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European FF-ICE/R1 Implementation roadmap – TWR Systems impact assessment

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1. Introduction

The **SESAR Deployment Manager (SDM)** has been tasked with conducting a **formal assessment** of the functional impact of FF-ICE/R1 **on Tower (TWR) systems**, considering:

- The regulatory framework defined by **Regulation (EU) 116/2021**,
- The architectural diversity and integration models of Tower systems across Europe,
- The operational characteristics and practical realities of the TWR environment.

This assessment responds to concerns raised about whether FF-ICE/R1 introduces new operational requirements or use cases in the Tower domain. Based on the current state of implementation planning, technical capabilities, and regulatory interpretation, SDM concludes that:

Except for two technical elements, the adoption of the new FF-ICE/R1 flight plan format and the mandatory use of the Global Unique Flight Identifier (GUFI), FF-ICE/R1 does not result in functional changes or create new operational use cases for Tower systems.

This finding provides clarity for planning and implementation activities, particularly in the context of increasing delays in FF-ICE/R1 deployment and potential uncertainty in TWR system integration strategies.

2. Regulatory Background

The obligation to enable FF-ICE/R1 compatibility in Tower systems originates from:

2.1 Regulation (EU) 116/2021 (Common Project One - CP1)

- CP1 mandates Tower (TWR) and Approach (APP) systems in selected airports must be capable of consuming flight plan information based on the FF-ICE/R1 format.
- However, no functional or operational requirements are defined concerning the use or interpretation of additional data fields provided by eFPL (enhanced flight plan).
- The regulation does **not specify any functional requirements** that require Tower systems to **modify their core logic, workflows, or decision-making** based on FF-ICE content beyond the legacy FPL2012.

2.2 SESAR Deployment Programme (SDP) 2024

- The SDP identifies **GUFI** as a **mandatory element** under requirement **FFICE-316**, aimed at ensuring **traceability and interoperability** across ATM systems.
- While the requirement ensures **technical harmonization**, the **functional relevance of other FF-ICE/R1 data elements (e.g. operator flight plan version, take-off mass, planning constraints)** is **considered non-applicable** to Tower operations.
- The current SDP does not define any **mandatory functional integrations** or **TWR-specific use cases** for FF-ICE/R1 beyond GUFI and format compatibility. However, future changes to TWR operations may involve usage of additional information from the eFPL, why the SDP should only be regarded as current status.

As such, **compliance** for TWR systems is currently limited to **technical adaptation**, not **operational transformation**.

3. Key Findings

3.1 Tactical Nature of TWR Operations

TWR systems operate in a real-time tactical environment. They rely on **up-to-date, locally generated data** (e.g. runway-in-use, SID allocation, stand assignment) rather than on the **pre-departure planning data** provided in the eFPL.

Take-off mass is not a necessary input for any TWR system or procedure. Tower relies on aircraft type and wake category, not dynamic mass values, to perform its duties safely and efficiently. Therefore, including take-off mass in the FF-ICE flight plan has **no functional benefit for TWR operations**.

Furthermore:
- **Tower Procedures Are Not Performance-Based** for the initial climb phase
- Tower operations are **procedural**, not performance- or weight-driven.
- Tower does **not calculate take-off performance, acceleration, or rotation points**, these are the responsibility of the **flight crew and airline**.
- The pilot is responsible for ensuring the aircraft complies with **performance minima.**
  - The **flight crew** is responsible for calculating and verifying that the aircraft can safely:
    - Take off within the available runway length,
    - Achieve required speeds (V1, Vr, V2),
    - Meet **obstacle clearance** and climb performance requirements after take-off,
    - Operate within certified **weight and balance limits**.

These calculations are based on the **actual take-off mass**, environmental conditions (wind, temperature, pressure), and runway characteristics. Tower controllers **do not verify these performance calculations**; they assume the aircraft is ready and legally fit for departure once the pilot requests take-off clearance. Mass might influence climb rate, but this is managed by the downstream ATC units, not Tower unit.

The eFPL, typically submitted more than three hours in advance, is frequently outdated or superseded at the time of use by the Tower.

3.2 Departure and Arrival Coordination

- **Departure:** TWR FDP assigns critical tactical data (e.g. runway, SID) and distributes this information **to the ACC**, overriding any prior eFPL content.
- **Arrival:** Updated trajectory and arrival data (e.g. STAR, runway-in-use) are received from the **ACC FDP**, not from the original FF-ICE flight plan.

3.3 Irrelevance for Surface Operations

TWR systems such as **DMAN** and **A-SMGCS** require real-time ground routing and sequencing data. These are **not included in the eFPL**, rendering FF-ICE/R1 data content functionally irrelevant for these systems.

4. Technical Requirements Applicable to TWR

4.1 New Flight Plan Format

TWR systems must be capable of **accepting and processing the FF-ICE/R1 format**, in compliance with the updated data exchange models. This is a **technical adaptation**, not a functional one.

4.2 Use of GUFI

The **Global Unique Flight Identifier (GUFI)** is mandated under FFICE-316 (Ref.: SESAR Deployment Programme 2024). It serves as a persistent flight reference, supporting:
- Cross-system traceability
- Enhanced data correlation
- Improved interoperability

GUFI is a non-functional enabler and does not influence operational decision-making within the TWR environment.

5 Architectural Considerations

- Many ANSPs operate TWR systems provided by **multiple vendors**, resulting in fragmented architectures.
- A trend is emerging to **decouple TWR systems from FDP systems** via a **SWIM middleware layer** that consumes FF-ICE/R1 data and translates it for Tower use. This reinforces the observation that TWR systems are **indirect consumers** of eFPL data.

6 Conclusion

FF-ICE/R1 introduces **no functional changes** to TWR systems beyond:
- The **technical requirement** to process the new flight plan format
- The **mandatory inclusion** of GUFI for data correlation and system interoperability

Tower systems continue to operate based on **real-time, local, and updated operational inputs**. The additional data fields introduced in FF-ICE/R1 have **no current operational use** within TWR environments and are frequently **overridden by local procedures and FDP updates**.

As such, implementation efforts for TWR systems should focus on:
- **Technical compliance** (format parsing, GUFI handling)

- **System integration** (via SWIM interfaces where applicable)
- **Avoiding unnecessary functional redesign** as the introduction of FF-ICE/R1 **do not** facilitate new use cases in the TWR domain