Paper IV-11

DELTAS FOR THE FUTURE
LESSONS LEARNED IN A WATER INNOVATION PROGRAMME

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ABSTRACT

Delta regions worldwide have to cope with increasing pressure on land use and the consequences of climate change and rising sea-levels. Usual methods and solutions are no longer satisfactory for future challenges of flood protection, sustainable energy, and freshwater supply. Consequently, truly innovative approaches and technologies have to be developed and implemented. Therefore, Rijkswaterstaat (NL) has executed a water innovation programme (WINN) in the period 2002 -2010, in cooperation with Deltares.

Analysing a selection of the important and interesting results of the WINN programme by use of the Cyclic Innovation Model (CIM), this paper indicates key factors for successful innovation and makes recommendations for an effective organisation of a governmental water innovation programme.

INTRODUCTION

Rijkswaterstaat (RWS), as part of the Dutch Ministry of Infrastructure and Environment, is primarily responsible for the realisation and management of the national road and water infrastructure. RWS is continuously looking for innovative solutions to cope with the challenges in the short and long future. Therefore RWS initiated various innovative programmes and projects. One of these was the Water INNovation program WINN that was carried out from 2002 to the end of 2010. Initially, this innovation programme was carried out by RWS itself, but after a reorganisation in 2007 it was decided to carry out the innovation programme together with Deltares, an institute for research and consultancy on delta technology. At the end of 2010, WINN was abandoned and the innovative water projects were transferred to a new corporate innovation programme of RWS.

In this paper we evaluate WINN by using the Cyclic Innovation Model. In the next section we describe this model. Then we report on three different cases of the WINN programme and we conclude with a set of lessons learned resulting from the analysis and illustrated by CIM.

THE CYCLIC INNOVATION MODEL

The main principles of the Cyclic Innovation Model (CIM) are that innovating is predominantly a cyclic interaction between different actors in the ‘innovation arena’ exchanging knowledge and information, and that every well-functioning innovation process (system) should be based on a clear view of the future (Berkhout, Hartmann, Van der Duin & Ortt, 2006). For the analysis of WINN we use the part of CIM that is illustrated in Figure 1. Innovation processes take time, often much more time than is wished for. Consequently, between the first idea for an innovation and its implementation into the market many changes might occur, in society, market, and/or technology. Therefore it is advisable to use in an innovation process one or more (possible) images of the future to 1) inspire the innovation process: what might happen in the future and what should we start developing in the future, or 2) to determine if our current innovation is 'future-proof': does it address possible future changes in society, market, and/or technology?

The 'forward-looking part' of CIM is made up of four components. First, the vision(s) of the future that functions as a kind of 'Leitmotiv' for all innovation activities. This future vision is fed both by the internal ambitions for the future of an organization and by recognition of external developments that may influence the goals and performance of the organization in the future. Secondly, to carry out innovation processes the organization needs an innovation process model to guide these processes. Thirdly, the ongoing innovation processes will together constitute a transition path that brings the organisation from the present to the future vision. Fourthly, the inner component is important because it links the former three nodes, thereby making sure that they are consistent, interconnected, and balanced. Leadership in this sense means being inspirational to set out a right vision of the future, to make sure that the future is vision is strategically aligned with the innovation processes, and that a sound process model is used to manage and execute these innovation processes.

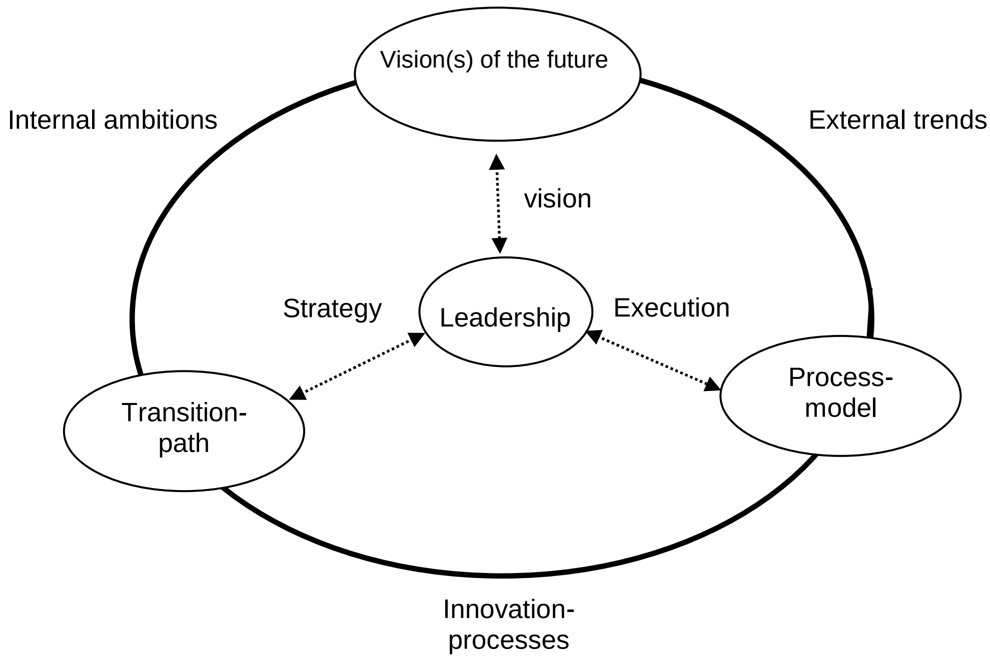


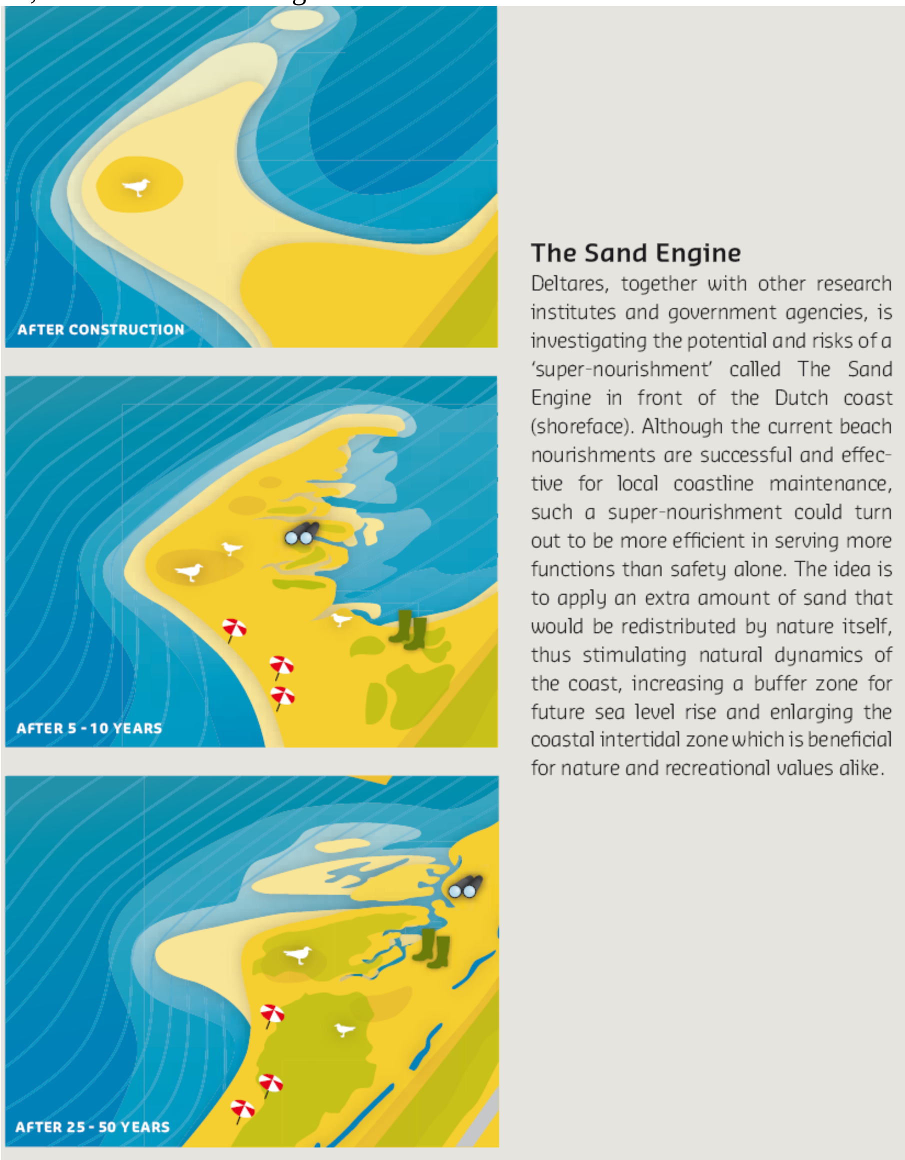
Figure 1. The connection between innovation and the future (from: Berkhout, et al., 2006)

THREE CASES

It takes too far for this paper to describe and analyse all the WINN projects (more than 60, in seven innovation themes, see also http://www.innoverenmetwater.nl, in Dutch). So we limit ourselves to three cases, chosen as different but representative examples of effective networked innovation in WINN. These cases are: 'the sand engine', 'the most beautiful and safe delta', and 'energy from water'. For each case, the idea of the innovation and its history is shortly described. All projects are analysed with help of the CIM.

Case 1: The Sand engine

The sand engine is a large amount of sand that will be deposited in front of the Dutch Delfland coast. Wind, waves, and sea current will spread the sand around. This will contribute to the coastal safety in the long term and create more space for nature and recreation. In the Netherlands, this is called ‘building with nature’.



Artist impression of the Sand Engine developing through time

Figure 2. An artist impression of the Sand Engine developing through time (Marchand, 2010)

Process

The idea of the sand engine was born at different places. A coast morphologist from university of Delft studied the phenomenon of super nourishment. During the same period (about 2000-2004) employees of the National Institute for Coastal and Marine Management of RWS who were responsible for coastal maintenance had the idea that sand nourishment could be performed much more efficiently. In 2005 the feasibility of the sand engine had been explored for the first time. The result was communicated with the ministry and at the end of the same year the ministry announced cooperation with the province of South-Holland to go on with this idea. This resulted in further studies in 2007 and an agreement with all concerned parties at the end of 2008. In 2009 the Environmental Impact Assessment procedure for a pilot project of about 20 million m^3 sand was passed. In 2010 the pilot project was put out to tender. And at the beginning of 2011 the pilot was started in front of the coast of South Holland in front of the village Ter Heijde.

Background

RWS is responsible for coast safety and therefore coast nourishment. The idea of an island in front of the coastline was very attractive as it is cheaper than the traditional way of supplementing. It fitted perfectly in the primary process of RWS regarding coastal and marine management. And in addition this concept generated extra value by creating possibilities for recreation and tourism. Another reason why this concept was well and fast accepted was that it fitted in the idea of 'building with nature'. Contractors saw there advantages with this kind of concepts in shortening permission periods for nourishment projects abroad. During the whole process the feasibility of the concept was grounded scientifically.

Case 2: Energy from water

The 'Energy from water'-project investigated the feasibility of generating energy with the infrastructural assets of RWS, such as canals and dikes, sluices and dams in rivers and estuaries. An inspiration booklet (Bruggers, 2008) was made illustrating the potentials and economic feasibility of different technologies that produce energy from water. The original idea was to offer locations for experiments to companies with different techniques and energy suppliers.

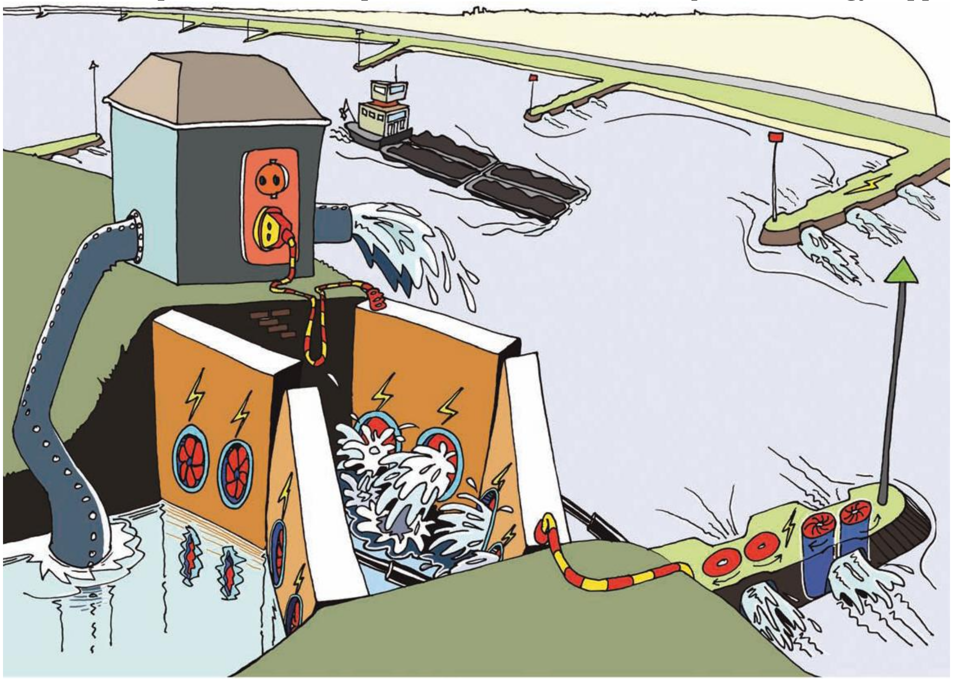


Figure 3. Cartoon on renewable energy from water made for inspiration booklet (Beeldleveranciers in Bruggers, 2008).

Process

Due to the global ambitions to reduce CO_2 and to increase energy production from renewable sources the project started in 2007. In 2008 an inspiration booklet (Bruggers. M. et al., Deltares, 2008) and a technology scan were made, showing the potentials and principles of water as source of renewable energy. In the same year and the year following pilots were prepared and conducted with initially four different technologies. In this phase a network of technology developers, energy suppliers, and responsible ministries was built up and lessons were learnt on the process to implement these kinds of technologies in the primary processes of RWS. In 2010 WINN facilitated developers in establishing a sector community to join their forces, for example for lobbying at governmental institutions. With the establishment of this community, WINN handed over the facilitating tasks of innovation in renewable energy from water to the sector. At the end experiments of two different technologies were realised within this project. Several regional departments became aware of the possibilities of renewable energy from water. This restarted the discussion within RWS on the role of RWS with respect to renewable energy from water (RWS-internal report, 2009, RWS). A final report of the WINN project is due in spring 2011.

Background

The Dutch government also wanted to reach the target to reduce the CO_2 emissions by 30% by the year 2020 compared to 1990 and to ensure that 20% of the energy used is produced by renewable sources by 2020. Renewable energy touches the core business of RWS only slightly. Nevertheless RWS is the biggest water manager of the Netherlands and has therefore a crucial role in supporting the introduction of technologies producing renewable energy from water. The chance that renewable energy from water will be applied in one of the biggest national waterworks, the renovation of the ‘Afsluitdijk’, is little as cost efficiency is estimated to be low. The government now focuses on biomass, solar energy, and wind energy as sources of renewable energy.

Case 3: The most beautiful and safe delta

‘The most beautiful and safe delta’-project is a conceptual project offering a framework for innovations on different levels (project, system, process and policy). The most tangible product of this project is an inspiration map sketching pictures of future Dutch water management (Van Duijvenbode, et al., 2008, see also Figure 3).

Figure 4. Section of inspirations map of the ‘Most beautiful and safe delta’ (Van Duijvenbode, et al., 2008)

Process

The idea of ‘The most beautiful and safe delta’ arose in a project meeting of another innovation project ‘Climate dike’ in 2006. In 2007 the project ‘Most beautiful and safe delta’ started with an exploration of inspiring concepts and ideas for climate adaptation in water management, in 2007. Two workshops were held with participants of different organizations (among them representatives of water boards, RWS, and different research and technology institutes) to develop an image of future water management in the Netherlands. During this workshop the map of ‘the most beautiful and safe delta’ has been developed. At the end of 2007 this map was presented at a national innovation day of the Ministry for Water and Transport. Ideas and innovations sketched on the map found there way in water policy plan. Most important ideas in this map are climate dikes or super levees, combined with river barriers, valves and sluices for flood protection and freshwater control. Some aspects of the idea of ‘Climate dike’ are now adopted by Delta Programme[1] under the name of ‘Delta dike’. They are now investigated further as well as is the idea of innovative freshwater control. Realization of Delta Programme will not start before 2020, but national strategic decisions are planned for 2015.

Background

At first there was resistance within the former Ministry of Transport, Public Works and Water Management when it was confronted with the map. But ‘climate change’ becoming an international issue, the public opinion in the Netherlands became aware of the need of a new approach for climate adaptation and flood protection. New ministers and secretaries of states were installed and incorporated the new ideas in their policy vision. The map was supported and presented by an external opinion leader feeding the debate on this subject. Furthermore a lot of pictures and maps have been used for presentation triggering the imagination of all kind of people in this sector. For example flippers were used to represent a more flexible control on the water system (Duijvenbode, J.D. van et al., 2008). This conceptual project gave a connected vision of a smart and beautiful Delta system naming technological challenges for the coming years. It relates to the Dutch tradition of building water structures and landscape design.

ANALYSES

The next step is to analyze the three cases by using CIM.

Case 1: The Sand engine

If we look at the ‘Sand engine’-project from the perspective of CIM we locate the starting point of the innovation system mainly in the ‘transition path’. Different ideas were present at the same time on the topic of super nourishment. These initiatives received a boost when the Dutch formulated ‘national ambitions’ regarding modernizing the Dutch coast. On the other hand, an important ‘international trend’ was (and still is) the rising of the sea level which especially in the Netherlands will cause severe problems, and which meant another boost to initiatives regarding sand nourishment. So, the interaction between the ‘transition path’, ‘national ambitions’, and the ‘international trends’ was being strengthened over time. And it resulted in a project that was implemented and is currently up and running, possibly forming an important step in the transition path towards a safer Dutch coast. Regarding the ‘open leadership’-part, the most important task was to convince stakeholders, i.e., citizens living at the coast where the ‘Sand engine’-project was carried out, that the sand engine is safe and is not causing a dangerous situation for people who like to swim in the sea.

[1] The Delta Programme is national Dutch programme with the aim to ensure national water safety and fresh water supply for the coming centuries.

Case 2: Energy from water

If we look at the ‘Energy from water’-project from the perspective of CIM we locate the starting point of the innovation system mainly in the ‘vision of the future’. International ambitions on CO_2 reduction gave a boost on external developments on renewable energy of different sectors. The international ambition (vision of the future) and the mentioned external development gave reasons to think about the responsibility of RWS to take a share in renewable energy. The inspiration booklet (Bruggers et al., Deltares, 2008) was therefore a tool to formulate an internal vision on renewable energy of water in RWS area. Within innovation program a ‘transition path’ was designed until the point of transfer to a sector community. Leadership focused on this goal and succeeded in reaching it. However, neither the internal vision nor the common vision of the future has been fully reached by reaching this goal. The question arises if handing over the facility task to the sector community was sufficient for an innovation programme in the role of leader to contribute to the internal vision.

Case 3: The most beautiful and safe delta

If we look at the ‘The most beautiful and safe delta’ project from the perspective of CIM this project explicitly starts with an image of the future. It is a framework for different innovations, among them also the sand engine and renewable energy from water. This internal vision was fed by international trends and national ambitions to build more environment-friendly and fulfil international agreements with regard to CO_2 reduction. Different enthusiast project members have filled in leadership. The right moment helped to get this idea on politic level and influence politicians at different political levels (local, regional, national). However, as this project was fully vision it is not implemented yet. An explicit transition path as well as an innovation process is still missing. However, due to the strength of this vision this project could serve as covering vision for existing and future projects.

All three cases are of great significance to the Dutch society as they offer acting perspectives to different authorities as well as companies of different sizes and from different sectors. The common vision for the future is: How can we live in harmony with nature while manipulating it in order to enable delta life?

The dilemma of all three is that they cannot be implemented directly in the working process of public works. Before implementing, more changes have to be achieved next to the technical feasibility such as organizational processes and structures as well as regulations and procedures - procurement for example - have to be adapted accordingly. The necessity to eliminate barriers at these levels in the system is in all three cases difficult to overcome.

LESSONS LEARNED

In this last section, we synthesize the analyses of the three cases (cross-case analysis) to formulate a set of lessons learned for managing a water innovation programme. CIM argues that a well-functioning -perspective addresses every aspect of CIM and relates them to each other. In all cases we see that several aspects of CIM are indeed being addressed and related to each other but also that several aspect are missing.

In the ‘Sand engine’-case ‘leadership’ was too long absent. That gave rise to too much societal resistance. Communicating a clear vision of the ‘Sand engine’-project explaining why it is vital to develop it (making our country safer) would have been a very good argument for convincing angry citizens. The main responsibility for communicating this message is with the leaders (managers) of the innovation system. Those directly involved might not be regarded by stakeholders as sufficiently neutral.

In the ‘renewable energy case’ transition path as well as innovation process were clear to one point. Transfer of leadership is done explicitly on one moment but the question stays if this has been done at the right moment and effectively to the right party. System barriers to implement this innovation have not been taken.

In the ‘Most beautiful and safe delta’-project a clear overall vision of the future was created. Some innovation projects clearly fitted in a transition to this vision. The overall vision, however, was never established. Also, no unidirectional transition path was described and was agreed on. So, the issue remains if the steps taken by individual projects will be durable steps along a transition path.

To conclude this paper we have formulated four lessons:

- *Lesson 1:* formulate a covering vision of the future that speaks to the imagination of a large group of stakeholders. Connect projects clearly to this vision and communicate this link to the top of organization as well as external parties.
- *Lesson 2:* organize a clear innovation process in order to realize a successful transition path. Participation of all stakeholders as well good communication on the process is necessary to take durable steps in the transition.
- *Lesson 3:* be aware of the systematic changes necessary to organize in order to realize a transition. Involve stakeholders that can take away system barriers on time.
- *Lesson 4:* be conscious of the role of leadership. Leaders has to have commitment of the political and governmental top of his/her organization. Transfer this role at the right time to the right party.

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