Extending Rijkswaterstaat's Infrastructure Product Platform for Performance, Risk, and Cost Assessment: ***Incorporating Data-Driven Design Decisions in the Movable Bridge Early Design Phase***

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Public Summary

Rijkswaterstaat (RWS) manages a large, aging asset portfolio of movable bridges and ship locks across the Netherlands. During early project planning, RWS teams select asset configurations through variant analysis, which currently relies on subjective qualitative scoring rather than quantitative data. This approach does not validate design choices against numerical reliability, availability, and lifecycle cost criteria. As a result, planning-phase decisions may lead to suboptimal performance, increased maintenance risk, and higher lifecycle costs. This practice does not align with the RWS Asset Management 2.0 objective of making informed, data-driven decisions that balance performance, risk, and cost throughout the asset lifecycle.

For over seven years, RWS has been developing a Configure-to-Order product platform for ship locks and movable bridges. The platform allows assets to be configured from standardized building blocks, creating a structured basis for recording operational data and performing quantitative assessment. This project extended the platform with reliability, availability, and lifecycle cost (RAL) assessment features, resulting in a working prototype that was verified and validated in a representative operational scenario.

The extended platform allows RWS project teams to view quantitative RAL metrics during configuration selection, enabling direct comparison of design alternatives by reliability (expressed as failure rate), availability, and lifecycle cost before a choice is finalized. After selection, a dedicated RAL Calculator generates a detailed assessment report at the component, asset-function, and asset level. This provides a traceable, quantitative basis for design decisions before formal RAMS (Reliability, Availability, Maintainability and Safety) analysis.

The prototype was demonstrated on the movement mechanism of the Schiphol Bridge with representative synthetic data. All new software components passed verification testing, and all fourteen user acceptance test cases were successfully completed with primary users and the platform maintainer. The end users thereby confirmed that all project objectives were achieved: design alternatives can now be selected in a standardized manner, with immediate quantitative insight into the reliability, availability, and lifecycle cost of each design choice and of the overall asset.

The platform architecture is asset-type independent and, with the appropriate data, can be extended to ship locks and other infrastructure assets managed by RWS. This provides a reusable, scalable foundation for data-driven asset management across the organization's portfolio in the upcoming years for new builds and renovations.