



**SP5 Migration to 2030/2050**  
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Burchard RIPKE and SP5 partners



## C4R solutions - selection

	Impact on infrastructure	Investment	Operation
Slab Tack	Rebuilding of track, sub-structure	++	++
New S&C's	Rebuilding of S&C's	++	+
25t Axle Load	Upgrade to E5, sub-structure, bridges	+++	+++
Longer Trains	Sidings, axle counter, bridges, signalling	++	+
Increased Speed	Maintenance of track, power supply	0 - +	0 - +
Terminal Upgrades	Rebuilding and upgrade of assets	+++	+
New Monitoring System	Sensors, data acquisition, evaluation	+	0
Optimized freight wagons	none	0	0

**Most C4R solution will impact the infrastructure, related investment and operation**

### Impact during migration

- 0 - small
- +
- ++ - medium
- +++ - strong

## Demands on the future railway with respect to the track

Demand	2015	2030	2050
Timeslots for maintenance - MTTR	100%	50%	50%
Planned & unplanned unavailability - MDT	100%	50%	< 1h/d
Specific CO2 emissions (incl. embodied)	100%	80%	50%
Resilience to severe weather conditions (measured by infrastructure down-time)	100%	<75%	<50%
LCC (NPV)	100%	90%	80%



**Innovative track constructions are necessary to fulfil these demands**



**Where?**



**Which construction?**



**When?**

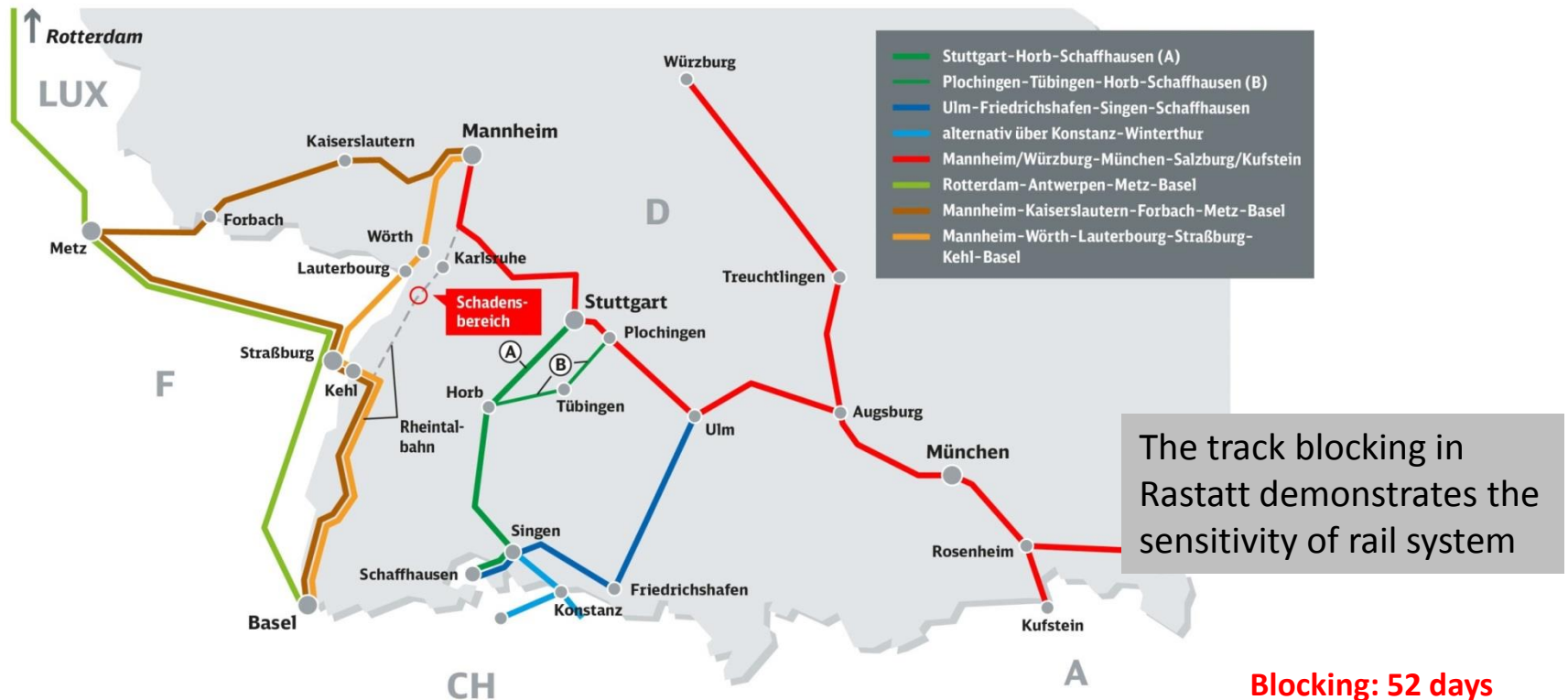


**Migration?**

## Decision criteria for upgrading with slab track



## Impact of track blocking on rail freight transport



Migration has to take into account the impact of blocking

## Comparison of application of slab track and ballasted track

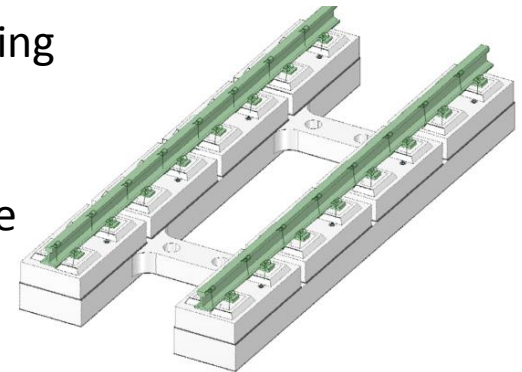
C4R

Aspect	Type	Compact	Pre-fabricated	Ballast standard	Ballast optimized
<i>New construction</i>		++	++	++	++
<i>Renewal</i>		o	+	++	++
<i>Earth structure</i>		+	++	++	++
<i>Bridge</i>		+	+	++	++
<i>Tunnel - single track</i>		+	++	-	-
<i>- double track</i>		++	++	+	+
<i>Sensitivity for installation failures</i>		medium	little	very little	very little
<i>Repair of rail support</i>		-	+	++	++
<i>Degree of mechanizing</i>		medium	good	excellent	excellent

Type of slab track is important for rebuilding

## Assumptions and Requirements

- Installation of slab track on an existing RCF
- Section length: 50 km double track
- Optimized installation procedure to minimize track blocking
- Use of existing ballast for HBL, drainage, ...
- Improvement of sub-structure is necessary on 30% of line
- **New track construction – SP1 solution**
- No experience with slab track for freight or heavy haul lines

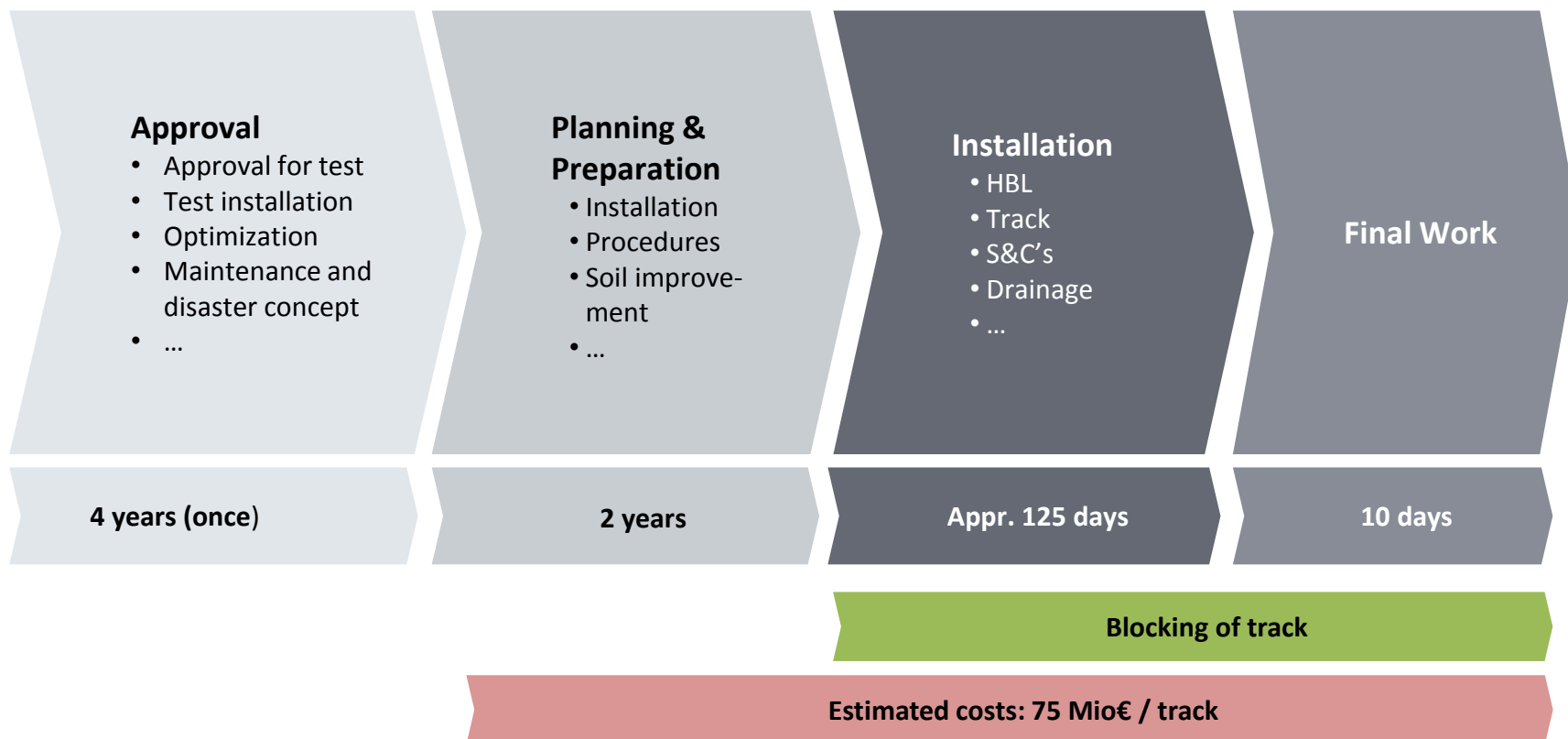


Source: SP1

## Cases

- Case 1 – alternative routes are available
- Case 2 – alternative routes are not available

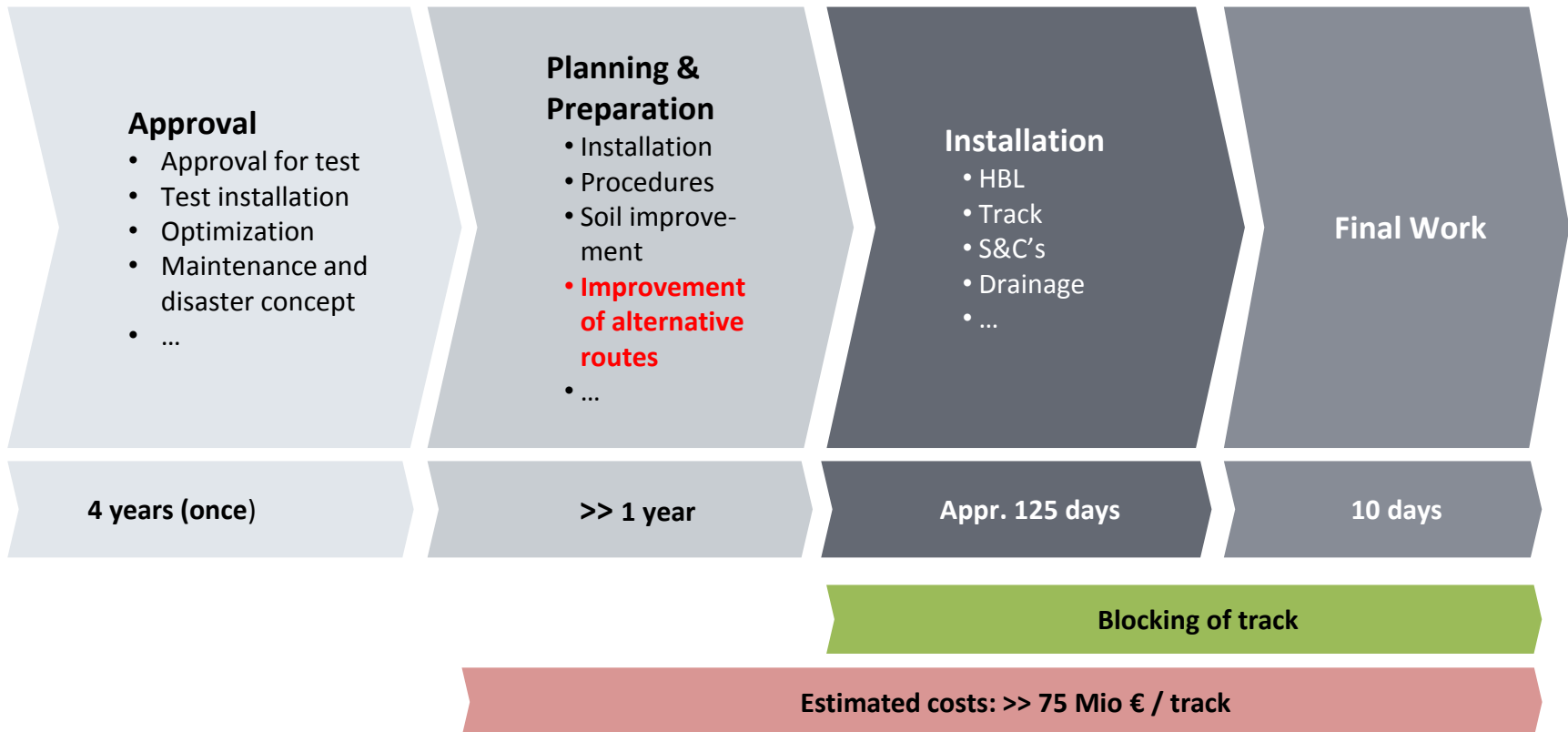
## Case 1 – alternative routes are available



Due to alternative routes track blocking is not a real issue

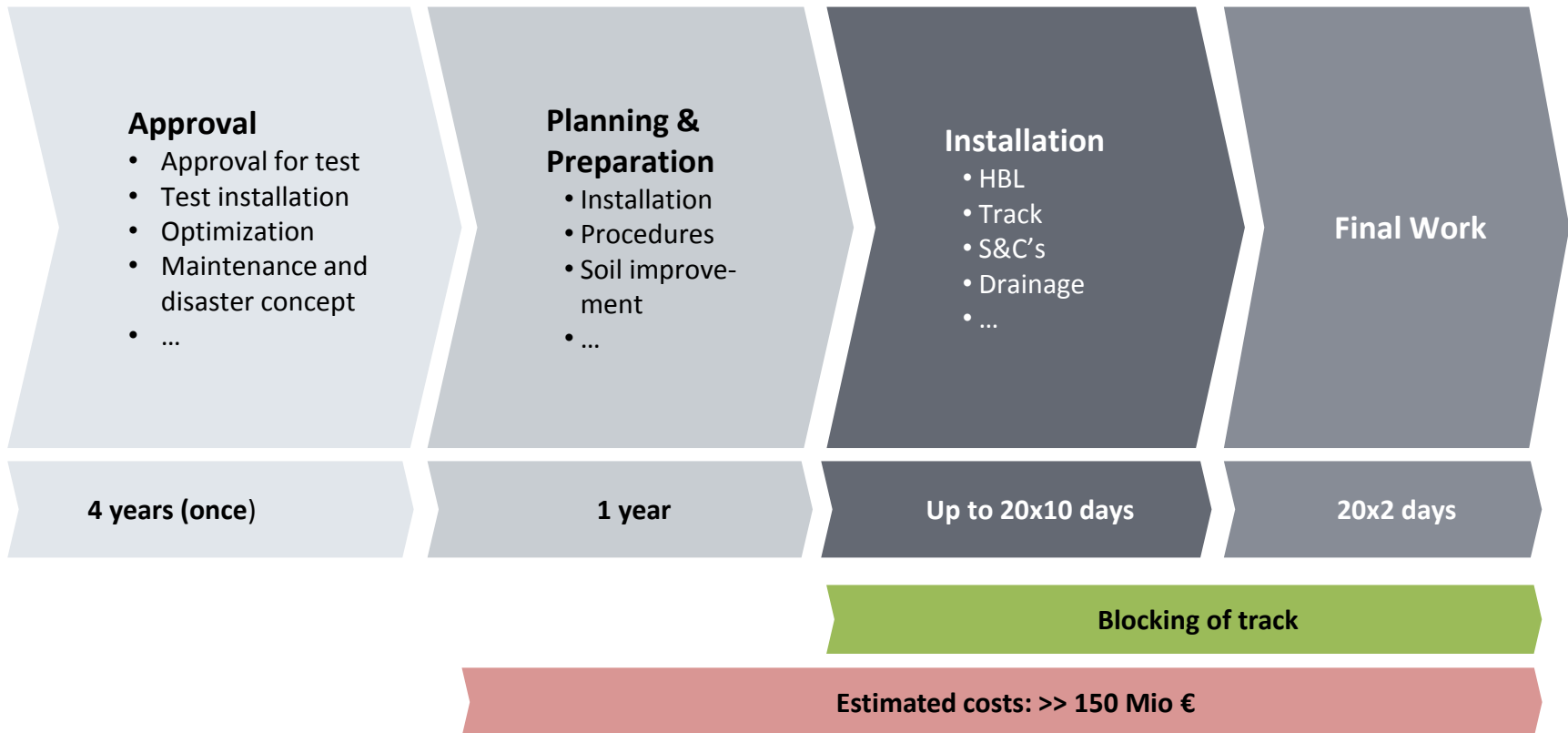


## Case 2 – alternative routes are **not** available



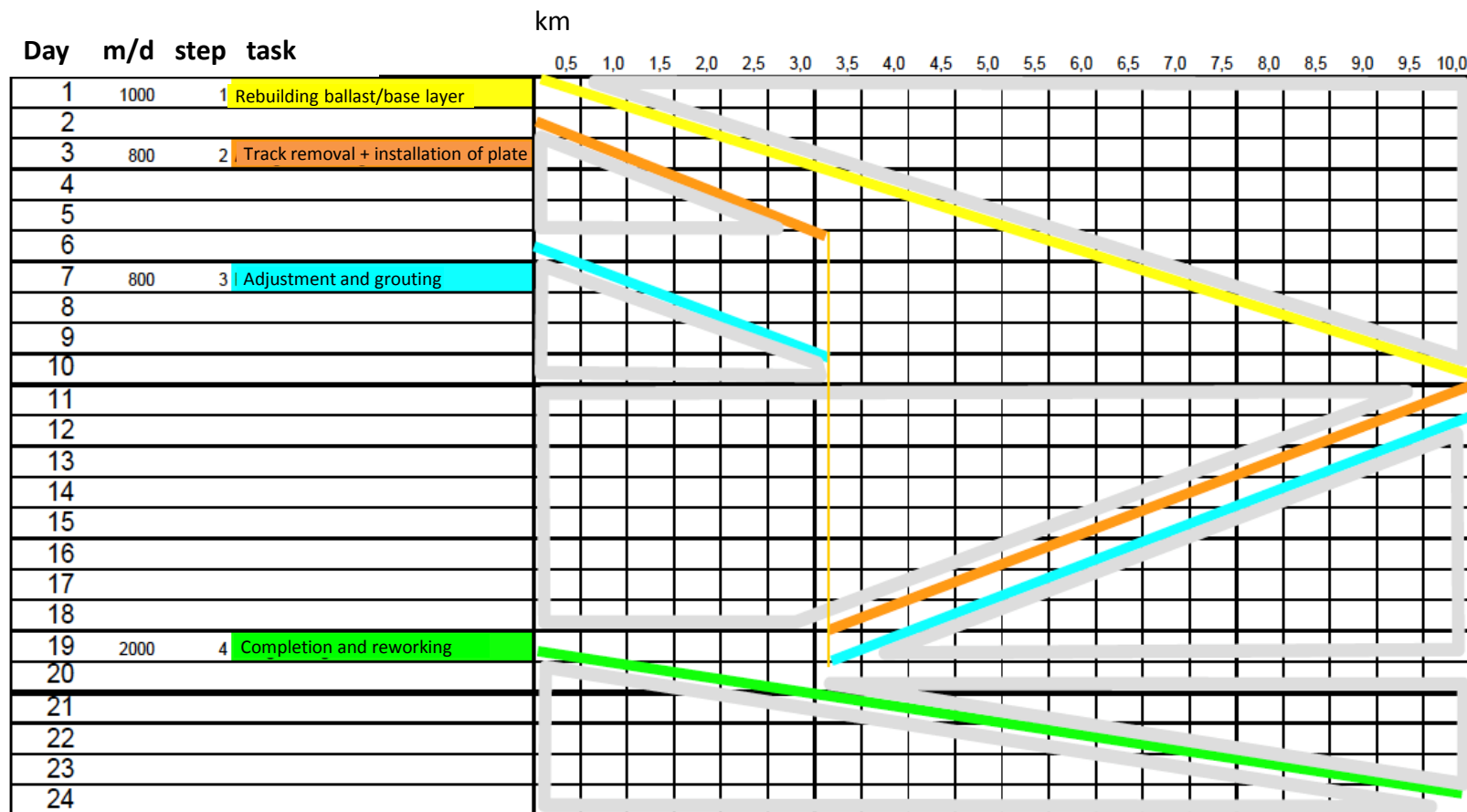
Track blocking is a issue, alternative routes should be prepared

**Case 2 – alternative routes are **not** available**



Track blocking is a issue, installation process is divided in 10 sections

## Sequence for rebuilding ballasted track into slab track

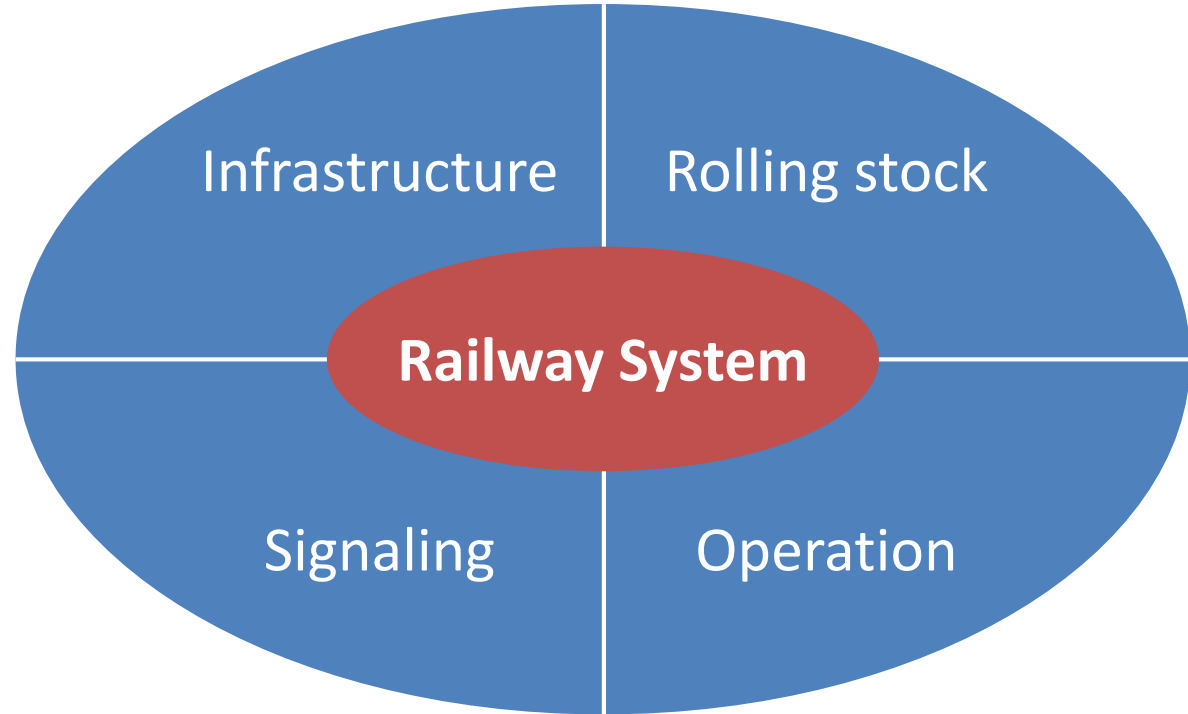


## **Necessary improvements for upgrading the track**

- Automated installation procedures with high quality output
- Automated correction of track geometry like in ballasted tracks
- Proofed repair and renewal concepts
- Cost reduction
- ...

## Conclusions

- Net Industry
- Track Access Charge
- External costs road, rail, water
- Long-life cycle
- High investment in infrastructure
- Interoperability



**To ensure European solutions, migration of innovations on RFC needs subsidy from EC!**

ADIF

University of Lisbon

University of Sheffield

TRL

TCDD

COMSA

NR

UIC

IK

*Thank you for your kind attention*

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