Welcome to the Europe's Rail DAC Info Session

February 22nd, 2024

13:00 – 14:00 CET

Agenda

1	**Welcome and Introduction**	13:00 – 13:05
2	**100 Pre-deployment trains - The bigger picture**	13:05 – 13:10
3	**Objectives and Scope**	13:10 – 13:15
4	**Phasing and Planning**	13:15 – 13:20
5	**Project Structure**	13:20 – 13:25
6	**Next Steps**	13:25 – 13:30
7	**Question and Answers**	13:30 – 14:00

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The challenges for EU rail freight

Capacity

+ 50% rail freight

- 55% GHG emissions

by 2030

from bottleneck
to green backbone

Productivity

from manual
intervention
to automation

Quality

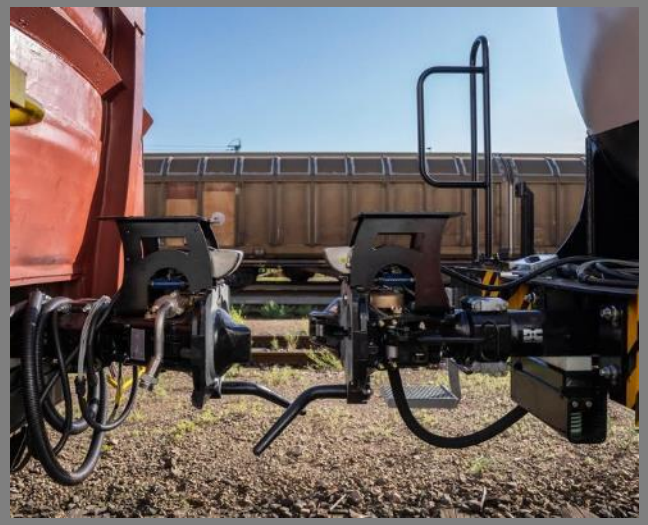
from paper
to digital

Processes today – and tomorrow

manual freight wagon coupling

Courtesy of ÖBB

automatic freight wagon coupling



mechanical, pneumatical, energy & data coupling

Courtesy of DAC4EU consortium

DAC core system & applications (Full Digital Freight Train Operations)

benefits =

gains in the processes (time, system time, cost savings, capacity, reliability, quality, safety)

+ induced modal shift

DAC core system

- **Automated coupling & manual uncoupling and digital backbone**
- **Recording of train composition**
- **Automatic (in-train** and remote**) uncoupling**
- **Heavier & longer trains (within existing infra limitations)**
- Increased payload
- Increased speed via improved longitudinal forces

DAC shunting

- Automated parking brake
- Rear view camera for train driver
- Proximity detection
- Sound signals when train in motion

DAC train preparation

- **Automatic brake test & calculation of brake capacity**
- Automated technical wagon inspection

DAC train run

- **Train integrity**, enabling ETCS L3 moving block operations
- Increased speed via better braking performance
- Multiple loco traction and trains up to 1500m
- Derailment detection

DAC telematics (wagon & goods monitoring)

- Predictive / preventive maintenance
- detection of cargo condition
- Cargo surveillance, intrusion alarm
- Wagon data & loading information on mobile device

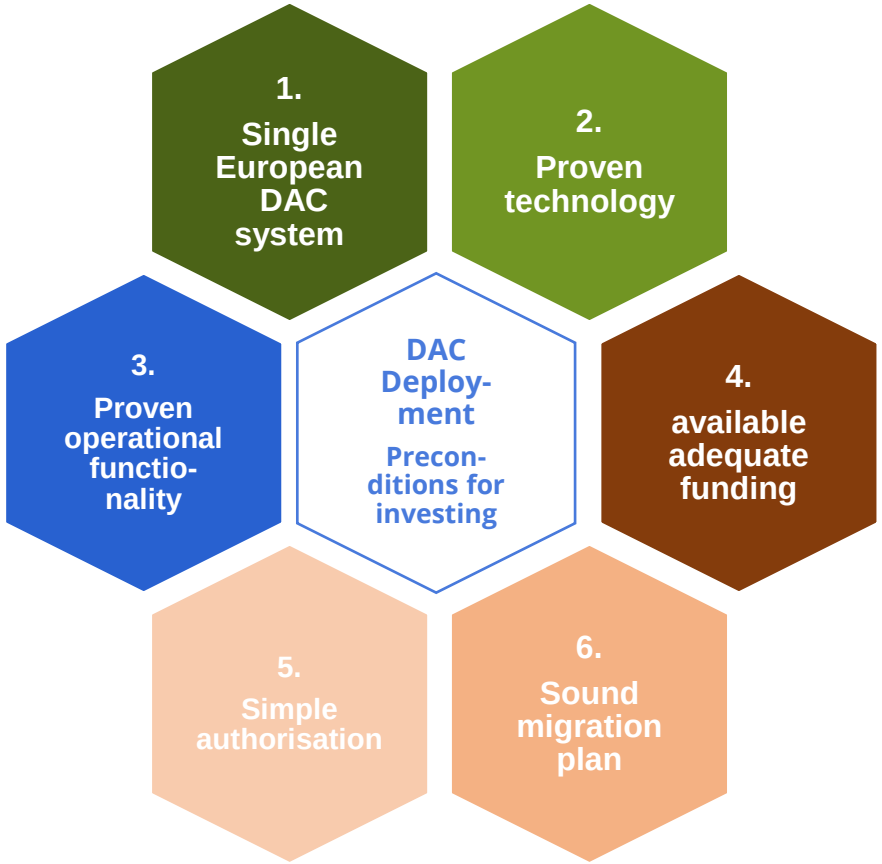
DAC loading & unloading

- Automatic loading/unloading processes (replacement of hydr/pneum components, electro-mechanical actuators for bridge plates, automated cargo securing, heating elements for defrosting, …) via ext. energy supply
- illumination for worker's safety & interior

red colour = components of the DAC basic package (only those use cases are linked to the pre-deployment trains)

Preconditions for investing in DAC deployment

(= everything that needs to be proven before investment decisions will be taken)



1. DAC-Technology (incl. additional DAC based technology) and DAC-operations/ functionalities are clearly defined (tech. package) and **harmonised (Single European DAC System)**
2. The **technology** meets all essential requirements - in particular in the area of RAMS (reliability-availability-maintainability-safety/security) - proven through large demonstrations
3. The **operational functionalities/use cases** bring the expected benefits - proven through large demonstrations incl. safety aspects
4. Positive **CBA incl. adequate funding programs** (by EU and MS) are made available and guaranteed
   - to all European wagon and locomotive operators (RU) and keepers (as they will have to invest)
   - in order to generate positive business cases in a maximum 10y perspective
   - considering the individual/regional conditions such as the cases where upgrading is not possible/feasible
5. Simple, tailor-made **“fast-lane” authorisation** procedures are available & authorization risks are mitigated **procedures** for wagons and locos (incl. availability of relevant documentation)
6. A **sound migration plan** is set, guaranteeing simultaneous deployment in Europe (sector agreement and legal framework) based on available and adequate funding programs, established capacities for production and upgrading of wagons and locomotives, staff training, and availability of the necessary infrastructure and IT adaptations

All DAC-related activities

Europe's Rail Flagship Project 5	EDDP	EC/ERA	Europe's Rail System Pillar	ESOs
	Stakeholder Management			

FP5TRANS4M-R

DAC migration roadmap

DAC/"Full Digital Freight Train Operations"

target operat. proc.
functional requ'mts
system architecture
tech. development
testing & demos
tech. specification
authoris. dossiers

FP 5 FDFTO sounding boards

Technology (mirroring & sector feedback)

Operational Procedures (mirroring & sector feedback)

Fleet Analyses & rtf Engineering (rtf readiness)

Infrastructural & IT adaptations

Placing into service plan (safety, workforce training, rulebooks etc.)

Retrofit capacity plan (workshops, work-force, components)

Retrofitting plan

(traffic & customer sidings analysis, operational plan)

Funding & Financing plan

CBA (updates)

Investment plan & procurement framework plan

Other regulatory & legal framework plans

development of efficient & suitable authorisation process & requirements

preparing TSI drafts for the EC

TSI revision

Operational procedures standardization (plan & execution)

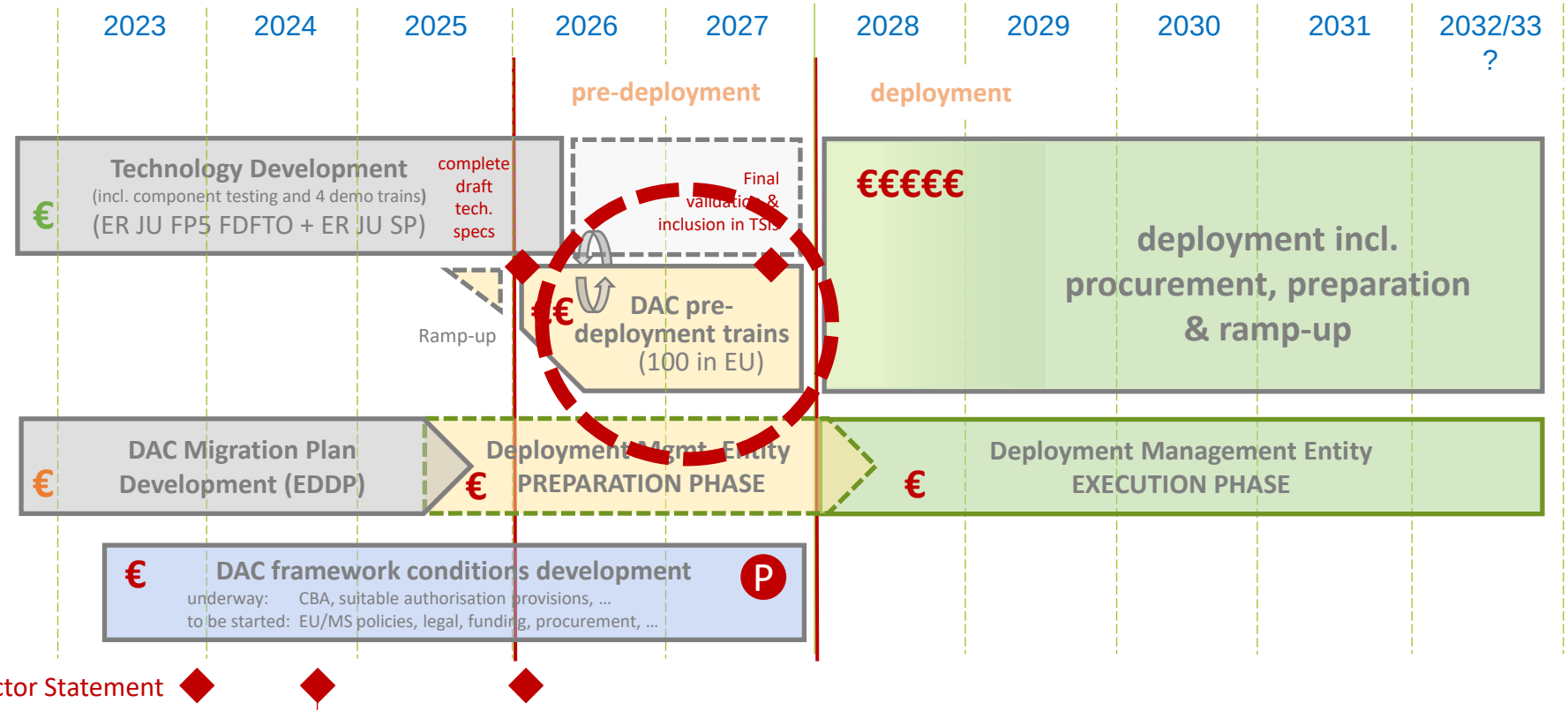
Technical harmonisation: preparing inputs for ERA TSI drafting process & driving EU standardisation

Alignment of rail & DAC system architecture

Executing European standardisation

Operating "100" DAC pre-deployment trains

The DAC General Master Plan 01 [June 2023]



DAC Legal Package:
TSIs final (technical + migration + operations)
Deployment Management Entity Deployment Funding Instrument
Suitable authorisation provisions

Major amendments/NEW:

- DAC pilot deployment projects
- DAC framework conditions development
- Deployment Management Entity

€ Budget and resource need (already funded)

€ Budget and resource need (currently mainly unfunded)

P Determining milestone:
DAC Legal **P**ackage to be implemented before this deadline

existing
to be prepared

Request for expression of interest for 100 pre-deployment trains

Giorgio Travaini – Executive Director a.i.

SENT BY E-MAIL ONLY TO:
EU-Rail GB members
EU-Rail SRG members
DAC list of National Contact Points in EU MS
EDDP Programme and Supervisory Board

SUBJECT: **Request for expression of interest to be part of a possible large-scale testing of 100 DAC pre-deployment trains in Europe (2026-2028)**

The Europe's Rail Joint Undertaking (EU-Rail) invites the European Rail Freight Sector, its Customers and other stakeholders to openly **express their interest** to be part of the needed phase of large-scale testing of DAC technology (Digital Automatic Coupling for freight trains incl. DAC based applications) in **100 pre-deployment trains** according to the DAC General Master Plan 01 (see below).

The reasons why a large-scale DAC testing and the pre-deployment phase is needed

DAC technology will be an essential game changer in the European rail freight transport. It will already be quite mature after the technological validation in the R&I activities of the ongoing EU-Rail Flagship Project 5 (in labs and through demonstrator trains). But, in order to successfully implement it in Europe and in line with the preconditions for DAC deployment set out by the European DAC Delivery Programme (EDDP) enabled by EU-Rail, it is necessary to allow **sufficient time and resources for successful testing on a large scale of this technology**.

The foreseen testing in different European regions is intended to **prove functionality, reliability, availability, performance and added value of DAC in real-life operation.** Sound and robust future investment decisions for the entire European Rail Freight Sector can only be based on feedback on how DAC applications perform in daily operation in different environments, geographical areas and operational conditions across Europe over a longer time.

A succesful full-scale transformation requires a successful pre-deployment phase first

To gather **statistically significant and sufficient information** and data to represent European freight traffic, long-term tests with a number **of around 100 DAC pre-deployment trains** are required. They are foreseen to operate for approximately two years throughout Europe, collecting important findings on technical challenges, regional specificities and use in different operational scenarios, added value for customers, and for potentially gaining cross-border experience.

This number is a preliminary statistical sample size that is considered sufficient to deliver the needed confidence level for low error rate in later full-size deployment, allowing 40 000 train trips in 2 years for a „population size" of around 5 mn. train trips/year in Europe. An authorisation strategy (whether at Member State or EU level) for safe in-service testing is currently under development.

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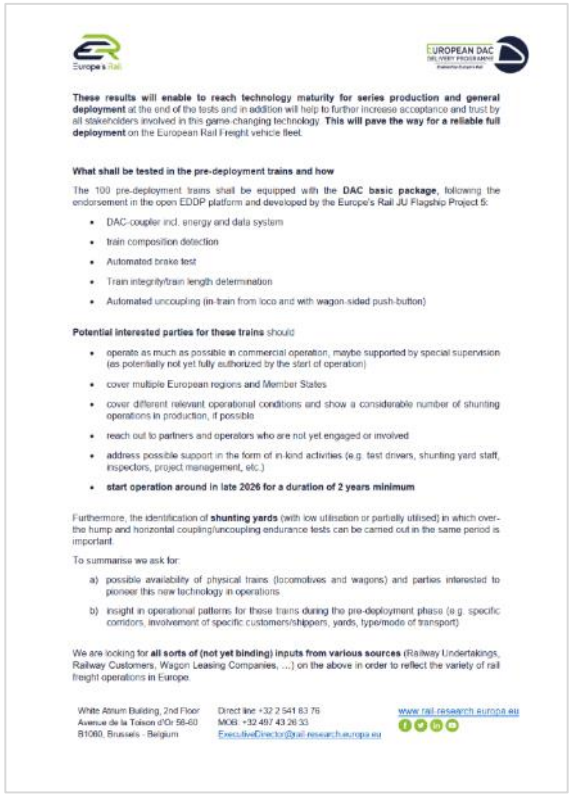

These results will enable to reach technology maturity for series production and general deployment at the end of the tests and in addition will help to further increase acceptance and trust by all stakeholders involved in this game-changing technology. **This will pave the way for a reliable full deployment** on the European Rail Freight vehicle fleet.

What shall be tested in the pre-deployment trains and how

The 100 pre-deployment trains shall be equipped with the **DAC basic package,** following the endorsement in the open EDDP platform and developed by the Europe's Rail JU Flagship Project 5:

- DAC-coupler incl. energy and data system
- train composition detection
- Automated brake test
- Train integrity/train length determination
- Automated uncoupling (in-train from loco and with wagon-sided push-button)

Potential interested parties for these trains should:

- operate as much as possible in commercial operation, maybe supported by special supervision (as potentially not yet fully authorized by the start of operation)
- cover multiple European regions and Member States
- cover different relevant operational conditions and show a considerable number of shunting operations in production, if possible
- reach out to partners and operators who are not yet engaged or involved
- address possible support in the form of in-kind activities (e.g. test drivers, shunting yard staff, inspectors, project management, etc.)
- **start operation around in late 2026 for a duration of 2 years minimum**

Furthermore, the identification of **shunting yards** (with low utilisation or partially utilised) in which over-the hump and horizontal coupling/uncoupling endurance tests can be carried out in the same period is important.

To summarise we ask for:

a) possible availability of physical trains (locomotives and wagons) and parties interested to pioneer this new technology in operations

b) insight in operational patterns for those trains during the pre-deployment phase (e.g. specific corridors, involvement of specific customers/shippers, yards, type/mode of transport)

We are looking for **all sorts of (not yet binding) inputs from various sources** (Railway Undertakings, Railway Customers, Wagon Leasing Companies, ...) on the above in order to reflect the variety of rail freight operations in Europe.

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The EDDP will use the received input to assess the contribution to the overall objectives of the deployment programme (e. g. a variety of operational patterns, trains, wagons and regions) and build the definitive pre-deployment plan, including scope, detailed planning, type of rolling stock and budget. It will also determine the vehicle types (in particular locos) to be analysed in context to retrofittability and to be prepared in first priority for DAC upgrade/retrofit.

Your benefits for being a pioneer and operating/using DAC pre-deployment trains

Operating DAC pre-deployment trains brings you in early touch with this technology before its is fully rolled out. You will have the possibility to optimise its integration into your operations to gain best efficiencies and to give feedback on its operational and technical handling, especially for your staff, if improvement should be needed. You will be able to gain an advantage in shaping your future freight train operations best to your needs and to become, together with your customers, innovation frontrunner to early optimise and secure your future business.

The received input will also be used to clarify the budget needed for these trains, as funding for the pre-deployment phase is not secured yet. A list of „train candidates" and interested players are indispensable to support the identification of the next steps, including possible funding/financing aspects. EDDP will encourage collaboration among participants and experts to foster knowledge sharing and collective problem-solving.

We kindly ask you to come back **until 29 February 2024** to the coordinating EDDP programme under

info-DAC@rail-research.europa.eu

with an expression of interest from your side to operate pre-deployment trains

If possible until then, please indicate

- one contact person per company
- Number or trains envisaged
- Type/description of operating train patterns and modes
- all potential related questions you might have

This request is addressed to the entire European Rail Freight Sector including its customers and is transparently published on the EU-Rail EDDP website for any interested stakeholders to answer.

We are looking forward to all your feedback which we will thoroughly discuss with you in Q2/2024.

Qualified electronic signature by:
GIORGIO TRAVAINI
Date: 2024-01-16 18:21:33 +01:00

Enclosure.: Background - The DAC General Master Plan 01

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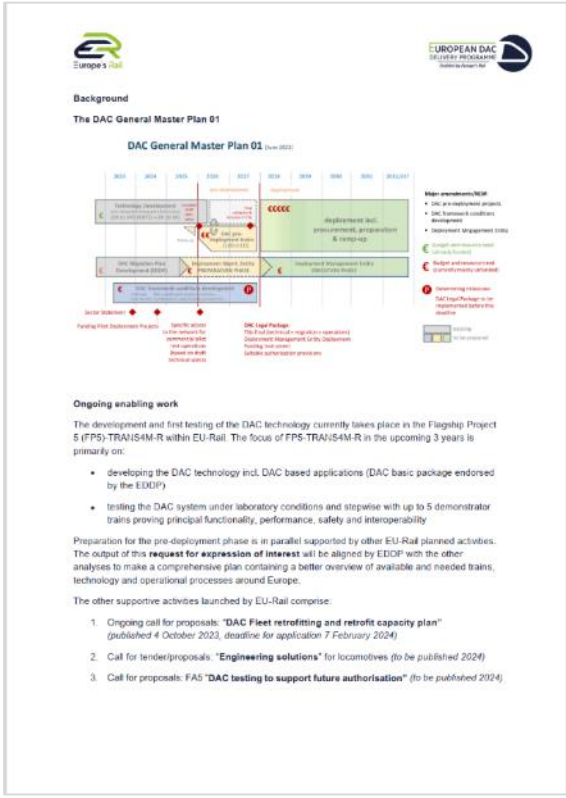

Background

The DAC General Master Plan 01

DAC General Master Plan 01

Ongoing enabling work

The development and first testing of the DAC technology currently takes place in the Flagship Project 5 (FP5)-TRANS4M-R within EU-Rail. The focus of FP5-TRANS4M-R in the upcoming 3 years is primarily on:

- developing the DAC technology incl. DAC based applications (DAC basic package endorsed by the EDDP)
- testing the DAC system under laboratory conditions and stepwise with up to 5 demonstrator trains proving principal functionality, performance, safety and interoperability

Preparation for the pre-deployment phase is in parallel supported by other EU-Rail planned activities. The output of this **request for expression of interest** will be aligned by EDDP with the other analyses to make a comprehensive plan containing a better overview of available and needed trains, technology and operational processes around Europe.

The other supportive activities launched by EU-Rail comprise:

1. Ongoing call for proposals: "**DAC Fleet retrofitting and retrofit capacity plan**" *(published 4 October 2023, deadline for application 7 February 2024)*
2. Call for tender/proposals: "**Engineering solutions**" for locomotives *(to be published 2024)*
3. Call for proposals: FA5 "**DAC testing to support future authorisation**" *(to be published 2024)*

› *EU-Rail Letter sent/published on 17/01;* ***replies requested until 29/02***

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Why large-scale testing and a pre-deployment phase is needed

Three objectives:

1 Ensure full reliability of the DAC technology

- Test DAC technology in commercial operations
- Assess the validity of assumptions developed in EDDP (Migration) / FP5 (Design)
- Assess technology integration by collaboration with FP5 technology providers and suppliers of existing assets

2 Prove added value and optimise EDDP processes for full DAC roll-out

- Gather information for full-scale deployment and roll-out
- Learn and develop. Create a steppingstone towards full DAC deployment
- inform and communicate with stakeholders

3 Ensure smooth integration of DAC into the overall railway system

- Ensure (mass) authorisation provisions can effectively be applied
- Test interchangeability/broad interoperability with other digital systems on trains, tracks and central IT systems
- Assess operational rules effectiveness

Functions and components considered within the pre-deployment trains

The 100 pre-deployment trains shall be equipped with the **DAC basic package**:

- DAC coupler incl. energy and data system
- train composition detection
- Automated brake test
- Train integrity/train length determination
- Automated uncoupling (in-train from loco and with wagon-sided push-button)

coupler with mechanical or push-button uncoupling from wagon side and including "prevent coupling" function

- *(Hybrid coupler for locos and DAC for special wagons, e. g. T3000 – if applicable)*

For successful piloting in commercial operations, we are looking for …

- A balance between different involved European regions and Member States
- A mix of different operational conditions (with considerable number of shunting operations, if possible)
- Different Loco and wagon types
- Partners and operators from the whole sector (especially those not yet engaged or involved!):

  RUs, wagon & loco keepers, rail freight customers, leasing companies, IMs/shunting yard operators, shunting service providers, maintenance providers, …

- **Enthusiastic frontrunners**

Pre-deployment trains should …

- **operate as much as possible in commercial operation**, maybe supported by special supervision (as potentially not yet fully authorised by the start of operation)

- **start operation around in late 2026 for a duration of around 2 years**

Your benefits as pioneer for DAC pre-deployment trains

- Operate DAC technology before it is fully rolled out
- Optimise its integration into your operations to **gain best efficiencies**
- Give feedback for **improvement** of operational and technical handling, **especially for your staff**
- **Gain an advantage** in shaping your future freight train operations best to your needs
- Become, together with your customers, innovation frontrunner to early optimise and **secure your future business**.

- Your feedback will also clarify the budget needed for the pre-deployment phase

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PRELIMINARY

100 Pre-deployment Trains Project - Phasing

PHASE I (2024-2025)

Preparation

Including finishing the preconditions before start of PHASE II

- Financing and funding conditions
- Stable technical solutions (TRL 6+)
- Authorisation
- Training
- Rolling stock and infra readiness

- ERJU (FP5; SP/Task4) deliverables, including additional calls

GO/NO GO

PHASE II (2026-2028)

Operation

With specific focus on…

- Operational scope, geographies, type, …
- Maintenance, repairs, etc.
- Upgrading and updating
- Monitoring + follow-up / accompanying of operations by FP5
- Procedures / interaction with customers for such special operations

PHASE III (2026-2028)

Evaluation

Check "intended vs. delivered".

Will be done mainly by FP5 for tech and operational useability and by the "project"/EDDP for the other parts, e.g. retrofit ability.

GO/NO GO

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For successful testing in commercial operations, we will offer…

- A centralised project structure and programme/project management, following EDDP structure
- Involvement of all participating companies
- Best practice exchange among participants and experts (knowledge sharing, collective problem-solving)
- Expertise support and stakeholder management
- Central alignment with technology providers & on operational rules effectiveness, authorisation, …
- Public Relations Support
- Interaction with ERA, EC, NSA's,…

Note: subject to financing and funding and sufficient participants

Funding & Financing for Pre-Deployment Trains

- Currently, there is no funding available for the large-scale testing
- Investigations have started on European budgets (e.g. CEF) and national funds
- Interested parties shall nominate, together with the potential train candidates, the required financing and funding

- **A substantial list of train candidates is a precondition for an ambitious plan for financing and funding**

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100 Pre-deployment Trains Project – Next steps

1	▪ **Reply to the „Expression of interest“ letter sent by EU-RAIL on January 17** ▪ **info-DAC@rail-research.europa.eu**	**Extended to mid March 15/03/2024**
2	▪ Consolidation of candidates (companies) and train types ▪ Refinement of 100 Trains concept and scope	Until mid April
3	▪ Project initiation charter to be co-developed with participating entities	Until end of May
4	▪ Project structure to be formalized and staffed; pre-conditions to be fulfilled	Until end of June

To summarise

- We are working on technology, test preparation, migration plans, etc.
- We need, in the next phase, **pilots in commercial operations across Europe** to prove the assumptions and to take the step towards full deployment

Therefore we need:

- Participants, information about trains, operations, vehicles, …

  to further prepare for this phase (funding and financing, testing,…)

… to achieve the final objectives of

- Making you more competitive in rail freight business
- Provide better working conditions for (shrinking number of) staff
- Contribute to the Green Deal

Are you interested to join?

- **For further questions, information and expression of interest:**

  info-DAC@rail-research.europa.eu

- Join the EDDP work packages and sounding boards:

  https://ec.europa.eu/eusurvey/runner/DACIdentificationGridforOperation

Europe‘s Rail DAC Info Session

February 22nd, 2024

13:00 – 14:00 CET

We are also looking for special testing environments

- **Sidings of different sizes** (from single-track to extended siding networks, e. g. chemical, automotive or steel plants)
- Stations using **own wagons for local use**
- **Separable sub-networks**

- Unloading by strong **magnet crane** (effect on electronic equipment)
- **Overhead gravity unloading**
- Very quick **heating of frozen bulk cargo** in winter
- **Permanent exposure to heat** (e. g. waiting close to a furnace)

- **Very heavy trains** close to structural durability, e. g. ore trains
- **Corrosive** environment, e. g. transporting salt
- **Dusty** environment with effect of dust on e. g. pneumatic couplers and e-couplers (e. g. concrete, coke, dust)
- **ATEX** transports

- **Effects of long periods out of service**: Functionality after long time without coupling and energy provision
- **(Vandalism)**