EUROCONTROL

What Next ? In the partnership EUROCONTROL & DFS & Prof Hollnagel

FRAMily
Munich 11-13 September 2013

Tony Licu
Head of Safety
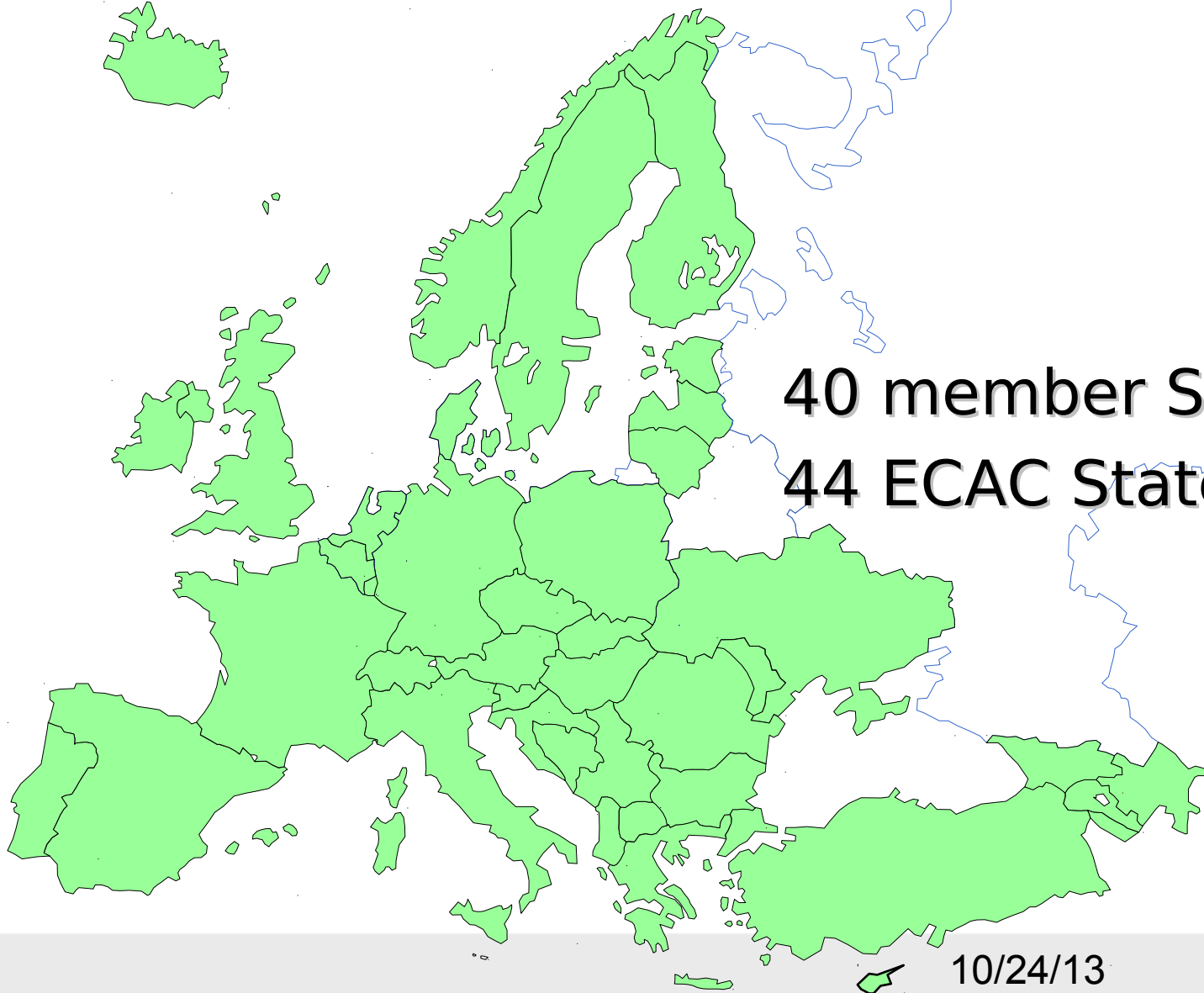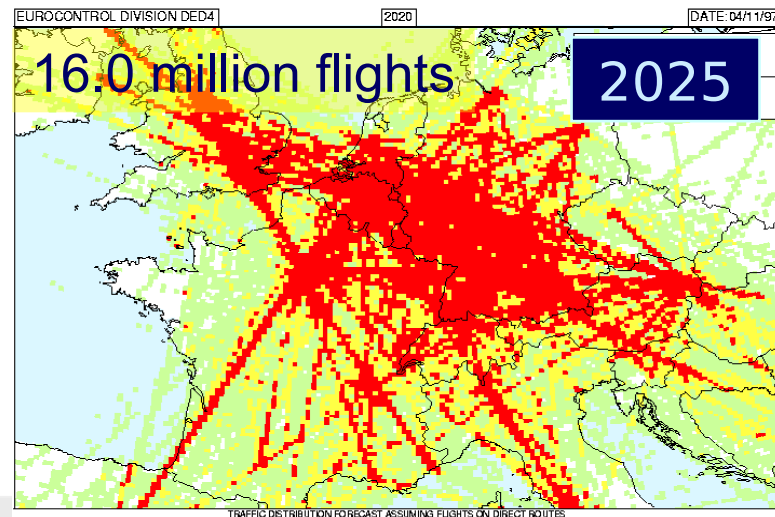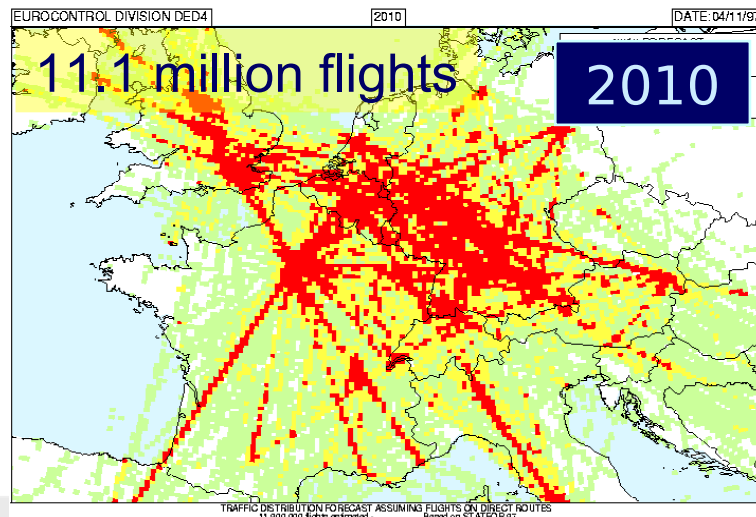antonio.licu@eurocontrol.int

Who is **EUROCONTROL**

EUROCONTROL

40 member States

44 ECAC States

Traffic doubles by 2020

7.0 million flights — 1997

8.0 million flights — 2000

Traffic tripled over 25 years
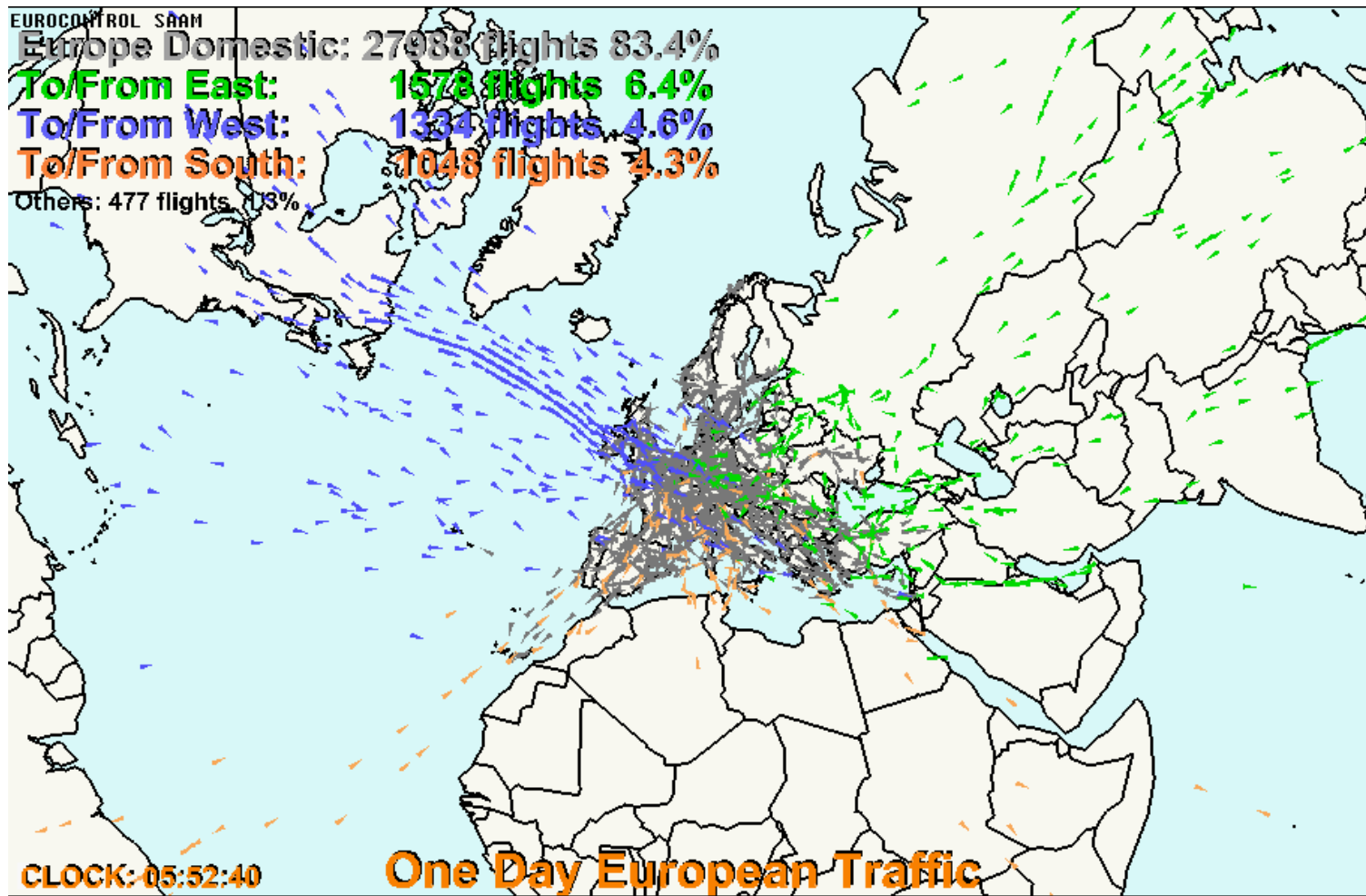
11.1 million flights — 2010
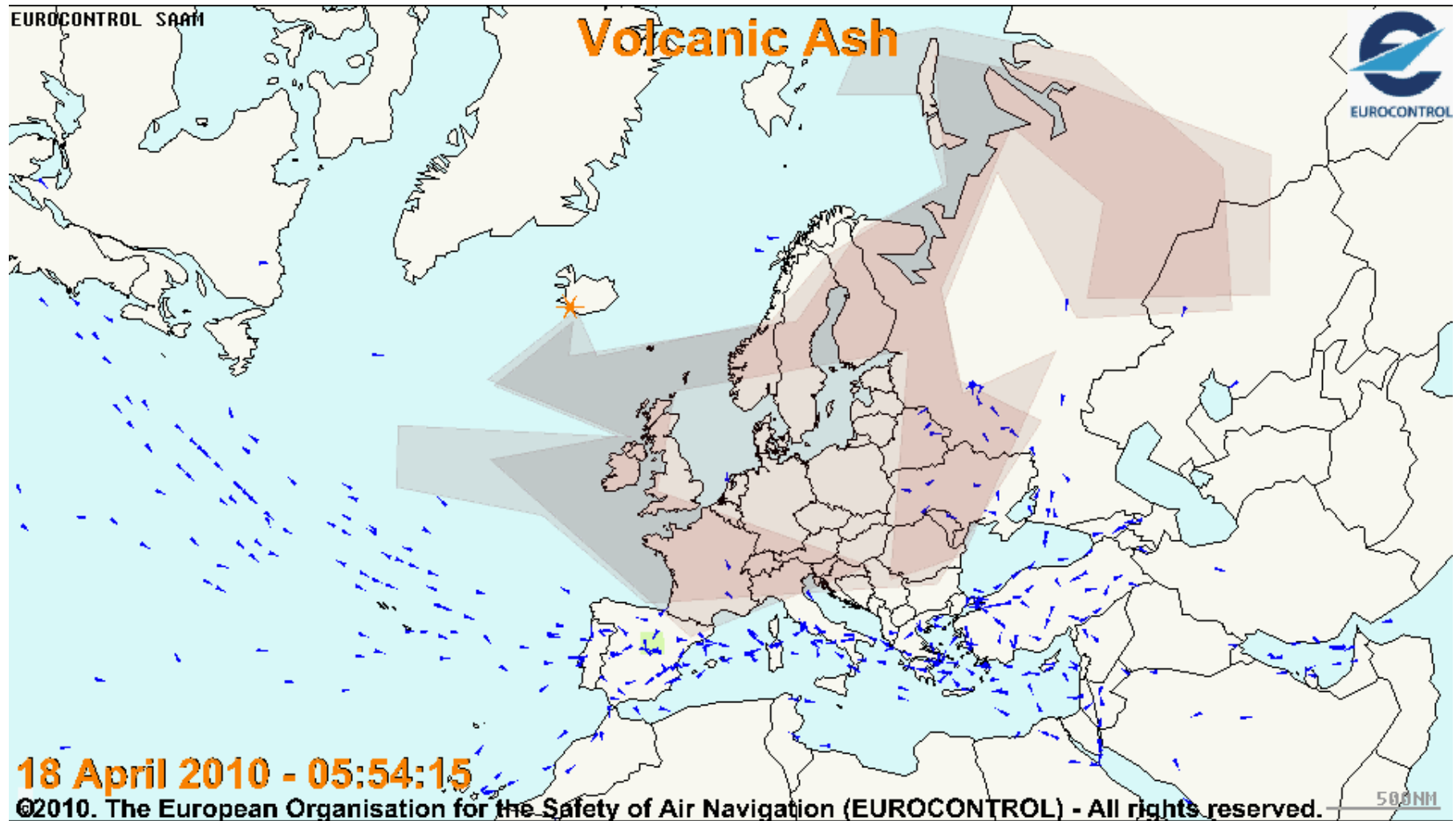
16.0 million flights — 2025
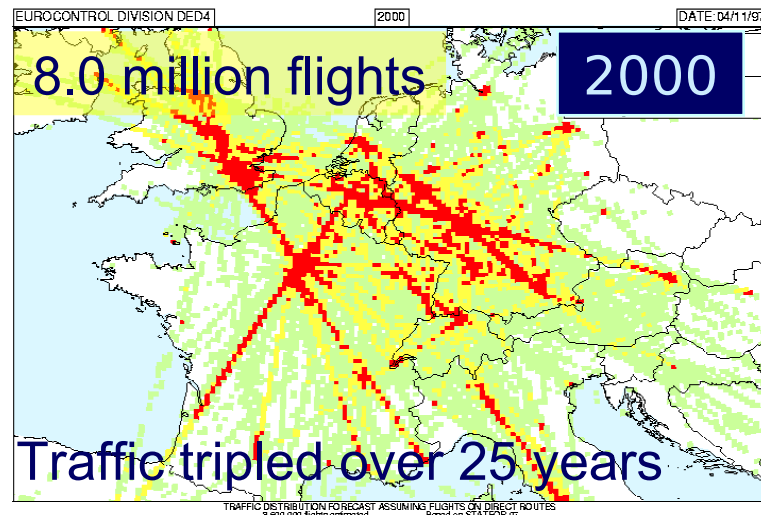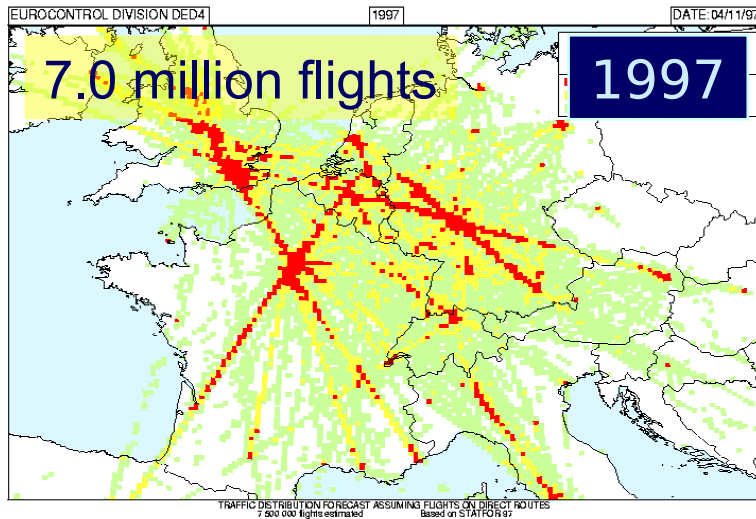
One normal day of Traffic
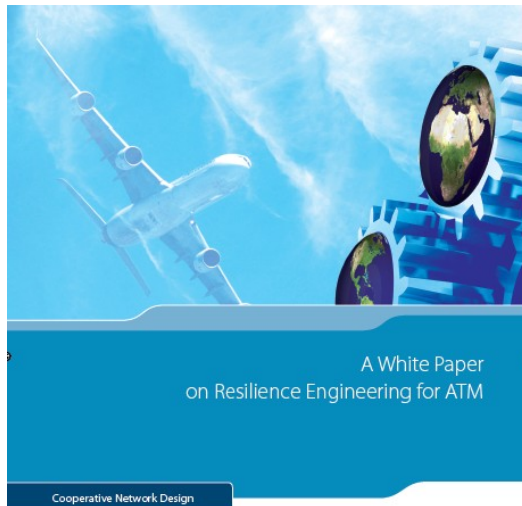
One less normal

What next

- Communicate on the work done in the recent past;
- Develop White Paper(s);
- Work on Positive methods
  - Weak signals;
  - Neutralised taxonomy;
  - 10 principles of introducing HF in investigations;
- Bring together DFS and NAV-P (others ?) to Model ATM/ANS using FRAM (not starting from scratch).

Building the foundation in the past – Resilience Engineering White Paper 2009

A White Paper
on Resilience Engineering for ATM

Cooperative Network Design

For further information contact:

- What is Resilience Engineering?

- Why do we need it in ATM?

- What is the usefulness of performance variability?

- What does Resilience Engineering look like in practice?

- How does Resilience Engineering fit with other safety methods?

- How mature is Resilience Engineering and what is the added value for ATM?

From Safety-I to Safety-II EUROCONTROL White Paper
to be ready for Dublin 26-27 Sept 2013

EUROCONTROL White Paper on Safety-I and Safety-II

DNM Safety

- Safety-I – Avoiding That things Go wrong
- Work-As-Imagined vs. Work-As-Done
- The Foundation of Safety-II – Performance Variability
- Emergency rather than causality
- The manifestation of Safety–II – things that goes right

Quick wins – neutralisation of contributing factors

The problem with negative contributory factors

- Apply only to errors/failures in **infrequent** safety occurrences;
- Need for constant expansion, **few data** in each category;
- Can be seen as **blaming;**
- Hard to use in **interviews**;
- Lead to **partial analysis -** do not allow the coding of **what went right;**
- So we need a focus on **performance variability** of activities, functions & resources.

What went right?

- How to identify **what went right** as well as what went wrong in…
  - **normal operations** – what keeps the operation safe
  - **safety occurrences** – what prevented a more serious incident or accident?

  ☺ **Mode S tools ☺ Emergency training ☺ Checklists ☺ TRM (Team Resource Management)**

What could go right?

- How to also identify what the person was **doing or trying to do right** at the time?

- How to identify what could **improve safety**?

Neutralise the contributory factors

Some are already neutral

D1. Documentation and Procedures

  D1-1.   Documentation-manuals

  D1-2.   Documentation-charts

  D1-3.   Documentation-SOP

  D1-4.   Documentation-checklists

  D1-5.   Procedures-airport

  D1-6.   Procedures-approach

  D1-7.   Procedures-EnRoute

  D1-8.   Procedures-oceanic

  D1-9.   Procedures-oceanic contingency

B8. Airport

  B8-1.   Ground markings

  B8-2.   Signage

  B8-3.   Airfield ground lighting

  B8-4.   Airfield layout

  B8-5.   Work in progress

  B8-6.   Line of sight

And **functions** & **activities** should also be neutral because their performance varies

So most other **resources** (equipment, staffing, etc) should also be neutral because they can contribute negatively or positively to safety (usually positively!)

12

And a few are already positive

E. Additional Causal Factor set – Mitigation

E1. Good ATC planning decision

E2. Good ATC tactical decision

E3. Good engineering planning decision

E4. Good engineering tactical decision

E5. Good defensive controlling

E6. Good resolution action

E7. Good network management decision

E8. Good local traffic management decision

E9. Good co-ordination

E10. Good assistance by

But this list will also be ever expanding as more mitigations are found (Good ATCO-ATSEP comms, Good CRM`/TRM, etc)!

So there is no need for the list if other categories are neutralised.

Examples

See - identification

A1-1. See - identification	Identification or reading of visual information, after initial detection. This focuses on how the person identifies what the visual information is, following initial detection but prior to interpretation of its meaning. The visual information could be textual, symbolic, positional or physical objects. The information may be visible directly (e. g. aircraft or vehicle visible out of the VCR window or a piece of equipment), or indirectly (e. g. via a radar, flight data display, support tool, or control and monitoring system).	Example: When looking out of the tower, the controller confused two aircraft. The aircraft were visually similar and the weather conditions were poor. Example: The controller thought that he saw on radar that KLM112 was descending but in fact it was KLM211, which had a confusable callsign. Example: The engineer misread the command line from the procedure and entered an incorrect command. The procedure was written in a small font and the engineer was under time pressure to complete the task. Example (positive): The engineer correctly identified a System A alarm on the display. The System A alarm was almost identical to the System B alarm, which also more frequent and therefore more expected.	SKYbrary: Visual scanning technique http://www. skybrary. aero/index. php/Visual_Scanning_Technique FSF: Vision http://www. skybrary. aero/index. php/Vision_(OGHFA_BN)

Remember previous actions

A2-3. Remember previous actions	Remembering a recently, previously performed action or task or that has already been conducted. This may include remembering whether a task has already been conducted or not, and 'place-keeping' within a series of task steps.	Example: The controller forgot that he had already climbed ACA112 to FL350 and transferred it to the next sector, when he tried to give it avoiding action. The flight progress strip was still in the display, and there was no reminder that the aircraft had been transferred, Example: The controller forgot that she had previously asked her colleague to do the co-ordination on her behalf when she made the telephone call. Example: The engineer forgot that he had already taken the system out of service and there was no visual reminder of this. Example (positive):The controller remembered that he had amended the strip to reflect the change in aircraft type.	SKYbraryMemory in ATC http://www. skybrary. aero/index. php/Memory_in_ATC FSF: Memoryhttp://www. skybrary. aero/index. php/Memory_(OGHFA_BN) FAA: The Controller Memory Guide: Concepts from the Field http://hf. tc. faa. gov/technotes/dot-faa-ct-tn94-28. pdf SKYbrary: Situational Awareness http://www. skybrary. aero/index. php/Situational_Awareness FSF: Situational Awareness http://www. skybrary. aero/index. php/Situational_Awareness_(OGHFA_BN) FAA: Human Factors for Air Traffic Control Specialist: A User's Manual for Your Brain (pp. 1-7) https://www. hf. faa. gov/HFPortalNew/Search/DOCs/Hfatcs. pdf SKYbrary: Human Error Types http://www. skybrary. aero/index. php/Human_Error_Types

Safety Occurrence Discussion Cards Concept

Draft – to be developed

Other uses

- One neutral taxonomy can serve many more purposes
  - Normal operations safety surveys (e.g. to choose markers)
  - Risk assessments
  - Workshops
  - Simulations
  - etc

Next steps

- Check and amend neutralization of terms;
- Check and amend definitions;
- Check and collect more examples;
- Implement the neutralised contributing factors in RAT (Risk Analysis Tool);
- Train investigators to shift to the new paradigm of positive contributing factors .

Quick wins cont'd
Introduction of the following 10 Principles in the Investigation

1. Field experts
2. Local rationality
3. Just culture

View of the person as part of the system

4. Demand, Production pressure & Goal conflict
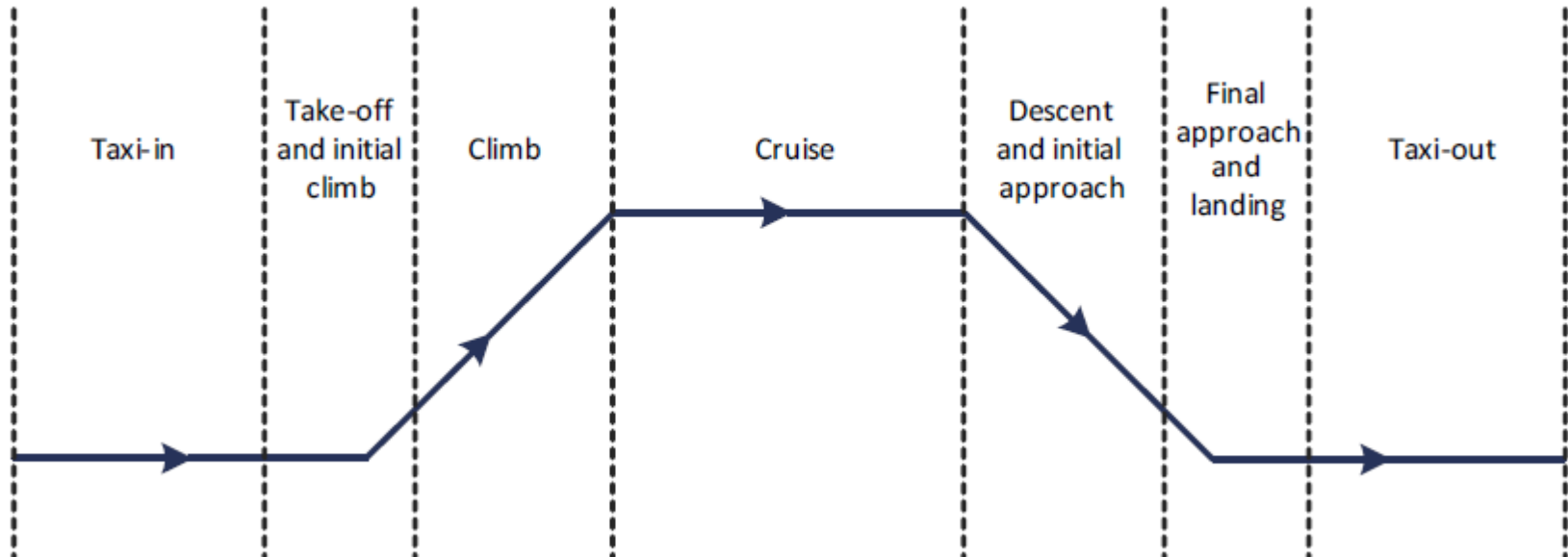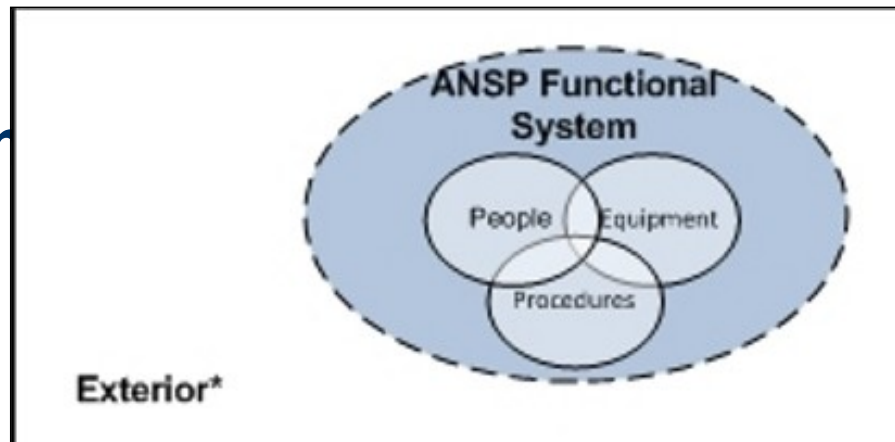5. Preconditions
6. Resources
7. Controls

View of system conditions

8. Flow
9. Efficiency-thoroughness trade-off
10. Performance variability
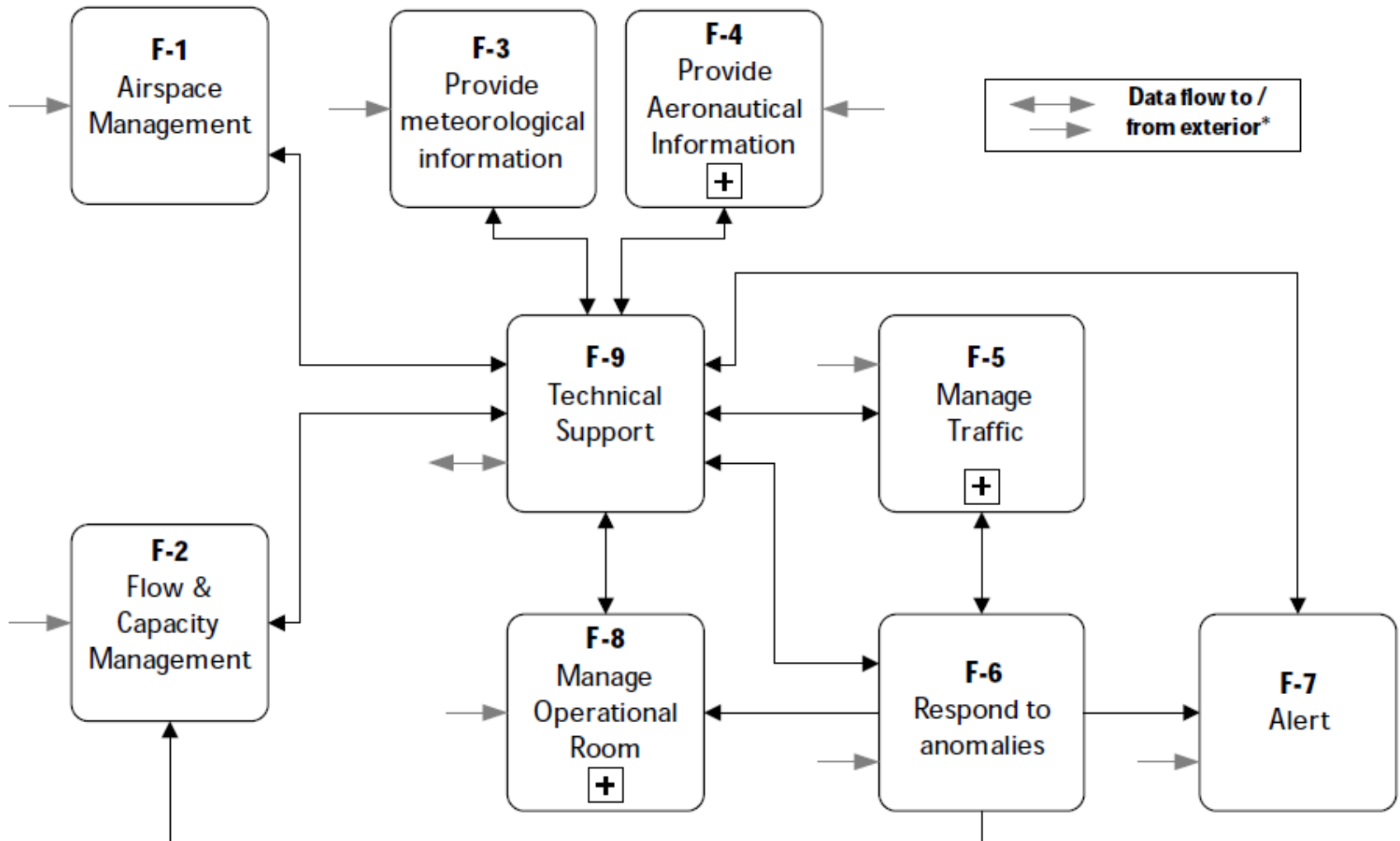
View of human & system performance
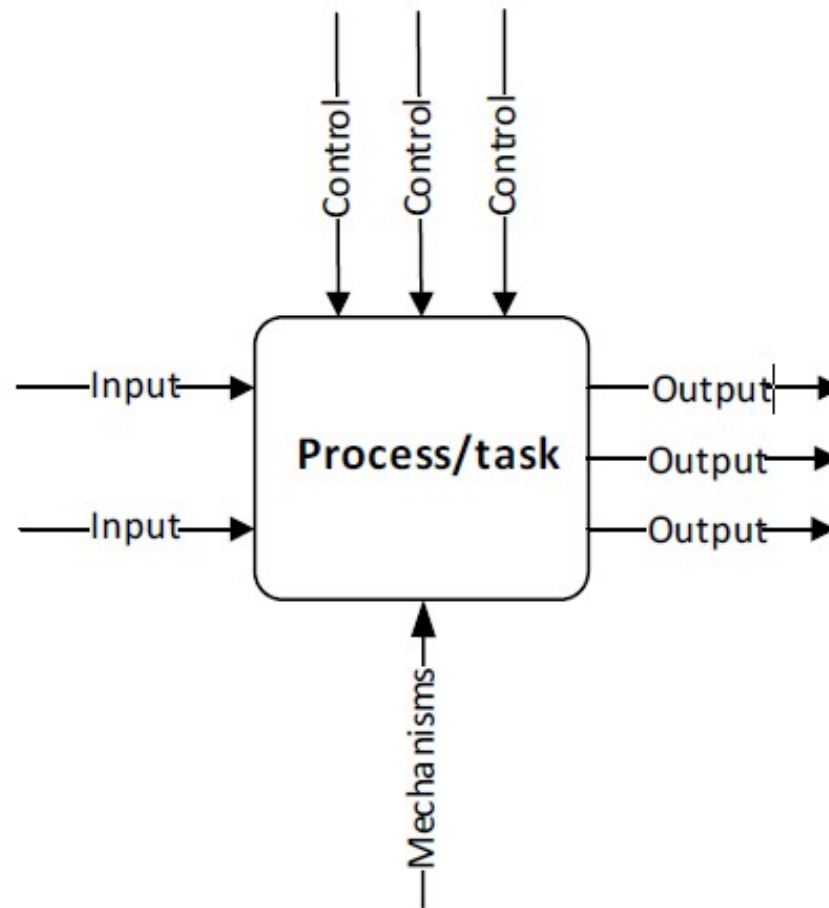
ATM/ANS Modeling
of normal operation

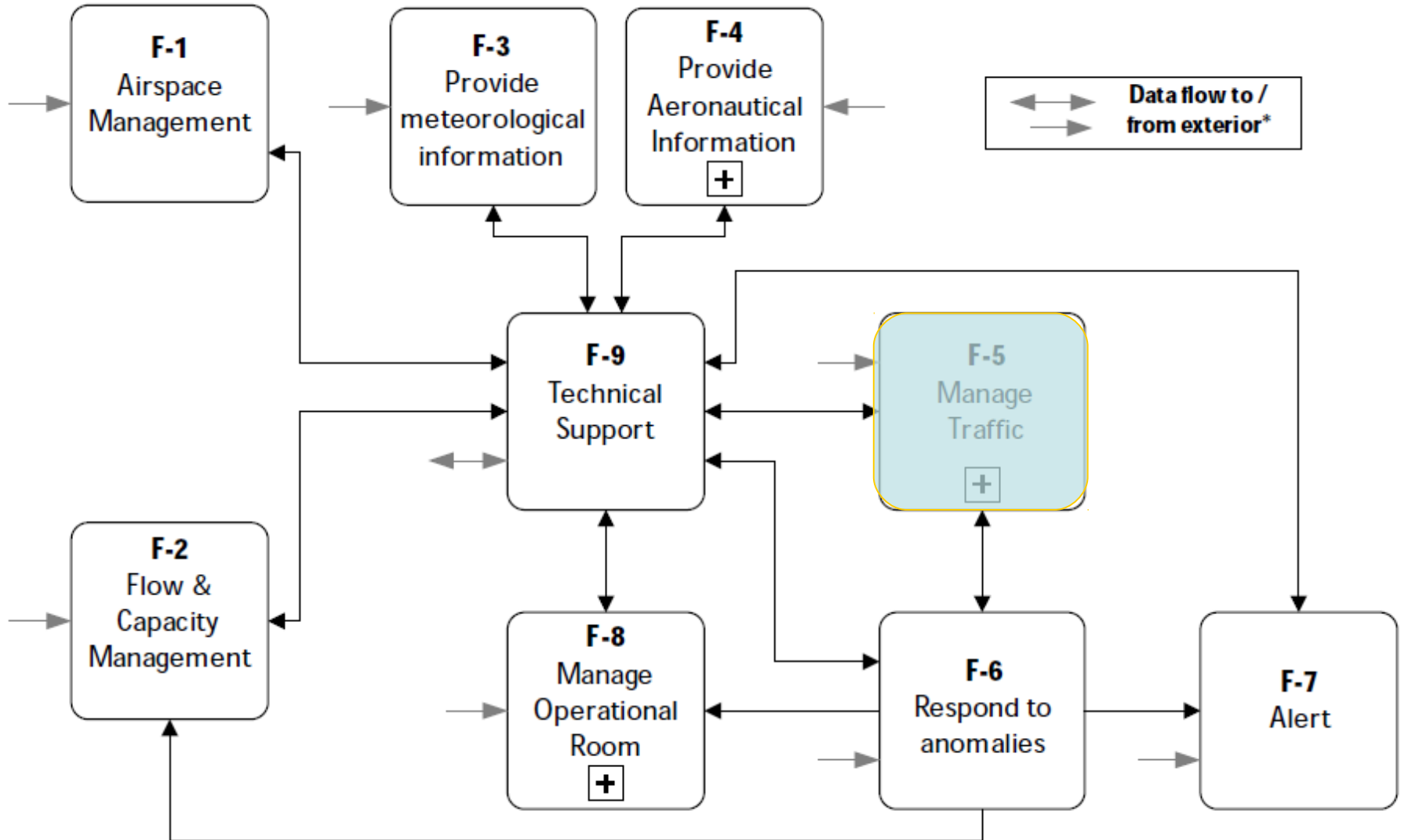# ATM/ANS Modeling - Top Level view

ATM/ANS Modeling – completed using SADT (Structured Analysis and Design Technique)
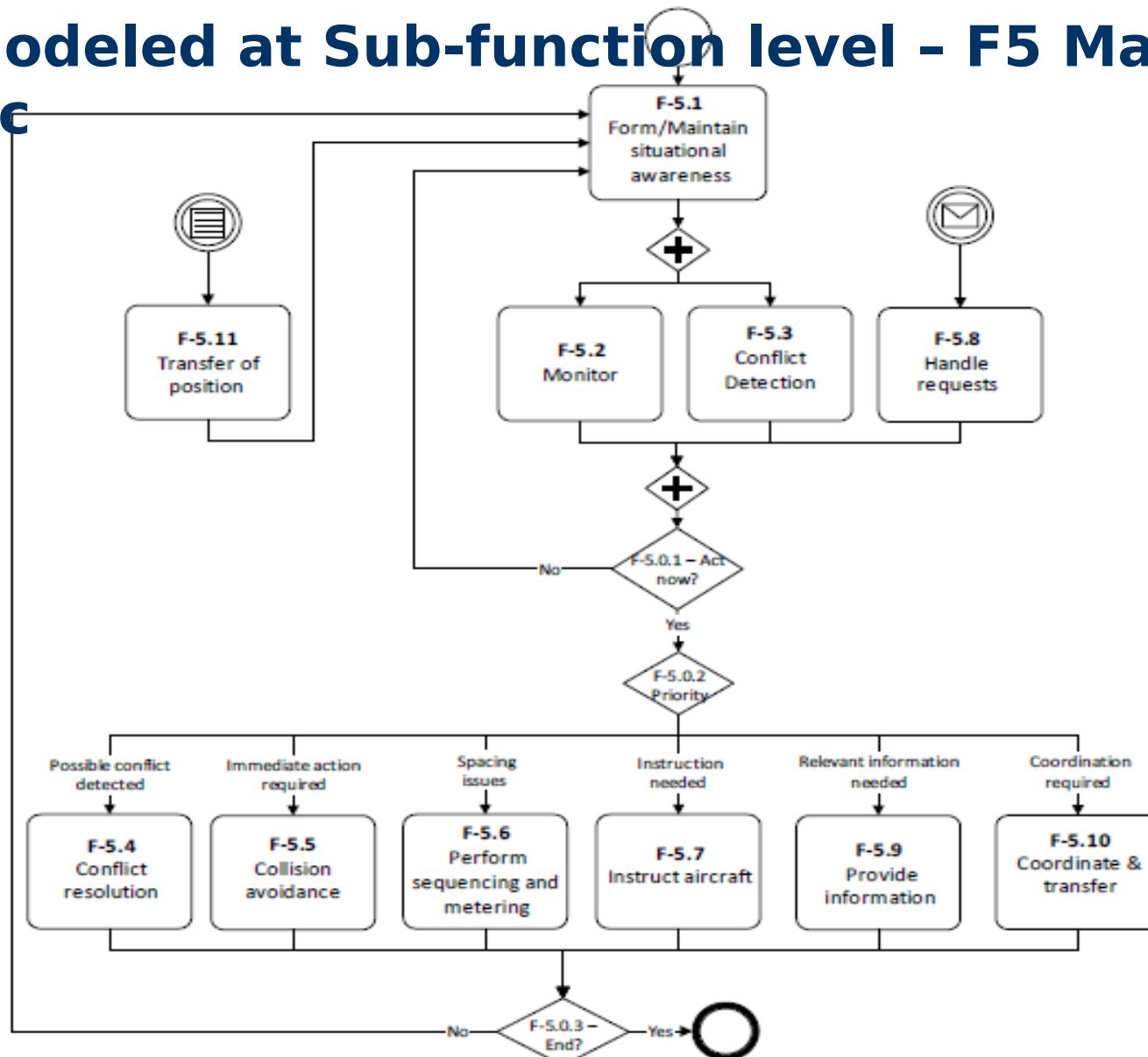
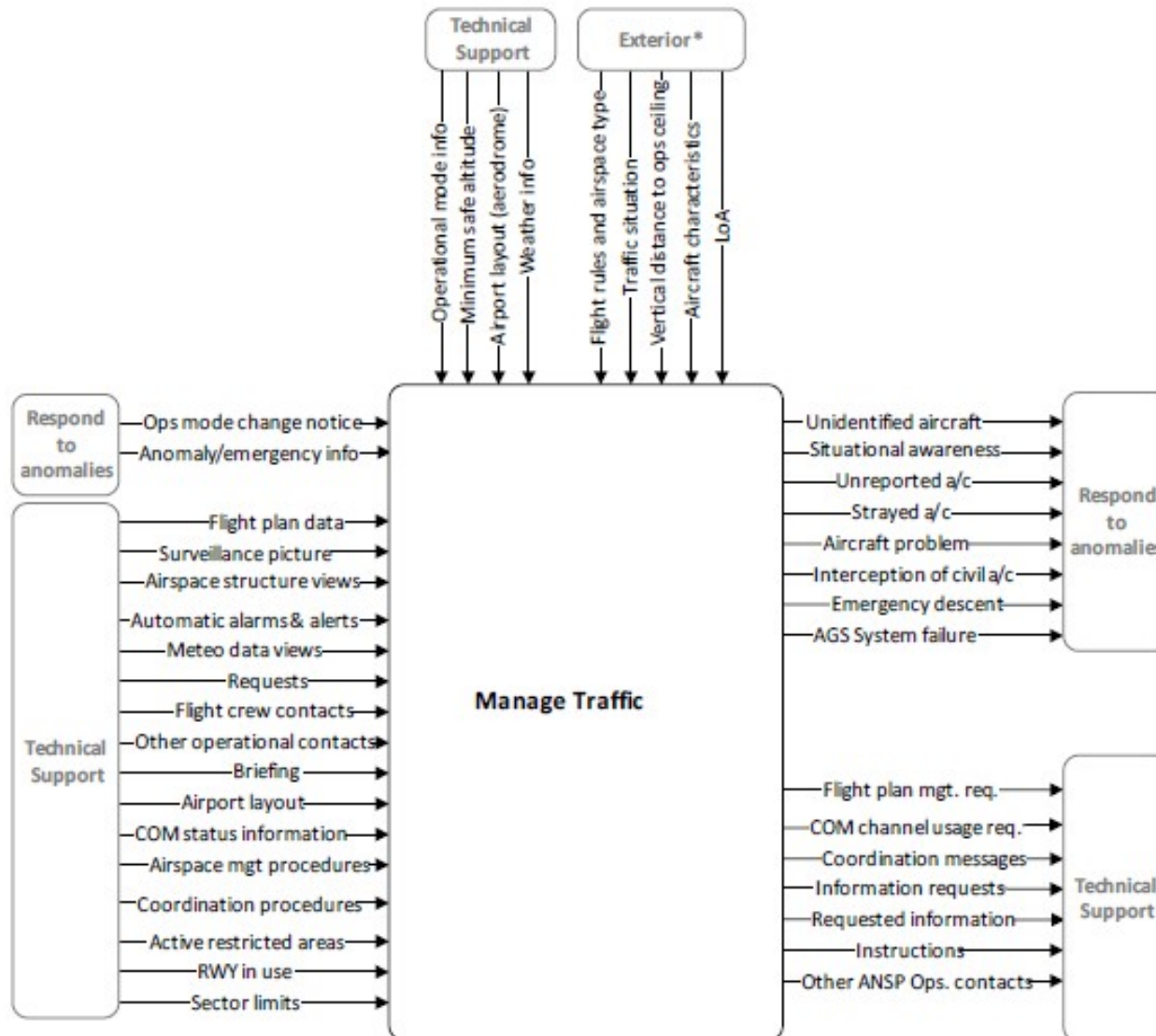# We modeled at Sub-function level – e.g. F5 Manage Traffic

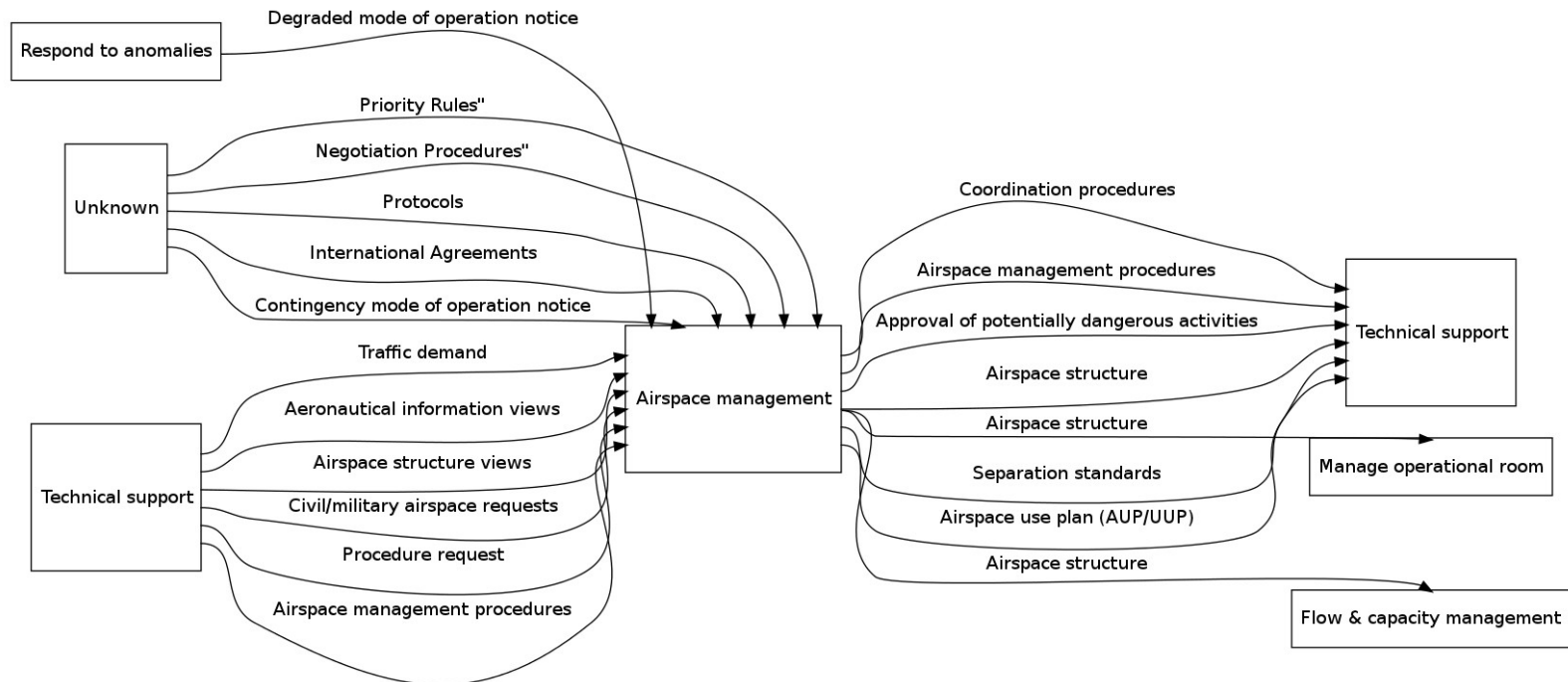# We modeled at Sub-function level – F5 Manage Traffic

We modeled at Sub-function level – F5 Manage Traffi

Next step is to move from SADT to FRAM

- Not trivial
- Requires SW support

Expectations

- Availability of robust SW tool to support the way forward;
- Validation of the ATM/ANS functions;
- Usage of the modeling for Safety-II rather Safety-I – incidents etc.;
- Safety in support of operations rather safety against costs;
- Bring others into the project;
- Cross industry exchange;
- Prove that it works and is worth it;
- Promotion;
- Changing the culture of ATM towards Safety II. (including Regulators).

QUESTIONS ?