

Market consultation

**‘Driver Advisory System’
TN142763**

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1 Introduction

This document describes the approach for market consultation for a Driver Advisory System, executed by ProRail B.V. in collaboration with NS (Nederlandse Spoorwegen – Dutch Railway Company). As the Infrastructure Manager (IM) in the Netherlands (ProRail) and the largest Train Operating Company (TOC) the NS (Netherlands Railways) consider to start a tender for the acquisition of DAS (both trackside and trainborne system) in the future, we would like to gain more information from the market by conducting this market consultation. The gained information might be used as input for the formal tender process which we expect to execute after this market consultation.

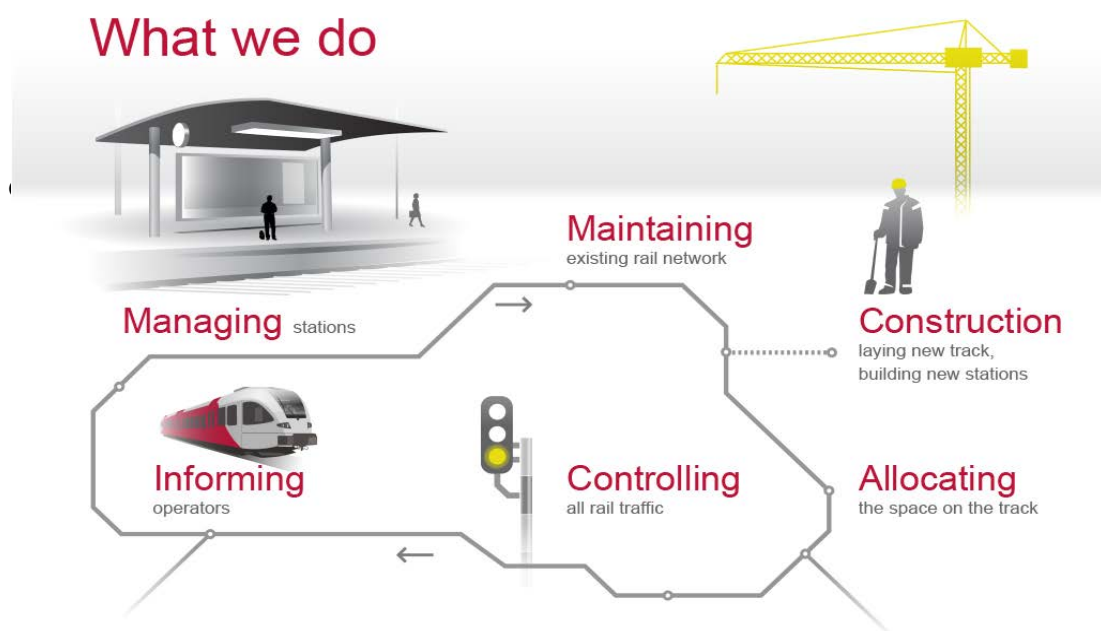
We invite your company as a candidate to participate in this market consultation, which is described in more detail in this document.

1.1 ProRail

ProRail connects people, cities and businesses by a dense, intensively used rail network. ProRail provides a secure, reliable, punctual, and sustainable rail network and comfortable stations, in conjunction with operators and partners. Our professionals work efficiently and cost-consciously on a rail network focused on pleasant passenger travel and unobstructed freight transport.

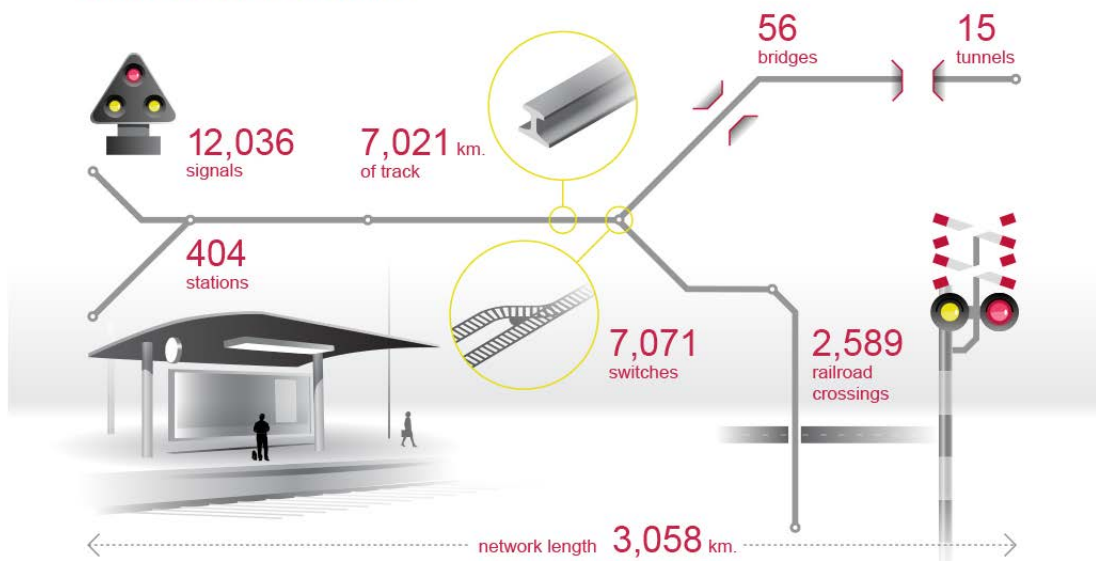
Rail transport in the Netherlands operates approximately 6500 track-kilometers. The infrastructure is managed by ProRail. Running of trains is operated by a number of different operators like Nederlandse Spoorwegen (NS), DB Schenker, Arriva, Syntus, Veolia and Connexxion. The rail network is well developed and has dense rail traffic. Most of the network is electrified at 1.5 kV DC. Trains run frequently, with up to 8 or 10 trains per hour per track. The train operators run a total of approximately 8000 trains per working day.

With a network of 3,058 km and 3.3M trains per year ProRail has a very heavily used network that needs to be constructed and maintained. ProRail does more than that, as shown below.



Our infrastructure is used by 10 passenger operators (one of them is NS) and 20 freight carriers who all together move more than 1M passengers per day and 45B tonnes of freight per year. The infrastructure consists of a network of track, switches, signals, etc.

Infrastructure

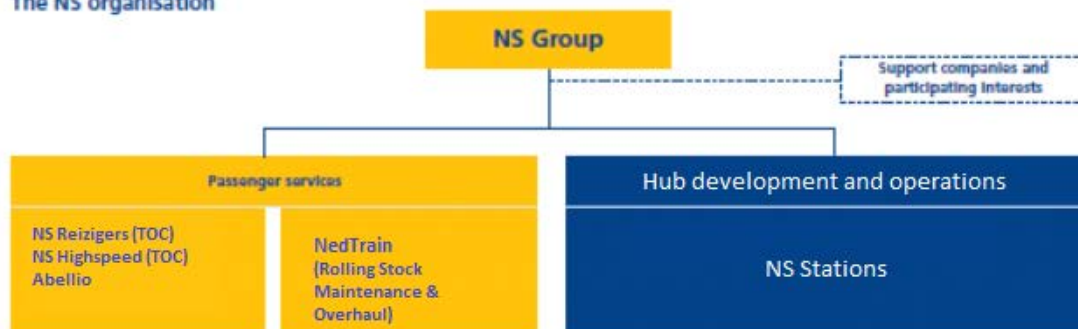




1.2 NS

NS handles the train journeys for over 1.1 million customers in the Netherlands every day, which means 4,800 scheduled trains on very busy tracks. Our work on rolling stock maintenance is an integral part of this. NS also provides additional services in the door-to-door journey chain, including bus transport.

The NS organisation



NS manages over 380 stations and is working with a variety of partners to develop the major public transport hubs, turning them into dynamic urban portals. Every day, over 230,000 people make a purchase in one of the shops or hospitality facilities. Working with partners in Germany, Belgium and France, NS also transports its customers to key destinations elsewhere in Europe. The NS subsidiary Abellio provides bus and train transport in Great Britain and Germany and bus transport in the Czech Republic; it carries about 650,000 train and bus passengers every day. Approximately 24,000 staff (FTE) work at NS. The NS head office is located in Utrecht, The Netherlands.

NS' ambition is to be a customer-driven, national and European multimodal service provider, offering reliable passenger transport, comfortable trains and buses, lively station areas and a wide range of services and facilities in the transport chain from door to door. NS' efforts are converging around a single mission: to keep transporting more passengers safely, punctually and comfortably via appealing stations. In doing this, we are focusing on our five main objectives:

1. running on time;
2. providing information and service;
3. contributing to personal safety;
4. creating sufficient transport capacity;
5. ensuring that trains and stations are comfortable clean.

Sufficient return on investment is a prerequisite for being able to continue to invest in such areas as new rolling stock and components, and is therefore crucial to the company's continuity in the longer term. More information about NS Group and its subsidiaries can be found on www.ns.nl which includes an English version of the NS Annual Report 2016.

Strategic themes

Themes with an ambition



The customer is king
Without our customers, we are nothing. Their satisfaction determines our success. We fulfil their wishes, in a friendly and hospitable way.



We think from door to door
The train is only part of the customer's journey. We therefore make the journeys to and from the station easy and comfortable.



We work throughout Europe
Working internationally lets us learn from the rest of Europe and lets us strengthen and improve our position in our own country.

Success factors



We can make the difference together.
You and your professional expertise are what make NS. And each of us can make a difference. NS is built on our desire to give passengers what they want. *maken wij samen NS.*



We look after our environment
We have made sustainable travel our business. Being careful with our energy consumption and our environment benefits everybody.



We are cost-conscious
Passengers want value for money. A cost-conscious approach will ensure that NS has a future.

2 Market consultation

2.1 Purpose of the market consultation

The purpose of this market consultation is to gather market information about the possible solutions that are available (at what price) and the impact that these solutions have on the goals that are set for this project. This will lead to a set of specifications in order to contract a supplier that will implement its system at ProRail, NS and possible other users.

The purposes that are served by the market consultation include:

- Gain insights in the different technology solutions for driver advice systems;
- Gain insights in the pricing models of the different driver advice systems;
- Gain insights in discriminating factors for different configurations of driver advice systems;
- Gain insights in the appropriateness of the generated driver advices, including resulting benefits;
- Gain insights in driver acceptance and compliance with other information sources of the generated driver advices.

This information can be used in a possible subsequent formal tender process.

2.2 Schedule

This market consultation consists of a questionnaire that can be filled out by interested companies. There are no dialogue sessions planned for this market consultation. When the answers given lead to additional questions at ProRail / NS, extra clarification can be asked written or orally.

The schedule of the market consultation is shown in the table below.

Date	Deliverable / activity
16th of June 2017	Market Consultation document published by ProRail / NS
26th of June 2017, 12:00h	Deadline for submitting your questions on the Market Consultation document
30th of June 2017	Deadline for ProRail / NS to reply to the questions and publish any additional information or revision of this document on TenderNed
10th of July 2017, 16:00h	Deadline for submitting your input (answers to the questions in chapter 4, please use the Excel format in the appendix) in writing to mariska.viester@prorail.nl .
July/August 2017	Possibility for ProRail / NS to ask clarification to each party individually when necessary (information will be included in the summary)
September 2017	ProRail / NS publish summary of market consultation results on TenderNed

2.3 Terms and Conditions

2.3.1 Information exchange

The contact person for this market consultation is:

Att. of:	Mrs. M. Viester
E-mail:	mariska.viester@prorail.nl
Telephone:	+31 6 3164 3089

From July 11th until July 27th please contact Mr. Achraf Talhaoui (Achraf.talhaoui@ns.nl).

2.3.2 Reimbursement of costs

The participating parties will not receive any reimbursement for costs incurred. Participation in this market consultation is entirely without obligation. The participating parties may not claim preferential treatment in the tender procedure either.

2.3.3 Reservations

This market consultation document was written in the context of the market consultation for the invitation of a Driver Advisory System. This document may not be regarded as a call to submit a tender on the invitation for which this market consultation serves as preparation or any other call for tender. The ProRail / NS reserve the right to:

- adjust the planning outlined in this document;
- perform the call for tender in question and/or other calls for tenders in a manner other than the manner described in this document and/or;
- temporarily or definitely discontinue the process of the market consultation and/or the tender procedure.

With its participation in the market consultation, the participating market participant agrees to the administrative conditions laid down in this market consultation document.

2.3.4 Intellectual property

Save for the exceptions provided by the Law, nothing from this market consultation document may be copied (other than for the purpose of this document) by means of prints, photocopies, microfilm or otherwise without the written permission of the organisation.

3 Project Description Driver Advisory System

3.1 Project context

ProRail, NS and the other train operating companies in the Netherlands cooperate in a program called TOL (Trein Op Lijn, translated Train On (timetable)line), which aims to increase ~~the precision in execution of the timetable. This will advance the program's main goal of increasing the~~ capacity on the existing Dutch Rail infrastructure. The programs consists of several projects in various stages of completion. One notable project the program completed is the implementation of the Routelint system.

3.2 Goal of DAS

One of the projects of the TOL program now under consideration is the implementation of a Driver Advisory System by ProRail IM and NS. The project will enable the implementation of DAS systems at other train operating companies.

A Driver Advisory System supports the train drivers goal of more accurately executing the timetable. This requires that ~~up-to-date~~ information indicating its position in relation to its current timetable is sent realtime to the train driver ~~indicating its position in relation to its current timetable~~, enabling the train driver to adjust his or her driving style to better adhere to the timetable. This will help the programs goal of generating more capacity on the busy Dutch railroad track. Besides this main goal this could also lead to safety improvements, punctuality improvements, energy savings, passenger comfort and reduced wear and tear on rolling stock.

3.3 Description of DAS

A DAS is any system which supports the train driver in his driving task. In order to support the drain driver, the system needs an optimized Driver Machine interface to communicate the advice. The advice itself is generated by a software algorithm which is fed the appropriate information needed.

3.4 History and development

The systems supporting the train driver have been and will be developing for some time. It started with the digitization of things like the work schedule, the timetable and temporary speed restrictions shown on the Railpocket a handheld pocket PC supplied to all train drivers. In 2012 came the application Routelint, which shows the train driver the actual traffic situation on his route. After that a general energy efficient driving advice was supplied on paper. A pilot was done with a digitisation of this advice. These applications are now being transferred to smartphones and tablets.

In 2016 there has been a trail with different driving advisory systems. The goal was to learn how a DAS impacts the train operation and what are important requirements for implementing a DAS. Studies about possible gains in capacity and punctuality are being conducted and in addition to market research. Visits to

other train operating companies and infrastructure managers in Europe were made to gain information about driving advisory systems and their experiences.

3.5 Scope

The scope of the project still under consideration, but the current approach is to integrate a DAS in the systems architecture available at the time of DAS implementation.

In this architecture train drivers are already supplied with tablets, These tablets have a connection with the IT landscape of both NS and ProRail, which make realtime up-to-date information available about timetable, current traffic situation, temporary speed restrictions and areas with reduced adhesion. This information is shown on a single screen interface.

We are looking for:

- Application of an existing product, adaption of it to ProRail/NS requirements and integration of it in the ProRail and NS IT landscape
- Participation in a development program to design and implement DAS by delivering software subsystems, specifications and consultancy.
- Stepwise evolution of DAS

3.6 Next steps

After this market consultation detailed specifications and requirements will be drawn for the final project plan.



4 Questions

4.1 General company information and references

1. Please provide general company information as shown in appendix "TN142763 Questionnaire.xls"
2. Please provide references of similar projects as shown in appendix "TN142763 Questionnaire.xls"

4.2 Technology

The project aims to first integrate a DAS system on the tablets being supplied to train drivers, using the information already made available on the tablets. ~~From then on a stepwise evolution of the driving advice, the DAS system architecture and the information basis of the driving advice. The system architecture below is a possible final architecture.~~

Core product & roadmap

3. Give a short description of your possible solutions, including functionality, architecture and technical specifications (max 2 pages).
4. What are your product's core competences and distinctiveness compared to DAS competitors?
5. Which of the goals mentioned in paragraph 3.2 can be optimised/achieved with your product(s)?
6. In your opinion, what are the most important-critical success factors in the development and introduction of a Driver Advisory System in the Dutch railsector?
7. In what ways ~~does your DAS solution do you ensure the safety of your solution~~ (i.e. hardware, software, MMI, training, monitoring etc) ensure an acceptable and manageable safety risk, which you are able to justify as minimal? What are the relevant safety aspects of your solution?
8. ~~In what ways can~~ What is your view on showing the context of a speed advice to drivers (i.e. goals of the algorithms, current traffic situation) in order to improve the quality and acceptance of the advice to drivers?
9. To minimize driver distraction, what technical mitigations can your solutions facilitate
10. Indicate the nonfunctional qualities of your solution (e.g. availability, flexibility, disaster tolerance, reliability, adaptability) and how they are achieved?
11. What is the roadmap of your solution? Are traffic management system solutions or ATO (Automatic Train Operation) functionalities on this roadmap?

Product integration

12. What is your approach (expert opinion) for integrating your solutions in current systems, specifically:
 - a. Train driver application on the tablets supplied to train drivers
 - b. The tablet's connectivity with trackside systems
 - c. The existing tablet user interface
13. What are your experiences with connecting your DAS to live traffic management systems
14. What are your experiences with connecting your DAS to Automatic Train Operation & Control systems
15. What are your experiences with DAS compliance with and operation alongside ERTMS
16. What tailoring might be needed for your solution to be able to function in the Dutch market?
17. Which information do you need to be able to tailor your product to the Dutch situation?



Product testing and monitoring

18. What is your view on ~~are~~ the minimal requirements for monitoring and analysis tools, which are needed for a smooth introduction and running of a DAS?
19. Does your solution have monitoring? Please explain how your monitoring functionality works.
20. Does your solution have reporting functionalities? Explain the measuring method?
- ~~21. Are you able to connect your DAS solution to a Publish-Subscribe environment for testbench work and drivers simulator testing~~
- ~~22. What are your experiences in using a single technical platform to execute test on a DAS (testbench) and also integrate this DAS into a driver simulator for further studies (MMI design, safety research, new features)~~
21. What are your experiences with connecting your solution with a driver simulator for further studies (MMI design, safety research, new features). Are you able to do this through to a Publish-Subscribe environment?
- ~~23.~~22. When making improvements to configuration data (infrastructure, timetable, traindata), what is your standard procedure for testing these improvements to the configuration data

4.3 Investments & Costs

This section is meant to capture the required development, system integration, investments, operational and support & maintenance cost (total cost of ownership) for your solution and/or options presented.

To develop an understanding of the required investments ProRail / NS seek to obtain additional quantitative information based on your suggestions and the available options.

- ~~24.~~23. What cost model would you propose to make your solution available for ProRail / NS?
- ~~25.~~24. What would the project and one off costs be (development costs, integration, license fees etc.)?
- ~~26.~~25. What would the recurring costs be (support & maintenance, changes etc.)?

4.4 Development and implementation

- ~~27.~~26. How much time would you need to develop the products needed for the Dutch market?
- ~~28.~~27. How much time would you need to implement your product within ProRail / NS?
- ~~29.~~28. Which preconditions from the ProRail / NS side are necessary to successfully implement your solution.
- ~~30.~~29. What are possible bottlenecks in the development and implementation process?
- ~~31.~~30. Do you have your own development and implementation capacity or do you depend (partly) on third parties?
- ~~32.~~31. What is your development and implementation strategy? Which information would you need to determine your strategy?
- ~~33.~~32. What is your experience on MMI and training of personnel?



4.5 Support and maintenance

- 34.33. Please describe your delivery and support model for the relevant solution?
- 35.34. How would you handle change requests as a consequence of changing demands from ProRail / NS or other users
- 36.35. How will you guarantee support for a long period of time (20+ years) on your products ?
- 37.36. How would you deliver local support in the Netherlands for your products?

4.6 Contract and collaboration

- 38.37. What kind of collaboration would you suggest for this project between supplier and ProRail / NS?
- 39.38. How would you suggest to handle Intellectual Property Rights?
- 40.39. How would you guarantee the availability of the software in case of for instance bankruptcy (e.g. Escrow)?

4.7 Tender

- 41.40. Do you consider bidding for the development, implementation, delivery and maintenance of a Driver Advisory System during the tender phase?
- 42.41. What are the prevailing considerations for participating or not participating in a bid for a Driver Advisory System?
- 43.42. What do you think of testing the algorithm performance during the tender (not specifically developed for the Dutch market)?
- 44.43. Which information should be available during the tender to make a sufficient proposal?
- 45.44. Which selection criteria should ProRail / NS apply during the tender?
- 46.45. Which award criteria should ProRail / NS apply during the tender?
- 47.46. What kind of dialogue / information exchange would you prefer during the tender?
- 48.47. How much time do you need to make a sufficient proposal during the tender?