

# CLOSING THE LOOP: ENHANCING RAILWAY ASSETS CIRCULARITY THROUGH SUSTAINABLE LIFECYCLE MANAGEMENT (CircularRail)

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## Nyttor och effekter

This project aims to extend the lifetime of railway assets by predictive maintenance, reducing life cycle costs, and environmental & societal impacts while practicing the implementation of CE framework.

Objectives in this context are as follows:

- Mapping railway assets life management process highlighting circular model requirements, data aggregation and MFA,
- Developing new Circular Predictive Maintenance by incorporating sustainability measures and future climate scenarios into maintenance practices.
- Identifying optimal CE scenarios for railway assets by integrating MFA and LCSA factors.

The methodology implemented in this project can have a significant impact of 5-10% reduction in the resource consumption, resulting in less CO2 emission utilizing proposed innovative CE tools.

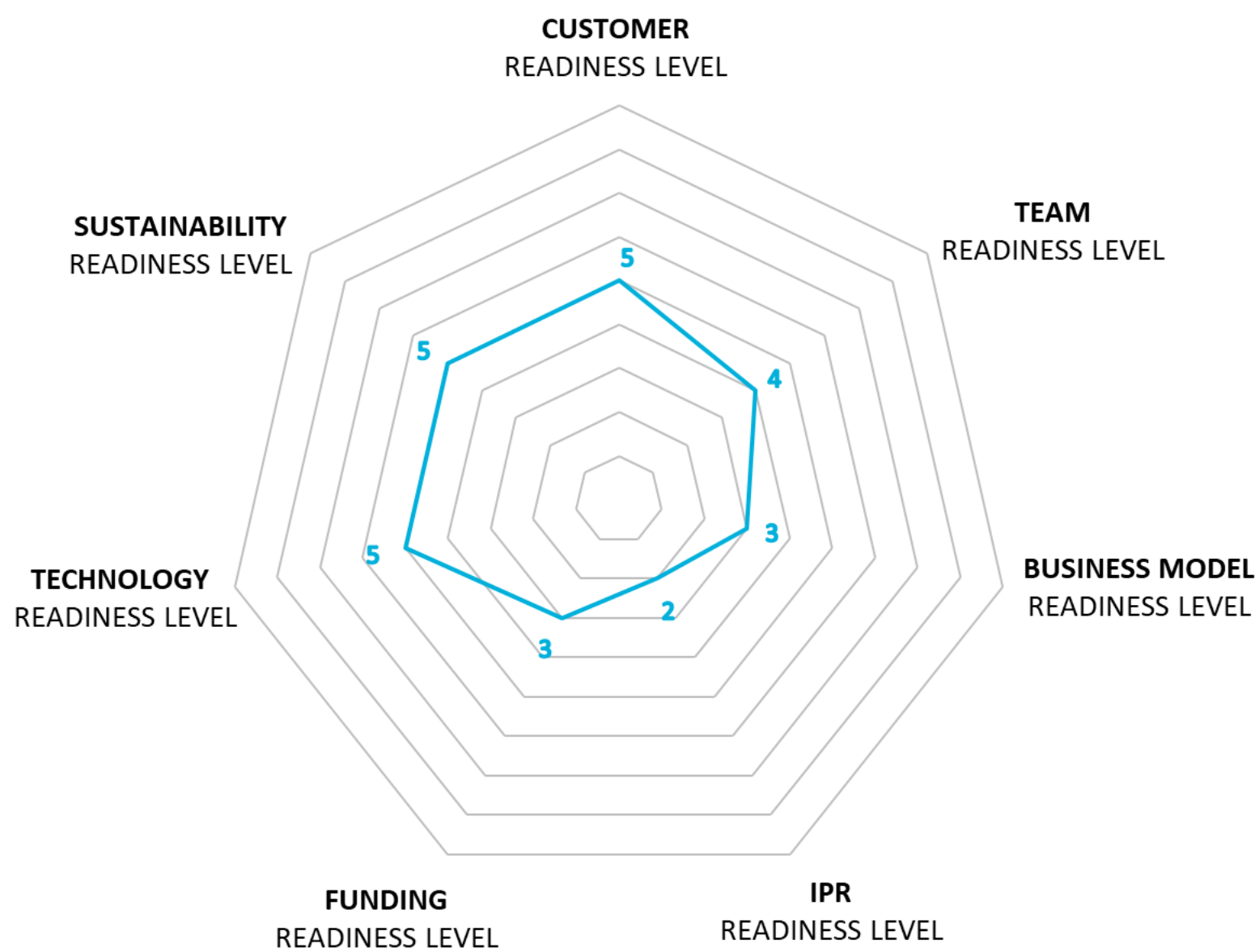
## Aktörskonstellation

- ❑ Luleå Tekniska Universitet (LTU)
- ❑ Trafikverket
- ❑ Järnvägstekniskt Centrum (JVTC)
- ❑ Luleå kommun
- ❑ Duroc Rail AB
- ❑ Omicold AB
- ❑ Alstom

## Leveranser

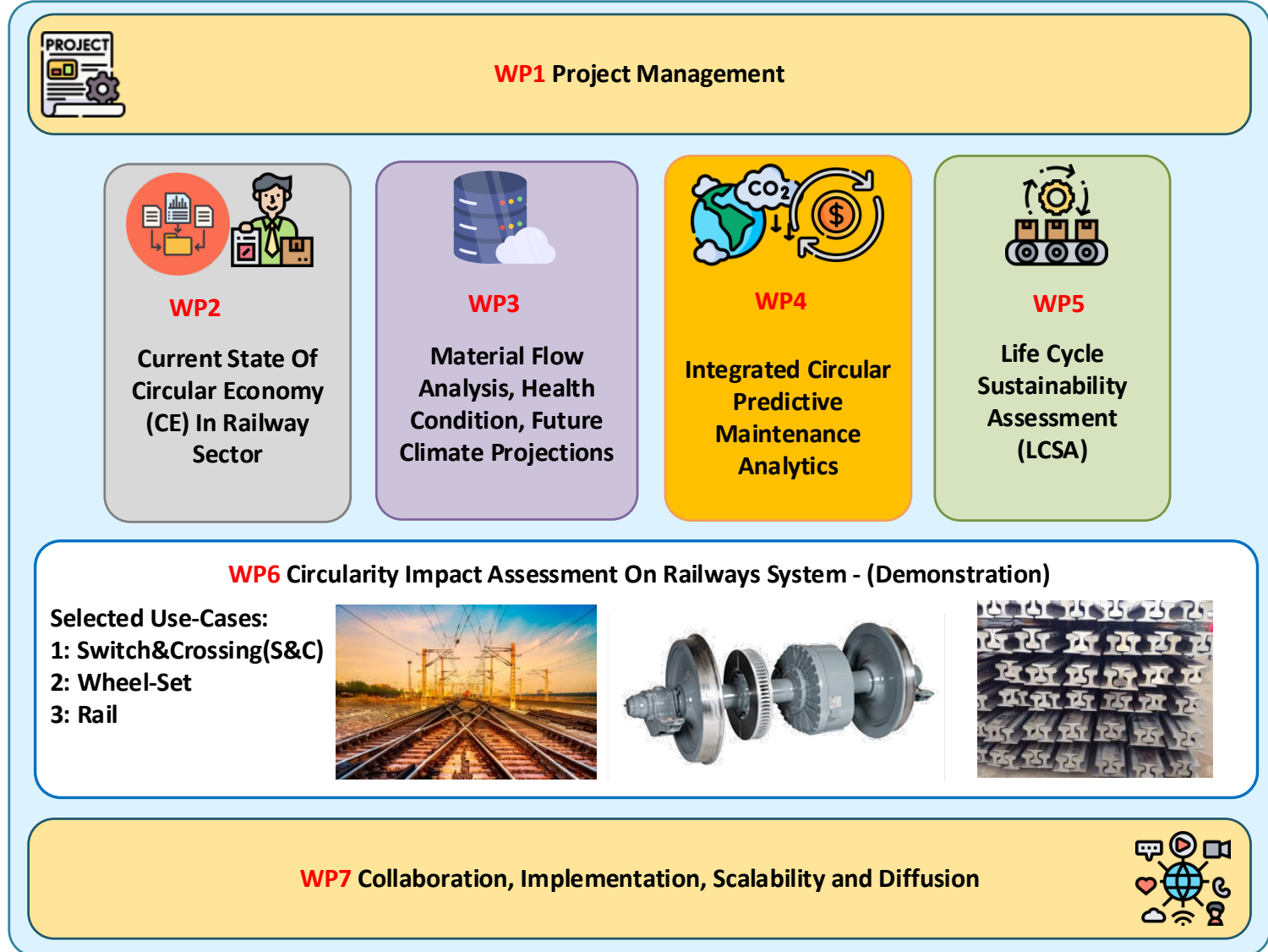
- ❑ Increasing the efficiency of railway assets by prolonging the asset life.
- ❑ Increasing the environmental safety by integrating environmental factors in predictive maintenance decisions.
- ❑ Consideration of climate change impacts in the proposed DSS to fulfill future demands and have more knowledge for long-term planning and developments.
- ❑ Supporting infrastructure managers to increase circularity within railway infrastructure assets by selecting the appropriate CE model.

## Innovationsstatus



In CircularRail project, the five pillars/dimensions of system innovation to define appropriate measures to accelerate the implementation of innovation solutions or/and identifying the bottleneck and shortcomings of the implementation process were considered. Some of the explored pillars are as follows:

- (i) Technology,
- (ii) Business Model
- (iii) Infrastructure
- (iv) Policy and Regulation
- (v) Behavior, Culture, and Values
- (vi) Organization Structure



## Vidareutveckling och implementering

- ❑ Replicate and extend the concept to other assets at railway network level
- ❑ Transferring the methodology, tools, and knowledge produced by this innovation to other linear assets such as roads, pipelines, and grids
- ❑ High potential for full-scale implementation of the solution in Environment division at TRV within 3-5 years after project completion
- ❑ Empowering stakeholders towards circular economy initiatives and fulfill government policies on sustainability and climate neutrality in the Swedish transport sectors

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