Deltares

Enabling Delta Life

Deltares

Independent institute for applied research in the field of water, subsurface and infrastructure

Living in deltas, coastal areas and river basins

- Throughout the world, more and more people are settling in deltas, coastal and river areas

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Living in deltas, coastal areas and river basins

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Living in deltas, coastal areas and river basins

- Traditional solutions are no longer adequate
- New technological and innovative solutions are needed

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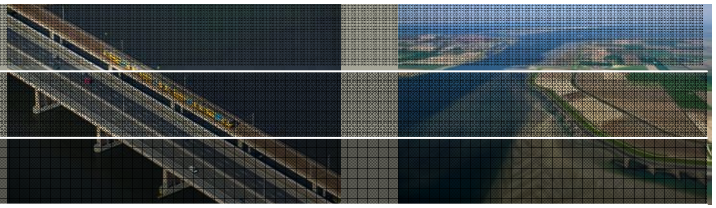
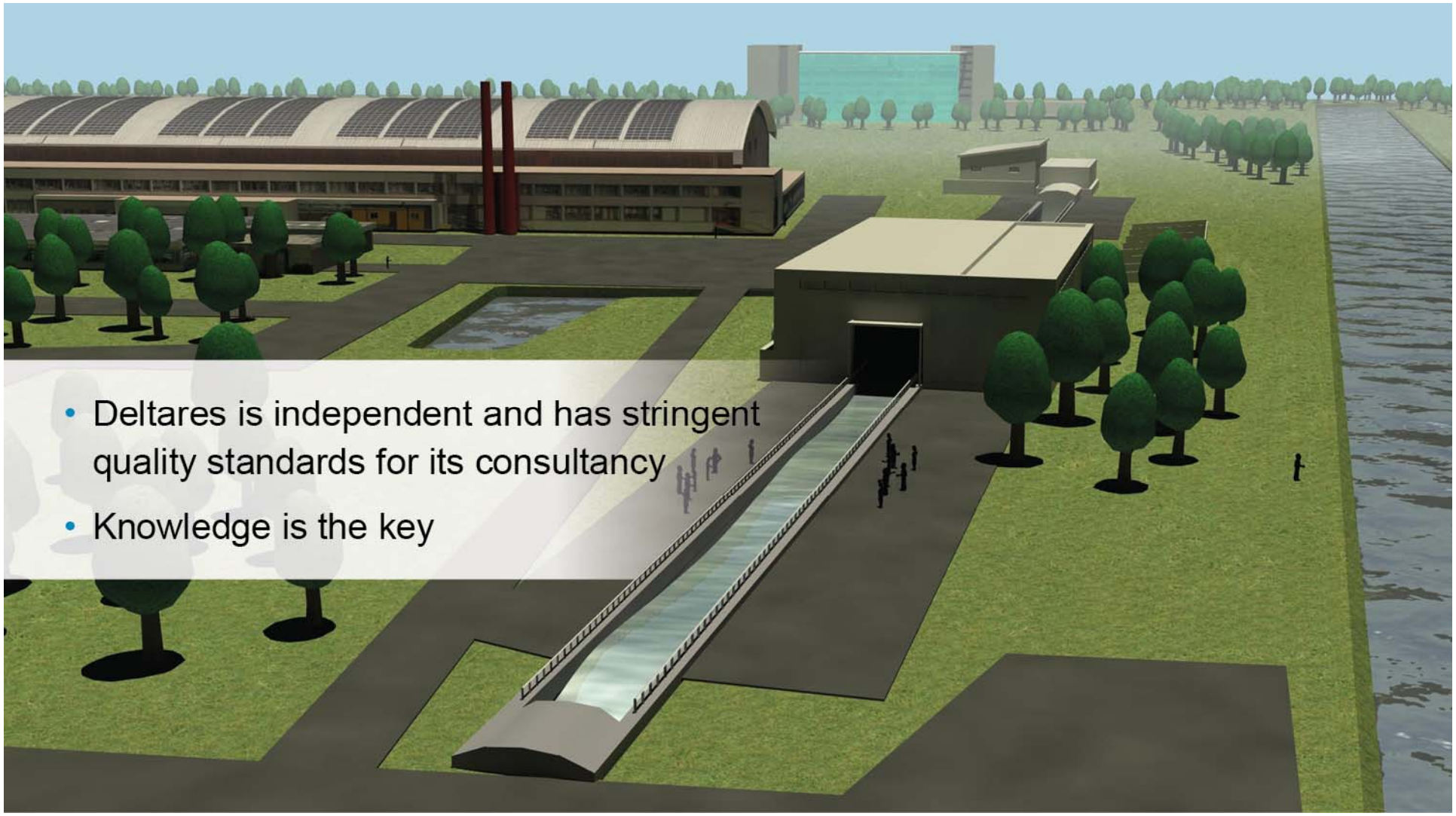
Leading top institute





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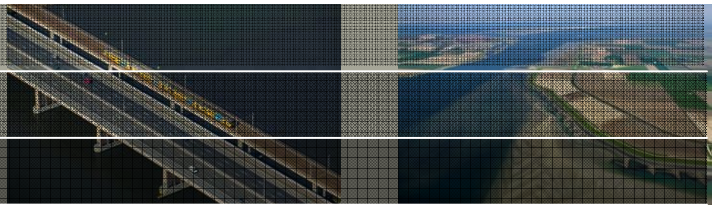
Facts and figures



- Legal form: Foundation under Dutch law
- Workforce: 840
- Number of nationalities: 28
- Annual turnover: 113 million euros
- Locations: Delft and Utrecht
- National and international activities
- Unique in-house facilities

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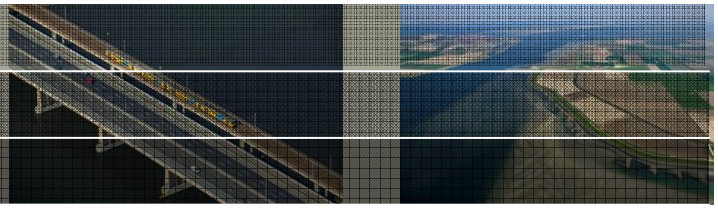
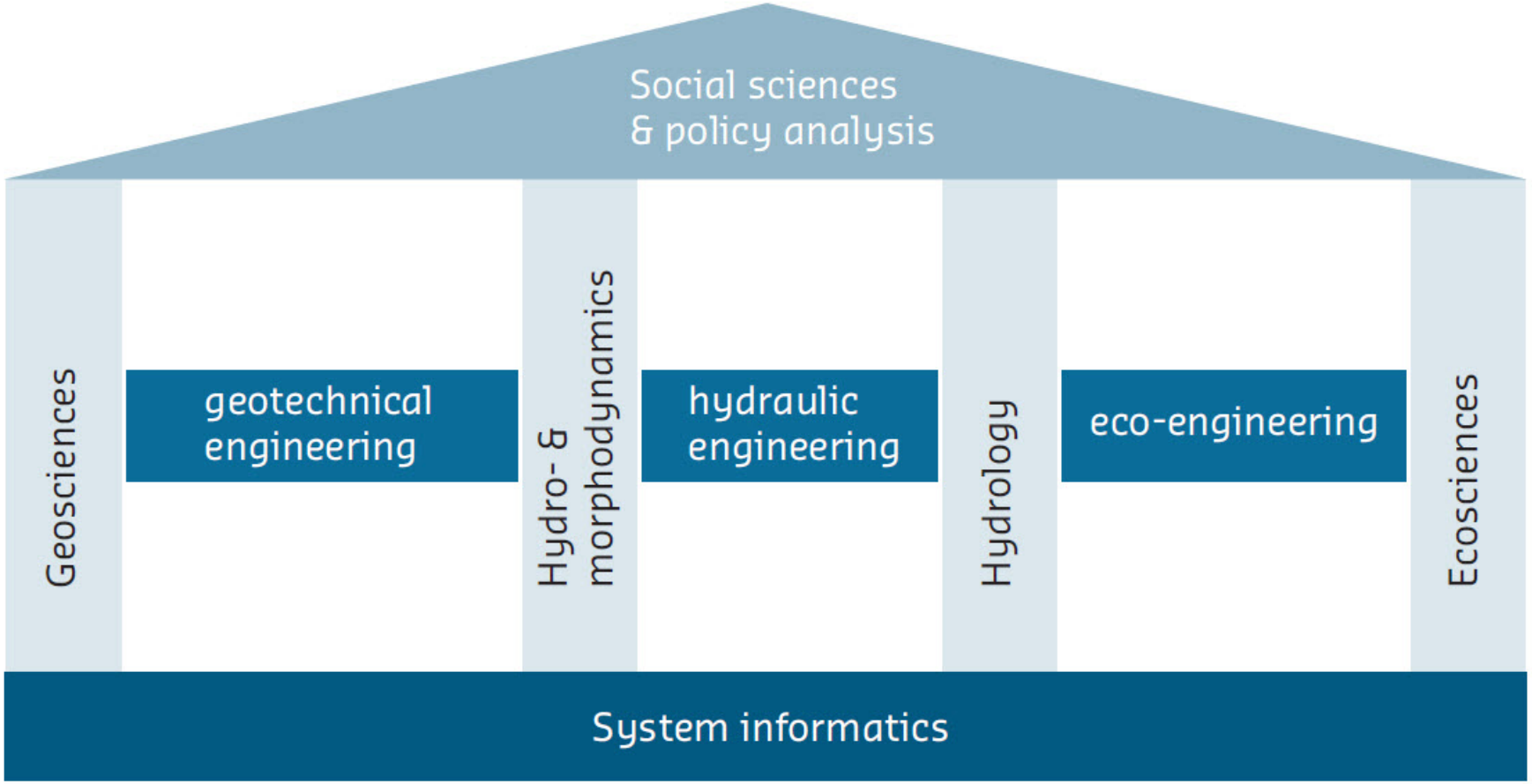
Excellent expertise





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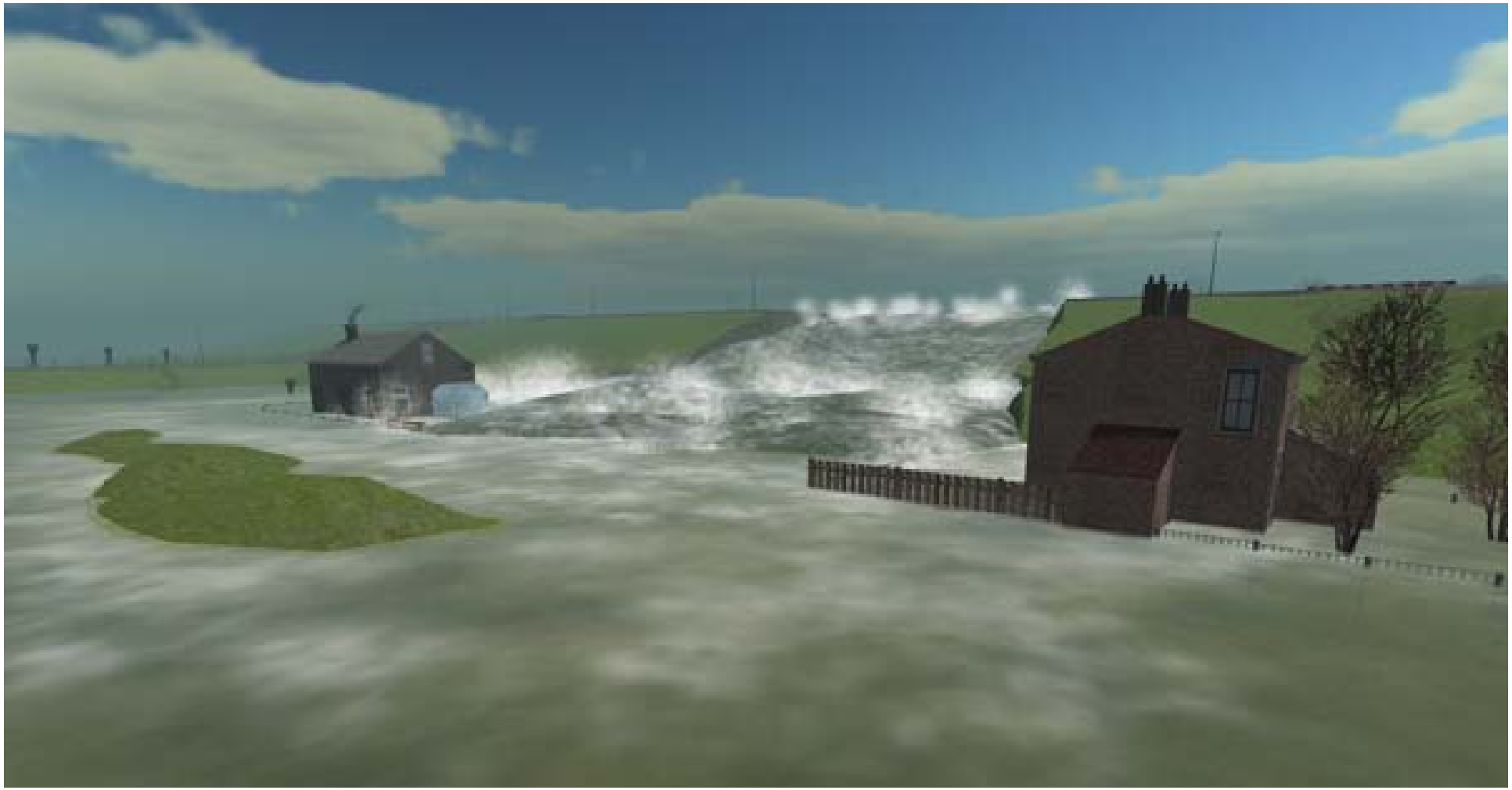
Sharing knowledge



Through serious gaming, (open source) software, publications, data and models, doctorate supervision, Deltares Academy, workshops, congresses and projects/research projects

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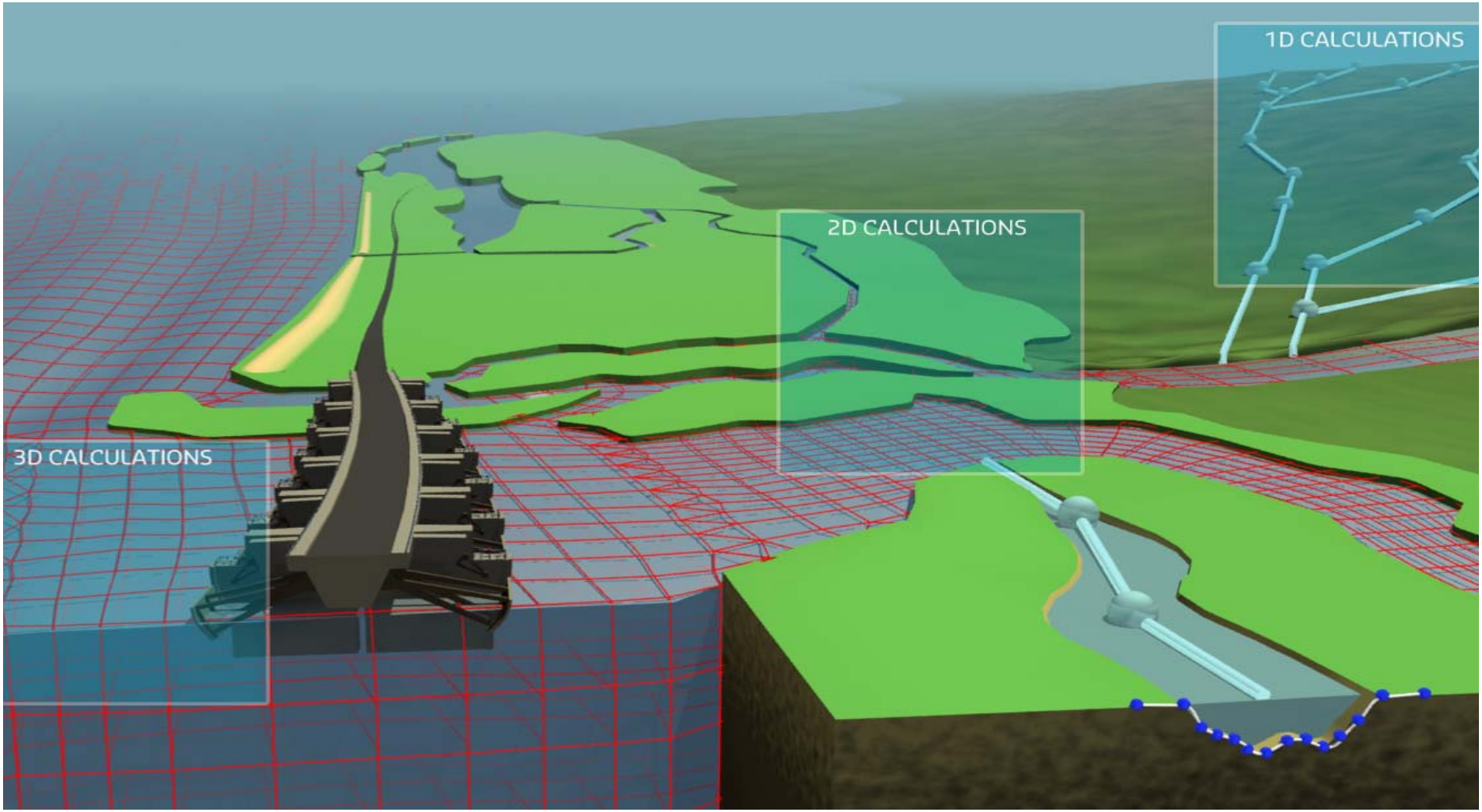
Open software

System informatics



- Deltares software used in more than 100 countries
- Open software establishes sharing community

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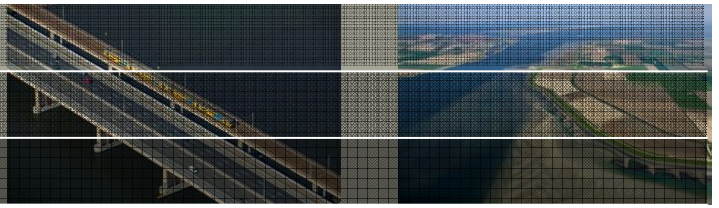
Sand Engine

Hydro- & morphodynamics



- Ter Heijde peninsula: 128 hectares (256 soccer fields)
- Protection against rising sea levels and space for nature

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Extension of Rotterdam harbour

Hydro- and morphodynamics/ Environmental sciences & eco-engineering / Hydraulics and geotechnical engineering

- Research and advice on port design
- Testing coastal defences using scale models
- Tidal flow predictions for ships during the construction phase
- Environmental impact assessments and cooling water discharges

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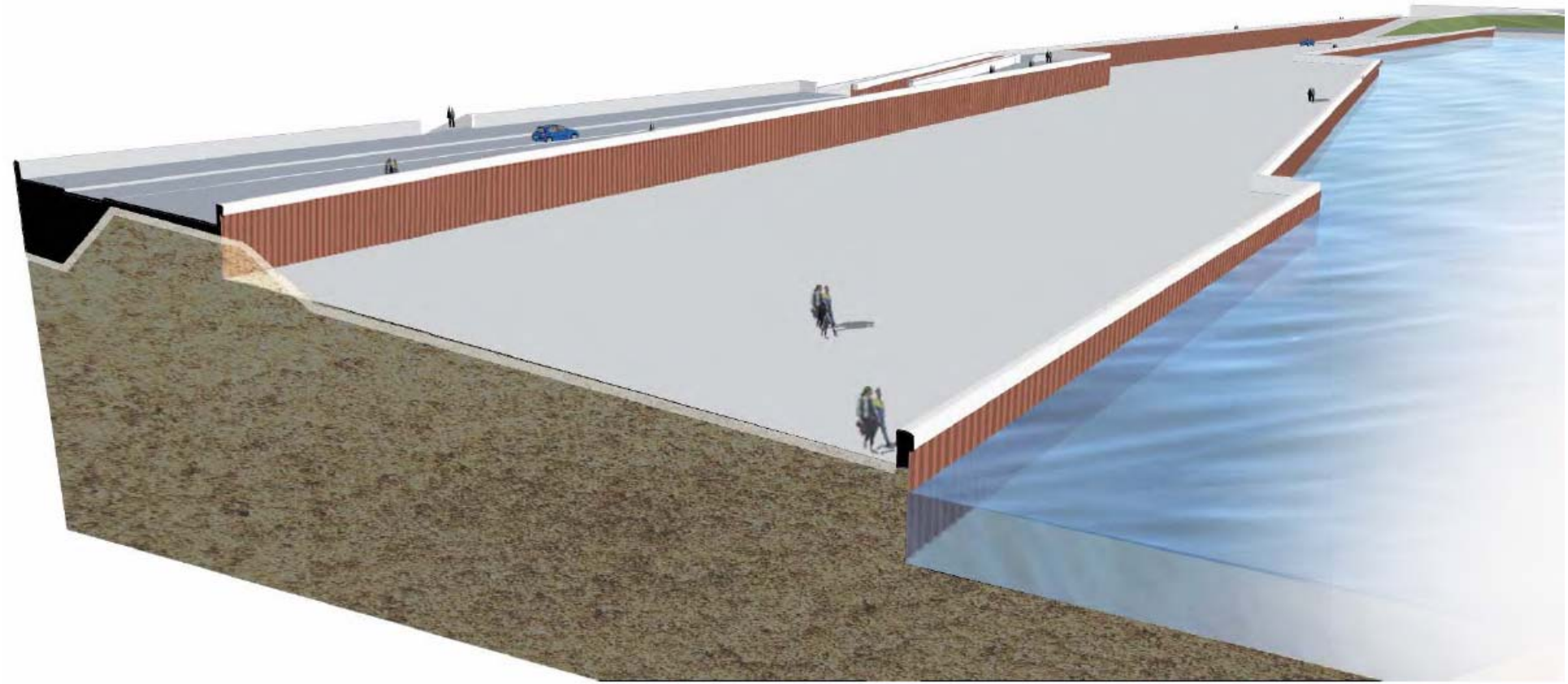
Climate Proof Areas

Social sciences & policy analyses



- Bruinisse – the dike as part of the village
- The dike is a part of the village and it is the link with the water

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Singapore Marina Bay

Hydrological sciences / Environmental sciences & eco-engineering

- Marina Bay: from estuary to freshwater reservoir
- Objective: an operational water quality management system
- Collaboration with the Singapore Public Utilities Board

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Flood forecasting for USA

Hydrological sciences / System informatics

Support for National Weather Service and Forecasting Centres during implementation of their own system based on Delft-FEWS

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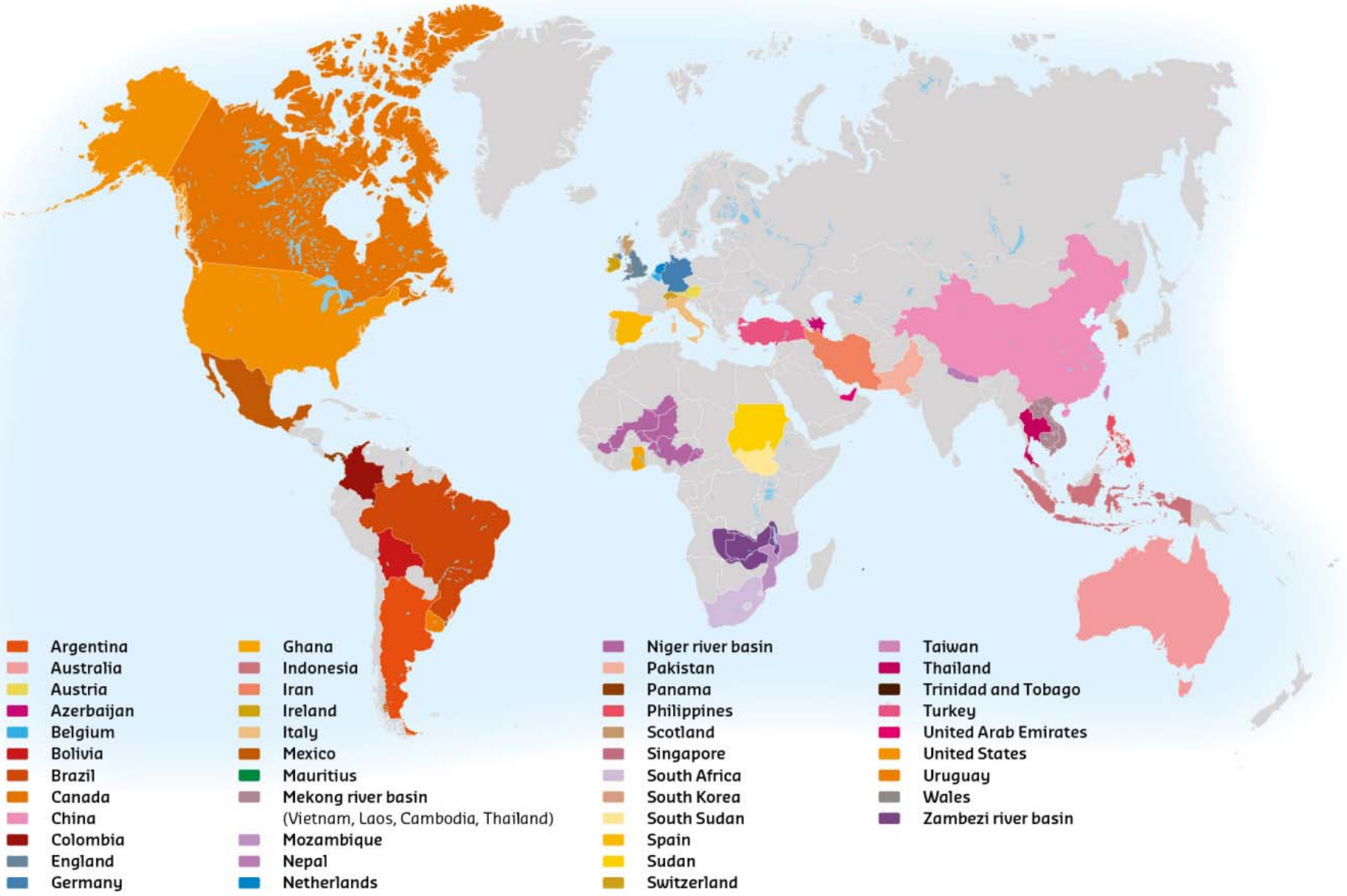
Delft-FEWS in more than 40 countries



Mekong Delta Plan Vietnam

Hydrological sciences / Environmental sciences & eco-engineering

- Flood precautions, river basin management, water quality and salt intrusion
- Global Water Programme
- Dutch government partnered with Dutch Engineering Firms

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Thailand floods

Hydrological sciences / Social sciences & policy analyses

Advising theThai Prime Minister and crisis team on flood control measures

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Large-scale practical testing

System informatics / Applied geosciences & soil mechanics

- Learning more about failure mechanisms
- Field validation of new measurement techniques
- New knowledge saves millions of euros

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IJkdijk Booneschans: many successful failures

2007 wave overtopping

2008 peat properties

2008 overall stability

2009
underseepage piping (4x)

2012 overall stability

2012 core instability + piping (2x)

2012 piping prevention

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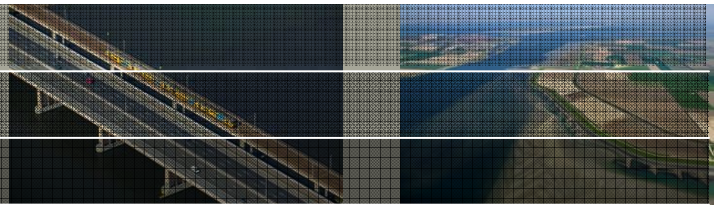
IJkdijk – goals and results



Goals:

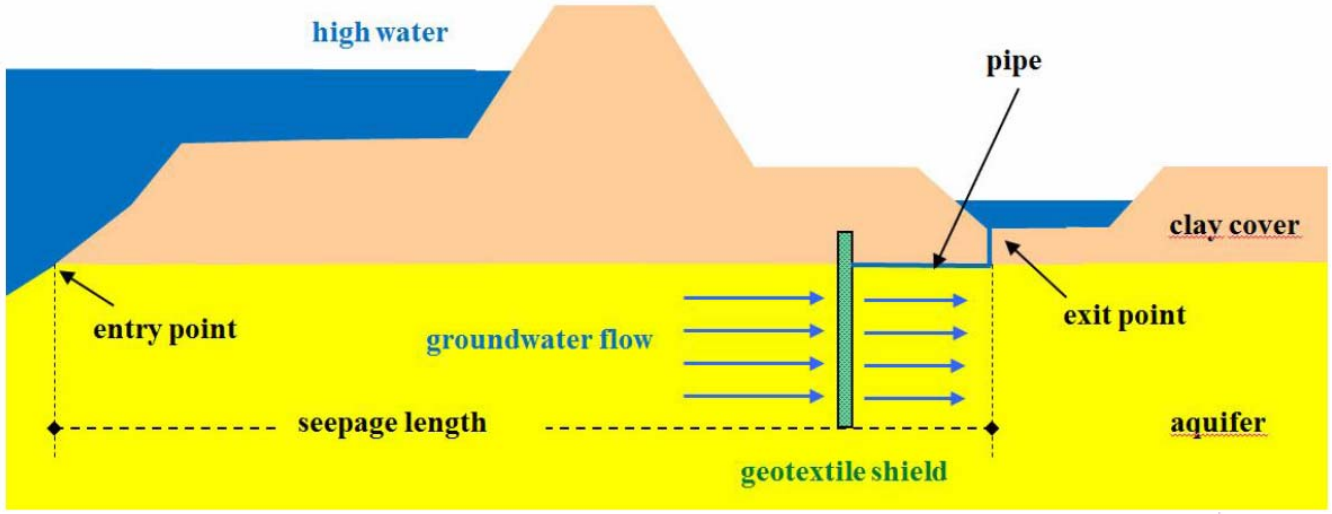
- testing sensors and processing ICT under field conditions
- learn from geotechnical failure mechanisms of dikes

Results:

- macrostability: smaller uncertainty in predictions
- backward erosion piping: improved safety model and three prototypes of safety measures
- microstability (slumping of a badly constructed dike body): confirmation that the process is really slow

Preventing pipe development

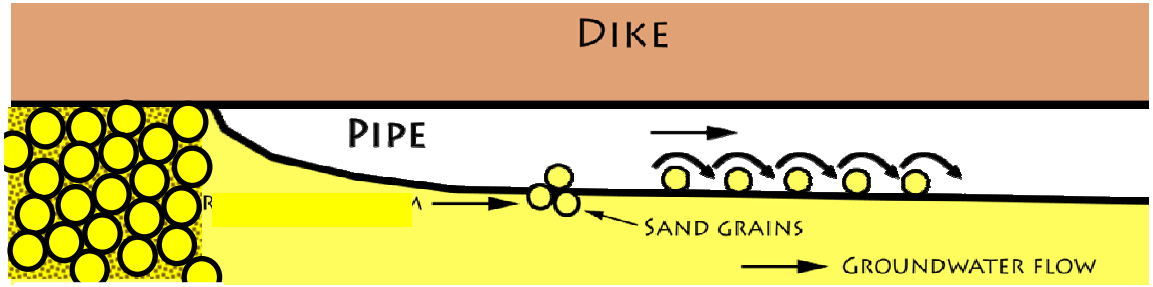
Vertically inserted sand-blocking geotextile



TECHNOLOGY READINESS LEVEL

- TRL 1 – basic principles observed
- TRL 2 – technology concept formulated
- TRL 3 – experimental proof of concept
- TRL 4 – technology validated in lab
- TRL 5 – technology validated in relevant environment
- TRL 6 – technology demonstrated in relevant environment
- TRL 7 – system prototype demonstration in operational environment
- TRL 8 – system complete and qualified
- TRL 9 – actual system proven in operational environment

Coarse sand barrier (single filter)



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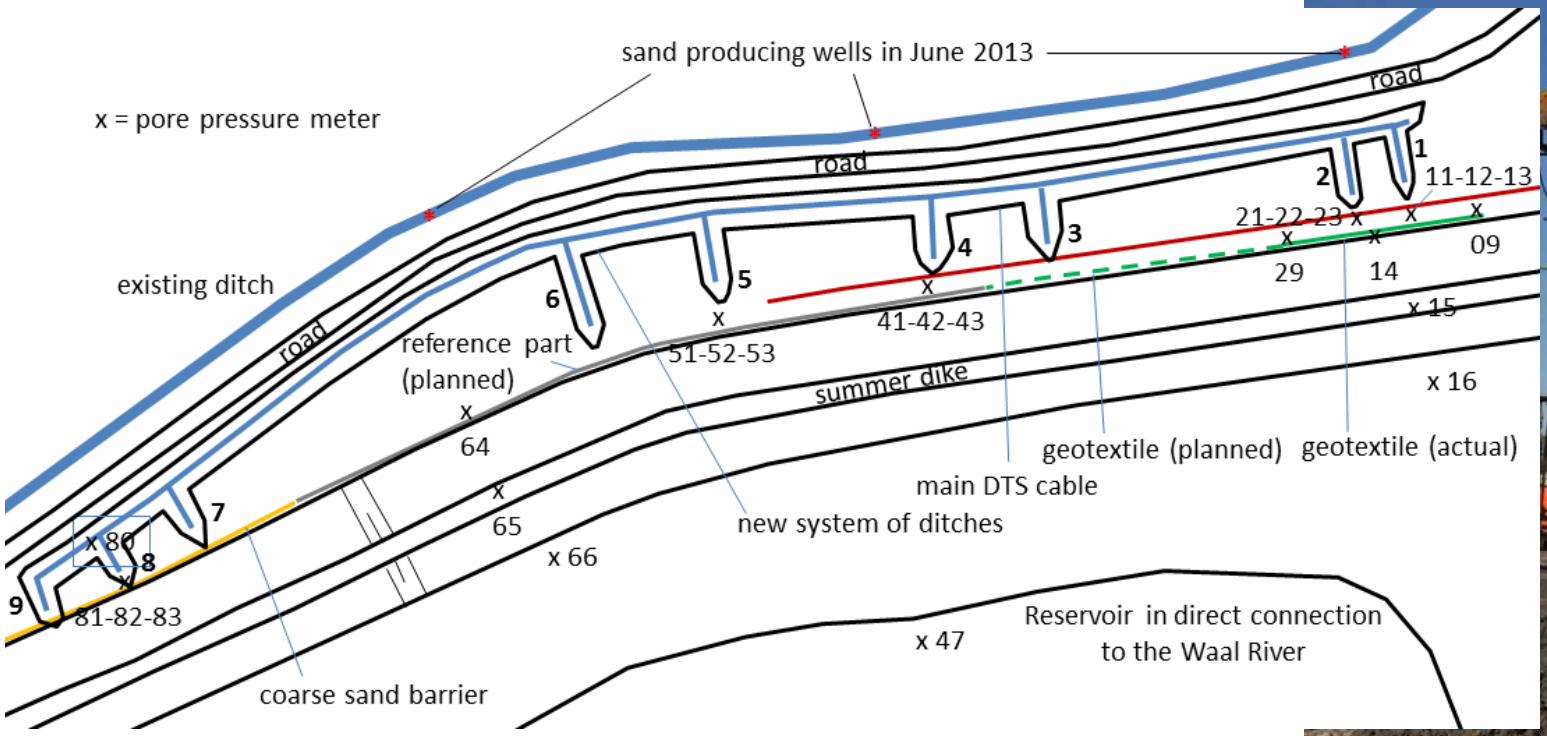
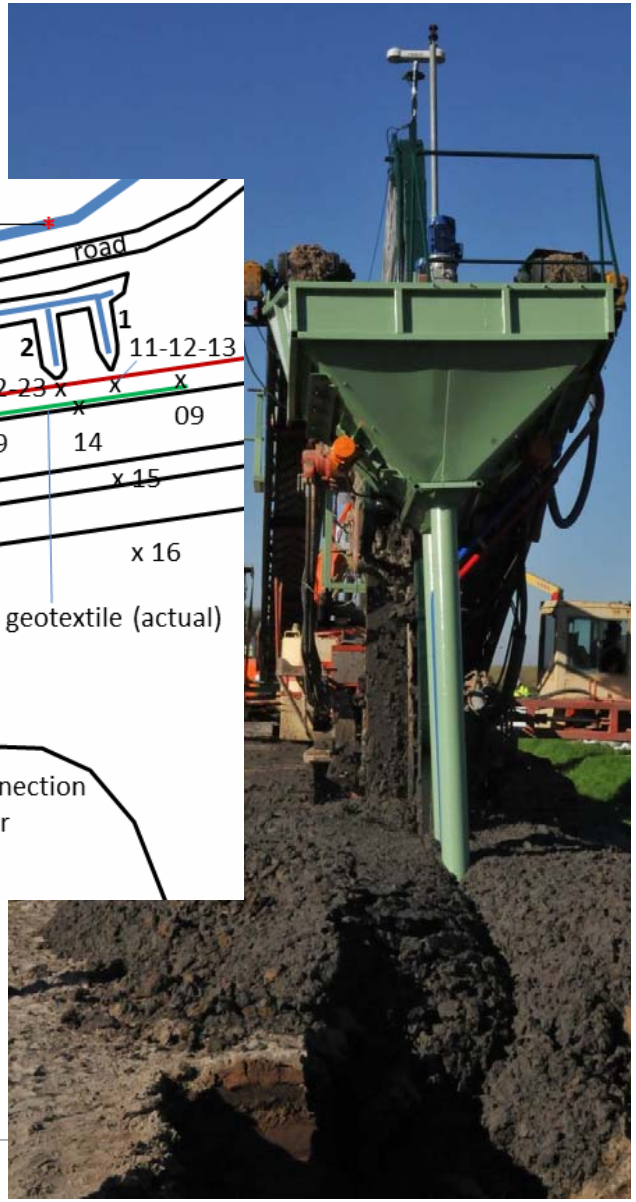
LiveDikes – e.g. Willemspolder field lab

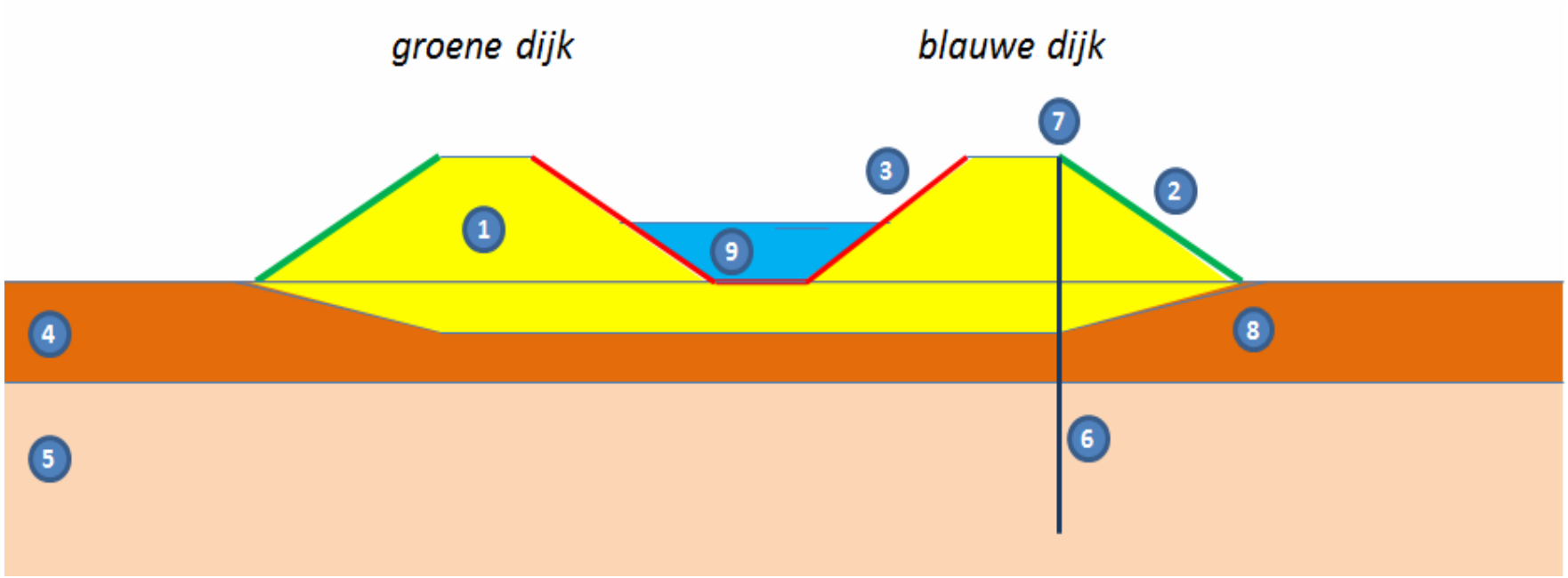




Large scale field test on a dike with a sheet pile wall

2nd half of 2017 at Eemdijk (NL), as part of a national research program

Dike with sheet pile wall, dike without, and push-over tests of single/double/triple profiles



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US Department of Homeland Security

Cooperation with Rensselaer Polytechnic Institute (NY, USA) & US Army Corps of Engineers

Project: Development & Full-Scale Testing of Early Detection Tools for Flood-Control Infrastructure

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National Science Fund – PIRE-program 2012-17

US$3.9 million for research in sustainability of earth dams and levees

Colorado School of Mines, MS state university, University of MS, IRSTEA, Bangladesh University of Technology, Deltares

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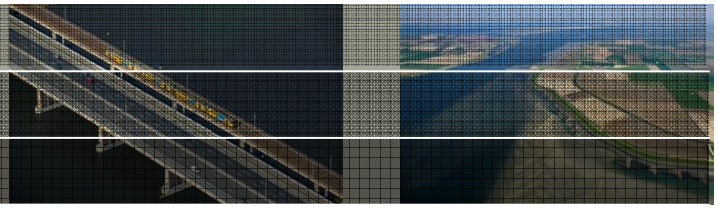
FloodProBe – 2009-2013



FP7-project, to provide cost-effective means for flood risk reduction in urban areas

Pilot sites: Humber Estuary, Rotterdam airport, Isle of Dordrecht, Trondheim, Orleans, Prague, case study Gloucestershire

Consortium of 14 partners from 7 countries, led by Deltares

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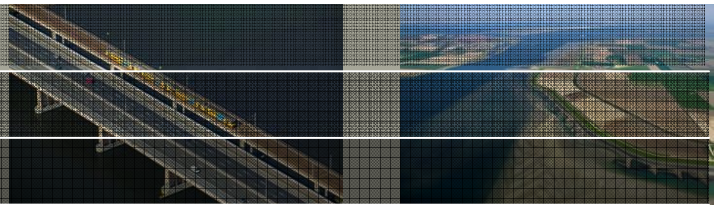
UrbanFlood – 2010-2012



UrbanFlood was a FP7-project investigating the use of sensors within flood embankments to support an online early warning system, real time emergency management and routine asset management.

TNO (NL), STOWA (NL), HR Wallingford (UK), Cyfronet AGH (PL), OOO Siemens (Russia), University of Amsterdam (NL), Deltares (NL)

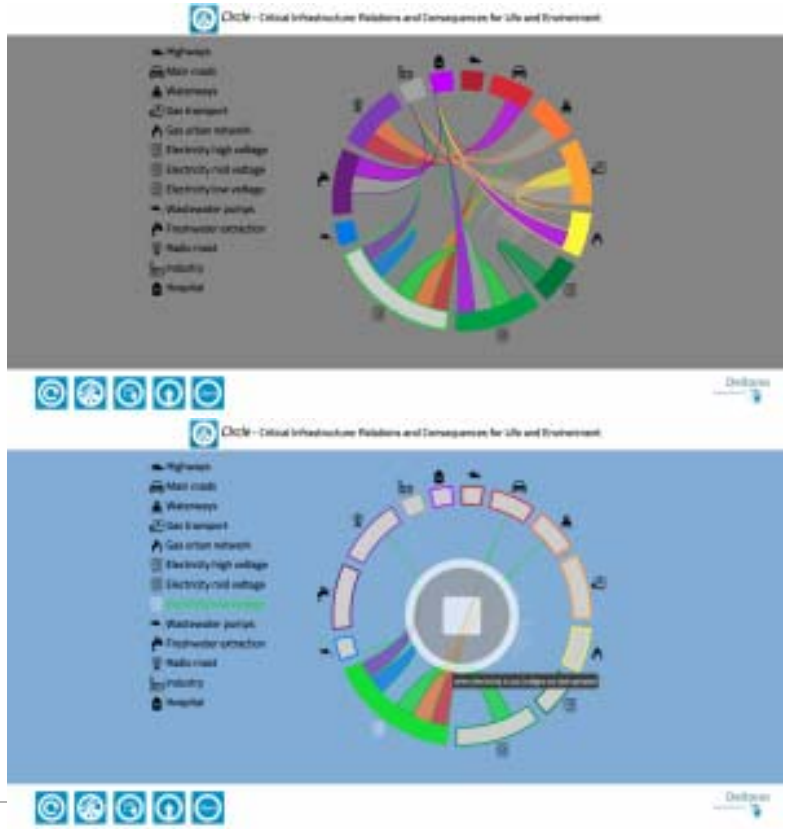
Test sites near Amsterdam, Boston (UK) and Emmerich (D)

Final evaluation: “Excellent”

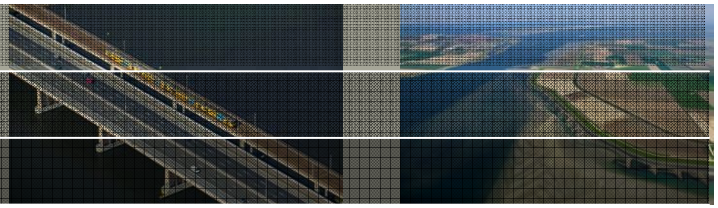
CIrcle (Critical Infrastructure)

Touch table application to analyse cascade-effects using Open Data

Applied so far for floods, but easily adapted to e.g. earthquakes or droughts



INTACT (2013-2017)

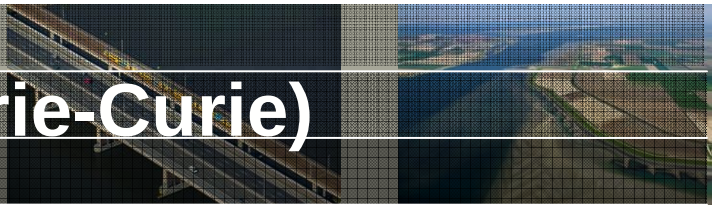


Answer to call FP7-SEC-2013-2.1-2, targeting the
Impact of Extreme Weather on Critical Infrastructures

Extreme weather ranging from storms, intense rainfall to cold waves and droughts

Consortium led by TNO (NL), 11 other partners, from I, E, IRL, UK, D, N, FIN, NL, including Deltares

MPM Dredge (2013-2017 – Marie-Curie)



Aim of MPM Dredge: to develop, validate and demonstrate a joint three-dimensional computer code for modelling large deformation problems for soil-fluid interaction, including generation and dissipation of (excess) pore pressures, with special dedication to dredging applications.

MPM Community: UPC Barcelona (E), UC Berkeley (USA), University of Cambridge (UK), Delft University of Technology (NL), Deltares (NL), TU Hamburg-Harburg (D), University of Padua (I), University of Salerno (I)

CI2Lab (2nd phase RIA to INFRAIA-02-2017)

CI2Lab coordinates the Research Infrastructure that enhances the engineering of the Critical Infrastructure of Europe

Coordinated by Deltares (NL), other participants from CH, SLO, N, E, F, UK, NL

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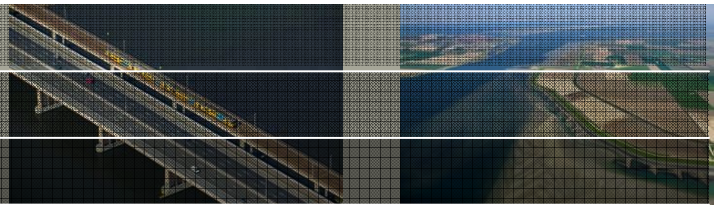
EIRE (2nd phase)



Enhancing Infrastructure Resilience to Extremes

Consortium led by Trinity College Dublin (IRL), with 18 other partners from NL, D, IRL, PL, A, E, I, UK, P, CRO, N

The EIRE project will increase the resilience of land-based and waterborne transport in Europe to the disruptive effects of extreme weather, natural and man-made hazards; it will decrease the risk of disruption due to these effects, improve operation during such events, and more quickly and safely restore the system to full operational capacity following an event. Furthermore, it will increase performance during normal operation.

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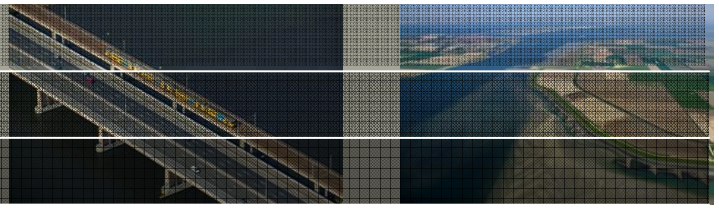
WaterPiPP – 2014-2016



To mobilise the procurement power of public and private actors in order to speed up innovation and contribute to solve water related societal challenges and to improve the competitiveness of the European Water Industry in a global market

Partners: OLEau (F), Arca Lomdardia (I), Universidad Zaragoza (E), VTT (FIN) ICLEI Europe (D), ARTI Puglia (I), TEHA Abrosetti (I), WssTP (B), Aqua Publica Europea (B), KTN (UK), City of Rotterdam (NL), Deltares (NL)

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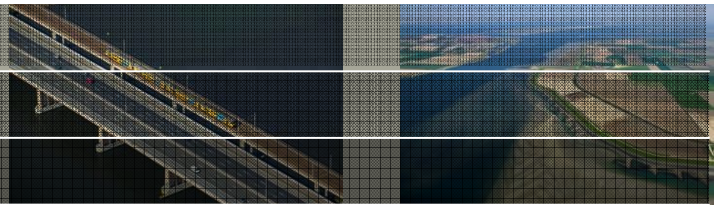
New calls



LC-CLA-04-2018: Resilience and sustainable reconstruction of historic areas to cope with climate change and hazard events (RIA)

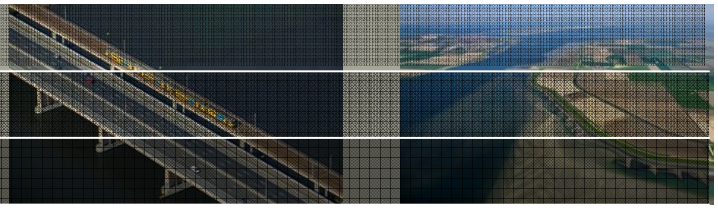
SC5-17-2018: Towards operational forecasting of earthquakes and early warning capacity for more resilient cities (RIA)

open 14 Nov 17, stage 1 deadline 27 Feb 18, stage 2 5 Sep 18

SU-INFRA01-2018-2019-2020: Prevention, detection, response and mitigation of combined physical and cyber threats to critical infrastructure in Europe

In 2018 and 2019, they should focus on any type of installation belonging to one of the following critical infrastructures: water systems, energy infrastructure (power plants and distribution), transport infrastructure, communication infrastructures, health services, e-commerce and the postal infrastructure, and financial services. Priorities for 2020 will be defined at a later stage.

Droughts



Thoughts about PRIMA (including non-Mediterranean countries like Germany, Luxembourg and Jordan)

Knowledge and experience with drought issues available within Deltares (unit of Inland Water Systems, geology-unit)