FDP Institutional Issues

FDP SYSTEM AND SERVICE STANDARDISATION

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FDP System and Service Standardisation

✓ **Existing standards and issues**

■ **Foreseen Layers of Rule-Making in the EU**

■ **Improvements needed**

■ **Proposed approach**

■ **Standardisation Roadmap**

■ **Qualification and certification issues**

ICAO Standards:

- ICAO FPL format standard defined in Doc 4444 and related to Annex 11 (Rules of the Air and Air Traffic Services)

- AFTN & AMHS standards defined in Annex 10 (CNS) for aeronautical data communication (including transmission of FPL messages)

European Standards: Eurocontrol-defined standards now published as European regulatory framework

■ OLDI (On-Line Data interface)

■ ADEXP (ATS Data Exchange Presentation)

■ FDE-ICD (Flight Data Exchange - Interface Control Document down to the inter-FDP specification of an X25 interface)

Current activities:

■ A common Flight Data Exchange Standard is under definition between Canada, USA and Mexico

■ EUROCAE has 2 working groups in charge of new FDP-related standardisation:
— WG 59 addressing inter-FDP inter-operability
— WG 61 for defining an open FDP architecture

Current issues:

■ New technical standards become too complex to be formally adopted and revised by means of classical line-by-line review procedures
(cf. new procedure at ICAO for putting the technical details into a Manual)

■ The European Commission needs a faster and more adequate mechanism to match its own regulatory requirements

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■ <u>Essential requirements</u>: the general principles that are part of the high level regulation to be enforced by all national authorities after being adopted by the political bodies of the Union

■ <u>Implementation rules</u>: more specific yet stable requirements reflecting essential requirements these rules that have to be adopted through an open consultation mechanism with all the parties impacted

■ <u>Voluntary standards</u>: technical inter-operability and performance requirements defined by the industry through transparent consultations.
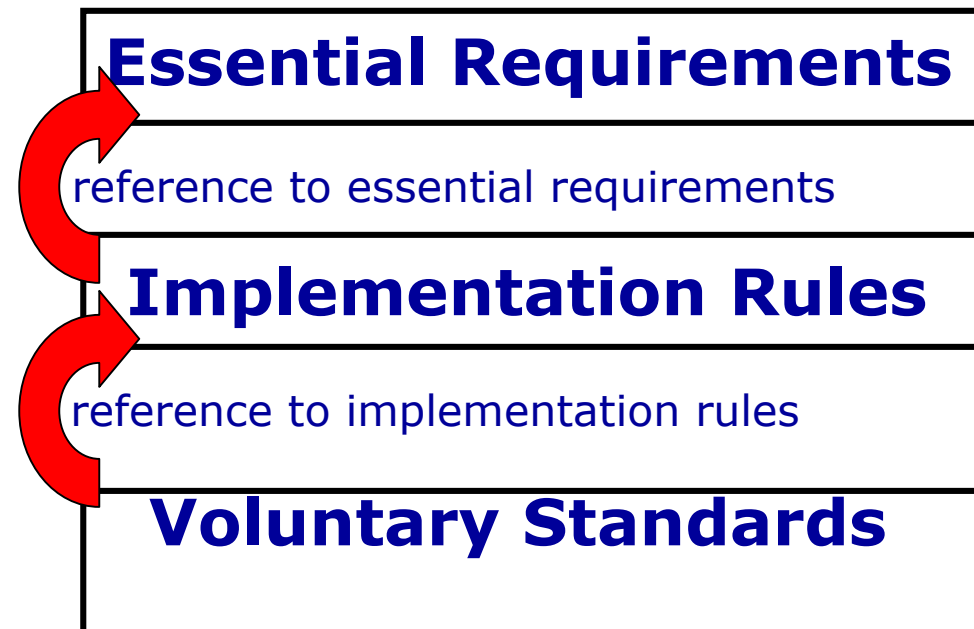
Voluntary standards may make reference to the implementation rules so as to become eligible as acceptable means of compliance. They can then be promoted as best practice, and be used by consensus without having to be incorporated directly into regulations

Current system

European Regulations including

detailed technical regulations like

EC 2082-2000

Future System

Essential Requirements

reference to essential requirements

Implementation Rules

reference to implementation rules

Voluntary Standards

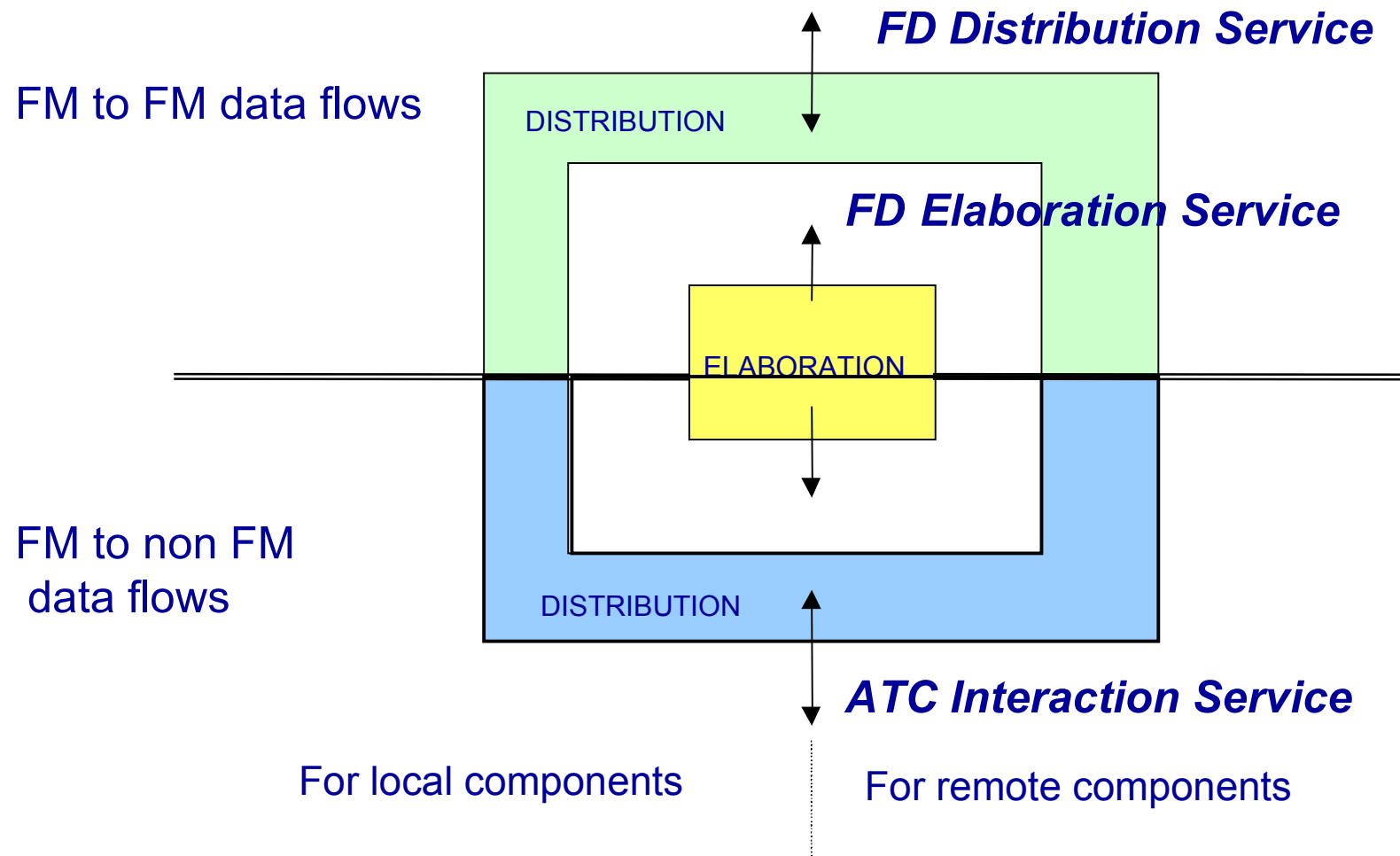# FDP System and Service Standardisation

- **Existing standards and issues**

- **Foreseen Layers of Rule-Making in the EU**

- ✓ **Improvements needed**

- **Proposed approach**

- **Standardisation Roadmap**

- **Qualification and certification issues**

Improvements needed

- **Improved inter-operability**

- **Performance homogeneity**

- **Stability of implementation rules**

- **Enhancement of security**

FD Distribution Service

FM to FM data flows

DISTRIBUTION

FD Elaboration Service

ELABORATION

FM to non FM
data flows

DISTRIBUTION

ATC Interaction Service

For local components

For remote components

Responsibility-based
FDP Service categorisation (2)

	Distribution performance	Correctness, accuracy performance
Current FPL messages	x	
Current OLDI messages	x	
Future 4D trajectory and FD exchanges between FMs	x	x
Current exchanges between FM and non FM systems	x	
Future 4D trajectory and FD exchanges between FM and non FM systems	x	x

Existing European standards   Existing ATSP or proprietary standards

Future standards to be introduced for improving inter-operability

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Proposed Approach

- **Universal inter-operability model**

- **Operational performance classes**

- **Stable high level requirements**

- **Detailed voluntary standards**

- **Requirement Layering Traceability**

Universal inter-operability model

- Use the same flight data representation standards for exchanging data between FM and other FDP entities as well as for FM-to-FM exchanges

- Same data formats for the ATC Interaction service as for the FM-to-FM Data Distribution service

- Define different performance level as required by operational needs (e.g. CWP-FM interaction may be more constraining in terms of delay and reliability than the FM-FM interaction)

Operational performance classes

■ Define a multi-criteria performance model relying on a specified set of metrics

■ Define each performance class as a sensible combinations of values for the different metrics

■ Use these performance classes for defining Service Level Agreements across responsibility boundaries between service providers and users (or within an open system architecture operated by an integrated FDP service provider/user)
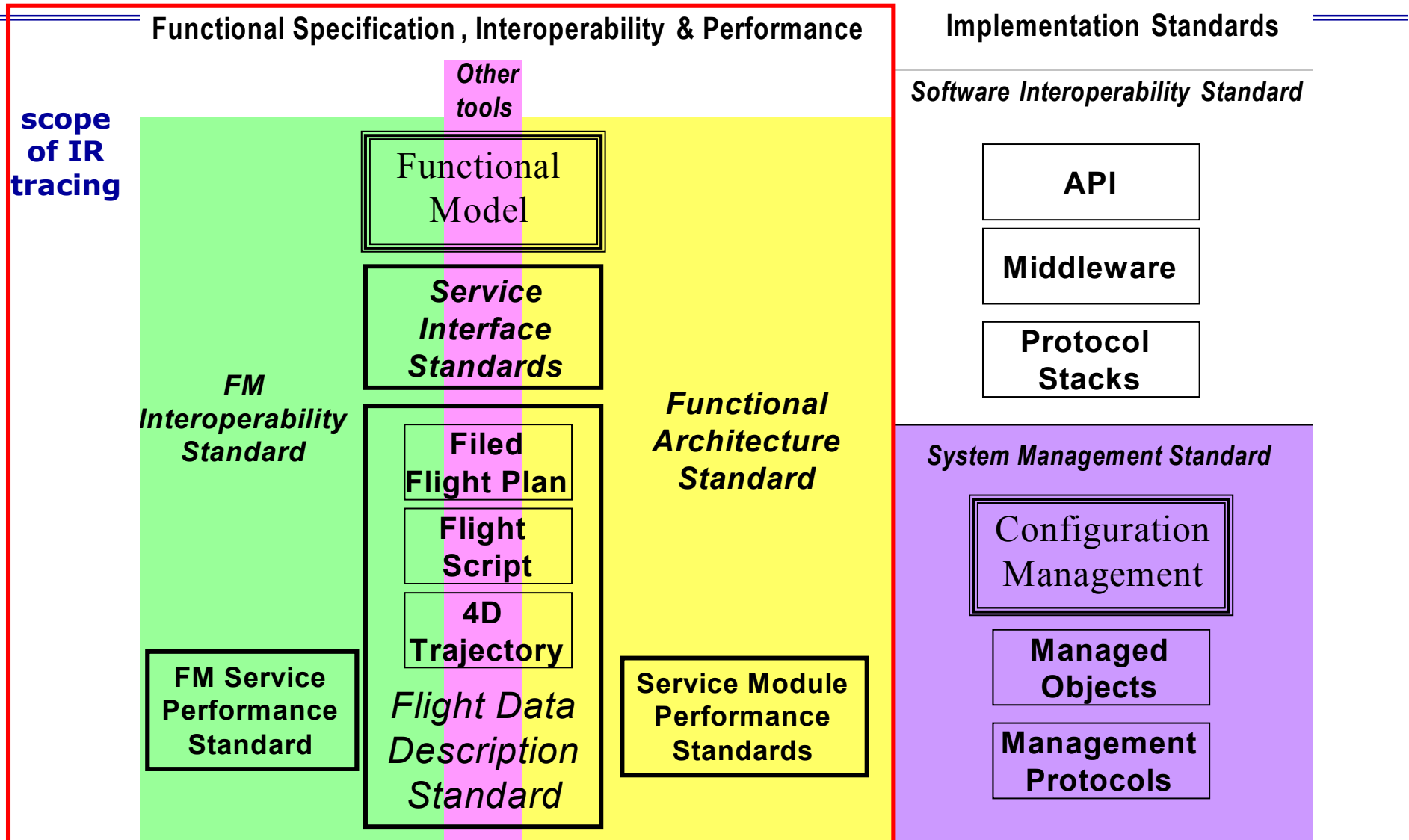
Stable high level requirements

- Define Implementation Rules in terms of functional content of the services to be provided, without any specific mechanisms or detailed representations put in the rules (however stable existing standards may be referred to)

- Justify the rules with respect to the higher level essential requirements common to all CNS-ATM services (seamlessness, security, safety, etc.)

Detailed voluntary standards

■ Define Voluntary Standards for inter-operability and performance with all the technical details necessary including verification and qualification tests to be passed

■ Justify that these Voluntary Standards provide a complete and consistent coverage of Implementation Rules (cross-reference matrix between VS and IR)

■ Voluntary standards for internal implementation details (e.g. API within an FDP) should be left outside the scope of IR-linked standardisation

Functional Specification, Interoperability & Performance

Implementation Standards

Software Interoperability Standard

scope of IR tracing

Other tools

Functional Model

Service Interface Standards

FM Interoperability Standard

Filed Flight Plan

Flight Script

4D Trajectory

Flight Data Description Standard

Functional Architecture Standard

FM Service Performance Standard

Service Module Performance Standards

API

Middleware

Protocol Stacks

System Management Standard

Configuration Management

Managed Objects

Management Protocols

Sample 1: common data representation requirement

Essential Requirement
    Inter-operability of Flight Data exchange

Interoperability Rule

A 4D trajectory data set shall consist of an ordered sequence of points in space representing WGS 84 co-ordinates associated with UTC times

Voluntary standards
    data structure model (semantics and ordering of fields)
    concrete syntax representation (bit-wise format)

Sample 2: security performance requirement

Essential Requirements

Security of Flight Data exchange

Interoperability Rules

authentication and flight data protection mechanisms shall protect users against state-of-the-art code-breaking attacks until flight completion

Voluntary standards

FDP entity authentication protocol
FD exchange encryption scheme
Key management and distribution protocol

FDP System and Service Standardisation

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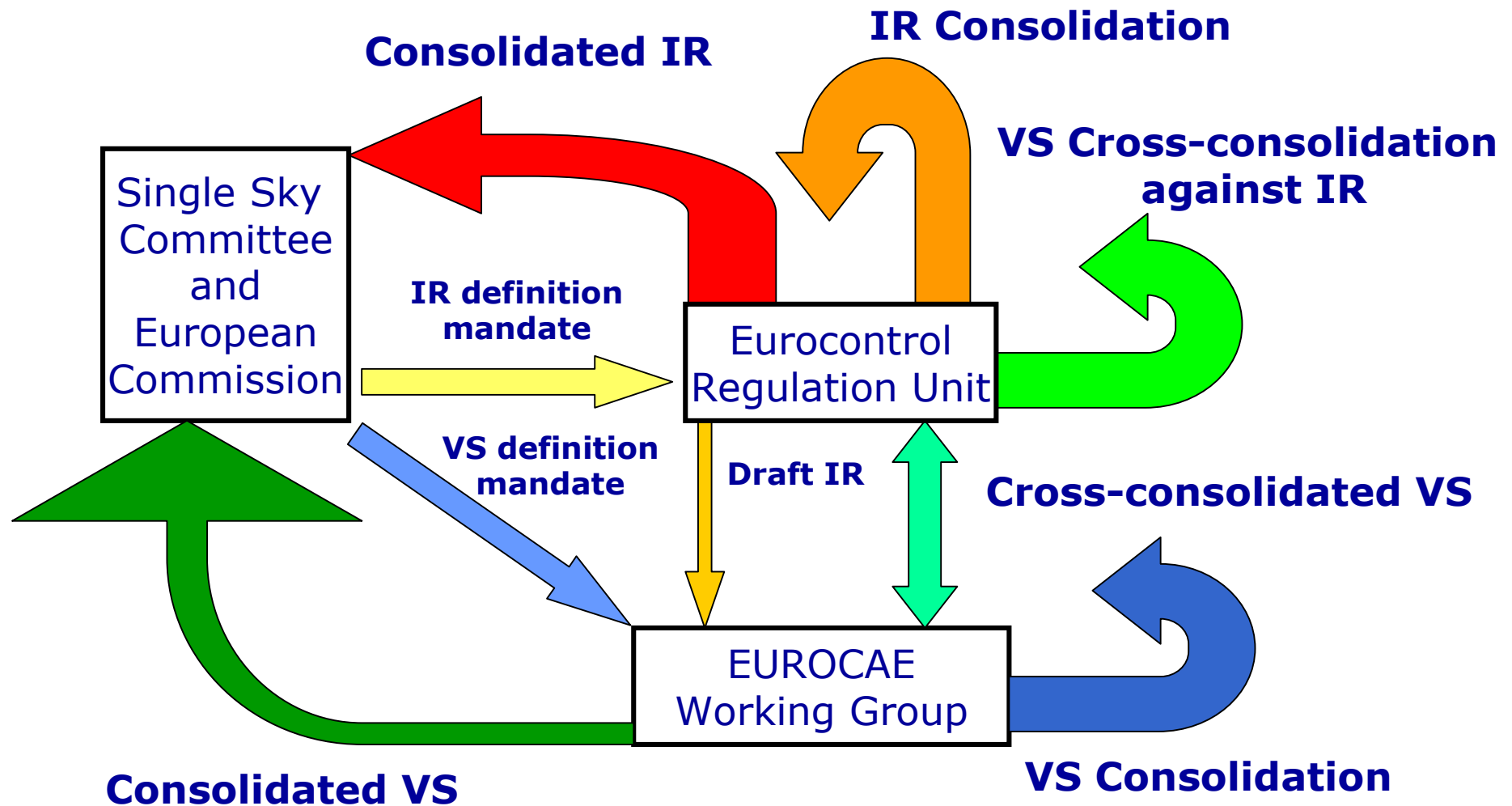- **Qualification and certification issues**

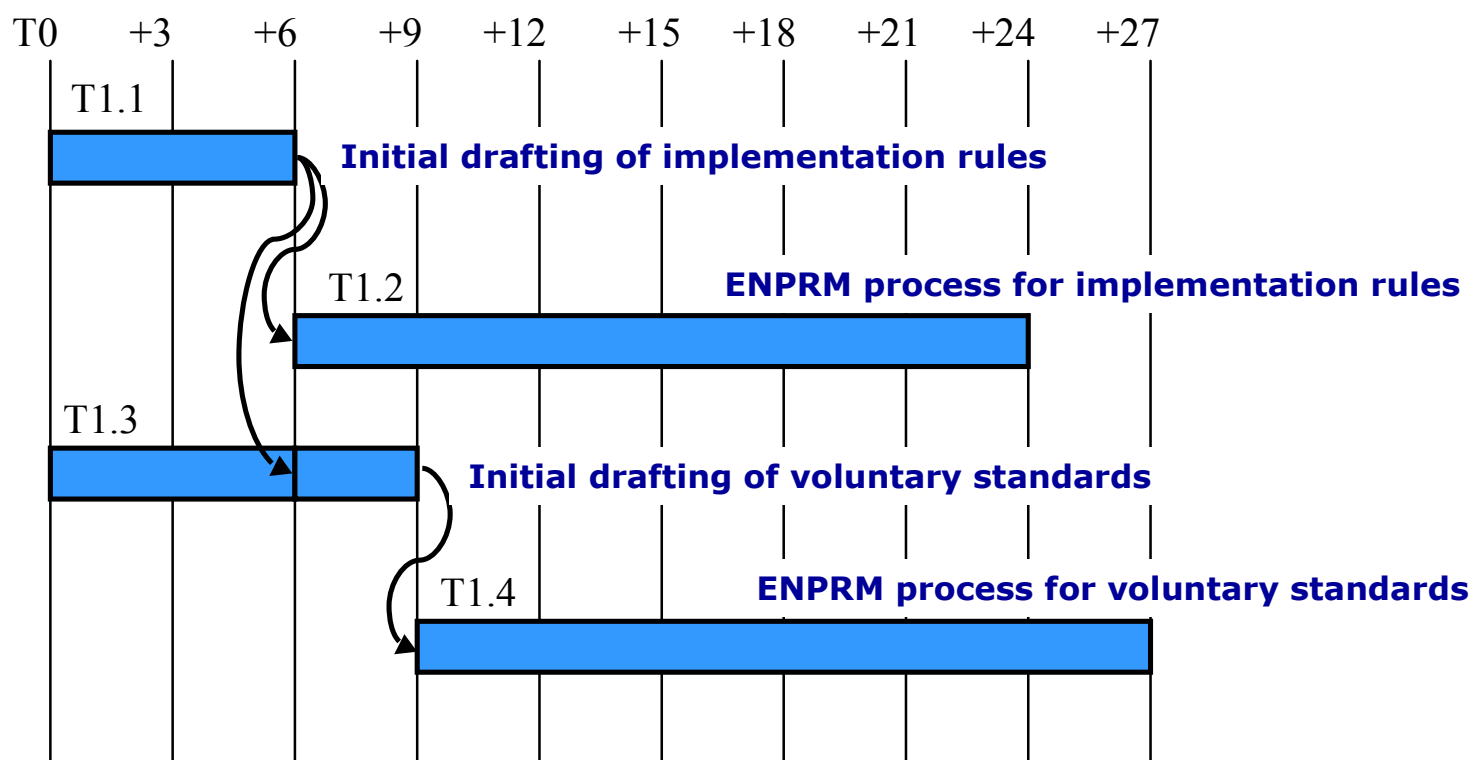# Standardisation Roadmap (1)

- **Step 1: FM-to-FM inter-operability**

- **Step 2: FM-to-FM data exchange performance**

- **Step 3: FM-to-non-FM inter-operability**

- **Step 4: FM-to-FM data accuracy performance and FM-to-non-FM performance**
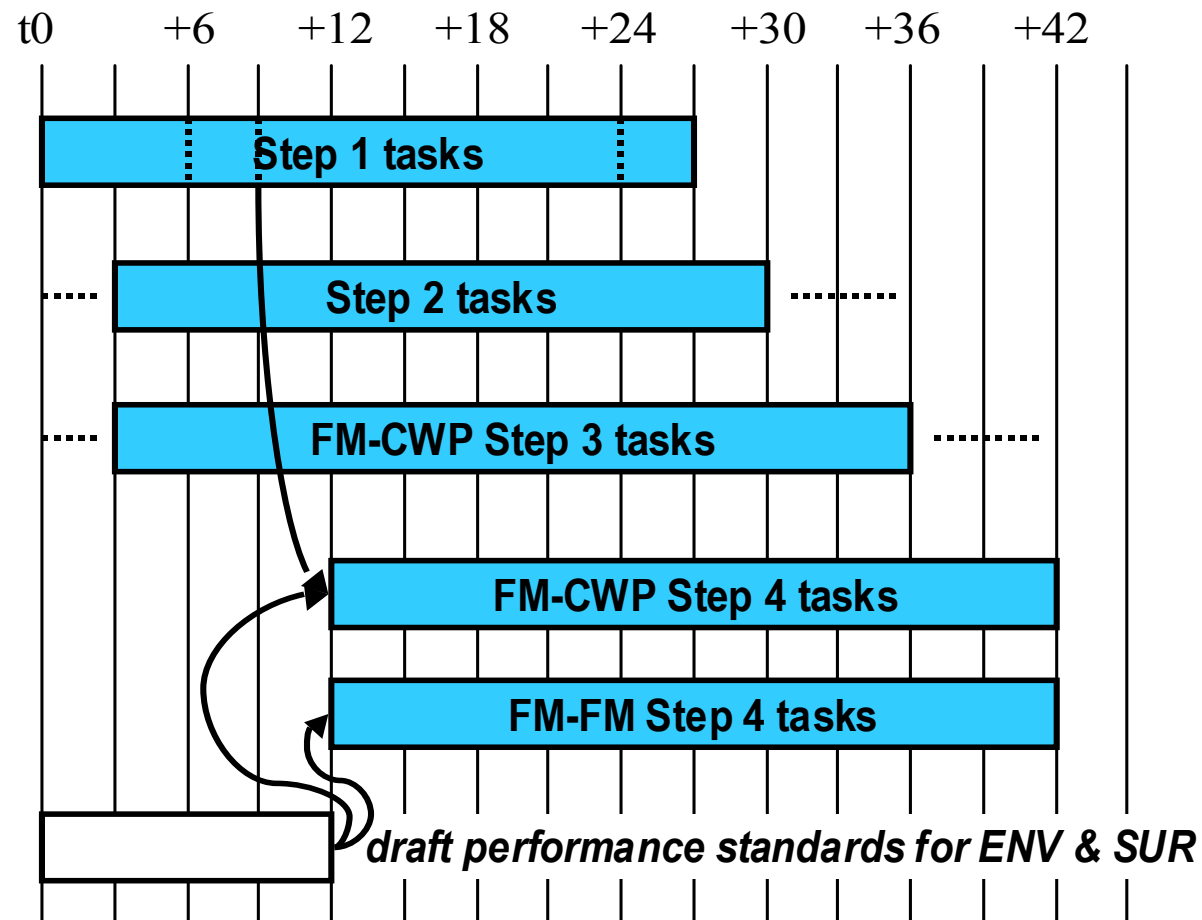
Standardisation Roadmap (3)

Step 1 co-ordination of IR and VS layers

T0   +3   +6   +9   +12   +15   +18   +21   +24   +27

T1.1

Initial drafting of implementation rules

T1.2

ENPRM process for implementation rules

T1.3

Initial drafting of voluntary standards

T1.4

ENPRM process for voluntary standards

Overall schedule for the 4 steps

- **Existing standards and issues**

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Qualification and Certification (1)

Current situation in ATS

- **ATS Standardisation:**

some Eurocontrol-defined standards exist (RNAV levels)
but no enforcement system is in place

- **Certification against standards in ATC:**

there is no agreed international system for qualifying systems and
approving ATS operations, only national rules apply

- **Qualification processes:**

system manufacturers then ATS providers conduct their own verification
and validation processes

- **Certification processes:**

no formal third party certification exist in ATC (except for Quality
Assurance where system manufacturers or ATS providers may apply for
an ISO 9000 certificate)

Qualification and Certification (2)

Recommendations

■ **create a European-wide certificate for Core FDP systems based on the EUROCAE-defined standards described in the roadmap**

■ **the thorough testing of an FDP would require a heavy simulation environment (for feeding realistic environment and surveillance data) it could be a cost-effective approach to establish a single European facility for conducting FDP conformance testing and deliver labels, but any specialised qualification entity may apply for a certification license from some national regulator**

■ **when the standards and associated compliance labels have been in application on a voluntary basis for some years, issue a regulation imposing the recognition of those labels and mandating their use in call for tenders for FDP system procurement**

■ **keep the verification of any local (i.e. not impacting inter-centre interoperability) deviations from the standard (e.g. caused by legacy systems), the supervision of system installation and the operational service approval under the authority of national safety regulators**