# Future Rail Mobile Communication System

*Dan Mandoc*
*UIC FRMCS Project Manager*

# UIC Future Railways Mobile Communication Systems Project

UIC FRMCS Project was formally initiated by UIC in 2014, after 4 years of previous activities in this field.

**Provide a set of overall preconditions for the successor of GSM-R:**

- User Requirements
- System architecture, interfacing with track side and on board equipment
- Frequency Spectrum
- Coordinated with stakeholders and partners

**Provide an appropriate replacement to EIRENE FRS:**

If possible 1-to-1

Based on User Requirements

-Investigate current usage of GSM-R; delete functionalities if unused

-Investigate future needs and add potential new functionalities

Apply this to (MI), (MI) and (O)

## Project Scope

**Investigate and perform studies for further improvement or opportunities related to:**

- Sharing infrastructure, spectrum or other resources
- .Usage of commercial non-specific equipment
- User applications;

**Migration Strategy:**

- Operational Impact
- Migration Spectrum needs
- Network model
- Interoperability
- Flexible FRMCS implementation plans

# 2017 – UIC FRMCS Project becomes GLOBAL

**UIC activities supported through ERIG***

(**EIRENE Networks Implementers Group*)

**UIC**

**Europe**

**Project.**

**Interfaced with TEN-T 4th Call**

**UIC Global Project**

**Aiming to involve important players like China, Korea, Japan, USA, Australia.**

2009 2014 2017

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## Why Change?

**GSM-R obsolescence.**

- Railway Operational Communications Industry Group (ROC IG) assured that GSM-R will be supported at least up to 2030.
  - **Planned GSM-R subsystems renewals** (due to e.g. equipment obsolescence or ETCS introduction).
- For railways, these are significant investments. The expectation for upgrades nominal life is 5-10 years. Therefore in the solution decision stage, it is expected to consider different options, including assessment for different technologies, for business or future proof reasons.
- ETCS radio bearer change in the middle of the ETCS expected life span will also impact the on-board EDOR change, which is very painful and expensive for the RU's.
  - **Railways mobile communications critical and business needs**.
- Railways have an increasing need for own wireless communications, from M2Ms to data in isolated places. Real Time information is a necessity, and will be the basis of the Connected Infrastructure. Many business aspects like maintenance are being automated with mobile handsets/tablets usage continuously increasing.

# FRMCS Project organisation

**UIC Governance structure of currently two Working Groups (WG) and one Associated Working Group (UGFA) :**

**WG Functionalities**

- **Functionalities:**
  - User Requirements
  - Use Cases
  - Traffic Analysis
  - Support ETSI SR Doc
  - Use Cases for 3GPP SA1
  - FRS

**WG Architecture & Technology**

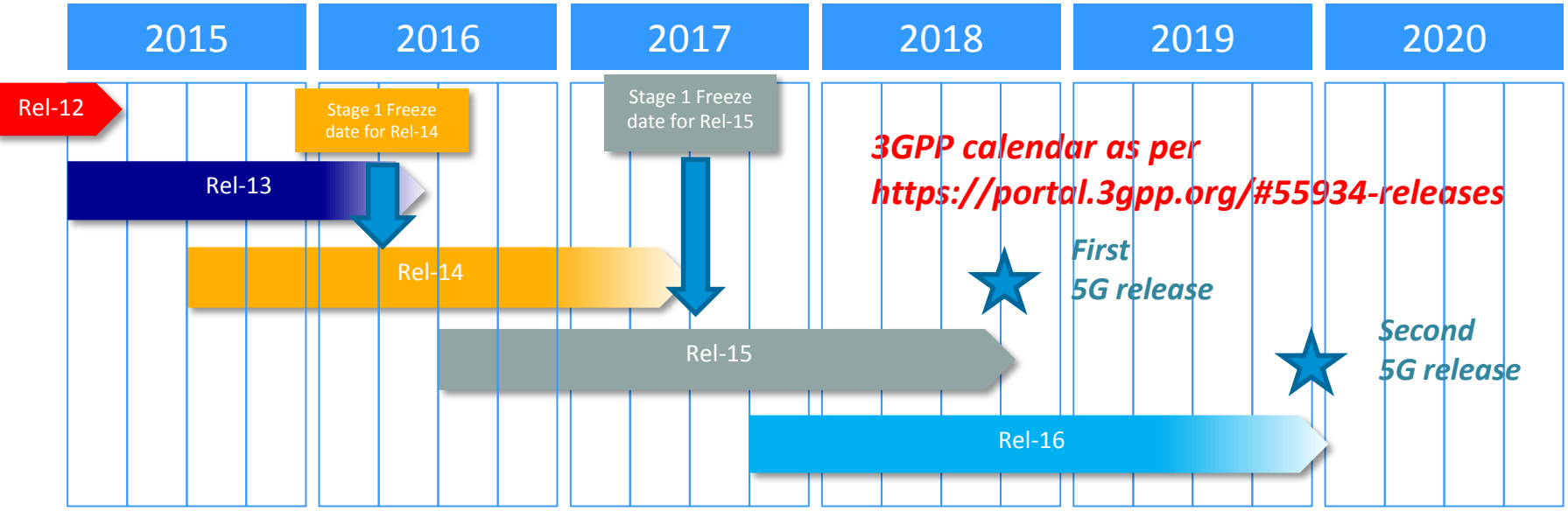
- **Architecture and Technology:**
  - Technology survey
  - On board and Track Side Architecture
  - Security
  - Use Cases for 3GPP SA1
  - Support ETSI SR Doc

**UIC Group on Frequency Aspects**

- **Spectrum:**
  - Spectrum analysis, needs, strategy
  - Interface ECC / WG FM, ETSI.
  - Traffic Analysis
  - Support for ECC WG FM56

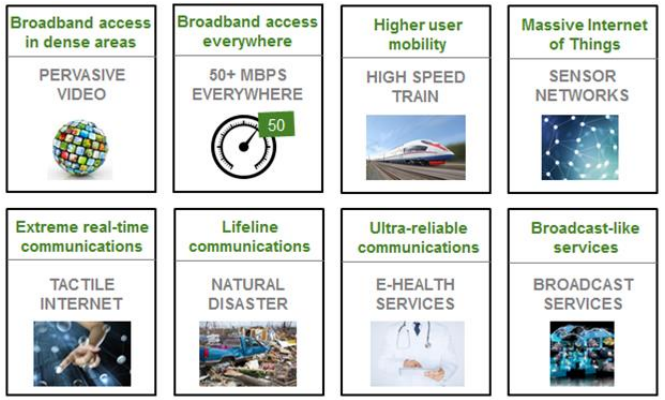
**Interfaced with the UIC Platforms, ERIG, ERA, ETSI TC RT, stakeholders and partners.**

# From 3GPP Standardization to equipment availability Timelines



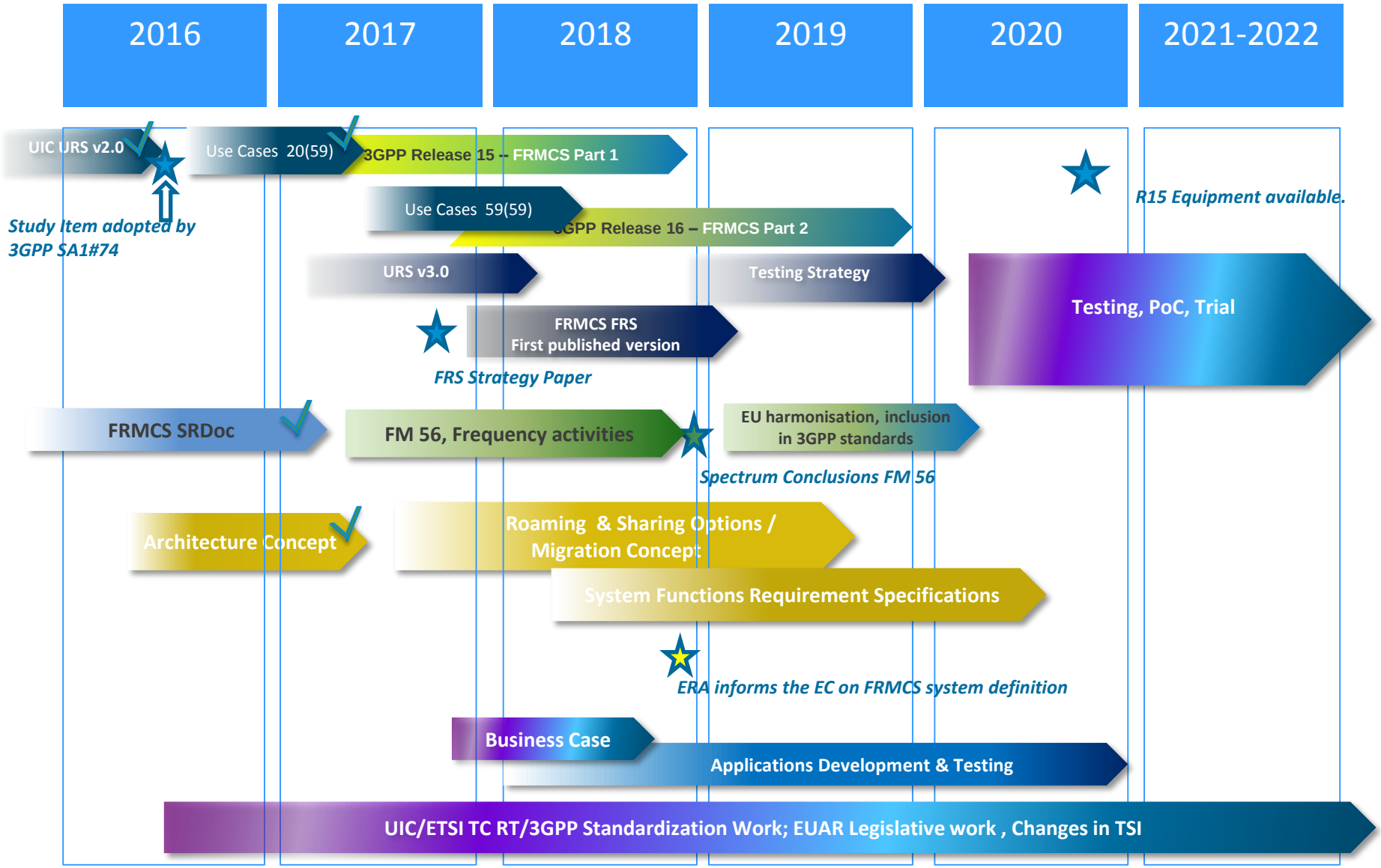

**Public Safety Equipment Availability**

- Group Communications Enablers (GCSE)
- Proximity Services (ProSe)
- Device-to-device communications (D2D)
- Group Based Enhancements (GROUPE)
- Extended Proximity Services (ProSe-Ext)
- Device-to-device Communications cont…
- Isolated E-UTRAN Operation (IOPS)
- Mission Critical Push-To-Talk (MCPTT)




**5G use case related examples from the NGMN 5G whitepaper.**

# FRMCS Integrated Plan

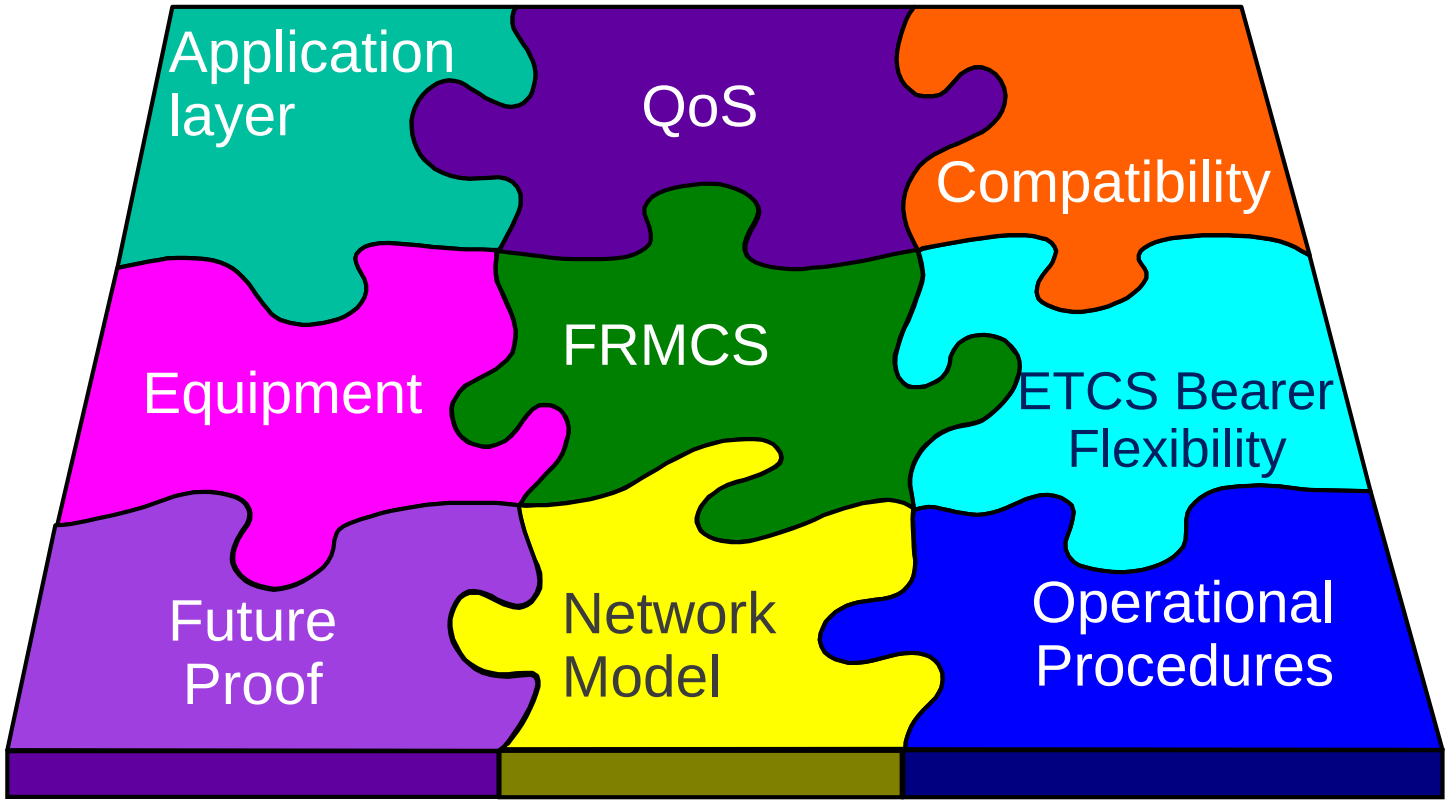


# Future Railways Mobile Communication System

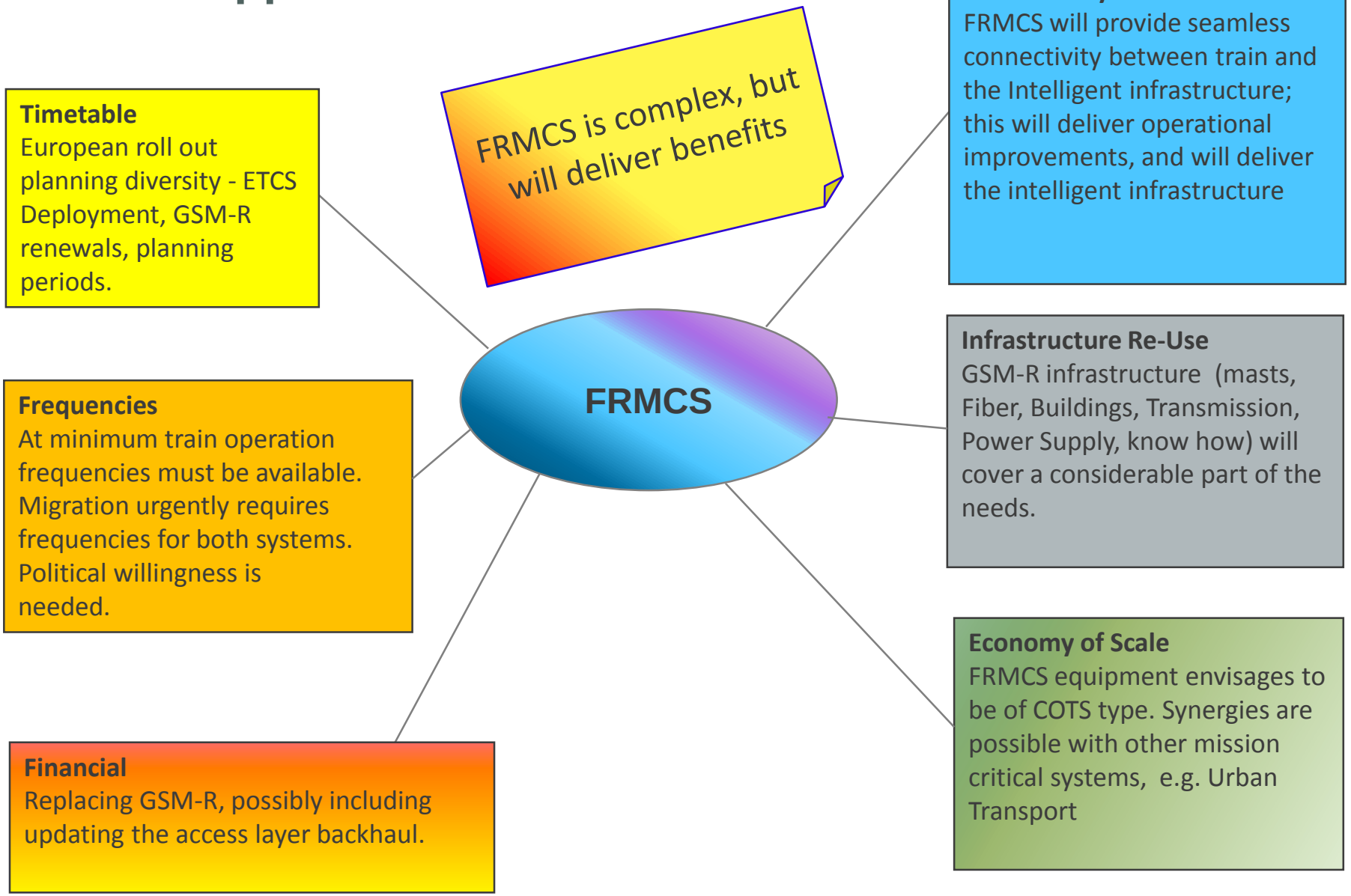
## High Level Integrated Plan

- Functionalities
  - Assess potential new Sector needs (URS)
  - 59 Use Cases planned to be transferred to 3GPP. Finalize transfer of Use Cases with R16 (first 20 use cases transferred to R15). Keep Use Cases aligned with needs of the Sector
  - Prepare and deliver FRMCS FRS v 1.0
- Architecture
  - Finalize Architecture model (On Board included)
  - Investigate Sharing and Roaming synergies with MNOs and Public Safety ( for e.g. fall back or regional lines)
  - Support Migration Plan
  - Start SRS
  - Continue Technologies Assessment
- Frequencies
  - Obtain harmonized, dedicated spectrum for critical applications
  - Discuss/obtain spectrum for train performance
  - Include migration needs
  - Include the frequencies allocated to FRMCS in 3GPP

# FRMCS Challenges



# Risks & Opportunities



# Future Railways Mobile Communication System

## Way Forward

- UIC FRMCS project continues, at Global Level. This will make possible access to enhanced innovation, and improve the system economy of scale. FRMCS shall:
- Continue the work with 3GPP and with CEPT WG FM / ECC.
- Deliver the Functional Requirements Specification v1.0
- Support ETCS bearer flexibility, so that the radio system change shall not impact ETCS.
- Continue at UIC and ETSI level the specification and standardization work for the system
- Start investigating the application layer
- Work on synergies with other stakeholders
- Propose a well documented Migration Concept

- Telecom importance within the Rail System is on a increasing trend.
- GSM-R obsolescence will become critical, and the FRMCS must cover the gap at latest the end of next decade.
- FRMCS is a game changer. It will improve the connectivity, and will enable the intelligent infrastructure and connected trains. It will enable a Digital Railway!


Thank You for Your Attention
Questions?
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