



Operational Mitigation Strategies

Traffic Flow Optimization

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Speakers



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THALES

Agenda

01



ANSP VISION



02



OPERATIONAL MITIGATION



Agenda

01



ANSP VISION



02

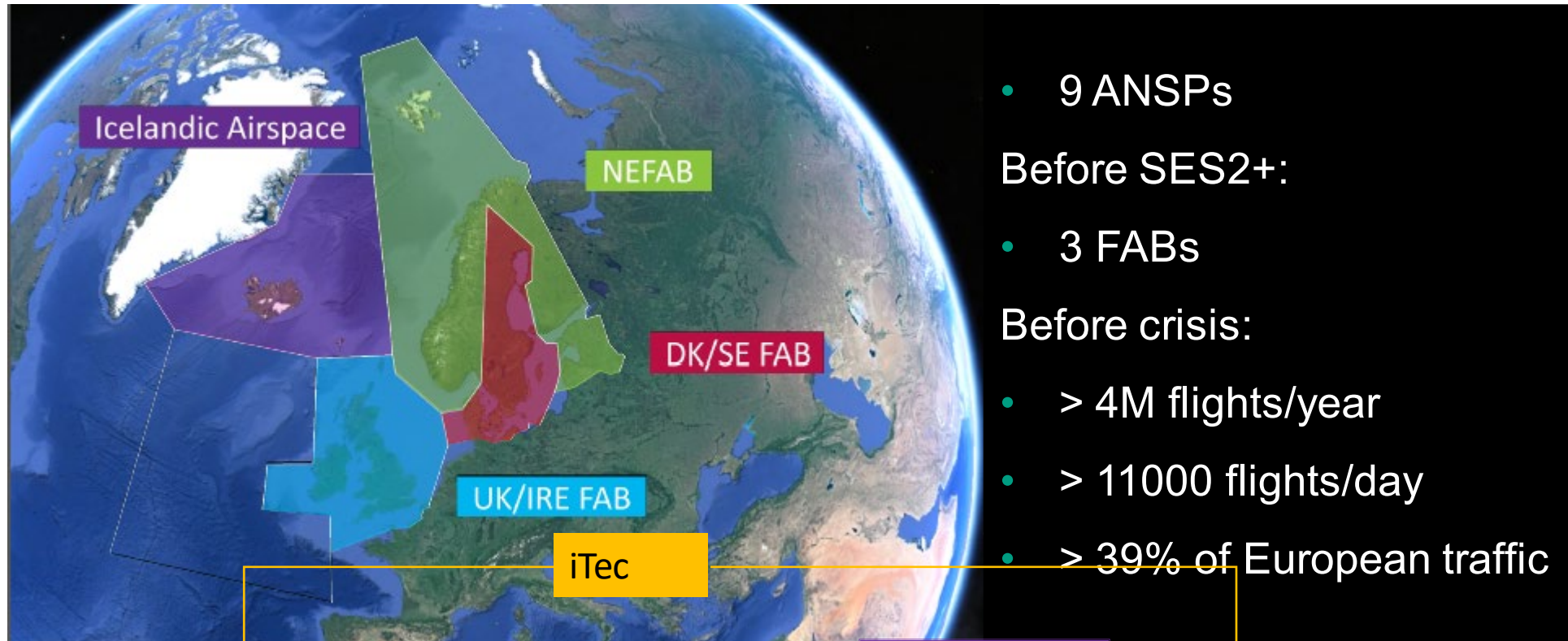


OPERATIONAL MITIGATION

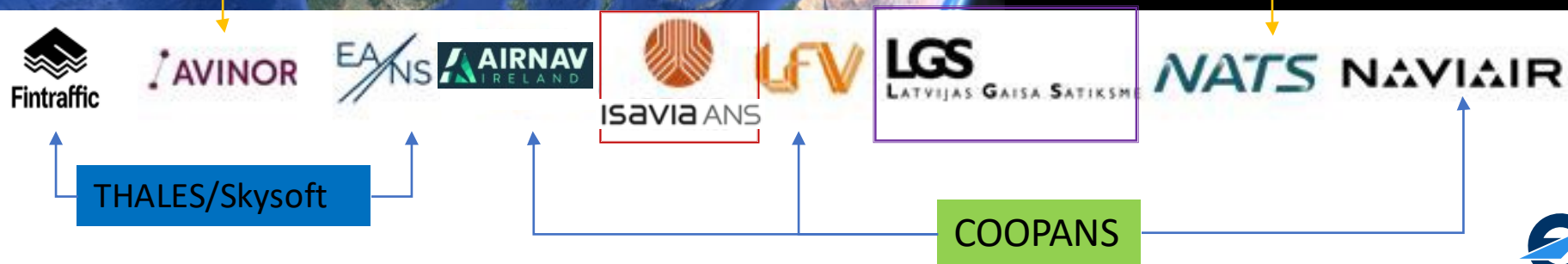
THALES



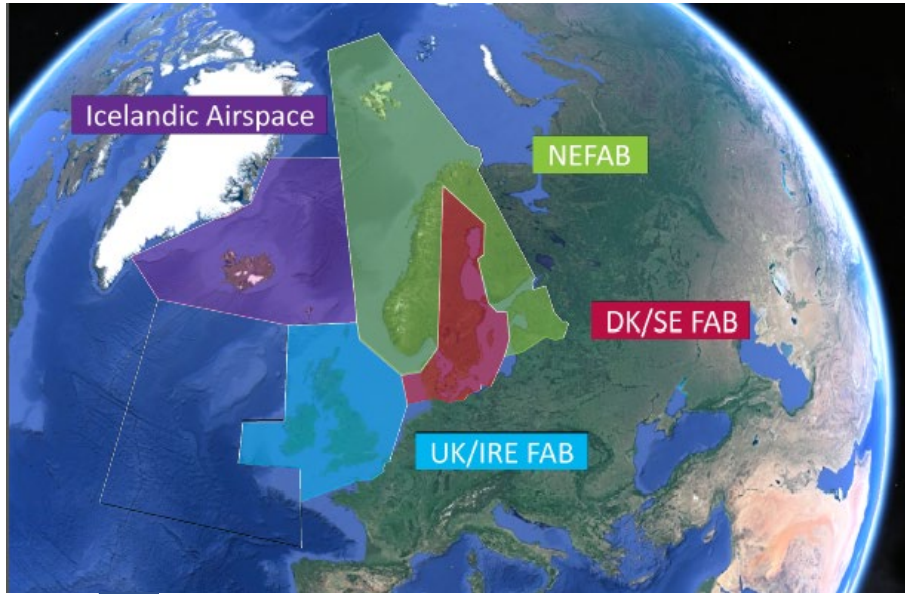
Borealis Alliance – Airspace and ATM platforms



- 9 ANSPs
- Before SES2+:
- 3 FABs
- Before crisis:
- > 4M flights/year
 - > 11000 flights/day
 - > 39% of European traffic



Free Route Airspace – Environmental Performance



2018 → 2027 (per annum)

Co-financed by the European Union
Connecting Europe Facility



Seamless Airspace

1.7M Nm → 4.7M Nm
237K min → 770K min



Cost Savings

Fuel Price fluctuation



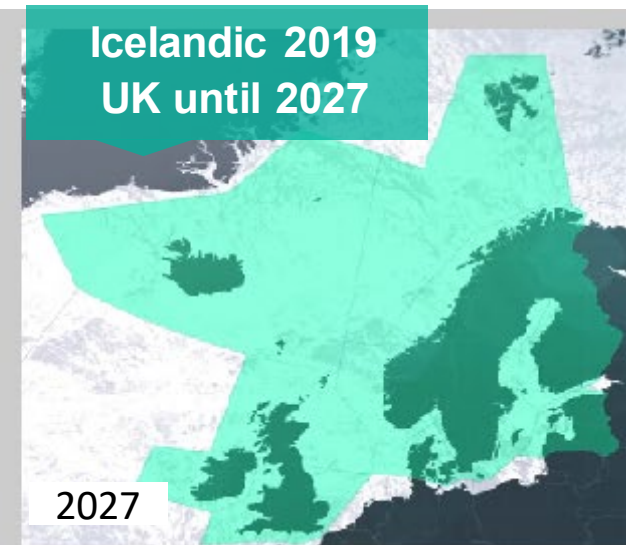
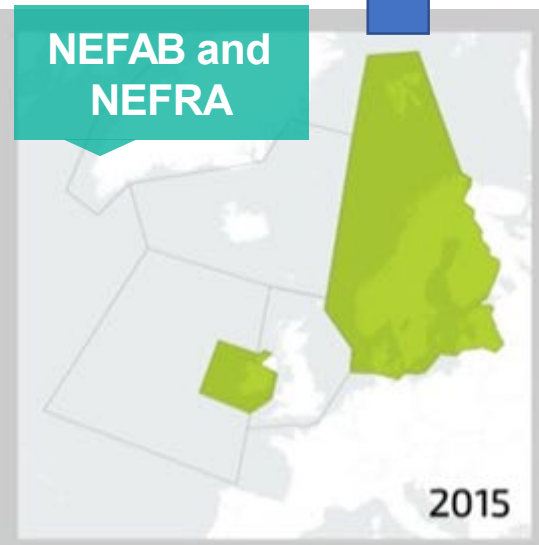
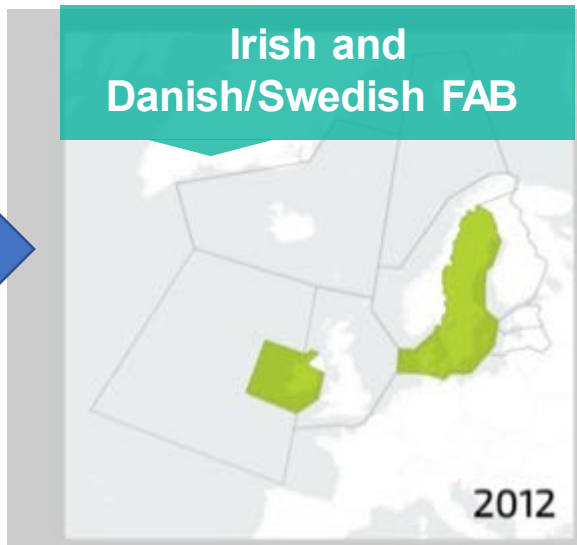
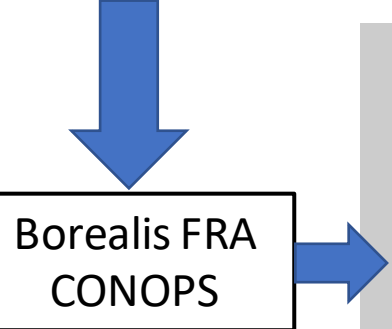
Reduced Fuel Burn

15K t → 30K t



Less Emissions

44K t → 94K t CO₂

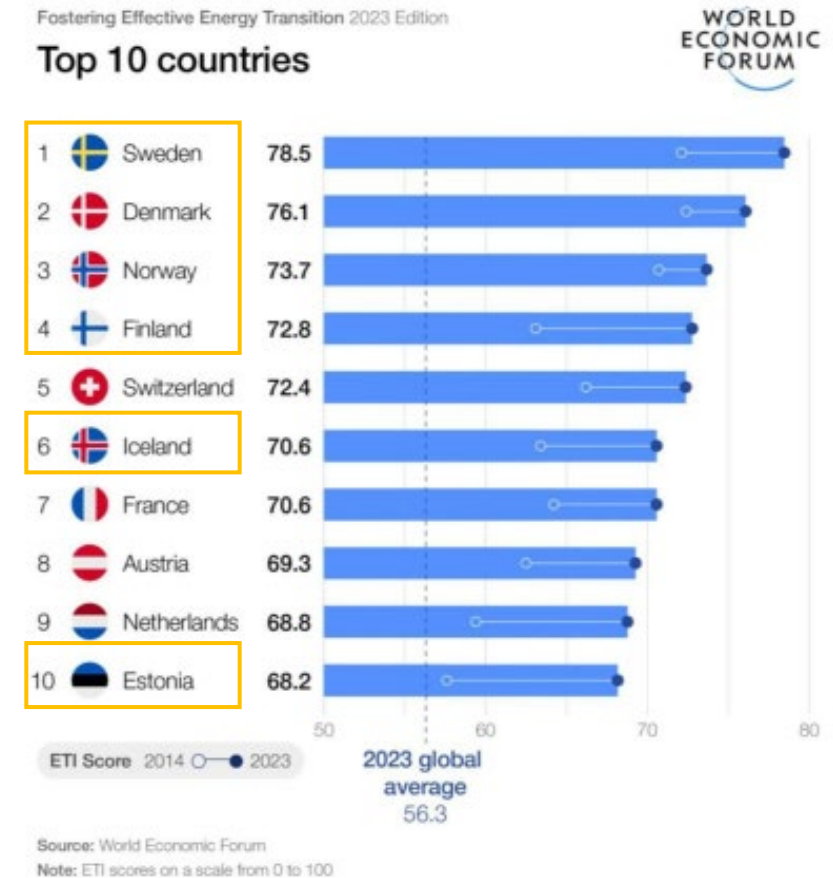


Evaluate new challenges in CONCERTO

- **Main focus has been on capacity, shortest route, fuel burn and emissions**
- **non-CO₂ and contrails is a new challenge which creates new ambitions**
 - Design next generation of environmental performance indicators
 - Test & assess the feasibility to deploy new climate mitigation means
 - Capacity/climate trade-off strategies in daily operations

The Alliance Expectations

- Environmental issues are high on the agenda of the members and relevant states
- Address the operational concerns for the service provision
- ATM flow management and NM vs. Environmental performance
- CO₂ / non-CO₂ balance and magnitude
- The analysis of feasibility and viability of the Solution – Real time Dashboard
- Verify the interoperability of the innovative tools that will be developed by CONCERTO
- If the Solution works in the Borealis airspace, then?





Currently, there are more questions than answers

- **Accuracy of non-CO₂ monitoring & situational awareness?**
- **Can we anticipate the impact on process, tasks & tools?**
- **How and by whom should cross FIR border contrail areas be published?**
- **Is there a willingness to act & start mitigation when possible?**
- **Changes to standards and regulation?**

Expectations that CONCERTO will be able to answer

Agenda

01



ANSP VISION



02



OPERATIONAL MITIGATION



CONCERTO

dynami**C** c**O**llaboration**N** to
generalize e**C**o-fri**E**ndly
t**R**ajec**T**Ories



- SESAR 3 Industrial Research
- From July 23 to July 26
- 2x Solutions
- 23x Partners
- Project lead by THALES

To maximize the opportunities for CO2 reduction
& introducing non-CO2 impact management in daily operations

Operational Process for Mitigation

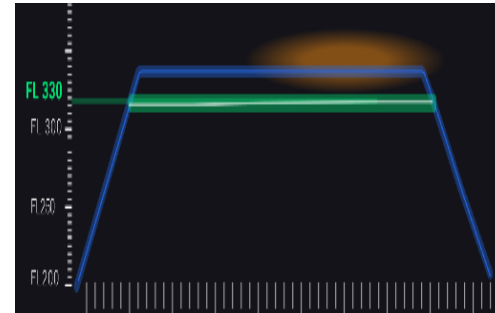
Estimate



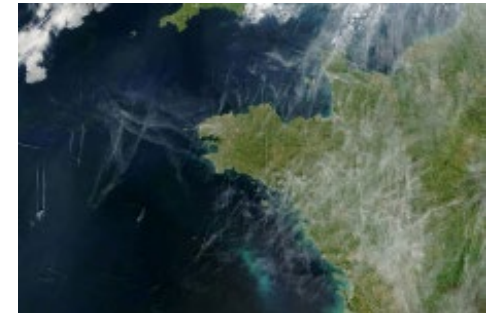
Detect



Mitigate



Verify



Operational Process for Mitigation

Estimate

Detect

Mitigate

Verify



Total Climate Impact

- CO₂ & non CO₂
- Airlines & Flight Planning System: per individual flight path
- ANSPs: at local traffic flow level (FIR / AoR)
- EUROCONTROL: at EU network level

Non CO2 Monitoring & Situational Awareness

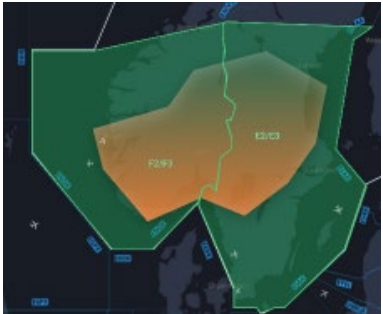
Operational Process for Mitigation

Estimate

Detect

Mitigate

Verify



Climate Sensitive Area / Climate hotspot / ECHO area

- Using existing non CO₂ prediction models from DLR & TU Delft
- Prototyping confidence level indicator

Big Hits

- AC quantity to fly on the ECHO area
- Prototyping biggest A/C contributors detector

Prototyping New Climate Detection Features at Traffic Flow Level

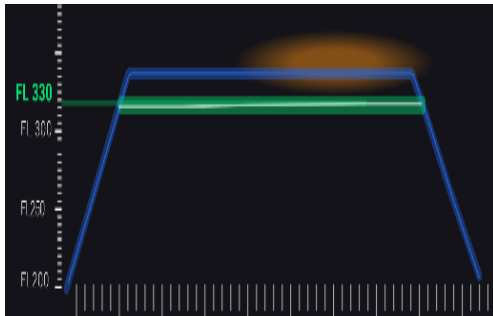
Operational Process for Mitigation

Estimate

Detect

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Verify



Optimize Flight Plan / Flight Path

- Prototyping non CO₂ criteria into the flight planning system
- CO₂ / non CO₂ / punctuality / cost ...



Optimize Traffic Flow

- Prototyping Climate Sensitive Areas traffic crossing minimization
- Assess re-routing impact
- Cross board ANSPs coordination
- CO₂ / non CO₂ / Capacity

Prototyping New Climate Mitigation Features at Traffic Flow Level

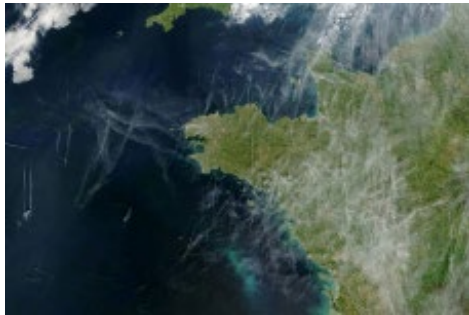
Operational Process for Mitigation

Estimate

Detect

Mitigate

Verify



Multi Source Analysis

- Using existing satellite image
- Mix satellites & on ground based cameras
- Assess coverage Vs Borealis area

Contrails image detection

- AI & algorithm for contrails occurrence verification

Post Ops

- Dashboards / reporting

Prototyping non CO2 Dashboard

Key CONCERTO Challenges - OPERATIONS



ATC / Airlines / Flight Planning / Eurocontrol

- Actors involved ?
- Right timing to act ?
- Climate indicators to use ?
- ECHO area database owner ?
- Contrails prediction accuracy ? Trust ?
- Alternate Green flight plan ?
- Impact on the existing process & tools ?
- How often non CO₂ mitigation is required ?
- Climate savings ?
- ...

Need to clarify the CONOPS

Key CONCERTO Challenges - INDUSTRIAL

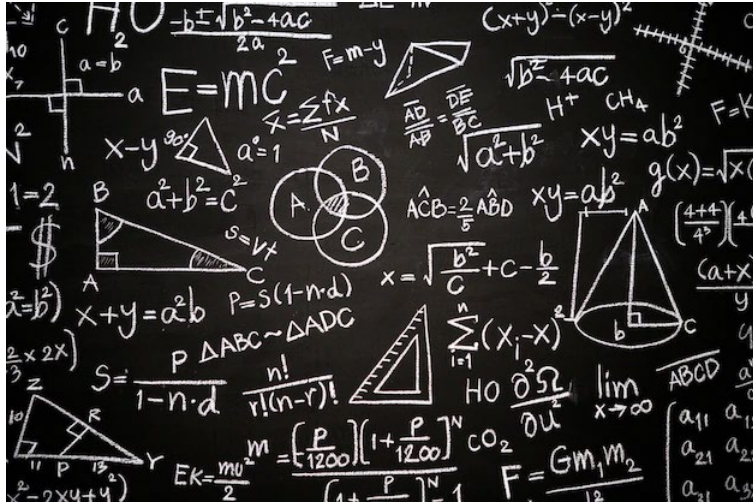


Technology

- Climate indicators into ATFCM tools
- Integrate contrail prediction in trajectory planning
- Multi criteria algorithm for decision making
- Automation
- Inter operability & deployment
- Digital tools
- Biggest AC contributors detection
- Traffic flow optimizer
- ...

Develop Prototypes

Key CONCERTO Challenges - SCIENCE



Contrails Prediction & Verification

- Contrails predictions accuracy in the Borealis area
- Accuracy Vs timing ?
- Quantify prediction uncertainties
- Set up a prediction confidence level
- Combine CoCiP-EF/cocipgrid and aCCFs
- Observational capabilities
- Combine satellite image & on ground cameras
- ...

To Consolidate Trust

CONCLUSION

Non CO₂: from Science to Operations

Leverage ANSPs & Airlines Environmental Performance

Test & Try the Feasibility to Deploy New Climate Mitigation Means

Thank You

