Case 2 Rotterdam

**How Flooding The Hague Rotterdam Airport
Helped Us Improve The Asset Management For
Interconnected Infrastructure Networks**

Climate Research and Hotspot areas

- **Dutch national Research Programme (2008-2014) on Climate Change**

- **Hotspot areas as cofinancing and actively involved end users**

- **phase 1 problem definition
  phase 2 knowledge development
  phase 3 implementation & application**

- **infrastructure and networks (INCAH)**

- **Knowledge and instruments developed for quantifying vulnerability to climate change
  (per type of infrastructure: sewerage, roads, dikes/dams, electricity)**
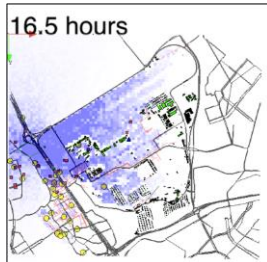
Typology of case study

- **climate change aspect under scrutiny:
  flood protection**

- **main focus on risk management (prevention)
  rather than on crisis management**

- **focus on addressing problems,
  not (yet) on taking / analyzing measures**

- **need to address climate change brought stakeholders
  together (but one should take the initiative)**
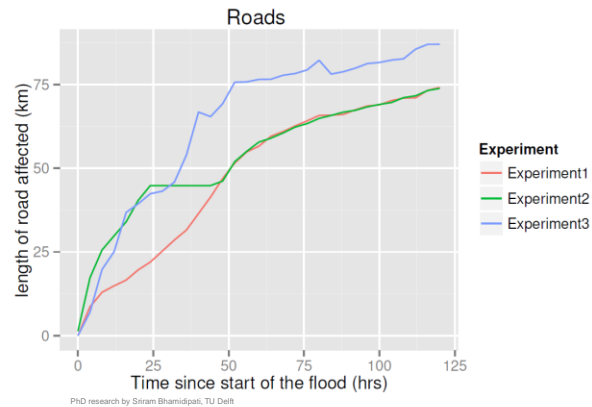
Case study

- **Wish to try out the instruments developed in actual practice**
- **Joint interest in interdependencies between networks**
- **Simulation results available for the flooding of a suitable test area
 (national highway, high speed rail track, airport, residential area)**

Case study results

16.5 hours

PhD research by Sriram Bhamidipati, TU Delft

Roads

length of road affected (km)

Time since start of the flood (hrs)

Experiment
— Experiment1
— Experiment2
— Experiment3

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- Interaction between different agents
- Increase of effects due to interconnected risks
- Climate and non climate related risks become apparent (e.g. emergency power supply located below the regular location, hence even more vulnerable)
- Simulation tool integrating individual network simulation tools is as powerfull as the weakest chain

Importance for asset management

PhD research by Sriram Bhamidipati, TU Delft
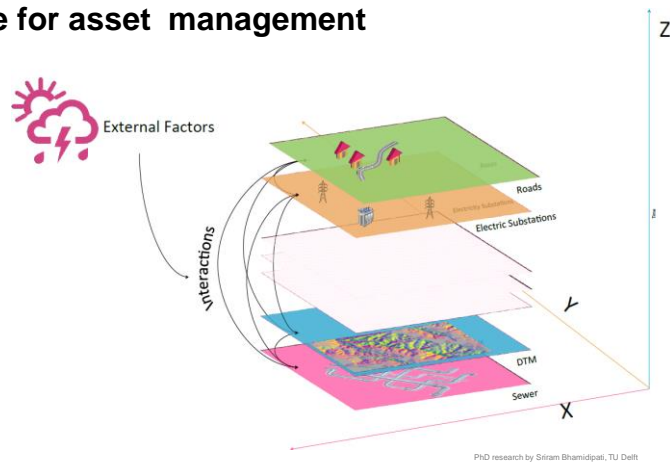
- Combination of data systems for different networks opens new perspectives
- Correlation between different networks forces agents to coordinate their management
- Both in operation (what to do in case of an extremely heavy shower) and planning (inventory of dike/dam vulnerability should include water transport pipes)
- Simulation tool is also a stimulation tool to improve quantitative knowledge of network

Long term gains from climate research

- Improved prioritization of maintenance investments and more effective risk reduction
- Simulation system is adaptive: it can absorb new and better knowledge

Further developments
(points of attention)

- Adequate monitoring is required (e.g. high resolution rain radar)
- Interconnection between traffic management and road maintenance schemes