

European Freight DAC Delivery Programme

enabled by Europe's Rail

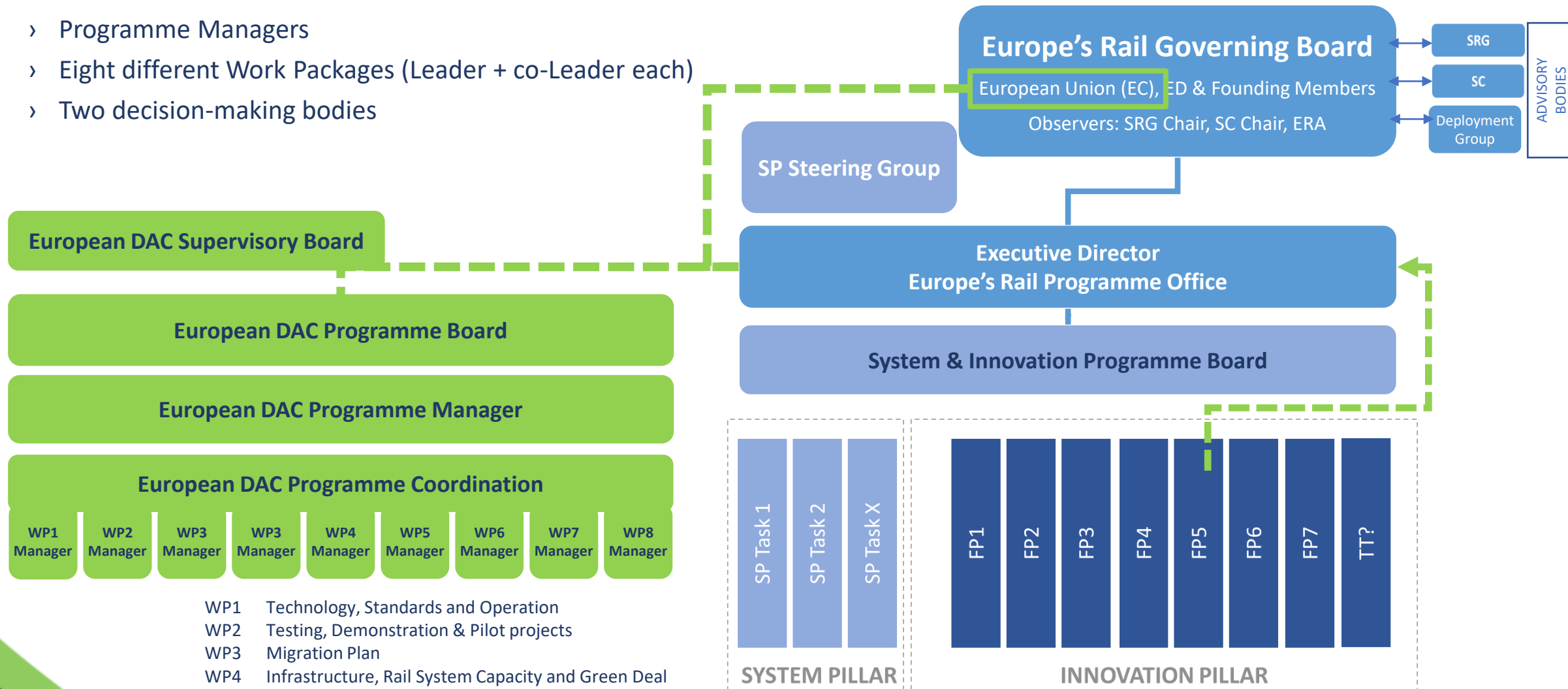
Moving European Rail Freight Forward

Modernisierung Güterwagen 4.0

EBA-Fachtagung Eisenbahnrecht + Technik, online, 15 März 2022

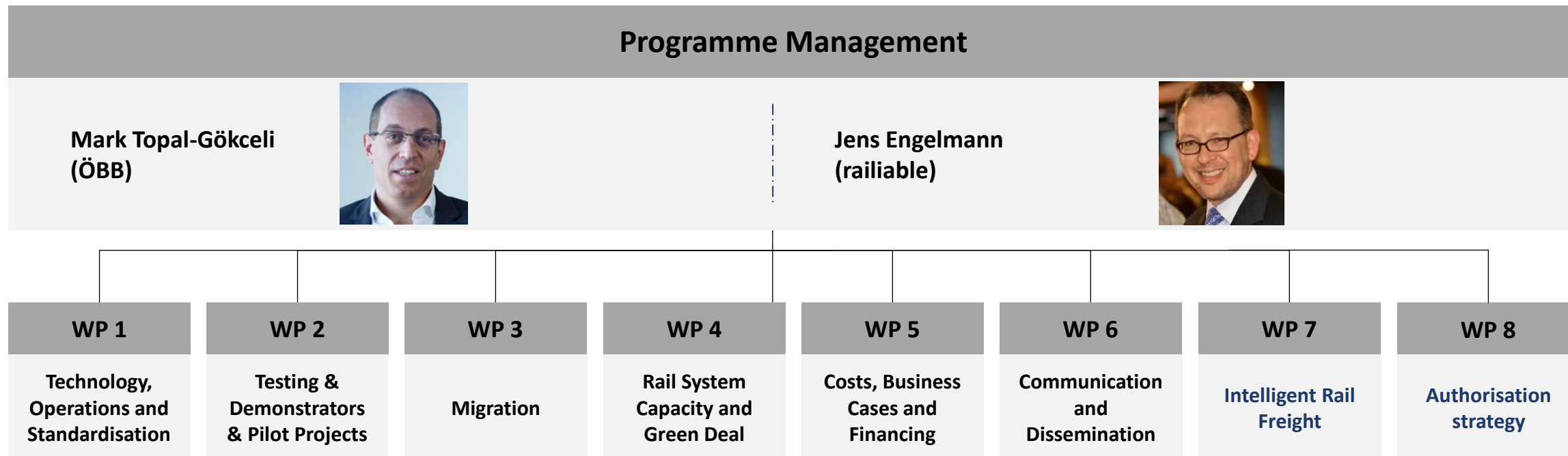
The EDDP structure

- › Programme Managers
- › Eight different Work Packages (Leader + co-Leader each)
- › Two decision-making bodies



- WP1 Technology, Standards and Operation
- WP2 Testing, Demonstration & Pilot projects
- WP3 Migration Plan
- WP4 Infrastructure, Rail System Capacity and Green Deal
- WP5 Costs, Business Case and Financing
- WP6 Communication and Dissemination
- WP7 Intelligent Rail Freight (future additional automation)
- WP8 Authorisation strategy for retrofit of wagons & locos

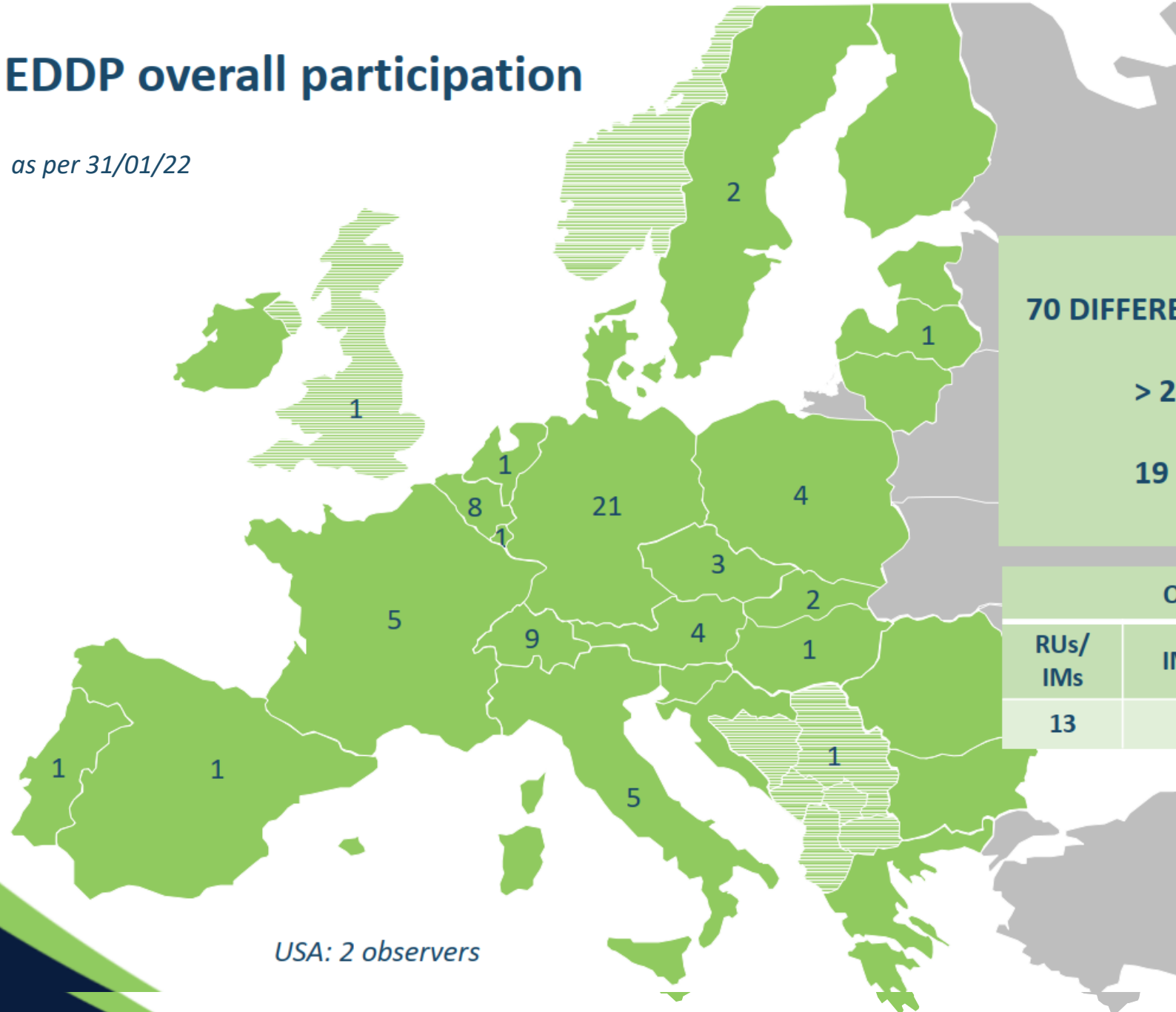
EU DAC Governance – programme and WPs





EDDP overall participation

as per 31/01/22



70 DIFFERENT ORGANISATIONS (01/22)
> 230 PARTICIPANTS
19 DIFFERENT COUNTRIES

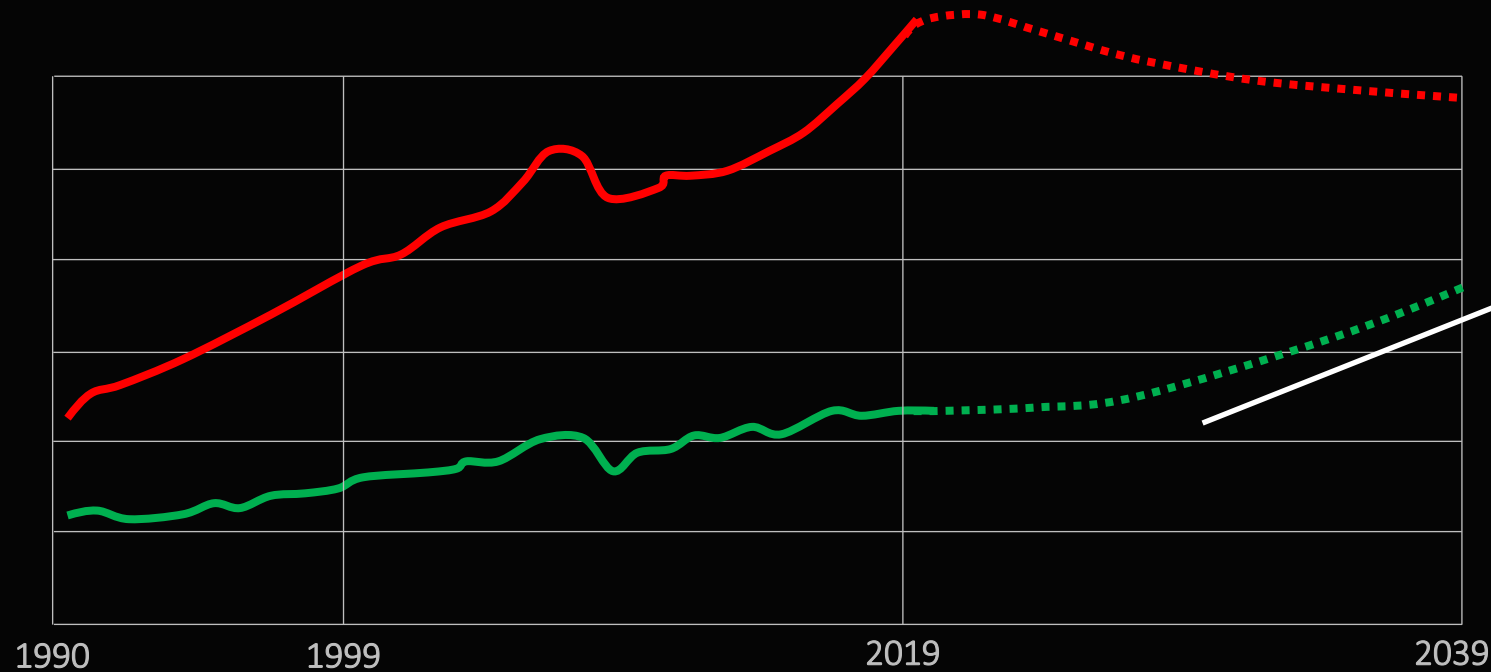
ORGANISATIONS BY TYPE				
RUs/ IMs	IMs	WKs	INDU- STRY	OTHER
13	2	16	14	26

w/o US, UK

USA: 2 observers

Development of freight volume road and rail in mn tkm in a representative MS

- Rail increased 35% (1999-2019)
- but needs to increase 60% (2019-2039) in order to meet the green deal objectives



- Innovation
 - Transformation
 - Revolution?
- ... of the rail freight system is needed

The challenges for EU rail freight



Capacity

+ 50% rail freight
- 55% GHG emissions
by 2030

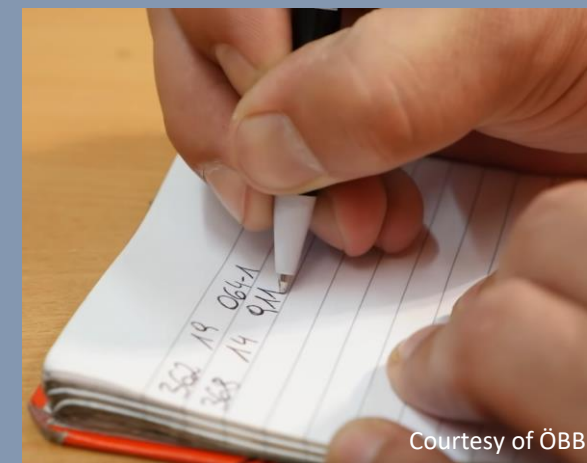
from bottleneck
to green backbone

Productivity



from manual intervention
to automation

Quality



from paper
to digital

Processes today – and tomorrow

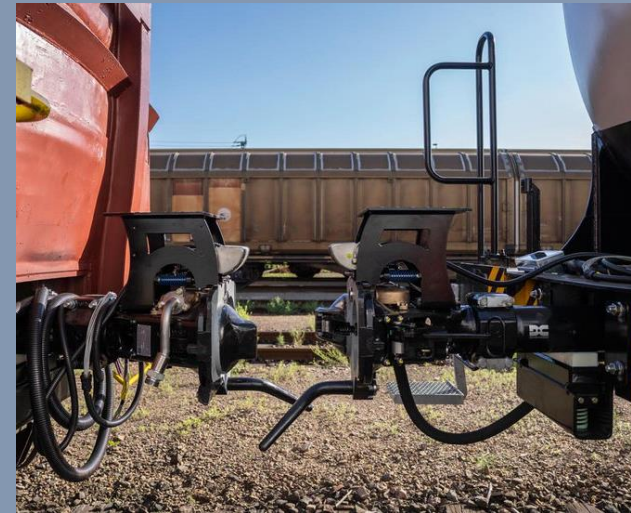
manual
freight wagon
coupling



Courtesy of ÖBB



automatic
freight wagon
coupling



mechanical, pneumatical, energy & data coupling

Courtesy of DAC4EU consortium

The DAC and automation benefits for EU

rail freight sectoral

society & environment

Capacity

Smart capacity,
more efficient
than conventional
extension
& much faster



Productivity

Reduction of
time/efforts (€),
increase of
system speed and
asset efficiency



Quality

Increased flexibility
and reliability,
innovative
customer services
and information



worker's & rail safety

Automation of
manual processes,
invest in
human capital



Economics & employment

10+ bn EUR
value creation
in Europe

better work-
places in rail



Green Deal

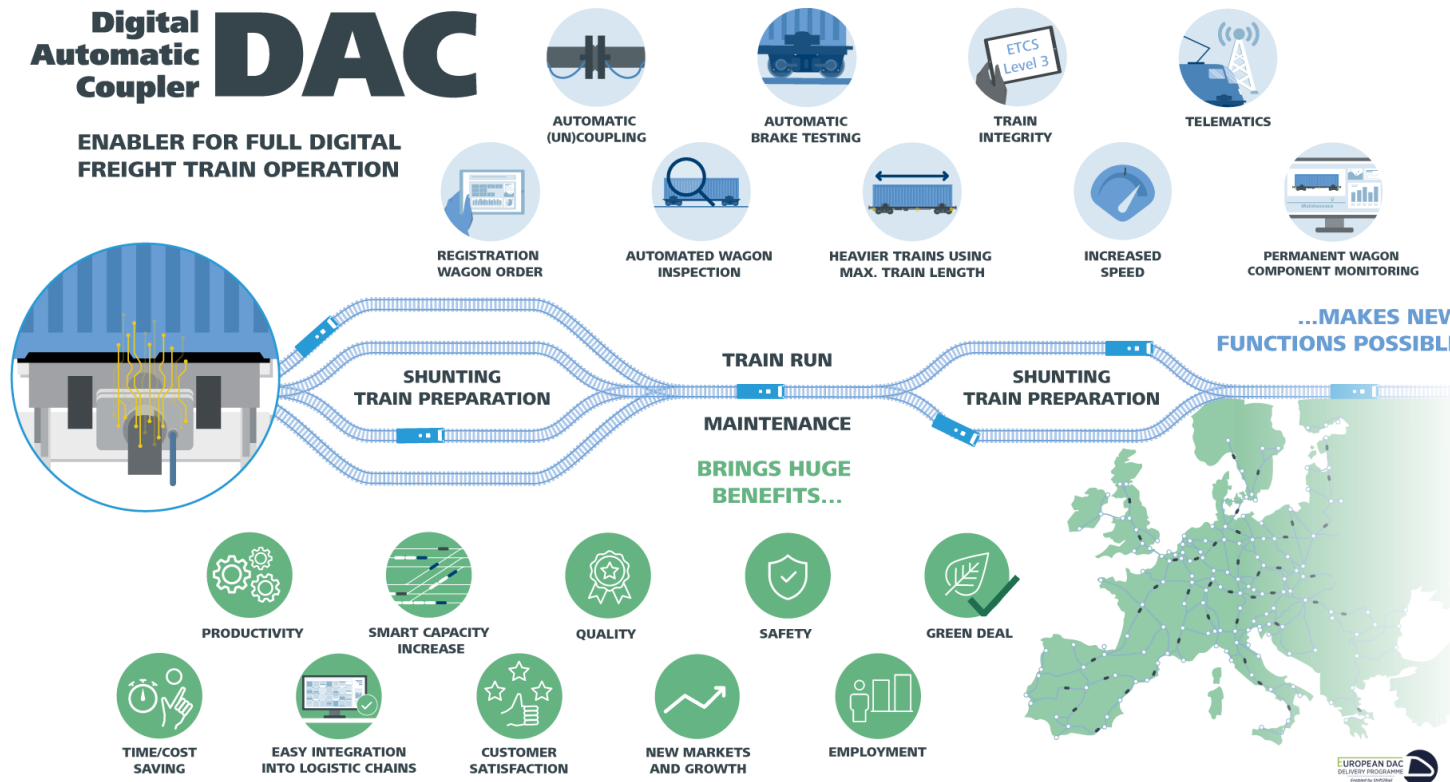
- 10 to -20 mn
tons CO₂ equiv.
p. a.



Competitiveness

new markets and growth

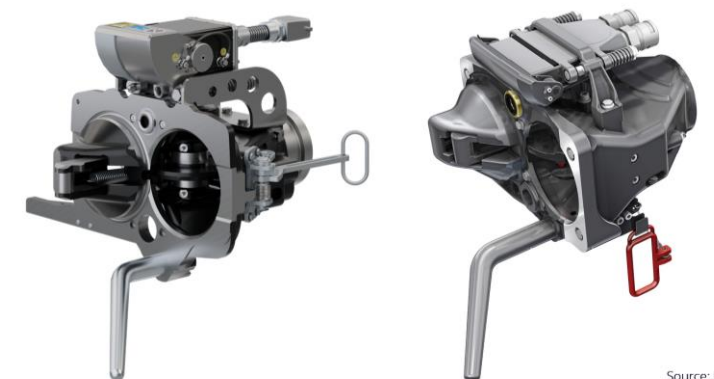
DAC for Full Digital Freight Train Operations



- › DAC is more than just a coupler
- › DAC is a key and unique enabler for numerous applications
- › DAC is not a stand-alone technology but the backbone for “full digital freight train operations” to achieve the ambitious transformation in European rail freight
- › This will allow the DAC to enable even more use cases and to generate a max. possible benefit

EUROPEAN DAC DELIVERY PROGRAMME
Enabled by Shift2Rail

“Scharfenberg” latch-type design selected for future Europe-wide Digital Automatic Coupling (DAC) standard coupler head



Source: Dellner & Voith

The apps for the customer's logistics and for the future



additional **displays**,
information polling,
deep integration into
IT systems



telematics and
goods monitoring
with highest
reliability add
customer value



optional signals
and **workplace**
illumination
increase work
safety

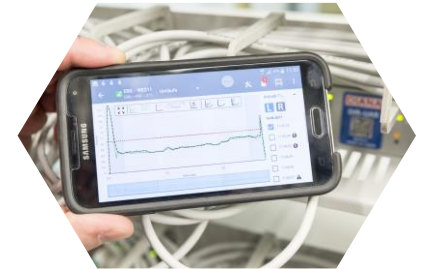
interfaces to
customer systems
support customer
digitalisation
activities



Surveillance
of high value
goods opens
new markets



data analysis for
condition-based
maintenance
increases
productivity
further



opportunities for digitalisation add real value to customer's and shipper's logistics processes

DAC and automation use cases



Will be slightly updated

Functionality (DAC/automation use case)

- 1 Automated coupling + manual uncoupling
- 2 Automatic brake test & calculation of braking capacity
- 3 Recording of train composition + abandon of rear signal
- 4 Heavier trains & longer trains (within existing infra limitations)
- 5 Increased payload
- 6 Train integrity (for moving block operations)
- 7 Increased speed via improved longitudinal forces
- 8 Increased speed via better braking performance
- 9 Wagon condition/performance info (incl. derailment detection)
- 10 Telematics for customers
- 11 Automated parking brake
- 12 Automatic uncoupling (remote)
- 13 Automated technical wagon inspection
- 14 Longer trains up to 1500m

Basis additional automation component

- DAC* -
- DAC* automatic braking test device
- DAC* -
- DAC* -
- DAC* (elimination of buffers, modified new vehicle design)
- DAC* train integrity system (+ ETCS level 3)
- DAC* -
- DAC* electro-pneumatic brake
- DAC* wagon telematics
- DAC* wagon telematics
- DAC* automated parking brake system
- DAC* actuator + automated parking brake system
- DAC* wagon telematics + video gate + infra check points
- DAC* (infrastructural adaptations +) ep-brake/distributed power
- DAC* actuator + dynamic coupling system

** incl. infrastructural adaptations for safe DAC operation (e.g. buffer stops, ..)*

Benefit allocation to process steps

Shunting	Train prep	Train run	Maintenance
X			
	X		
	X		
		X	
		X	X
		X	
		X	
X	X		
X	X		
	X		
		X	
		X	

Future automation use cases

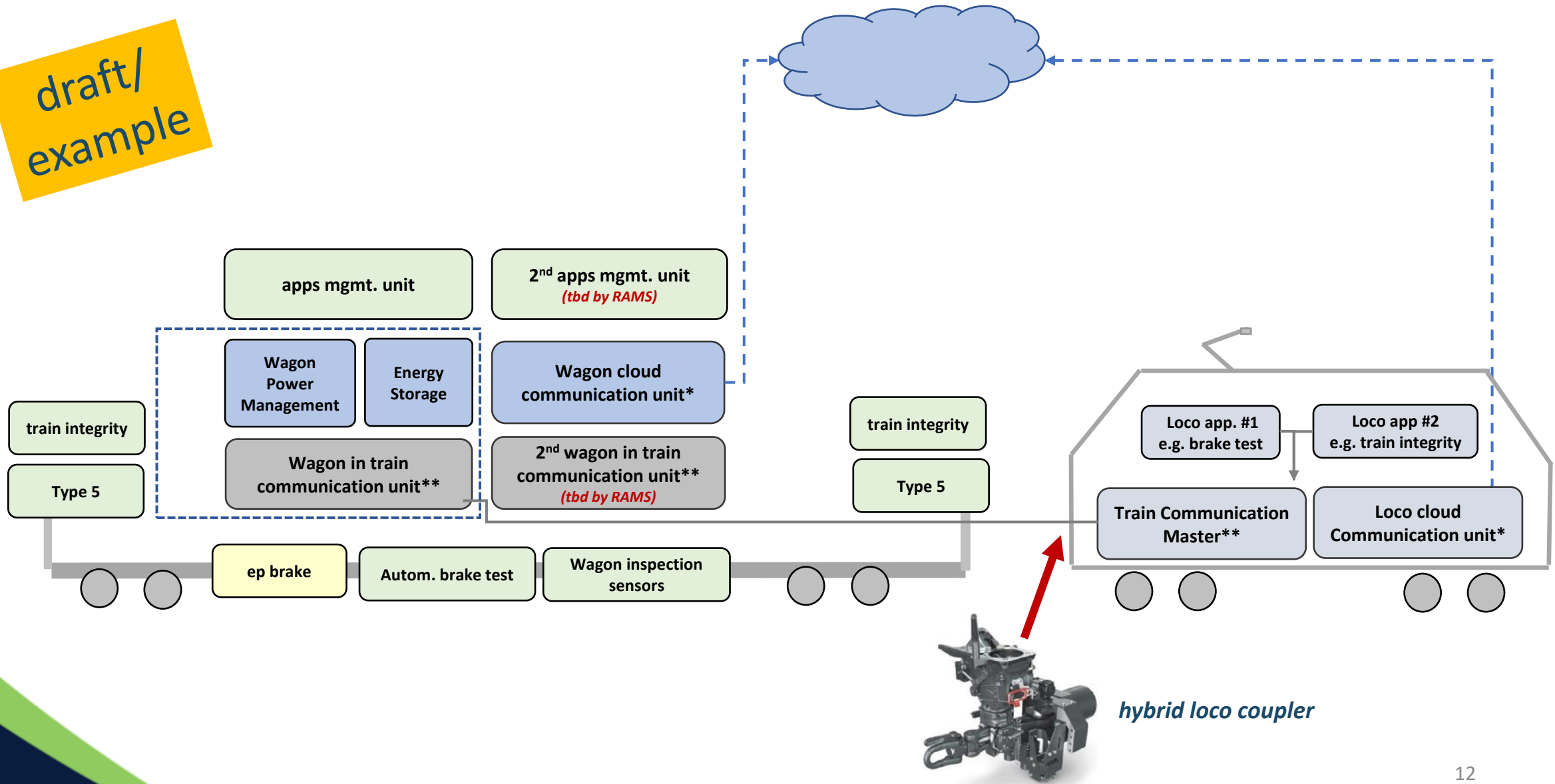
- 15 Dynamic coupling and uncoupling

1. Cost-benefit assessment for all use cases
2. Selection of use cases and linked technology packaging for roll-out to be defined based on CBA results

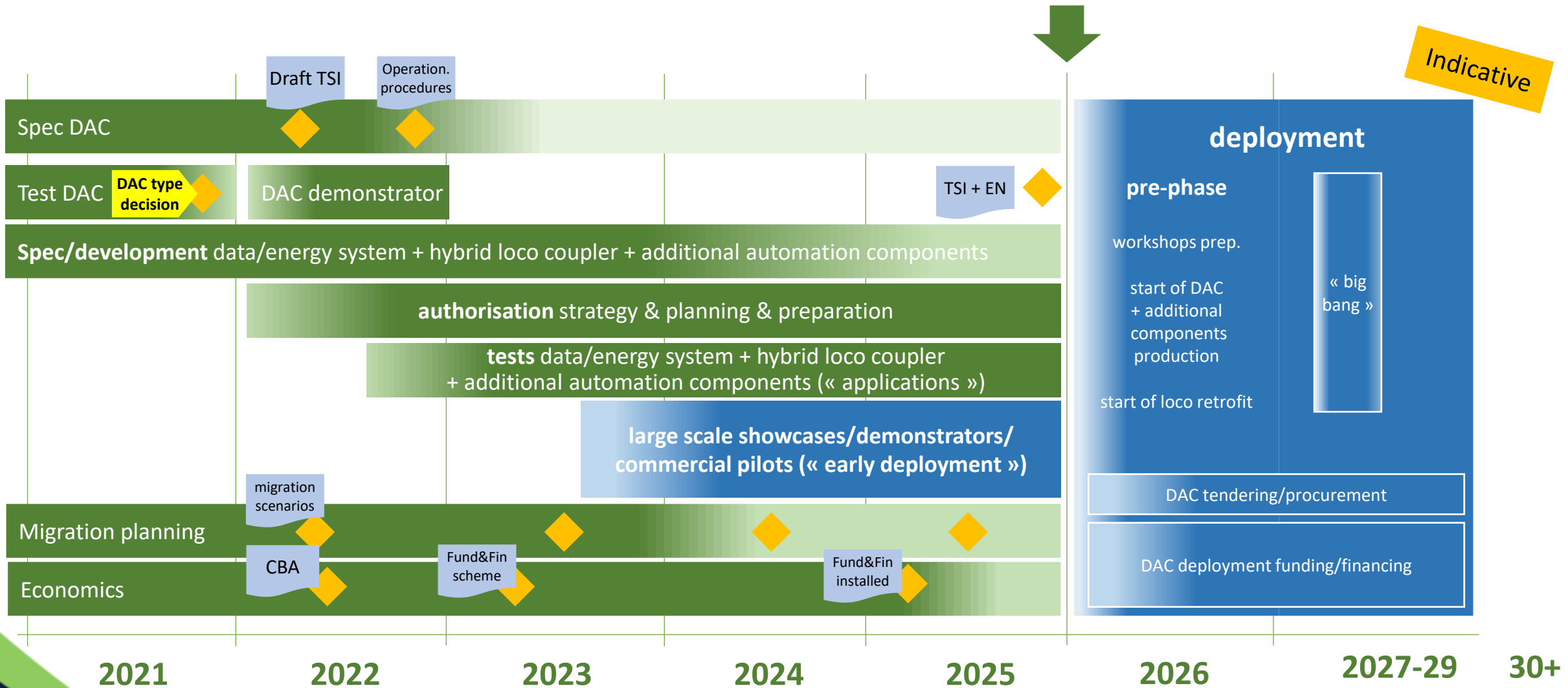
benefits = gains in process (time, system time, cost savings, capacity, reliability, quality, safety + induced modal shift)

DAC automation components – indicative architecture principle

draft/
example



Indicative overall time plan



EC/ERA/ER JU/EDDP alignment on TSI WAG revision 2022

The discussion showed the difficulty to complete even the mechanical and pneumatical DAC aspects for TSI WAG until 25/04/22

Agreed solution:

- › all good work done on DAC spec so far will be included in an ERA technical report
- › No migration dates, fleet exceptions etc. Yet

TSI WAG will read as follows:

7.6.2 Digital Automatic Coupling

As part of the Digital rail and Green freight TSI revision package (2022 revision) set out in point 7.6.1, the Commission requested the Agency to include provisions regarding the implementation of the Digital Automatic Coupling for freight wagons.

The provisions above should apply to both new, renewed and existing freight wagons. Due to the complexity of the discussion, the Agency did not deliver a recommendation in the Green Freight revision package. However, these provisions will be included in the TSI no later than in year 2025.

The Agency has produced a Technical Report showing the current state of development of the specification for the DAC. The report ERA/xxx/ is available in ERA website.

Vehicle authorisation preconditions for wagon/loco retrofit

ERA proposal:

- › Sector needs to prove that there is no potential to “impact safety adversely” when retrofitting vehicles [(EU) 2016/797 21(12)(b)]
- › Demonstration based on a **generic risk assessment & requirements capture** (for all vehicles - no case by case; plug&play approach)
- › **If this assured**, TSI could include detailed tech. spec., assessment methodology, statement that change cannot impact safety adversely
- › **Objective: as far as possible no vehicle re-authorisation after retrofit (at least for freight wagons)**

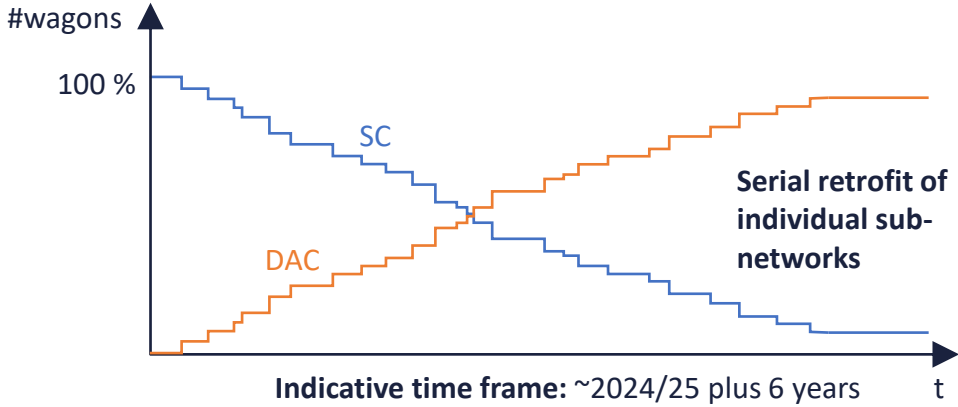
Challenges/TO DOs:

- › Risk scenarios / “plug&play conditions” to be included in TSI WAG (and, if possible, in TSI LOC&PAS) **before retrofit starts**
- › Probably some tests with wagons required (locos: tbd)
- › **Draft concept exists, work started**
- › **Under investigation: locos (mechanical integration of loco hybrid coupler & electrical integration)**

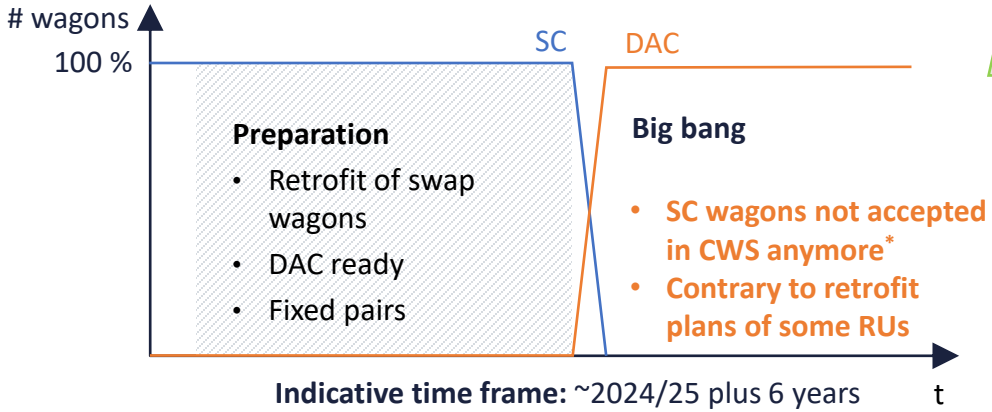
The overall migration path will be a serial migration of subnetworks with a CWS big bang at an earliest possible point in time

SCHEMATIC

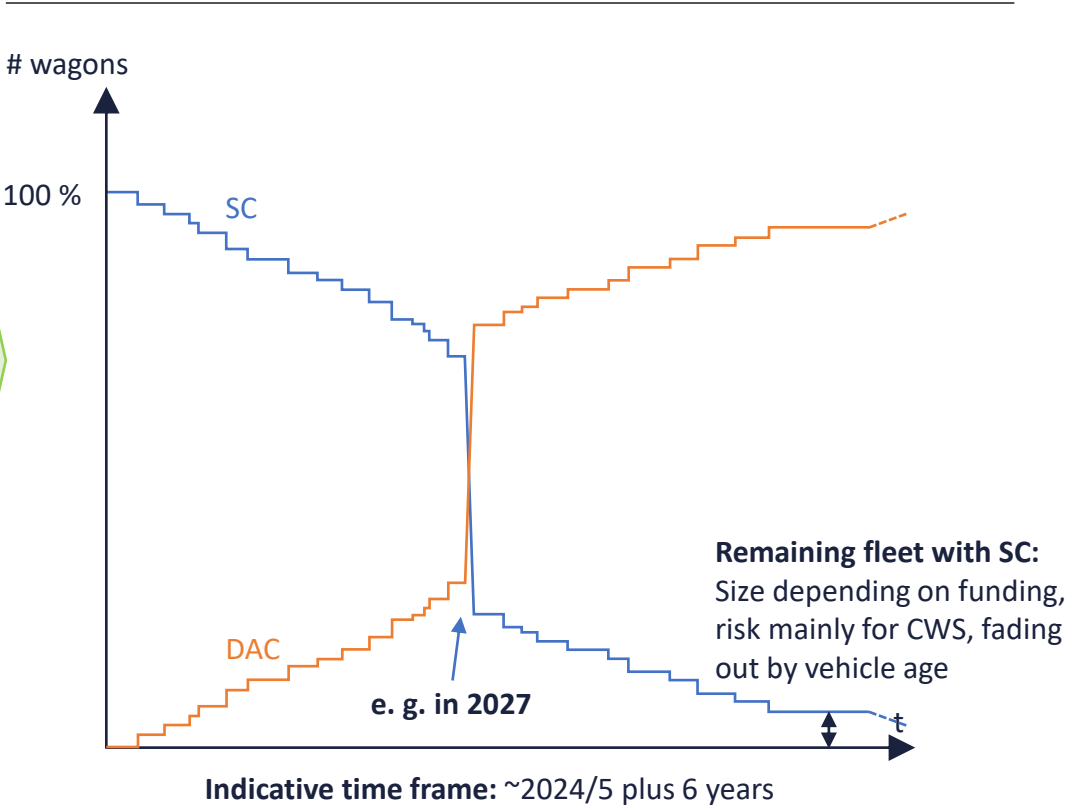
Seperately migrateable segments



CWS



Resulting overall



* Share of SC wagons in CWS would strongly impact the economic viability of CWS operations and DAC business case benefits

A single entry point for all Europe and beyond

<https://rail-research.europa.eu/european-dac-delivery-programme/>

Home » **Open European DAC Delivery Programme enabled by Europe's Rail**

IP5 Projects

Delivery Programme WPs & outputs

DAC 4EU

News

Events

Resources

Aim

European DAC delivered through **integrated shared programme** building upon R&I results and pilots; ensuring the necessary actions **for a fast, technically and economically feasible European-wide roll-out.**

Key benefits

- Delivering the European Green Deal
- Contributing to the Sustainable and Smart Mobility Strategy by increasing rail freight traffic
- Increasing Rail Freight Efficiency
- Increasing Infrastructure Capacity

Target

All freight wagons (450.000 - 500.000) in Europe couple automatically latest by 2030:

- > Selection of an open, fully functional, operationally tested, safe and sustainable European DAC open model ready for industrialization and deployment
- > Deliver final open design of the selected model by the end of 2021 of which interoperability and safety requirements to be incorporated to TSI, Green Deal & Digitalization Package 2022
- > Produce efficient and cross-countries compatible migration and business plans
- > Identify possible European funding to support the migration plan

Would you like to participate to the programme which is open for all?

Click on the button below to fill in the application form.

APPLICATION FORM

Any questions?

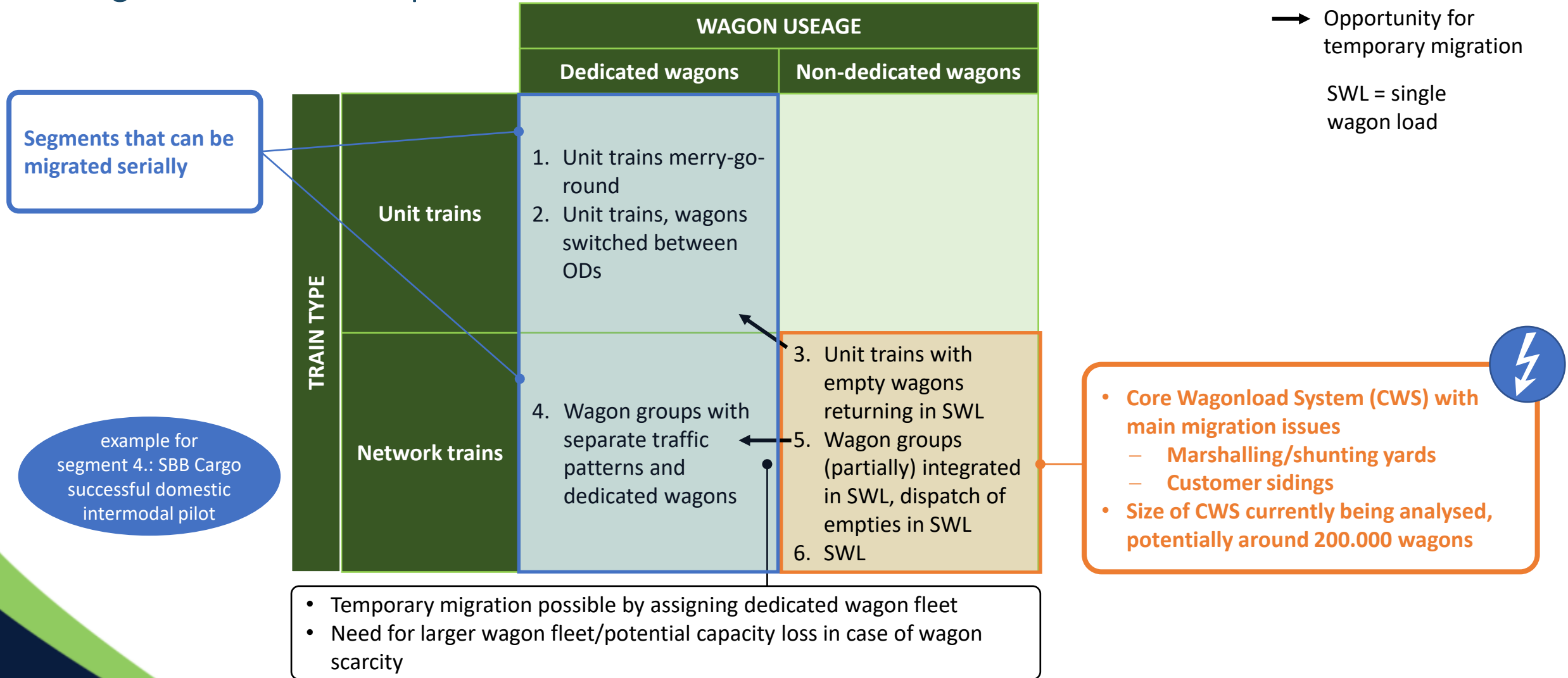
Europe's Rail EDDP Programme Management

- | | | |
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More information: <https://rail-research.europa.eu/european-dac-delivery-programme/>

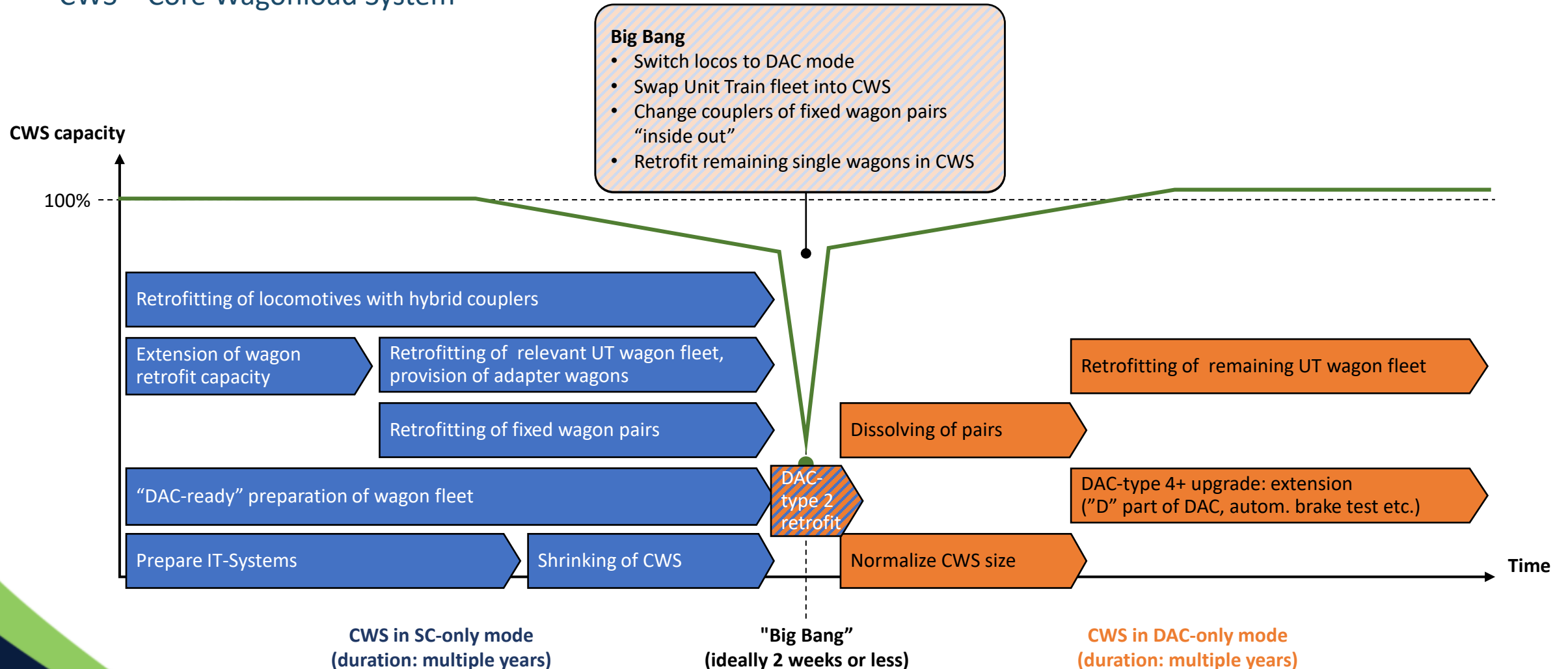
The main DAC migration issue resides in the Core Wagonload System (CWS) that cannot be operated in a mixed mode

Segmentation of transport flows



A big bang migration with preparation of assets and fixed wagon pairs is the only operationally feasible option for the CWS

CWS = Core Wagonload System



“DAC ready” is followed by “plug&play” – next to the wagon flows, partly in “pop-up retrofit points”

Idea of “pop-up retrofit points” for “DAC ready”




- After vehicles have been made "DAC ready", they are to be retrofitted as quickly as possible,
- Possibility: short-term "pop-up" retrofit points – with two main aims:
 - Creation of temporary, additional retrofit capacities
 - Retrofit close to the customer to reduce the long transport times to and from the workshop (and thus the time spent away from the customer/transport)
- Demonstration/testing planned for this summer

DAC migration in a nutshell

Main migration elements

- › Migration of **separable wagon fleets**
 - › Migration of traffic in **Core Wagonload System** (SWL & similar)
 - › Migration of most **locomotives** to hybrid couplers

 - › **Preparation** of wagons involved in “big bang”
 - › Exchange of screw couplers with DAC coupler heads
 - › Additional operational measures to support “big bang”

 - › *To be assessed further:*
 - *Possibility of additional procurement (wagon reserve for migration)*
 - *Scrapping bonus*
- 
- › **Step-by-step approach**
 - › **In one single step (“big bang”)**
 - › **Before** “big bang”

 - › **“DAC ready”**
 - › **In the field** during “big bang”
 - › **Wagon pairing**

 - › *for easier swap-over*
 - › *for e. g. assets w/o possible retrofit*