NEFRA

North European Free Route Airspace

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Introduction and aim

- The aim with this presentation is to:
  - Provide information related to other issues than the direct operational when implementing FRA.
    - In particular over several ANSP/states where so many various stakeholders and decision processes are involved. (NSA, ANSP, Military… just in NEFRA this is 18 stakeholders without counting Airports that could be affected)
  - Only briefly address the direct problems with FRA implementation that we have faced. (basically those to be discussed during these two days)
  - Help others to prepare for such a widely influenced implementation with difficult decision processes with various timeframe within various stakeholders

  - No question is to small or stupid
  - Most likely I/We can't answer direct, but I expect that I have NEFRA support from our project in the audience that can assist.

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Agenda

PART 1:

- Introduce the programme background
- Present major milestones for design phase
- Explain the concept highlights

PART 2:

- System support (Technical Specification)
- Implementation
- Organization and governance
- Back up plan
- Implementation issues
- Lessons learned

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PART 1:

The Design Phase

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Background

2012

2013

Starting point 2012/2013:

- DK/SE FAB FRA already operational
- NEFAB project ongoing, aiming for 2015 implementation of NEFAB FRA

6 states declaration in March 2013 for “establishing a seamless FRA within DK/SE and NEFAB by November 2015”:

- NEFRA Program initiated
- “Steering Group” assembled – responsible for overall program strategic guidance
- “Expert Group” assembled – participant from each ANSP; responsible for the design phase

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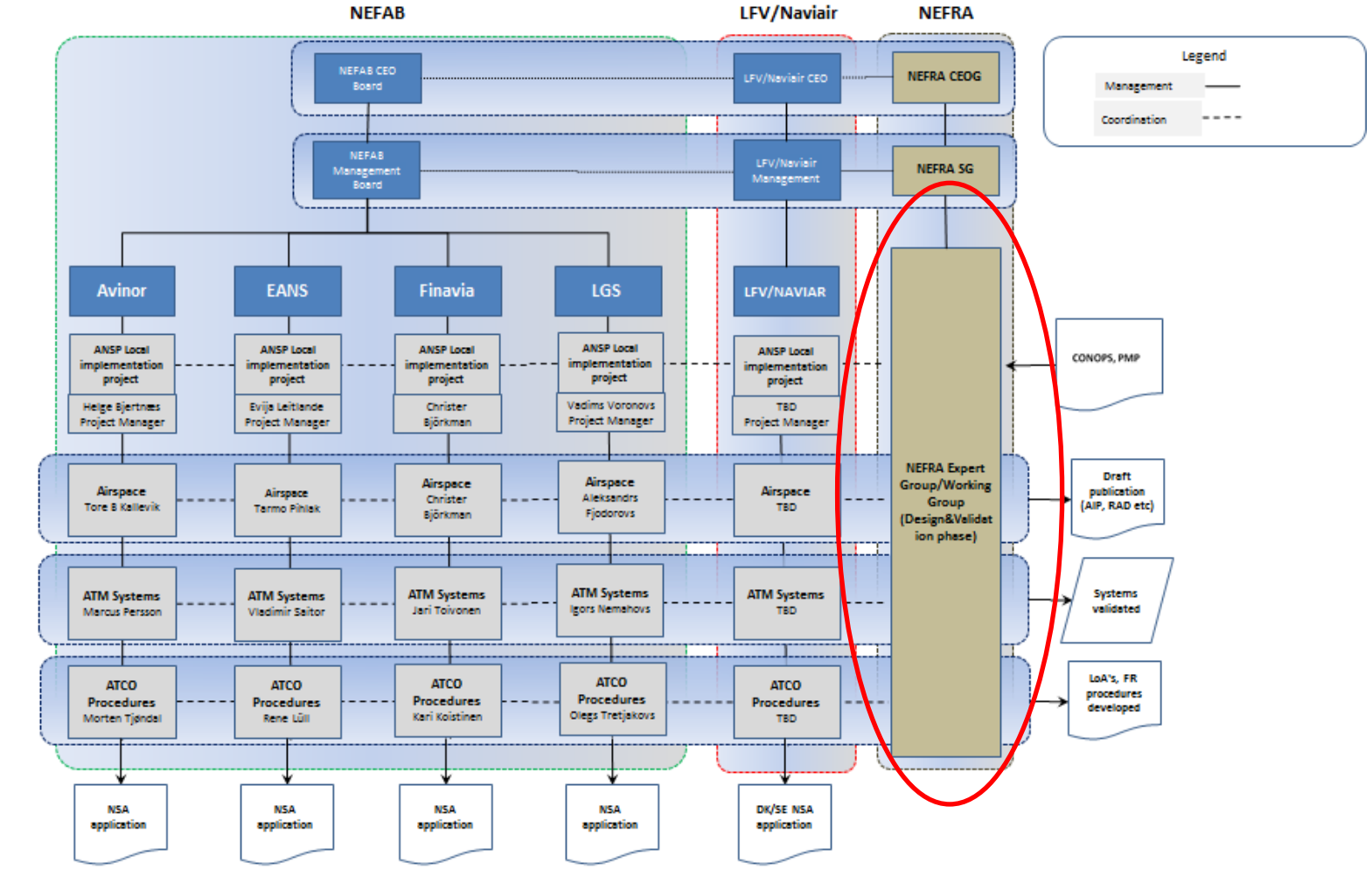
Organization – Design Phase



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Expert Group – Design phase

2013

2014

2015

Project Plan

- Detailed task/deliverable list

CONOPS:

- A description of the interface of two FRA concepts
- The goal was to create a seamless FRA from the airspace user's perspective
  - Common FPL rules
  - Harmonize the publication as far as possible

ATM System Specification

- Describes ATM system requirements to support FRA
- 5 different ATM system platforms with different capabilities

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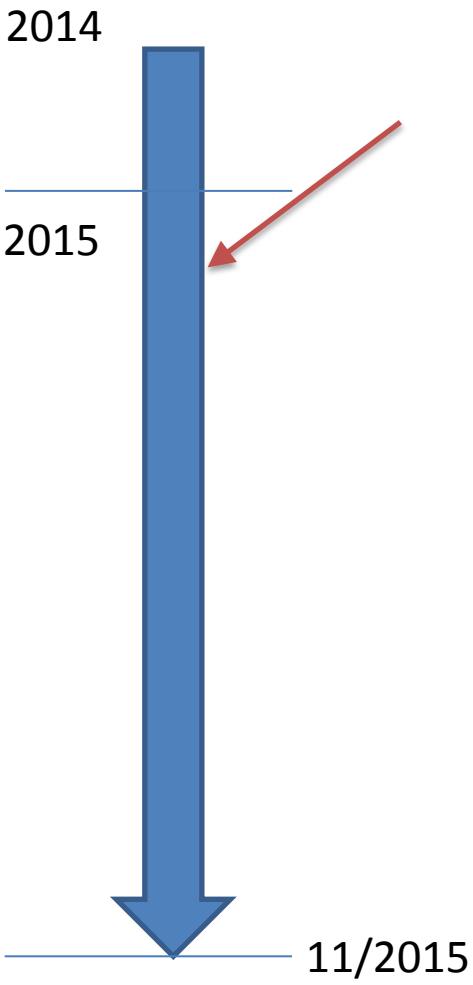
Expert Group – ATCO procedures



A separate task force was assembled to establish procedures:

- CONOPS and technical capabilities as input
- ATCO procedures and LoA's between ACC's as output

Major change in ATCO mind setting needed – clearing aircraft DCT into the downstream ACC without coordination

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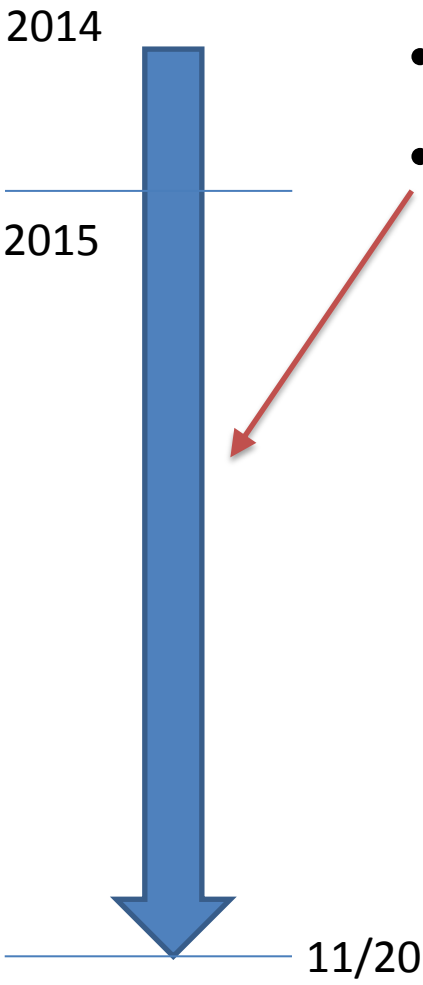
Expert Group – Publication



- AIC issued in May 2015
- AIP proposal – a proposal for the local AIS departments on how to publish FRA in national AIP's
  - No clear guidance from ICAO/EUROCONTROL
  - Difficulties to publish clearly multi state FRA without publishing "foreign data"

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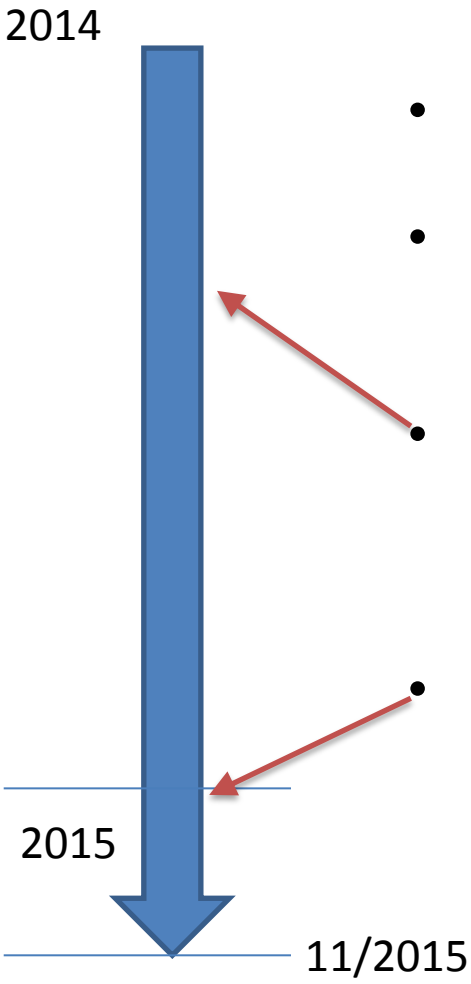
Expert Group – Airspace Design and operational validation



- No changes in DK/SE airspace (sectorization, transition routes etc.)
- NEFAB airspace in NEFRA is based on the upcoming 11/2015 airspace design

- Fast-time simulation/CAPAN analysis performed in each ACC
  - Results showed that no blocking issues were found

- Real-time simulations were performed as needed to verify the concept
  - System support requirements were verified
  - ATCO procedures are important

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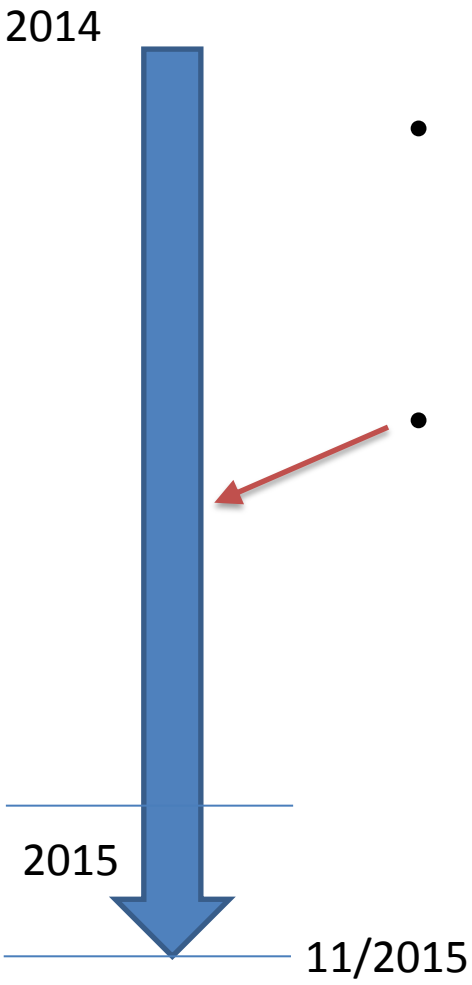
Expert Group – FRA Safety Case



- DK/SE NEFRA implementation based on existing approval – no safety case needed
- NEFAB performed a general FRA safety case together with EUROCONTROL
  - Was deemed very valuable for local safety assessments

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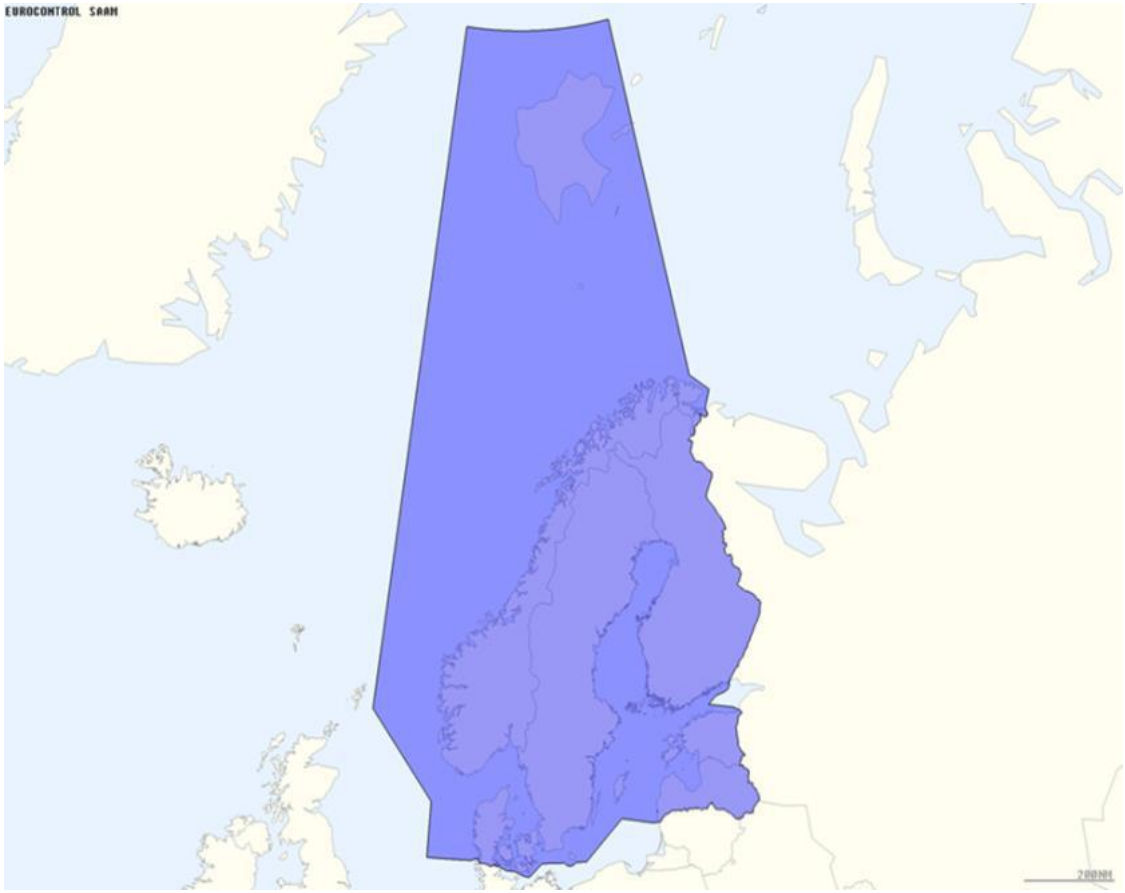
NEFRA Concept of Operations – Applicable area

Danish/Estonian/Finnish/Latvian/Norwegian/Swedish FIR//OFIR FL285+



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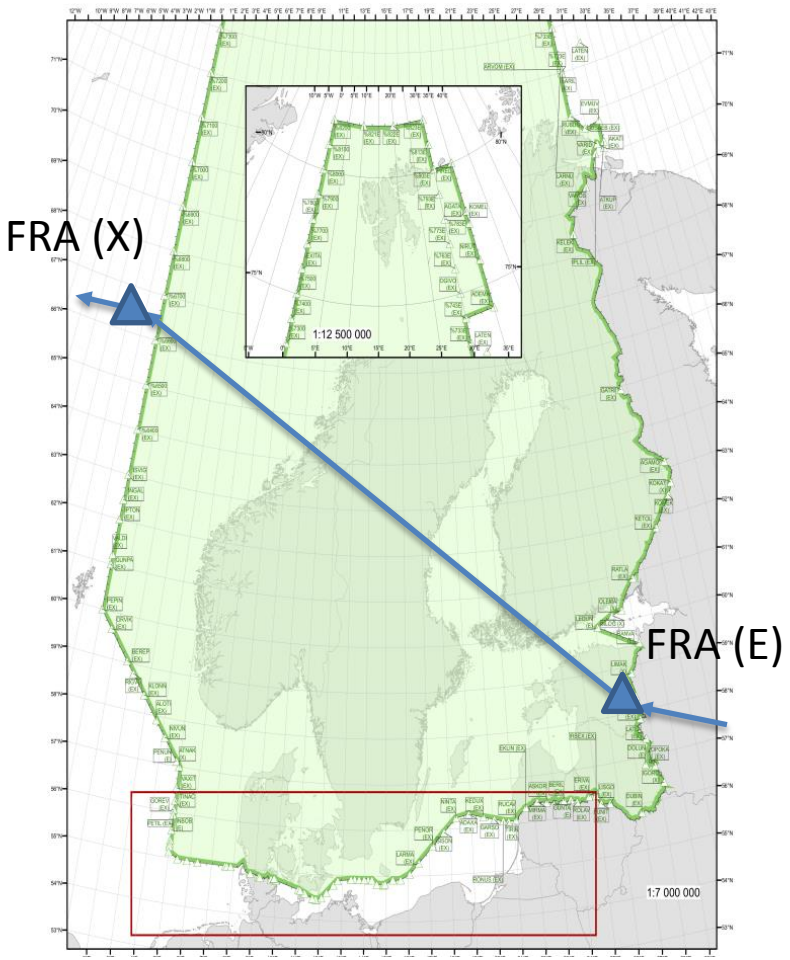
NEFRA Concept of Operations – FPL rules



Overflights:

- From FRA Entry (E) to FRA Exit (X)

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NEFRA Concept of Operations – FPL rules

Departing traffic:

Depending on the aerodrome there are different requirements as described in AIP.

- a SID Final Waypoint,
- a specific connecting point linked to aerodrome according to the RAD, Appendix 5,
- if required, the last point on a FRA Transition Route as described in ENR 3.5,
- if no suitable SID is available or there is no requirement for a connecting point, a waypoint within a required distance from the aerodrome according to the RAD, Appendix 5,
- a FRA Entry Point If departing from aerodrome in the proximity of DK/SE FAB or NEFAB.

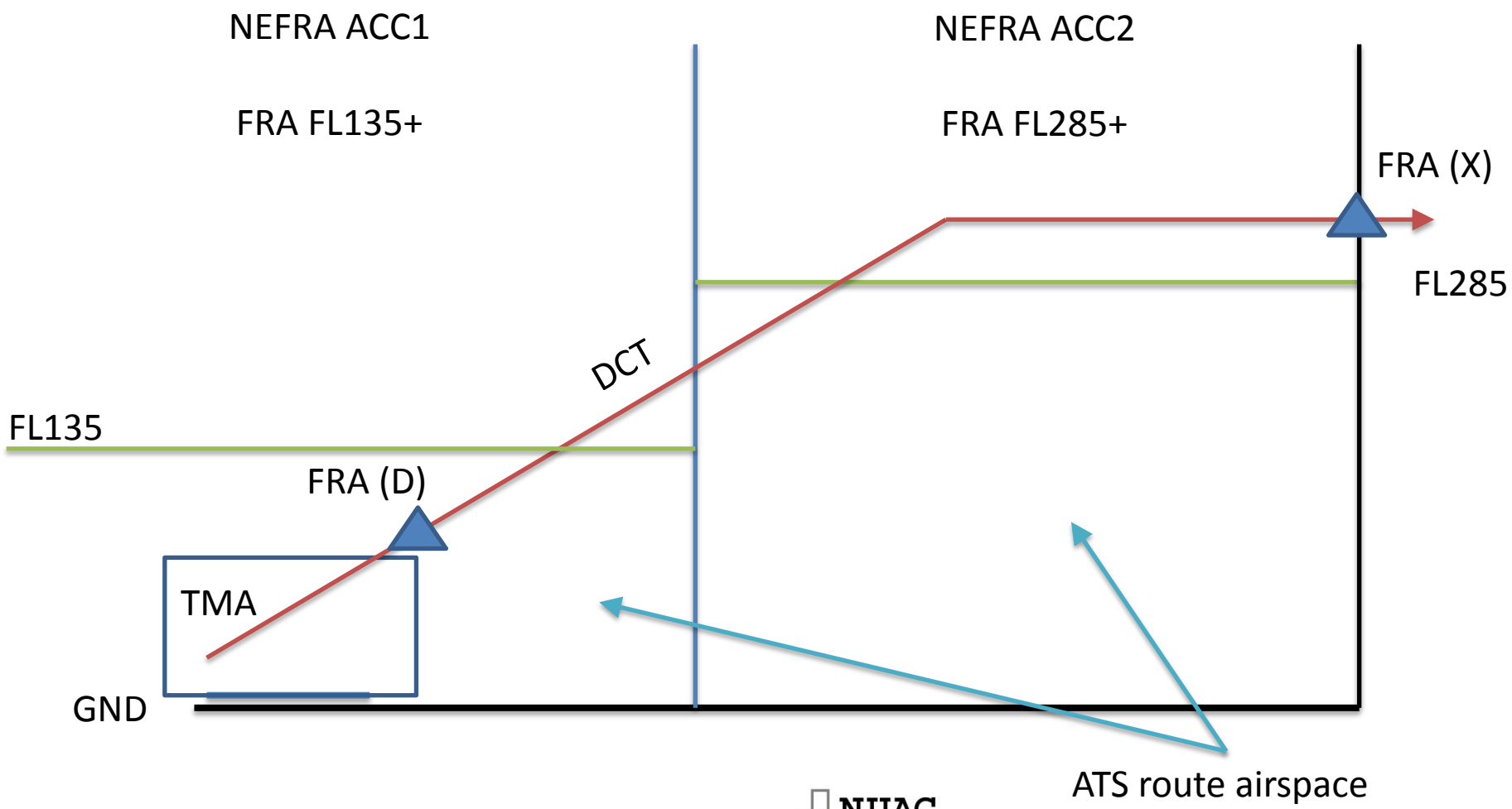
NEFRA Concept of Operations – FPL rules

Arriving traffic:

Exiting FRA for arriving traffic is via a FRA Arrival Transition Point.
Depending on the aerodrome there are different requirements as described in AIP.

- a STAR Initial Waypoint,
- a specific connecting point linked to aerodrome according to the RAD, Appendix 5,
- if required, the first point on a FRA Transition Route as described in ENR 3.5,
- if no suitable STAR is available or there is no requirement for a connecting point, a waypoint within a required distance from the aerodrome according to the RAD, Appendix 5,
- a FRA Exit Point if arriving to an aerodrome in the proximity of DK/SE FAB or NEFAB.

FPL Example – Departing Traffic



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The Transition From Design phase to the Operation

The design was ready and validated – how to secure the implementation?

Assembling the NEFRA “Implementation Group” in mid 2014

- Consists of local ANSP implementation project managers
- Making it all happen according to the design
- Each implementation manager is responsible for all activities within an ANSP (systems, training, publication etc.)
- Close co-operation with the concept owners (Expert Group)

PART 2:

The Implementation

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Contents

- System support (Technical Specification)
- Implementation
  - Starting point for implementation
  - Breakdown of Implementation
  - FRA over several states
  - Different system support
- Organization
- PMP and ToR
- Back up plan
- Implementation issues
- Lessons learned

System support (Tech Spec)

- Basic requirements
  - The following systems support is deemed as *basic* requirements to accommodate NEFRA operations:

    a) The ATM systems have to be able accept and process the NEFRA flight plans.

    b) NEFRA ACC`s shall be able to process and coordinate flights via OLDI. This coordination shall be based on the point where the planned DCT crosses the ACC boundary.

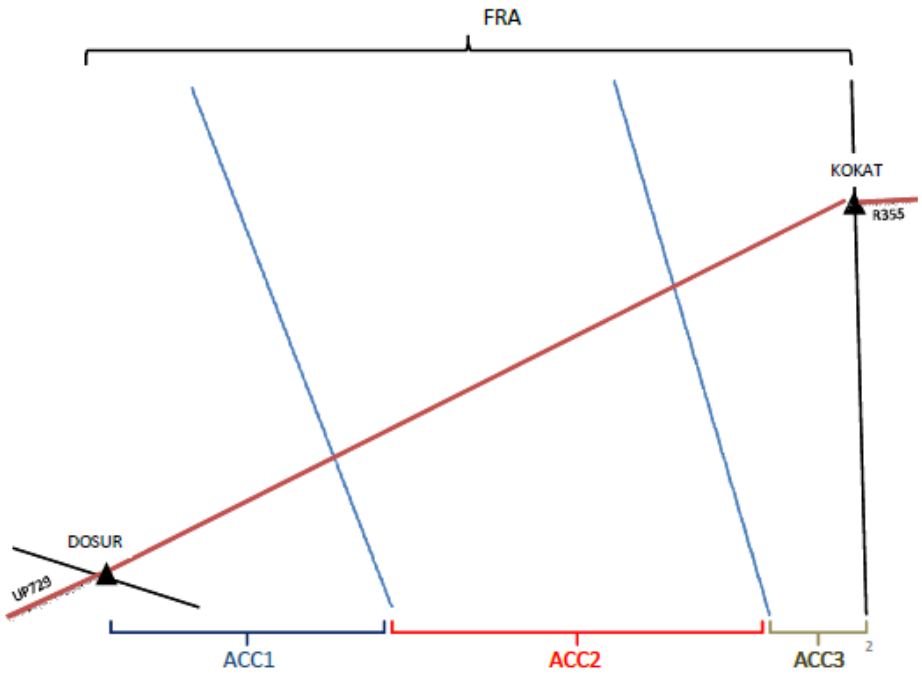
- *Enhancements* include:

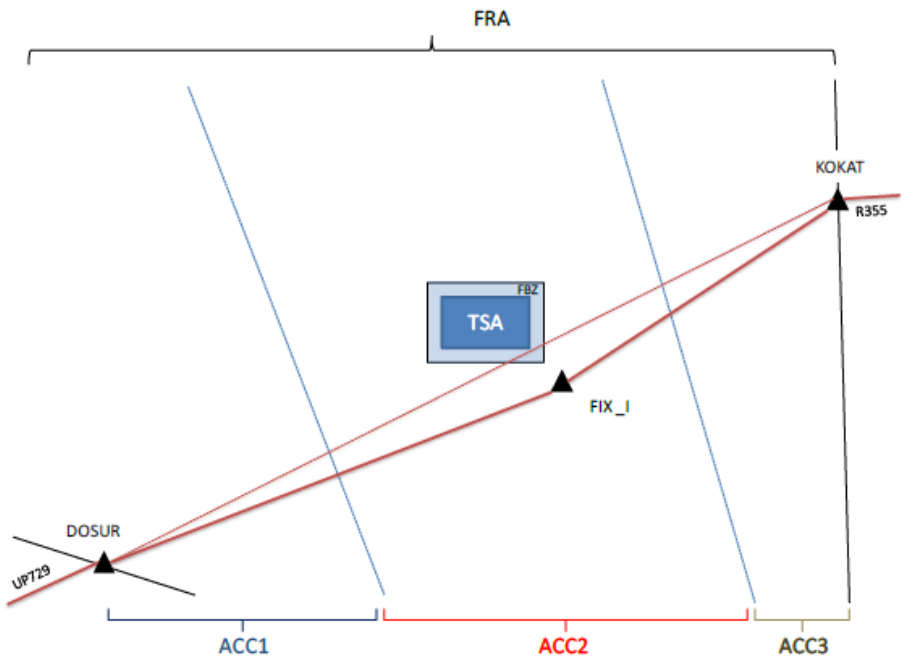
  a) Automated trajectory update via OLDI: sending, receiving and processing of route changes (updated field 15 information) in ABI and REV messages.

  b) NM integration: automatically sending AFP message to the NM upon route/level change and processing of received ACH/APL messages.

System support (Tech Spec)

- Flight planning*





* In ESAA FIR flight planning through an active PCA is allowed and transit is handled tactically.

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System support (Tech Spec)

- Environmental information
  - All ATM systems shall have all the en-route points/fixes/nav-aids within the NEFRA in the database.
- System area
  - System area is the geographical area that ATM systems is aware of (system is aware of all required points/fixes/nav-aids within the system area).
  - System area shall contain as a minimum the whole of NEFRA.

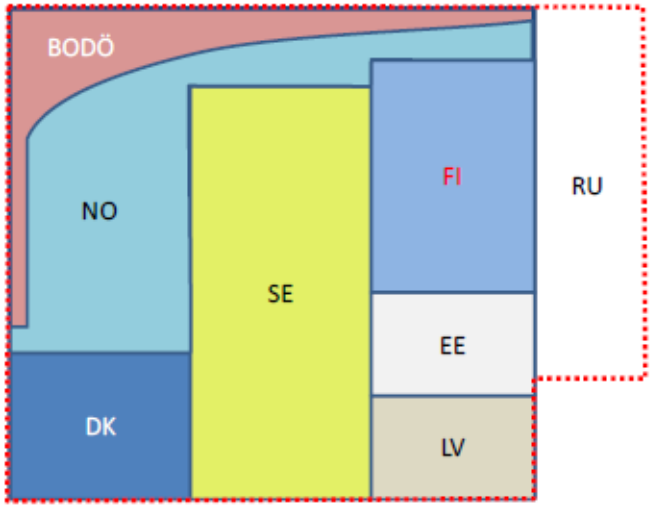

Figure 3: System area for Finnish system

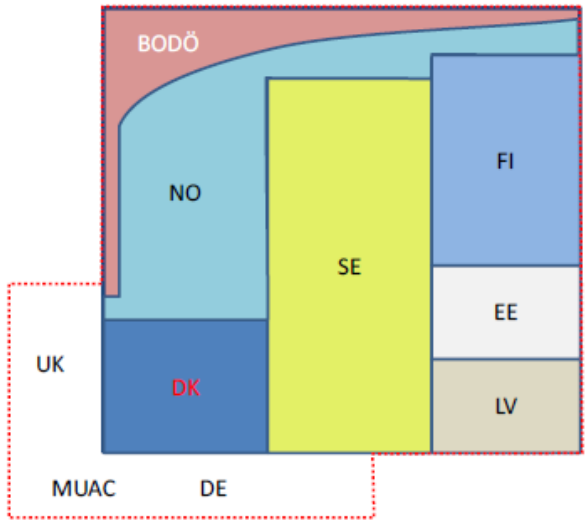

Figure 4: System area for Danish system

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System support (Tech Spec)

- OLDI
  - OLDI specification v4.2 shall be followed.
  - Bearing and Distance from the closest defined COP at the boundary.
  - ABI, ACT, PAC

- Enhancements
  - Field 15 with MAC and REV
  - AFP messages

Implementation

- The implementation of FRA over several states/ACC has been divided in three different steps:
  - System support for FRA area
  - System support for OLDI/AFP to the level decided
  - The actual commissioning of FRA airspace with publication and NM allowing flight planning in accordance with FRA rules.

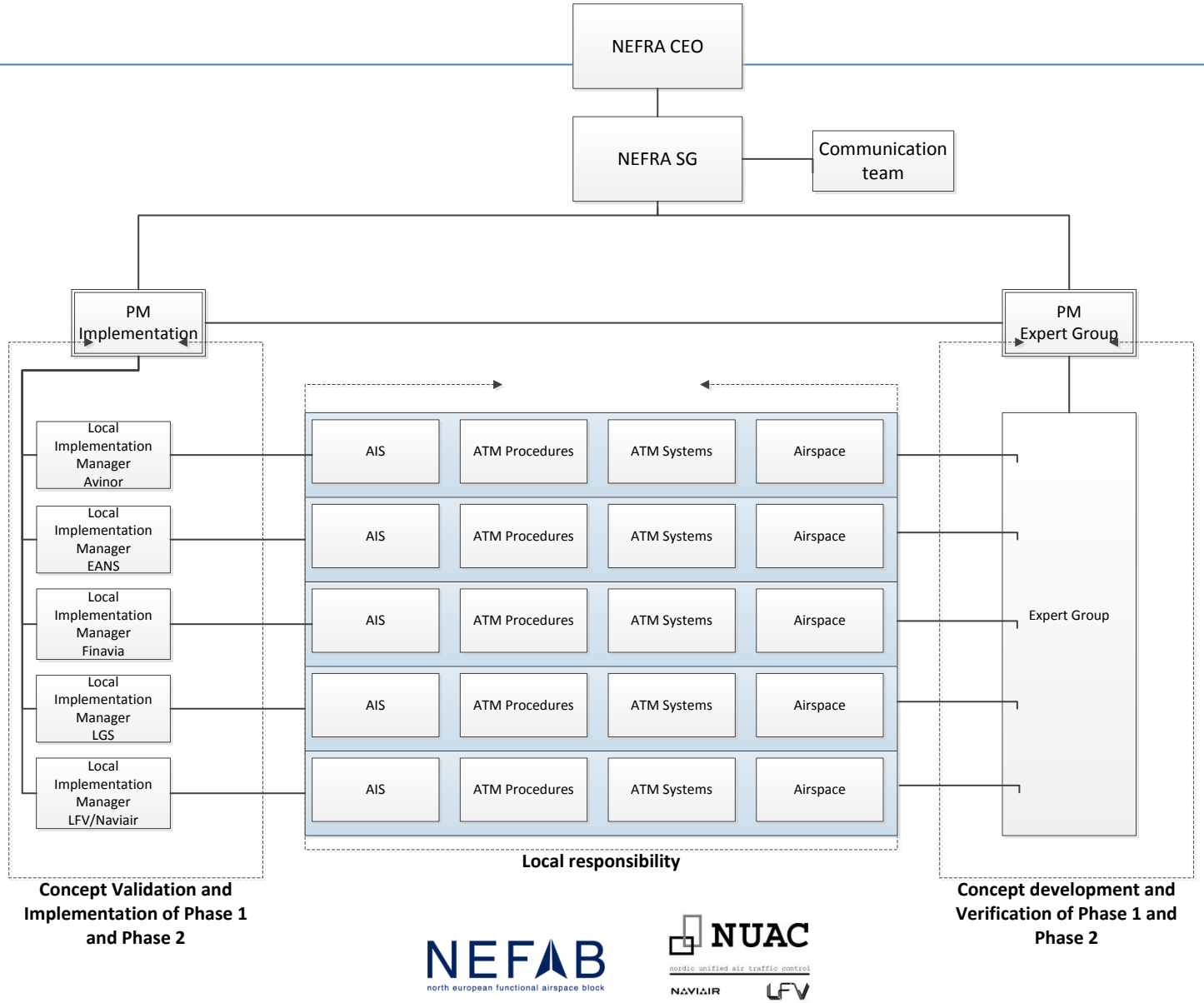
- With the requirements on NEFRA each one of these steps can be performed individually and there is no need to do them all at once.

- Obviously the two first steps has to be achieved before the third

Implementation

- System support at starting point for implementation
    - Based on the decided technical specification the following was required to be able to provide required system support to operators in the FRA area:
        - Avinor (INDRA/RAYTHEON) and LGS (SI)
            - System update required for both FRA area and OLDI support
        - EANS and FINAVIA (THALES)
            - System update required for OLDI support
        - LFV and NAVIAIR (THALES)
            - Compliant
- It’s quite clear that the Implementation projects will have huge variations in size and complexity between respective ANSP.

Organization – Implementation



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PMP and ToR

- There should be two different PMP. One for concept Development and one for Implementation.
- This was early discovered and mitigated with establishment of sub groups initially.

- Implementation faces a number of challenges that the concept doesn't take into consideration, such as:
  - the various starting points for implementation
  - the change of working methods

- The largest deviation/issue from planning to realization for us has clearly been the different approach to how FRA can and shall be published in respective AIP
  - With the knowledge we have now this should have been handled much earlier
  - There are unclear regulations in this area related to how "national" it shall be and how FRA is supported by ICAO.

Back up plan

- Due to the complex organization and difficulty to get decisions supported fast enough by all there is a need for a clear and accepted back up plan when things doesn't go as intended.

- NEFRA established this early with clear options and times for decisions
  - Without it we would have got caught in endless discussions when problem occurred

- It saved NEFRA when all requirements couldn't be met in time

- NEFRA is now planned to be implemented in two steps in accordance with back up plan
  - First establishment of two additional FRA areas beside DK/SE FRA
    - All technical changes performed where possible
  - Then the borders between the FRA areas are "erased".

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Implementation issues

- How shall this implementation and it's changes be handled with respect to the normal change work in respective organization?
  - Various approaches within NEFRA

- Publication of FRA in general
  - FRA relation to ICAO
  - Foreign information in national AIP
  - Procedures and workload to get and maintain data

- System development and readiness related to FRA required procedures
  - System area
  - Fix/point at a certain distance
  - OLDI/AFP
  - Deviation of flights and TSA:s

- Back up plan
  - This is considered as a must with Implementation Manager perspective

Lessons learned and summary

- We probably haven't learned all yet……. But worth mentioning:

- The balance in CONOPS and TECH spec.
  - Clear guidance, but with room for flexibility and close connection to what is feasible within the given timeframe
- PMP and management structure
  - Important with clear mandates and roles in a complex decision structure globally (NEFRA, DK/SE FRA, NEFAB) and locally (individual ANSP)
- The importance of a clear back up plan to make the complicated decisions easy
  - It's vital to face the risks ahead in a realistic way
- Implementation Manager need to have a wide knowledge since FRA implementation affects all areas within an ANSP (Tech, Airspace, Publication and so on). We have had a lucky mix in our Implementation group that complements each other.
- A phased implementation should be considered
  - System support ready first, it's clear that system support is essential.
- The value of simulations in our environment

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Thank you for the attention

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NEFRA Programme – overall workload sharing between NEFRA programme and ANSPs