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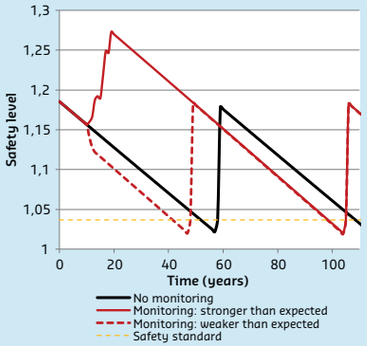
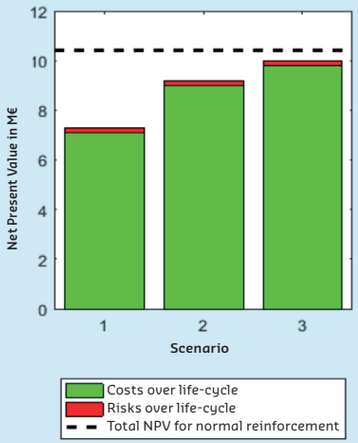
Risk- and Opportunity-Based Asset Management for Critical Infrastructure



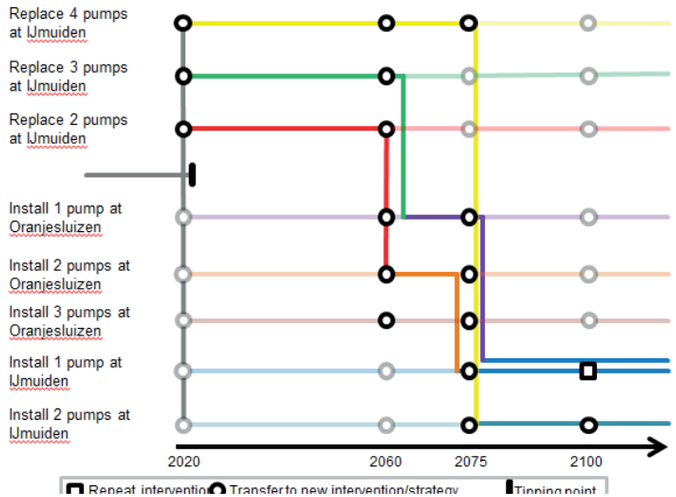


Conceptual representation and the different benefits of reducing uncertainty through a monitoring campaign (above) and a comparison of costs for a strategy with and without monitoring (below)

Asset management is defined as 'realising value from assets' with the aim of finding an optimal balance between costs, performance and risk. The Risk- and Opportunity-Based Asset Management for Critical Infrastructure (ROBAMCI) programme (2015-2018) uses a risk-based and system-oriented approach to improve the management and maintenance of public infrastructures. The programme shows that an efficiency gain of more than 10% (€ 1-2 billion a year in the Netherlands) can be achieved by using risk-based and system-oriented asset management for decisions in life-cycle management. The ROBAMCI programme is a collaboration between government, private companies and research institutes which provides a wide-ranging and complete base of relevant knowledge and data.

A framework for Life-Cycle Analysis is being developed that can be used for calculating performance, cost and risk over time for the life cycle of systems of assets delivering functions in the public environment. As part of the framework, a tool is being developed that can be used to compare different strategic, tactical and operational plans for any type of asset. The tool is being developed and applied in various case studies, with applications throughout the domain of public infrastructure, such as underground infrastructure, dikes, sluices and pumping stations, and the coastal zone.

Many of the hydraulic structures in the Netherlands are aging and will have to be replaced within the next thirty years. The smart replacement of these structures will maintain the functional service level of the water system as a whole at the required level. In the case study looking at the pumping station and lock in IJmuiden, the future capacity requirement of the pumping station was studied from a system perspective. Various



Adaptation pathways for long-term replacement strategies in the water system of the IJmuiden pumping station

strategies (for example drainage through the Markermeer lake) for adapting the system in the light of a range of future scenarios were studied. This analysis showed that the range of solutions increases when a system approach is adopted, resulting in more perspectives for optimal long-term management.

Another case study is the LiveDike XL situated in the area managed by the Noorderzijlvest water authority. Structural health monitoring can be an important way of accurately assessing performance, a pivotal aspect of asset management. A tool for assessing the costs and benefits of dike monitoring was developed on the basis of experience at the LiveDike XL in the FloodControl IJkdijk research programme. A large monitoring campaign has been conducted in recent years on this dike. During the case study, the costs and benefits of the monitoring campaign were determined and a method was developed for forecasting those costs and benefits, while taking the uncertain return on investments into account. The savings from information obtained in the monitoring programme were in the order of 30% in terms of life-cycle costs for this particular case.