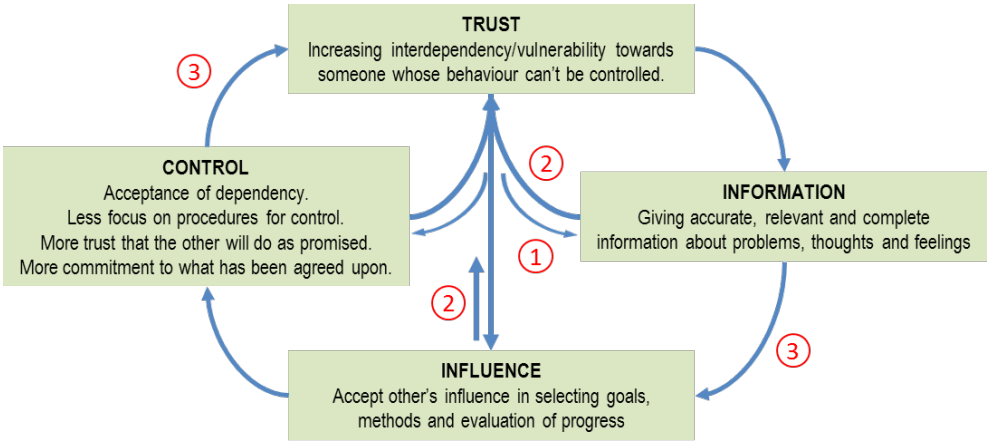
- When you want to set-up fruitful (sustainable, long-term) collaborations with other organizations.
- When you get the feeling there is not enough openness in the collaboration.
- When you have a team that doesn't know each other.
- When you have a team that comes from different organizations.

WHAT LITERATURE SAYS ABOUT IT

Trust is a component that is crucial in the whole process of partner selection and collaboration. Trust has different forms. Trust can refer to the basic attitudes a person has towards others (initial trust): some people tend to trust easier than others, and in some industries trust is more present than in others. The competences of a partner which refers to the knowledge, organizational and other skills of the partner to make the innovation a success determines the competence trust. The goodwill of a partner towards the relationship (affective trust), or whether he/she is trusted to refrain from opportunism, show good care and royalty in dealing with the innovation and relationship.

Whereas the first two types of trust – initial and competence – are basic conditions for a collaboration, affective trust is also (or especially) important to create the open, creative and mutually supportive atmosphere needed for innovation. It can be stimulated by for instance organizing social events to get to know each other personally, showing care and concern in times of trouble, and by co-locating workers in the same location so that frequent personal interaction is warranted.

The reason why trust is so important is because it improves the working relationships: When actors trust each other, they are willing to become more vulnerable towards the other. This will increase their openness: not only the necessary information will be exchanged, but also the worries, crazy ideas, and other factors will be exchanged that may influence the innovations progress (e.g. personal factors). Vulnerability also implies that one is more willing to listen to the other as 'the other' is trusted to want the best. As a result there is less need for control, rules and procedures in the relationship (Zand 1971), and both the quality and timeliness of the innovation will be improved (Klein Woolthuis 1999).



1. Initial trust level determines information exchange, control and influence
2. The response influences trust
3. The relation is stable

Trust is often a very time consuming process to build up; "Trust arrives on foot but leaves on horseback". Knowledge of each other's goals, intentions, expertise, experience and capacities are often not communicated systematically because it takes time to do so. As a result, coordination and cooperation between the parties develops only gradually or remains limited, often leading to confusion and misunderstanding, and distrust. Profiler brings together what organizations need to know about each other (De Koning et al., 2013).

HOW TO DO IT: PROFILER

Profiler provides participants with an in-depth insight of each other and each other's organization. By developing deeper insight at an early stage, participants are better aware of what they can and should expect from the other parties and what each individual can contribute to the coordination and cooperation processes. This results in richer knowledge of each other, shared in an easy way. This knowledge enables the group to make better use of the valuable time when they first meet and quickly improves the group's potential to act.
Keep in mind that Profiler has the most added value at the start of collaborative innovation activities and is especially developed for teams; interaction on an individual level.
In forming collaborations between organisations other chapters help in getting the ingredients to carefully balance give and take of trust. For example by creating insights in the stakes of the different stakeholders (STAKEHOLDERS - How to engage multiple stakeholders in the ecosystem for the benefit of your innovation).

Profiler is part of iCOBUS, an 'intelligent Collaboration Building Suite' – an integrated concept of tools for developing effective collaboration.

PROFILER STEP-BY-STEP
Before the Profiler session (dislocated, takes about 15 minutes)
Step 1: Filling out the profiles. Team members will fill out their profile. Some guidelines: • Use only relevant information; information has to be specific for the context of collaboration. • Make sure that somebody who does not know you, is able to understand your card. When using the digital Profiler tool, each profile can be filled out dislocated. Team members are able to get to know each other before the first meeting starts.
Profiler session (co-located, takes about 90-120 minutes)
Step 2: Short exchange and explanation of information. The team members shortly exchange and explain the information they have written down on their profile; both their personal profile and the organization profile.
Step 3: Scenario with issues. For different issues the group must decide what organization should be involved to tackle the problem. After establishing this, the group must decide which people from that organization within their team are most suitable. All dilemmas are discussed by the group. If the discussion does not lead to anything or does not contribute to the intervention, the trainer can put it to a halt.
Step 4: Reflection. Team members will reflect on step 3. They can use different questions that we have described (e.g. 'what did you learn about the other organizations and team members', 'how is this of use for your work').
Step 5 Formulate work agreements. The group formulates work agreements according which they will work in the future. The information from the profilers and the discussion and reflection can be leading.

WHO

The project team and a facilitator organizing the sessions.

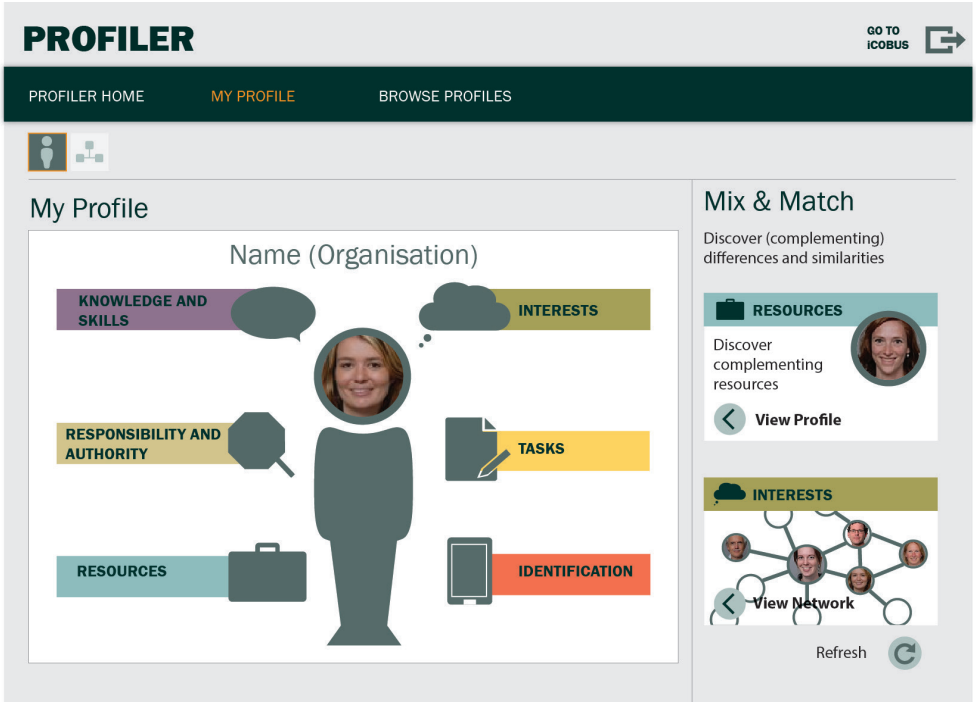
WHEN

A session with Profiler should take place in the beginning of a project, when a team has to get to know each other.

RESULTS

The filled out profiles for each team member and for each organization are a result of Profiler. When using the digital Profiler tool, the digital profiles are available during the project.

SCREENSHOT PROFILER



FUNCTIONALITIES OF THE DIGITAL TOOL

Fill out & view each other's profile (individual and organizational profile): each profile consists of 6 topics that can be filled out and viewed.

Overview of profile: each profile contains a quick overview of the profile; a summary of one's skills and expertise etc. in five words.

Mix & match: here you see people that are of interest to you based on similarities and differences. It broadens people's perspective.

Browse Profile: here you can search for different profiles, by selecting a topic or search for a specific keyword.

Compose team: for the profiler session, select the profiles of your team members.

LITERATURE

Zand, D.E. (1972) “Trust and managerial problem solving” *Administrative Science Quarterly* 17/2: 229–239.
Klein Woolthuis, R.J.A., (1999) *Sleeping with the Enemy: Trust, dependence and contracts in interorganizational relationships* Twente University, Enschede, the Netherlands.
Klein Woolthuis (1999): Winnen kan ook samen – handleiding voor samenwerking.
L. de Koning, W. Kamphuis, K. van Dongen, F. Thönissen, R. Paulissen, (2013) *Handleiding Profiler* TNO 2013 R12156, Soesterberg, the Netherlands.

LINK TO OTHER CHAPTERS

AGREEMENTS
Creating and giving trust already starts when formulating collaborations with partners. Trust is also created by living up to the expectations that are created in conversations in early stages of the innovation development. If not managing these expectations and keeping an open dialogue of what is expected from others this might have impact in the collaborative process and outcome of the project and impact of the innovation.

TEAM VISION
Creating a team vision helps in creating trust between team members.

TEAM LEARNING
By allowing a team to learn, also feedback about what went wrong (or what went very well), is expressed. This creates a shared picture and helps in expressing possible frictions that might stand in the way of further collaboration.

STAKEHOLDERS

AUTHORS: Mike Duijn, Rosalinde Klein Woolthuis **DATE:** October 2015

HOW TO ENGAGE MULTIPLE STAKEHOLDERS FOR THE BENEFIT OF YOUR INNOVATION.

Successful innovation is more than making the perfect product or technology at the right price: every innovation needs other stakeholders to be developed, tested and to become diffused in the market.

TNO innovation for life

INTERACTION
INNOVATION SUCCESS
MARKET ADOPTION
DIFFUSION

THE IDEA IN SHORT

Innovation can be developed in isolation. This is the idea many have of innovation: a lonely inventor in a lab, a sole entrepreneur in a garage and we all relate to the heroic stories of famous successes: Apple, Dyson…. However, nothing is what it seems. Whereas the products of these companies may be good, their real success can be explained through the productive connections they have managed to create with their stakeholders.

Interaction with and involvement of direct and indirect stakeholders in the development of the innovation helps to develop and test an innovation, to increase its acceptance and market uptake and reach the societal impact that is intended. This chapter helps to identify the relevant stakeholders in different parts of the innovation process, and what might be the best way to convince or involve them.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

By involving or communicating with direct and indirect stakeholders (customers, suppliers, policy makers, financers or criticasters, interest groups), the idea can be tested and developed to optimize the value it has for all involved. Through this process, the product is not only improved, also awareness and support is created for it in relevant stakeholder groups which will help its adoption and diffusion. While working already in collaboration with other partners, often other or new stakeholders become relevant in the successful adoption of your innovation.

This is especially true for innovation in hybrid contexts in which public, private and societal actors determine the success of an innovation. Construction, mobility, security, health care, energy, etc. are 'regulated' markets in the sense that governments set the rules and public opinion have great influence on the viability of innovation. Knowing how to involve them, and how to persuade, influence or convince them of the value of your innovation, greatly benefits the uptake. In other words, it is more than product and price that counts, it is the stakeholder ecosystem that drives the innovation!

WHY IS IT A CHALLENGE TO DO THIS?

When inventing it is easy to get caught up in the development of the innovation and spend less time on asking questions like: How can we involve the stakeholders in our innovation effort, and how can they help us to make the innovation a success? When stakeholders are identified, their engagement needs to be warranted. In the development stage, this will often close cooperation for idea exchange and creative interactions. But once you move towards marketing and diffusion, the group of (potential) stakeholders grows rapidly, and more and more indirect influences will play a role. It is of great value when stakeholders are identified in time, and when they can help build the support for your innovation.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- When your innovation can solve societal problems.
- When your innovation creates value for multiple stakeholders.
- When you wonder which stakeholders to involve.
- When you want advice on how to involve stakeholders.

WHAT LITERATURE SAYS ABOUT IT:

In the literature there is more and more consensus that we move from 'shareholder' dominated companies, to 'stakeholder' approaches to do business. For this goal, methods have been developed to identify which stakeholders are important (PESTLE), how to approach them (framing, theorizing) and how to engage with them (stakeholder strategy).

PESTLE

It is important to take into account PESTLE (Aguilar 1967) factors for the following main reasons: Firstly, by making effective use of PESTLE analysis, you ensure that what you are doing is aligned positively with the powerful forces of change that are affecting your innovation. By taking advantage of change, you are much more likely to be successful than if your activities oppose it. Secondly, good use of PESTLE analysis helps you avoid taking action that is likely to lead to failure for reasons beyond your control, like opposing regulation or competitors that cannot be beaten. Thirdly, PESTLE helps you break free of assumptions, and helps you quickly adapt to the realities of the new environment.

	PESTLE analysis
Political	How does the innovation fit in the current political landscape? Is it likely to get political support, subsidy, be instrumental in solving political ambitions?
Economic	Does the innovation have economic potential? What are likely costs? Benefits? Is it affordable for customers? But also: what are the competitors for this innovation? What are relative strengths and weaknesses? What your relative price?
Social	How does the innovation fit within the social context. Is there societal support for the innovation? Can opposition be expected?
Technological	What are technological alternatives for the innovation? Are they already on the market? What are your relative strengths vis-à-vis competing firms / technologies?
Legal	What are the legislative drivers and barriers for the innovation? Does it contradict existing law and rules, or does it anticipate new legislation? Can this be changed?
Environmental	What are the expected environmental impacts of the innovation? How can it improve nature, or reduce negative impacts of existing technologies?

To engage stakeholders, they need to be convinced that your innovation is important to them personally or professionally. This can be done through framing in which you connect to emotions, or theorizing why it offers a better solution than the old technology (Klein Woolthuis et al. 2013).

FRAMING

Through framing one can make likeable stories tailored to the stakeholder you want to convince. This can create support and improved access to resources. Framing is an activity much like storytelling. The entrepreneur presents the solution as 'the' right thing to do. This story is compelling, and often makes an appeal to things or issues that the audience already like or better love. For instance: Green entrepreneurs 'sell' electric cars by introducing their children into the story and telling how much they care for their future. Or tech entrepreneurs sell their product by telling how well it is inter-operable with the popular Apple products.

THEORIZATION

Theorization is another tactic that one can use to create support for their 'right' solution. This is done by making a compelling argument. This can either be done by reasoning why old solutions are bad, or by summing up the reasons why the new solutions is superior. For the green entrepreneur for instance: Petrol cars are a hazard to our environments, because of pollution and health problems. If you adopt my technology, CO2 will be reduced, we will have less illness, and a new industry will blossom!

HOW TO DO IT: MULTI-STAKEHOLDER ENGAGEMENT STRATEGY

Once stakeholders are 'on board' a societal and political sensitivity analysis can be made for each of those stakeholders. In this analysis you examine which political viewpoints and developments are important for your stakeholders. What are the developments that matter to them? And how does this affect your innovation?
On this basis you can plan for activities on how to involve the stakeholders in a more active way (chapter 4, 8, 10 and 15 also relate to involvement of stakeholders), or communicate with them (chapter 17).

OVERVIEW OF ACTIVITIES

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Stage 1: PESTLE/ Stakeholder analysis	Document analysis	3 days	Stakeholders involved in innovation	Overview of who should be involved to make innovation a success
	Interviews	Variable		
	Convening workshop	3 days including preparation and reporting		
Stage 2: Engaging with stakeholders	Sensitivity analysis	3 days	Project team	Convincing case to approach stakeholders
	Framing and theorizing	Ongoing process		
	Presentations Publications	Ongoing process		
Stage 3: Collaborating with stakeholders	Developing shared value proposition (see Chapter 4)	3 days, organizing and convening; ongoing process	Interactive workshop(s) with stakeholders	Shared value propositions and commitment for innovation

WHO

The most relevant stakeholders and potential other stakeholders that will benefit from your innovation, or are needed to make the innovation diffuse in the market. This can be suppliers, knowledge partners, resellers, legislators, potential consumers and professional end users, etc.

WHEN

It can take place in several parts of the project. It is best to involve stakeholders as early as possible in the development phase so that feedback from the market / stakeholders helps to prevent a blinkered view on one's own innovation and helps to find the creative connections to vital additional knowledge and contacts.
Furthermore, it is best to do it multiple times, as landscapes might change and external developments can influence the political and economic landscape for example.
Innovation processes take some time, depending on their complexity and sensitivity. In addition, innovation processes can be capricious. Regular interaction with stakeholders is necessary to keep the innovation process aligned with dynamic objectives and changing expectations.

RESULTS

A document describing the multi-stakeholder engagement strategy: PESTLE, playing field, interaction rules and mutual expectations of the outcomes.
Attractive presentations and brochures that frame and theorize in a way that stakeholders are convinced and are willing to participate. Chapter 17 about communication can also be consulted.

TEMPLATE: PESTLE ANALYSIS

	PESTLE analysis
Political	
Economic	
Social	
Technological	
Legal	
Environmental	

TEMPLATE: SOCIETAL AND POLITICAL SENSITIVITY ANALYSIS

What societal values are at stake?	What political viewpoints are dominant?	Which existing and pipeline policies are relevant?	Which productive connections can be made with which stakeholders?

TEMPLATE: FRAMING AND THEORIZING ANALYSIS

What are the stakeholders identified?	What's the emotional appeal your product / technology has to them?	What logical reasoning could involve these them?
	E.g. family, nature, status, beauty ...	E.g. efficiency, CO2 reduction, economic growth

CASE: STAKEHOLDER INVOLVEMENT FOR OPEN INNOVATION IN GROUND WATER MODELING: MIPWA

In 2003, the water management organizations in the Netherlands signed the National Governance Agreement on Water, calling for a better balance between water management and spatial development. This balance required the implementation of a so-called desired surface and groundwater regime. To develop those regimes for each water management area, an integrated and detailed groundwater model is needed. This innovative model would be helpful to water management authorities—mainly provinces and water boards—to pretest the impact of future groundwater measures, before being implemented.

There is a variety of stakeholders interested in the management of the water system, and those stakeholders needed to accept the outcomes of the model as policy-relevant and legitimate. The model that was developed is named the "Methodology for Interactive Planning of WAter management" (acronym: MIPWA).

Equally important as the actual model was the collaborative process through which it was designed and developed. MIPWA was constructed in a collaborative modeling process in which scientists, engineers, and policy professionals from 17 water managing organizations in the Northern part of the Netherlands worked together on an innovative model that is scientifically sound and has practical meaning for regional policy making.

The innovation process began with extensive discussions between scientists and engineers and the intended users of the model, i.e. the professionals of the organizations mentioned above. The actual collaboration in the modeling process itself was organized around the stages of groundwater modeling that need to be covered in order to construct a scientifically sound model. Each of these stages was covered by one or more workshops in which the professionals of the organizations were closely involved.

Prior to the modeling process the project team analyzed the objectives, expectations, and wishes of the participants with regard to the intended model through an extensive stakeholder analysis. This information was used to develop the model specifications and to manage the expectations of all involved in the collaborative modeling process. The stakeholder analysis was repeated to "monitor" if the process was still on track with regard to the expectations of the participants and the intended policy support it had to provide. In addition, the information gathered in this second stakeholder analysis was used to test the model and its user interface.

LITERATURE

Aguilar F.J. (1967) *Scanning the Business Environment* Macmillan.
Klein Woolthuis, R.J.A, F. Hooimeijer et al. (2013) "Institutional Entrepreneurship In Sustainable Urban Development Dutch Successes As Inspiration For Transformation" *Journal of Cleaner Production.*

LINK TO OTHER CHAPTERS

INNOVATION ECOSYSTEM
In innovation ecosystem activities the stakeholders are identified and possibly a strategy on how to manage them is formulated. However actually managing them on a day to day basis is another job and requires constant attention.

SHARED VALUE
Some stakeholders will be involved in creating shared value pictures. This is focused on the desired outcome and impact of the innovation, whereas the chapter on stakeholders addresses the need to manage the stakeholders throughout the process.

COLLABORATION
Some of the stakeholders are also collaborative partners. You probably will deal differently with them, than with stakeholders that are not part of the project team.

PROPOSITION
Some stakeholders might also be future customers. The chapter on proposition helps in creating more insight in how to deal with stakeholders as customers.

COMMUNICATION
The chapter on communication includes all possible people that need to be communicated with. In the chapter on stakeholders you focus on the communication with the stakeholders that you need for the adoption or further development of your innovation.

TEAM LEARNING

AUTHORS: Mario Willems, Paul Preenen **DATE:** October 2015

HOW TO ENSURE MY PROJECT TEAM LEARNS COLLECTIVELY.

Collective learning via the exchanging and storing of knowledge ensures you can adjust team performance on time, as it identifies missing skills, inefficiencies and underperformance. Yet, in daily practice this is often forgotten or simply fails.

TNO innovation for life

LEARNING
TEAMS
EXCHANGE KNOWLEDGE
COMMON LANGUAGE
COLLECTIVE STORY

THE IDEA IN SHORT

Organizations and teams re-invent projects all the time but often fail or forget to manage collective learning. Collective learning and creating a collective story helps in creating a work environment that is more efficient and effective, and prevents teams to spend energy on activities that are not meant for the outcome and impact of the project.

In this chapter the learning history method (LHM) is explained. The LHM ensures a fast and natural way to learn from past successes and failures. The Learning History is a practical process that results in a jointly-told tale containing facts, perceptions and reflections. The process allows team members to reflect on their progress and the factors underlying it, which improves teambuilding, efficiency and performance.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

In innovation projects the outcome is often uncertain at the start of te project. When speaking of the ambition to learn (what is best) along the way, also activities to facilitate the learning process need to be planned for. When facilitating the learning process on the project level it enables project teams to reflect on their progress and identify the need for other skills or activities. Furthermore, it stimulates creativity and prevents groupthink by allowing for multiple perspectives. On the organizational level it allows for collective learning, ensuring that lessons from innovation projects can be collected and shared within the organization and future innovation projects can learn from that. Especially in system innovations (which is often the case in shared value innovations), reflection on the innovation process, and learning from past activities, enables the transition to move faster, or facilitate other transitions in a better way.

WHY IS IT A CHALLENGE TO DO THIS?

Firstly and most importantly, innovation project teams hardly allow time for reflection, also if they explicitly choose a learning by doing approach. Operational affairs and deadlines take priority. Secondly, project leaders often fear that hidden tensions will be exposed and endanger the project. Thirdly, costs for external facilitators are considered too high. External facilitators are essential in the LHM for bypassing power differences in the team and creating an open learning environment.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- When you do similar processes or projects in the future.
- When it is important to document the knowledge gathered during the process for accountability.
- For teambuilding purposes and can help break standstills in projects when the stakes are high.
- When you want to have a learning by doing approach in your project.

WHAT LITERATURE SAYS ABOUT IT: LEARNING HISTORIES

The LHM was first developed in 1994 by MIT's Center for Organizational Learning. Organizational Learning is the process by which the knowledge and values of an organization are exchanged, leading to improved solutions and the capacity to learn from actions.

The Learning History is placed within the school of action research, more specifically participatory action research. The researcher forms an insider/outsider team that creates the Learning History together. In traditional research, researchers collect and analyze data without the participation of people in the organization. In insider/outsider research, dialogue and heterogeneous interpretations are encouraged (Louis & Bartunek, 1992).
The method can also be described as inductive research. The researchers do not test a set of starting hypotheses. A naturalistic/constructivist perspective is used to capture and construct stories by collecting data from a wide group of people (Parent & Beliveau, 2007). The story unfolds organically rather than following a specific structure.

Storytelling

The use of stories in helping organizations learn and transfer tacit knowledge is gaining widespread favor among both practitioners and academics (Cortese 2005; Sole & Wilson, 2002). More traditional approaches such as employee surveys, best practice reports, case studies, lessons learned reports often deliver non satisfactory results. The reason storytelling is superior to other methods is the use of context in a learning history. Rather than just copying lessons from one situation to another, the reader of the learning history can judge if a lesson is applicable to his/her own situation by reading the context in which the learning history was collected.

Format of the Learning History

Originally Roth and Kleiner (1995) define the Learning History as a 20 to 100 page narrative of an organization's recent critical episode, presented in an engaging two-column format. The document contains a strict separation of fact, perception and reflection (or expert analysis). This form of presenting the results engages the reader, forcing you to make choices about what to read first and to balance the 'objective' facts with the perceptions of various participants in the project. The text used for the perception is often taken from the vocabulary of the project. As Roth and Senge (1996) state: "Learning Histories are proven to be effective in engaging and influencing readers, because of the extensive use of participants' own narratives to capture their own coherent stories about complex realities." (Roth and Senge, 1996, p. 97).

Recent use of the Learning History

In the Netherlands practitioners and researchers (TNO, LEI, VU) have put the LHM to use in an effort to learn from transition experiments (Mierlo et al., 2010; Roelofs, 2011). Programs such as 'innovation netwerk', 'the energy transition', and 'energy neutral areas' have commissioned researchers to create Learning Histories of the transition experiments in their project portfolio. Since the Dutch transition approach relies heavily on learning by doing, gathering learning experiences is a crucial element of the transition strategy. In this perspective the LHM is used as an instrument for the reflective monitoring of system innovation. Researchers have also deviated from the original two-column, fixed-length document, testing out various formats such as an audiovisual version and interactive presentations. Researchers have also tested different formats for the resulting story, deviating from the two- column document of 20-100 pages. Audiovisual versions have been made, as well as have interactive presentations.

HOW TO DO IT: LEARNING HISTORY METHOD FOR INNOVATION TEAMS

The LHM can be done in a full and a light version. The full version is described in the following table. When budget is limited one can do a light version with just a timeline workshop. This is a well-prepared and well-facilitated half day workshop in which the participants of a project create a joint timeline containing facts, perceptions and lessons. The workshop by itself creates strong learning experiences with the participants. With minimal preparation and no reporting this requires not more than 1 day of a skilled facilitator. Steps of the full version can then be added. Interviews with project team members provide more depth and allow including insights of those not present at the workshop. Creating a document or presentation allows the results to be communicated to others outside the project team. Reflection of outside experts draws in more knowledge to the learning process.

ACTIVITY	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Document analysis of the selected innovation project	1 day	Researcher/ Project leader	Insight in the main elements of the project
Step 2: Time line workshop	½ day	Project team	Timeline and learned lessons
Step 3: Round of in-depth interviews with stakeholders (Full version only)	2 days	People outside the project team	Interview reports
Step 4 Write concept of the Learning History	2 days	Researchers	Document, presentation
Step 5: Reflection on first concept of the Learning History (Full version only)	1 day	Project team and interviewees	Insight in XXXX
Step 6: Workshop: discussion of second concept of the Learning History with the stakeholders (Full version only)	1 day	Interested people from involved organizations	

WHO

The whole project team should be involved in making the Learning History. Preferably also people on the edge of the project team are invited (e.g., suppliers, local stakeholders, etc.).

WHEN

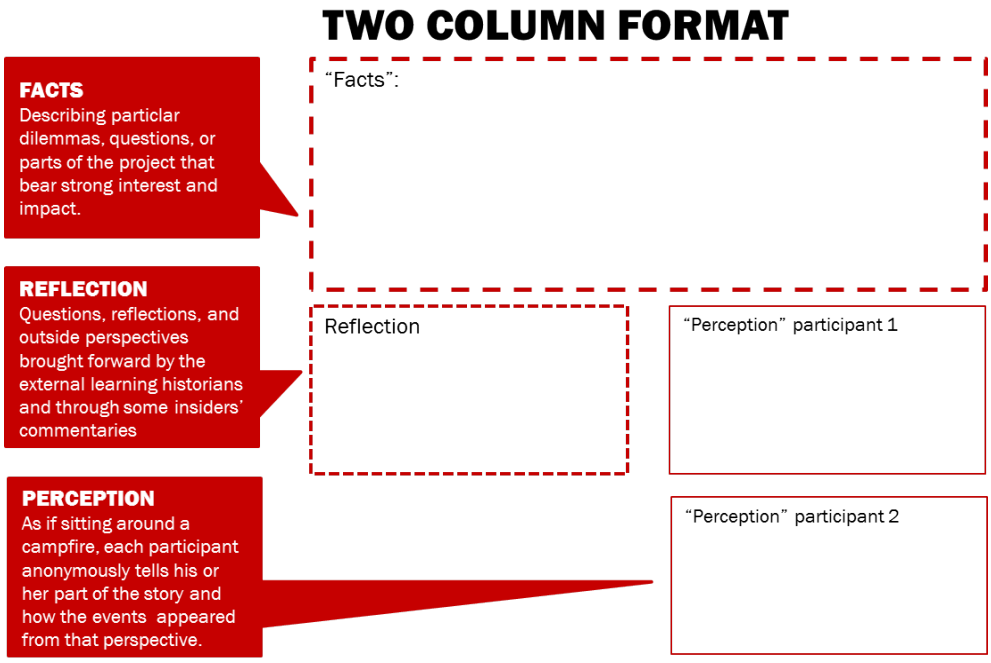
Ideally the intervention should take place about halfway through the project. This ensures there have already been quite a few interesting events and the project has taken a clear course. There is enough material to look back on. It is also an interesting point to reflect on the process the project has followed so far and which factors have determined this course. Lessons from the intervention can be taken to the next phase of the innovation project.

RESULTS

Completion of a Learning History results in a *Document, awareness, filled in template, slide show.*

TEMPLATE : LEARNING HISTORY CONCEPT

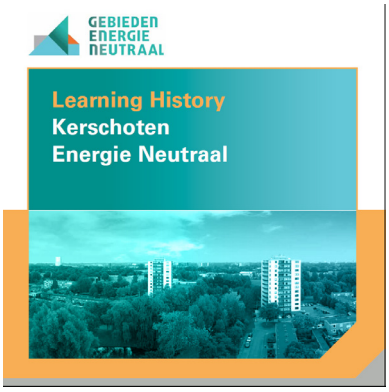
The Learning History written in step 4 will have a two column format, containing facts, perceptions and reflections. The facts can be organized either chronologically or thematically, dependent on the length and richness of the stories found.



CASE: LEARNING HISTORY FOR ENERGY NEUTRAL AREAS

The LHM was used for the Dutch innovation program Energy Neutral Areas (ENA, GEN in Dutch). GEN was a cooperation of 10 companies doing research on creating zero-energy districts. The consortium chose two locations for realizing an energy-neutral area in practice. The site of the former airport in Valkenburg was chosen as a case study for a new area to build in. The Kerschoten district in Apeldoorn was chosen as a case study for refurbishing an existing area. The GEN board of directors had decided that knowledge management was a key priority of the overall project. This entailed the importance of extracting the lessons learned from the two cases. They choose the method of Learning History to do so and communicated this to the project leaders of both Kerschoten and Valkenburg.

The Kerschoten Learning History is of particular interest; it yielded a number of interesting lessons for the program team and on top of that played an important role in getting the case study going. The process started at a key moment when the GEN consortium and the local stakeholders in Apeldoorn were experiencing a lot of friction. After an enthusiastic start, the municipality of Apeldoorn was highly critical of the progress of the GEN companies. The GEN project leader was therefore quite reluctant to engage in a timeline session with the local partners. He feared they would be too critical to allow for a fruitful meeting. The timeline session was subsequently done with only the GEN project team. The Apeldoorn partners were interviewed separately by the Learning Historians. The timeline session proved to be very helpful in setting team priorities and creating a common understanding of the task ahead.
Moreover, the interviews gave the Apeldoorn stakeholders a means of airing their grievances. They felt their comments on the project were finally heard. One of the main themes which came up was that totally different views existed among local residents involved in the process. The GEN project team was aiming for the full participation of residents in the framing and building of the project. The local residents said: “We do not want some weird process we just want a plan and we want to know how much we need to invest to get solar panels”.



After the round of interviews the skies in Apeldoorn cleared, and cooperation between GEN and Apeldoorn improved considerably. Another interesting moment occurred during the reflection meeting on the concept Learning History - step 5 -. The Apeldoorn alderman remarked that the Learning History made him realize that their new policy of merely facilitating rather than partaking in sustainable energy initiatives was received very critically by local residents. “They want us to invest in solar panels and do not invest themselves”.

LITERATURE

Louis, M. R., & J.M. Bartunek (1992) “Insider/outsider research teams collaboration across diverse perspectives” *Journal of Management Inquiry, 1*(2), 101-110.

Parent R. & J. Beliveau (2007) “Organisational knowledge transfer: Turning research into action through a learning history” *The Electronic Journal of Knowledge Management (5)*1, 73-80.

Roelofs, E. G. M. (2011) *10 lessen in leren* Delft: TNO.
Roth, G. & A. Kleiner (1995) *Learning about Organizational Learning - Creating a Learning History.*

Roth, G. L. & Senge (1996) *Learning histories: Using documentation to assess and facilitate organizational learning - Sloan working paper.* Center for Organizational Learning, Sloan School of Management, Massachusetts Institute of Technology.

Van Mierlo, B. C., B. Regeer, M. Van Amstel, M.C.M. Arkesteijn, V. Beekman, J.F.G. Bunders, & C. Leeuwis (2010) *Reflexive monitoring in action. A guide for monitoring system innovation projects* (p. 104). Wageningen: Wageningen UR Communication and Innovation Studies.

LINK TO OTHER CHAPTERS

COLLABORATION
Results of team learning can result in findings that require new knowledge or other partners. It can also strengthen the ties between the collaborative partners.

TEAM VISION
Team vision focuses on the results a team has to create together. Team learning focuses on the way that the team members have created those results.

TRUST
Having an open dialogue about what went well and what didn’t go so well can help in creating trust between team members. It makes implicit expectations and assumptions explicit, which makes it more clear what team members and collaborative partners can expect from each other.

FINANCE

AUTHORS: Jan Willem Sluiman, Wouter van den Broeck **DATE:** October 2015

HOW TO FINANCE FUTURE DEVELOPMENTS AND IMPLEMENTATION?

“Is there a valid business case?” This question is often heard when working on some new innovation. The actual question is more often than not: “Is this research worth the time and effort we invest?” Therefore it is crucial to know what the financial prospects are, and a business case supports in finding this answer.

TNO innovation for life

BUSINESS CASE
BUSINESS PLAN
FINANCING

THE IDEA IN SHORT

In order to make an innovation a success beyond the research lab and scientific papers, it needs to get out into the real world and that requires money. The steps to take from research results to production might be more than can be envisioned by the researcher and scientist.
This chapter provides you with insight in different financial means that can be used in different technology readiness levels. In order to apply for those funding mechanisms, the first step needed is to create insight in the financial potential of your innovation by means of a business case.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

The chances of finding sufficient financial means to develop, implement and launch a successful innovation increase considerably when you have a valid business case. Even though exact outcomes of the innovation can be difficult to make explicit, trying to do this early in the process of development, helps in convincing investors to spend money on your idea.
A business case can also help when scoping of your project is needed. If there are several different applications envisioned within a project, business cases can indicate which application has the most potential and therefore where to focus research. This also creates a rationale when you need to convince (non-)technical people to continue or start investing in your research or you decide to enter the marketplace yourself.

WHY IS IT A CHALLENGE TO DO THIS?

Writing a business case and thinking about financing requires a different point of view than what you need when doing research. The innovation should be positioned in such a way that it becomes attractive to customers and investors. This often means that attention is paid to aspects of the innovations that are often considered by researchers as irrelevant or not innovative at all. Furthermore it is often forgotten that a business case is more than just an excel worksheet.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- There is no clear idea of the financial benefits of your innovation.
- It is unclear what will happen with the research results once the project is finished.
- You feel that an innovation has a large potential in the marketplace.
- An alternative source of financing is required to continue research.
- A project lacks clear scoping.

WHAT LITERATURE SAYS ABOUT IT: DIFFERENT TYPES OF FINANCING

There is wide set of options when looking for financing. There are two crucial aspects: how far is the development and at what point do you "hand-over" the result from research to commercial exploitation? For fundamental research options for funding can become limited in the future as the risks are simply too large for most investors.

Funding instruments from national government and EU: EU and national governments often have subsidy mechanisms available for innovation. Each has its' own conditions that apply. For example the Dutch government has a website where you can browse different mechanisms (see literature section).

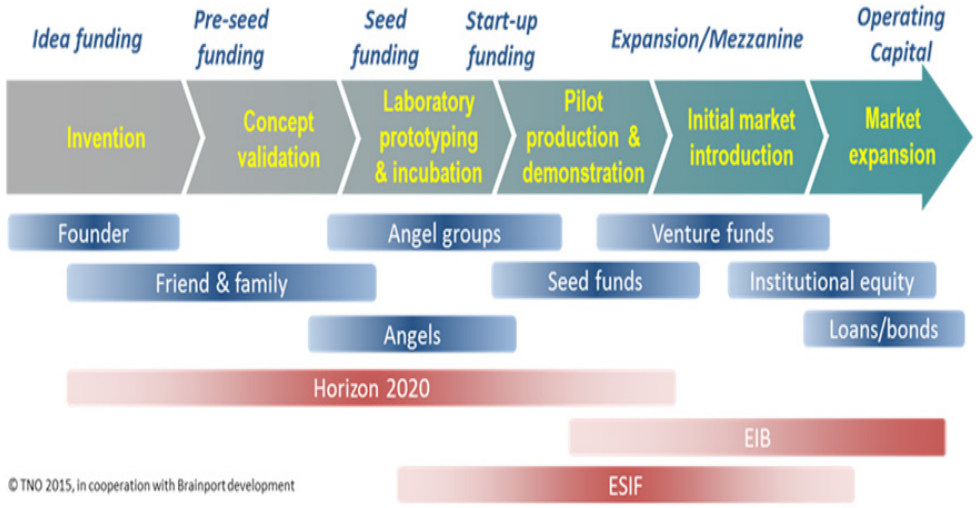
Bank Loans: A bank loan allows you to finance a large investment, at a certain interest rate. The rate is dependent on your financial credibility and the risk involved.

Private Equity Firms: These firms invest in existing, mature companies (and are therefore less relevant for us), restructure and optimize performance and sell.

Venture Capitalists: VC take a minority share in a young startup, providing a capital injection. In order to attract a VC, you should have the ambition to start your own company around your innovation and you should be able to convince everyone of possible success as VC aim for companies that can show double digit growth numbers. Next to capital, they also bring a network and expertise.

Angel Investors: Often retired entrepreneurs who invest in startups in an early stage. Next to financial support they often provide access to their personal network. Their interests often exceed simple return on investment as they are also motivated by pushing the limits in certain fields. Examples in the Netherlands: SEED Capital (Part of the "Innovatiefonds MKB+"), Startup Bootcamp

Crowd Funding: Through (large) numbers of small donations, required capital for research, product development, money is raised. Four major types exist: donation (no return expected) , sponsoring (non-monetary return expected), loans (capital plus interest rate expected back), equity (share in enterprise expected). Initiatives focused on scientific research have shown limited success up to now.



Relation between development phase (idea – operation) and possible financing mechanisms. (EIB = European Investment Bank, ESIF = European Structural and Investment Funds).

HOW TO DO IT: MAKING A BUSINESS CASE

No matter where you apply for funding or get your money from, a business case is often part of the plan that you have to present to a potential funder. The best known part of a business case is an assessment of financial costs versus benefits, nevertheless it is a much more powerful tool. A well-executed business case is a careful analysis of market trends, competition, customer needs, your own strategy and, indeed, financial feasibility. In the end it provides support to make the decision whether or not to pull the trigger on the new product or service.
A complete business case starts with a clear definition of the new product or service (chapter 10), followed by five steps: (1) determine market value, (2) assess competitive intensity, (3) analyze customer needs, (4) determine the strategic fit and involved risks and (5) calculate financial feasibility.
During all steps involvement of both business developers (i.e. people familiar with the market) and experts (i.e. people familiar with the technology and its alternatives) is absolutely crucial! The business case writer moderates and brings both market and technical view together.

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Market Attractiveness	Interviews, desk research, workshop	5 days	Business developers and experts	Market segmentations, size and growth potential and most relevant market for you
Step 2: Competitive Intensity	Porter 5 Forces	3 days	Business developers, experts	Clear sense of competitive playing field
Step 3: Customer Needs	Desk Research, interviews	3 days	Business developers, experts	Key Success Factors and expected market shares
Step 4 Strategic Fit	Workshop, interviews	2 days	Business developers, experts	Does it make sense that 'we' do it, risk analysis
Step 5: Financial Feasibility	Spreadsheet, values obtained in previous steps and through additional interviews	5 days	Business developers, experts	CAPEX, OPEX, revenues

WHO

Writing of the business case: Person with business sense, experience with business cases and affinity with the field of expertise (preferably not the researcher).
Input for the business case: The experts involved in the research.

WHEN

A business case is valuable at the start of a project to add scope to research with a wide set of potential applications. In a later stage, it can be of added benefit when extra funding must be secured.

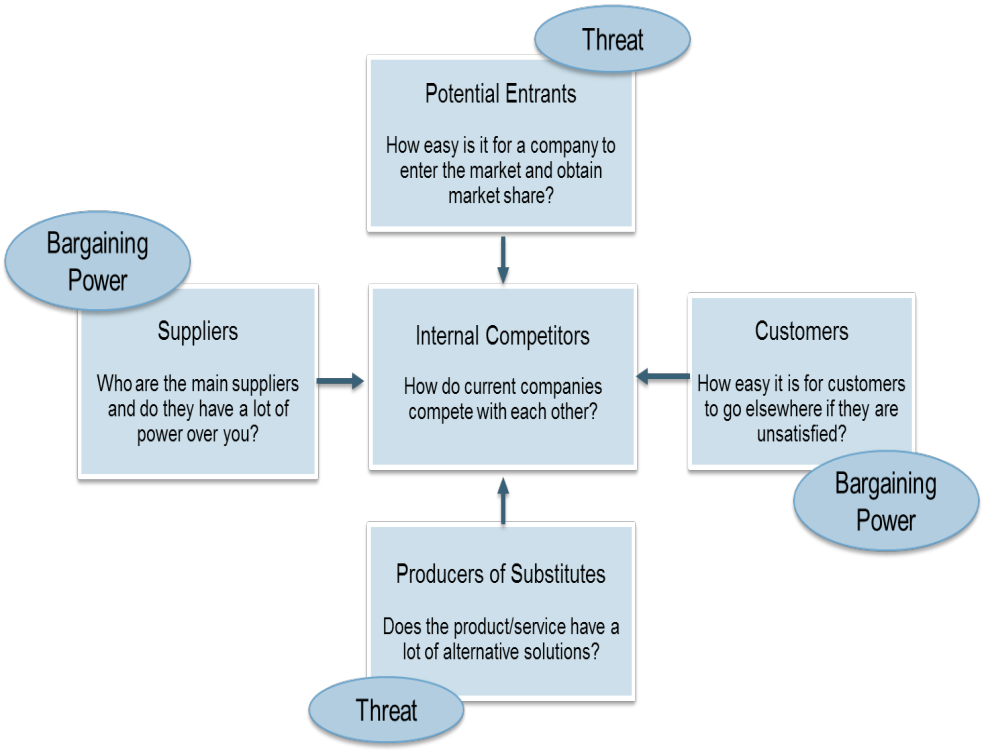
RESULTS

In general the results are presented in a spreadsheet and slide deck. Especially when the business case is intended to convince potential investors, the slide deck is of crucial importance: concise and to the point, formulated in an attractive and convincing way.

TEMPLATE: MARKET ATTRACTIVENESS

Segment *List of market segments*	Select *Indicate attractiveness*	Size *Indicate size of market segment*	Growth Estimate growth expectations

TEMPLATE: COMPETITIVE INTENSITY (PORTER'S 5 FORCES)



LITERATURE

https://decorrespondent.nl/2496/
Maak-kennis-met-de-grootste-uitvinder-aller-tijden/327327988416-11682a83
http://www.forbes.com/sites/victorhwang/2012/10/01/
presidential-debate-primer-whats-the-difference-between-private-equity-and-venture-capital/
http://www.nvp.nl/pagina/wat_is_private_equity/
http://www.rvo.nl/subsidies-regelingen/overzicht-seed-fondsen
http://en.wikipedia.org/wiki/Crowdfunding

Subsidies & programmes of the Dutch government: http://www.rvo.nl/subsidies-regelingen
Information on ESIF and EIB: http://www.eib.org/products/blending/esif/index.htm
Information on EU programmes in Horizon 2020: http://ec.europa.eu/programmes/horizon2020/

LINK TO OTHER CHAPTERS

COLLABORATION
The set of collaborative partners often has impact on the ways an innovation can be financed (e.g. sometimes specific organizations are required to be eligible for funding mechanisms, or sometimes only a consortium can apply for funding.

PROPOSITION
The business model created with the proposition has impact on the potential business case.

STAKEHOLDERS
Engaging stakeholders that can help in finding future funding works beneficial to get the required financial means.

ADOPTION

AUTHORS: Geerte Paradies, Nicole de Koning **DATE:** October 2015

HOW TO UNDERSTAND DRIVERS OF HUMAN BEHAVIOR TO PROMOTE THE ADOPTION OF YOUR INNOVATION.

People (citizens, consumers, employees, employers) are the ones that will need to adopt your innovation. Often a change in behavior is needed to make the innovation effective, which requires specific attention in developing and implementing the innovation.

TNO innovation for life

ADOPTION
BEHAVIOR CHANGE
EMPOWERMENT
DRIVERS FOR CHANGE
CONSUMERS

THE IDEA IN SHORT

While some innovations may be embraced (sort of) immediately (e.g. the smart phone), not every innovation will be as popular. Some innovations will cause resistance because they make our world look different (e.g. windmills), or because they interfere with our need for privacy (e.g. smart energy meters). Others will just be ignored for lack of interest (just another gadget or app), or because using the innovation takes too much effort and has only advantages on the longer term (e.g. electric cars).

Focusing on the drivers of behavior change will improve the outcome because it will help you to anticipate barriers and remove them as much as possible in advance. In addition it helps you make use of human drivers to stimulate the necessary behavior changes and thus make adoption as likely as possible. In other words, when you know what could prevent people from the adoption of your innovation and what would drive them towards adoption, you can use this information to design your innovation, and your implementation strategy.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

There are many examples of (ICT) innovations that take years and years to develop but that are in the end not used by the intended target group. Sometimes these innovations have to be redesigned; this costs time and money. Sometimes it is already too late; the innovation raises a lot of resistance from the target group and redesigning the innovation to match users' needs is of no use. Other examples are innovations that are difficult to use by the target group. People struggle to use them and need support. This support (e.g., calls to a service desk) can be very costly for an organization.

Also the chances for adoption are influenced by societal trends that change over time. Currently people have become more and more busy: they need to combine work, childcare, care for elderly, house work, and hobbies. This makes people overwhelmed and may make them uninterested, which can make it difficult to convince them to spend time to change their behavior.

Positive societal trends are however providing opportunities. Firstly people like new things in general. It provides them with a way to distinguish themselves from others. Secondly we live in a change of era (Rotmans 2015); we see that what we are doing (e.g., the dependency on fossil energy, the financial crisis and the problems in the health system) now is not always good for us, or for our future. This creates the need for openness, reflection and change (Trendrede 2015).

WHY IS IT A CHALLENGE TO DO THIS?

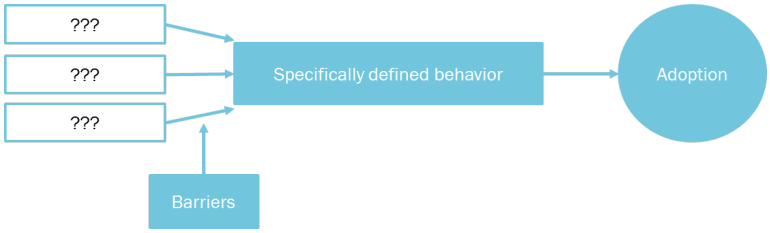
When designing a technical innovation this may be challenging enough without thinking about the people who will need to adopt the innovation (in their household or organization), and how their behavior may need to change. While addressing this problem is essential for the success of the innovation, it requires time and effort. On the other hand, developing an innovation that will not be adopted is a lot more expensive.

WHEN IS THIS USEFUL IN YOUR PROJECT?

- When your innovation is intended to be used by people.
- When your innovation requires a change in behavior by some (groups of) people.
- When you want your innovation to be adopted.
- When your innovation is so innovative that it may cause resistance, or be perceived as a threat.
- When the problem you are trying to solve requires a change in behavior.

WHAT LITERATURE SAYS ABOUT IT: HUMAN BEHAVIOR RESEARCH

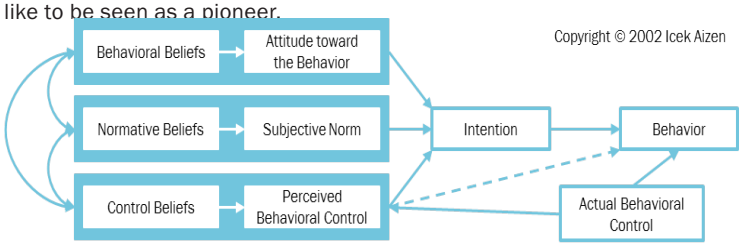
To enhance adoption, it is necessary to know which behaviors are necessary for adoption. When it is clear which behavior needs to change and under which circumstances, it is possible to focus on which drivers or factors (e.g. knowledge, certain beliefs, abilities) are causing the behavior of interest, and more importantly: which ones we need to influence in order to change behavior.



Schematic figure of the Human Factors Research

Understanding drivers of behavior

Human behavior is caused by numerous factors. Some factors lie in the individual, for example certain beliefs of individuals about themselves, other people, and the world. Other factors lie in their environment such as the behavior of other people, laws and regulations, and (cultural) norms. There are numerous models which show (parts of) these relationships (for example see Theory of Planned behavior). The Human Behavior Research investigates which drivers cause the behavior that will need to change to make an innovation effective. This is different for each innovation, and for each innovation different groups with similar behavior can be defined. For example, some people drive an electric car for mainly environmental reasons, while others drive it because they like to be seen as a pioneer.



Example of a model that predicts human behavior: Theory of Planned behavior

Select Behavior Change Techniques

When you have 1) investigated which factors are predictive of the behaviors that are related to adoption, and 2) selected those behavior that can be improved, the social psychology literature provides Behavior Change Techniques that have been proven to influence one or more factors.

Based on Intervention Mapping

The Human Factors Research is based on a method to develop health interventions in a structured and theory based manner named Intervention Mapping (Bartholomew, et al., 2011). The difference between both methods is that Intervention Mapping is a very elaborate process, while the Human Factors Research is more lean and therefore more practical in use. Recently this method has been merged with a method to develop technological health interventions, named situational Cognitive engineering , which allows psychologists to collaborate more effectively with designers (Blanson-Henkeman, in press).

HOW TO DO IT: HUMAN BEHAVIOR RESEARCH

This method provides you with insights into the drivers of the current behavior of your target group(s). It also shows which barriers are blocking the desired behavior. It provides you with the interventions to change the current behavior. When you are still designing your innovation you can apply this knowledge immediately in the design. When the innovation is already designed you can apply this knowledge to predict which factors you will need to regard or influence when implementing your innovation. When the innovation is already 'rolled out' you use the results of the research to further promote adoption of your innovation (e.g., by the right communication strategy).

ACTIVITY	FORMAT	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Problem & behavior specification	Workshop	0,5 day	Developer of innovation & (social) psychologist	Clear target behaviors
Step 2: Selection of most relevant factors	Desk research	2 - 5 days	(social) psychologist	Questions for the interviews / questionnaire
Step 3: Measuring factors	Interviews and/ or Questionnaire	0,5 - 1 days / 6	(social) psychologist	Input for step 5
Step 4: Analyzing results	Analyzing	Several days	Psychologist / data analyst	Factors (Barriers and drivers)
Step 5: Matching with behavior change techniques	Workshop	1 day (depending on elaborateness)	Project group / designers	Matched factors with behavior change techniques

WHO

A (social) psychologist and a data analyst apply the method. They need access to the target group of the innovation. The psychologist and data analyst apply the method in cooperation with the designer and developer of the innovation. During step 5 of the method the complete project group is involved.

WHEN

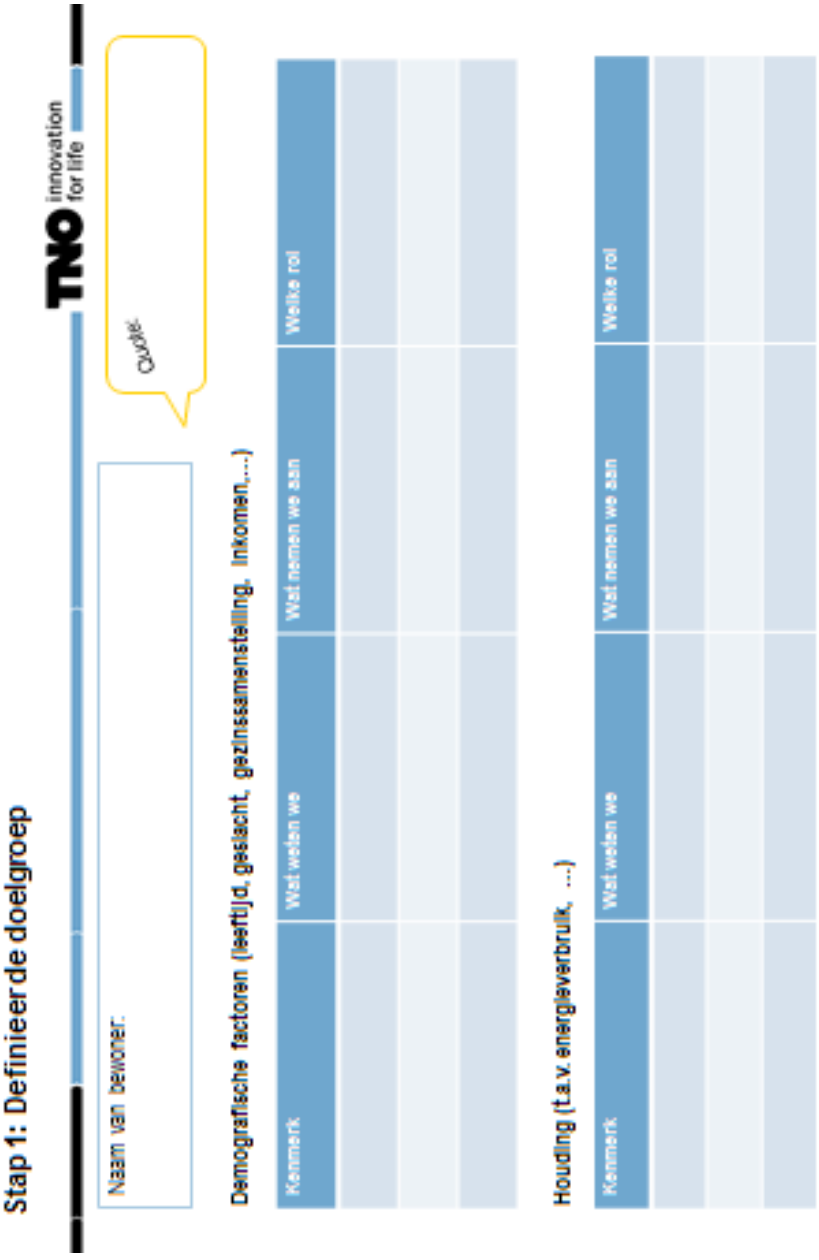
This can be done in different stages: when you are designing your innovation, when your innovation is developed and when your innovation is rolled out. However it is preferred and more cost-effective to do it when still designing your innovation.

RESULTS

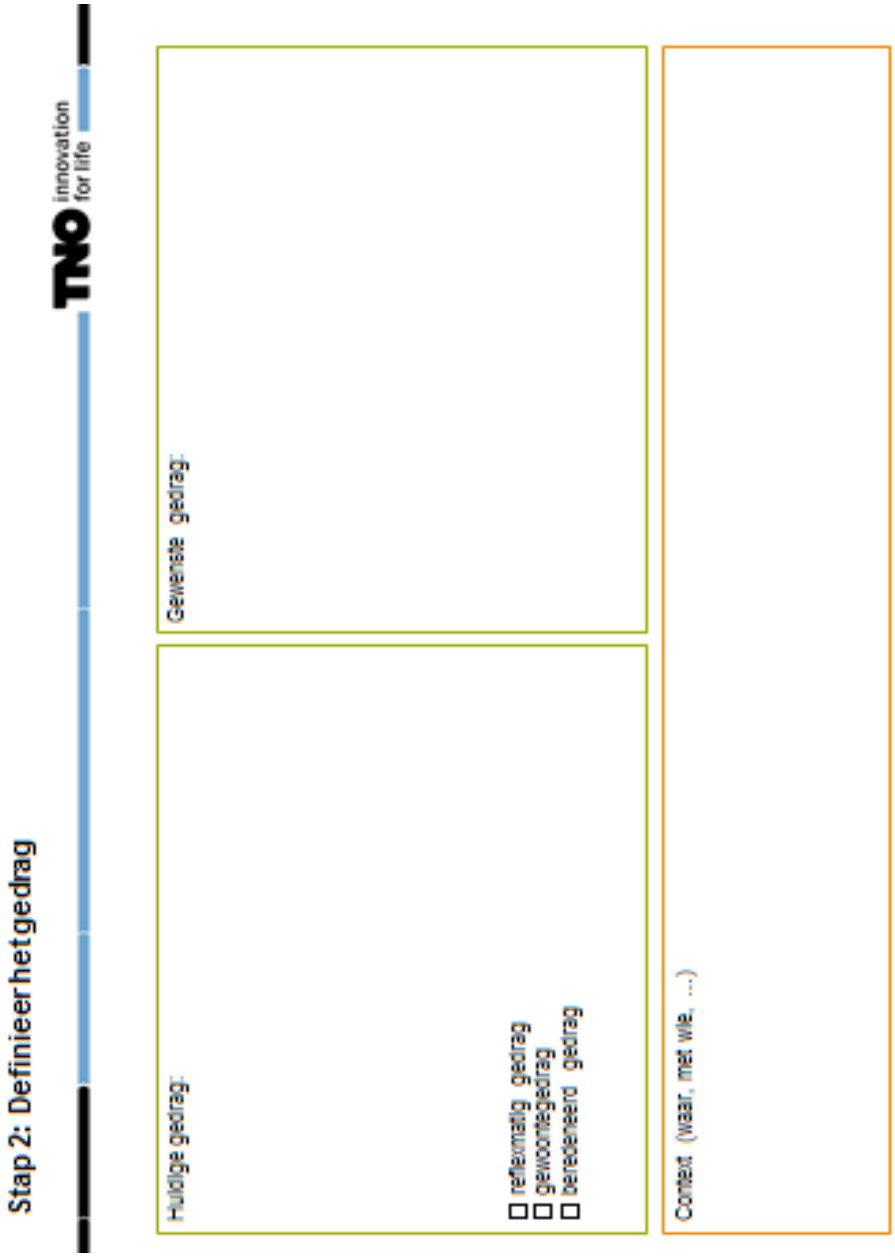
The results of the investigation (factors of importance that will need to be addressed and the contingent behavior change techniques) can be placed in a slide show or word document. The results can be used in the design process of the innovation or to create a communication- and implementation strategy.

TEMPLATE: DEFINE A TARGET GROUP

The following templates can be used to see what you already know or assume about your target group, and which consequences this has for your implementation strategy and assumptions you will need to test. You can do this for example in a first workshop before going into the details of the human behavior research in which you clarify and validate the assumptions with interviews and focusgroups.



TEMPLATE: DEFINE TARGET GROUP BEHAVIOR



Stap 3: Analyseer het gedrag

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Determinanten (kennis/bewustzijn, persoonlijke drijfveren, sociale drijfveren)

Determinanten	Wat weten we	Wat nemen we aan	Welke rol

Barrières (wat houdt de doelgroep tegen om het gewenste gedrag te vertonen)

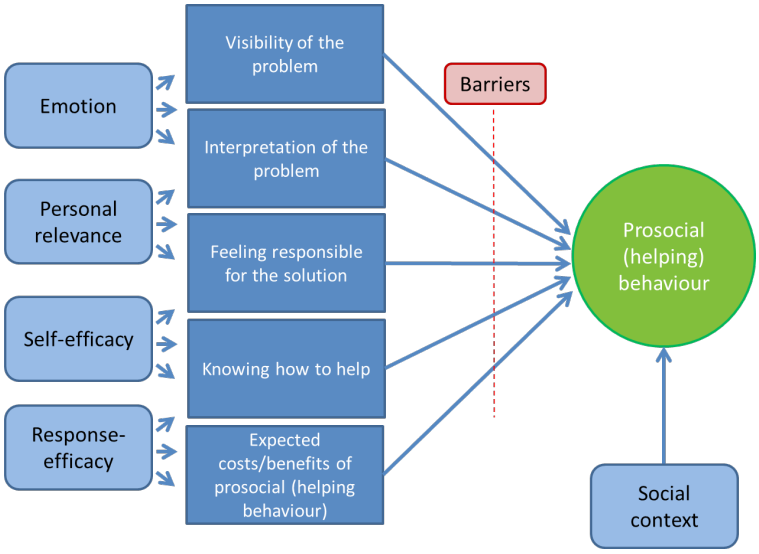
Barrières	Wat weten we	Wat nemen we aan	Welke rol

CASE: GREEN ARUBA

Aruba wants to make the transition to a renewable energy supply as fast as possible. TNO is developing a Smart Community to test several techniques in a tropical climate. However, it is unknown how Arubans feel towards environmental actions.

The research

TNO developed a questionnaire based on literature on environmental behavior. Environmental behavior can be seen as prosocial behavior, because it is behavior that is not only beneficial for yourself, but also for others. Based on this literature the model in figure 3 was constructed, which formed the basis for the questionnaire. The questionnaire was aimed at measuring 1) in what way Arubans adhere to certain environmental behaviors, and 2) how they scored on a list of selected factors. The questionnaire was adapted by the University of Aruba to reflect their culture and situation, and translated into multiple languages. Students of the University of Aruba went door to door to survey people, resulting in one thousand respondents.



The hypothesized model for our study.

The outcomes: human factors

It was found that, among other things, the Arubans do perceive environmental problems, but do not think they are responsible. It appeared that anger and excitement are activating emotions for people, and increasing one's standing is an effective motive to engage in green investment behavior. The outcomes are used as input for several organizations in Aruba who are thinking of combining their efforts to make Aruba greener. The results were also used to design experiments in Smart Community Aruba.

LITERATURE

Bartholomew L.K., G.S. Parcel, G. Kok, N.H. Gottlieb & M.E. Fernández (2011) *Planning health promotion programs: An Intervention Mapping approach*. 3rd ed. San Francisco, CA: Jossey-Bass.

Rotmans J. (2014) *Verandering van Tijdperk – Nederland kantelt* Aeneas.

Trendrede 2015 www.trendrede.nl

Blanson-Henkemans, O. A., P. van Empelen, G.L. Paradies, R. Looije & M. A. Neerincx (2015) "Lost in persuasion" CONFERENCE PAPER *Pervasive Computing Technologies for Healthcare*.

LINK TO OTHER CHAPTERS

INNOVATION ECOSYSTEM
One of the barriers in the innovation ecosystem can be the adoption of end-users or changing behavior of people. This chapter tells you how to deal with that barrier.

SHARED VALUE
Having a shared value strategy can greatly benefit the adoption of the innovation by different stakeholders. However also separate activities need to be defined in more detail on how to influence the people and their behaviour to ensure they also see and feel the added value that is assumed in the shared value analysis.

FOCUS
The focus chosen can create implications for behaviour change in end-user groups. When choosing a focus, it can be considered if the behaviour change that is required is easy to make, or if a lot of persuasion is needed for people to change their behaviour accordingly.

ITERATIONS
When checking with your end-users and customers early in the process of development, the likelihood for adoption also increases. A project team gets feedback about the value for the customer and end-users and knows how to communicate about it. It also creates insights on what might be the hurdles they see for adoption.

PROPOSITION
The way a proposition is formulated has influence in the way it is adopted and whether or not people make the required behaviour change automatically. In this chapter on adoption you learn more in-depth about what appeals to people that need to adopt the innovation, and whether possibly more is needed than 'just' formulating the right proposition.

COMMUNICATION

AUTHORS: Caroline van der Weerdt, Jonneke Klinkenberg, Rosemarie Huver

DATE: October 2015

HOW TO COMMUNICATE ABOUT THE INNOVATION.

Communicating about your innovation is done almost every day, to multiple people with different backgrounds. A communication strategy ensures that the innovation is at least understood and at best adopted by your target audience.

TNO innovation for life

COMMUNICATION STRATEGY
TARGET GROUP
MULTIMEDIA
ALIGNMENT

THE IDEA IN SHORT

By making the communication strategy an integral part of your project, respecting the different stages of innovating and how to communicate alongside these stages, the innovation process and the communication efforts can be optimally aligned as to ensure the best results. Communicating within the project team, organization and to the outside world, is done constantly. Not just the content counts, but also the channels, timing, outlets are influencing if you can bring across your message.

In this chapter you will learn to identify the key items of a communication strategy, such as the goal, the target group, the channels or outlets, and timing and budget. Furthermore, this chapter describes the alignment of the communication strategy with the innovation process itself, as to ensure endorsement by the intended target group for the innovation. It supports activities related to the involvement of stakeholders and users.

WHY DOES THIS IMPROVE OUTCOME AND IMPACT OF INNOVATION PROJECTS?

By means of a communication strategy, the most relevant aspects of communication are considered and methodologically taken into account. This supports the actual desired outcome of your project , whether it is market adoption or spreading an opinion, or any other goal that is also established in the communication strategy. Also, a communication strategy supports to address your target group(s) in different phases of development, as communication does not always necessarily come at the end (for instance, you may need participants for a research and have to communicate about that). Meanwhile, having a communication strategy instead of communicating ad hoc, will ensure that a clear message regarding the innovation is conveyed, which will have far more impact than a diffuse representation. A well-thought out approach and strategic positioning of your communication within the innovation project thus helps to create the impact that is envisioned at that moment.

WHY IS IT A CHALLENGE TO DO THIS?

A first challenge is encountered in aligning the goals of the innovation project with the communication strategy: positioning a niche product requires a different approach than a broad market launch. The second challenge is to align communication with the development of the innovation project: e.g. do we already want to publish at this stage, or do we need participants? The third challenge is the allocation of time and budget to communication; communication specialists (from inside our outside the own organization) need to be involved when time and budget are usually limited. These challenges can be largely overcome by designing the communication strategy as an integral part of the project directly from the start.

WHEN IS THIS USEFUL IN YOUR PROJECT?

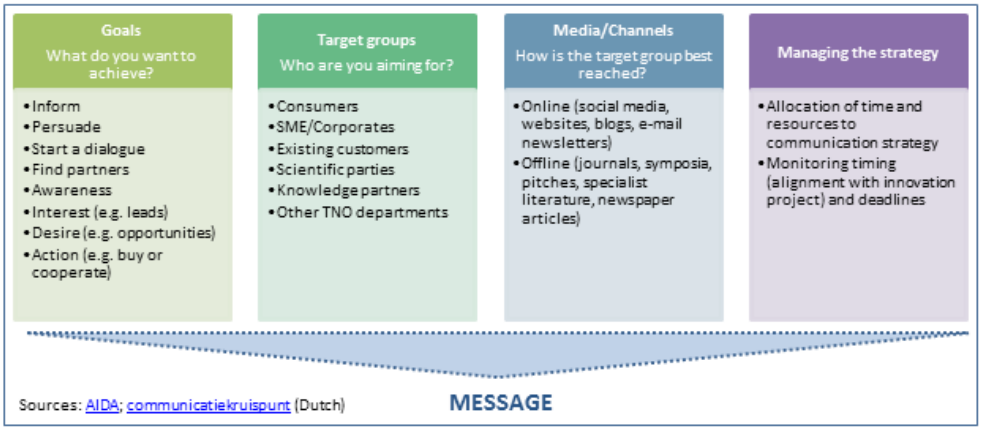
- When deciding how to reach your target audience for optimal impact of your innovation.
- When the innovation project involves an array of partners and a common communication strategy has to be defined.
- When deciding how to communicate about and visualize your innovation.

WHAT LITERATURE SAYS ABOUT IT: COMMUNICATION STRATEGY

Although there is no standard recipe for a communication strategy, several ingredients can be distinguished:

- The communication goal or goals.
  - What goal do you want to achieve by communicating? (Examples in the table below).
- The target group or groups.
  - Who are you aiming for? (Examples in the table below).
- Media/Channels.
  - How can you reach the target group? This is also influenced by the goal. For instance, broad awareness about a specific subject among adolescents may be achieved by a social media campaign whereas SMEs might be informed through symposiums or specialist literature.
  - The communication channels can, for sake of clarity, be divided into two main channels: online and offline (examples in the table below). Often a mix is most effective.
- Managing the strategy: the added value of dedicated management of the communication strategy, through allocating and monitoring, cannot be stressed enough.

A communication plan in the form of a Word document can be drafted at the start of a project and will evolve over time.



Consider communication opportunities for each distinct phase of your project. For instance, while still defining the problem, a round table discussion with your potential market may both help to get insights and already create awareness and even interest. And in the conception phase, asking for feedback can create the same result. Also, taking into account the earlier findings (as described in earlier chapters) you will more easily be able to define the classic communication triangle of “what is the need of my target market? What do we promise? And what will be our proof?”

A few general remarks are in order here. Firstly, even when dealing with a scientific audience, and especially when dealing with consumers or businesses, it is always important to keep your key message simple and attractive. The ‘what’s in it for me (or them?)’ should be clear right away (consider moving scientific background to appendixes). Secondly, have someone else conduct a ‘test read’ of your message, preferably someone who is not familiar with the content matter but who does know the market, e.g. a Business Developer. Thirdly, invest in an appealing visualisation of your innovation, for instance an infographic or a video.

HOW TO DO IT: REACH SMES FOR A TECHNOLOGY CLUSTER

Evidently there are many steps and elements of a communication strategy that can be described. Depending on the communication strategy, the innovation and goals you will have to select what fits best.

We will illustrate how a part of a communication strategy is created by using a common TNO example: attracting SMEs to collaborate on bringing the innovation to the market in a so-called Technology Cluster (TC).

An overview of possible activities is shown in the table below.

OVERVIEW OF ACTIVITIES

ACTIVITY	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Awareness: create a flyer for easy dissemination	1 week	1 or 2 project members, Marketing & Communication department	TNO TC flyer
Step 2: Awareness: dissemination online and offline	1 week	Marketing & Communication department	Participants
Step 3: Interest: follow-up calls	1 week	Business Development	Invites to a meeting
Step 4: Desire / Action: follow-up meeting with interested parties	Preparation: 3 days Meeting: half a day	Project leader/members of TC, Business Development	A technology cluster

WHO

Always make sure to check the M&C (Marketing and Communication) Plaza on TNO City for help with templates, preferred suppliers and corporate identity. Also, involve TNO's communication department, especially when your message addresses sensitivities (either politically, socially or technically).

WHEN

Ideally Marketing & Communication activities are included from the start of the project. In this way they can help to shape the internal and external communication strategy from day 1.

RESULTS

In this example the tangible output would be a TNO flyer for Technology Cluster and possibly the final report of the TC.

HOW TO DO IT: ORGANISING AN EVENT

Another example comes from our project 'NAM Monitoring Network', concerning the earthquakes in Groningen (see case description for further details). For this innovative and highly sensitive project, 180 residential participants were needed for the roll-out of the sensor network and long-term involvement in the research. After interesting residents to participate through newspaper articles and a website, an event was organised to inform them about the research and the details on what would happen and what was expected. The decision to enrich the event with an in-depth presentation on the science of earthquakes, resulting from the belief that knowledge leads to the empowerment we would like to achieve with the project, turned out to be a crucial step for full participant endorsement of TNO's research.
An overview of communication activities of organizing such an event is shown in the table below.

OVERVIEW OF ACTIVITIES

ACTIVITY	TIME NEEDED	PEOPLE TO BE INVOLVED	RESULT
Step 1: Logistics plan: set a date, a location, send around invitations also to press	2 weeks	1 or 2 project members, Communication department	Event planning and logistics
Step 2: Set the agenda and prepare the presentations	2 weeks	1 or 2 project members, presenters	An event program with activities and presentations
Step 3: Facilitate event	1 day (event = 2-3 hrs)	Invitees, press, client, project members	Participant endorsement

WHO

In this case, a close cooperation was sought with our client's communication department that was already very experienced with organising events for inhabitants of the area and press relations. Also, TNO's communication department was fully involved due to the surrounding sensitivities and possible effects on TNO's corporate image.

WHEN

Marketing & communication should be an integral part of the project as described above.

RESULTS

Neutral/positive newspaper articles about the project in the local press.

CASE: COMMUNICATION STRATEGY FOR THE NAM MONITORING NETWORK

The goal of the 'NAM Monitoring Network' project was to understand the effects of earthquakes on buildings in Groningen. An important consequent result was transparency for home-owners and residents in Groningen regarding the effect of earthquakes. This was possible because of the ground-breaking innovation of this project: a monitoring network based on sensors, all connected to a 'data vibration center', that gives insights into vibration on a house-level and can deliver insights that are globally new.

It was clear from the start that it was a project filled with political and societal sensitivities and that a thorough communication strategy was needed. Besides the related sensitivities, this was also due to the fact that 200 participants were sought (amongst a population seized with emotion), who were expected to join the research project for 10 years(!) and also required to occasionally play an active role. Communication was thus integral and two experts, dedicated to communication, were part of the project from the start and part of the core team. Also, these experts were in constant close contact with the communication department at NAM. Communication activities of the project were mainly: organising events for residents, cooperating with NAM on materials such as website (clarity, tone-of-voice, user experience) and guarding TNO's corporate image in relation to the research project. Content-wise, as explained above, crucial input came forth from TNO's communication strategy by stressing the need for in-depth presentations on the subject matter, instead of more practical items about conducting the research as the client first proposed. This was motivated by the fact that empowering participants with knowledge and their long-term commitment to the project was defined as an important desired effect of TNO's project.

Feedback from the participants and the press throughout the project (during sensor installation and information events) has been positive. Also, NAM has very much appreciated this integral approach in the project and specifically highlighted it in the evaluation of the project. Another reaction from NAM was: "yesterday [at the event] we noticed we do not only have 180 participants, but we have 180 ambassadors for this research".

DAGBLAD VAN HET NOORDEN

09 december 2014 , pag. 24

'Een mens is veel gevoeliger dan zijn huis'

Gerdt van Hofslot

MIDDELSTUM Door de plaatsing van 183 sensoren in evenzoveel huizen in het bevingsgebied in Groningen hopen experts de geheimen van de verwenste aardbevingen snel te ontsluieren.

De nieuwe sensoren, waarvan de laatste op 14 november bij een woning werd geplaatst, leveren samen met 21 trillingsmeters in gemeentehuizen en enkele industriepanden een stroom aan gegevens over de beweging van de bodem. Zelfs het kleinste schokje wordt vastgelegd. ,,Een magnitude van min 2, dat is een basketbal die op de grond stuitert,

LITERATURE

AIDA, the wikipedia page gives a broad overview of the basics: https://en.wikipedia.org/wiki/AIDA_(marketing)

Communicatiestrategie: het communicatiekruispunt van Leren.nl. can be found at: http://www.leren.nl/cursus/professionele-vaardigheden/communicatieplan/strategie.html

LINK TO OTHER CHAPTERS

INNOVATION ECOSYSTEM
A communication strategy that is tailored to specific groups that are also part of the innovation ecosystem. It can help in deciding how you want to influence (communicate with) the actors in the ecosystem.

AGREEMENTS
Often when agreements have been formalized it is a moment to communicate about it. Consider already a communication strategy at this point, as you can never make a first impression twice.

PROPOSITION
Both in proposition and communication you talk about target groups and user profiles. However in proposition activities, outcomes can have influence on the innovation.

STAKEHOLDERS
The chapter on communication includes all possible people that need to be communicated with. In the chapter on stakeholders you focus on the communication with the stakeholders that you need for the adoption or further development of your innovation.