

APPENDIX 1

THE CUSTOMER'S DESCRIPTION OF NEEDS AND SPECIFICATION OF REQUIREMENTS

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INTRODUCTION

Appendix 1 describes the current functional and technical landscape and Vy's needs for the future and includes both technical and functional specification of requirements. The appendix also describes internal and external constraints, cross-border dependencies, and conditions that may affect service delivery, system integration, and performance, and which are largely outside the direct control of the Parties.

The following attachments apply as part of Appendix 1:

- Attachment 1 - Technical requirements
- Attachment 2 - Functional requirements
- Attachment 3 - Demonstration of functional areas
- Attachment 4 - Voluntary option regarding Rail replacement Bus Planning
- Attachment 5 - Target State Integrations

1.1 ABOUT THE ONETRACK PROJECT

The OneTrack project is Vy's strategic initiative to improve how Vy plans, coordinates, and operates passenger rail services in Norway and Sweden.

The OneTrack project is intended to establish a more integrated and future-oriented foundation for production planning and operational control through a new system solution, process improvements and organisational development.

Figure 1 illustrates the intended transition from today's fragmented System Landscape to the future target state. The current state consists of several separate applications supporting different parts of production planning and operational control, with limited integration and data flow between them. The future state represents Vy's ambition to consolidate these capabilities into one common, integrated solution that supports end-to-end processes, improved information flow, and more consistent ways of working across Norway and Sweden.

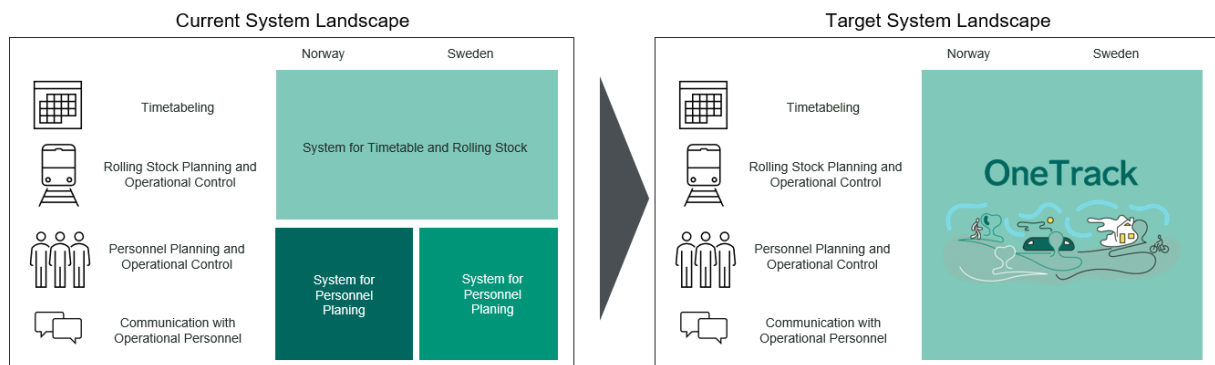


Figure 1: Current System Landscape and target System Landscape

The project is not only about replacing current systems. It is about enabling more robust operations, more effective use of resources, better support for employees, improved adaptability to future changes, and a more reliable and passenger-oriented train service.

1.2 PURPOSE OF THE PROCUREMENT

The purpose of the procurement is to establish an Agreement for a cloud-based core system solution, hereinafter referred to as the "OneTrack Solution", that supports the core functional areas within production planning and operational control, described in chapter 1.3.1, for passenger rail services in Norway and Sweden, and that supports the realisation of the OneTrack project's business objectives.

1.2.1 Business objectives

The business objectives represent the outcomes Vy seeks to achieve. The business objectives and the definition of each objective are shown in figure 2.

Business objective	Definition
 Secure and Reliable Technical Solutions	Enable secure and stable operations with high system availability by simplifying the IT landscape and establishing a robust governance and management model.
 Greater Organizational Agility	Strengthen Vy's ability to rapidly adapt to changes in the market and technology through a flexible organization and modern IT architecture.
 Engaged Employees	Enhance employee engagement through user-friendly tools, more unified ways of working, and improved support for collaboration.
 Higher Production Quality	Improve the quality of passenger rail service by enabling more robust and reliable plans, better handling of deviations, and more precise performance management.
 More Profitable Operations	Reduce operating costs and increase value creation through smarter planning, more efficient work processes, reduced IT operating costs and better utilization of data and resources.
 Increased Customer Value	Enhance customer experience by enabling timely and accurate customer information and a reliable train service.

Figure 2: Business Objectives for OneTrack

1.2.2 Key Capabilities to achieve the business objectives

The business objectives depend on a set of underlying capabilities. These capabilities represent the organisational and solution characteristics required to support the intended outcomes. The capabilities and the definition of each capability are shown in figure 3.

Key Capability	Definition
Holistic Governance and Management	The ability to establish a coherent and structured approach to managing systems, processes, and data throughout the lifecycle of the solution.
Well-Defined System Landscape	The ability to maintain a clear, consolidated, and well-structured system landscape with defined roles and responsibilities.
Redundancy and Disaster Readiness	The ability to maintain operations in the event of system failures, disruptions, or unexpected events.
Scalability	The ability to adapt system performance, cost levels, and solution components in response to changes in operational volume and contract scope.
Flexibility	The ability to adapt processes, organizational structures, and system behavior quickly and with minimal effort.
Future Oriented System Design	The ability to develop and manage technology based on architectural principles that support long-term adaptability and sustainability.
Usability	The ability to provide intuitive and consistent user experiences that support effective and efficient task execution.
Seamless Information Flow	The ability to ensure continuous and integrated data exchange between systems and processes without manual intervention.
Standardized and Automated Processes	The ability to perform tasks consistently across planning domains through the establishment of standardized and harmonized business processes.
Data-Driven Decision-Making	The ability to use reliable, governed and rule-validated data to support analysis, optimization and decision-making across planning and operational contexts.

Figure 3: Key Capabilities for OneTrack

The following sections describe how the identified capabilities contribute to achieving the business objectives.

1.2.2.1. Secure and Reliable Technical Solutions

The most important capabilities supporting this business objective are scalability, flexibility, and future-oriented system design. Together, these capabilities strengthen Vy's ability to adapt efficiently to changing business needs, operating models, and external conditions.



1.2.2.2. Greater Organisational Agility

The most important capabilities supporting this business objective are scalability, flexibility, and future-oriented system design. Together, these capabilities strengthen Vy's ability to adapt efficiently to changing business needs, operating models, and external conditions.



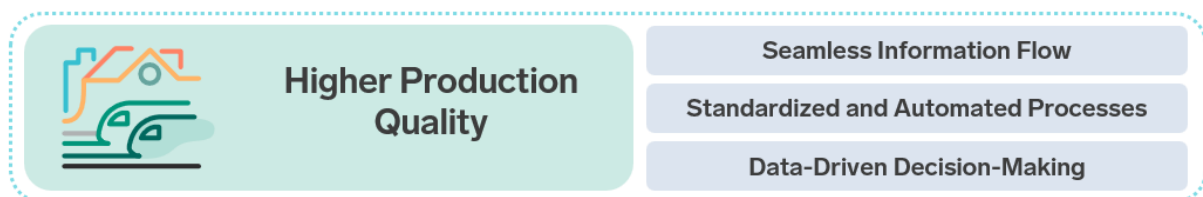
1.2.2.3. Engaged Employees

The most important capabilities supporting this business objective are usability and seamless information flow. Together, these capabilities support effective collaboration, improve situation awareness, and contribute to a more manageable and attractive work environment.



1.2.2.4. Higher Production Quality

The most important capabilities supporting this business objective are standardised and automated processes, data-driven decision-making, and seamless information flow. Together, these capabilities support the creation of more robust plans, improved handling of deviations and disruptions, and better-informed operational decisions.



1.2.2.5. More Profitable Operations

The most important capabilities supporting this business objective are standardised and automated processes, data-driven decision-making, and seamless information flow. While these capabilities also contribute to Higher Production Quality, their primary contribution in this context is improved resource utilisation, reduced operating costs, and increased value creation through better use of data across the business.



1.2.2.6. Increased Customer Value

This business objective is considered a derived effect of improvements in production quality, operational stability, and information availability. Key capabilities are therefore not directly linked to this business objective.

1.2.3 Requirements to achieve the business objectives

The business objectives describe the outcomes Vy seeks to achieve, while the key capabilities represent the organisational and solution characteristics required to realise those

outcomes. These objectives and capabilities have subsequently been translated into detailed, verifiable requirements for the Establishment, delivery and Management of the OneTrack Solution.

1.3 SCOPE OF THE AGREEMENT

The scope of the Agreement encompasses a cloud-based core system solution (cf. the General Terms clause 1.1.2), including associated services throughout the Agreement lifecycle. The scope includes all activities, deliverables and services necessary to ensure that the system is fit for purpose and meets Vy's requirements as set out in the Agreement.

The scope of the Agreement includes:

- The Cloud Services: the software (OneTrack Solution), the infrastructure and data resources provided on Standard Terms as a Service delivered online. See Appendix 1, 2 and 3 for more information.
- The Services: The Supplier's services related to Facilitation, Implementation and Management of the OneTrack Solution throughout the Agreement's lifecycle; as specified in the appendices.
 - Establishment: The Supplier shall deliver Services to the Establishment of the OneTrack Solution, hereunder:
 - Facilitation activities; hereunder Customisation and Integrations with other relevant systems, as well as the Data Conversion and migration of relevant data and functionalities from existing systems, where applicable.

The details of the integrations to be established are outlined in Appendix 1 - Attachment 5. The Supplier's responsibility for delivering integrations is outlined in Appendix 4.
 - Implementation activities; hereunder Training, Development of routines, Organisational development and Digital Transformation, Quality Assurance and Testing. For more information on what is included in the Agreement, see Appendix 4.
 - Management: The Supplier's Services related to the operation, Monitoring, and support of the Cloud Services in the Management phase, including support, training and compliance with agreed service levels. See Appendix 5 and Appendix 6 for more information.
 - Voluntary option: The scope further includes a voluntary option for Rail replacement Bus planning.
 - Any optional services offered by the Supplier through its Service Catalogue as part of Appendix 7.

1.3.1 Core Functionality to be supported by the OneTrack Solution

Core functionality refers to the business-critical capabilities that the OneTrack Solution shall support within production planning and operational control and represents the functional scope of the Solution. This includes the end-to-end planning and management of timetables, rolling stock and crew across long-term planning, short-term planning and the day of operation.

- **Timetable Planning** - Planning of train routes and traffic systems, including origin/destination, stopping patterns, runtimes, dwell times and arrival/departure times at intermediate stations, hereunder:

- Define and manage detailed timetable plans including departure and arrival times, intermediate stops and dwell times.
- Support handling of operating calendars, including operating days, exceptions and special periods such as holidays and weekends.
- Enable updates and dynamic adjustments of plans in response to planned construction work, infrastructure constraints or failures.
- Provide interfaces towards infrastructure manager systems for capacity requests, coordination and allocation.
- **Rolling Stock Planning** - Planning and optimisation of rolling stock for individual train services (fleet types, train composition, vehicles), including rotations aligned with production plans, hereunder:
 - Assign appropriate rolling stock types, train compositions and vehicle configurations to planned departures based on operational requirements.
 - Plan and optimize rolling stock diagrams and stabling activities between services to ensure efficient utilization.
 - Manage maintenance windows and operational restrictions within rolling stock plans.
- **Crew Planning** - Planning of workforce requirements, including generation of crew rosters and work sequences based on operational needs and competence requirements, hereunder:
 - Generate detailed crew rosters aligned with timetable and rolling stock plans to ensure consistent planning across domains.
 - Support automated planning of work sequences, including breaks, transitions and regulatory constraints.
 - Incorporate agreements and legal requirements in the planning process.
 - Ensure that planning outputs support communication and coordination with crew.
- **Crew Assignment** - Allocation of individual crew to predefined duties and shifts based on business rules, hereunder:
 - Allocate crew to duties based on HR policies, qualifications and individual preferences.
 - Ensure compliance with working time regulations (i.e. maximum shift durations and rest requirements)
 - Handle exceptions such as leave, training, part-time arrangements and special constraints.
 - Enable continuous communication with crew related to assigned duties and absence management.
- **Rolling Stock Dispatching** - Operational monitoring, control and adjustment of rolling stock aligned with plans and operational conditions, hereunder:
 - Monitor real-time status and position of rolling stock in relation to planned services across systems.
 - Enable operational adjustments to rolling stock allocations and movements in response to disruptions and changing conditions.
 - Ensure compliance with operational rules, safety requirements and contractual obligations during execution.
- **Crew Dispatching** - Real-time management of crew duties and assignments during operations, hereunder:
 - Provide real-time updates of crew duties and assignments based on changes in operational conditions.
 - Support the communication and confirmation processes between dispatch functions and crew.
 - Track, manage and document deviations from planned duties with full traceability and auditability.
 - Ensure compliance with working time regulations (i.e. maximum shift durations and rest requirements).

The core functionality is divided in the following time horizons:

- **Long-term Planning** covers the development of annual or seasonal plans for timetabling, rolling stock and crew, based on strategic plans expected demand, infrastructure capacity and contractual requirements. The Long-term planning sets the framework for all subsequent short-term adjustments.
- **Short-term Planning** involves the day-to-day, week-to-week and month-to-month adjustments needed to keep the production plan achievable, robust and reliable. It includes refining timetabling and rolling-stock allocations, finalizing crew assignments, adapting to updated infrastructure restrictions, handling planned disruptions and re-planning, and preparing plans for weekends and operational periods with higher variability.
- **The day of Operation** refers to the continuous, 24/7 management of the passenger rail services. It includes real-time monitoring of the train service, handling and mitigating operational disruptions and re-planning (such as delays and cancellations), and coordinating the allocation and use of staff, rolling stock, and routes to ensure stable and safe daily delivery of the planned passenger rail service.

The OneTrack Solution shall be delivered as a standardised product for all core functionalities, which implies that configuration is expected rather than Customisation wherever feasible.

1.3.1.1. Additional Functionality

In addition to the core functionality described above, the OneTrack Solution shall provide a Crew Portal, Communication and Self-Service capability for train drivers, conductors and other crew.

The functionality shall provide a unified digital interface for accessing operational information, receiving instructions and notifications, managing work-related requests, and communicating with planning and operational control functions.

The Solution shall support targeted and automated communications, real-time information sharing, two-way communication, acknowledgements, read confirmations and recipient feedback.

Furthermore, the Solution shall provide self-service functionality enabling crew to submit and track vacation requests, leave applications, absence notifications, availability preferences, and other crew-related requests, including approval workflows and status tracking where applicable.

Detailed requirements for this functionality are set out in Appendix 1 - Attachment 2, under Section 6.Crew

1.3.2 Out of scope and system-technical limitations

Outside the scope that is defined above are certain sub-processes and interface processes, this includes, but is not limited to:

- Long-term rolling stock strategy, including procurement, fleet introduction, and maintenance planning and management.
- Crew strategy, including retrospective analysis, training planning, leave frameworks, and compensation schemes.
- Planning and operational management of replacement transport for unplanned service disruptions and operational incidents (excluding planned engineering works and scheduled service changes), beyond integration and data exchange requirements.

- Transport management outside core crew and rolling stock operations, including alternative transport handling and roster monitoring.
- Payroll, settlement, and absence management, except where reliable data is required to support crew planning and operational control.

The following systems and components are out of scope:

- **NeTeX Integrator**, a critical component for ticketing data, currently a third-party solution, is excluded from scope and will be replaced by an in-house developed component but must integrate with the OneTrack Solution via the service platform.
- **Certification register**, Vy's internal system for managing train crew certifications and competences, integrated with other systems. It is out of scope but must integrate with the OneTrack Solution via the service platform. If the Supplier offers a Certification register it should be represented in the service catalogue in Appendix 7.
- **TOPAS / 1409**, Operational tools for train crew in Norway (Topas) and Sweden (1409). Both are out of scope but must integrate with the OneTrack Solution via the service platform.
- **DROPS Dashboard**, a key operational tool aggregating data from multiple sources for cross-functional management. It is out of scope but must integrate with the OneTrack Solution via the service platform.
- **Viriato**, a strategic planning tool for train services, and serves as an upstream input system. It is out of scope but must integrate with the OneTrack Solution via the service platform.
- **External systems and integrations** are limited to the identification and specification of integration requirements. Any development, configuration, testing, or modification of external systems, applications, or services required to support such integrations is outside the scope of this project.

These limitations collectively define the boundaries of the OneTrack Solution and are fundamental to distinguishing in-scope capabilities from supporting or dependent systems and processes.

1.4 CURRENT FUNCTIONAL AND TECHNICAL LANDSCAPE

This chapter provides a consolidated overview of the current landscape for production planning and operational control of passenger rail services in Vy. It outlines processes, ways of working, system support, and collaboration across Norway and Sweden.

1.4.1 Organisation and main functional processes

The planning and operational control domains are organised into strong functional departments with high levels of specialized expertise. At the same time, value creation takes place through cross-functional processes that cut across these functional departments. As-is mapping of the current situation shows that internal communication often works well within departments, but that collaboration across organisational boundaries can be challenging; particularly when rapid changes are required.

Figure 4 below provides an overall view of the current main processes within planning and operational control in Norway and Sweden and shows how the value chain is built from long-term planning through to operational execution. In Norway, this includes the annual production plan, planned disruptions, crew dispatching, requisitions, and operational control. In Sweden, the structure is based on long-term and short-term planning for timetable planning, rolling stock, and crew, as well as operational control. Although the structure differs between the two countries, the same core needs recur: to establish robust plans, ensure correct staffing, manage changes, disruptions, and operations in real time.

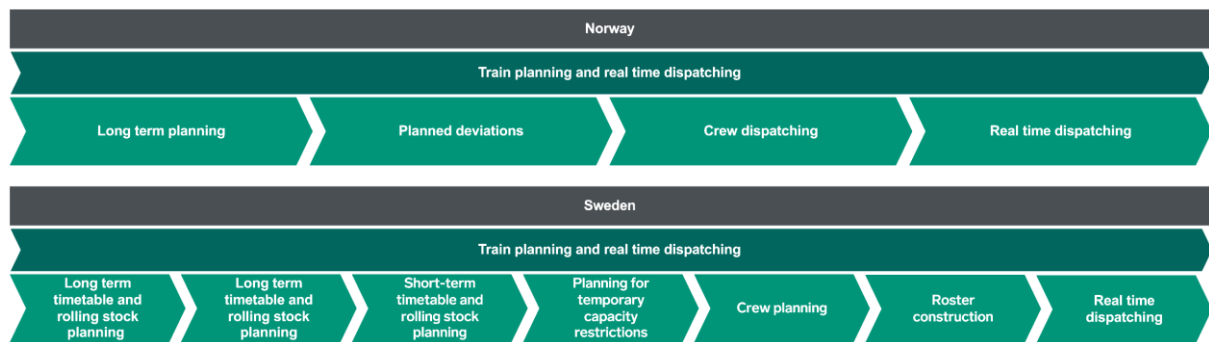


Figure 4: Overall process landscape for planning and control of train production

1.4.2 Description of the current technical landscape

Today, the processes are supported by a fragmented System Landscape with multiple applications, Graphical User Interfaces and manual routines. For timetabling and rolling stock planning, the system portfolio from Signature Rail is primarily used in both Norway and Sweden. For crew planning and management including communication with crew, Norway uses Siscog TPO, while Sweden uses Trapeze. For more details, see Appendix 3.

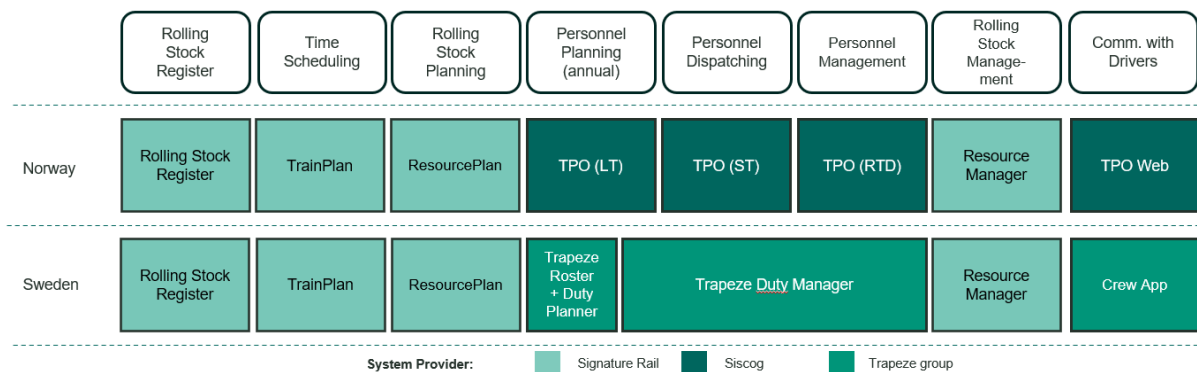


Figure 5: Current application portfolio

This results in a technical landscape where information must be transferred manually between systems and functional areas. Integrations are largely file- and batch-based, and data often needs to be verified, processed, or re-entered in several places. Data quality and availability vary, and decision-making is based on information from multiple sources. The consequence is resource-intensive work processes and vulnerability, particularly in situations with time pressure, frequent changes, and a need for rapid replanning.

1.4.3 Key figures from today's train production

The following key figures are representative for the Norwegian and Swedish passenger rail services as of August 2026.

1.4.3.1. Rolling Stock

Vy has the following rolling stock of various types:

Independent train units, locomotives and EMUs	Vy Tog (Norway and Sweden)
Locomotives	19
Coaches/wagons	122
Electric Multiple Unit (EMUs)	263
Diesel Multiple Unit (DMUs)	6

Table 1: Types of rolling stock

Peak trains: Approximately 290 arrivals and departures per working day between 07:00–08:59 and 15:00–16:59 at key stations in Norway and Sweden (August 2026).

1.4.3.2. Personnel

Over 2 000 employees rely on the current planning solutions, either directly or indirectly. The resource distribution across planning and operational control roles are provided in table 2 below.

Role	Norway	Sweden
Long-term planner timetable and rolling stock	10	-
Long-term planner crew	12	4
Short-term planner crew	23	3
Short-term planner deviations	2	1
Rolling stock dispatcher	19	8
Crew dispatcher	17	1
Alternative transportation crew	3	-
Payroll and absence employees	11	3
Crew - conductors	924	51
Crew - train drivers	893	51
Group leaders and resource planners	57	3
Management team planners	6	1
Management team operational control	2	1

Table 2: Types of roles within planning and operational control

1.5 OPERATIONAL CONTEXT AND FUNCTIONAL REQUIREMENTS

This chapter provides context for the operational environment and conditions the OneTrack Solution must be able to support.

1.5.1 Future scenarios for Vy's passenger train operations

Vy has established a strategic target state for the next ten years, with the ambition of becoming the leading railway undertaking in Scandinavia within passenger rail services. This involves building a robust and diversified portfolio, including commercial services and tendered operations in the Scandinavian countries, as well as cross-border traffic. The

purpose of this diversification is to ensure resilience and reduce risk, enabling Vy to remain strong regardless of market development.

However, Vy is currently facing a wide range of potential outcomes regarding both the future scale and nature of its operations (i.e. degree of commercial vs. Public Service Obligation (PSO) traffic). This uncertainty is largely due to evolving framework conditions within the Norwegian railway sector. As a result, Vy's size and strategic focus may shift over the term of the contract for the OneTrack Solution. It is therefore essential that the OneTrack Solution is both flexible and scalable, and capable of adapting to future needs.

1.5.2 Service delivery arrangements and contract types

Vy's passenger rail services may be delivered under different service delivery arrangements and contract types. The OneTrack Solution must therefore be capable of supporting all relevant models, enabling Vy to adapt to changing market conditions and contractual frameworks while maintaining flexibility in future service delivery.

- **Commercial Services:** Passenger rail services run entirely on commercial terms, without compensation from authorities and with full revenue and cost responsibility placed on the railway undertaking. Market risk is borne by the railway undertaking.
- **Tendered Services – Gross Contract:** Authorities hold the revenue responsibility, and the railway undertaking receives a fixed fee for delivering the service. Ticket revenues are accrued to the Contracting Entity, and the railway undertaking carries no revenue risk.
- **Tendered Services – Net Contract:** The railway undertaking holds the revenue responsibility, retains ticket revenues, and receives subsidies from authorities. The railway undertaking bears the risk associated with revenue development and is incentivized to grow the passenger base.

1.5.3 Regulatory and Sector Framework

Passenger rail services in Norway and Sweden are regulated under national railway legislation, sector specific regulations, and applicable EU/EEA railway directives. While the regulatory framework is largely harmonised at European level, regulatory responsibilities, approval processes, and market models differ between the two countries.

Service delivery is dependent on, inter alia:

- Compliance with national requirements for Safety and security management, authorisation and certification requirements, and operating rules applicable in each country.
- Authorisation from European and national safety authorities, i.e. European Union Agency for Railway (ERA), National Safety Authority (NSA) in Norway and Sweden.
- National market arrangements, including public service obligation (PSO) agreements and open access conditions.

For cross-border passenger services, compliance must be achieved concurrently in both jurisdictions. Regulatory approvals, approval timelines, and regulatory changes imposed by authorities constitute external dependencies outside the control of the Parties and the Supplier.

Although work is underway in the EU to standardise and digitalize the railway sector, the various infrastructure managers and ticket distributors still use different formats and solutions for data exchange. This makes it difficult to achieve seamless information flow and effective use of data across borders and between parties. Transitioning toward common standards will therefore be essential to meeting future needs for flexibility, interoperability, and user-friendly solutions within the railway sector.

1.5.3.1. Regulatory framework for safety, security and information security

Vy operates in a highly regulated railway environment where traffic safety is a fundamental prerequisite for all operations and deliveries. As a licensed railway undertaking holding valid single safety certificates in Norway and Sweden, Vy is required to demonstrate systematic control of safety, security, and information security across all activities that may affect operational risk.

Traffic safety is closely linked to the planning, coordination, and execution of train operations, and depends on the integrity, reliability, and correctness of both processes and supporting systems. The OneTrack Solution and Services delivered as part of the OneTrack project are therefore expected to support safe and robust operations under both normal and degraded conditions, and to contribute to maintaining control of safety-critical information and decision processes.

Norwegian and Swedish railway legislations for safety and security management for railway operations and passenger transport by train is governed by a combination of EU regulations and Norwegian and Swedish national legislations, with detailed requirements issued by the Norwegian Railway Authority (Statens jernbanetilsyn), and the Swedish Transport Agencies (Transportstyrelsen). The following legislation and regulations apply:

Norway:

- Railway Safety Regulation (Sikkerhetsforskriften FOR-2021-09-08-2740)
- Railway Act (LOV-1993-06-11-100) with associated regulations from the Norwegian Railway Authority (<https://lovdata.no>)
- Digital Securities Act LOV-2023-12-20-108 with associated digital security regulations FOR-2025-06-20-1131

Sweden:

- Railway Safety Act (2022:367)
- Railway Act (Järnvägs lag 2004:519) with associated regulations from the Swedish Transport Agency (<https://riksdagen.se/sv/dokument-lagar/>)
- NIS2 Directive (cybersecurity)
- Cybersecurity Act (2026, based on NIS2)

The Norwegian and Swedish railway authorities continuously monitor the safety performance, including Services delivered by Suppliers. The Suppliers must therefore confirm and describe the following requirements in Appendix 2, chapter 2.5.

The Supplier must:

- Ensure that the OneTrack Solution, all delivery activities, and associated processes remain fully compliant at all times with all applicable statutory, regulatory, and railway sector-specific requirements in Norway and Sweden.
- Give necessary support to the traffic safety assessment process, if the Customer engages an independent assessment body to oversee the activities.
- Ensure that unauthorised persons are prevented from gaining physical access to areas or buildings.
- Ensure that the facilities are suitable for the Cloud Services, hereunder servers, data centers and other facilities used for the Cloud Services are protected against damage, sabotage, theft and other malicious acts.

1.5.4 Infrastructure Management and Capacity Dependencies

Passenger rail services are dependent on railway infrastructure managed by the national infrastructure managers in Norway and Sweden. Decisions related to capacity allocation, maintenance and traffic management are outside the control of both Vy and the Supplier and have direct and significant operational consequences.

The structural characteristics of the railway infrastructure differ materially between the two countries. In Norway, approximately 90% of the railway network consists of single-track infrastructure, which significantly limits routing flexibility and makes overtaking, rerouting, and recovery from operational disruptions inherently challenging. Even minor deviations may propagate quickly and require coordinated replanning across timetable, rolling stock, and crew domains.

In contrast, large parts of the Swedish railway network are double track or equipped with greater passing capacity, allowing a higher degree of operational flexibility, including overtaking and rerouting during disturbances. While this generally improves operational robustness, it also increases complexity for cross border services, as different infrastructure logics and capacity characteristics must be managed consistently within shared operational plans.

These infrastructure related conditions constitute external dependencies that may affect Vy's service stability, recovery capability, and operational performance.

1.5.5 Complex collective agreements

Collective agreements governing railway operations in Norway and Sweden are highly complex, containing numerous detailed and sometimes ambiguous rules that make both crew planning and payroll calculation demanding. Payroll is not based solely on fixed hours, but on a combination of planned rosters, actual work performed, and extensive provisions for allowances and overtime. Even minor operational deviations, such as delays or disruptions, can affect start and end times, trigger overtime, and alter which variable supplements apply.

In Norway, limited system support increases uncertainty. For example, delay information is not always available beyond the final station and must therefore be entered manually by train drivers. At the same time, many allowance rules are hard coded in the current systems based on collective agreement logic, reducing flexibility and making the calculations difficult to interpret.

In Sweden, payroll builds on both fixed parameters from HR systems (such as employment rate and base salary) and dynamic inputs from planning systems, including scheduled and actual working time, overtime, and various supplements. These inputs are governed by rules that can differ significantly across agreements and employee groups. Payroll data is derived from baseline planning assumptions, planned changes, and adjustments reported retrospectively by employees and approved by managers. Overtime alone is divided into multiple categories — including general, delay-related, and settlement overtime — with further distinctions between simple and qualified overtime compensated either in time or pay, resulting in numerous coded variants governed by collective agreements. In addition, time balances (e.g. compensatory time and time banks) and day-based balances (such as vacation and other leave accounts) must be reconciled between planning and payroll systems, each governed by specific accrual and usage rules over varying time horizons. Together, these factors create a highly intricate and interdependent payroll landscape with significant operational and system dependencies.

1.5.6 Planning and cross-border dependencies

Passenger rail services depend on coordinated planning across multiple domains, including timetable planning, rolling stock management, crew planning, and maintenance planning.

Although planning principles are broadly similar in Norway and Sweden, differences exist in planning systems, data standards, and levels of digital integration. The Solution shall consider dependencies related to:

- Exchange of planning data between national domains
- Alignment of planning assumptions, parameters, and time horizons
- Continued reliance on manual coordination where system interoperability is limited

The OneTrack Solution shall reduce fragmentation and improve end-to-end planning coherence. However, until full interoperability is achieved, dependencies on national tools, legacy systems, and manual processes will remain in some degree.

The railway sector is transitioning towards a more flexible and long-term planning framework, including the management of Temporary Capacity Restrictions (TCR)¹, a planned, temporary reduction in railway infrastructure capacity. TCR management aims to minimize disruption, optimize capacity usage, and ensure reliable railway services during periods of infrastructure work.

The European initiative Timetabling and Capacity Redesign (TTR) aims to modernise capacity allocation and establish a harmonised European scheduling process. A new EU Regulation on rail capacity management is expected by 2026, and the future solution shall be capable of supporting compliance with such regulatory requirements.

1.5.7 The functional requirement specification

The functional requirements are set out in Appendix 1 – Attachment 2 – Functional requirements.

Vy refers to the Tender Instruction Document, Chapter 21, for further information regarding the categorisation of requirements. The requirement categories are also reproduced in the Instructions tab of the Functional Requirements Specification.

1.6 TECHNICAL CONTEXT AND REQUIREMENTS

1.6.1 Technical landscape and system principles

The target technical landscape is characterized by modern architectural principles, with API-first integration, event-driven data exchange and a clear separation between core planning and dispatching capabilities and external systems.

Data is consistent, structured and available in near real time, enabling effective operational execution, analysis, optimization and reporting. Configuration is favoured over custom development, particularly for business rules, to help minimize technical debt and reduce dependency on suppliers.

The Solution includes built-in capabilities for Monitoring, redundancy and recovery, strengthening operational resilience and continuity. The architecture supports a sustainable governance and lifecycle-management model, allowing predictable upgrades, secure operation and ongoing functional and technical improvements in line with evolving business needs.

1.6.2 Target architecture and system responsibilities

Vy's target technical architecture positions the OneTrack Solution at the core of the technical ecosystem, with the Service Platform serving as an insulating and integration layer between OneTrack and the surrounding systems.

As part of the target architecture, the OneTrack Solution will consume data from a range of external sources. This includes, among others, approved long- and short-term timetables

¹ Annex VII of Directive 2012/34/EU

from infrastructure managers, rolling stock master data from Rolling Stock Keepers, and topology master data from infrastructure managers.

Vy follows an API-first principle, meaning that services and applications are designed with robust, well-defined APIs as the primary interface for all functionality and data exchange, with strong emphasis on documented, versioned, and secure interfaces. Vy does not mandate a single internal integration pattern; instead, the choice of integration approach is driven by the functional requirements of each specific integration. As a result, both synchronous and asynchronous interaction patterns are used across the technical ecosystem, with event-based integration patterns playing a dominant role, particularly in operational contexts.

The target architecture aims to minimize the number of direct integrations between the OneTrack Solution and external data sources. Instead, dedicated services are established on the Service Platform to consume upstream data and expose this data in a standardised manner for consumption by downstream systems, including the OneTrack Solution.

This design reduces the coordination complexity between external actors required to meet Vy's needs and establishes a clear separation of concerns. It also ensures that Vy assumes responsibility for complying with external stakeholders' standards, formats, and interface requirements. As a result, the Supplier of the OneTrack Solution is shielded from the heterogeneity of external implementations and can focus on a limited, stable, and well-defined integration surface aligned with Vy's internal architectural standards.

Vy's Service Platform enables the distribution of data to a wide range of downstream consumers in a fit-for-purpose and controlled manner, overcoming limitations in legacy systems used for planning and operational control of timetables, rolling stock, and crew. The principles underpinning the Service Platform are foundational to the development of Vy's future technological ecosystem. As the OneTrack Solution is positioned at the core of Vy's operations, it will act as a primary producer of data, supplying services and applications on the Service Platform and, by extension, all downstream consumers connected to it.

This architecture implies that the future OneTrack Solution may be fully insulated by the Service Platform, with no direct integrations to external data sources or consumers. Specific architectural requirements, message contracts, and integration patterns shall be defined and agreed during the Design phase. In this phase, each information domain and integration will be evaluated to determine whether it should be mediated through the Service Platform or whether a direct integration between the OneTrack Solution and a given producer or consumer is justified. The architecture diagram (figure 6) below illustrates this concept by presenting examples of information producers, services hosted on the Service Platform, and consumers of this information. In the target architecture, the future OneTrack Solution will both consume data from and produce data to the Service Platform.

It is important to note that the architecture diagram shown in **Error! Reference source not found.**figure 6 represents a proposed target architecture intended to illustrate the overall concept. As such, it is subject to further refinement and change as the design is elaborated and validated.

To get a better overview of all services which are a part of the Service Platform, see detailed description in Appendix 3, chapter 3.2.6.

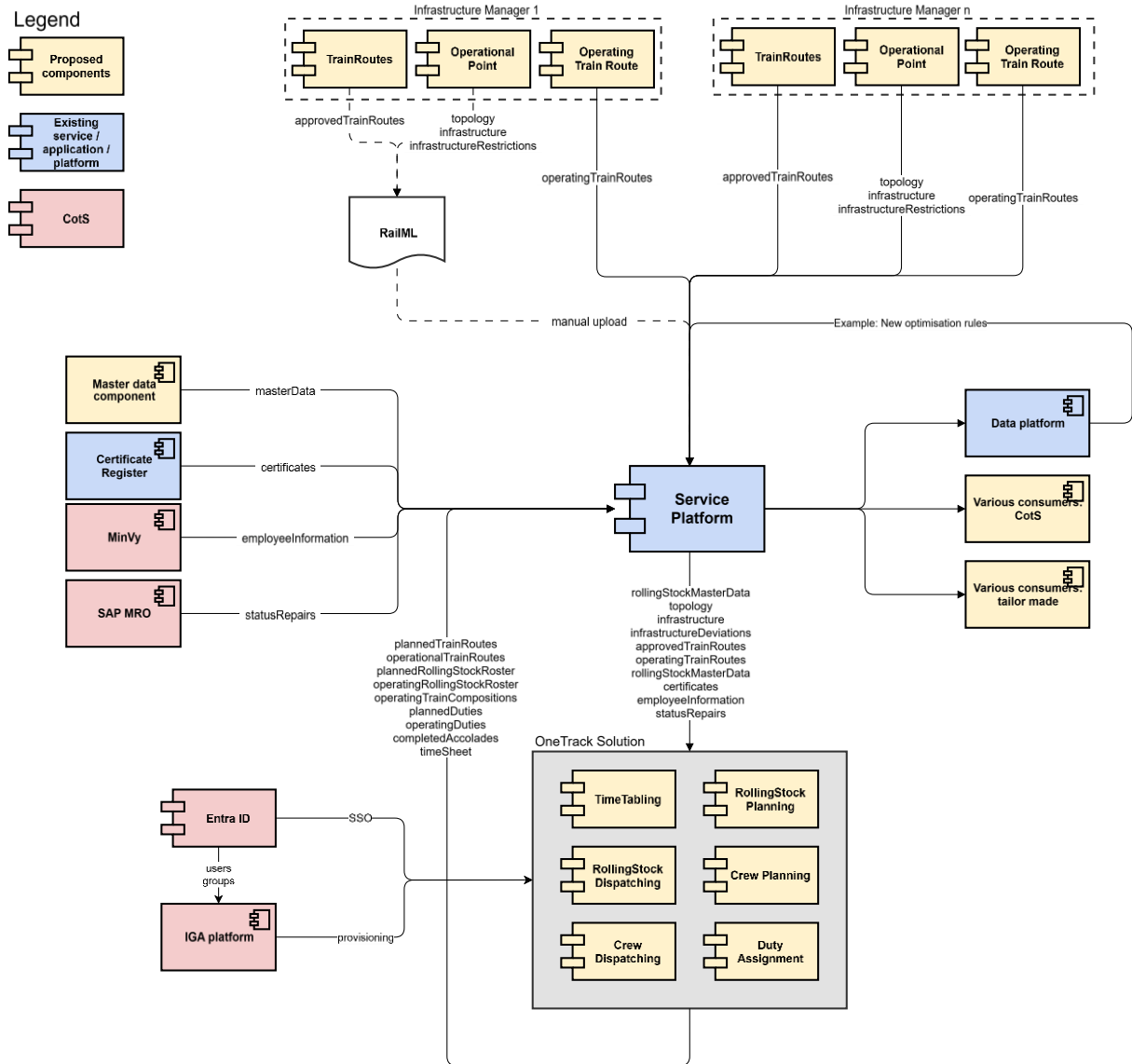


Figure 6: Target architecture

1.6.2.1. Positioning and Responsibilities of the OneTrack Solution

This chapter outlines the proposed functional and architectural responsibilities of the OneTrack Solution within the suggested target technical architecture. The objective is to establish a clear separation of concerns between domain functionality, enterprise integration, and external data exchange. In line with this objective, the OneTrack Solution is positioned as the authoritative domain system for production planning and operational control of passenger train services. Its proposed responsibilities and limitations are defined below.

Domain Responsibility and System of Record

In the target architecture described in chapter 1.6.2, the OneTrack Solution is the authoritative system of record for:

- Long-term, short-term, and operational timetabling
- Rolling stock allocation and operational control
- Crew planning, allocation, and dispatching
- Operational adjustments and deviation handling within the planning domain
- Lifecycle management of planning objects and operational entities

Furthermore, the OneTrack Solution shall ensure that planning and operational data is structured, consistent, and accessible for integration and reporting purposes.

The OneTrack Solution shall not assume responsibility for enterprise master data outside the defined planning domain, nor for business processes explicitly excluded from scope in chapter 1.3.2.

Architectural Boundaries

In the target architecture, the OneTrack Solution has the following architectural boundaries:

- The OneTrack Solution is implemented as a domain platform within Vy's broader technical landscape and is not positioned as an enterprise-wide integration hub.
- Vy's Service Platform remains the primary integration and distribution layer for cross-domain data exchange and for distribution of data to downstream consumers and external stakeholders, unless otherwise agreed during the Design and Specification phase.

This separation of responsibilities ensures:

- Clear ownership of domain functionality within the OneTrack Solution.
- Clear ownership of enterprise integration, data harmonization, and external distribution within Vy's architectural governance model.
- Reduced architectural complexity and improved long-term maintainability.

1.6.2.2. Integration Principles

In the target architecture, the OneTrack Solution follows these integration principles:

- Provide well-documented, versioned, and secure APIs.
- Support both synchronous and asynchronous integration patterns.
- Enable event-based data exchange where relevant for operational contexts.
- Ensure use of standard mechanisms wherever possible.
- Integration via Vy's Service Platform wherever suitable.

In specific cases, direct integrations between the OneTrack Solution and other services or systems may be established where this is functionally justified and agreed during the Establishment phase.

Functional descriptions of proposed future integrations are described in Appendix 1 - Attachment 5. Vy refer to Appendix 4, chapter 4.2.3 for details about roles and responsibilities regarding establishing the identified integrations.

1.6.3 The Technical requirement specification

The technical requirements are set out in Appendix 1 – Attachment 1 – Technical Requirements. The requirements set out in Chapter 7 are covered by the Technical requirements specification.

Vy refers to the Tender Instruction Document, chapter 21, for further information regarding the categorisation of requirements. The requirement categories are also reproduced in the Instructions tab of the Technical Requirements Specification.

1.7 OBLIGATIONS IN EVENT OF TRANSFER AND/OR TERMINATION

1.7.1 Transfer to a new supplier

In case of transfer of Cloud Services to a new Supplier these requirements apply, cf. the General Terms clause 2.4.5.

The Supplier must:

- Provide complete exports preserving schema, metadata, and referential integrity, including mapping of attachments/blobs to records.

- Support open, machine-readable export formats: e.g. CSV (tabular), JSON (hierarchical/logs), XML (config/records), and Parquet or ORC for analytical datasets.
- Deliver a documentation set at transfer that contains current architecture diagrams; configuration baselines; data models; integration/API specifications; event/webhook schemas; job schedules; known limitations; security hardening notes.
- Deliver structured knowledge transfer (live + recorded) covering runbooks, Monitoring/alerting, troubleshooting, and integration operations to the Customer.
- Make named experts as defined in Termination Plan reasonably available for up to 6 months post-transfer on agreed rate cards not exceeding standard professional-services rates.
- For at least 30 days after transfer; keep the environment accessible in read-only mode to permit validation, evidence capture, and re-export, unless prohibited by law or the Customer instructs earlier deletion.
- Upon Customer instruction and after the read-only period, securely delete all Customer Data (including backups as retention expires) and provide a signed deletion certificate including evidence of media retirement schedules.

Transfer Service Levels must be agreed in the Termination Plan (deadlines for exports, documentation, and handover).

1.7.2 Termination of the Cloud Service for convenience

In case of Termination of the Cloud Services, cf. the General Terms clause 4.2.3, the following requirements apply:

- The Supplier shall maintain a Termination Plan defining the governance, responsibilities, dependencies, and exit service levels required for the transition of the Cloud Service.
- The Supplier must provide complete data exports that preserve schema, metadata, and referential integrity, including clear mapping of attachments/blobs to their corresponding records.
- The Supplier must support open, machine-readable export formats, including CSV (tabular data), JSON (hierarchical data and logs), XML (configuration and records), and Parquet or ORC for analytical datasets.
- The Supplier must deliver a comprehensive exit documentation package that includes current architecture diagrams, configuration baselines, data models, integration and API specifications, event and webhook schemas, job schedules, known limitations, and security-hardening notes.
- The Supplier must provide structured knowledge transfer to the Customer, both live and recorded, covering runbooks, Monitoring and alerting, troubleshooting, and integration operations.
- The Supplier must make named experts, as defined in the Termination Plan, reasonably available for up to six (6) months post-Termination at agreed rate cards not exceeding standard professional-services rates.
- The Supplier must maintain the environment in read-only mode for at least thirty (30) days after Termination to allow validation, evidence capture, and re-export, unless prohibited by law or the Customer instructs earlier deletion.
- The Supplier must securely delete all Customer Data, including backups as retention periods expire, upon Customer instruction and after the read-only period, and must provide a signed deletion certificate with evidence of media retirement schedules.