ERRAC
The European Rail Research Advisory Council

Foster Rail – Roadmap "Control Command and Communication"

07/04/2016 - Brussels

Jacques Poré
Alstom/UNIFE

ERRAC
The European Rail Research Advisory Council

Introduction

- The control, command and communication systems are pivotal to **increasing the efficiency** and **safety** of transport networks and operations

- High levels of safety are maintained when railways operate under a flexible, real-time intelligent traffic management system

- Secure customer information and communication technology provide **seamless transition between transport modes for passengers** and ensure the provision of a **modern multimodal freight distribution system**

- **Predictive and adaptable** operational control of train movements increases system **capacity**, conserves **energy and reduces life cycle costs**

ERRAC
The European Rail Research Advisory Council

Key issues and objectives linked to the SRRIA

- Increase capacity and reduce energy consumption through **real-time intelligent traffic management systems**, **Automatic Train Operation** (ATO), ensure interoperability.

- **Reduce life cycle costs** through cost effective standard design, test, installation and maintenance of signalling and communications need of an open architecture.

- **Dedicate a frequency bandwidth** or at least give the priority to urban railway.

- **Keep the current level of safety** in the rail networks and improve **cybersecurity** while increasing networked interconnections.

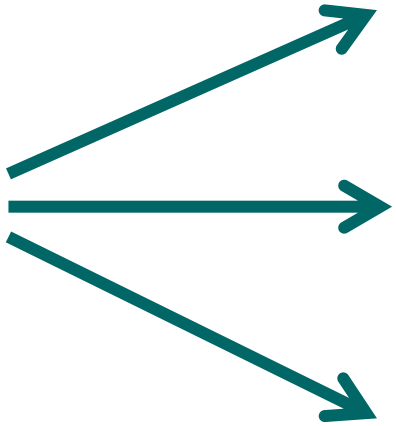
- Improve customer quality for both passengers and freight companies in the transition between transport modes: **enhance reliability and punctuality.**

- Maintain the **competitiveness** of the European suppliers.

ERRAC
The European Rail Research Advisory Council

State of the Art, including innovation from within and outside rail

- **FP7**



Specifications for a **new generation of interlocking systems**

A model of the complete on-board ERTMS system behaviour to eliminate interpretation differences

Research on a novel positioning system based on the combination of different techniques (**GNSS, UMTS and GSM-R**)

- **H2020**

Research on intelligent rail systems (infra + on-board) to increase capacity and reliability; GNSS (Galileo); ECC/ITS initiatives; cybersecurity

ERRAC
The European Rail Research Advisory Council

The Roadmap (1/2) Challenges

- **INCREASE CAPACITY**
  - Reduce the need for infrastructure-based equipment
  - Automatic Train Operation (ATO)
  - Moving block
  - New train localization/integrity
- **INTEROPERABILITY**
  - Trains that have on-board databases stored should be able to run autonomously: while the system is safer and less dependable on external physical signals, the cost of infrastructure should also decrease.
- **SAFETY**
  - Keep or increase current level of rail safety while increasing interconnections.
- **RELIABILITY AND PUNCTUALITY**
  - New radio-based control systems that allow for less signal failures
- **AFFORDABILITY**
  - Control command systems modularized: on-line tests minimized to almost zero
- **ENERGY EFFICIENCY AND SUSTAINABILITY**
  - Cost-effective standard design, test, installation and maintenance of signalling infrastructure and on-board equipment

ERRAC
The European Rail Research Advisory Council

The Roadmap (2/2)
Priorities for development

1. **Real time traffic management** capabilities for increased **capacity, energy efficiency and sustainability.**

2. **Robust** and **cost effective** standard design, test, installation and **maintenance** of **signalling infrastructures.**

3. **Future generation of train control systems** focusing on **autonomy, enhanced train location knowledge** and its impact in capacity, environmental gains and operational costs

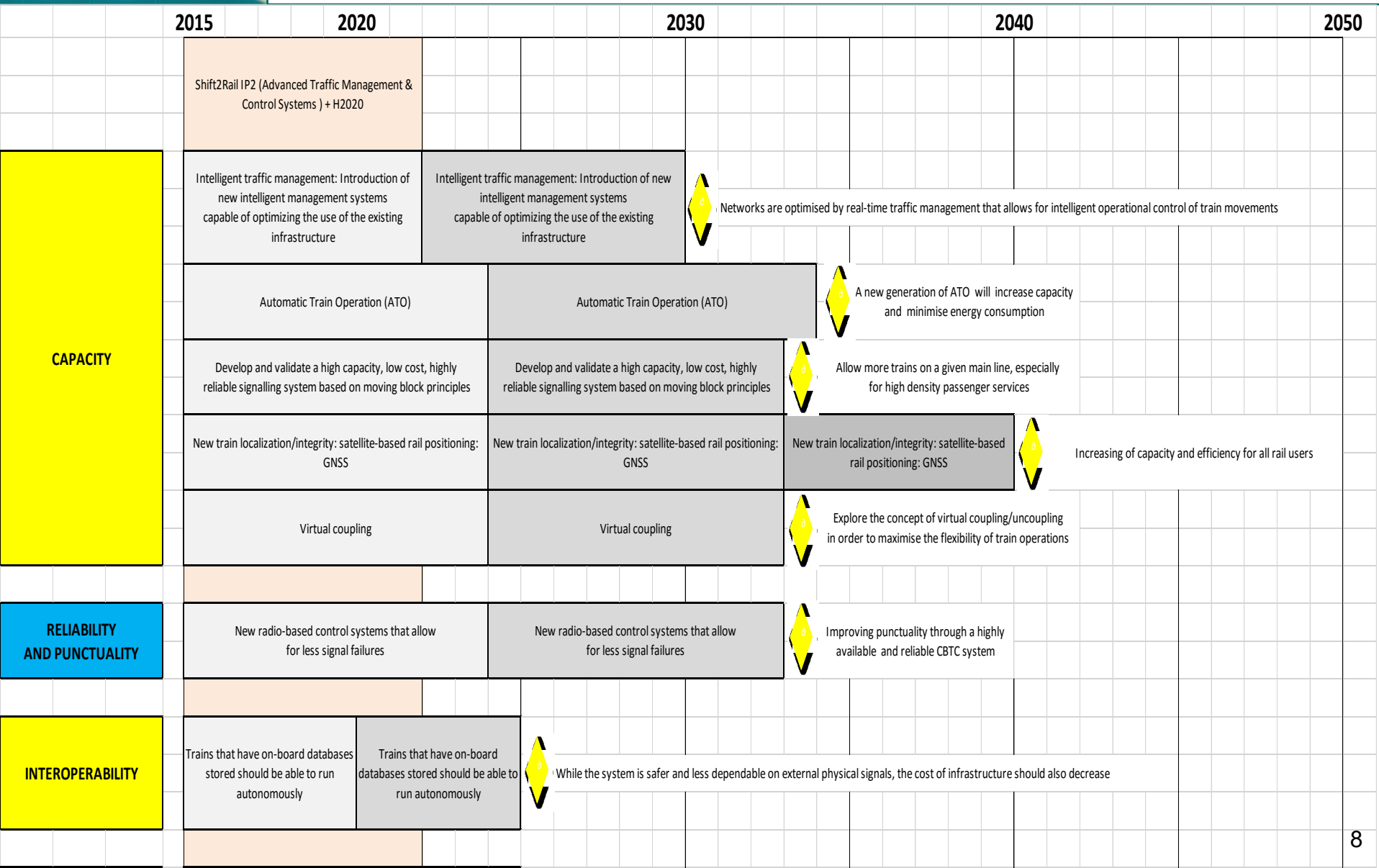
ERRAC
The European Rail Research Advisory Council

Implementation Plan
SHIFT²RAIL IP2 + Horizon 2020

- Develop a **fail-safe, multi-sensors train positioning system**, boosting the quality of train localization
- **Automated advanced traffic management systems** combined with Driver Advisory Systems (DAS) and automation functionality to allow for predictive and dynamic traffic management
- **Moving blocks** and train integrity
- Smart commissioning and **testing**
- **Virtual coupling**
- **Cybersecurity**
- **Application of GNSS in ERTMS**

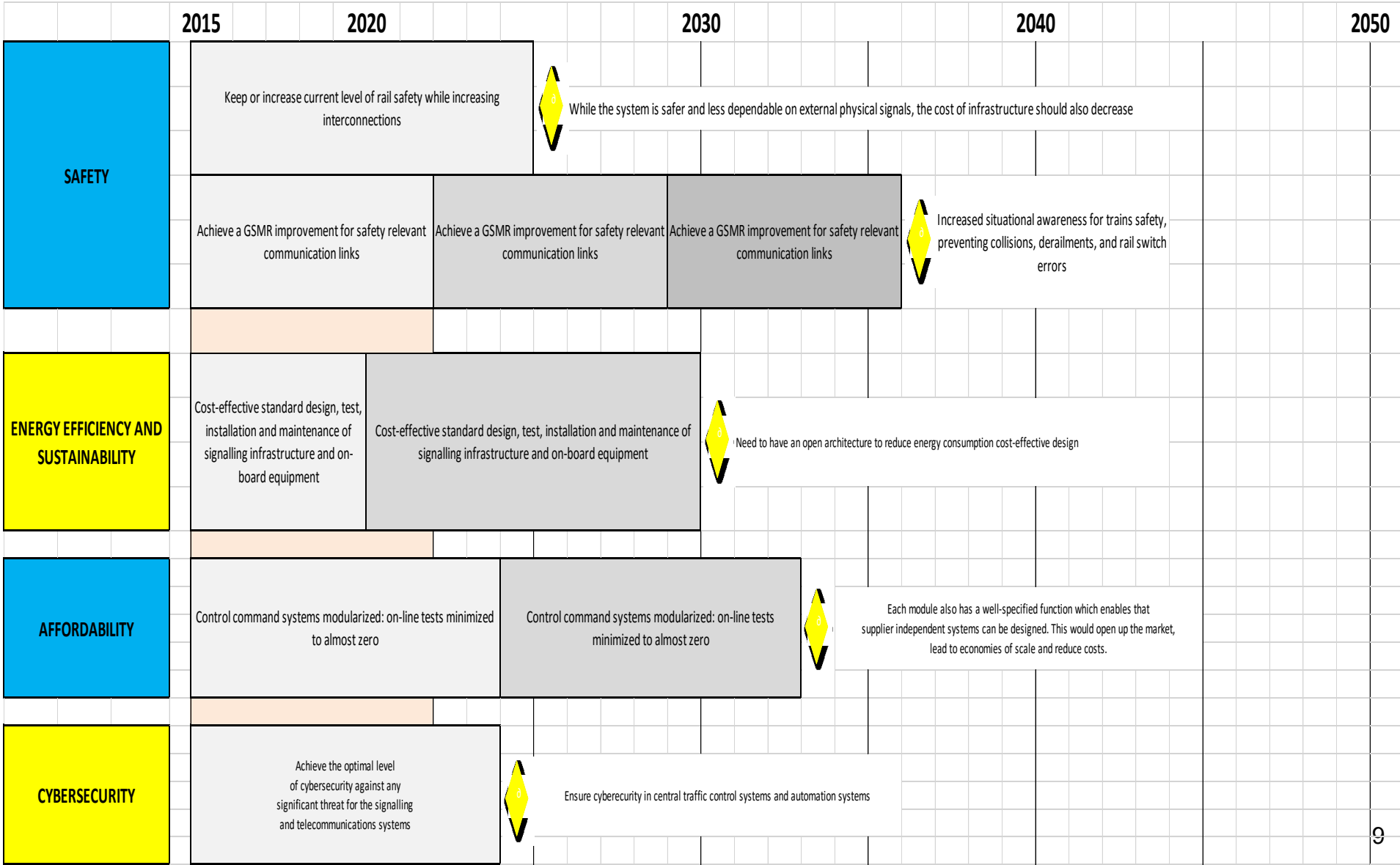
ERRAC
The European Rail Research Advisory Council

Visual Roadmap, milestones and deliverables overview (1/2)



ERRAC
The European Rail Research Advisory Council

Visual Roadmap, milestones and deliverables overview (2/2)



ERRAC
The European Rail Research Advisory Council

Thank you for your attention!

For the full report, please visit

http://www.errac.org/foster-rail/deliverables/