

Accelerating innovation: empiric lessons from the Dutch water and construction sector

Dr. Sonja Karstens (Deltares), Dr. Mike Duijn (TNO), Dr. Monica Altamirano (Deltares), Corné Nijburg (Water Governance Centre) and André Oldenkamp (De Ruimte Advies) and Annebeth Loois (Tygron)

Key words

Innovation, barriers, interventions, Community of Practice, learning capacity, serious game, systems analysis, return on investment, risk distribution

Summary

Improving the cooperation between government, private sector and knowledge institutes is regarded as one of the great challenges to create more innovations in the water and construction sector in the Netherlands. By better cooperation the creativity and the quality of the sector can be optimally used which in the end will lead to smarter, cheaper and quicker solutions. Therefore it is important to find out how a more efficient cooperation can be reached.

At the moment people that are innovating in the water and construction sector in the Netherlands face a lot of barriers. Nevertheless, until recently, there was little learning capacity, as no tool, devices or platforms were present that facilitated learning of these experiences. The result was that a lot of energy and money was wasted because people that are innovating encounter the same barriers and take the same unsuccessful actions in an attempt to overcome these barriers.

Therefore it is not only regarded important to make an overview of the barriers that need to be overcome and the interventions that can be used to overcome these barriers but also to start creating a learning capacity in innovation processes in the water and construction sector.

To do so, a barrier and intervention model was created based on literature study, case studies, a systems analysis and interviews with people from the triple helix. To support a learning community on innovation in the triple helix, a website and a game have been developed based on the major barriers and interventions to overcome these barriers identified. The interactive website supports professionals in the sector in the innovation process by showing case histories related to those barriers. People are invited to share their experiences that are linked to those barriers by making specific the barrier they encountered, what kind of intervention measure was taken and what they learned from it. The Innovation game that was developed gives insight in the different roles of the government, knowledge institutes and private sector and how cooperation is essential to overcome the barriers.

1 Introduction

At the moment, a better collaboration within the triple helix government, private companies and research institutes is considered one of the major challenges to achieve more innovations. The Topteam Water, a committee of water experts that recently

advised the Dutch government how to improve the export position of the Dutch water sector and the Dutch Ministry of Economic Affairs have stressed the importance of this collaboration repeatedly. The Ministry of Economic Affairs even used the words *golden triangle* when referring to this collaboration. The water sector can make the most of its creativity and quality to achieve smarter, cheaper and faster solutions by working together within the triple helix. There are however barriers that negatively affect or even hinder the collaboration within the triangle.

Six years ago a group of people from the government, private companies and knowledge institutes joined forces and created a Community called the Working group Innovation Acceleration. This group evolved during the years towards a real Community of Practice. Pyka addresses such a group as an Innovation Network: the membership is not restricted, anyone that wants to contribute to the goals of the group can become a member (Pyka, 2002). The Working group works in an empirical way, the practice of innovation projects and the experiences of professionals working on innovation are always taken as a starting point. The group developed four methods to accelerate innovation:

- Case consultation by giving hands on advice and reflection from the triple helix
- A barrier and intervention model that was published on a website to enhance learning capacity within the sector
- A systems analysis was performed to distillate key factors to accelerate innovation
- An Innovation game was developed as a training instrument.

The following sections of this paper will explain these four methods in more depth and reflect on the way they are working out in practice.

2 Case consultation

The working group Innovation Acceleration invites to their meetings (six times a year) people that are encountering one or more barriers in their innovation process. One hour is always allocated on the agenda for this hands on advice and reflection on a case from the triple helix. A problem owner is asked to give a presentation ending with some specific questions on the barriers he or she is encountering and the members of the community will give recommendations on how they think how barriers can be dealt with and reflect on the overall approach. Sometimes the case consultation results in a follow-up like a workshop or sometimes a project. Through the years many project leaders presented their specific innovative projects that were faced with particular barriers. A few of the many examples are: a lack of sufficient return on investment in the Floating Life case, lack of urgency in the plastic soup case, cherry picking and other intellectual property issues in the reconstruction of the Afsluitdijk and lack of room for experiments in the sand nourishment case. Also, policy officials presented policy programmes, like the Delta Programme, asking how to stimulate innovation in those programmes. It is about coaching on the job, not talking about cooperation but doing it. Knowledge and network (entrance to persons) connections are provided by the members of this working group.

Reflection:

Remarkable is the fact that the members of the working group act on voluntary base in this situation, which means they are aware of the added value for the sector as a whole. Working with specific cases, the desire to share knowledge and an appealing action oriented agenda played an important role in this matter. But also the building of

sustainable relationships, mutual trust and an inspiring chairman are important factors in this long term commitment. The people that were invited almost always feel supported and leave inspired because they gained new ideas to take action to overcome the barriers they face.

3 Barrier and intervention model

A barrier and intervention model was created based on a literature study, case histories and interviews with people from the government, private companies and knowledge institutes. To enhance a learning community and sharing best practices this barrier and intervention model was published on an interactive website. A number of cases that were presented to the Work group are also displayed on the website. Other people can contribute and share their case experiences by sharing information about the barriers they faced and the interventions that were used to overcome these barriers. Six major barriers were identified:

- Risk avoiding behavior and dealing with risks
- Culture and procedures (including legislative rules)
- Competences and shattered knowledge
- Focus on Return on investment
- Urgency
- Room for experiments (both physically and legislatively)

The barrier and intervention model was published on an interactive website: www.snellerinnoveren.nl. This website also contains all the reports that the Working Group produced in the last few years. The creation of this website was largely funded by the Ministry of Economic Affairs in the Societal Innovation Program Water and the Ministry of Water and Infrastructure in the Corporate Innovation Program.

Unfortunately the barrier and intervention model is only available in Dutch at the moment. Plans exist to make an English version.

Reflection:

A lot of people are interested and visit the website at the moment. It can be concluded that it contributes to the knowledge distribution in the sector. However, the interactive character of the website is limited. Not many people add their own case experiences. A possible cause for this is that it is quite complicated and time consuming to add information on the website. Therefore, we are working with a web editor to add cases and information at the moment, but of course this is time and budget consuming.

4 Systems analysis

Through a systems analysis eight key factors have been defined through which the process of innovating within the triple helix of government, business community, and research institutes can be influenced to overcome barriers. The interviews that were held to create the barrier and intervention model were the starting point for the systems analysis. The results of the systems analysis were also added to the barrier and intervention model on the website.

A number of causal loop diagrams (influence diagrams) portraying the main mechanisms of the system were built in order to discover the most important leverage points (Meadows, 1999) for effective innovation and on this basis propose a number of changes and boundary conditions needed to promote a faster adoption of innovative technologies in the Water and construction sector.

Leverage points are factors that have a high multiplier in the performance of the system; and on which therefore efforts should be concentrated in order to have the maximum effect on the innovation performance of the sector.

These key factors stem out from the mechanisms discovered, which in combination determine and drive the behaviour of the system, explaining its poor performance in terms of innovation. These key mechanisms refer to two themes of the barrier and intervention model:

- Focus on return of investment: ensuring enough deal flow and dealing with transaction costs
- Dealing with risks: Risk allocation in contracts

Companies need to invest more in innovations than in standard projects. The decision whether or not to invest not only depends on the return on investment within a given project, but especially on the number of future projects to be tendered where the innovation can be applied. The future return on investments is often uncertain. That is why the following question is crucial: What factors are key in the cost recovery model for these investments? Three key factors are important for the return on investment within a certain project: (1) *The value of the contract*, (2) *the costs of preparing the tender*, and (3) *the percentage of the performance risks assigned to the contractor*. For the future return on investment, two key factors are important: (4) *The number of similar projects in the future* and (5) *the competitive advantage retained by the company* applying the innovation for the first time. In addition to these key factors on the return on investment three key factors have been defined that are crucial for dealing with (the sharing of) risks, namely (6) *the continuity and consistency of government policy*, (7) *the budgetary room within the project*, and (8) *the design freedom granted to contractors*. All these factors are crucial for the decision whether or not to participate in an innovative process.

Recommendations were given how and by whom these key factors can be influenced and how the barriers can be dealt with.

Reflection

The systems analysis provides in depth insights on the way the innovation system is working and ends up with clear key factors that can be influenced mostly by the government (the most important client in the water and construction sector). Two subjects that keep coming back in the discussion on increasing the capability to innovate through collaboration in the triple helix are cost recovery models and dealing with (the distribution of) risks. Having sufficient eye for these subjects (and the key factors that are related to these subjects) in the design of the project helps to prevent a deadlock that hinders the realization of innovation. The key factors also formed a solid base for both the design of the website and the game.

5 Innovation game

A serious game was developed to enhance the learning process to (future) project leaders in innovative projects in a spatial setting. The objective of this serious game is:

- (1) give people a closer insight and better understanding of the different actors roles in the triple helix,
- (2) to let people experience the barriers they may encounter in an innovation process and how cooperation is essential to overcome the barriers.
- (3) To activate knowledge on innovation projects and to secure this knowledge.

The game provides a simulation of a village situated near a lagune. Three types of roles are present in the game: the Water Authority, the business consortium and the knowledge institute. Together they have the assignment to protect the village from flooding by the construction of a dike. A large number of options are available varying from more to less innovative design solutions. It is a role playing game, so participants play often a different role than the one they have in reality. In this way they gain a better understanding of the other actors in the triple helix and learn a lot about the motivations, possibilities and limitations of other actors. Two story lines are present within the game: in one story line the Water Authority is the procurer of the project and the private sector acts merely as a “hired hand”, and in the other story line an Alliance is formed between government, business consortium and knowledge institute. In both story lines different barriers are encountered that are logically related to that particular story line. All barriers in the game are also present in the barrier and intervention model that is published on the website. Immediately after playing the game a reflection takes place. A lot of time is reserved for this to be able to start a discussion in depth about what happened during the game and what people learned from it. The development of the game was a coproduction of Tygron, Deltares, Water Governance Centre and TNO. The creation of this game was largely funded by the Ministry of Economic Affairs in the Societal Innovation Program Water, the Ministry of Water and Infrastructure in the Corporate Innovation Program and the Union of the Water Boards.

Reflection:

The game supports the start of a dialogue between the different actors about their different roles and can be very useful at a project start or in education settings. During the testing sessions of the game, it's added value on making explicit how people are thinking was observed, which resulted in a number of eye openers for the players. For example, one of the actors from the government who played a knowledge institute during the game got quite frustrated because he felt restricted by the available budget. At the end of the game during the reflection he admitted that that was something he had never thought about. The coming months the game will be played more and more learning experiences will become available. We are currently developing a methodology to evaluate what people learned from the game to be able to make learning experiences explicit and tangible.

6 Concluding remarks and follow-up

By operating during a longer time on the barriers and interventions in innovation processes in the water and construction sector the Working Group Innovation Acceleration has developed towards a real Community of Practice. The Working Group developed different methods to enhance the learning capacity in the water and construction sector and encountered some barriers in doing that as well. First, it appeared that funding is an issue if you want to develop freely accessible tools that are useful for many people. Good for the community in general, but difficult to find a single actor to make a financial contribution. Fortunately, when the Societal Innovation Programme was started by the Ministry of Economic Affairs this problem was partly solved and tools that enhanced learning capacity could be developed. Another difficulty has been to make people committed in such a way that they invest time to make a contribution on the further development of the content. So far, most participants want to gain knowledge but not many want to share knowledge. The Working Group itself is a fortunate exception in this matter. The authors therefore would like to thank all fifteen participants of the Working Group for their continuous engagement that contributed to the development of the above mentioned tools to enhance the learning capacity of the innovators in the Dutch water and construction sector.

Plans are elaborated for an European empirical cross case comparison study on how innovation programmes are being funded, how innovation is stimulated and what barriers play a role and what interventions are successful in what context. Since Germany and the Netherlands are neighbours we started to cooperate with Berlin Brandenburg. This cooperation between the two countries is aiming for an European proposal, either Interreg or Horizon2020, in which more countries can be involved. The start of this project has to be somewhere in 2014. We would like to invite people that are interested in similar issues to contact us to explore possibilities for cooperation.

Literature

Karstens, Sonja & Monica Altamirano, Key factors to accelerate innovation: lessons from the Dutch water and construction sector, July 2012

Nijburg, Corné, J. van der Pol, M. Duijn & J. Groen, Innoveren in de deltatechnologie: omgaan met belemmeringen als essentie van vernieuwing, published in **H2O/23-** 2010

Lulofs, Kris & Mike Duijn, Eindrapport Innovatielessen MIA Water, maart 2013

Pyka, Andreas & Günter Küppers, Innovation Networks: Theory and Practice, 2002

Meadows, Donella, Leverage points: places to intervene in a system. Hartland, VT, USA: Sustainability Institute; 1999