



PODS4RAIL

# Annual Activity Report 2024



# Annual Activities in 2024

## General

The Pods4Rail project aims to achieve the vision of a rail based fully automated supermodel mobility system for passengers and goods, which is standardised, scalable and suitable for all transportation modes, as set out in ERRAC's "Rail Strategic Research and Innovation Agenda" of December 2020. The introduction of a disruptive concept as intended in the Pods4Rail project, which aims a stronger connection between the individual transport modes, will require a change in the behaviour of the users.

The idea of a passenger cabins (Transport Unit) that can be booked and used individually, and which can collect the passenger directly from the front door and take the person to the desired destination without changing the vehicle is a clear increase in comfort. Such a system would make the ownership of private vehicles obsolete, reduce the required parking space for cars and thereby make the use of public space more sustainable. In freight transport, which is already partially intermodal, the pod system could provide new impetus in on-demand transport, particularly in general cargo or parcel logistics. Another aim of the system is to make operation more cost-effective and efficient on the one hand through autonomous, lighter vehicles. The concept of carriers as "moving infrastructure" being in use most of the time can also help to reduce the number of vehicles and increase the efficiency of the railway system. The challenge for the project lies in developing the appropriate solutions and in addressing the new needs in existing transport regulations.

The project Pods4Rail, which started in September 2023 with 15 partners from 7 EU countries, presented the first results in December 2023 and is constantly publishing the results of the continuous work on its project homepage <https://pods4rail.eu/>.

## Continuous work in the work packages

In 2024 the analysis of the existing safety framework and compilation of the presumably relevant safety requirements could be finalised (D3.2). It was found that due to the supermodal approach, not only standards and regulations from the railway sector have to be taken into account, but also those of other means of transport, such as road transport or cable cars. The intended design of the transport units, which are basically swap bodies or containers, results in open aspects in the set of standards.

Also, the Use Cases were defined, which result in a wide range of usage and design options for the transport units (D4.1). More than 20 use cases were identified and described, and an example system use case "transport in rural areas" was derived.

The results shows that mainly three kinds of transport solutions have to be considered for Pod systems. Passenger transport Use Cases such as premium and individual transport services are highly relevant, since they can offer new services and better comfort for several user groups. For freight transport and combined (passenger and freight) transport, Pod systems offer new solutions for more effective, flexible freight transport and also for specific event-driven Use Cases.

Within a “SWOT analysis” an analysis of the strengths, weaknesses, opportunities, and threats of the autonomous Pod system for passenger and freight transport were done (D4.2). The SWOT analysis was accompanied by a public survey. Questions were asked about two scenarios for Pod application to identify the preferences of different user groups. The survey distinguished between two target groups. The first was general public transport users and the second target group was users from the logistics sector. Both surveys are based on the use cases presented and analysed in D4.1. The SWOT analysis identified the potential benefits of the Pod system, such as energy efficiency and door-to-door service for passengers. The results of the passenger and freight transport surveys highlighted the importance of safety and flexibility in implementing the Pod system. The surveys indicated a preference for public Pods over private Pods, with a focus on the flexibility of the system and safety measures.

To determine the economic boundary conditions for the realization of the proposed supermodal system, an estimation of economical effort was carried out (D4.3). The results provide an initial overview of the socio-economic parameters that influence the development of a Pods system and the extent to which these parameters will be affected by this new system. Due to the lack of information about the necessary system components and the costs of the system to be developed, the determination of the costs was carried out as a qualitative estimate of the impact and an approximate specification of boundary conditions for the implementation of the Pods system. For the sake of comparison and an overall estimate of the absolute amount of funds required, the costs of current transport systems are quantified at current prices as much as possible. The scenarios for freight and passenger transport assessed gave a first indication of costs of current transport systems as a boundary condition under which the Pods system should operate. A more precise comparison of the existing modes of transport with the newly planned inter-modal system will only be possible at a later stage of the project, when parameters of the system have been specified in more detail.

As a first step towards technical implementation, a high-level functional requirements specification was developed (D4.4). It represents a foundation for the Pods System concept and design specification of involved components or subsystems as to be prepared in the following work packages. For the specification process conducted by the project partners the outcome of the use case and cost evaluation performed was considered. In total, around 500 high-level functional requirements in 11 system areas were identified and specified.

In a next step the Generic Business Case Elements (D5.1) and Business Case Study for selected Use Cases (D5.2) were carried out. Main outcome of D5.1 was the development of various potential Business Cases for Pod Systems in both passenger and freight transport, relevant for different stakeholders. An initial evaluation of the economic and technical feasibility offered a preliminary insight into the viability of Pod Systems. Crucially, assessments by project-external experts from Trafikverket highlighted the potential of Pods4Rail.

Within the comprehensive Business Case study of different transportation and mobility services for Pod Systems (D5.2) a selection of a wide range of scenarios from manufacturing to service deployment were worked out which covers different Business Models within the public transport sector. The aim of the study was to evaluate a variety of specific Pods4Rail Business Cases for target customer markets with regards to Use Cases to increase efficiency and sustainability in the mobility sector.

The Concept Proposal for the System (D7.1) will also be completed by the end of the calendar year 2024. Within the concept proposal for the Transport Units (Vessels), 3D models will show the general structural design of the Transport Units. Also, the required power and energy of the HVAC system in the Transport Units are analysed under various boundary conditions. Based on these results, an initial specification of the energetic parameters of the energy storage systems required in the Pod is made. Furthermore, energy transfer concepts between the Pod system and the carrier are considered. To ensure compatibility and interoperability between transportation modes, a comparison of concepts for coupling (docking) will be carried out and a definition of the necessary interfaces between vessel (pod) and carrier developed. Based on the Use Cases defined in D4.1, essential modules for operating vessels, such as interfaces, traffic coordination, logistic network, communication, etc. are defined. The output will be a concept of how these modules may work together to run the system including information and communication.

## Public Relations Activities

We had the opportunity to present our innovative project, Pods4Rail, at the 2024 edition of the most important Conference on cross-modal transport research, the Transport Research Arena (TRA), held in Dublin the 15 to 18 of April 2024. During the 4 days conference there were the opportunity to learn more about Pods4Rail through a poster and presentations. Walter Struckl, Siemens Mobility Austria GmbH, held a presentation at the EURNEX session at the “Research Village Associations” Stand in the main Hall to a very interested crowd. Additionally, Dr. Struckl participated as a distinguished speaker in Special Session 6.5, titled “Disruptive Sustainable and Smart Guided Transport Solutions as Part of Europe’s Future Mobility?”, moderated by Judit Sándor (Europe’s Rail Joint Undertaking). The panel engaged in a discussion on the future of the mobility system, addressing the rising demand for personalized transport services and the potential integration, complementarity, and benefits of new technologies within existing transport networks and proven solutions.

Our Swedish partners have organised a workshop and participating in a conference in Gothenburg, Sweden, in November 2024 to disseminate the results of our project and raise awareness. Within the conference “The Results Conference for Europe’s Rail Joint Undertaking” one key topic will be “Future Visions,” and Pods4Rail will be presented by Wilco Burghout from KTH Royal Institute of Technology and Michel Gabrielsson from Trafikverket.

In the July/August 2024 edition of the German and also in the September 2024 edition of the international publication ETR – Eisenbahntechnische Rundschau an Article with the title “Neue Lösungen für den Verkehr von morgen” / “New solutions for the transportation of tomorrow” could be found. An article written by Dirk Winkler and Walter Struckl from Siemens Mobility and Maria Traunmüller from moodley strategy & design group, presenting the project Pods4Rail.