



**Next generation trains
Shift2Rail perspectives**

Energy efficiency of future trains, 4/10/2017

Giorgio Travaini, Head of Research & Innovation, S2R JU

The S2R Joint Undertaking has been created in June 2014 to play a major role in rail-related research and innovation, ensuring coordination among projects and providing all stakeholders with relevant and available information on projects funded across Europe. It shall also manage all rail- focused research and innovation actions co-funded by the Union

Council Regulation (EU) No 642/2014 of 16 June 2014 (S2R Regulation)

It reached autonomy in May 2016, it is now fully operational

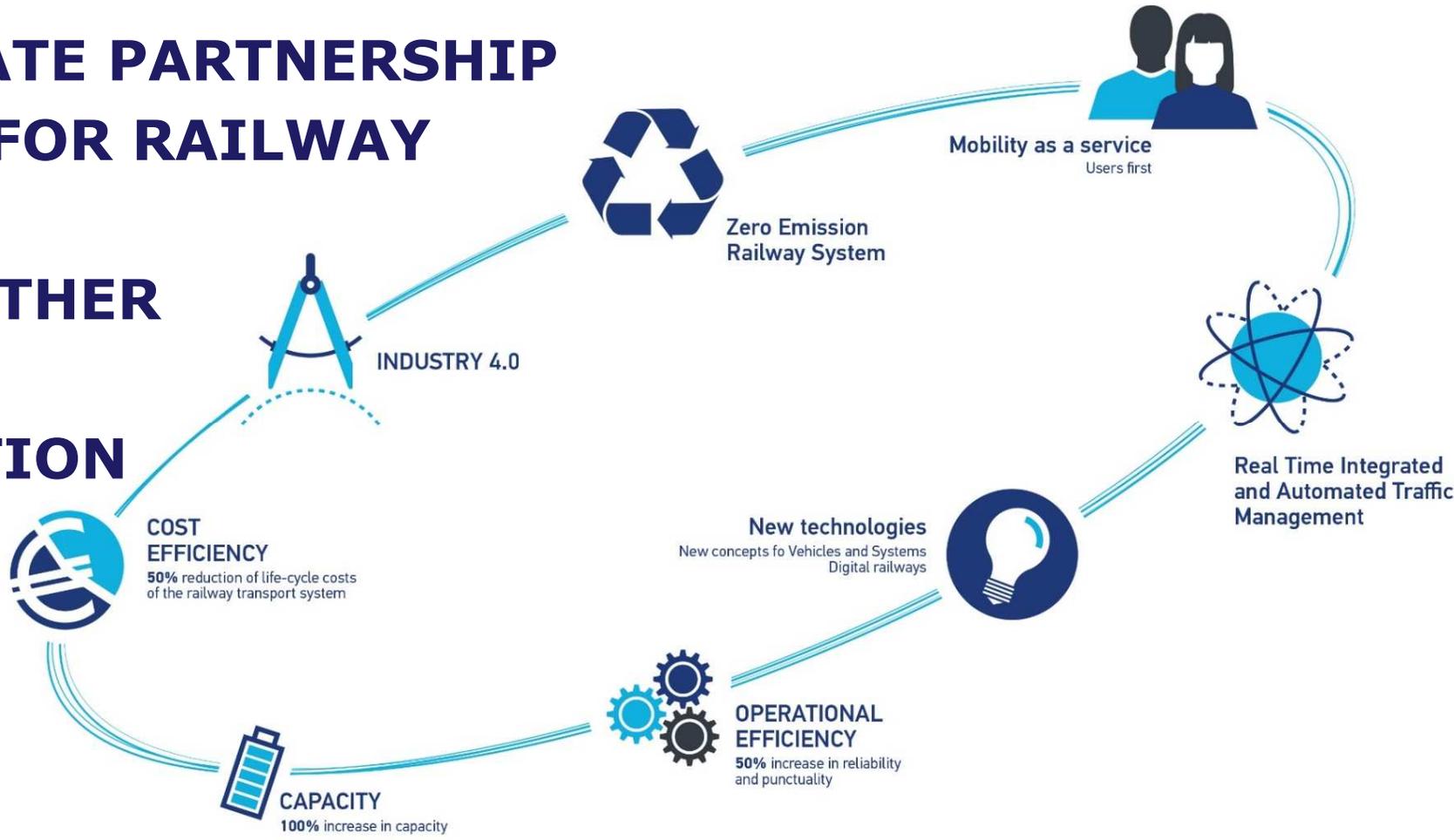


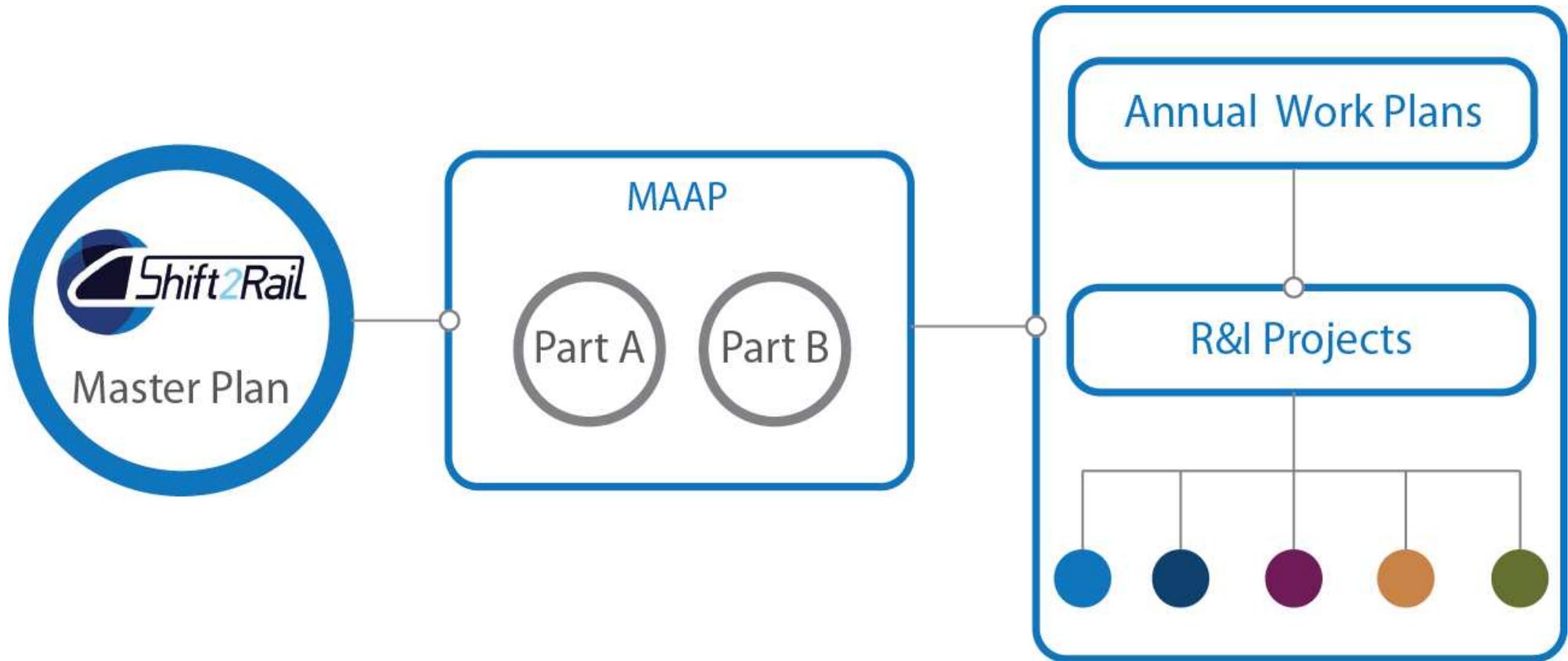
PUBLIC-PRIVATE PARTNERSHIP & I PLATFORM FOR RAILWAY

WORKING TOGETHER

DRIVING INNOVATION

BY 2024



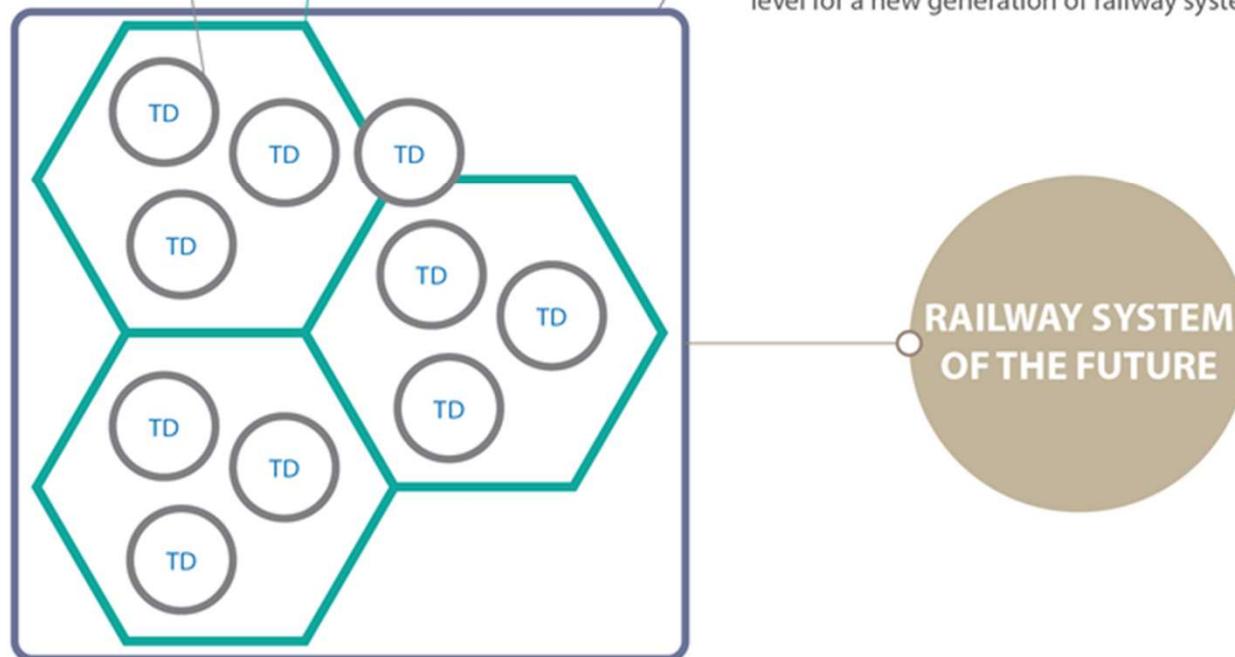


From TRL0 to TRL6/7

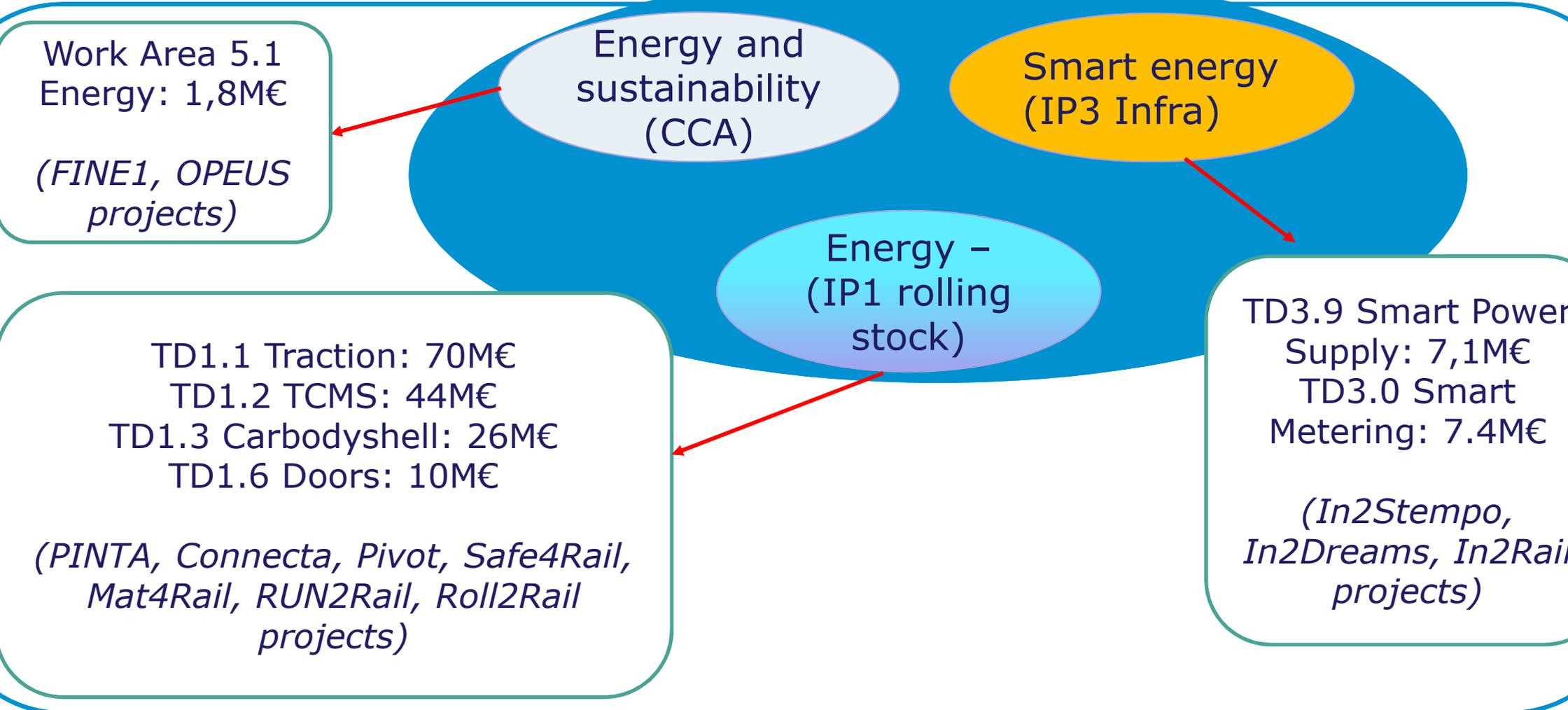
Technology Demonstrator (TDs)
Projects specifying, developing and demonstrating a specific technology resulting in a lab tested and/or simulated prototype

Integrated Technology Demonstrators (ITDs)
Projects integrating/combining TD prototypes at system level (lab and on-site) and testing performance

System Platform Demonstrators (SPDs)
Assessment of the whole systems performance based on the results of TDs and ITDs. SPDs bring S2R innovative solutions to a technology maturity level for a new generation of railway system



Energy-related Activities: S2R



The PINTA project aims address two key topics : Development of concepts towards the next generation of traction systems and management of wheel/rail adhesion.

Line capacity increase through weight, volume, Energy and noise savings of Traction equipment

Operational reliability increase via higher reliability/availability

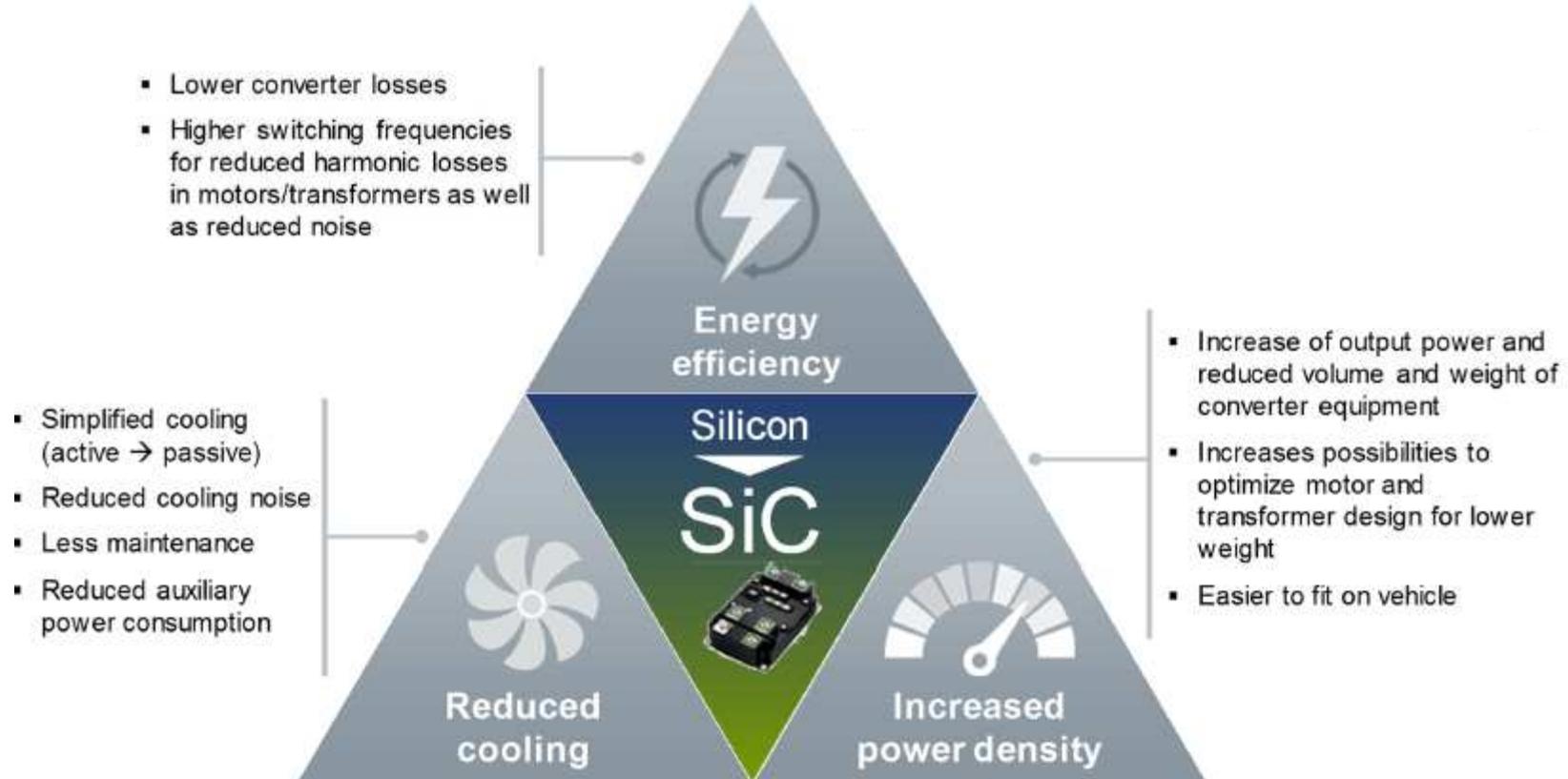
Traction & Brakes systems LCC reduction

Improvement of braking degradation limit in poor adhesion condition

Improvement of the overall train safety



- Develop energy savings solutions → example of foreseen optimisation possibilities with Sic in traction



Improve S2R KPIs at Traction/Adhesion levels

– LCC

- [...] Reduction in traction energy consumption (Usage of more energy efficient technologies, significant weight reduction, evaluation of technologies for potential hybrid traction, traction auxiliaries optimisation, etc.)

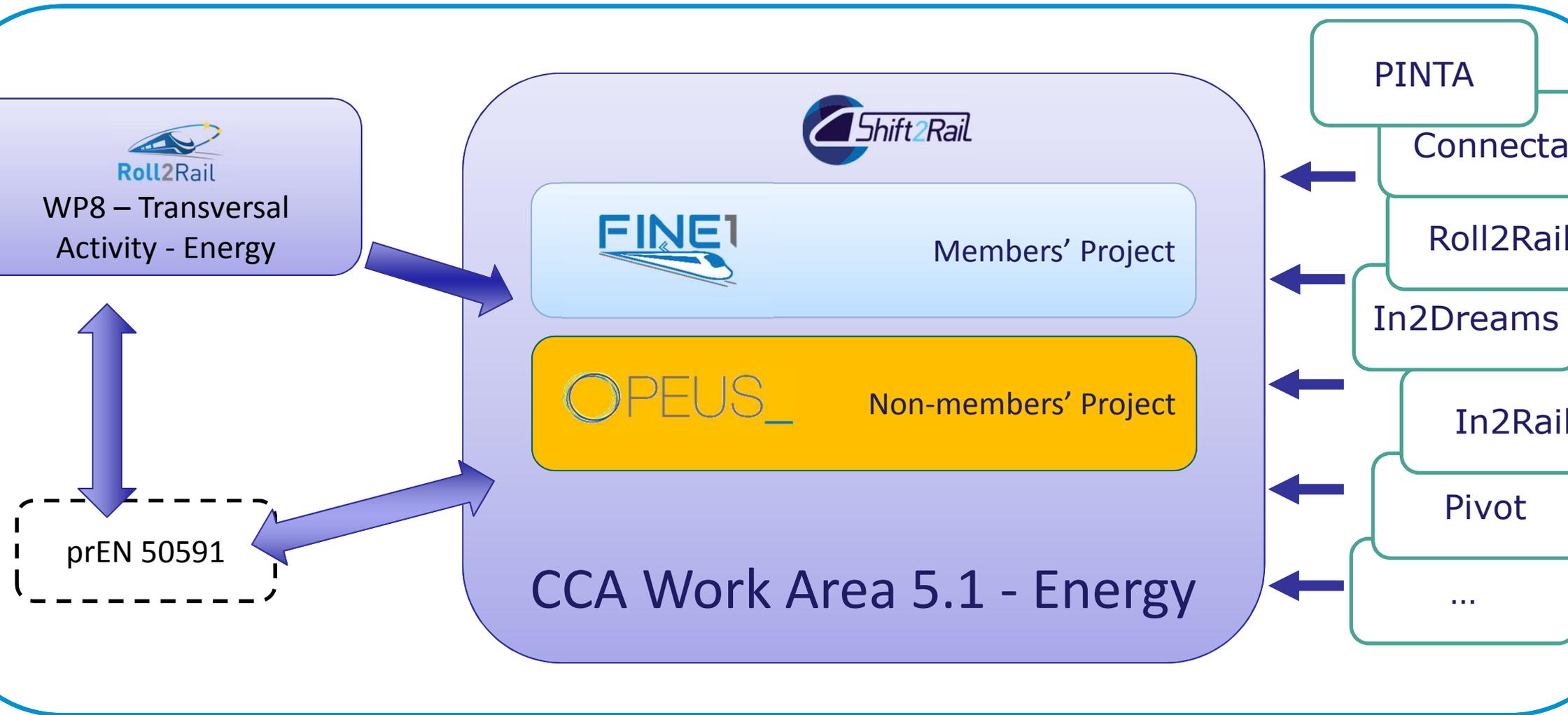
Application	Data type	LCC reduction	
		Energy	Cost
Tramway	Average	-12%	
Metro	Average	-15%	
Sub-urban	Average	-17%	
Regional	Average	-15%	
High Speed	Average	-14%	
Total	Average	-15%	



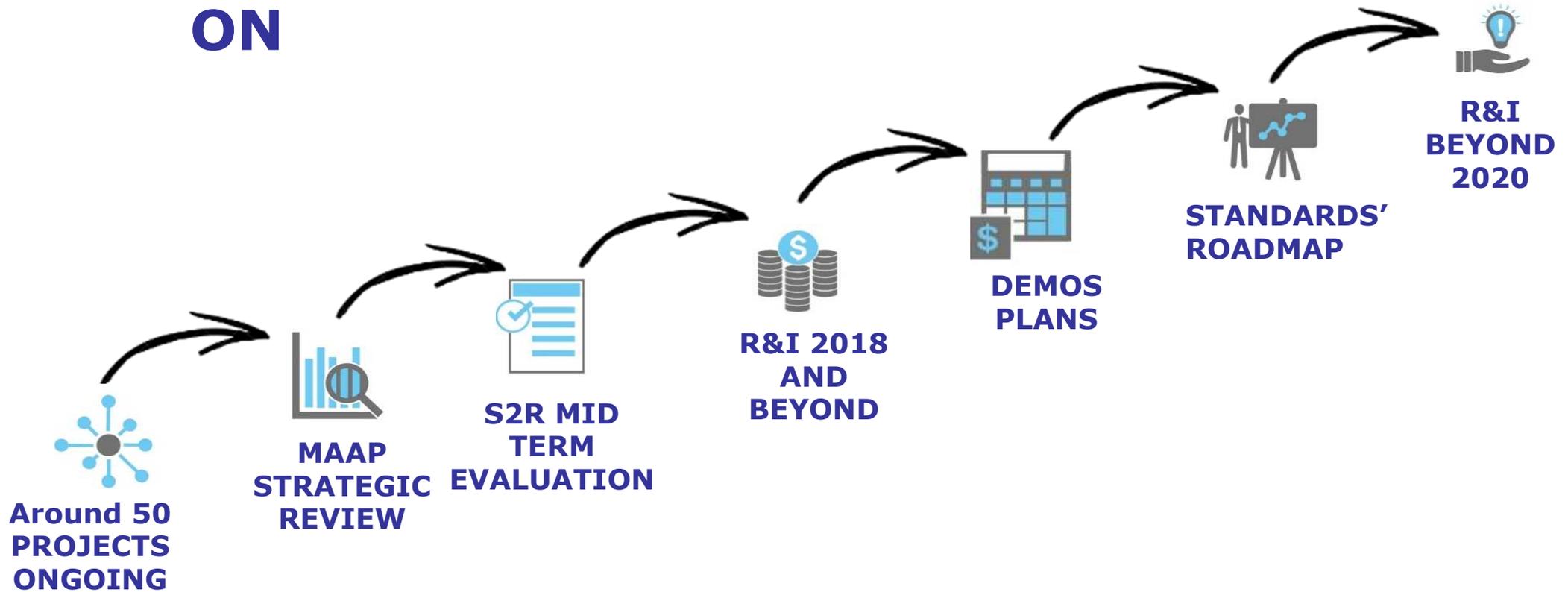
FINE1 = Future Improvements Noise & Energy

- Energy quantification methodology
- Gathering of sub-level KPIs
- Quantification of energy improvements (kWh and €) gained in Shift2Rail (KPI generation)
- Interface to external energy groups, normative groups
- Strategic view on energy

S2R system approach

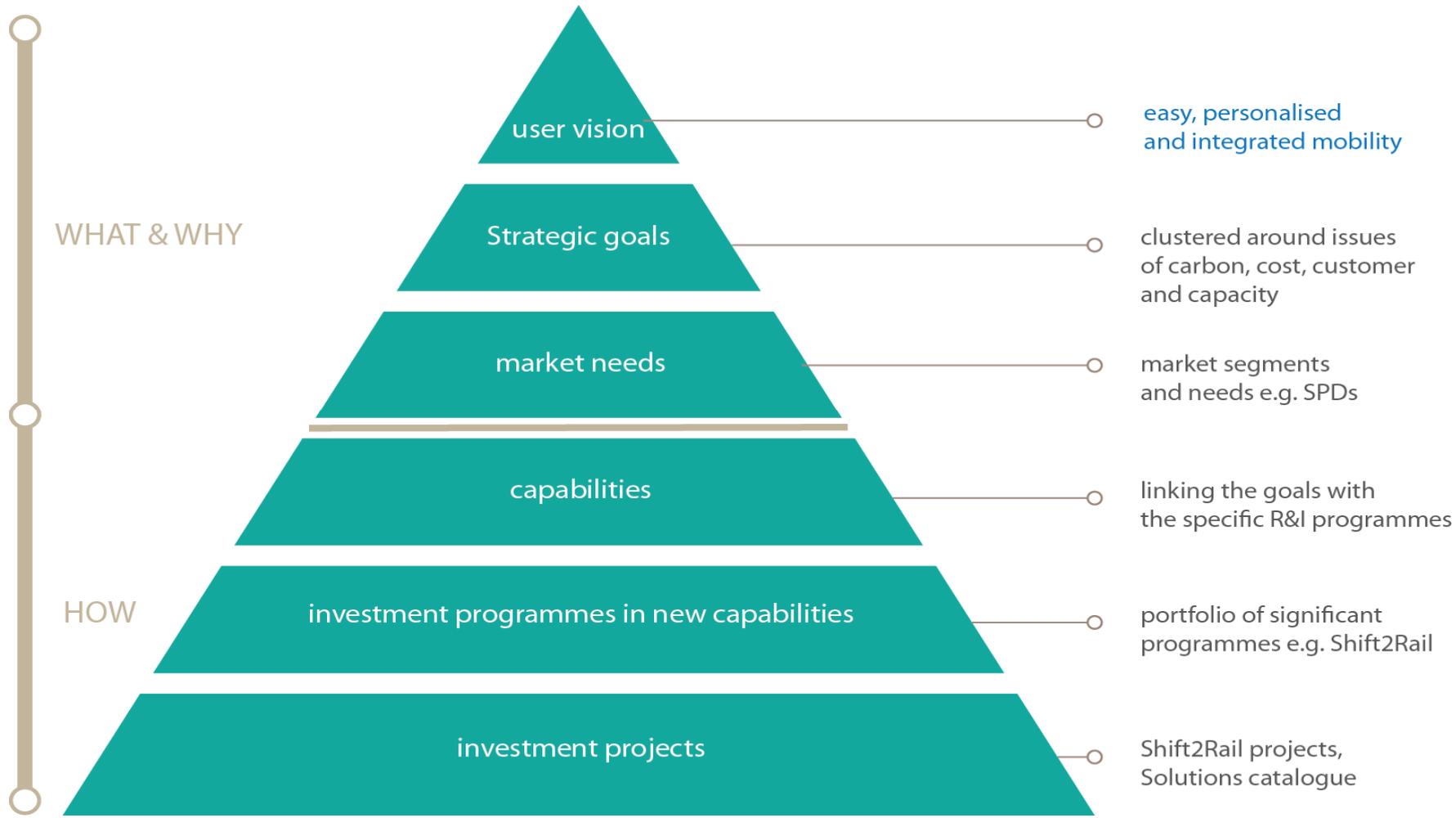


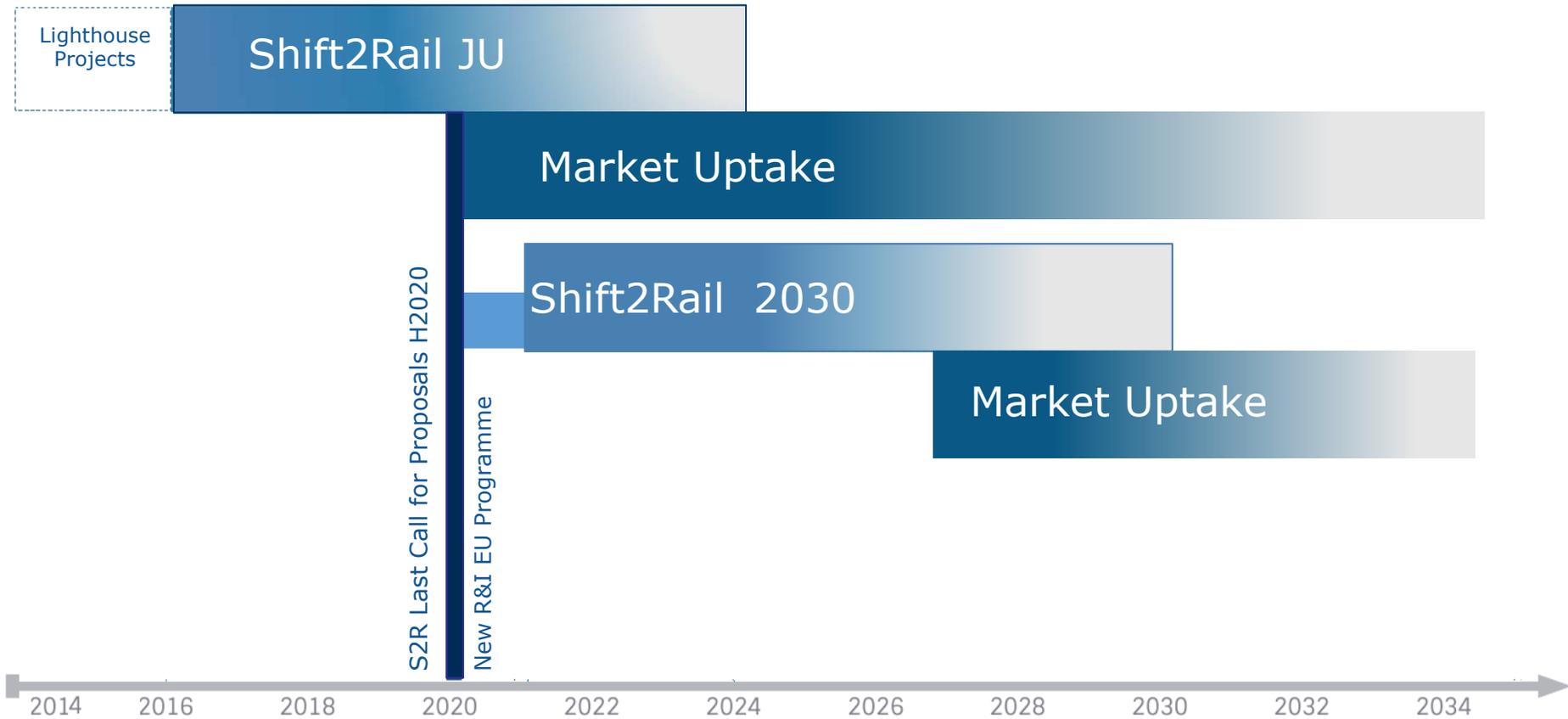
WHAT'S GOING ON



USER FIRST: USER CENTRIC MOBILITY AS A SERVICE







Efficient and reliable R&I delivery...

An ecosystem for rail R&I delivery based on effective collaboration, the provision of greater technology demonstration capability (including virtual and physical testing) and the efficient integration of technology into the railways. This removes barriers to the adoption of new technology and decreases time to market.



...opening up new Capabilities coming from emerging technologies or concepts.

R O B O T I C S

BIG DATA, CLOUD, IOT

INTEROPERABLE AND AUTONOMOUS PASSENGER OR FREIGHT TRAINS

DIGITAL AND SERVICE ORIENTED (RAILWAY 4.0)

PARADIGM SHIFTS FOR RAILWAY

MACHINE TO MACHINE COMMUNICATION

REAL TIME INTEGRATED AND AUTOMATED TRAFFIC MANAGEMENT

FULL RAILWAY IT ECOSYSTEM AND CONNECTED BUSINESS MODELS

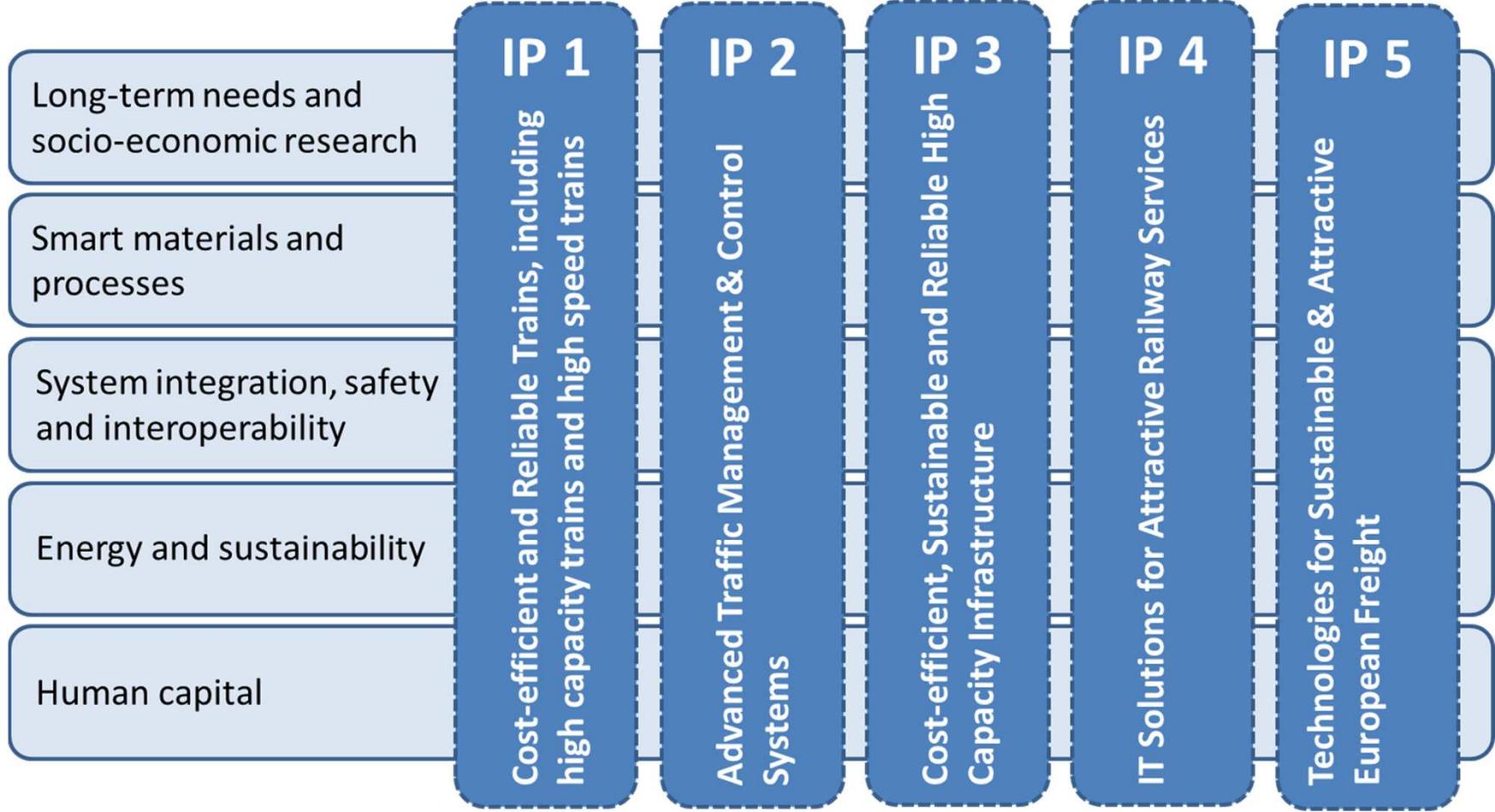
ARTIFICIAL INTELLIGENCE
ZERO EMISSION RAILWAY SYSTEM



Backups

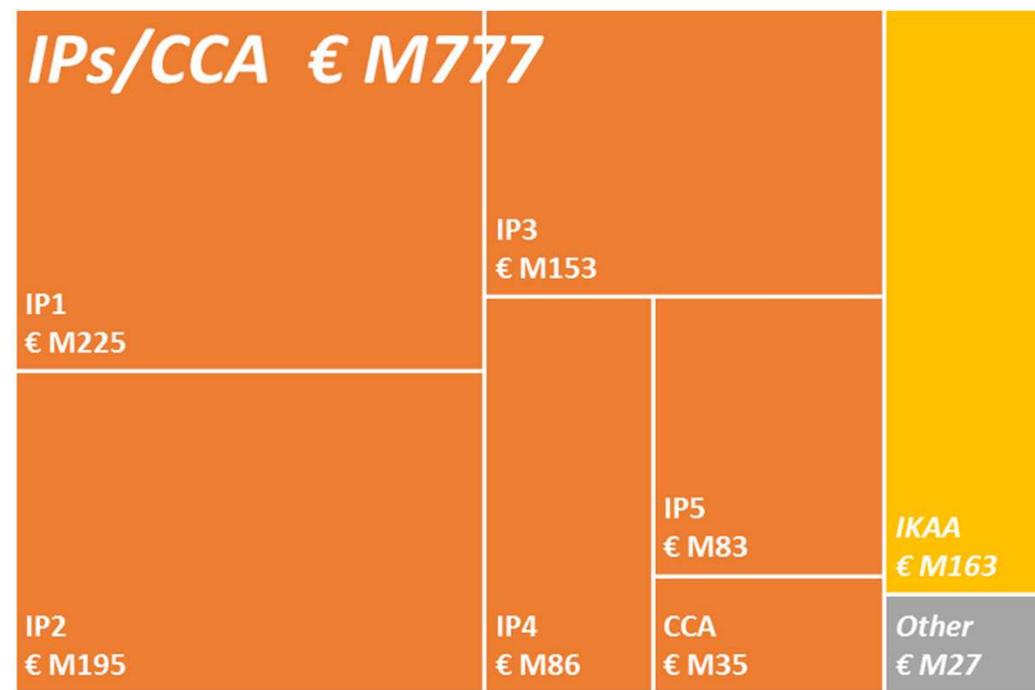
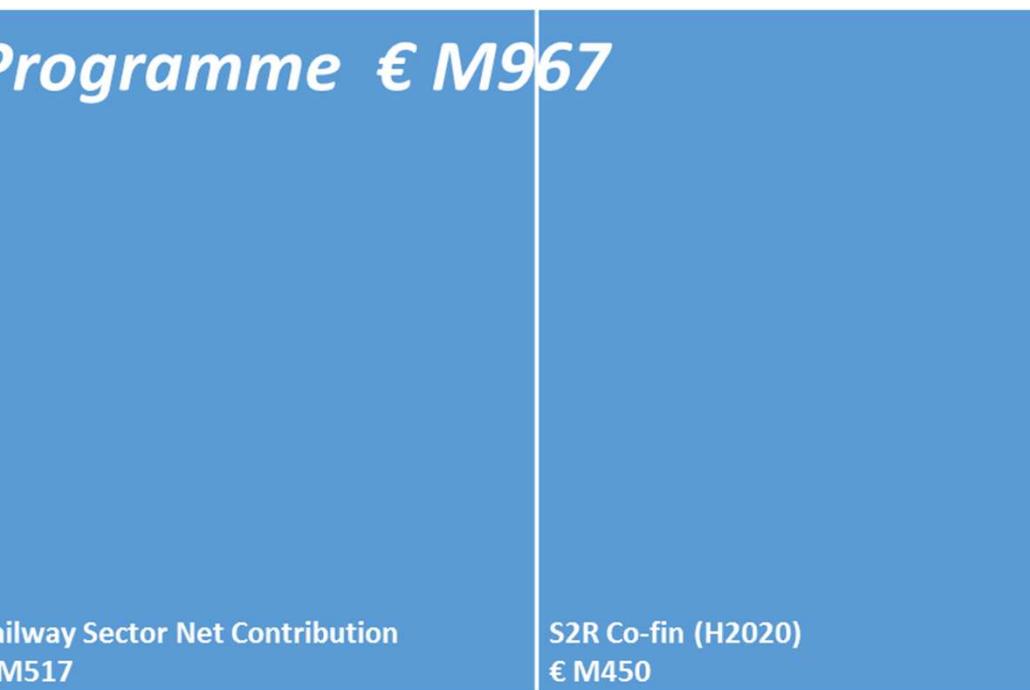


S2R PROGRAMME: INTEGRATED CONSISTENT DELIVERY ORIENTED



PROGRAMME FINANCIALS

Values as at 1 Sept 2016 in Million EUR





OPEUS

Overall aim

To develop a simulation methodology and accompanying modelling tool to evaluate, improve and optimise the energy consumption of rail systems with a particular focus on in-vehicle innovation

Thank you

imagine, together we make it...

