How to Foster Innovation in a large Governmental Organization?

J.W. Wesseling
Civil Engineering Division Ministry of Transport Public Works and Water Management, The Netherlands.
J.W.Wesseling@bwd.rws.minvenw.nl

Abstract

In a commercial organization Innovation is essential to stay ahead of competitors. For a governmental organization innovation is essential to deal with -or to be prepared for- external changes. The Netherlands Ministry of Transport Public Works and Water Management, is dealing with increasing demands of the society (mobility, safety, comfort); scarcity of resources and technological developments. In 1996 DG of Public Works and Water Management (Rijkswaterstaat) started the Roads to the Future project. Its mission is to initiate innovations in the field of Transport and Public Works contributing to a superior mobility (reliable, comfortable, safe, clean and silent). The aim of the programme is to realise concrete pilot projects in which innovations are demonstrated. The Roads to the Future project is organised in cycles of 2-3 years. It started in 1996 and is now in its third cycle. Each cycle starts with an orientation on possible future developments (long term thinking) which provides a framework for concrete pilot projects (short term action). Essential elements in the approach are open communication with stakeholders and cooperation with commercial parties. The presentation will focus on the methodology and results of the project, as well as the institutional setting within the Ministry.

KEY WORDS: INNOVATION / TRANSPORT / INSTITUTION

1. BACKGROUND

Congestion, unsafety, noise and stench. Many people have mainly negative connotations linked to mobility. Technological innovation may help to eliminate these negative impacts and emphasize the positive aspects of mobility. To explore the opportunities of present and future developments, Rijkswaterstaat started in 1996 the innovation programme Roads to the Future. Its mission is to initiate innovations in the field of transport and infrastructure. RttF produces innovative products and processes and aims to give incentives for the development of new policies. The main conditions for the programme are:

- innovations must contribute to safety, speed, comfort and reliability of traffic on the main road system of the Netherlands;
- innovations should be demonstrated in practical pilot projects that can be realised in a timeframe of about 2 years and within the available budget of 8 M€ per year;
- pilot projects should be inspiring, imaginative and catching.

Early 2002 RttF started its third cycle. Apart from a number of practical products RttF has developed an approach that appears to be productive. Important elements in the approach are development of pilot projects linked to a long term perspective and close cooperation between public and private parties.

1.1 Practical pilots linked to long term perspectives

Development and renewal of road systems is a slow process. Both, plan preparation and construction are generally time-consuming: it may take 10 to 20 years between the first initiative and the realisation of a road. The lifetime of road infrastructure is generally long, between 50 - 100 years. On the other hand, technological and societal developments are

relatively fast. In a period of 20 - 30 years new materials and technologies may become available. In RttF we aim at a future of 20 to 30 years. We focus on opportunities of future developments and leave the threats and limitations to others. Pilot projects are developed as stepping stones. They do not constitute elements of a man made future, but are merely a first step to explore the opportunities of a desirable future. As pilot projects have to be realised within practical limitations of time and budget they can have a limited scope only. Without the link to a long term perspective pilot projects tend to become prosaic. On the other hand, a long term perspective without practical illustration remains theoretical. Thus, the combination of practical pilot projects linked to a long term perspective has proven very powerful.

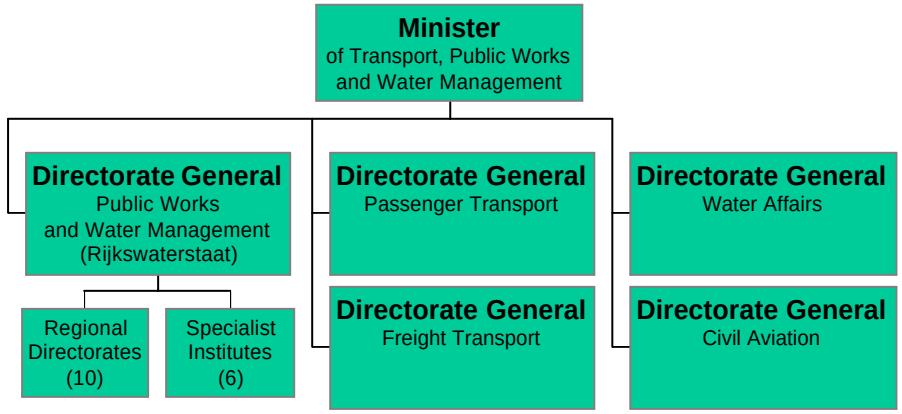
1.2 Cooperation between public and private parties.

In all RttF pilot projects close cooperation is sought between public and private parties. Rijkswaterstaat identifies promising subjects and provides a framework in which private parties are invited to participate. Private parties are generally interested, because RttF offers them an opportunity to develop a new product in which their main client is interested. Also companies told us that participation in some RttF pilot projects helped to structure their own innovation programmes. For Rijkswaterstaat the cooperation has two major advantages: firstly investments by private partners help to increase the available budget; secondly, the fact that private partners are willing to invest in a development indicates that these parties support the concept. In the pilot "energetic road", a big construction company developed a road surface that generates electrical energy. The presentation of the product by a proud company, who expects to generate income with the product, is far more convincing than the introduction of the same product by a governmental organization.

2 INSTITUTIONAL SETTING

Within the Netherlands Ministry of Transport, Public Works and Water Management, the Directorate General of Public Works and Water Management (Rijkswaterstaat) is responsible for the development and maintenance of the main water- and road infrastructure. In addition to Rijkswaterstaat the Ministry comprises four policy oriented DG's: Directorate-General (DG) for Passenger Transport, the DG for Freight Transport, a DG for Civil Aviation and a DG for Water Affairs. Rijkswaterstaat is organised in 10 Regional Directorates and 6 specialist Institutes, managed by a main office. Figure 1 shows the organization chart.

Figure 1 Organization chart Ministry of Transport Public Works and Water Management



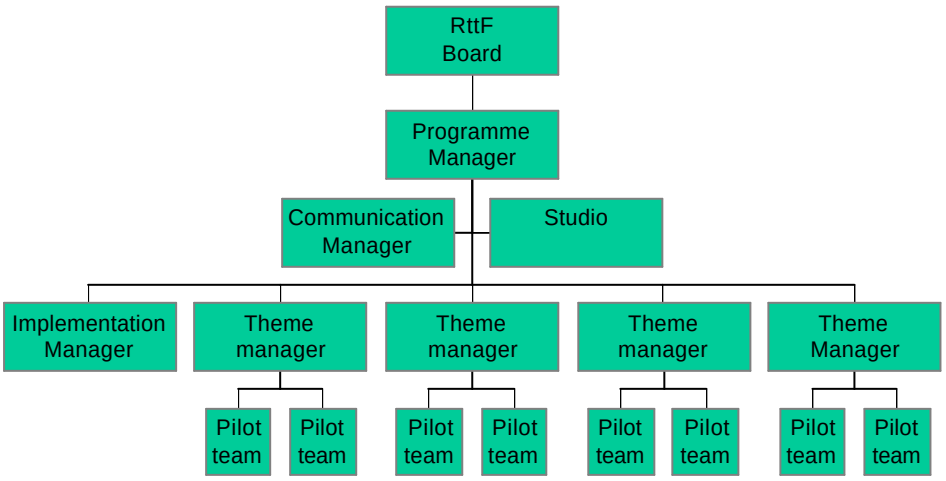
The initiative for RttF was taken by the directors of the four Specialist Institutes related to Road Infrastructure and the director R&D at the main office. To date they are members of the board of the program. Additional to organizing innovation the program intends to improve cooperation between specialist institutes, to develop non technical skills of participants and to contribute to the image of Rijkswaterstaat of a modern, public oriented

organization. In the course of the program good coordination with policy directorates appeared very productive in the development of long-term perspectives. Regional Directorates were intensively involved in the implementation of pilot projects and the further development of successful innovations. At the start of the third cycle the board was therefore extended with representatives of the General Directorates for Transport and Freight as well as the director of a Regional Directorate. The R&D director chairs the RttF board. The institutes participating in RttF are: Civil Engineering division; the Road and Hydraulic Engineering department; the Geo Information and ICT division and the Transport Research Center.

The annual budget of RttF was fixed at the start of the program at 7,7 M€. Most of the budget comes from the Ministries large fund for road construction and maintenance; some 15% of the budget from the research budgets of the participating institutes. Staff of RttF, in total some 40 ftu, is made available by the four participating Specialist Institutes. In each cycle of the program each of the four participating institutes is elaborating its own theme. For each theme a long term vision is developed that provides the framework for concrete pilot projects. To coordinate the activities within a theme, each institute assigns a theme manager. Apart from the development of activities within the theme he is responsible to comply with administrative regulations of his institute. The overall program is managed by a program manager who reports directly to the R&D director.

At the program level activities are coordinated by a core team comprising the program manager, the communication- and implementation managers and the theme managers. The implementation manager was assigned during the second cycle of RttF. His task is to ensure that promising innovations are indeed implemented. For completed pilots this means selection and internal marketing of promising results. For the new pilots the innovation manager has developed an approach in which the pilot project is a first step in a process that intends to produce a successful innovation. Apart from the overall coordination of activities, the core team decides on the allocation of budget between the participating institutes. Figure 2 shows the organization chart of RttF.

Figure 2 Organization chart RttF



2.1 Institutional development

At the start RttF was the innovation program of Rijkswaterstaat. The involvement of the Director R&D in the RttF board ensured commitment of the top management of Rijkswaterstaat. The recent extension of the board with representatives of the General Directorates for Transport and Freight as well as the director of a Regional Directorate enhanced a broader support within the Ministry. Involvement of Regional Directorates is

essential since most of the pilot projects are realized on the existing road system for which Regional Directorates are responsible. In addition, the implementation of successful innovations will generally be done by Regional Directorates.

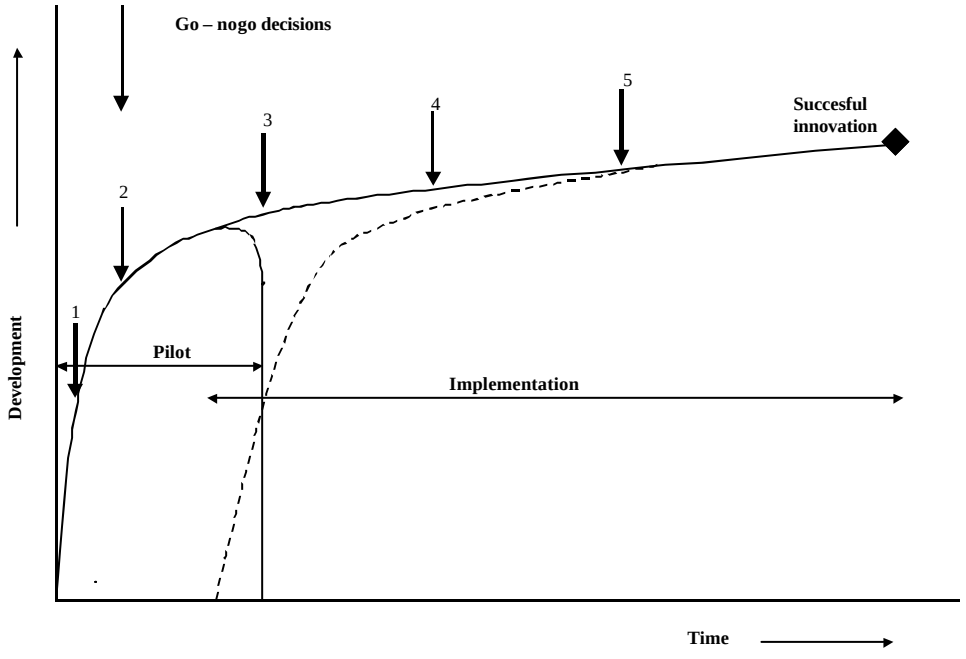
Recently, the central management of Rijkswaterstaat was reorganized. In the new structure, the Road Director combines the portfolios of R&D and road construction. For RttF this implies that the chairman of the board is not only committed from an R&D point of view, but also from his responsibility as budget holder for road construction.

At the completion of the present cycle of RttF, a new setting for innovation within Rijkswaterstaat may become effective. Redesign innovation, the type of innovation sought for by RttF will remain at the corporate level. The innovation program for Roads will share services with an innovation program for Water. Restyle innovation; the permanent development of new techniques and working methods will become an explicit responsibility of the Regional Directorates. Specialist Institutes will arrange coordination and promotion of successful innovations. The Road Director will have final responsibility for both types of innovation. It has been proposed to earmark a fixed percentage of the budget for construction and maintenance for innovation.

3 PILOT PROJECT AS A FIRST STEP TO A SUCCESSFUL INNOVATION.

The mission of RttF is to initiate innovations in the field of Transport and Public Works contributing to an improved mobility in the Netherlands. The operational objective is to realize concrete and appealing pilot projects in the context of an attractive long term perspective. In each cycle of RttF a thousand ideas are generated, of which the most promising are selected, eventually leading to some 10 pilot projects. From these 10 pilot projects 1 or 2 will finally lead to a successful innovation which is applicable throughout the Ministry.

Figure 3 RttF pilot project as a first step in the development of a successful innovation



Each RttF pilot project aims at the development of a successful innovation. In the course of time explicit decisions are made whether to continue or stop the development of a pilot. The process is depicted in figure 3. At the completion of a pilot project, a new party has to be found that takes responsibility for further development. In the present Rijkswaterstaat

structure this means that either a Regional Directorate or a Specialist Institute takes over the initiative. In the past some pilots have been continued by a policy Directorate.

If private parties are participating in the development, it is essential that in an early stage of development appropriate contracts are made and that opportunities and threats are well analyzed. A basic principle is that the contract describes the entire process, even if only the first part of the process is described in detail. A second essential element is that within the Ministry funds are earmarked for further development of promising innovations. For example: RttF developed a very promising “silent road”. In the RttF pilot project a prototype has been built (the first 100m) showing that the concept is technically feasible. The next step is application of the same concept on a larger scale , say a few km’s to test the concept under traffic conditions. Regional Directorates are only interested if additional budget is available to cover additional costs and risks.

3.1 Early projects

In 1996 Automated Vehicle Guidance (AVG) started to draw the attention as a possible promising concept. In RttF we developed a long term perspective in which cars move electronically coupled over our motorways. Advantages are clear: the distance between cars can be reduced considerably, leading to a significant reduction of energy consumption and a considerable increase in allowable traffic intensity. Also AVG would enhance safety on the motorways. According to our long-term perspective, Rijkswaterstaat, being responsible for operation and management of the main road system, would provide pre-booked slots allowing roads to operate smoothly, even during peak hours.
In a pilot project we literally flew in a set of AVG equipped vehicles from the USA and organised a demonstration in the Netherlands. The pilot initiated several follow up activities: the development of a Lane Departure Warning Assistant (LDWA) and tests with EVA (Electronic Velocity Adaptation).

A second early project that gave an impulse to a development that is still in progress is the pilot with dynamic road marking. The idea is simple: if road marking is done with lights in stead of paint, the subdivision of a road into lanes can be changed on demand. A three lane road can for instance be changed into a four lane road during hours of heavy traffic. In the Netherlands the maximum speed on our motorways is, dependent on local conditions, 120 or 100 km/h. During heavy traffic the average speed reduces. At lower driving velocities the acceptable lane width decreases. A road, designed with three lanes at 120 km/h could accommodate four lanes at 80 km/h. Since the road is said to have its maximum capacity near 80 km/h the measure would add over thirty percent to the capacity of the road. In a pilot project we invited companies to prepare practical designs for such a system of dynamic road marking. The team prepared a draft set of functional specifications and evaluation criteria. A European tendering procedure was adopted for contracting. Five consortia reacted on our call for tenders. Two consortia were selected to realise a 50 m prototype. Finally only one of them managed to meet our requirements. After realisation of the prototype we further refined the functional specifications which formed the bases for the preparation of the contract for a large scale trial by the selected consortium. Although the system still has some technical imperfections, we consider the concept as very promising. Recently we started a new test, for which we launched an open tender. 5 companies, including the two consortia that were involved in the initial development, have realised a test application on a motorway near the Hague. If the test is successful and the product appears economically feasible, we have many locations where we would love to apply dynamic lane marking.

Figure 4 AVG pilot (1996)

Figure 5 Pilot Dynamic Road Marking

3.2 Completed projects

Themes in the second cycle of RttF were: Virtual Mobility, Flexible Infrastructure, Road Architecture and Road surface of the Future. Results of the latter theme will be presented in a separate paper. To illustrate the methodology of RttF two projects are presented below.

The theme Road architecture 2030 had a vision of the future in which traffic would become safe, silent and clean. New technology would do away with noise pollution, stench nuisance and vibrations once and for all. In this perspective, road users and people living in the vicinity of roads will no longer suffer from negative impacts of traffic. Roads and the areas around them would be connected by innovative, daring architecture. Opportunities are created for living, working and recreation in the vicinity of roads. The emphasis would gradually shift to the positive aspects of roads: namely to connect and open. Within the perspective of safe, silent and clean traffic, the development of motorway related buildings becomes very attractive. The idea fits within the current focus on the intensive use of space and multifunctional user potential Within the theme two pilots have been realised; a "noise" pilot aiming at measures that contribute to the reduction of traffic noise; and the pilot "motorway house".

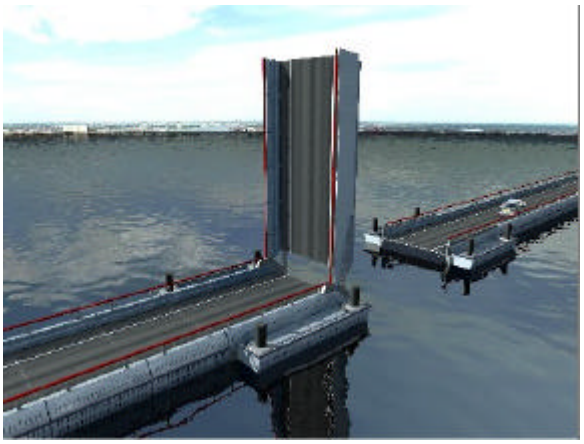
Pilot Motorway House

The Motorway House pilot project involved market players, experts and the public at large in discussion of the opportunities that the road has to offer in the future. What would a Motorway House look like? That was finally the question posed in a European design competition. Architects, urban developers and landscape architects were invited in the spring of 2001 to design a dwelling that was fully integrated with the motorway and its surroundings. The main condition for designs was that they should be technically feasible. In the summer of 2001, the competition yielded some 80 designs from a variety of European countries. The ideas elaborated in the various designs contributed significantly to the public discussion on the living in the vicinity of Motorways.

The theme *Flexible Infrastructure* aimed at a future in which Road infrastructure can easily adapt to changing demands. One pilot within the theme dealt with the lengthy decision making process, which may prevent the construction of essential connections. The second pilot in the theme dealt with the more physical aspects of road construction. The notion that in the western part of the Netherlands, with its peaty subsoil, considerable effort is required for the foundation of the road, led to the idea of a “floating road”.

Figure 6 Design of a Motorway house

Figure 7 Floating Road



Pilot Floating road.
The Pilot “Floating Road” wants to promote the development of floating roads that are able to adapt to a changing water level. The pilot corresponds well with the actual Water Management policy in the Netherlands to give more room to rivers in stead of framing them between ever increasing dykes. Floating roads may offer a flexible solution for existing bottlenecks in road infrastructure. Floating roads may provide a temporary by pass during maintenance of bridges or roads along the water. In areas with a peaty subsoil the floating road may be founded on the shallow groundwater.

The pilot started with a European tender that yielded 16 attractive proposals. From these the ‘De Bouwsteen over Water’ was finally selected to be built. The prototype has a length of 70 meter consisting of coupled aluminium pontoons. At the surface the pontoons constitute a smooth and stable area allowing safe and comfortable traffic at a speed of 80 km/h.

4. CONCLUSION

Since 1996 RttF has been a successful innovation program within the Netherlands Ministry of Transport and public works. Important success factors are:

- support of the top management;
- well implemented within the Ministry through adequate institutional arrangements;
- access to resources (budget as well as knowledge and experience); and
- fruitful cooperation with private parties.