Flight and Flow – Information for a Collaborative Environment

IMPLEMENTATION OF THE EXTENDED FLIGHT PLAN

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Bachelor's Thesis
Aviation Engineering
May 2025

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Date
05-05-2025

Word Count
7.761

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Summary

The modernisation of flight planning across European airspace is a critical step toward a more efficient and data-driven air traffic management environment. As part of this transition, the European Common Project One (CP1) regulation mandates the implementation of the extended Flight Plan (eFPL), a key component of the Flight and Flow Information for a Collaborative Environment (FF-ICE) framework. This thesis investigates the current implementation status of the eFPL at LVNL (the Dutch Air Navigation Service Provider) and a designated home carrier, identifying the necessary steps for compliance with the CP1 regulation by the deadline of December 31, 2025.

The primary objective of this research is to map the readiness of both stakeholders regarding eFPL implementation and to determine their alignment with CP1 requirements. The significance of this study lies in its contribution to the understanding of national-level compliance challenges, system readiness gaps, and stakeholder coordination in the context of European regulatory mandates. The research also identifies the division of responsibilities between ANSPs and airline operators, highlighting the technical and procedural changes required by each.

The study employs a comparative document analysis and qualitative interviews with representatives from both LVNL and the home carrier. Key regulatory documents, system capability descriptions, and implementation plans were reviewed to assess alignment with CP1 and eFPL standards. A comparison between the legacy FPL2012 and eFPL formats was conducted to identify the additional data fields and system functionality needed for compliance. Furthermore, stakeholder-specific requirements were categorized to determine which responsibilities lie with LVNL, the home carrier, or both.

The results reveal that the home carrier is on track to meet the CP1 deadline using a combination of Lido Flight 4D IFS and an updated Lido legacy system, though full FF-ICE compliance will be limited by the exclusion of take-off mass. Conversely, LVNL will not meet the 2025 deadline due to core system limitations—specifically, the inability of the AAA and iCAS systems to process eFPL messages, with full compliance only expected in 2032 following the iTEC SkyNex implementation.

Based on these findings, the thesis recommends that LVNL ensure the inclusion of FF-ICE capabilities in its ongoing Flight Data Services (FDS) project, covering both the ADAS and HBS system replacements. Additionally, it is advised that LVNL evaluate the feasibility of enabling eFPL support within its Arrival Manager (AMAN) system and seek transitional solutions with regulators to bridge the gap until 2032. Ongoing coordination with the home carrier and participation in European ATM initiatives are also crucial for maintaining alignment with evolving standards.

In conclusion, while the home carrier is positioned to achieve timely compliance with CP1 through adaptable technical solutions, LVNL's delayed timeline underscores the challenges of large-scale system upgrades in the face of rapidly advancing regulatory frameworks. The research contributes valuable insights for stakeholders navigating similar transitions across Europe's air traffic ecosystem.

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List of abbreviations

Abbreviation	Definition
AAA	Amsterdam Advanced Air traffic control system
ADAS	Aeronautical Data Access System
AFTN	Aeronautical Fixed Telecom Network
AIP	Aeronautical Information Publication
AMAN	Arrival Manager
ANSP	Air Navigation Service Provider
ARO	Air Traffic Services Reporting Office
ASAP	Advanced Schiphol Arrival Planner
ATC	Air Traffic Control
ATM	Air Traffic Management
AU	Airspace User
AUAS	Amsterdam University of Applied Sciences
B2B	Business-to-Business
CFSP	Computerised Flight Plan Service Provider
CP1	Common Project 1
DLA	Delay message
DST	Decision Support Tool
EASA	European Union Aviation Safety Agency
eFPL	Extended Flight Plan
FDP	Flight Data Processing System
FDS	Flight Data Services
FF-ICE	Flight and Flow Information for a Collaborative Environment
FIXM	Flight Information Exchange Model
FPL	Flight Plan
FPL2012	Flight Plan 2012
GML	Geography Markup Language
GUFI	Globally Unique Flight Identifier
HBS	Home Briefing System
IATA	International Air Transport Association
ICA	Intercontinental
ICAO	International Civil Aviation Organization
iCAS	iTEC-based Centre Automation System
iTEC	Interoperability Through European Collaboration
KDC	Knowledge & Development Centre Mainport Schiphol
LVNL	Luchtverkeersleiding Nederland (Air Traffic Control the Netherlands)
NM	Network Manager
NMOC	Network Manager Operations Centre
NOTAM	Notice to Airmen
OCC	Operations Control Centre
OPS	Operational
SESAR	Single European Sky ATM Research
SWIM	System Wide Information Management
TBO	Trajectory Based Operations
TDT	Tactical Demand Tailoring
XML	Extensible Markup Language

Chapter 1 Introduction

This chapter will introduce the study and will elaborate more on the background information (1.1), problem statement (1.2), research objectives (1.3 and 1.4), and the scope and limits (1.5) of this research.

1.1 Background information

Flight planning plays a central role in air transport operations. Routes, take-off time, aircraft weight, and vertical profiles influence the performance of the flight in terms of fuel consumption, cost, delay, airborne time, and environmental impact. All these aspects are managed through flight planning to optimise Air Traffic Management (ATM). The *Flight and Flow Information for a Collaborative Environment* (FF-ICE) is the next evolutionary step, designed to increase user flexibility and maximise operational efficiencies while enhancing capacity and safety in the ATM system.

Traditionally, ATM has relied on flight plans submitted by airspace users (AUs), such as airlines, along with surveillance data. These two primary data sources provide air traffic controllers with the necessary information to manage air traffic safely and efficiently. However, AUs have expressed concerns that the current ATM operations do not fully align with their operational preferences as expressed in submitted flight plans. They often encounter limitations related to routing options and timing flexibility.

The path toward a more efficient and user-centric ATM concept has been outlined by the SESAR (Single European Sky ATM Research) R&D program and is detailed in the European ATM Masterplan. One of the key areas of improvement identified is the management of flight trajectories. In response, the International Civil Aviation Organization (ICAO) has developed a new global flight plan framework under the FF-ICE concept. This new format offers more comprehensive data than the existing ICAO Flight Plan 2012 (FPL2012) and introduces collaborative processes for flight plan negotiation before departure. The FF-ICE concept has been formally adopted in Europe and integrated into the processes of the European Network Manager (NM).

In European airspace, the Flight Plan (FPL) is not submitted to individual Air Navigation Service Providers (ANSPs) but centrally filed with the Network Manager (NM) at EUROCONTROL. The NM validates the submitted flight plan, ensures it aligns with airspace and capacity constraints, and then distributes it to the relevant ANSPs and other operational stakeholders. This centralised coordination enhances network efficiency, consistency, and situational awareness.

Given the complexity of the airspace, the volume of daily flights, and the finite number of air traffic controllers, the ATM system depends on the ability to anticipate where and when flights will occur. This information is historically conveyed through the Flight Plan—a mandatory document for any flight using controlled airspace—submitted by AUs, primarily commercial and charter operators.

While surveillance tools like radar have traditionally been used to track and monitor aircraft, they offer limited scope for improvement. These tools are largely fixed in capability and provide only positional and basic intent information (such as speed, heading, and altitude). Therefore, to achieve further operational enhancements, improvements must come from the flight planning system itself. This has led to the development of the extended Flight Plan (eFPL).

The current FPL format, FPL2012, has been in use since 2012 and includes basic operational information such as the departure and destination aerodromes, estimated times, and the planned route (ICAO Annex 2). The route itself is composed of a series of predefined waypoints that describe the horizontal trajectory of the flight, but it lacks a detailed vertical component. This means that while air traffic controllers can see the intended path of the aircraft in two dimensions, they receive only limited information about the aircraft's altitude profile. As a result, the current flight plan presents a relatively static and simplified view of flight intent, with no capability for in-flight updates or dynamic re-planning once the flight has commenced.

As part of the FF-ICE initiative, a more dynamic and connected version of the flight plan—the eFPL—is being introduced. In contrast to the current system, the eFPL will include a complete **four-dimensional (4D) trajectory**, which incorporates not only the horizontal route via waypoints but also the vertical flight profile and the time dimension. This enriched information set will allow for a more accurate representation of the intended flight path, enabling better coordination, conflict detection, and capacity management. Additional data elements such as a **Globally Unique Flight Identifier (GUFI)**, aircraft performance characteristics, and take-off weight will also be required, providing a more comprehensive and adaptable planning framework for both AUs and ATM systems.

The FF-ICE framework was developed to overcome the limitations of the current system and support a collaborative, information-rich ATM environment. Its first release (FF-ICE/R1) is mandated for implementation in Europe by **December 31, 2025**, in accordance with **Regulation (EU) No 2021/116 (CP1)**.

The upcoming eFPL is designed to fully leverage the benefits of a connected airspace and collaborative ATM ecosystem. Its goal is to align the flown trajectory as closely as possible with the user-preferred flight path, allowing earlier and more effective resolution of conflicts and demand/capacity imbalances. This environment is based on a shared four-dimensional trajectory—accounting for position over time—that serves as a common reference for decision-making among all stakeholders. By better aligning trajectories with user intent, the system supports more efficient operations, reduced fuel consumption, lower environmental impact, and increased economic benefits for AUs.

To facilitate the exchange of eFPLs and trajectory-related information, the Network Manager has implemented **System Wide Information Management (SWIM)** services. SWIM is an ICAO-endorsed framework for enabling standardised, digital information exchange across the ATM ecosystem. Through SWIM, Airspace Users can electronically file the new eFPLs, while ANSPs can request or retrieve flight plan data in real time. These services are critical for enabling the high level of collaboration, automation, and data availability required for the FF-ICE vision to function effectively.

Nevertheless, to realise the full potential of this transformation, both AUs and ATM providers must adapt their operations to support the introduction and operational use of the eFPL.

1.2 Problem Statement

The eFPL has to be implemented by December 31, 2025 to comply with European regulation. Currently, it is not clear for different stakeholders in the Netherlands, such as Air Traffic Control the Netherlands (LVNL) and the home carrier, the national airliner, the current status of this improvement in terms of, for LVNL to provide the required services to enable this new eFPL, and for the home carrier, if they are able or willing to provide new information in the required new format as well as having the required systems to communicate this new flight plan.

Due to the different departments involved in the FPL development, departments working on the required infrastructure to communicate the flight plan, along with some communication deficiencies between the stakeholders. It is unclear for LVNL if they can even implement FF-ICE, thus enable the eFPL. The home carrier does not have a clear view of at which stage of implementation they are at. It is also not known if any of the involved parties are considering using any of the optional new requirements of the eFPL.

1.3 Objectives

The main objective of this thesis is to map the current status of LVNL and the home carrier in terms of implementation of the eFPL and what steps have to be taken in order to comply with the European CP1 regulation. By complying with the regulation, the different concepts such as FF-ICE, the eFPL, and SWIM are taken into account.
The following sub-objectives will help to systematically gather and analyse relevant information.

1. Identify and describe the differences between the FPL2012 and the eFPL. This is necessary in order to know what additional information LVNL should be able to process and provide and what additional information the home carrier should provide in order to enable the new eFPL.

2. Identify elements in the CP1 regulation and related documents that the home carrier and LVNL have to comply with, related to the eFPL, by December 31, 2025. This contributes to the main goal by identifying the mandatory elements to be inquired with LVNL and the home carrier in implementation of the eFPL.

3. Classify the outputs of the FPL versus eFPL comparison and the CP1 analysis to identify what is relevant to LVNL and what is relevant to the home carrier and both. Different aspects of the eFPL are beneficial to the home carrier and LVNL. In order to investigate which steps have to be taken by each stakeholder, the appropriate aspects have to be identified for each stakeholder. Some regulations apply only to LVNL and some apply only to the home carrier and some to both. It is important to identify which regulations apply to which stakeholder in order to define the scope.

4. Investigate the stage of implementation of the eFPL and CP1 regulation at LVNL. This is necessary in order to document the steps already taken and the steps that still need to be taken in order to comply with regulation CP1 by December 31, 2025.

5. Investigate the stage of implementation at the home carrier and the willingness to provide additional information. This is necessary in order to document the steps already taken and the steps that still need to be taken in order to comply with regulation CP1 by December 31, 2025.

1.4 Research Questions

From the problem statement and the main objective, the following main research question has been formulated:
"What is the current status of eFPL implementation by LVNL and the home carrier, and what steps are necessary to ensure compliance with the European CP1 regulation?"

The supporting sub-question to systematically lead to answer the main question are:

1. What are the key differences between FPL2012 and eFPL, and what additional information must LVNL and the home carrier be able to process and provide to support eFPL implementation?

2. Which specific elements of the CP1 regulation and related documents must LVNL and the home carrier comply with in relation to eFPL by December 31, 2025?

3. How can the findings from the FPL versus eFPL comparison and the CP1 regulation analysis be classified to determine which aspects are relevant to LVNL, the home carrier, or both?

4. What is the current state of eFPL and CP1 implementation at LVNL, and what steps remain to achieve compliance by December 31, 2025?

5. What is the current state of eFPL and CP1 implementation at the home carrier, and how willing is the organization to provide the additional information required for compliance?

1.5 Scope and Limits

This thesis will focus on the Flight Plan according to the interest of LVNL and the home carrier.
There are three main parties involved in flight planning: Airlines, Air traffic Control and Network Management.

- Airlines to provide specific flight information
- Network Management to validate and distribute FPL to ANSPs
- Air traffic control to plan initial route, steer, monitor and ensure safety and capacity

If one of these parties does not have the right information prior and during a flight, the flight involved can be affected in on time-, fuel- and safety-performance. A depiction of how the involved parties relate to the Flight Planning is shown in Figure 1.
As LVNL being the local Air Navigation Service Provider and the airline being the home carrier at, the focus of this thesis is on identifying the progress of implementation of the eFPL and what steps have to be taken in order to comply with the European CP1 regulation.

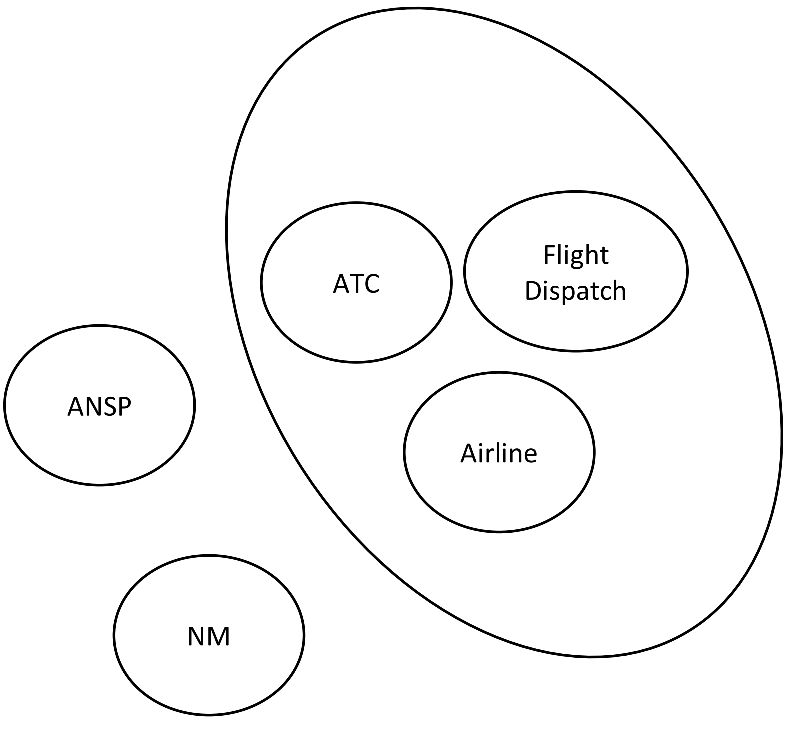

Figure 1: Relation to flight planning

Chapter 2 Theoretical Framework and Literature Review

This chapter outlines the key concepts, systems, and studies relevant to this research. The theoretical framework introduces important terminology and technologies central to the development and implementation of the extended Flight Plan (eFPL), including FF-ICE. The literature review presents existing research on these concepts, highlighting their impact and relevance to future Air Traffic Management (ATM) developments.

2.1 Theoretical Framework

This section aims to explain the importance and use of the current flight plan, the coming FF-ICE flight plan, and the environment where the new flight plan will be used.

2.1.1 Current flight plan

A flight plan is a detailed document filed by a pilot or flight dispatcher prior to departure. It outlines the intended route, estimated times, cruising altitude, alternate aerodromes, and other critical details of a flight. The primary purpose of a flight plan is to ensure the safety and efficiency of air travel. It helps air traffic control (ATC) manage and monitor flights and provides crucial information for search and rescue operations if needed (ICAO, 2023).

The current flight plan system has been in use since 2012, following the implementation of the ICAO flight plan format (appendix I). This format was introduced to accommodate aircraft with advanced capabilities and meet the evolving requirements of increasingly automated ATM systems (ICAO, 2012).

When an airline wants to operate a flight—for example, from Amsterdam to Milan—it must submit a flight plan. This plan involves multiple stakeholders, including the airline, EUROCONTROL, various ANSPs, and airports, each with specific interests and responsibilities related to the flight plan. The airline's Operations Control Center (OCC) prepares all flights for the home carrier, ensuring that crew members are supplied with accurate and timely information, such as the chosen route, cockpit documentation, and training details (EUROCONTROL, 2022).

In European airspace, flight plans must be submitted to the Network Manager Operations Centre (NMOC), which is operated by EUROCONTROL. The Network Manager (NM) plays a central role in managing and optimising the flow of air traffic across Europe. Acting as a single coordination point, the NM ensures that flight plans are validated, deconflicted, and harmonised across the region. It processes flight plans to avoid airspace congestion, ensures capacity is respected, and facilitates collaboration between ANSPs, airports, and airlines (EUROCONTROL, 2022). The NMOC not only receives the flight plan but also checks and adjusts it, if necessary, then distributes it to all relevant parties.

Outside of Europe, flight plans are submitted directly to the national or regional ANSPs. These local entities manage flight planning and ATC services according to ICAO standards, but without the centralised coordination found in the European system (ICAO, 2023).

To support flight planning, airlines utilise advanced software solutions from Computerised Flight Plan Service Providers (CFSP), such as Lufthansa Systems' Lido Flight 4D. This system calculates the most efficient route for a flight based on real-time data, including weather conditions, NOTAMs, Aeronautical Information Publications (AIP), ATM restrictions, aircraft performance, and ATC-related charges (Lufthansa Systems, 2023). The completed flight plan is then submitted to EUROCONTROL for assessment and integration into the European air traffic network.

The OCC of the home carrier plays a crucial role in ensuring the safe and efficient execution of flights. It coordinates with various operational departments, including cockpit and cabin crew, maintenance, customer care, cargo, and technical services, to ensure that flights are operated punctually and effectively (EUROCONTROL, 2022).

Understanding the current flight plan system is essential for recognising the rationale behind developing a new flight plan model. Since 2012, the system has relied on collaborative tools, centralised coordination (in Europe), and sophisticated flight planning technologies. By comprehensively understanding how the current system operates, we can better assess potential innovations and improvements that a new flight planning system could offer.

2.1.2 FF-ICE

The Flight and Flow Information for a Collaborative Environment (FF-ICE) is a concept developed by ICAO to enhance ATM through improved information sharing and collaboration. It aims to address the limitations of current flight planning systems—which are often static, inflexible, and based on outdated communication protocols—by providing a flexible framework that accommodates new technologies and procedures (ICAO, 2012). Specifically, the FPL2012 message format is based on a structured text file that is limited in both format and machine readability. Its rigid structure makes it difficult to extend with additional machine-readable information, which constrains its usability in automated systems and modern data exchange environments. FF-ICE can be understood as a cornerstone of performance-based air navigation systems. It emphasises the importance of information sharing among various participants in the ATM community, enabling better decision-making and coordination throughout the entire flight process. This collaborative environment supports strategic, pre-tactical, and tactical performance management, facilitating 4D trajectory operations and ensuring that all actors have access to the most accurate and timely data available (SESAR, 2019).

The limitations of current systems are evident in several areas. Traditional flight plans are typically filed well in advance and offer limited capacity for modification once the flight is underway. This static nature restricts the ability to respond effectively to real-time changes in weather conditions, airspace availability, or traffic flow (EUROCONTROL, 2018). Moreover, the existing ICAO Flight Plan (FPL2012) format contains constrained data fields that hinder the transmission of detailed or updated information necessary for dynamic airspace management (SESAR Joint Undertaking, 2016). Interoperability issues also persist, as many air navigation service providers (ANSPs) operate using disparate systems that are not harmonised, leading to fragmented communication and operational inefficiencies, particularly in cross-border operations (ICAO, 2020). Additionally, the coordination between stakeholders—airlines, ANSPs, airports, and meteorological services—is often limited, resulting in delayed updates, reduced situational awareness, and increased workload for both pilots and controllers.

To address these shortcomings, FF-ICE introduces the concept of the extended flight plan (eFPL)(Appendix II). Unlike the conventional approach, the eFPL is designed to include a comprehensive dataset that represents the entire four-dimensional trajectory of the flight, incorporating spatial coordinates and time, along with detailed aircraft performance parameters (ICAO, 2012). This enhanced plan supports incremental updates throughout all phases of the flight lifecycle and leverages machine-readable formats such as XML and GML to support automation and integration with trajectory-based operations (EUROCONTROL, 2018). FF-ICE's principles include the need for globally standardised data elements, the elimination of unnecessary limitations on information, and support for the dynamic exchange of flight and flow information. By integrating these principles into the theoretical framework, this thesis explores how FF-ICE contributes to the evolution of air traffic control into trajectory-based traffic management, ultimately enhancing situational awareness, interoperability, and the achievement of global performance targets (SESAR, 2019; ICAO, 2020).

2.2 Literature Review

Since the introduction of the FF-ICE concept by ICAO, a growing body of research has emerged exploring how enhanced flight information exchange can modernise ATM. These studies collectively provide valuable insights into the potential of FF-ICE and the eFPL to address the limitations of the current flight planning environment.

One of the earlier studies in this field, conducted by Mondoloni (2013), investigated how improved exchange of trajectory-related data can lead to better air traffic management performance. By validating trajectory prediction models against operational data, the research demonstrated that uncertainty in predicted flight paths can be significantly reduced when more accurate and timely information is available. The study concluded that this improved exchange supports the move toward Trajectory-Based Operations (TBO), where real-time data sharing and collaborative planning are central tenets—precisely the goals of FF-ICE.

The role of advanced data technologies in supporting FF-ICE objectives was further explored by Thomson et al. (2020) in study on flight object sharing using blockchain. This paper presented a prototype system built on Tendermint, a blockchain platform, which facilitates consistent and secure data exchange among aviation stakeholders. Through a distributed ledger system, stakeholders can access real-time flight information with high integrity and traceability. This method aligns with the FF-ICE framework's emphasis on transparency, reliability, and the need for globally consistent information exchange.

Another relevant direction of research focuses on demand and capacity balancing through Tactical Demand Tailoring (TDT) by Vegter et al. (2023), where it was explored how FF-ICE enables better sector traffic management by supporting real-time rerouting of flights based on predicted congestion. By adjusting flight paths before aircraft reach congested areas, TDT reduces delays and increases overall airspace efficiency. A practical application at Amsterdam Schiphol Airport showed promising results: although flight track length increased slightly, delays were significantly reduced, showcasing a meaningful trade-off between airspace capacity and punctuality.

Building upon this concept, Kuijpers (2024) investigated the feasibility of implementing TDT within the FF-ICE structure specifically to enhance runway load balancing at Schiphol Airport. The study highlights how the collaborative and dynamic data-sharing capabilities of FF-ICE provide the operational foundation required for real-time decision-making and optimisation, benefiting both air traffic control and airline operators.

Rosenow et al. (2021) examined another essential aspect of FF-ICE and eFPL implementation: in-flight trajectory optimisation. The research demonstrated how continuous trajectory updates during flight, enabled by access to real-time data, can significantly improve operational efficiency and reduce environmental impact. By adjusting flight paths dynamically in response to weather, airspace congestion, and fuel performance data, aircraft can reduce fuel consumption and CO_2 emissions. This aligns with the FF-ICE goal of enabling more sustainable aviation through better coordination and situational awareness.

The combined insights from these studies underscored the transformative potential of FF-ICE and the eFPL in shaping the future of air traffic management. They highlighted how real-time information exchange, supported by secure and standardised data formats, can improve coordination among stakeholders, optimise capacity management, and enhance both the environmental and economic performance of flight operations. In this context, the eFPL serves as more than a format upgrade—it becomes a crucial enabler of automation, dynamic rerouting, and collaborative decision-making, bringing the vision of a connected and efficient airspace closer to reality.

Chapter 3 Methodology

This chapter outlines the systematic approach and specific techniques that will be employed to address the research questions and achieve the objectives of this study. The proposed methodology is designed to ensure the reliability, validity, and reproducibility of the research findings.

Objectives		Method	Output
Sub-objective 1	Identify and describe the differences between the FPL2012 and the eFPL.	Document analysis	List of the differences between FPL2012 and eFPL
Sub-objective 2	Identify elements in the CP1 regulation and related documents that the home carrier and LVNL have to comply with, related to the eFPL, by December 31, 2025.	Document analysis	Compendium of mandatory elements airline and LVNL have to comply
Sub-objective 3	Classify the outputs of the FPL2012 versus eFPL comparison and the CP1 analysis to identify what is relevant to LVNL, what is relevant to the home carrier, and both.	Classification Semi-structured interviews	description of which elements are relevant to the home carrier, which elements are relevant to LVNL, and which elements are relevant to both.
Sub-objective 4	Investigate the stage of implementation of the eFPL and CP1 regulation at LVNL.	Semi-structured interviews	A description of the steps taken by LVNL to ensure implementation of eFPL and CP1 and what still has to be done in order to comply.
Sub-objective 5	Investigate the stage of implementation at the home carrier and the willingness to provide additional information.	Semi-structured interviews	A description of the steps taken by the home carrier to ensure implementation of eFPL and CP1 and what still has to be done in order to comply.

Document analysis allows for a thorough examination of the official documents, guidelines, and technical specifications of both FPL2012 and eFPL. This will help identify and describe the differences in detail, ensuring a comprehensive understanding of the changes.
By analysing primary sources such as ICAO amendments, SESAR documentation, and other regulatory materials, the findings will be based on authentic and authoritative information, adding credibility. Document analysis enables a systematic comparison of the specific fields, data requirements, and procedural changes between FPL2012 and eFPL.

This methodology allows for an understanding of the context and rationale behind the changes. Understanding these objectives can help explain why certain additional information is necessary for ANSPs and airlines.
Document analysis provides a structured approach to gather and analyse data. A framework can be created to categorise and compare different aspects of the flight plans, making it easier to identify key differences and their implications. Additionally, analysing documents from different time periods (e.g., the introduction of FPL2012 and the development of eFPL) can provide a historical perspective on how flight planning requirements have evolved. This can add depth to the analysis and highlight the progression in regulatory and operational standards.
This approach also allows for a detailed examination of the CP1 regulation and related documents to identify specific compliance requirements related to the eFPL. By analysing these documents, it is possible to pinpoint the exact elements that need to be addressed by both the home carrier and the ANSP, ensuring that all regulatory requirements are met within the specified timeframe.
By using document analysis, a thorough, credible, and well-structured examination of the differences between FPL2012 and eFPL, as well as the compliance requirements of the CP1 regulation, can be ensured.

Classification will be used in order to cluster the outputs of the document analysis of FPL2012, eFPL, and CP1 regulation. Classification is an excellent methodology because it allows for the systematic organisation and categorisation of the outputs from the comparisons and analyses. This approach helps in organising the data into distinct categories, making it easier to understand and interpret. By classifying the outputs, it becomes clear what is relevant to the ANSP, the home carrier, and both. This structured approach ensures that each stakeholder's requirements are addressed separately and comprehensively.
By categorising the outputs, the analysis can focus on the specific needs and responsibilities of each stakeholder. This targeted analysis helps in identifying the unique elements that each party must address, ensuring that no critical information is overlooked. Classification also simplifies the communication of the findings. When presenting the results, having clearly defined categories makes it easier for the audience to grasp the key points and understand the implications for each stakeholder. This clarity is crucial for effective communication and decision-making.
Additionally, classification allows for an efficient comparison of the outputs from the FPL2012 versus eFPL analysis and the CP1 regulation analysis. By grouping similar elements together, it becomes easier to identify patterns, commonalities, and differences, which can provide deeper insights into the requirements and changes. By classifying the outputs, it is ensured that the information is relevant and actionable for each stakeholder. This relevance is essential for practical implementation, as it highlights the specific areas where the ANSP and the home carrier need to focus their efforts to comply with the new regulations and requirements.
Overall, classification provides a structured, clear, and efficient way to analyse and present the findings.

Semi-structured interviews would be an effective methodology because they allow for a flexible yet focused approach to data collection. This method enables the researcher to gather in-depth insights from key stakeholders, such as representatives from the ANSP and the home carrier, regarding the classification of outputs from the FPL2012 versus eFPL comparison and the CP1 analysis. By using semi-structured interviews, the researcher can explore specific topics in detail while also allowing for the emergence of new and relevant information during the conversation.
For the fourth sub-objective, which involves investigating the stage of implementation of the eFPL and CP1 regulation at the ANSP, semi-structured interviews provide a platform to understand the current status, challenges, and progress from the perspective of those directly involved in the implementation process. This method facilitates a comprehensive understanding of the practical aspects and any potential barriers to full compliance.

Similarly, for the fifth sub-objective, investigating the stage of implementation at the home carrier and their willingness to provide additional information, semi-structured interviews offer the opportunity to delve into the attitudes, readiness, and specific actions taken by the home carrier. This approach allows the researcher to capture nuanced views and experiences, which are crucial for assessing the overall readiness and willingness to adapt to the new requirements.

Overall, semi-structured interviews provide a balanced approach that combines the structure needed to address specific research questions with the flexibility to explore unexpected insights. This makes them an ideal methodology for gathering detailed and relevant information for these sub-objectives.

Chapter 4 Results and Discussion

4.1 Gap analysis: ICAO 2012 Flight Plan versus Extended Flight Plan

In the context of transitioning toward a more dynamic and interoperable ATM system, this thesis conducts a document-based comparative analysis between the ICAO 2012 Flight Plan (FPL2012) and the Extended Flight Plan (eFPL) proposed under the Flight and Flow Information for a Collaborative Environment (FF-ICE) framework. This analysis supports the sub-objective of identifying the key differences between these two formats to determine what additional information **LVNL** should be capable of processing and what enhanced data inputs are required from the **home carrier** to enable eFPL operations.

The ICAO 2012 flight plan, as outlined in ICAO Doc 4444 (Procedures for Air Navigation Services – Air Traffic Management), represents an incremental evolution of older flight plan formats. It introduced improvements such as longer data fields and more detailed information on aircraft capabilities (e.g., RNP, RNAV), yet it remains inherently static. Once filed, the FPL2012 offers limited support for dynamic updates throughout the flight lifecycle. This creates operational inefficiencies, particularly in accommodating real-time changes in weather conditions, airspace availability, or tactical rerouting decisions (ICAO, 2012).

The FPL2012 also presents limitations in data structure and interoperability. It relies on fixed-field, plain-text message formats (e.g., via AFTN), which restrict the inclusion of complex or contextual data. From a document analysis perspective, ICAO's documentation reveals that the current format does not natively support four-dimensional (4D) trajectory data, nor does it provide standardised mechanisms for incremental data sharing across multiple stakeholders. This affects both the **data processing capabilities required of ANSPs like LVNL** and the data provisioning responsibilities of airlines, which are unable to share detailed aircraft performance metrics, intent data, or contingency profiles in a structured, digital format (ICAO Doc 4444; ICAO Doc 9965).

In contrast, the eFPL is a core component of the FF-ICE framework, as described in ICAO Doc 9965 (Manual on Flight and Flow Information for a Collaborative Environment). It redefines the flight planning process as an **information-centric and collaborative** activity, emphasising flexibility and frequent updates. The eFPL supports rich, structured data formats—specifically XML/GML—enabling automated validation, enhanced interoperability, and real-time integration with other systems (ICAO, 2012; EUROCONTROL, 2018). Unlike the static FPL2012, the eFPL is **incrementally updateable** throughout all flight phases: strategic, pre-tactical, and tactical. This allows stakeholders to adjust flight data dynamically in response to operational constraints.

From a practical standpoint, **LVNL must be equipped to receive, interpret, and act upon eFPL updates**, which may include aircraft performance profiles, intent-based trajectory elements, and contingency plans. Similarly, the **home carrier** will need to ensure its flight planning systems can generate eFPL-compliant data, covering a broader set of parameters such as environmental tolerances, preferred trajectories, and temporal accuracy. The document review further highlights that eFPL implementation requires a shift from message-based communication (like FPL and DLA messages) to **information exchanges via SWIM (System Wide Information Management)** services, which implies technical and procedural changes for both ANSPs and operators (ICAO Doc 9965; SESAR JU, 2019).

This document-based gap analysis reveals that the shift from FPL2012 to eFPL entails more than a format change—it reflects a **paradigm shift** in ATM, from static air traffic control to dynamic, trajectory-based traffic management. To enable this transition, both LVNL and the home carrier must align their information management systems with the data richness, update frequency, and interoperability standards defined by FF-ICE. This understanding directly supports the thesis objective of preparing stakeholders for the operational, procedural, and technological requirements of the eFPL environment.

4.2: Operational Effects and CP1 Compliance for LVNL and the Home Carrier

To address the second sub-objective—**identifying the elements in the CP1 regulation and related documents that the home carrier and LVNL must comply with before December 31, 2025**—this chapter builds on the gap analysis by examining specific mandatory data fields in eFPLs and their regulatory basis. This analysis draws on SESAR documentation, NM B2B guides (e.g., NM27.0), SDP2024, and the IFPS Users Manual.

The **Common Project One (CP1)** regulation, adopted under the European ATM Master Plan, makes several data elements in the eFPL **mandatory for operational implementation** by the end of 2025. Both ANSPs like LVNL and airspace users (AUs) such as the home carrier are required to support and exchange this information as part of full FF-ICE Phase 1 compliance.

For eFPLs **submitted or filed**, the following elements are **mandatory** under CP1 and its supporting technical frameworks:

- **Globally Unique Flight Identifier (GUFI)** – Enables consistent tracking across systems and jurisdictions.
- **Operator Flight Plan Version** – Required to manage incremental updates.
- **Desired Route/Trajectory** – Must include 4D performance-based planning.
- **Aircraft Take-Off Mass** – Now mandated, despite initial industry reluctance due to its business sensitivity.
- **Trajectory Points** – Including geo-position, time, level, and associated trajectory point properties.
- **Performance Profile and Speed Schedule** – Support environmental and efficiency objectives.
- **Weather and Environmental Data** – Wind vectors and temperatures are mandatory to support trajectory prediction and conflict detection.

For **distributed eFPLs**, the following items must also be transmitted:

- **Agreed Route/Trajectory**
- **Performance Profile**
- **Trajectory Point Property**
- **GUFI and Flight Plan Version**
- **Aircraft Take-Off Mass**

Of particular importance is the **Aircraft Take-Off Mass**, which has become a compliance issue. The home carrier initially regarded this data as business sensitive and had not planned to include it in eFPL submissions. However, SESAR Joint Undertaking (2016) and the updated **IFPS Users Manual (NM27.0)** clarify that this information is **mandatory** under CP1, FIXM schema definitions, and SDP2024 implementation guidance.

LVNL's compliance responsibilities include upgrading flight data processing systems to handle all mandatory FIXM elements, integrating SWIM-compatible interfaces, and ensuring that eFPL version management and GUFI tracking are fully operational. Additionally, training for controllers on interpreting trajectory-based performance data is critical.

The home carrier, in turn, must implement flight planning tools capable of:

- Generating valid FIXM-based eFPLs,

- Including all CP1-mandated fields, particularly take-off mass and environmental parameters,
- Supporting ongoing updates through B2B exchanges with NM and ANSPs,
- Managing internal data privacy concerns in compliance with operational requirements.

In summary, both organisations must act to close the implementation gap by aligning their systems and procedures with the requirements laid out in CP1 and related ICAO/SESAR documentation. This is not merely a technical update but a shift toward collaborative, data-driven ATM operations grounded in real-time, performance-based information exchange.

4.3 Status of implementation

In this chapter, the status of implementation of the eFPL at both LVNL and the home carrier is discussed.

4.3.1 Status of implementation at LVNL

At this moment the expectation is that LVNL will not be compliant with CP1 by 31 December 2025. The factors that contribute to this are discussed in this section. LVNL is currently in the process of transitioning to a new air traffic control system named Interoperability Through European Collaboration Centre Automation System (iCAS). This system will replace the current air traffic control system, Amsterdam Advanced Air traffic control system (AAA). This is a very complex transition and is already ongoing for several years. The eFPL will have to be integrated into the new iCAS system and LVNL does not think it economically responsible to spend money changing the current AAA system to accommodate the eFPL, for it to be functional only a relatively short period of time. The full transition to iCAS will happen between 2026 and 2028. When this project first started, FF-ICE functionalities were not included in the requirements, meaning iCAS is currently not able to accommodate the eFPL. iCAS is a system that was developed by the Interoperability Through European Collaboration (iTEC) consortium. Since LVNL joined this consortium, several versions of iCAS have been developed. The version that LVNL currently uses, and which will be fully implemented between 2026 and 2028, is iTEC v2, which is suitable for both upper and lower airspace. This version however, does not have the functionality to provide FF-ICE services. One of the reasons it is such a big transition is because LVNL wanted to customise the look and feel of the new system to resemble that of the AAA system. This would, among others, help reduce the amount training required for the transition. However, more functionality was required than expected to replicate the behaviour of the AAA system resulting in a longer transition period.
More partners have joined the consortium over the years, and combined with the multiple developments of iTEC, this has led to the current situation where there are many different tracks of software development (figure 2). In order to achieve more commonality between the different partners iTEC v3, or iTEC SkyNex, has started development. In this version the functionality as prescribed in CP1 will also be available, making it possible to accommodate the FF-ICE services. iTEC SkyNex is currently in development and will become available in 2028. However, it will be another big transition to go from iTEC v2 to iTEC SkyNex, just like the transition from AAA to iCAS with iTEC v2. This results in the prediction that LVNL will probably not comply with the CP1 regulation before 2032 (figure 3) (Senior strategy consultant LVNL, personal communication, April 1, 2025; Strategy expert LVNL, personal communication, April 9, 2025).

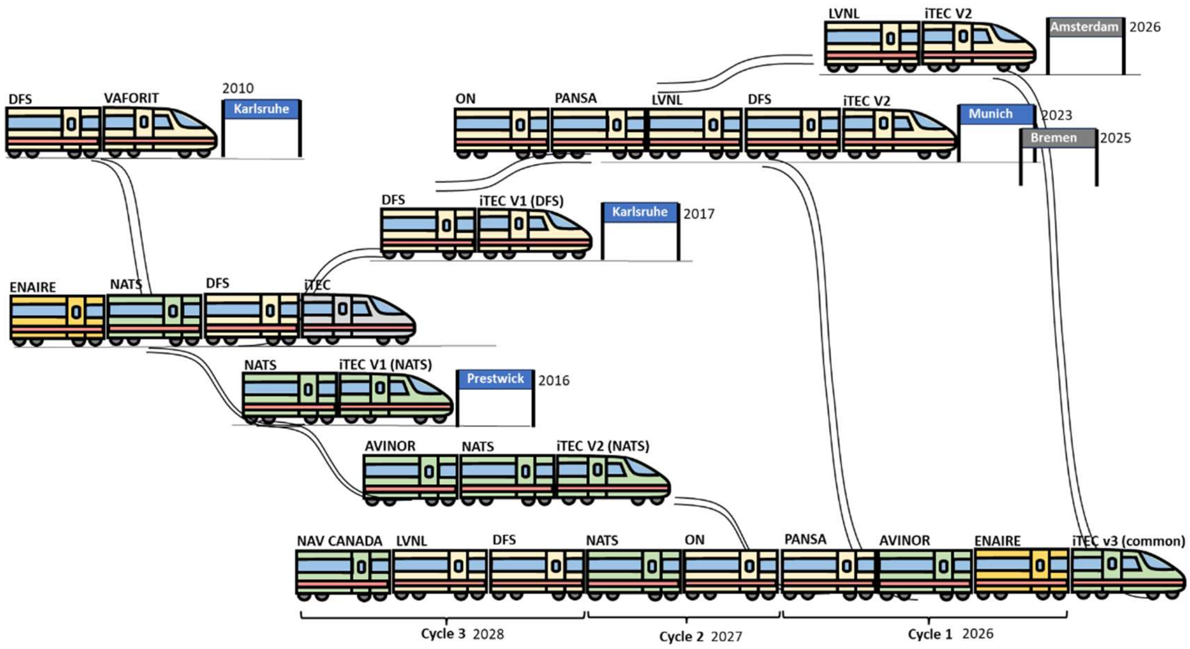

Figure 2: Development of different iTEC tracks and planned convergence for iTEC v3 (iTEC SkyNex)

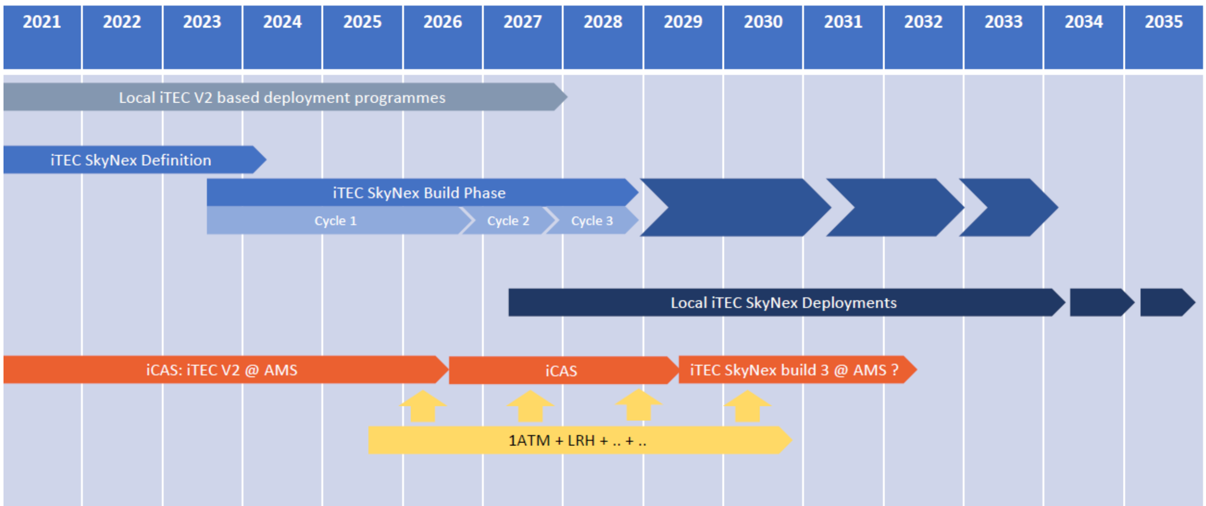

Figure 3: Timeline of different iTEC versions

Meanwhile, LVNL is also updating several other current systems. The Flight Data Service project (FDS) focusses on updating the Aeronautical Data Access System (ADAS) and the Home Briefing System (HBS) to be able to support SWIM and FF-ICE services. The ADAS is a system that enables sending, receiving, and saving ATS messages, which are currently transmitted via Aeronautical Fixed Telecom Network (AFTN), and providing ATC staff with flight information. The HBS is a system that allows pilots and operators to submit flight plan proposals and flight plan related proposal messages to the ATS Reporting Office (ARO), who then validate the proposals and distribute them to the relevant ATM systems. The new FDS system shall consist of a service supporting functionalities to process flight data and ATS content to replace the current ADAS system and a service supporting home briefing and ARO functionalities to replace the current HBS system. The project is divided into two phases. Phase 1 is the replacement of ADAS and phase 2 is the replacement of HBS. Phase 1, the replacement of ADAS for a cloud service, will take place in Q1 of 2026. From CP1 it is required that this new system will be able to process FF-ICE services. Seeing as AAA and iCAS are currently unable to process FF-ICE services, the plan is to incorporate the functionalities needed to process the FF-ICE services, but not utilise them yet and keep working with the FPL2012 format. The FF-ICE services that would be used are the publication service and the request service. Phase 2 of the project, the replacement of HBS, will take place end of 2026. This part of the service will use the notification service and the filing service. The goal is to make it possible to file flight plans in the eFPL format, even though this will have limited added value seeing as the eFPL cannot yet be processed by AAA or iCAS, but it does show goodwill and the desire to comply with the CP1 regulation (System engineer LVNL, personal communication, April 1, 2025).

Other options for utilising FF-ICE services and information provided in the eFPL lie in the Decision Support Tool (DST) and the Advanced Schiphol Arrival Planner (ASAP). The DST uses simulation techniques and machine learning to facilitate traffic flow prediction multiple hours in advance. These forecasts aid in preventing delays and determining whether regulations are needed in order to maintain an optimal balance between capacity and sustainability in the Dutch airspace (LVNL, 2023). The DST has its own B2B connection with the NM, thus can be provided with the information provided in the eFPL without needing AAA or iCAS, making predictions even more accurate. The ASAP is the Arrival Manager (AMAN) for LVNL. The ASAP would also benefit from the richer information provided in the eFPL. Currently the ASAP receives information from AAA and utilises the Base of Aircraft Data (BADA) to realistically model the performance of aircraft. The information provided by the eFPL would be even more specific per flight, leading to more accurate calculation of aircraft arrival sequences. It might be possible to create a connection between the ASAP and the DST to provide the ASAP with the same information from eFPLs, or it might be possible for the ASAP to get a separate B2B connection with the NM, but further research will be needed to determine whether this is feasible (System engineer LVNL, personal communication, April 22, 2025).

4.3.2 Status of implementation at the home carrier

The home carrier will be able to comply with the CP1 regulation by 31 December 2025. They have two options available that will ensure their compliance, which are discussed in this section. The home carrier utilises a CFSP, Lufthansa Systems, for their flight planning. They are currently in the process of transitioning from the Lido legacy modules to the Lido Flight 4D Integrated Flight Support (IFS) system. At the moment they are in the first phase of implementation. At the start of April, the flight plans for about 5 to 10 city pairs were being filed with the new Lido Flight 4D IFS system. They are planning to convert the whole European fleet to the new system around May, but the flight plans for intercontinental flights will have to be filed with the old legacy system. However, even though the home carrier is using the new system, the flight plans are still being filed in the FPL2012 format. This is due to the fact that they need a new B2B certificate to be allowed to file the eFPL with Lido Flight 4D IFS. The CFSP is already in possession of an operational (OPS) certificate, but the airline will need an additional certificate. The home carrier is in the process (figure 2) of obtaining this OPS certificate. They already have the PRE- OPS certificate, which is necessary for technical testing, but to gain access to the NM OPS environment they need operational validation (SESAR, 2025). The home carrier is hopeful that they will receive their OPS certificate before the summer, but this depends on NM. When they receive the OPS certificate the home carrier wants to continue testing with the filing of the eFPL through the new Lido system, before gradually transitioning to filing the flight plans of the whole European fleet in the eFPL format before 31 December 2025. As stated before, the flight plans of intercontinental flights will still be filed with the old Lido legacy modules due to the fact that Lido Flight 4D IFS will not yet be ready to accommodate the intercontinental flights. It will most likely be about a year and a half before Lido Flight 4D IFS will be ready for this transition. In the meantime, in order to comply with CP1, Lufthansa Systems has updated their Lido legacy modules to be able to file flight plans in the eFPL format. Therefore, the home carrier will be able to file all flight plans for the entire fleet in the eFPL format. If everything goes to plan, the eFPL for the European fleet will be filed through the Lido Flight 4D IFS system, and the eFPL of the intercontinental fleet will be filed through the Lido legacy modules. If, however, the Lido Flight 4D IFS system will not be ready for filing the eFPL, because for example the operational validation is not complete yet, the home carrier will still be able to comply with CP1. The home carrier will be able to use the updated Lido legacy modules not just for the intercontinental flights, but for the entire fleet, ensuring compliance by 31 December 2025 (Project manager flight operations, personal communication, April 8, 2025).

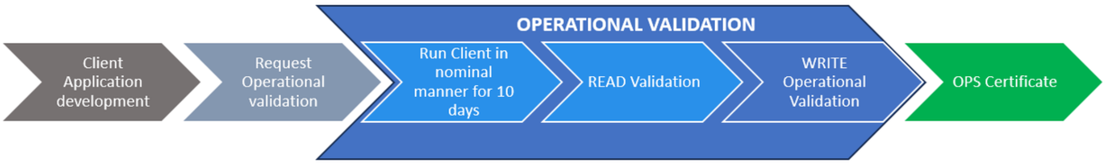

Figure 4: Operational validation process

Chapter 5 Conclusion and Recommendation

5.1 Conclusion

This thesis has investigated the current status of eFPL implementation and the level of compliance with the European CP1 regulation by both LVNL and the home carrier. The findings clearly indicate a disparity in progress between the two stakeholders.

The home carrier is on track to meet the CP1 compliance deadline of December 31, 2025. Its strategy involves filing eFPLs using the Lido Flight 4D IFS system for the European fleet, while continuing to rely on the updated Lido legacy system for intercontinental (ICA) flights. Should unforeseen obstacles—such as B2B certification issues or technical delays—prevent the Lido Flight 4D IFS system from being fully operational in time, the updated legacy system provides a reliable fallback. However, the home carrier's implementation will not include take-off mass in the eFPL, which could limit certain benefits of full FF-ICE compliance.

LVNL, by contrast, will not be able to comply with the CP1 requirements by the 2025 deadline. The key obstacle is that neither the AAA system nor the iCAS system, in the current iTEC v2 version, can process the eFPL until the expected iTEC SkyNex version of iCAS can be implemented. As a result, LVNL's compliance is realistically projected for 2032. In the meantime, LVNL is upgrading its ADAS and HBS systems to a new Flight Data Services (FDS) platform, which may include FF-ICE-related capabilities.

Despite these limitations, the work undertaken in this thesis lays out a clear understanding of each stakeholder’s role, progress, and challenges in achieving compliance, providing a foundation for strategic development in the years ahead.

5.2 recommendations

To support future compliance and prepare for the eventual implementation of eFPL capabilities, it is essential that the ongoing Flight Data Services (FDS) project at LVNL incorporates full support for FF-ICE functionalities. This includes ensuring that both the ADAS and HBS replacements are designed from the outset to handle eFPL messages and the data elements required under CP1 regulation. By building in these capabilities now, LVNL can avoid redundant system overhauls and ensure a smoother transition once backend systems such as iCAS become fully operational.

In addition, LVNL should explore the potential for its Arrival Manager (AMAN) system to consume eFPL data. Enabling AMAN to make use of the more detailed and trajectory-based information provided by eFPL would enhance operational predictability and improve alignment with future European ATM standards.

Coordination with the home carrier remains important, particularly to manage the limitations around certain data elements—such as take-off mass—that the carrier does not plan to include. Continued collaboration will help ensure consistency in implementation and minimize the risk of interoperability issues as systems evolve.

Given the delay in LVNL's full compliance timeline, efforts should be made to engage with regulatory authorities to explore transitional strategies or interim compliance solutions. This may help mitigate potential operational disruptions or regulatory gaps between the 2025 deadline and the projected readiness in 2032. Finally, both LVNL and the home carrier should remain actively involved in European initiatives such as SESAR and maintain close contact with EUROCONTROL to stay informed of regulatory updates, implementation best practices, and funding opportunities to support this ongoing transition.

Reflection

Working on this thesis has been a deeply enriching yet personally challenging experience. I genuinely enjoyed exploring a complex issue and being responsible for finding a structured, well-founded answer. Diving into the material and being allowed to own the process made the work feel meaningful. I find satisfaction in creating something that contributes to solving a real-world problem, especially through structured research and analysis.

However, the process was far from smooth. I struggled with my own mindset more than I expected. Time management, while decent on paper, often faltered in practice because I let perfectionism and self-doubt delay progress. I still have trouble believing in my own abilities, even when external feedback and past results suggest I should. This often led to overthinking and getting stuck, especially during the middle phase of the project when the initial momentum had faded, and the final deadline was still far off.

A major lesson I've learned is the importance of reaching out and asking for help earlier. This was something I only started to apply halfway through. Once I did, it made a big difference. My supervisor's understanding and honest feedback helped me regain perspective. The support I received from Studiemeesters and my personal network also played a key role in keeping me going, emotionally and mentally.

Methodologically, the project went well. I structured my approach carefully and followed a consistent process that ultimately led to results I stand behind. Still, I recognize now that I could have benefited from involving others more—whether through peer reviews or informal discussions—to challenge my ideas and refine my direction sooner.

If I were to do this all over again, I would start by accepting that asking for help is not a weakness. I'd also try to maintain a steadier rhythm throughout the process rather than having overly intense start and end phases, with a slow middle. These are lessons I plan to carry forward into any future research or professional work.

In the end, I'm proud of what I produced and of having made it through, not just academically but personally as well.

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Appendices

Appendix I

Approved OMB No.
2120-0026 Exp. 9/30/2023

U S Department of Transportation
Federal Aviation Administration

International Flight Plan

PRIORITY
<=FF

ADDRESSEE(S)
<=

FILING TIME
ORIGINATOR
<=

SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND / OR ORIGINATOR

3 MESSAGE TYPE
<=(FPL
7 AIRCRAFT IDENTIFICATION
—
8 FLIGHT RULES
—
TYPE OF FLIGHT
—
<=

9 NUMBER
—
TYPE OF AIRCRAFT
WAKE TURBULENCE CAT.
/
10 EQUIPMENT
— /
<=

13 DEPARTURE AERODROME
—
TIME
<=

15 CRUISING SPEED
—
LEVEL
ROUTE
<=

16 DESTINATION AERODROME
TOTAL EET
HR MIN
ALTN AERODROME
2ND ALTN AERODROME
<=

18 OTHER INFORMATION
—
<=

19 SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN FPL MESSAGES)

ENDURANCE
HR MIN
—E/
PERSONS ON BOARD
P/
EMERGENCY RADIO
UHF VHF ELT
R/ U V E

SURVIVAL EQUIPMENT
POLAR DESERT MARITIME JUNGLE
/ P D M J
JACKETS
LIGHT FLUORES UHF VHF
/ L F U V

DINGHIES
NUMBER CAPACITY COVER
COLOR
D / C
<=

AIRCRAFT COLOR AND MARKINGS
A/

REMARKS
N /
<=

PILOT-IN-COMMAND
C/
)<=

FILED BY	ACCEPTED BY	ADDITIONAL INFORMATION

FAA Form 7233-4 (7/15)

Appendix II

Summary - FF-ICE Data item presence in the submitted eFPL

> **WORK IN PROGRESS**

The table below provides a recap of the rules on the presence of fields for the submitted eFPL. The table should be read as follows:

- Columns 1 and 2 contains the name of the Data Category and Data Item as listed in ICAO Doc 9965 Ed2 Volume 2 (the FF-ICE/R1 Implementation Guidance Manual), chapter C-4 Filed Flight Plan. A data item displayed in italic is an FF-ICE data item that is specific to Europe.
  - Use of symbol ⭐ indicates that the FF-ICE Data Item is new in the eFPL compared to the legacy FPL content.
- Columns 3 to 7 describe the rules on the presence of the FF-ICE Data Item in the submitted eFPL.
  - Column 3 indicates whether the data item is declared Mandatory (M) or Optional (O) in the message template for the filed flight plan provided by FIXM's FF-ICE Message Application 1.1.0, which generally reflect the rules on the presence of fields from ICAO Doc 9965 Ed2 Volume 2, Appendix C.
  - Column 4 indicates whether the data item is considered mandatory (M) as per CP1. Use of the character "-" indicates that CP1 does not specify any rule for that item.
  - Column 5 indicates whether the data item is considered Mandatory (M), Optional (O), forbidden (F), or not needed by NM. Use of the character "-" indicates that no rules are specified on top of what FIXM specifies.
  - Column 6 indicates whether the data item is considered Mandatory (M) from the perspective given OUTDATED - Use cases (ANSPs).
  - Column 7 provides the aggregated rule on the presence of the data item, which corresponds to the most stringent of the FIXM, CP1, NM and Use Cases rules.
- Column 8 provides an indication whether the data item is supported by the current NM systems, based on the NM B2B R27 documentation. Use of symbol ✅ means that the data item is supported by the NM B2B R27 Filing Service. Use of symbol ⚠️ indicates that data item is either partly supported (e.g. can be received but cannot be processed yet) or not supported.
- Column 9 may capture additional notes in relation to the requirements on the data item presence, such as the justification for a particular CP1 requirement that is more stringent than what ICAO specifies.

Content of the filed eFPL		Requirements on Data Item presence in the filed eFPL					
Data Category	**Data Item**	**From FIXM**	**From EU CP1**	**From NM B2B**	**Aggregated Requirement**	**NM R27 Capabilities**	**Notes / Justifications**
Message Information	List of Recipients	O	-	Not needed	Not needed	✅	The FIXM template leaves these fields optional, even though they are described as mandatory in ICAO Doc 9965 Ed2 Volume 2 Appendix C-4, to allow these fields to be absent from the XML body of the FF-ICE message if they can be exchanged/retrieved through other means, as is the case in the NM B2B implementation.
	Message Originator	O	-	Not needed	Not needed	✅	
	Request for Translation and Delivery ⭐	O	-	Not needed	Not needed	✅	This item identifies the eASP that has been requested to translate and deliver the Flight Plan to identified Requested Recipients. In the context of the European implementation of FF-ICE, this eASP is always NM. The information is therefore implicit and the field is irrelevant.
	Requested Recipients ⭐	O	-	-	O	✅	This implements the (IFPS Users Manual) Re-addressing Function.
	Request for Forwarding ⭐	O	-	Not needed	Not needed	✅	This item identifies the eASP that is requested to forward the Flight Plan to all Relevant ASPs. In the context of the European implementation of FF-ICE, this eASP is always NM. The information is therefore implicit and the field does not need to be provided.
	Relevant ASPs ⭐	M	-	❓	M	❓	
	Message Date-Time	O	-	Not needed	Not needed	✅	See Notes above for "Message Originator"
	Message Identifier	O	-	M	M	✅	
	Type of Request/Response	O	-	M	M	✅	
	AFTN Address	O	-	-	-	?	

	Total Estimated Elapsed Time	O	M	M	M	✅	
	General Flight Constraint ⭐	O	-	F	F	N/A	
Route/Traj. Element ⭐		M (2+)	**M (2+)**	M (2+)	M (2+)	✅	
	Along Route Distance ⭐	O	-	M	M	✅	
	Route Element Start Point	M	-	-	M	✅	
	Route to Next Element	O	-	-	O	✅	The ICAO FF-ICE/R1 Manual states that the field is required on each element, except when the element is the last point of the route.
	Route Truncation Indicator ⭐	O	-	-	O	⚠️	
	Requested Change	O	-	-	O	✅	
	Route/Trajectory Constraints ⭐	O	-	F	F	N/A	
	Trajectory Point ⭐	O	**M (Cond)**	-	M (Cond)	✅	
	Geo Position ⭐	M	**-**	-	M	✅	
	Time ⭐	M	**-**	-	M	✅	
	Level ⭐	M	**-**	-	M	✅	
	Predicted Airspeed ⭐	O	**-**	-	M	⚠️	
	Predicted Ground Speed ⭐	O	**-**	-	M	⚠️	
	Wind Vector ⭐	O O O	- - -	M M M	M M M	⚠️ ⚠️ ⚠️	
	Assumed Altimeter Setting ⭐	O	-	-	O	⚠️	
	Temperature ⭐	O O	-	M M	M M	⚠️ ⚠️	
	Trajectory Point Property ⭐	O M O O	**M (Cond)** - - -	- - - -	M (Cond) M O O	✅ ✅ ⚠️ ⚠️	
	Planned Delay	O	-	-	O	✅	
	Weight at Point ⭐	N/A	O	O	O	⚠️	
Route/Traj. Aircraft Performance	Performance Profile ⭐	O O M (1+) O M M M M	**M (Cond)** **M (Cond)** - - - - - -	- - M (2+) - - - - -	M (Cond) M (Cond) M (2+) O M M M M	✅ ✅ ✅ ⚠️ ✅ ✅ ✅ ✅	
	Speed Schedule ⭐	O O M M	**M (Cond)** **M (Cond)** - -	- - - -	M (Cond) M (Cond) M M	⚠️ ⚠️ ⚠️ ⚠️	
Route to Revised Destination	Revised Destination	O	-	-	O	✅	
	Route String to Revised Destination	O	-	-	O	✅	
Dangerous Goods	Dangerous Goods Information ⭐	O	-	-	O	⚠️	
AIRAC	AIRAC Reference ⭐	O	-	-	O	⚠️	
Supplementary Information	Fuel Endurance	O	-	-	O	✅	

	Contact Information ★	O O	-	Not needed	Not needed	✓	The NM B2B services implements an authentication mechanism (using digital certificates – PKI) which makes the exchange of contact information about the sender not needed as part of the FF-ICE Message.
Flight Identification	GUFI ★	M	**M**	-	M	✓	
	Aircraft Identification	M	**M**	M	M	✓	
Flight Status	Operator Flight Plan Version ★	M	**M**	-	M	✓	
Flight Characteristics	Flight Rules	M	**M**	-	M	✓	
	Type of Flight	O	**M**	M	M	✓	
	Special Handling	O	-	-	O	✓	
	Flight Plan Originator	O	-	-	O	✓	
	Remarks	O	-	-	O	✓	
	Operator	O	-	-	O	✓	
	Equipment and Capabilities	M	**M**	-	M	✓	
	Supplementary Information Source	O	-	-	O	⚠	
	Required Runway Visual Range	O	-	-	O	✓	
	EUR Special Handling	N/A	-	O	O	✓	
Aircraft Characteristics	Total number of aircraft	O	-	-	O	✓	
	Registration	O	-	-	O	✓	
	Aircraft Address	O	-	-	O	✓	
	SELCAL Code	O	-	-	O	✓	
	Mode A Code	O	-	-	O	✓	
	Number and type of aircraft	M	**M**	-	M	✓	
	Wake Turbulence Category	M	**M**	-	M	✓	
	Aircraft Approach Category	O	-	-	O	✓	
Departure/Destination Data	Departure Aerodrome	M	**M**		M	✓	
	Destination Aerodrome	M	**M**		M	✓	
	Estimated Off-Block Time	M	**M**		M	✓	
	Departure Airport Slot Identification ★	O	-	-	O	✓	
	Destination Airport Slot Identification ★	O	-	-	O	✓	
	Departure Runway ★	O	-	-	O	⚠	
	Destination Runway ★	O	-	-	O	⚠	
Alternates	Alternate Destination Aerodrome(s)	O	-	-	O	✓	
	Alternate Take-Off Aerodrome(s)	O	-	-	O	✓	
	Alternate En-Route Aerodrome(s)	O	-	-	O	✓	
Desired Route/Trajectory ★		M	-	-	M	✓	
Route/Traj. Group	Aircraft Take-off Mass ★	O	**M (Cond)**	-	M (Cond)	✓	
	Requested Cruising Speed	M	M	-	M	✓	
	Requested Cruising Level	M	M	-	M	✓	