

Request for Information

Modular Measurement Train

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Used definitions

Nr	Concept / abbreviation	Betekenis (NL)	Meaning (UK)
1	ATB	Automatische treinbeïnvloeding	Automatic train influence: The Dutch signalling system
2	BAAN	Spoor	Track
3	BVL	Bovenleiding	Overhead line / Catenary
4	Deployment	Inzet van een meetvoertuig voor de duur van 8,5 uur (inclusief 0,5 uur pauze) met een uitloop naar 9 uur. Dit is exclusief transport naar startpunt van de meetrit en exclusief transport na afloop van de meetrit	Deployment of a measurement vehicle for 8.5 hours (including 0.5 hour break) with an extension to 9 hours. This excludes transport to the starting point of the measurements and excludes transport after the measurements
5	ERTMS	European Rail Traffic Management System, de Europese standaard voor treinbeveiliging- en besturing.	European Rail Traffic Management System, the single European signalling and speed control system
6	GaM	Goederentrein als Meettrein	Cargotrain as a measurement train
7	GSM-R	Global System for Mobile Communication – Rail (digitale treinradio)	Global System for Mobile Communication – Rail (digital train radio communication device)
8	HITS	Ultrasoon defecten gemeten met de meettrein	Ultrasonic defects measured by the measurement train
9	NCBG	Niet Centraal Bediend Gebied	Area not controlled by signalling
10	PVR	Profiel van Vrije Ruimte	Clearance profile
11	PVS	Permanente Vastlegging Spoor	Permanent Way Track Geometry
12	RaM	Reizigerstrein als Meettrein	Passenger train as a measurement train
13	Rfi	Request for information (Vraag naar informatie van de markt)	Request for information
14	SPDEF	Spoorstaafdefecten	Internal track defects
15	SEB	Schoon en Emissievrij bouwen	Clean and Emission-Free Building (SEB)
16	WaM	Werktrein als Meettrein	Work train as measurement train
17	WISI	Wisselinspectie en Spoorinspectie	Switch and track inspection

1 Introduction

This “Request for Information” (Rfi) has been published in preparation for a possible tender for:

- (1) the development, realization and maintenance of the “Modular Measurement Train”,
- (2) the delivery, operation and maintenance of measurement systems,
- (3) carrying out measurement runs in the Netherlands and
- (4) auditing & consultancy.

Collecting condition data of railway assets is a crucial activity to determine the quality and safety of the railway infrastructure. ProRail is investigating the possibilities of entering contract(s) for these activities. In order to align the requirements of ProRail and the possibilities of the market concerning condition monitoring of the Dutch rail infrastructure, ProRail would appreciate your contribution by completing this questionnaire.

ProRail has the following objectives with this Rfi:

- Insight in the boundary conditions in which this possible tender project can be successfully completed.
- Insight in the number of interested and qualified contractors.

This Rfi consists of two parts. The first part concerns the development and exploitation of the “Modular Measurement Train.” The second part concerns the bridging from the expiring measurement train contracts until the Modular Measurement Train is operational.

Participants cannot derive any rights from the information stated in this Rfi. The project is still in its early stages. Positions and principles may therefore be subject to change.

1.1 ProRail B.V.

ProRail B.V. is responsible for the rail network in the Netherlands, regarding construction, maintenance, management and safety. Every day, our employees ensure that 1,200,000 travellers and 100,000 tons of goods arrive safely at their destination. They do this with 6,550 trains with more than 7,000 kilometres of track and more than 6,000 switches. The rail network is the beating heart of transport in the Netherlands.

ProRail works on the accessibility of the Netherlands by ensuring an optimal railway network. We distribute the capacity on the track, regulate all train traffic, build and manage stations and lay new tracks. ProRail also ensures the maintenance of existing infrastructure such as rails, switches, signals and level crossings.

1.2 Condition monitoring

As railway infra manager, ProRail is responsible for the maintenance, renewal, expansion and safety of the Dutch railway network. Condition monitoring is used to determine the condition of railway assets and predict possible failures. This enables ProRail to intervene in a timely manner and create value by guaranteeing (and demonstrating) the safe accessibility of the network, increasing availability and reliability, and optimizing maintenance and investment costs. This is done by maintaining and replacing assets at the right time.

Condition monitoring in the Netherlands takes place using various measurement platforms and resources, such as: measurement trains, visual inspections, fixed sensors in and along the track. The whole of all measurement platforms and resources is called the MonitorMix. The current MonitorMix has grown historically, and most measurements are currently being carried out with specific measurement trains. Under

the influence of technological developments (smaller, cheaper, more accurate sensors/measurement techniques), opportunities arise to carry out condition measurements with other measurement platforms (i.e., passenger trains, fixed sensors, drones) cheaper, more frequently and without consuming the scarce rail capacity. In the meantime, the market for measurement trains has stagnated and is characterized by outdated assets, high investment costs, low margins, difficult entry and a limited number of suppliers. ProRail's dependence on one supplier is very high.

ProRail has researched the contents of the future MonitorMix and the share of measurement trains. ProRail also researched how they can make optimal use of the condition measurement market and which sourcing choices (make or buy) must be made. The research has led to a vision (see appendix 1). Two important conclusions are:

1. The future MonitorMix will become more diverse. The use of specific measurement trains will decrease in favour of measurement carriages, Passenger train as Measurement train (RaM), Freight train as Measurement train (GaM), Work train as Measurement train (WaM). In addition to measurement trains, new measurement platforms will emerge, such as: fixed sensors, drones, satellites and robots.
2. There is a market for all elements within the MonitorMix, except for the 'classic' measurement trains. However, a market can be created by changing demand. Instead of completely outsourcing measuring with measurement trains, ProRail will invest in modular measurement carriages, on which measurement systems from different suppliers will be used. We call this transition: the 'Modular Measurement Train', see section 1.3.

1.3 Modular Measurement Train

The market for the use of the current traditional measurement train is vulnerable. The availability of condition data from the measurement trains is under pressure and this poses a risk for ProRail. ProRail is highly dependent on this data to carry out its asset management tasks, and this data is an important foundation for demonstrating the safe serviceability of the Dutch railway.

The objective of the "Modular Measurement Train" is to sustainably guarantee the availability of condition data. Market forces are a prerequisite for this and ProRail makes this possible by changing demand. Instead of completely outsourcing measuring with measurement trains, ProRail will invest in modular measurement hubs containing measurement systems from various suppliers for operation, maintenance and data delivery.

The scope of the Modular Measurement Train covers all parameters measured with the current measurement trains for ProRail, namely: track geometry, overhead wire, switches, PVR, PVS, ATB and GSMR. To provide a general idea of the current scope, a brief summary of the specifications is attached. (Appendix 2)

The MonitorMix consists for 95% of specific measurement trains, these trains take very accurate measurements at a low frequency (2 times a year), with some parameters measured at a low speed. An overview of a possible annual tender is included below (Table 1) as an indication of the scope.

ProRail's intention is that measurements in the so-called NCBG areas will be out of scope of the Modular Measurement Train due to the assumption that other techniques from the MonitorMix can adequately implement this.

Measurement Domain	Indication annual size
Switch and video inspection	175 deployments
Rail defects (train measurement)	14.250 km
Overhead line (train measurement)	9.750 km
Track (geometry) measurements (train measurement)	13.750 km
ATBEG	11.375 sections 6 deployments for infraprojects
GSMR	45 unattended deployments 25 attended deployments
PVS+PVR	1075 km multiple tracks 150 km single track
PVR Train Yards	300 km
PVR Tunnels	10 km multiple tracks 20 km single track
Rail defects (manual measurements)	2.000 track measurements 10.500 objects 10.500 HITS (train points)

Table 1: Indicative annual size per measurement domain based on an average of 2022 and 2023.

ProRail's intention is that so-called 'difficult to measure infrastructure' (MTMI) will be out of scope of the Modular Measurement Train. This infrastructure cannot be reached with a measurement train, or, for other reasons, it is not (cost-)efficient to measure it with a measurement train.

ProRail's intention is to place manual measurements (USH) out of scope of the Modular Measurement Train due to the specific nature of these measurements and the current market situation. The intention is to contract this service separately: see Appendix 4.

The need for traditional measurement trains is expected to continue until 2030. From 2030 we expect a decrease in the use of these measurement trains per measurement domain. After that, it is expected that they will only be needed for very specific, accurate, low-frequency measurements. The trend is to switch from measurement trains to measurement carriages, without their own propulsion and protection, because of the lower investments and flexibility in the operation.

The expectation is that the realization of the Modular Measurement Train will take several years and will be operational in 2030. However, current measurement train contracts expire earlier than 2030, which means that there is a period that must be bridged to ensure safe serviceability. The way in which continuity of current services can be guaranteed is also examined in this RfI. This depends, among other things, on the current interest in this service and the expected market situation at the time of the intended bridging. For more information see Chapter 1.5 and the related questions in Appendix 4.

1.4 Modular Measurement Train: division into tenders

ProRail's intention is to market the realization of the Modular Measurement Train in four tenders, see table 2.

Please note that this classification has not yet been determined and may differ in a possible tender.

	Tender	Scope activities	Target number of suppliers
1	Modular measurement hub	- Develop, build and maintain the measurement hub - Installation of the measurement systems - Making the measurement hub ready for measurement trips	Unknown
2	Measurement systems	- Supplying measurement systems (per measurement domain) - Supplying validated data to ProRail	Multiple, Amount unknown
3	Logistics, planning and operation	- Carrying out measurement runs with a locomotive - Planning of measurement runs - Leading of measurement runs	Unknown
4	Consultancy and audits	- Advisor to ProRail - Auditing of the whole 'chain', tender 1 t/m 3	Unknown

Table 2: Realization of the Modular Measurement Train by means of four tenders.

The exact financial scope of each tender is not yet known because in the current situation the tenders have been put on the market as a whole.

Figure 1 concerns a schematic representation of part of the condition chain, starting with ProRail's 'measurement needs' to 'central validation'. The follow-up process, up to the feedback of maintenance carried out based on detected exceedances is not shown.

The current measurement train contracts, important for bridging, relate to the part from 'measurement scenario' up to and including 'data available'. These contracts are tendered for each measurement domain (see Table 3 in section 1.5), whereby the contractor is responsible for this entire chain.

The same start and end points apply to the 'Modular Measurement Train' (respectively 'Measurement Requirement' and 'Central Validation'), with the difference that several contractors (contracts 1 to 4) are each responsible for a part of the chain.

Figure 1 gives a rough description of the responsibilities and activities for each tender. In this phase (RfI) a detailed flow chart has deliberately not yet been developed with responsibilities, transfer and communication moments between the various tenders. The result of this RfI may have an influence on this.

In sections 1.4.1 to 1.4.4 below, the intended parts of the tender are further specified. In order to promote a healthy market and to prevent ProRail's dependence on a limited number of parties from becoming too great, ProRail is considering imposing restrictions on the number of contracts to be awarded.

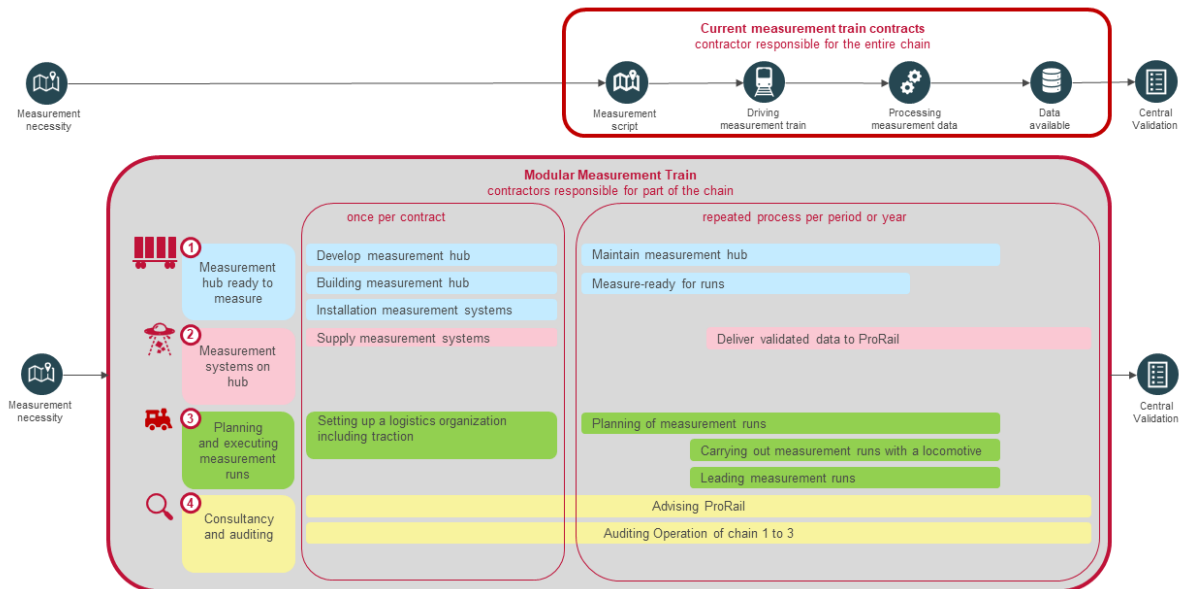


Figure 1: Current and future processes have the same start and end point. The Modular Measurement Train is divided into four tenders

1.4.1 Tender 1: Modular measurement hub

This tender concerns the design, construction and maintenance of one (or more) so-called modular measurement hubs, including the necessary certification and approval, but excluding traction. The measurement hub is suitable for the implementation of third-party measurement systems, including boundary conditions such as space and fixing, which are yet to be determined. The intention is that the measurement hubs will be available exclusively to ProRail, but ProRail explicitly keeps the possibility open that the measurement hubs can be used for ProRail contractors. The number of measurement hubs has not yet been determined.

Contractor is responsible for:

1. That all measurement systems can act modularly at the measurement hub and interact with the basic facilities at the measurement hub carriage(s) (i.e., synchronization of location and time);
2. Construction and maintenance of the ICT facilities on the measurement car;
3. Protocols and interfaces to third-party measurement systems;
4. Developing and managing the supply chain architecture;
5. Supervising the installation of measurement systems at the measurement hub;
6. Support team to provide technical support and troubleshooting.;
7. Approval of the whole of the platform, the measurement systems and traction (sum of its parts);
8. Preparing the measurement hub for measurement and parking before and after each measurement run.

1.4.2 Tender 2: Measurement Equipment

This tender concerns the supply and operationalization of measurement systems on the measurement hubs and supplying validated data to ProRail.

Contractor is responsible for:

1. Correct functioning of the measurement system so the right data is collected to deliver the required coverage and quality;
2. Supplying modular measurement systems for installation on the modular measurement hub;
3. Certification and approval of measurement systems;
4. Maintenance and calibration of the measurement systems;
5. Providing validated data to ProRail;
6. Analysing measurement data (depending on the measurement domain).

Measurement systems will be used for the following measurement domains: ERTMS, track geometry, corrugation, ATB, GSMR, (track) video image, ultrasonic, eddy current, ground radar, point inspection, catenary inspection (thickness, position), LIDAR. Due to the modular nature of this tender, it is also possible that other parameters will be added in the future.

ProRail's wish for the operation of measurement systems during the measurement run is that they will be carried out remotely ('Over the Air') as much as possible. Generic operational tasks are assigned to the so-called measurement drive leader (part of tender 1.4.3). It is expected that there will be multiple tenders and/or suppliers: combinations of measurement systems are not excluded.

1.4.3 Tender 3: Logistics, planning and operations

This tender contains the planning and preparation of the measurement runs based on ProRail's measurement needs, as well as the actual execution of these measurement runs with the required traction.

The contractor is responsible for:

- a. Providing a maintained locomotive, able to communicate with the measurement hub. Possible requirements for traction are as follows:
 - The locomotive must be certified, technically correct and can be connected to the measurement hub for accurate measurements.
 - ProRail has committed itself to Clean and Emission-Free Building (SEB) and has the ambition to work emission-free. We expect the same for the 'Modular Measurement Train'. The locomotive is self-propelled – with the aim of being able to drive autonomously for the purpose of test runs – on both routes with and without overhead wires, where ProRail's intention is to only allow emission-free locomotives.
 - The locomotive must be suitable for both ERTMS and ATB tracks .
 - Able to link basic measurement instruments (i.e., front video cameras).
- b. Carrying out test runs with the locomotive with at least one driver familiar with 'route knowledge' . The following responsibilities are envisaged:
 - Driving the correct (measurement) speed, planning and route;
 - Carrying out pre-departure inspection to ensure good working conditions and communication with external parties, such as the train traffic controllers.
 - Routine maintenance & reporting.
 - Ensuring safety: by following all safety procedures and protocols.

- c. Logistics and (re)planning of the measurements and the locomotives, including the personnel planning of the test drive leader and drivers. The following responsibilities are envisaged:
 - Based on the annual measurement plan, the supplier develops a concept schedule for the running, maintenance of the train and maintenance of the measurement equipment.
 - The supplier ensures that capacity on the railways is requested in a timely manner from the "Infrastructure Availability" department of ProRail.
 - For each measurement day, the supplier prepares a detailed driving schedule. Based on this schedule, a delivery plan is provided to ProRail that specifies which measurement data will be delivered at what time.
 - Measurements are carried out according to the supplier's quality plan (measurement set-up).
 - Includes ad-hoc planning and advance planning.
 - Driving, adjusting speeds and adjusting tracks on the spot.
 - Daily verification (Insight into planning, realization of measurements, malfunctions and repetitions).
 - Responsible for the communication and supervision of the staff working on the train system.
 - Communication with the client and contractors from the other tenders regarding, planning, availability of measurement hub(s) and measurement systems, measurements, deliveries and maintenance, among other things.
- d. Measurement drive leader with the possibility of physical presence during the test run. Due to further automation, the number of deployments of this function may decrease during the contract. A test drive leader has the following responsibilities, among others:
 - 1st line maintenance (on behalf of the supplier / contractor measurement systems), for example: basic calibration of measurement systems, cleaning measurement systems, (re)starting computers;
 - Guiding the operator (e.g., route, schedule, speed, etc.) based on measurement system requirements;
 - Communication of the measurement results to the contractor(s) measurement systems.
 - Other practical ancillary tasks on the measurement hub during and after the measurement drives.
 - Manual operation of systems if necessary.

1.4.4 Tender 4: Consultancy and Auditing

This tender consists of two sub-tenders.

1. Consultancy

The ProRail consultant maintains a vision on the measurement systems, performing measurements and validating measurement data. The consultant also advises ProRail on the implementation of measurement systems and their data.

2. Auditing

Responsible for auditing the functioning of the entire measurement process chain as outlined in figure 1 (and/or parts thereof). This can include auditing of the following: design process, compliance with standards, quality, safety, working conditions, approval, certification, personnel qualifications, risk assessment.

1.5 Bridging current measurement train contracts

ProRail expects that the realization of the Modular Measurement Train will take several years and will be operational from January 2030 onwards. However, some current measurement train contracts expire before the Modular Measurement Train is operational. The availability of condition data is a condition for the safe

accessibility of the Dutch track. For this reason, a bridge is necessary from the current situation to the new situation. The table below provides an overview of the current contracts and the expected period that bridging will be required.

Contract	Contract ends ¹ by	Expected ² Bridging period	Current contractors
"Sporstaafdefecten" (Hand+Train ultrasonic)	19-12-2027	2 years	- Eurailscout Inspection & Analysis B.V.
ATB & GSMR	01-01-2028	2 years	- Eurailscout Inspection & Analysis B.V.
Track measurements and catenary	31-12-2028	1 year	- Eurailscout Inspection & Analysis B.V.
Switch Inspection and Track Inspection (Wisselmetingen en videoschouw)	18-02-2031	unforeseen	- Eurailscout Inspection & Analysis B.V. - VolkerRail Nederland B.V.
PVR/PVS	31-12-2029	unforeseen	- VolkerRail Nederland B.V. - IGL

Table 3: Overview of the current measurement train contracts.

In these current measurement train contracts, no subdivision into tenders has been applied as described in section 1.4. The contractor is therefore responsible for all parts of the entire chain.

In order to guarantee the availability of the condition data during the bridging period, these contracts must be re-contracted for a short period of time. However, ProRail's assumption is that – partly in view of the current market situation, possible high investments for new entrants, strict validation requirements in combination with a relatively short payback period – the interest and possibilities are limited. Entrants may be confronted with investments in the entire chain, such as in the logistics process, in rolling stock, measurement systems, approval, demonstration of quality measurement data, quality management, trend break analysis, etc., which cannot be recouped within the term of the bridging agreement. In this RfI, this assumption of ProRail will be tested. See the specific questions in Appendix 4.

¹ Under the condition that ProRail makes use of the extension options in the contract.

² The bridging period is an estimate and partly depends on, among other things, the possible need to drive in parallel for the purpose of determining a break in the trend and unforeseen delays.

2 Procedure Rfl

2.1 Introduction

As mentioned before by means of this Rfl, ProRail intends to obtain answers to a number of questions from the contractors in the market, so that on this basis, it can position the possible tender(s) better in the market. In addition, it tries to reach as many contractors as possible in order to interest them and encourage them to contribute ideas.

2.2 Procedure

This Rfl is published on TenderNed, which means all eligible suppliers can participate. This is a written procedure with an optional dialogue. You are requested to fill in the enclosed questionnaire and submit it before the date mentioned in paragraph 2.3. You can state your answers in Dutch or English. If answers are unclear, raise questions or need further explanation, ProRail reserves the right to ask for clarification in the dialogue round. If you are interested, please send your answers to the questionnaire (Appendix 4) to arno.odijk@prorail.nl, no later than January 17th 2024.

An anonymous report is made of the total Rfl. Excluded from mentioning in the final report are explicitly stated confidential answers of participants and information that is, in the opinion of ProRail, confidential. The Rfl will be completed by drawing up a final report via TenderNed. The final report will be part of the tender documents for the European tender, if ProRail decides to publish a European tender.

2.3 Planning

Date	Activity
15 th November 2023	Publication on TenderNed
4 th December 2023 15:00 CET	Deadline and time for asking questions about the Rfl procedure
19 th December 2023	Deadline for answering questions via the Information Memorandum (by ProRail)
17 th January 2024 12:00 CET	Deadline and time for submitting your completed Questionnaire by email (arno.odijk@prorail.nl)
February 2024	Dialogue / clarification (optional)
February 2024	Reporting

2.4 Open and honest

Participation in the Rfl is completely voluntary and will not lead to any privileges in a tender. Likewise, not participating in the market consultation will not lead to exclusion from a possible tender. By participating in this Rfl, you agree that the information you provide may be used by ProRail in (the preparation of) the tender. Commercial (numerical) information provided by you will be treated confidentially by ProRail. ProRail values a transparent process. It is not the intention to favor participating market parties in the Rfl or to place non-participating parties at a disadvantage. From this perspective, all relevant information resulting from the market consultation will be made available to all potential tenderers upon publication of the tender or added to the tender dossier. Any costs for participating in this market consultation will not be reimbursed.

3 Appendices

The following appendices (separately attached) are part of this RfI:

1. Whitepaper MonitorMix
2. Current scope of the measurement train contracts
3. Current planning process
4. Questionnaire