



Demonstration sites to speed up innovations in delta technology

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ABSTRACT

Innovations in delta technology appear to be urgently needed to provide solutions for effective and impactful water management in vulnerable delta areas. Unfortunately, the development of these solutions and their acceptance by the market appear to face several obstacles. Thematic demonstration sites have proven to be an effective intervention, addressing these obstacles and helping to speed up the introduction of innovative products in the market. This “message from the field” shares our experience developing such demonstration sites, and discusses their effectiveness.

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At present, more than half the world's population lives in delta regions. Climate change, global population growth and widespread urbanization pose complex challenges for the continued use of these delta regions. This contributes to a growing need for innovative and effective delta technology solutions. Two major obstacles appear to hinder and retard the development and realization of these crucial new solutions.

You only love what you know. Public water managers in the Netherlands face a complex challenge, with declining public funding and increasing expectations on the part of citizens. Since innovation brings risks with it, and since the costs of new technology precede the benefits, many water managers prefer to place their confidence in known solutions rather than investing in new and still unknown, often unproven, alternatives.

An old boys network. The delta technology sector in the Netherlands is characterized by public water managers and established, generally large, commercial parties such as dredging companies and engineering firms. They have already worked together for decades, seeking solutions to delta projects, often by applying and further optimizing existing solutions (so-called incremental innovation). Radical innovation, on the other hand, generally comes from smaller companies (SMEs—small and medium enterprises),

from start-ups, as well as from spin-offs from university research. SMEs and start-ups are often not adequately connected to decision makers and their knowledge structures.

An effective tool for breaking this logjam is to create environments, whether physical or digital, that are open, accessible, largely free from regulations, and which specifically relate to the actual reality: demonstration sites. These sites permit innovative entrepreneurs, researchers and end users to jointly test and improve innovations, as well as demonstrating them to potential customers.

Starting in 2013, the Delft University of Technology (DUT) has developed such a delta technology demonstration site. The goal of this demonstration site, called Flood Proof Holland (FPH, Fig. 1), is to develop flexible, temporary flood barriers as alternatives to the traditional sandbag (<http://www.vpdelta.nl/proeftuinen/floodproofholland/>).

The facility, about the size of a large football field, permits flooding to be simulated in separate basins. In cooperation with students and researchers from the DUT, more than ten entrepreneurs are currently testing various competing innovative solutions for temporary flood protection. The cooperation with the DUT provides, among other things, recommendations for optimizing the various products. DUT does not offer Environmental Technology Verification schemes or other forms of certification, because DUT wishes to maintain her independent role.

Because competing entrepreneurs are testing and demonstrating solutions at the same site, critical mass is developed to actually realize products in the market. Their agglomeration makes

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Fig. 1. Picture impression of Flood Proof Holland demonstration site in Delft.

doing business more efficient as they can share demonstration facilities and national and international customer base (expected following Harold Hotelling's paper entitled "Stability in Competition"). Particularly the international customer base would be difficult to access without the international network of DUT and other knowledge institutes in the area (e.g. UNESCO-IHE and Deltares). The concrete physical site also makes it possible for potential customers and end users to learn about innovative solutions ("seeing is believing"). Also financially it is beneficial to share the facility. Start-ups that use the facility intensively for a longer period contribute to maintenance cost of the facility, one-time use of the facility is without charge. The intellectual property rights are with the companies. DUT is shareholder in some of her spin-offs.

In addition, researchers at the DUT are using the demonstration site since summer 2013 as a real-life environment to test ideas and start new research and as practise site and field lab for their students. The site thus clearly complements the controlled laboratory environments offered nearby due to its outside conditions and flexibility. As well as providing research results, the project makes the researchers' work more visible; the site has already led to university spin-offs and to new cooperative agreements. For example a group of entrepreneurs initiated Flood Team Europe, a fast response team for flood disasters.

To date, over a thousand visitors from more than forty countries have visited the demonstration site. Millions more have learned about the facility and the innovations being developed there thanks to TV reports from BBC, Al Jazeera, film crews from Canada, Italy, the Netherlands, Taiwan, Thailand, and Vietnam. Practically all the entrepreneurs have already received their first orders, from countries in Africa, Asia and Europe. Buyers are primarily governments, but also private sector seeking to protect e.g. their valuable

industrial zones. Yearly over 20 demonstration days take place and videos are available of these demonstrations.

From the experience with FPH we learnt that, successful demonstration sites are dynamic. After its opening in the summer of 2013, the site underwent a large expansion in spring 2014 to permit more entrepreneurs to test and demonstrate their products simultaneously; a further expansion will take place in the fall of 2015 to allow more different tests to take place. In addition, the Romanian government is working with the FPH partners to create a comparable facility in Romania: Flood Proof Romania. Both this proposed facility and the functioning site in Delft will be included by an international consortium as part of three Horizon2020 EU research proposals. At the same time, thanks to demonstration of their innovations, individual entrepreneurs are participating in a wide range of large international projects that have been initiated by the DUT.

Since 2013, the FPH demonstration site has been developed as a result of intense cooperation between national, regional and local government, universities, research institutes, and both large companies and SMEs, as well as start-ups and spin-offs. The driving force behind this site is the Valorisation Programme Delta Technology and Water (www.vpdelta.nl). This program is financed by the European Funds for Regional Development (EFRD) with the aim of encouraging entrepreneurship and innovation in delta technology. Since the project team "speak the language" of business, university and government, they have been able to build Flood Proof Holland into a strong and committed consortium, which offers each individual party an added value. Combined with the means to physically build, exploit and develop new technologies, this had led to a dynamic environment promoting innovation.

An initial investment of 300,000 euro from the consortium combined with 250,000 euro of in-kind contributions permitted

the development, realization and exploitation of Flood Proof Holland. After only three years, this has already led to purchase orders for innovative water flood barriers totalling more than 1 million euro. Customers include Dutch water boards, individual house owners, companies, a museum and an NGO. Dutch water boards are discussing how market acceptance of flexible and temporal flood defence structures can be increased. Add to this the indirect benefits to research and education that have been gained by students and researchers conducting tests, as well as the positive exposure the project has given the DUT, the municipality of Delft, and the region.

Based on this experience with FPH, we see thematic demonstration sites are thus an effective means of testing and optimizing innovations, as well as providing opportunities for “seeing is believing” and for breaking out of the traditional “old boys network.” They can offer a cost-effective tool for developing much-needed radical solutions and for speeding up innovations in the increasingly complex delta technology.

To successfully implement a comparable demonstration site, at least four ingredients appear essential according to our experience with FPH:

1. An independent party needs to organize and promote the project—with a commitment of at least few years.
2. Members of all three major parties need to be involved and committed: local and regional government (responsible for the physical location and necessary authorizations, but also able to elucidate the need for effective solutions to flood events); universities and research institutions (able to provide researchers and

students); and a range of larger and smaller companies as well as start-ups (for whom the facility needs to be easily accessible).

3. The project needs to have sufficient initial funding to permit both the initial development and realization of the demonstration site as well as its subsequent operation (e.g., organizing demonstration days, profiling the site with relevant events and attracting media attention).
4. The site must be open and inclusive, welcoming all interested parties who want to test an innovative solution.

In view of the global demand for innovations in delta technology, and as a result of the demonstrated success of Flood Proof Holland, VPDelta is starting a new project which aims to develop at least ten new demonstration sites around the themes Safe Delta, Urban Delta and Smart Delta. Among others, these will include a demonstration site for building on tidal water (Aqua Dock in Rotterdam), a climate-adaptive neighborhood (ZoHo in Rotterdam), and a demonstration site for innovations in the transition area between land and sea (located in Scheveningen Harbor). This new project will offer additional case study material for scientific evaluation of the perceived accelerating effect that demonstration sites have on innovation, as presented in this “message from the field”.

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