FRMCS Definition, Specification and Standardization Activities

ERA CCRCC 2019

Dan Mandoc, UIC FRMCS Project Manager

Future Railway Mobile Communication System Project

Three main work directions, to provide the baseline platform for the system definition and delivery:

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

Provide an appropriate replacement to EIRENE FRS:

- **Based on the User Requirements**
- **Investigate future needs and add new functionalities**
- **Technology independent**
- **Future Proof**
- **Application Layer approach**
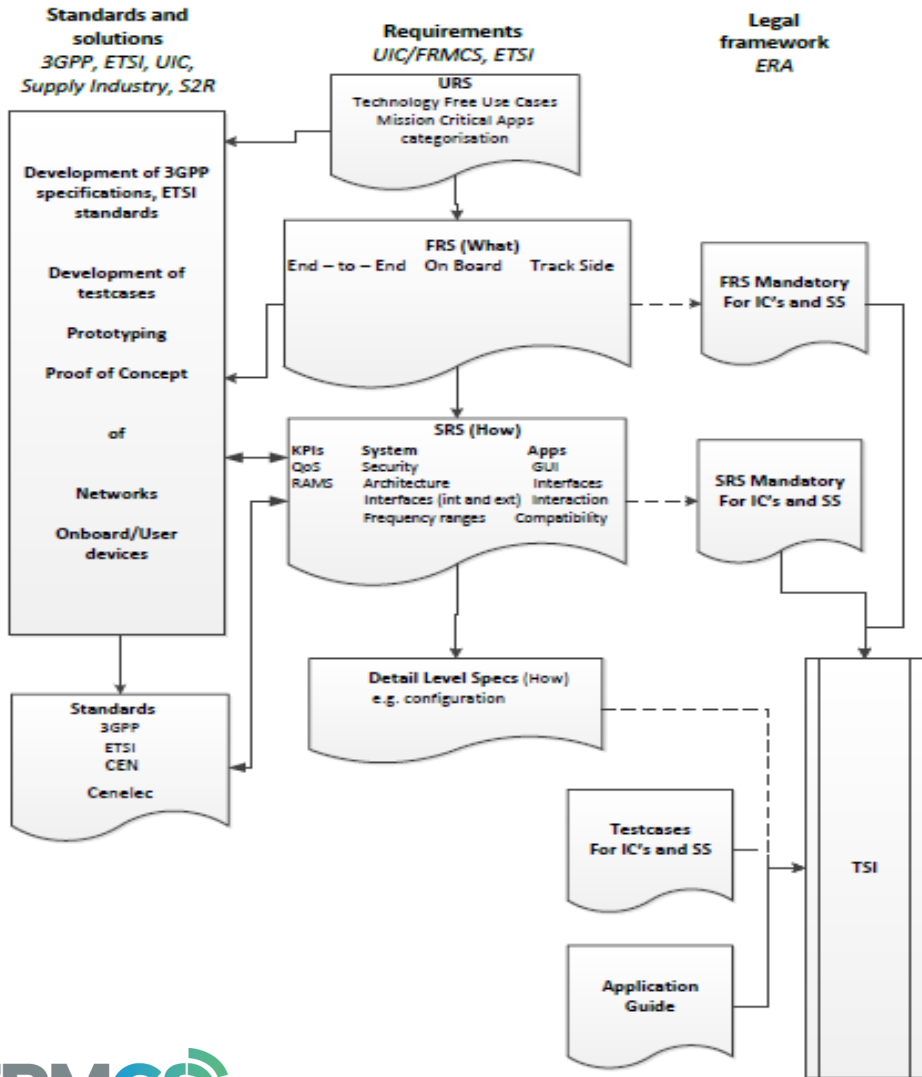- **Enabling Interoperability**

Provide an appropriate replacement for EIRENE SRS:

- **Based on 3GPP and ETSI specifications**
- **Define building blocks and interfaces**
- **Provide comunication service to the application layer**
- **Ensure interoperability**

Project Scope:
Provide overall technical conditions for the successor of GSM-R
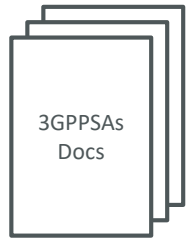
FRMCS
Future Railway Mobile Communication System

FRMCS: Specifications workflow

**FRMCS will be based on 3GPP building blocks, gaps will be covered by ETSI specifications.**

The system will have an FRS and an SRS, to provide the necessary means to operate the FRMCS networks and to guarantee their interoperability in the context of cross border operations.

The FRS and the SRS will complete the FRMCS system and will be the base in the CCS TSI for the Train-Radio and ETCS critical applications.
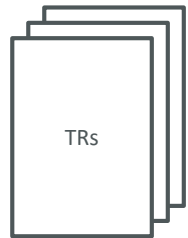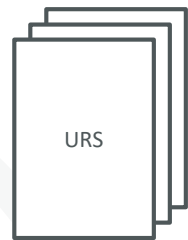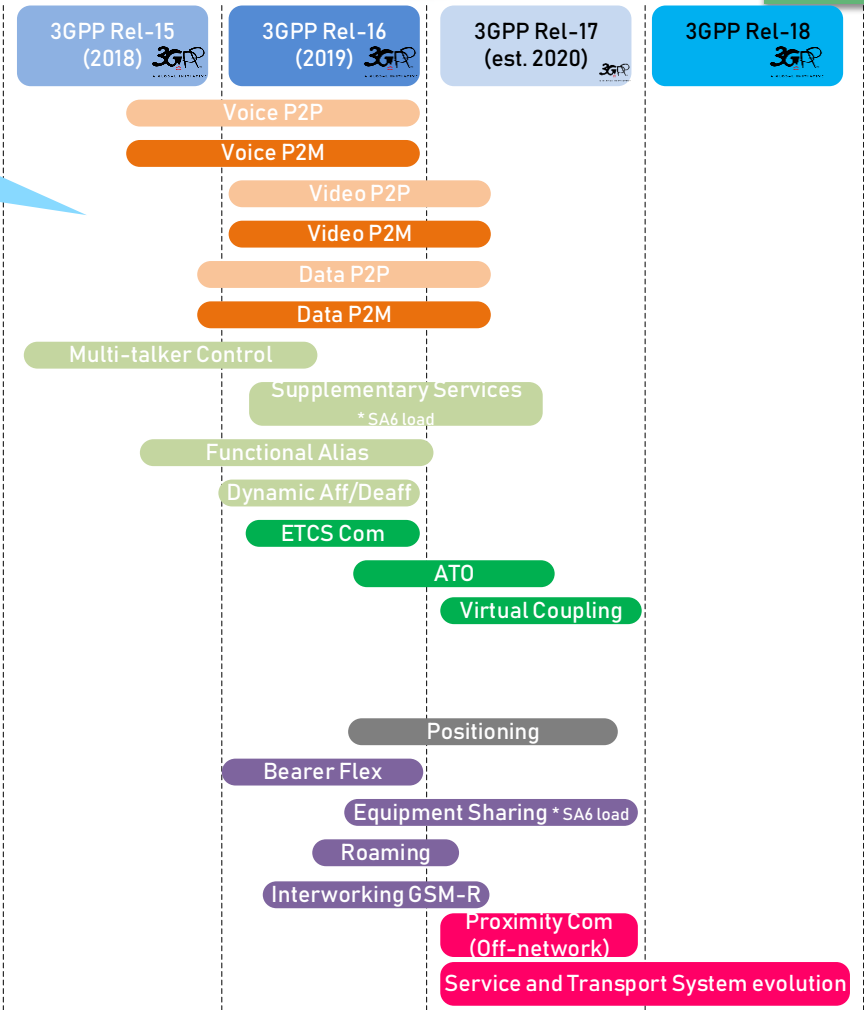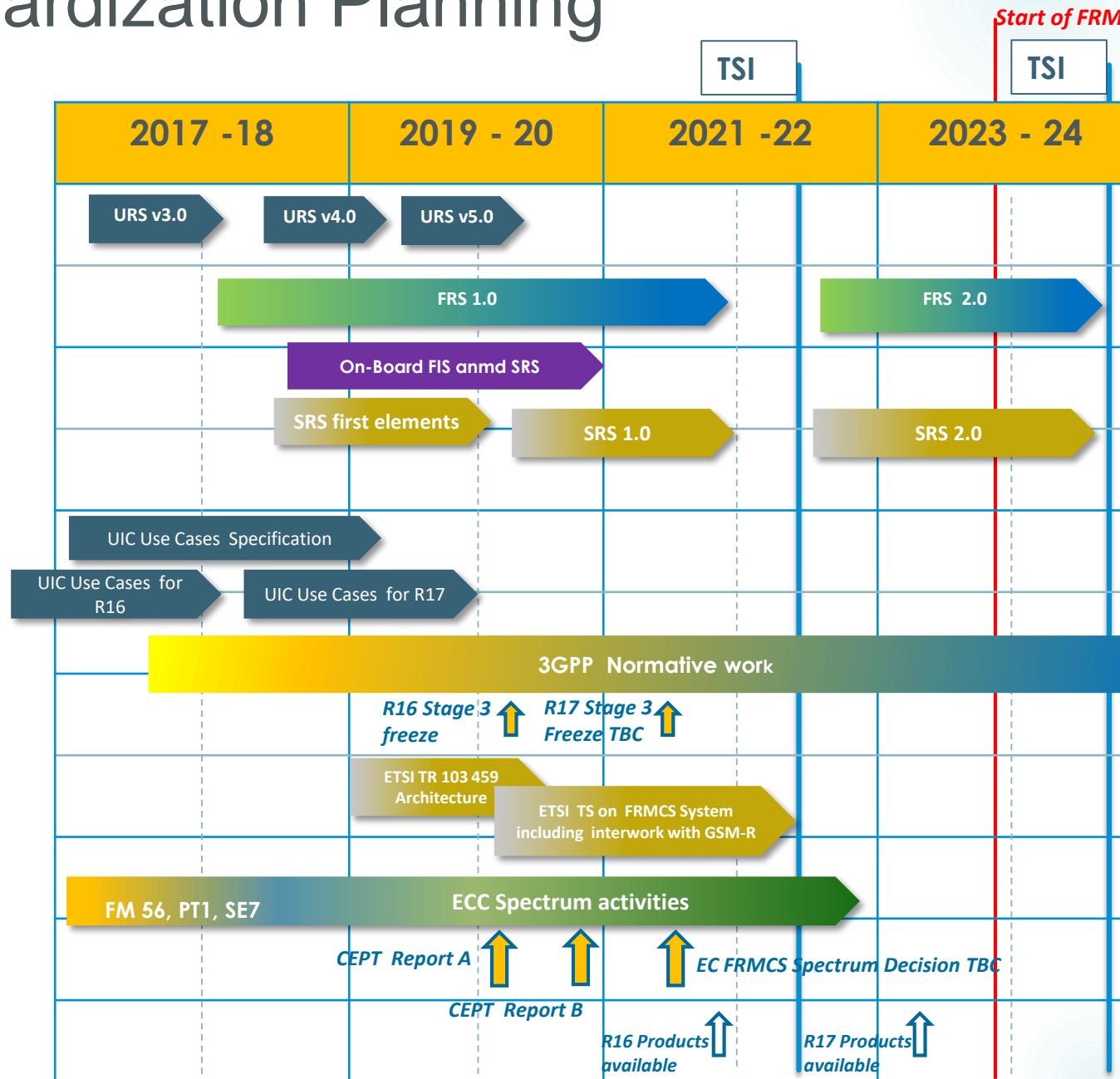
FRMCS Standardization Planning

Start of FRMCS European Trial

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FRMCS FRS, SRS, FISs
-Deliver and FRS based on the global accepted URS
- Deliver a FRMCS SRS and FISs coordinated with ETSI RT & 3GPP

ETSI TC RT & 3GPP
- Deliver complete set of use cases to 3GPP
- Include all use cases in with 3GPP MCX
- Deliver a set of ETSI specifications to cover FRMCS needs and interwork with GSM-R
- With UIC FWG and ATWG support

Spectrum
Obtain spectrum for critical applications in 900, 1900 and/or 2300 MHz for migration period. Secure 5 MHz in 900 MHz and access to 1900 MHz and/or 2300 MHz post migration

TSI	TSI

2017 -18	2019 - 20	2021 -22	2023 - 24

URS v3.0　URS v4.0　URS v5.0

FRS 1.0　　FRS 2.0

On-Board FIS anmd SRS

SRS first elements　SRS 1.0　SRS 2.0

UIC Use Cases Specification

UIC Use Cases for R16　UIC Use Cases for R17

3GPP Normative work

R16 Stage 3 freeze　R17 Stage 3 Freeze TBC

ETSI TR 103 459 Architecture

ETSI TS on FRMCS System including interwork with GSM-R

FM 56, PT1, SE7　ECC Spectrum activities

CEPT Report A

CEPT Report B

EC FRMCS Spectrum Decision TBC

R16 Products available

R17 Products available

DELIVERABLES	
URS 4.0	Q1 2019
FRS 1.0	Q2-3 2021
On Board FIS	Q4 2020
On Board SRS	Q1 2020
SRS V1.0	Q3 2021
Final CEPT Rep A	Q1 2020
Final CEPT Rep B	Q3 2020
EC FRMCS Spectrum Decision	Q2 2021
R16 Use Cases	Q3 2018
R17 Use Cases	Q3 2019
ETSI FRMCS TS	Q2 2021

FRMCS Available for National Trials

FRMCS High Level Plan

2Q'2019	3Q'2021	4Q'2022	4Q'2024

FRMCS V1 Specification	FRMCS Demonstrator ⇒ V2 Spec	FRMCS European Trial ⇒ Readiness
STARTING POINT	**STARTING POINT**	**STARTING POINT**
• URS 4.0	• Stabilized FRMCS Specification	• Operational FRMCS Specification
• Use Cases V1 to 3GPP R16 (60%)	• R16 Products : MCX 4G/5G (→ Industry)	• R17 Products : FRMCS 5G (→ Industry)
PLAN	**PLAN**	**PLAN**
• FRS 1.0	• FRMCS demonstrator based on FRMCS V1 (→ H2020, S2R)	• FRMCS European Trial(s) based on FRMCS V2 (→ CEF, S2R)
• On-Board System Definition & Migration	• FRS 2.0	• FRS 3.0
• On-Board FIS 1.0	• On-board FIS 2.0	• On-board FIS 3.0
• SRS 1.0	• SRS 2.0	• SRS 3.0
• Validation of Uses Cases V1 in 3GPP R16	• Validation of Use Cases V1 in 3GPP R17	• Validation of Use Cases V2 in 3GPP R18
• Use Cases V1 to 3GPP R17 (95%)	• Use Cases V2 in 3GPP R18	• Use Cases V3 in 3GPP R19
• Use Cases V1 Gaps vs. 3GPP => ETSI TS	• Preparation of TSI inclusion 1 (→ ERA)	• Preparation of TSI inclusion 2 (→ ERA)
• CEPT Report with Railway Frequencies & radio coexistence criteria, then EC Radio Spectrum Committee harmonization	• Frequency Plans for Migrations	• Cross-borders procedures
• Technology target(s) decision	• Deployment & ENIR Migration assessments	• Interconnection hubs development (→ Industry, → CEF, S2R)
• Migration Scenarios Traffic Estimates	• Signalling Continuity assessments	• Guidelines for Operational Migrations

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FRMCS Challenges