DeloitteStiftung

Initiative D21

DIGITAL FUTURE CHALLENGE

DFC #6 – Deutsche Bahn use case

Deutsche Bahn

USP Deutsche Bahn: Deutsche Bahn is the only company in Germany to offer comprehensive, climate-friendly and digitally integrated mobility and logistics services from a single source for passengers, goods and the sustainable networking of entire regions.

Employees: 338,000 worldwide, including 211,000 in Germany

Industry: Transport and logistics

Thematic focus of the use case

Robotics

TITLE OF THE USE CASE

ICE pit stop – automated processing using robotics

SHORT DESCRIPTION

At DB plants, you automate the supply of drinking water and the disposal of waste water. Real-world experience, clear mission: Develop reliable robotics solutions that not only speed up processes, but also relieve the burden on local employees and win them over. Real-world experience meets social and operational acceptance: How can technology be successfully adopted?

#HASHTAGS

#RailTechInnovation

#SmartMaintenance

#FocusOnEmployees

DESCRIPTION OF THE ORGANISATION

Deutsche Bahn AG is a global mobility and logistics group based in Berlin. Its core business includes passenger and freight transport, rail infrastructure and logistics-related services. Through subsidiaries such as DB-Regio, DB-Fernverkehr and DB-Cargo, it offers comprehensive transport and logistics solutions in Germany and abroad.

DB operates in the transport and logistics sector and targets private individuals, companies, commuters and public sector clients. Since 2024, it has been bundling its infrastructure activities under the public-interest-oriented DB InfraGO AG.

Technology plays a central role, for example in the form of digital passenger services, AI-supported maintenance and automated operating processes.

Digital innovations are intended to improve efficiency and the customer experience.

DB sees challenges in the digital transformation, such as the need to modernise a neglected rail network, IT security, the development of digital skills within the company and the integration of new technologies into existing structures. At the same time, there are numerous opportunities, for example through automation, data analytics and digital customer services.

Our organisational culture is characterised by sustainability, responsibility, customer focus and innovation, with the aim of enabling climate-friendly mobility for all.

VISION OF THE ORGANISATION

Deutsche Bahn AG is striving to achieve a highly automated, fully digitally networked rail system in the long term, which will enable significantly higher capacity, punctuality and efficiency thanks to state-of-the-art technology such as ETCS, digital signal boxes, AI-supported traffic management and automatic train operation. The focus is on the Digital Rail Germany programme, the S3 renovation programme and the overall Strong Rail strategy, which specifically improves infrastructure, operations and economic efficiency.

Ethical principles such as data protection, IT security and a digital strategy oriented towards the common good are an integral part of this.

Digitalisation should be designed in a way that is not only technically but also morally responsible. DB sees itself as a partner to society and is expressly committed to responsibility for the climate, people and Europe-wide mobility.

DB wants to use digitalisation to create added value for society: through more reliable, environmentally friendly mobility, through a shift in traffic from road to rail, through better service and barrier-free stations as part of the infrastructure transformation.

The ideal scenario: a digital railway system in which trains run automatically, efficiently and resiliently.

PROBLEM SETTING

ICE trains are currently supplied and disposed of manually at the plant. Employees walk the entire length of the train – flap by flap, repeating the same movements over and over again. DB Fernverkehr would like to examine whether robotics can be used to support these work processes.

Supply means: supplying the train with operating media such as drinking water in a hygienic manner, without any contamination of the train or the ground.

Disposal means: draining waste water and other media in a controlled and leak-proof manner, also without any dripping or contamination.

Sounds simple? The reality is complex:

there are different types of flaps and closures depending on the series, carriage side and carriage. Supply lines must be cleaned after each use, and because flaps open differently, different attachments are required.

QUESTION AND TASK

How can robotics be used to support the supply and disposal process in the factory efficiently and reliably?

Please note:

Variation: Safe handling of different flap and closure types depending on the series, side and carriage.

Hygiene and tightness: Drip-free, hygienic for drinking water, without any contamination of the train or floor.

Cleaning: Automatic pipe cleaning after each use with clear, traceable documentation.

Extended benefits: What passive tasks does the robot perform on the side?

Social acceptance: Which design features promote positive perception and acceptance of the robot by employees?

ADDITIONAL BONUS QUESTION

What ethical, moral and legal considerations could play a role in this context?

ADDITIONAL

For example, existing guidelines, previous efforts and strategies for responsible AI, digital ethics or digital responsibility.

Vehicles

DB Long Distance relies on the ICE 2, ICE 3, ICE 4 and ICE T series – all with different requirements.

Side and carriage dependency:

Left vs. right makes a difference: the type of flap and closure vary depending on the side of the carriage and the carriage itself (sometimes mirror-inverted).

On-board bistro: Depending on the train configuration, the flaps are on the left or right.

Reading/operating instructions:

No uniformity: Labels, pictograms and displays differ.

Markings and reading logic differ depending on the type/series.

Position and height:

No standard dimensions: Installation location, height above the top of the rail and distance from the end of the carriage vary from carriage to carriage.

Opening/closing:

Different closures (levers, hooks, magnets, etc.).

Different amounts of force required for opening and secure locking.

In short: lots of variation that needs to be taken into account.