

The road to better performance

Dennis van 't Ende from Iter Fidelis explains how major Design – Build – Finance – Maintain (DBFM) infrastructure projects are using performance measurement systems (PMS) to make sure client and contractor goals are aligned.

Dutch Highway Agency, Rijkswaterstaat, requires contractors of DBFM infrastructure projects to use performance measurement systems to ensure its goals – for instance, Availability and Safety – are aligned with those of their contractors.

Aligning the goals of the contractor with those of the client is a big challenge for project managers of Dutch DBFM infrastructure projects. When this alignment is not executed in a thorough and structured manner, the outcome of the project will be dissatisfying for (one of) the involved parties. Given the long duration and the high financial stakes of these projects, this can lead to disastrous outcomes.

Measuring performance

In the case of Dutch Highway Agency, Rijkswaterstaat, it took quite some years for them, as well as for their contractors, to develop a proper vision around the means, function and actual implementation and usage of a PMS in a way that it is of value to both parties, instead of being a costly and time-consuming burden. In fact, a PMS is basically a way for the contractor to record their performance and measure it against the minimum performance, as set out in the client requirement specification.

The client's goals, which have to be aligned with the contractor's goals, can be divided under the well-known categories of Reliability, Availability, Maintainability, Safety, Health and Environment (RAMSHE). In Dutch practice, however, Health and Environment are not aligned with the contractor, but are fixed in the client requirement specifications. This gives the contractor a certain amount of design freedom for the remaining RAMS aspects.

Critical requirements

Within RAMS, Availability and Safety are the most important categories around which goals need to be aligned. This being said, Safety is more or less a fixed performance level that has to be met during the entire project. The Availability aspect, however, is the parameter that determines the major part of the contractor's profit or loss.

The basic scope of Availability is defined by the client and divided into two sets of performance requirements. The first set contains the requirements that are most critical to the client. If, for example, a part of the road has an insufficient skid resistance for one day, it can lead to an income deduction as high as 50 per cent of the contractor's maximum quarterly income.

The second set contains what the client regards as the less critical performance requirements, such as the visibility of the traffic signs for the road user. If this is insufficient for one day, it can lead to an income deduction of approximately three per cent of the maximum quarterly income.

These examples represent theoretical income deductions that, in practice, will be much lower in most instances, due to contractual conditions. All information regarding these insufficiencies, income deductions and relevant contractual conditions is stored in the PMS.

Only the basic outline of the scope of Availability is defined by the client – most requirements and failure definitions have to be agreed between the client and the contractor. This gives the contractor the opportunity to have a significant influence on the scope of the Availability aspect

and on the actual impact these requirements have in the design, realisation and maintenance of the system.

Reliability and maintainability

These two aspects have a huge impact on Availability because a more reliable system (all other things being equal) will lead to a higher availability of the system. Take, for example, Rijkswaterstaat's expansion joints: one that fails once every 30 years is expected to keep the system more available than an expansion joint that fails once every 10 years.

A system that is more maintainable (again, all other things being equal) also leads to a higher availability of the system. A guardrail that consists of standard (modular) components that can be repaired in two hours, for example, is expected to keep the system more available than a traditional guardrail that takes eight hours to repair.

The relationship between RAM aspects leads to interesting optimisation challenges that can only be resolved if all phases – design, realisation, maintenance – and technical disciplines are put together in an integrated lifecycle analysis. During this process, a trade-off is performed between all viable solutions, taking into account the expected design, realisation and maintenance costs, as well as the expected RAM values, of the specific solutions that lead to income deductions. Only in this way can the best solution for the project be found.

Reliability of data in PMS

As well as its technical aspects, Reliability has a more financial and process-driven side. As described, the contractor's performance needs to be stored in a PMS, and they are responsible for collecting, recording and storing data on the performance they deliver.

During the tender phase, they have defined the procedures that will be applied to this process and, based on these, the minimum reliability of the PMS data that must be delivered during the entire project can be calculated. This is the basis on which the client can assure themselves that they get what they pay for.

This type of performance-based contract – which is new for the Dutch infrastructure sector – forces the client to prepare their requirement specifications with great care. It also forces contractors to use integrated lifecycle analyses to design, build and maintain the infrastructure systems they manage, and to develop a PMS that is reliable and supports their internal management goals.

Based on initial results in the Netherlands, it is likely that these developments will take place in all densely populated regions of the world where infrastructure availability is of high economic value and space is scarce. Belgium has already started this development, and we expect it's just a matter of time before others will follow.

Author's biography

Dennis van 't Ende is Business Consultant at Iter Fidelis. He has been involved in several Dutch DBFM infrastructure projects with a special focus on the performance requirements and the development, implementation and usage of performance measurement systems.