

## **CASE STUDY ON PUBLIC PROCUREMENT OF RAILWAY MAINTENANCE**

Arnout van den Bosch\*

**ABSTRACT.** Recently the first public tender of the maintenance of railway infrastructure in The Netherlands has come to significant results. This case study aims at providing some basic insight in the environment in which this was achieved and the solutions used to counter the problems on the road to the results ProRail is proud of. After some giving some insight in the background two aspects will be discussed. First the contract itself will be examined. It is based on Systems Engineering, which results in RAMS being the basis for the contractual requirements. The second aspect to be discussed is the tendering procedure in which the contract was intensively discussed with candidates. This case study concludes with the results of the tendering procedure.

### **HISTORICAL BACKGROUND**

Almost ten years ago the large old conglomerate Dutch Railways (NS) was split up because of European regulations. Whereas the old NS did almost everything themselves, from engineering and construction of railways to moving the actual locomotives and carriages, the new situation was completely different. NS continued to be responsible for passenger transportation but some other activities were privatized. New transportation companies started up and in order to guarantee fair competition ProRail was created as independent government agency responsible for the infrastructure. ProRail not only divides capacity on the railroads, but ProRail also maintains that infrastructure. This too was a function previously carried out by the old NS. While ProRail was given the responsibility, the means to carry out the tasks following from that

-----  
*\* Arnout van den Bosch, LL.M., is a tender consultant at the ProRail Department of Public Procurement. He is currently working on tendering procedures for several large projects, both maintenance and construction.*

responsibility separately privatized into three construction companies. Those companies carried out all the of maintenance planned and paid for by ProRail. In theory this is very logical: construction is generally not something government agencies are good at, but the market needs competition in order to guarantee efficiency and that was something that lacked completely. The three old ex-NS construction companies got contracts for the same areas where they had already worked for years. Public procurement by ProRail was simply out of the question. Railway maintenance was regarded to be something too complicated for the market. The Dutch competition authority disagreed. Pressure mounted to start public procurement and as simultaneously costs were rising as fast as the demanded quality ProRail decided to start the first public tender named after the region in which the maintenance was going to be carried out: Gelre.

### **CONTRACT BASED ON SYSTEMS ENGINEERING**

Because of good results in the construction of new infrastructure a contract was created based on Systems Engineering (SE). SE provides an integrated and structured set of methodologies for successfully implementing and managing projects. Three main aspects of SE are the following:

- Separation of specification and design. Application of SE means that the specifying of the required 'product' is separated from the planning and design of that product. The functional specification is the basis of the requirements. Those requirements are translated into the maintenance plan.
- Verification and validation. Because the product is defined mostly by function it is important to constantly verify whether or not the actual product has the required functionality.
- The focus on the entire lifecycle of the subject. It's not good enough that the product meets it's specifications at this moment, but it has to for the entire lifecycle.

In practice this SE approach to maintenance means that ProRail no longer describes in detail what the contractor is supposed to do. Instead of defining activities, clear goals, formulated on a more abstract level. Those requirements are split in two main categories: the requirements on

what the contractor is required to deliver and second the requirements on how the contractor is required to deliver, these categories will be discussed first. After that the other aspects of SE will be discussed.

### **System Requirements**

The first main category is requirements on the (state of) the railway infrastructure: the system requirements. Those requirements are derived from the well known RAMS (Reliability, Availability, Maintainability and Safety).

#### ***Reliability and availability (RA)***

Reliability and availability were defined both in one document. In the tendering procedure all participating parties have offered a certain availability of the tracks, with a minimum of 99.29%, so that doesn't need any further specification by ProRail for the incentives, to be described in a later paragraph, already guarantee compliance. Reliability is more complex. Irregularities in the quality of the infrastructure can cause major inconvenience to train travelers, especially when it directly disturbs train traffic, in which case those are called urgent irregularities. Reduction of such irregularities and trains traveling on time is a much debated issue in Dutch politics and therefore ProRail wants to be more in control on this. The number of allowed urgent irregularities is limited in the specifications and furthermore the maximum duration of those irregularities is limited. This is regulated in the following way: the allowed number of irregularities with a duration of 5 to 30 minutes is limited to X per year, the allowed number of irregularities with a duration of 30 to 60 minutes is limited to Y per year etc. Coupled to these requirements are strong incentives, which will be discussed in paragraph 3.3.

#### ***Maintainability (M)***

The specification on maintainability has some strict limitations. The Gelre contract has a duration of 6 years at most and at the end of that period ProRail doesn't want a neglected contract area, not even when the requirements on availability, reliability and safety are fully met. The requirements in this specification mainly describe the margins in which the tracks must remain in order to prevent faster than usual degradation of quality, based on the broad experience ProRail has gained over the years. This guarantees that components will be fully operational until the end of their planned lifecycle. Of course some components will be at the

end of their lifecycle during the contract, replacement of those components is not the responsibility of the maintenance contractor. ProRail has separate long term projects to replace certain components on a larger scale. For those large scale maintenance works separate tendering procedures are used partly based on input gathered by ProRail from the regular maintenance contractor.

### ***Safety (S)***

Safety is the subject of probably the most important specification document. Because of the great importance of safety in the railway business, those requirements are written down in a more traditional way. Besides the general requirements such as the one demanding the tracks have to be safe to users at all time, more detailed requirements are written down. For example: the width of the tracks has to be within certain limits. But, even when the more detailed requirements are met, the general requirements remain in place. If, for example, a train derails, the track clearly wasn't safe and the contractor is accountable and the contract can be immediately terminated. This applies to any situation in which people get hurt or properties are damaged. The contractor is liable and has to indemnify all who have suffered from this non-performance.

### **Process Requirements**

The second category of requirements is not about the actual maintenance to be carried out, but about the processes the contractor has to follow in order to implement the RAMS requirements correctly and to convince ProRail the tracks are in good condition and will remain so in the foreseeable future. The document in which these requirements are specified is the so-called Statement of Work (SoW). Planning of maintenance is an important issue addressed by the SoW. Because of the importance of timely and correct maintenance ProRail greatly values a good structure of planning by the contractor. As the basis of the planning by the contractor ProRail requires the use of FMECA (Failure Modes Effect Criticality Analysis) by which the contractor predicts failures in the infrastructure and analyses possible consequences. This demonstrates to ProRail the contractor knows what is doing.

### ***Planning Maintenance***

After the FMECA is approved by ProRail, the contractor can start the actual planning of the maintenance based on that FMECA. Priorities are set and the contractor can decide how to prevent serious irregularities

and how to respond to less serious ones. Based on information provided by manufacturers of components, measurements of the quality of the railways over the years it is possible to predict in advance when chances of failure of the infrastructure grow beyond acceptable levels and maintenance is necessary. This scientifically approach to maintenance makes a growing efficiency possible.

Careful planning not only is important to perform maintenance in an efficient way, but without this planning maintenance is almost impossible on the extremely busy tracks of The Netherlands. Tracks cannot be taken out of service at random, applications to take tracks out of service have to be submitted a year in advance, with only an exception for irregularities that directly disrupt train traffic. Even when requested in advance, there are limits to the amount of time tracks can be taken out of service, especially on busy stations. This makes efficient planning even more important.

Planning of maintenance goes further than just the information necessary to apply for tracks to be taken out of service and efficient planning. ProRail wants to be convinced that the railways are safe at all time. The maintenance plan made by the contractor therefore is carefully analyzed and needs to be approved before the contractor can start its activities. This way even without constant checking and measuring of the actual situation outside, ProRail can be sure the tracks are in good condition at all time.

### ***Reporting to ProRail***

As soon as the contract is signed the contractor has to start reporting to ProRail. As ProRail remains accountable to the outside world and has to make long term plans on for example replacement of switches, ProRail wants to be informed on irregularities and the way the contractor dealt with them. Besides reporting maintenance, the contractor is also required to report non-performance. If he reports this himself he is given one month to correct it, if it is not reported by the contractor but discovered by ProRail in an audit the incentive-clause as mentioned in paragraph 3.3 is immediately in effect, with significant financial consequences to the contractor.

### ***Incentives***

Another way of guarding the smooth operation of Dutch railroads are the strong contractual incentives in the Gelre contract. In the tendering

process companies have offered to keep the Gelre on a certain quality level but also offered a high percentage of availability of the tracks. On both topics incentives are in place. When the tracks don't comply with the quality level demanded by ProRail up to 25 % of the monthly payment is withheld. The same sanction follows when the contractor doesn't carry out its own maintenance plan. That maintenance plan is based on the before mentioned FMECA, so when the contractor doesn't carry it out he can not prove he is in compliance with the contract.

Another incentive is the one regarding reliability. As mentioned before reliability is measured in irregularities, when the amount of irregularities is structurally above the required level a bonus is rewarded, when the reliability is structurally below the required level he is fined with an equivalent sum of money. Likewise the other incentives a fine in case of non-performance in mirrored with a bonus in case of better than required performance. All of these incentives of course do not reduce the liability of the contractor and his duty to pay damages to parties who justly claim to have suffered from the contractor's non-performance.

If non-performance continues for a longer period of time, ProRail is allowed to terminate the contract altogether, for example: if the amount of irregularities is on average 15% larger than allowed by the contract, termination by ProRail is possible. All together these incentives are regarded by the market as challenging, but proved to be acceptable after some minor adaptations in the tendering procedure.

### ***Contract Management***

Because of the larger role of the maintenance company in planning of maintenance those processes are very important for ProRail to perform the infrastructure management role it's legally obliged to. Planning beyond the extend of the maintenance contract, guarding strict application of (safety-) regulations and making sure that components used are compatible with the ones used in other parts of the country are still important tasks for ProRail itself. Furthermore contract management in the new system is more important than before as there is much at stake for contracting parties. Strong incentives are in place, but ProRail too needs to function more commercially than before to enforce those incentives. This is especially critical as in the old situation ProRail employees were used to work on a more cooperative basis with maintenance contractors. ProRail and the contractor together discussed the detail of maintenance, together decided about priorities and together

negotiated payment for the actual maintenance without any competition between contractors.

### **Tendering Procedure**

Because of the radical new approach of the contract it was not possible to just start a tendering procedure. Failure of the tendering procedure would have been unacceptable. National and European competition authorities demanded public tendering of the maintenance and a failing contract would cause serious risks to Dutch railways. The contract influences ProRail's core business, namely guaranteeing access to railways to be used for rail transport and is therefore considered vital. After intensive internal debate on the structure and contents of the contract a concept was drafted.

### ***Market Consultation***

This concept was then offered for discussion to potential contractors in a so called market consultation. All potential candidates for participation in the tendering procedure were invited to give their opinion about the proposed contract. Of course there were some critical remarks, but in general the market reacted positively to the proposed contract and its terms and conditions. This gave ProRail the confidence to start the actual tendering procedure.

### ***Participating Parties***

Because of the intensity of the tendering procedure access to this procedure was limited to qualified parties with recognized maintenance capability. Those parties were the previously mentioned three existing maintenance companies and two new parties which already demonstrated to be up to the demanding tasks that would emerge from a closed agreement for the maintenance of the Gelre area. In the demanding process leading to recognition all parties wanting to be eligible for being awarded the contract had to prove to be able to fulfill all of the tasks arising from the contract. Of course there was at first some concern about the necessary level playing field for both existing and new parties. To mitigate that risk much attention was given to this issue. All parties were given access to the same data, both digital systems and the more static information. Where necessary meetings between technical experts of both ProRail and the new (and sometimes old) parties were arranged. In the end all parties were content with the way this problem was dealt with.

### ***Negotiations prior to Submitting the Tender***

After the contract was written and market parties were given the opportunity to give their opinion about those documents the tendering procedure, the so-called Negotiated procedure started with a new concept of the contract documents. The five eligible parties formally requested to participate and were invited to do so, after which they received the latest draft of the contract and other information necessary to get acquainted with the area the contract is about. Because of the complexity of the new contract and railway maintenance in general comprehensive talks started between ProRail and the competing parties individually. The nature of those talks was far more than just informative, parties were given the opportunity to request for changes in the contract and negotiate what the offer they were expected to make should look like. Of course there were limits to that, the object of the tendering procedure had to remain the same for all parties. The area had to remain the same and the more general requirements had to be the same, otherwise the offers would not be comparable as demanded by procurement law. The requirements were the same to all parties, the way parties translated these requirements to planned maintenance was open for discussion. After these negotiations were concluded all parties were invited to submit a tender.

### ***Condition of the Infrastructure***

When ProRail first started talks with the interested parties it soon became clear that the condition of tracks in the Gelre area was not as good as anticipated. Mainline tracks were generally in a good condition, but less used freight tracks were not. Participants of the tendering procedure showed photos of tracks with large trees growing from those tracks. Large scale inspections by participants also revealed that certain mainline standards were too strict to be fully implemented. Difficult negotiation within ProRail and with participants proved necessary. But in the end agreement was reached and all parties were able to submit excellent tenders.

### ***Negotiation after Registration***

After the five parties submitted their tender, the two which best fitted the award criteria were invited for further negotiation. One of these parties was an existing contractor, the other was one of the newly started competitors. Their tenders were closely examined for possible risk and for opportunities to further optimize the contract. ProRail wanted a

commercially good result, but without the risk of parties offering more than they are able to deliver. Because of that ProRail didn't just ask parties to reduce their demanded monthly payment nor made ProRail the offers of other parties known to their competitors, but the negotiations were focused on real improvements of the contract by optimizing terms and conditions and further discussing the effects of certain technical requirements. ProRail greatly values its technical requirements, but if a better result in terms of reliability or safety can be obtained with slightly altered requirements, that is of course something ProRail is willing to discuss. After these negotiations both remaining parties made their best and final offer and the best was selected by the award criteria known by the candidates from the beginning.

#### **Award Criteria**

Both the evaluation after the first tenders were submitted and the evaluation after the adjusted tenders were based on the same objectively stated award criteria. It was made clear to all parties the contract was going to be awarded to the tenderer with the economically advantageous tender. This criterion was spilt out. The price was of course important, but availability above the demanded level, consequences of change in usage of the track (for example: heavier trains) were weighted too.

### **RESULTS**

After agreement was reached about the exact scope and conditions of the contract, things went a lot faster. All participating parties offered to do the job in less time for less money. Although not all ideas of participants could be implemented, the creativity of the market surprised everybody at ProRail. Now it's up to ProRail and the winning party to make the contract a success in the implementation phase too. Contract management is of course more demanding when managing a strict contract than when managing a contract based on mutual understanding and cooperation, but in the end we are sure this way of contracting is the future of asset management in railway infrastructure. At the moment the second public tendering procedure is starting, with the third planned for September this year. Over the next five to six years maintenance of the entire railway network of The Netherlands will be contracted based on the standards set by this first public tender.

Because of the nature of the contract, in which not the technical requirements but the correct functioning of the infrastructure has a central position, we are convinced that this system can be useful for the maintenance of all sorts of assets, especially those with the amount of complexity as in railway infrastructure. The system is not based on the technical details of railway infrastructure and therefore can be used on other assets as well. In this system it is no longer necessary to prescribe every detail of the activities the contractor has to perform, but on the other hand the customer can oversee the state of the infrastructure and thus be confident everything is and will be functioning as it should.