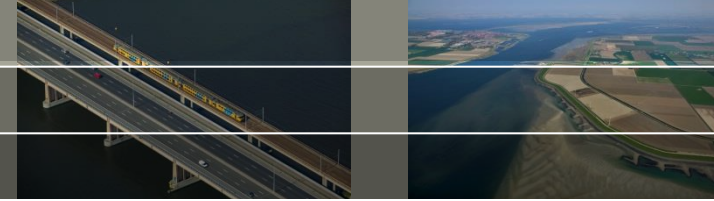# TKI Project: "Multi-stage Stochastic and Robust Optimization of Flood Mitigation Measures under Forecast Uncertainty"
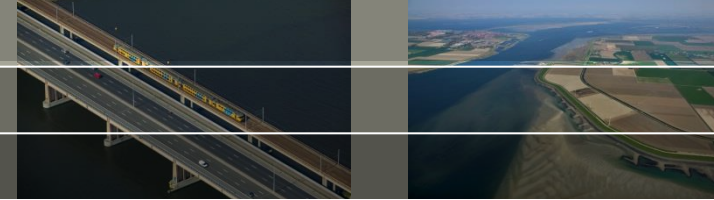
Workshop @ N&S

Utrecht, 30 March 2016

- Introduce N&S to the current status of the RTC-Tools software development as basis for implementation choices in the TKI projects
- Roadmap to RTC-Tools version 2.0
- Hands-on exercises with RTC-Tools

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Agenda

- 9:30 - 12:30
  Introduction to RTC-Tools (Dirk Schwanenberg)
  Hands-on exercises (Dirk Schwanenberg)
- 13:00 - 13:30
  Introduction of Modelica new modeling options (Jorn Baayen)
- 13:30 - 14:00
  Discussion of implementation choices for the TKI / WEX projects (all)
- 14:00 - 15:30
  Split into groups
  - Small group (JIP project)
  - Large group (RTC-Tools exercises, additional examples)
- 15:30 – 16:00
  Wrap-up
- 16:00 – 16:30
  N&S input in TKI project "Multi-stage Stochastic and Robust Optimization …"

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- Development of an integrated tool for real-time control and operational decision support since 2008, current version of RTC-Tools since 2010

- Most research and development activities were driven by clients abroad (SDWA, Bonneville Power Administration, CEMIG) and focused on (hydropower) reservoir systems

- Main application areas:
  - Short-term decision support for hydropower reservoirs
  - Short-term decision support for low-land water systems
  - Feedback control component (D-RTC) in Delta-Shell
 - Stand alone as 0D model for reservoirs in forecasting systems

Development version of 1.X

- CasADi as computational core including 2nd order derivatives
- Cleaned-up schematization of constraints
- Only available for very limited components (hydraulic model will become available in the course of April)

Prototype version of 2.0

- New architecture to merge the 1.X model library and Modelica models including goal programming approach
- Basis for the new Quick-Scan tools of RWS
- Currently in Python, core features will get migrated to C++ in June/July

Migration of existing 1.X version of prototype of 2.0 until late summer 2016, core features will become available both in C++ , Python and Matlab

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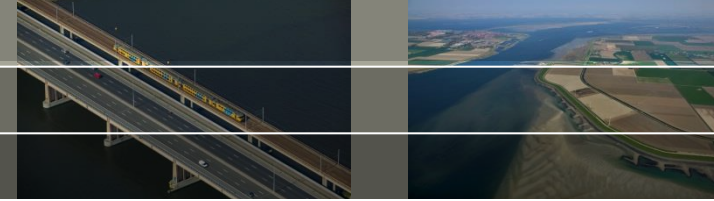
- Case "HydraulicModel_NZV": predictive control of a more sophisticated hydraulic optimization model for a regional water authority
- Case "HydraulicModel_Wind": predictive control of a simple hydraulic optimization model including wind
- Case "HydrologicalModel_FM1": data assimilation example for flow propagation in a river reach by hydrological routing (Muskingum-Cunge)
- Case "HydrologicalModel_RR1": data assimilation example for rainfall runoff model (HBV)
- Case "ReservoirCompact2": predictive control of a multi-purpose reservoir
- Case "ScenarioTree1": stochastic optimization in application to a simple reservoir model

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