Airport Regions Dealing with Old & New Challenges in a Changing World
| ARC’S ANNUAL SPRING CONFERENCE

Vantaa, FI
May 16, 2024
Welcome Words

Erich Valentin, ARC President
Pekka Timonen, Mayor of Vantaa City

10:00 - 10:30
Session 1 - The urban and territorial dimension

Dr. Johanna Sonnenburg, Research Associate, TUB
Wolfgang Scheibenpflug, Senior Vice President Real Estate and Landside Management, Vienna Airport
Stronger together!
Public private cooperation as success factor for Airport Regions

ARC’s Annual Spring Conference | 16. May 2024, Vantaa Finland
Dr. Johanna Sonnenburg | Center for Metropolitan Studies, TU Berlin
Content

Research: Airports & Cities

Case Study Berlin

Strategies & Projects
Stronger together! Public private cooperation as success factor for Airport Regions
Models of Airport Area Development
Airport City / Aerotropolis / Airport Corridor / Airport Region

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Sonnenburg (2009)
Models of Airport Area Development
Definition of the Airea

The concept of the Airea simultaneously provides an approach, a methodology, a toolbox and a new spatial and functional category to analyse and describe processes of airport-related development within the metropolitan region.

The Airea is rather an objective analytical term that refers to the various fragmented islands of development within a certain space of opportunity in relation to the airport. That means it refers to the part of the metropolitan area which is predominantly influenced by the airport, or which in the other way around influences the airport directly.

It can be observed that the Airea in large part features familiar city components and hence can be explored with the following key-parameters:

1. program in concept, function and use
2. physical form in framework and development pattern
3. major involved stakeholders regarding their constellation, main goals and power-relations
The Airea
Analysing the Airport Area
Types of Interaction
Isolation / Competition / Parasitism / Symbiosis

Isolation: The airport hardly interacts with the airport surroundings and the wider urban region.

Competition: The airport and its surroundings compete with the city for new urban developments.

Parasitism: The airport and its surroundings increasingly attract functions and impulses from the urban region.

Symbiosis: The airport, its surroundings and the urban region multidimensionally interact with each other for mutual benefit.

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Sonnenburg (2011)
Better Aireas
Qualifying the Airport Area

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Sonnenburg (2012)
Better Airea Box
Criteria for Sustainability & Implementation

3 Key Criteria
Environment
Culture
Quality
Diversity
Networks
Structure
Process
Product

4 Dimensions
Requirement
Toolbox
Defined Goal
robust
flexible
smart
sustainable
integrated

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Sonnenburg (2012)
Better Airea Box
Guidance & Shared Benefit for Decision Making Processes

- Environment
- Society
- Economy
- Culture
- Diversity
- Quality
- Networks
- Structure
- Process
- Product

Building culture

Economy

Environment

Society

Sonnenburg (2012)
Abstract
In recent decades large airports have become major foci of urban development. However, the exposure of air transport to external shocks, such as the current COVID-19 pandemic, has led to significant risks for adjacent airport areas. Also, airport areas are facing specific economic, environmental and social challenges. Accordingly, this paper develops a concept for the development of resilient airport areas by synthesizing both the academic and practice-oriented literature on airport-related urban development. Robustness and flexibility and their key parameters diversity, quality and integration are used to develop strategic recommendations for airport stakeholders to foster the development of resilient airport areas.

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Case Study Berlin

Quality
Product
Environment
Process
Structure
Networks
Culture
Economy
Society
Diversity

Stronger together! Public private cooperation as success factor for Airport Regions
Berlin and the single Airport BER
Transforming airport system & emerging growth triangle
Planning the Airport
Masterplan BER 2040
Planning the Airport Area
Concepts & Plans around BER

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Land-Use Plan (FNP) Schönefeld

Common Structural Concept Airport Area BBI

Masterplan Gateway BBI
The Airport in the Region

Berlin Strategy 2030 & Transformation spaces
The Airport in the Region
Economic Urban Development Plan 2030

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The Airport in the Region
Overlay and Interference of Strategies and Plans

Stronger together! Public private cooperation as success factor for Airport Regions
United we stand, devided we fall
Complexity of stakeholders
Strategies & Projects
Public private cooperation as success factor

Quality
Product
Environment
Structure
Networks
Culture
Economy
Society
Diversity
Process
Managing transformation & urbanisation

Airport Municipality Schönefeld

PROTOKOLL
Folgeworkshop "Stadtwerdung Schönefeld"
15. Januar 2024

Ergebnisprotokoll
Datum
15. Januar 2024 von 10:00 bis 13:00 Uhr
Ort
Rathaus Schönefeld
Teilnehmende
Chris@an Hentschel, Bürgermeister
Simone Eberlein, Dezernat III (Finanzen und Zentrale Dienste)
Steffen Käthner, Dezernat IV (Bildung und Familie)
Chris@an Könning, Büroleiter Bürgermeisterstab
Claudia Moch, Dezernat II (Bau und Investorenservice)
Susanne Venske, Personal und Recht
Hilmar Ziegler, Dezernat I (Bürgerdienste)
Dr. Johanna Sonnenburg, Menschen & Räume
Dr. Cordelia Polinna, Forward – Planung und Forschung
Sarah Oßwald, Forward – Planung und Forschung

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Association BER+
Community of interests // Private investors & developers

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BER Airport City
Tender process // HORIZN BER City

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Concept tender process for Part 1 has started
VISION 2030+

Airport Berlin THF

Hub for Arts, Culture & Creative Industries

**THF IM FOKUS**
- Das Besucherzentrum CHECK-IN am zentralen Haupteingang gibt seit 2020 als Startpunkt der Führungen Besucher*innen den Überblick über THF.
- Der THF TOWER bietet in der Ausstellungfläche einen Blick auf die Zukunft THFs und auf der Dachterrasse einen Blick über Berlin.
- Den Blick zurück auf die Geschichte des Flughafens THF und über die Wellen des Tempelhofer Feldes eröffnet die 1200 Meter lange Dachgalerie.

**EVENTS UND AUSSTELLUNGEN**
Den Platz für die experimentelle Kunstausstellung oder das Musikfestival mit Hunderttausenden Besucher*innen bieten die Hangars 1 bis 4, die Haupthalle und das Vorfeld. Ziel der Sanierung ist der Umbau zur dauerhaften Versammlungsstätte und damit die Möglichkeit, die Flächen für temporäre Großveranstaltungen flexibel nutzen zu können.

**MUSEEN UND DIE MEILE DER KUNST**
Das Ateliers Museum, Musikstudios, Proberäume, Ateliers und noch viel mehr kann sich in den Flächen zur dauerhaften Kulturnutzung anwenden. Hierfür werden die Hangars 5 bis 7, die Bauteile P und Q sowie viele der Treppentürme sanier.

**KREATIVE UND VERWALTUNG**
In modernen Arbeitswelten sollen nicht nur die Polizist*innen in THF arbeiten können, sondern auch Design*innen, Softwareentwickler*innen und Werbeagenturen. Bauteil für Bauteil werden dafür in den kommenden Jahren die Büroflächen und die gesamte technische Ausstattung im Flughafen Tempelhof zeitgemäß saniert.
Airport Berlin TXL
Urban Tech Republic & Schumacher Quartier

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Stronger together! Public private cooperation as success factor for Airport Regions
Behrensufer BE-U
Quarter for Sustainability - Airport Corridor

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FlyGreen - Sustainable Aviation
Urban & Advanced Air Mobility

New Concepts *Feeder traffic versus eHub*

- eVTOL as Airport Shuttle
- Integrated Approach
FlyGreen - Sustainable Aviation
Urban & Advanced Air Mobility for Berlin

Urban Air Mobility für Berlin

Standorte für klimaneutrale Luftfahrttechnologie in Berlin und Brandenburg pilothaft entwickeln.

Beispiele Berlin-Brandenburg

- TXL: Heliport + Kompakt
- ICC: Parkhaus-Dach
- THF: Mobil + Kompakt
- BER – T5: Vertiport + Regional

Flughäfen THF, TXL
Ehemalige Flughäfen Berlins Tempelhof und Tegel

Flughäfen BER
Umnutzung Bestandsterminal T5, Anbindung an internationalen Großflughafen BER

Zukunftsorte
EUREF und Adlershof als weitere Beispiele für die Zukunftsorte Berlins

Verkehrsknotenpunkte
ICC als Beispiel für Verkehrsknotenpunkt (auch Südkreuz oder Ostkreuz)

Regionalflugplätze
Zum Beispiel Schönhagen (EDAZ) und Strausberg (EDAY)

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Thank you very much!

johanna.sonnenburg@metropolitanstudies.de

www.johanna-sonnenburg.de

Stronger together!
THE WAY TO AN AIRPORTCITY.
FACTS & FIGURES.

**Passengers:**
- 2019: 31.7Mio
- 2020: 7.8Mio
- 2022: 23.7Mio
- 2023: 29.5Mio

**Cargo:**
- 2019: 284,000 t (air + RFS)
- 2020: 218,000 t
- 2022: 251,000 t
- 2023: 245,009 t

**Movements:**
- 2019: 266,802
- 2020: 95,880
- 2022: 188,412
- 2023: 221,095

**EXISTING PROPERTIES**
- **Office:** 120,000 m²
- **Logistics:** 45,000 m²
- **Hotels:** 2 (900 Rooms total)

**REGIONAL IMPACT**
- 23,000 employees at site
- 36,000 indirectly employed
- rd. 250 established companies

**SHAREHOLDER STRUCTURE**

**CONNECTED MOBILITY**
Variety of transport services:
- International and Regional Rail, City Airport Train
- Bus terminal
- Motorway Access
- Rental Car, Carsharing Centres, Taxis and Uber
- Bike path
FACTS & FIGURES.

RESPONSIBILITY FOR THE ENVIRONMENT & SUSTAINABILITY

• Sustainability & environmental statement
• Environmental Policy & Management
• Photovoltaic system 2022
• Dialogue with the surrounding area
• Environmental protection according to EMAS
• Noise management

CERTIFICATES
STRATEGIC DIRECTION.

Advanced terminal offerings
- Retail
- Catering
- Parking
- Advertising

Airport with Mall & Office Park
- Hotels
- Office Space
- Shopping experience

AirportCity
- Conferencing & Coworking
- Industrial park
- Medical center/clinic
- Entertainment
- Community
- Warehouse & distribution center

“AEROTROPOLIS”
- Production
- Free trade
- Continuing Education
- Sport
- Leisure
- Living
AREAS OF TASKS AIRPORTCITY.

The different aspects of an Airport City contains several strategic and economic opportunities that need to be taken advantage of.
VIENNA AIRPORTCITY.

- Train & CAT City Express
- Airport terminals
- Air Cargo
- Logistics & warehouses
- Shopping
- Gastronomy
- Post & parcel services
- Hotels
- Fitness & Health
- Hairdresser & other services
- Parking & Car rental
- Advertising
- Green spaces
- Car workshop
- Event areas
- Conferencing & Coworking
- Office space
- Kindergarten
- Gas station
HOTELS.

4-Star Hotel ("NH")
3-Star Hotel ("Moxy")
2-Star Hotel ("Vienna House Easy") opening summer 2025

Relaxation at the end of a long working day.

- Hotel rooms
- F&B, Bar
- Enjoyment & comfort
- Networking Areas
HOTELS @ AIRPORTCITY
ARRIVE. LOAD. DELIVER. DRIVE. CONNECT.

Professional & independent freight services in the heart of Europe

- 45,000 m² cargo and storage
- logistics area
- 1,700 m² pharmaceutical warehouse with 2 climate zones
CARGO AREAL.

FORWARDERS
CARGO HANDLING
LANDSIDE OPS
AIRSIDE OPS
NETWORK
COMMUNITY SERVICES PLUS.

A CITY THAT OFFERS EVERYTHING YOU NEED IN DAILY LIFE:
Community Building

- Interaction within the AirportCity community is important
  - Decreases tenant fluctuation
  - Creates value on site
  - Enables identification and workplace attractiveness

- Tools are
  - Community information systems
  - Community events of different formats
  - Transparency of tenants and their services
  - Participation formats
  - Community manager!
MEETING POINTS:

Multifunctional and high-quality options for events, conferences, meetings, presentations, trade fairs and workplaces

• Terraces & outdoor areas

• Four event locations
  (Vienna Airport Conference & Innovation Center, City Gate, Level 22, VIP Terminal)

• Green spaces
Active marketing of location projects in the "Future Zone":

- 360,000 m² total area
- 200,000 m² developed
- Well known logistics companies
- Development Kickoff 2018, scheduled finalization 2024
- Second Line Logistics
- Only 4 km from Vienna Airport
STRATEGIC PATH – AIRPORTCITY CARGO FISCHAMEND.
THE ROLE OF AIRPORTCITY – IN THE AIRPORT REGION

→ Development Area West – EGW approx. 47,5 ha
→ Redesign to industrial area in progress
→ Expected 2024/25
PATH INTO THE FUTURE
THANK YOU FOR YOUR ATTENTION

Mag. Wolfgang Scheibenpflug MRICS
Senior Vice President
Real Estate and Landside Management
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Session 2 - The mobility dimensions

Jan Eklund, Intermodality Strategist, Swedavia
Jenni Eckhardt, FIT ME! Project Coordinator
Kay Plötner, MultiModX Project Coordinator
Ivo Cré, Director of Policy and Projects, Polis

11:15 - 12:15
The state of multimodality at Swedavia´s airports and the way forward

Jan Eklund
Intermodality Strategist
Swedavia Airports Sweden
Mission

Swedavia’s mission is to own, operate and develop Sweden’s national basic infrastructure of airports.

Based on solid business principles, Swedavia shall help to achieve the transport policy goals adopted by the Swedish parliament and take part in developing the Swedish transport sector.

- 85% satisfied passengers, 2025
- 75% engaged leaders and employees, 2025
- 6% return on operating capital annually
- 0% Fossil carbon dioxide emissions from domestic flights
FTE: 2,603
Million passengers: 32,1
Number of airlines: 64
Number of routes: 527
Direct routes: 322
Share of fossil free aviation fuel, %: 1.8
Share of CO₂ emissions in Sweden – Domestic flights (2021): 0.3%
Share of CO₂ emissions in Sweden – Internat. flights (2021): 2.2%
Transition is happening here and now

**Goal, 2020**
Swedavia’s own airport operations became fossil-free.

**Goal, 2025**
Fossil-free airports – airport operations run by Swedavia’s partners are also to be fossil-free.
5 per cent of all jet fuel used at Swedish airports is to be sustainable aviation fuel (SAF).

**Goal, 2030**
All domestic flights are to be fossil-free.
Transport to and from the airport is to be fossil-free.

**Goal, 2045**
All international flights that take off from Swedish airports are to be fossil-free.
10 airports with a focus on sustainable development

- One state, several authorities, subdivisions of authorities
- Eight regions operating public transport
- Ten municipalities that host the airports
- Numerous surrounding municipalities
- Operators of commercial transit
Stockholm Arlanda Airport

• Largest airport in Sweden and hub for international och domestic flights

• Connected with rail and bus, several operators

• A state-appointed coordinator currently evaluates the airports competitiveness, including ground transport.
Luleå Airport

• Regional airport with considerable air travel to and from Stockholm Arlanda.

• Offers access to other destinations within Sweden or abroad.

• The airport is fully integrated in the local public transport system, with regular buslinks to the city centre, the railway station and the university.
Åre Östersund Airport

• A small regional airport with a few daily flights to Stockholm Arlanda.

• Connecting bus service to and from Östersund for some arrivals and departures.

• Östersund is located about 90 kilometers from the ski resort Åre.
Strategic Vision 2030

The airport as a multimodal hub

Together we will enable people to meet by...

...future-proofing aviation
...simplifying the journey from door to door
...creating magical meeting places
- Swedavia’s airports will be hubs in a seamless transport system
- Connections to other transport modes will be improved – digitally and physically – for even smoother and more sustainable travel
- It will be easy to book and easy to travel from door to door
Roadmap for The airport as a multimodal hub

- Traditional multimodality: Participate in planning of the transport system
- Digital multimodality: Forming digital tools to support passengers and strategic operations
- New multimodality: Plans, measures and cooperation to promote AAM
Traditional mobility

- Engagement in rail-projects of the National Transport Authority
  - Stockholms Arlanda Airport
  - Göteborg Landvetter Airport
  - Luleå Airport
- Monitor potential new regional rail to Arlanda
- Highlight need of improved bus-services at all airports
Digital mobility – supporting tools

• Feasability study on whether to develop a solution based on Sweden's nationwide database of transit

• Ongoing work to enhance our webpage to easier access to information regarding ground transport

• Harnessing digital data for improved decision making
Drones and eVTOLS

- Following signals from the AAM community and its evolution
- Participating in ongoing regulatory work regarding U-space and security issues
- Feasability studies and strategic preparations for eVTOLS and drones at Swedavia’s airports
Closing remarks

• Airports are operated in a complex system of systems
• Holistic approach and management is necessary

• Develop airports in tandem with local and regional authorities
• Be ready for disruptive events and trends
• Influence national planning of transports to strengthen the role of aviation and airports as multimodal hubs
FIT ME! -project

Foreign Individual Traveller’s hospitality and Mobility Ecosystem

Dr. Jenni Eckhardt
VTT Technical Research Centre of Finland Ltd.
Airport Regions Council Conference
16.5.2024, Vantaa
FIT ME! Project stakeholders and environment 2021-2024

**Steering group**

Companiess
- zoneatlas

**Research**
- VTT
- SITOWISE
- Matkahuolto

**Companies**
- Fintraffic
- Naturpolis
- Tunturi-Lapin Kehitys
- Turku (Visit Turku Archipelago)
- Naantali
- Kemiönsaari
- Parainen
- Users, e.g.
- Business Finland
- Visit Finland
- Metsähallitus
- Public administration (e.g. ministries)

**Self-funded**
- PayiQ
- KOVA KOODARIT

**EU data strategy**
- Towards a Common European Tourism & Mobility Data Space

**National programmes**
- National Programme for Sustainable Growth in the Transport Sector 2021-2023

**Project and development cooperation**
- Tourism mobility collaborative project and development network
- Transport data ecosystem
- Smart tourism mobility
- Visit Finland DataHub and emissions’ calculation
- AURORAL
- Ylläs ympärivuotiseksi
- eHospitality
- Kestävä liikkumisen palveluiden ekosysteemi (KeLiPa)
- Gateway to Land of National Parks
- DigiMasa
- Rethinking North (REINO)
- Älyliikenne 2020

**Business Finland**

**Public administration**
- (e.g. ministries)
Aiming at tourism mobility ecosystem

Tourism mobility ecosystem crossing sectoral, regional and administrative boundaries

Current state in silos
- Transport
- Tourism
- Public sector
- Other sectors

Travellers’ Hospitality & Mobility Ecosystem

Shared purpose → Operations model and rules

Value sharing in the ecosystem
- Evolution of the ecosystem
- New needs
- New services
- More users
- Longer seasons
- Growth of the ecosystem
- Growth of business

Co-creation

Continuous development

Concepts and services
- Pilots and their impacts
- Data platform and digitalization
Tourism mobility operational environment

- Trends in tourism (& transport)
  - Individual travellers, nature experiences
  - Technology
  - Sustainability
  - Sharing economy
- Remote destinations
  - Limited services
    - Integration/ travel chains
  - Accessibility
    - Physical
    - Digital
- Safety
Customer centricity

• Tourism aims to create experiences
  • Challenges of mobility cause stress → affects negatively the entire travel experience

• Individual tourists differ from e.g. commuters
  • New environment
  • Differently organized, with different features, modes and services
  • Language

• Information in a key role
  • Quality, findability, usability...
  • Trust is needed to use new services and to reduce stress

New tourism mobility concepts and services
Benefits of tourism mobility services

• Improved accessibility (physical and digital)
  • Seasonal employees
• Destination selection, stay and image
  • Growth and profitability of the destination
• Increased use of public transport
  • Sustainability: emissions and resources
• Digitalization improves efficiency and collaboration
• Safety
  • Destination, transport network
Enriched Travel Chain

Travel chain enriched with destination services

Search travel chain for transition

Return travel chain and possible services and PoIs along the travel chain

Route planning

• Open Trip Planner

Mobility data

• Finnish GTFS national database dump

Tourism data/ Point-of-Interest (PoI) data:

• Visit Finland DataHub collecting data on Finnish travel companies and their services and products

• Open Street map PoI data
ETP: Search for trip

Transfer waiting time: 2 h 38 min

Icons representing options for waiting time
ETP: Zoom in to see options for transfer time use
ETP: Manage settings to control results

All results on the map
ETP: Restrict results to see only the desired visiting point options

Click icon to see visiting point info

Restrict desired result set
ETP: Select visiting point for transfer time

See further information
Select as visiting point
ETP: New routing after visiting point addition

Choose another visiting point

New routing via visiting point
ETP: Multiple visiting points in transfer

Second visiting point & addition to walking routing
Conclusions and recommendations

- Building a common ecosystem takes time
  - Extensive and complex
  - Sectors are different, e.g. data standards
  - Resources

- Management of the entity
  - National collaboration forums
  - Regional collaboration models
  - Development of business ecosystems

Who is responsible for the development/ takes the ownership?

- Innovation ecosystems and pilots also needed

Tourism mobility services on a one-stop-shop principle
- Benefits and responsibilities (business model)?
- Already being a mobility integrator (e.g. MaaS operator) is challenging

Digitalization is an enabler
- Lack of machine-readable data

User-centric development
Thank you!

https://travellersmobility.fi/

Jenni Eckhardt  
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Integrated Passenger-Centric Planning of Multimodal Networks

ARC Spring Conference
Vantaa, 16 May 2024
SESAR 3 JU snapshot

Accelerate through research & innovation the delivery of an inclusive, resilient & sustainable Digital European Sky

50+ founding members representing entire aviation value chain (incl. new entrants)

• Horizon Europe - EUR 600 million
• Eurocontrol – up to EUR 500 million (in-kind & financial contributions)
• Industry - EUR 500 million minimum (in-kind & financial contributions)

Additional funds via Connecting Europe Facility (in coordination with CINEA) to the value of at least EUR 200 million.
# Digital European Sky research and innovation flagships

<table>
<thead>
<tr>
<th>Flagship Area</th>
<th>Description</th>
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<tbody>
<tr>
<td>Connected and automated ATM</td>
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<tr>
<td>Air-ground integration and autonomy</td>
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<td>Capacity-on-demand and dynamic airspace</td>
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<td>U-space and urban air mobility</td>
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<tr>
<td>Virtualisation and cyber-secure data sharing</td>
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<td>Multimodality and passenger experience</td>
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<tr>
<td>Aviation green deal</td>
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<tr>
<td>Artificial Intelligence for aviation</td>
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<tr>
<td>Civil/military interoperability and coordination</td>
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Multimodality in SESAR 3

MAIA (ER, targeting TRL1)
• Enable multimodal services for airport access that balance passenger experience with capacity and environmental sustainability

MultiModX (ER, targeting TRL2)
• Performance framework as well as schedule design and disruption management solutions for air-rail transport networks

SIGN-AIR (Fast-Track, targeting TRL7)
• Establishing contracts between TSPs and sharing of data in multimodal travel

*New project with EU-Rail* (IR, targeting TRL6)
• Integrated Air and Rail network backbone for a sustainable and energy efficient multimodal transport

More information:
Jérôme Delmeulle
SESAR programme manager
What is MultiModX about?

ARC Spring Conference
Vantaa, 16 May 2024
MultiModX  The project and team

The goal of MultiModX is to develop a set of innovative multimodal solutions and decision support tools for the coordinated planning and management of multimodal transport networks.

Project duration: 07/2023 – 12/2025
GA 101114815
MultiModX

Objectives

• To characterise current and future scenarios for long-distance passenger multimodal transport in Europe

To develop...

• a Schedule Design Solution for the integrated planning of air and rail networks
• a Disruption Management Solution based on coordinated passengers’ reallocation, and tactical schedule adjustments and speed/trajectory adjustments for air and rail services.
• a multimodal modelling and evaluation framework
• a multimodal performance framework

to finally nurture the conditions for the transfer of the MultiModX Solutions to the subsequent stages of the R&I cycle
MultiModX
Case-studies

• Simulation of multimodal (air + rail) journeys
MultiModX
Policy options

- Passenger rights
- Multimodal passenger rights
- Environmental regulations
Future Air-Rail Schedule Design

exemplified on Valencia-Lanzarote travel

Future Air-Rail Disruption Management

Passengers arriving by ICE at FRA for onward flights are being delayed by ‘light’ (e.g. 20 minute) or ‘medium’ (e.g. 60 minute) disruptions.
MultiModX
Passenger archetypes

• Model demand, preference and impact for and of multimodal solutions

Clusters based on mobility data (e.g. number of trips, distance)
MultiModX
Regional archetypes

• To understand the potential for using multimodal solutions at the EU-level

• Identify and map types of “travel regions” (NUTS2) in Europe

• Clustering regions on the basis of
  • Socio-demographics
  • Tourist volumes
  • Infrastructure
Infrastructure

• Consideration of planned infrastructure updates (e.g. HSR lines) opened until 2035
• No impact analysis of infrastructure updates on multimodality

Data & Legal Aspects

• Data sharing agreements & smart contracts between Transport Service Providers

→ SESAR SIGN-AIR https://www.sign-air.eu/
MultiModX

Concept and approach
MultiModX

Where we are: MMX Timeline

Kick-off
- June 2023

1st Industry Board Workshop & Dissemination Event
- 20 February 2024, Paris

Functional requirements
- MMX scenarios & solutions

2nd Industry Board Workshop
- 12 November, Rome@SIDs

Preliminary implementation
- MMX scenarios & solutions

Final Dissemination Event
- November 2025

Final prototyping
- MMX scenarios & solutions
The Mobility Dimension... urban nodes in the TEN-T

What is new in EU legislation?

What are the impacts?

Ivo Cré
Director Policy and Projects
- 1994 • 14 priority projects
- 1996 • First TEN-T regulation
- 2001 • Recognition of ports, intermodal terminals
- 2004 • Recognition of the enlarged EU
- 2013 • Corridors, core and comprehensive network
  • CEF
  • 88 Urban Nodes
- 2021 • Proposal for a new regulation
- 2024 • New regulation
  • 431 Urban Nodes
Window of opportunity for Urban Nodes

Leading to current recognition in new TEN-T concept
Urban Nodes on the forefront

• By 2027, each urban node is expected to have a Sustainable Urban Mobility Plan (SUMP)
• By 2027, urban nodes are required to collect and submit urban mobility data to the European Commission.
• By 2030, the development of multimodal passenger hubs is required
• By 2040, each urban node is expected to have access to at least one multimodal freight terminal
Urban Nodes as Airport Regions?
## Nodal Typologies

Potential to map functional interrelation between nodes

Typologies to be expanded/coordinated with airport profiles and interdependencies

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<tr>
<th></th>
<th>Cross-border function</th>
<th>Sea port</th>
<th>Inland function</th>
<th>Relation of the node and the Corridor</th>
<th>Developed / cohesion region</th>
<th>Centric / poly-centric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vienna</td>
<td>Multi-modal</td>
<td>Inland, big</td>
<td>Inbound/consumption</td>
<td>Developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotterdam</td>
<td>Gateway</td>
<td></td>
<td>Outbound/production and transit</td>
<td>Developed</td>
<td>Polycentric</td>
<td></td>
</tr>
</tbody>
</table>

**Rotterdam**

*Figure 2 - The indicative functional urban area of Rotterdam*

**Vienna**

*Figure 4 - the indicative functional urban area of Vienna*
Reinforced Role for Urban Nodes

Subsidiarity in Governance – local must lead!
- governance structures at the Urban Nodal level to align with local governance frameworks
- nationally and locally tailored approaches to address diverse needs

Effective mobility governance for FUAs
- expertise and skills to design appropriate policies – this includes owning or having access to data to inform planning processes

More active collaboration between stakeholders
- across governance levels, sectors and disciplines

Governance mechanisms to facilitate delivery of multi-modal infrastructures, addressing
- complexities in project management
- transport network competence
- financial stability and accountability
- digital skills & responsibilities

No Specific focus on integration of Aviation, Urban Air Mobility, land access of Airports: Local must lead!
What’s Next? Step by Step

1. Aware
2. Informed
3. Capable / Agile
4. Active / Compliant

In cooperation with aviation and UAM stakeholders
Thank you

Ivo Cré
icre@polisnetwork.eu
The role of aviation in the building of an accessible Europe

Henna Virkkunen, Member of the European Parliament
Lunch Break

12:45 - 13:30
Session 3 - The economic dimension: Aviapolis case

Kimmo Mäki, CEO, Finavia
Tommo Koivusalo, Director of Economic Development, Vantaa City
Connectivity and Success of Aviapolis

Kimmo Mäki
CEO, Finavia
16.5.2024
We ensure smooth travelling and high-quality service at our airports. Customer satisfaction at Helsinki Airport is at a record high level.

We manage and develop our operations responsibly and take care of the construction, maintenance and availability of airport infrastructure throughout the year.

We ensure Finland’s accessibility and good connections by building routes with airlines and other stakeholders.

**FINAVIA**
Our work brings the world closer

Finavia Group provides airport services to passengers and airlines.

We manage and develop 20 airports in Finland.

We build seamless flight connections to our airports.

We do our part to ensure Finland’s accessibility.
## Finavia Group’s key figures

**Figures 2023 (2022)**

<table>
<thead>
<tr>
<th>Category</th>
<th>2023</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>359.8 EUR</td>
<td>(298.4) EUR</td>
</tr>
<tr>
<td>Group personnel</td>
<td>2,535</td>
<td>(2,239)</td>
</tr>
<tr>
<td>Flight connections to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>destinations</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Balance sheet</td>
<td>1,513 EUR</td>
<td>(1,595) EUR</td>
</tr>
<tr>
<td>Operating result</td>
<td>-23.8 EUR</td>
<td>(-52.3) EUR</td>
</tr>
<tr>
<td>Investments</td>
<td>52 EUR</td>
<td>(106) EUR</td>
</tr>
<tr>
<td>Towards sustainable air travel:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All of our airports are carbon neutral</td>
<td></td>
</tr>
<tr>
<td>Owned by</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>State of Finland</td>
<td>100%</td>
</tr>
</tbody>
</table>

FINAVIA
### Helsinki Airport in a nutshell

- **15,3 million passengers in 2023**
- **130 destinations around the world**
- **88%** of all passengers travelled on international flights in 2023

#### Most popular European destinations**
1. Germany
2. Spain
3. Sweden

#### Most popular destinations outside of Europe**
1. USA
2. Japan
3. Thailand

### Carbon emissions of Helsinki Airport reduced to net zero level in 2024
- **6 times** between 2016 and 2024**
- **5 times** between 2018 and 2024***
- **4 times** with a BREEAM certificate

### Best airport in Northern Europe

### The best airport in Europe in its category

### Sustainability awarded

**Reason for travelling***

<table>
<thead>
<tr>
<th>%</th>
<th>Leisure</th>
<th>Business</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>70%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0%</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### Travellers by residence***

<table>
<thead>
<tr>
<th>Country</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>48%</td>
</tr>
<tr>
<td>Germany</td>
<td>5%</td>
</tr>
<tr>
<td>Sweden</td>
<td>5%</td>
</tr>
<tr>
<td>USA</td>
<td>5%</td>
</tr>
<tr>
<td>UK</td>
<td>4%</td>
</tr>
</tbody>
</table>

* Airport Service Quality (ASQ) benchmark survey for departing passengers.
** Based on passenger numbers.
*** SKYTRAX World Airport Awards **** Airports Council International (ACI)
**** Airport Service Quality (ASQ) benchmark survey for departing passengers.
Helsinki Airport Development Programme 2013-2023

The employment impact during construction is nearly **17,000** person-years.

Finavia has invested a **billion euros**.

Degree of domesticity is **90%** Finnish.

**17,000** baggage processed in an hour (+50%).

New capacity is **300** charging places for electric cars.

Capacity is **16** passenger bridges for wide-body aircraft (+100%).

One roof concept.

Travel centre that connects different forms of transport.

New security control.

Helsinki Airport is ready to serve 30 million passengers annually.

The expansion of Helsinki Airport

The content of the development programme

The development programme includes:

- **2013** New security control
- **2014** New baggage control
- **2015** New departures, new traffic arrangements
- **2016** New gates, new security control
- **2017** New departure hall and security control
- **2018** New passenger bridges for wide-body aircraft
- **2019** New security control
- **2020** New baggage control
- **2021** New departures, new traffic arrangements
- **2022** New departure hall and security control
- **2023** New baggage control

FINAVIA
We are missing number of direct Asian routes, but Helsinki Airport is still best connected in North Europe

- Russian airspace closure has resulted in less direct flights from Helsinki Airport to Asian destinations; especially in China. Japan routes have almost recovered, but with less weekly flights.
- Passengers on Asian routes last 12 months has reduced by 47% compared to 2019.
- Air cargo to/from Asia is 26% behind 2019 level.

<table>
<thead>
<tr>
<th>Summer season</th>
<th>Airports served</th>
<th>Weekly Flights</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2019</td>
<td>2024</td>
</tr>
<tr>
<td>Japan</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td><strong>China</strong></td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Singapore</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>South Korea</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>India</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Thailand</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>20</td>
<td>12</td>
</tr>
</tbody>
</table>

Direct Asia flights from:

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2024</th>
<th>2019</th>
<th>2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockholm</td>
<td>4</td>
<td>2</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Oslo</td>
<td>3</td>
<td>2</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>8</td>
<td>6</td>
<td>49</td>
<td>29</td>
</tr>
</tbody>
</table>
Helsinki Airport has connectivity to almost all the same destinations in Europe and USA as pre-Covid

- Number of weekly flights per destination is smaller this summer season from Finland to Europe
- Helsinki Airport has connections to about 140 airports in the world
- Total cargo tonnes are down 23% compared to 2019
Airport generating success to the Aviapolis area

Helsinki Airport ecosystem employs 20,000 people daily and generates a need for a wide range of services and facilities.

Without a vital community also the success of the Airport is threatened.

Success is based on collaboration of the airport corporation, city, government, corporations and people.

Real Estate development a business area and also enabler.

Source: Avia Real Estate Oy
Finavia land area

- Finavia land area 1 700 hectares
- Target to support the community through development of airport operations and connectivity
- Aircraft noise on low level high at the end of runways, not in the Aviapolis area
- Real Estate development is a common business area for Airport corporations and also for Finavia
  - Finavia direct investments and through an associated company Avia Real Estate
- International and domestic connectivity is a key success factor in real estate development
Aviapolis development at the moment

• New hotel ready for its summer opening and a cargo terminal under construction
• Starting of new profitable projects in Finland challenging at the moment
• Work continues and during following years we expect many new project launches:
  • residential, offices, logistics, museum, school, events congress...
Helsinki Airport’s urban travel centre combines different ways of transport

## Multimodal travel centre

Helsinki Airport is easily accessible and different modes of transportation are linked. Bus, train and taxi stations are located just outside the terminal. In the future also the new tram line.

### Biggest high-power charging station in the Nordics

Biggest charging area in the Nordic countries with 40 high-power charging stations opened for taxis in January 2024. There are separate high-power charging stations for public use.

- Finavia’s parking areas offer passengers a wide selection of parking spaces and charging stations for electric cars right next to the terminal.

### Zero-emission taxis have a right of way in the terminal taxi lanes

Compared to higher-emission cars. The share of zero-emission taxis in rides departing from Helsinki Airport increased from around 30 per cent (2022) to over 90 per cent (March 2024).
Helsinki Airport Connectivity Developments
Three cornerstones of our sustainability programme

The well-being of people

Sustainable air traffic

Good governance and finances

FINAVIA
We focus on sustainability on all our airports

Finavia’s goal is to reduce the carbon emissions of all our airports to a net zero level.

In order to reach our goal, we develop tailor made energy-efficient solutions at our airports.

We compensate for those emissions that cannot be eliminated with current technology and energy solutions.
The attractiveness of Finland as a travel destination must be developed together

- Prior to the corona crisis and the Russian war of aggression, the tourism industry was growing rapidly. The industry has good opportunities to rise again as a significant growth industry.
- The increase in the number of tourists has many positive societal and economic effects, especially regionally.
- Finland's international accessibility is mainly based on air connections, and comprehensive connections play a big role in Finland's attractiveness as a travel destination.
- Promoting international tourism requires investments and working together towards a common goal – the outlook is challenging.
- Diversity and linguistic diversity in the tourism industry should also be increased to ensure enough labour in the future.

<table>
<thead>
<tr>
<th>Total tourism demand</th>
<th>Companies</th>
<th>Share of GDP</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.3 b € / 13.5 b €</td>
<td>29 000 / 38 600</td>
<td>2.7% / 1.6%</td>
<td>154 100 / 133 400 persons</td>
</tr>
</tbody>
</table>

Source: Visit Finland
FINAVIA
FOR SMOOTH TRAVELLING
Aviapolis – the future of Vantaa

16.5.2024
Tommo Koivusalo
Director of Economic Affairs, City of Vantaa
students, 10 universities in the metropolitan region, within maximum 35 km (ca. 30 minutes) from any point in Vantaa

136,000
Vantaa is the 4th largest city in Finland with more than 10,000 companies (>700 international), providing more than 100,000 jobs.

Superior transport connections, rapidly increasing internationalization and major investments in expertise and sustainable development are key enablers for your growth.

Capital region estimate: 
>100,000 companies (> 6000 international, >700,000 jobs)
280,000 Population forecast 2030

25 % The foreign-language speaking population today

Source: City of Vantaa 2022 & 2023
Carbon-neutral city

Most important measures by 2030:

• Improving energy efficiency of buildings
• Integrating and developing urban structures
• Improving public and electric transport
• Making sustainable acquisitions
• Accounting for the energy efficiency
• Vantaa Energy innovation and partnership models
Case: Vantaa Energy

TOWARDS A CARBON NEGATIVE ENERGY SYSTEM IN VANTAA

- 2014: 30% reduction in emissions compared to 2010
- 2019: 50% Waste-to-energy plant
- 2021: 55% Martinslakio biofuel power plant
- 2022: 70% Phasing out peat
- 2024: 72% phasing out coal, improving recycling and material efficiency
- 2025: 75% increasing the use of bioenergy, high-temperature plant and contaminated wood waste plant, optimising decentralised energy system
- 2026-2028: 85% carbon negative projects, utilisation of geothermal energy and waste heat increases, energy production and indoor conditions as an energy-efficient entity
- 2030: 102% carbon negativity, carbon capture and processing into raw material, improving recycling and material efficiency, carbon negative projects

Carbon dioxide emissions in kilotonnes per year

CO₂-emissions
Vantaa is the logistic hub of Finland.

Helsinki Airport, the key railway station of main rail line with its’ nationwide connections, main highways, and Helsinki Vuosaari harbor, they all are at best less than 15 minutes away and in the worst case less than half an hour from any business area in Vantaa.
Connecting the city - Vantaa Light Rail

- Ring Rail Line
- Helsinki International Airport
- Main Rail Line
- Vantaa Light Rail
- Helsinki Metro
We have superior food brands e.g. Fazer established 1891 and HK Scan with 700 Me turnover in Finland, among startups based on the megatrends of the future, like Solar Foods. Vantaa is also surrounded by top research and education in the area of the capital region. Several pilots are already underway, e.g. in the brewery and roastery sectors and new targets are constantly being sought.
Logistics

FINAVIA

The goal is to make Helsinki-Vantaa Airport one of the most successful stations in the world, also in terms of cargo transport. HUB logistics and DHL are comprehensive partners for warehousing, internal logistics and material flow management. Helsingin Taksipalvelu represents wide range of person transporting operators. Finavia maintains Finnish airport network and is proceeding 10-year development program in Helsinki-Vantaa, worth over a one billion euros.

The presented figures are from companies in the industry operating in Vantaa, representing turnover and the size of the personnel in Finland.
Vantaa’s goal is to significantly increase high competence jobs. The key is innovation between large and small companies. Vaisala is a global technology leader and expert in the field of weather, environment and industrial measurements. Finkova is a small and agile import and sales company specializing in valves for heavy industry.

The presented figures are from companies in the industry operating in Vantaa, representing turnover and the size of the personnel in Finland.
Why Aviapolis?

• International business and residential area next to the airport - even within walking distance
• #1 accessibility in Finland
• #1 shopping center in Finland
• #2 hotel district in Finland
• International school
• An ambitious development plan in place
In the pipeline:
New districts
More rails
The biggest hotel
A renewed museum
An international school
...

And a little bit later:
An arena
Headquarters
Showrooms, retail
...

The Best Airport in Europe 2023
(in the 15 to 25 million passengers size category, the award was granted by Airports Council International (ACI)).
Session 4 - The environmental dimension

Laurent Leylekian, PULSAR Project Coordinator
Virginie Pasquier, OLGA Project Coordinator
Charlotte Verreydt, STARGATE Project Coordinator
Fokko Kroesen, TULIPS Project Coordinator
The PULSAR project (101095395) is funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the granting authority can be held responsible for them.
An agenda with multilateral demands

**The EU Strategic Agenda**
- Protecting citizens and freedoms
- Developing a strong and vibrant economic base
- **Building a climate-neutral, green, fair and social Europe**
- Promoting European interests and values on the global stage

**The EC priorities (2019-2024)**
- A European Green Deal (-55% by 2030 compared to 1990, carbon-neutral by 2050).
- A Europe fit for the digital age
- An economy that works for people
- A stronger Europe in the world
- Promoting our European way of life
- A new push for European democracy

**The existing & forthcoming regulations**
- EU Emissions Trading Scheme (ETS)
- EU Fit for 55 (including Refuel EU Aviation)
- ICAO Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)
- ICAO Annex 16 and its successive chapters (nowadays chapter 14)

**A single question**
Will the aviation sector deliver?

**Subsidiary points**
- Which technologies are promising to meet the goals?
- What are the educational needs of the sector?
Policy demands – will the aviation sector deliver? It depends:
• On economic trends & social willingness
• On concurrent access of various sectors to resources
• On overall costs (energy, wages, taxes, ...) 
• On technology achievements
• On market readiness

Technologies come in a context. Assessing their capability is necessary, not sufficient.

Techno assessments give indications on possible improvements, TRL levels and possible dates of EIS
Scenarios give indications on probability for air transport patterns (flights numbers, ATS configurations, aircraft types, etc...)

PULSAR aims at connecting scenarios with techno roadmaps to deliver information on the most promising technologies and their capability to support the EU policy goals

Example: EU regulation imposes shares on SAF. Beneath techno, will we have such resources for aviation? At which cost?

Legacy of techno assessment
• AGAPE (FP7 – 2008-2010)
• OPTI (FP7 – 2011-2012)
• X-NOISE EV (FP7 – 2010-2015)
• ANIMA (H2020 – 2017-2021)

Legacy of scenarios (excerpt)
• ACARE Fly the Green Deal 2050
• NLR Destination 2050
• EREA Vision Study 2050
PULSAR METHODOLOGY – ROAD-MAPPING

- Socioeconomic & other inputs
- Defining scenarios
- Fleet traffic patterns
- Technology database
- Techno “deltas”
- Quantitative assessments
- LTO assessment
- Global assessment

Update of European aviation R&I roadmap

- Review of educational offer
- Postgraduate courses database
- Sector needs & demand
- Gaps identification

Connect better with education and skills

- Survey of aviation industry
- Communicate to citizens & stakeholders

Series of public events and dedicated events with EC & policy-makers

Recommendations to EC & policy-makers

Roadmap Qualitative validation

Experts’ judgments through workshops

Recommendations to EC & policy-makers
Interim status – 1st year

Scenarios definition: 85%
Technology screening: 50%
Assessment phase: 5%
Educational offer and needs: 20%
4 scenarios to evaluate scope R&D Roadmaps

**Go with the Flow**
Baseline scenario
- Continuation of current measures and policies
- No larger than expected technological development or stronger climate action than currently foreseen

**Climate is Everything**
Focus on regulation
- Climate goals enforced by policies
- More expensive air travel
- Price flights based on true distance and emissions

**The Sky is the Limit**
Technology-optimistic
- Relative high GDP per capita
- High technological and innovation development
- Less policy measures needed

**The Glass is Half-Empty**
Low growth and fragmentation
- Lower GDP per capita
- Less innovation and fleet renewal
- Decreased demand for (especially long-haul) flights
**PULSAR Scenarios compared to other studies**

<table>
<thead>
<tr>
<th>PULSAR</th>
<th>CONSAVE</th>
<th>EUROCONTROL</th>
<th>EREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down to earth</td>
<td>Regulation and growth</td>
<td>Go with the flow</td>
<td>Glass half-empty</td>
</tr>
<tr>
<td>Tech for you</td>
<td>Unlimited skies</td>
<td>Sky is the limit</td>
<td>Climate is everything</td>
</tr>
<tr>
<td>Mad Max</td>
<td>Fractured world</td>
<td>Happy localism</td>
<td>Stripping down</td>
</tr>
<tr>
<td>Fragmenting world</td>
<td>Regulatory push and pull</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Comparing PULSAR scenarios

Constant factors and proposed variations

• Proposed constant factors in black, variations in green
  • Constant factors will be a given for workshop
  • Variations to be discussed at workshop

<table>
<thead>
<tr>
<th>Storyline</th>
<th>Target</th>
<th>Policy</th>
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<tbody>
<tr>
<td>Go with the flow</td>
<td>• Net zero CO₂</td>
<td>• ReFuelEU Aviation (EU/UK departures)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• EU ETS reduced scope</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Global MBM to drive to net zero CO₂ by 2050</td>
</tr>
<tr>
<td>Sky is the limit</td>
<td>• Net zero CO₂</td>
<td>• ReFuelEU Aviation (EU/UK departures, mandate possibly surpassed)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• EU ETS reduced scope, reinvest into sector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Global MBM to drive to net zero CO₂ by 2050</td>
</tr>
<tr>
<td>Glass half-empty</td>
<td>• Net zero CO₂</td>
<td>• ReFuelEU Aviation (EU/UK departures)</td>
</tr>
<tr>
<td></td>
<td>• Climate neutrality (EU)</td>
<td>• EU ETS full scope, incl. non-CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Global MBM to drive to net zero CO₂ by 2050</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• EU kerosene tax (ETD)</td>
</tr>
<tr>
<td>Climate is everything</td>
<td>• Net zero CO₂</td>
<td>• ReFuelEU Aviation (global scope)</td>
</tr>
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<td>• Climate neutrality (global)</td>
<td>• EU ETS reduced scope, incl. non-CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Global MBM to drive to net zero CO₂ and non-CO₂ by 2050</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Global kerosene tax</td>
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## Scenario comparison

<table>
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<th>Element</th>
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<th>Glass half-empty</th>
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<td>Focus</td>
<td>Continued trends</td>
<td>Policy</td>
<td>Technology</td>
<td>Regions</td>
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<tr>
<td>Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Globally growing, limited decline in Europe</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Demographics</td>
<td>Ageing</td>
<td>Ageing</td>
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<td>Ageing</td>
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<td>Globalisation</td>
<td>Continued</td>
<td>Continued</td>
<td>Increasing</td>
<td>Reduced</td>
</tr>
<tr>
<td>Need for transport</td>
<td>Similar to today</td>
<td>Reduced for (business) passengers</td>
<td>Growing</td>
<td>Focused on intra-regional</td>
</tr>
<tr>
<td>Political development</td>
<td>Market philosophy</td>
<td>Environmentally restrictive</td>
<td>Technology supportive</td>
<td>Regional differences</td>
</tr>
<tr>
<td>Economic growth</td>
<td>Slower</td>
<td>Decline, later economic growth</td>
<td>Stronger</td>
<td>Decrease</td>
</tr>
<tr>
<td>Energy usage / demand</td>
<td>Continued</td>
<td>Less</td>
<td>Increasing</td>
<td>Less</td>
</tr>
<tr>
<td>Energy availability</td>
<td>Continued</td>
<td>Less</td>
<td>High availability, on short term no abundance (due to upscaling of renewable energy)</td>
<td>Less</td>
</tr>
<tr>
<td>Energy sources</td>
<td>Mixed</td>
<td>Fully renewable</td>
<td>Short term mixed, long term fully renewable</td>
<td>Regionally different</td>
</tr>
<tr>
<td>Energy independence</td>
<td>Medium, continued</td>
<td>Low, slowly increasing over time</td>
<td>First low, later high</td>
<td>High</td>
</tr>
<tr>
<td>Citizens’ values</td>
<td>Mixed, compromise focused</td>
<td>Climate / environment focused</td>
<td>Technology-optimistic</td>
<td>Focused on regions</td>
</tr>
<tr>
<td>Technology development / innovation</td>
<td>Continued trends</td>
<td>Focused on environment</td>
<td>Rapid and more diversified</td>
<td>Slower, focused on improving ‘known’ technologies</td>
</tr>
</tbody>
</table>
### Notable Metrics & indicators by PULSAR

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>km total travelled</td>
<td>Climate (contrail-cirrus)</td>
</tr>
<tr>
<td>CO₂ emissions</td>
<td>kg total per year and total cumulative</td>
<td>Climate</td>
</tr>
<tr>
<td>NOₓ emissions (mass)</td>
<td>kg total per year: LTO &amp; full flight</td>
<td>Climate &amp; LAQ</td>
</tr>
<tr>
<td>NOₓ emissions (number)</td>
<td>number total per year: LTO &amp; full flight</td>
<td>Climate &amp; LAQ</td>
</tr>
<tr>
<td>nvPM emissions (mass)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nvPM emissions (number)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPNdb</td>
<td>Certification value for an aircraft</td>
<td>Noise</td>
</tr>
<tr>
<td>L_{Amax}</td>
<td>Peak sound level per aircraft</td>
<td>Noise</td>
</tr>
<tr>
<td>L_{day}, L_{night}</td>
<td>Daily or yearly accumulated noise exposure, can be related to health risks</td>
<td>Noise</td>
</tr>
<tr>
<td>Noise awakenings</td>
<td>Nightly estimated noise awakenings, related to health risks, cardio-vascular diseases, etc.</td>
<td>Noise</td>
</tr>
<tr>
<td>Psycho-acoustic metrics (tonality, roughness, fluctuation strength)</td>
<td>Alternative measures that may relate to annoyances for different aircraft configurations.</td>
<td>Noise</td>
</tr>
<tr>
<td>% of people highly annoyed</td>
<td></td>
<td>Noise</td>
</tr>
<tr>
<td>% of people highly sleep-disturbed</td>
<td></td>
<td>Noise</td>
</tr>
</tbody>
</table>

### Suggestions at PULSAR Workshop

**Related to climate**
- H₂ boil-off / leakage, as hydrogen itself is a potent greenhouse gas.
- Distance flown per altitude band
- A metric considering “net” (i.e., well-to-wake) energy use
- A separate metric for water vapour emissions, besides contrail cirrus
- Taking into account life cycle aspects for the development, maintenance and end-of-life of new aircraft

**Other**
- Safety aspects
Interim status – Technology screening

Technology screening aims at:
- Maintaining the EU techno database for environmental aviation (strand #1)
- Providing techno packages for assessment in scenarios (strand #2)

These two objectives do not require the same level of granularity. We are not able in PULSAR to assess the impact of fine aggregation of technologies.

Strand #1: A very detailed assessment of benefits for individual technologies.
Interim status – Technology screening

Technology screening aims at:
- Maintaining the EU techno roadmap for environmental aviation (strand #1)
- Providing techno packages for assessment in scenarios (strand #2)

These two objectives do not require the same level of granularity. We are not able in PULSAR to assess the impact of fine aggregation of technologies.

Strand #2: Coarse overall assessment of benefits for integrated aircraft types

<table>
<thead>
<tr>
<th>Category</th>
<th>Aircraft</th>
<th>Engine/Fuel</th>
<th>Quantitative assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional</td>
<td>Regional A/C (70 pax) with propellers</td>
<td>retrofit Fuel Cell</td>
<td>Continental (ECAC)</td>
</tr>
<tr>
<td>Regional</td>
<td>Regional A/C (70 pax) with propellers</td>
<td>10% Hybrid + 100% SAF</td>
<td>Continental (ECAC)</td>
</tr>
<tr>
<td>Regional</td>
<td>Regional A/C (100 pax) with propellers</td>
<td>clean sheet prop aircraft</td>
<td>Continental (ECAC)</td>
</tr>
<tr>
<td>Regional</td>
<td>Regional A/C (100 pax) with propellers</td>
<td>clean sheet prop aircraft + fuel cell combustion</td>
<td>Continental (ECAC)</td>
</tr>
<tr>
<td>Regional</td>
<td>Regional A/C (30 pax) with propellers</td>
<td>Electric propulsion</td>
<td>Continental (ECAC)</td>
</tr>
<tr>
<td>SMR</td>
<td>Single aisle (200/250 pax)</td>
<td>100% SAF UHBR</td>
<td>LTO + Continental (ECAC)</td>
</tr>
<tr>
<td>SMR</td>
<td>Single aisle (200/250 pax)</td>
<td>100% SAF Open Fan</td>
<td>LTO + Continental (ECAC)</td>
</tr>
<tr>
<td>SMR</td>
<td>Single aisle (160 pax)</td>
<td>H2 combustion</td>
<td>LTO + Continental (ECAC)</td>
</tr>
<tr>
<td>LR</td>
<td>Twin aisles (300 pax)</td>
<td>with improvements &amp; SA, EIS 2035</td>
<td>LTO + Continental (ECAC)</td>
</tr>
<tr>
<td>LR</td>
<td>Twin aisles (300 pax) BWB</td>
<td>clean sheet prop aircraft</td>
<td>LTO + Continental (ECAC)</td>
</tr>
<tr>
<td>LR</td>
<td>Twin aisles (400 pax)</td>
<td>Improved with UHBR</td>
<td>LTO + Continental (ECAC)</td>
</tr>
</tbody>
</table>

The two strands will eventually need to be reconnected for providing recommendations on research to EC and policy-makers.
**PULSAR Endeavour**

1. **Enrich & Update the techno database maintained along X-Noise & ANIMA**

<table>
<thead>
<tr>
<th>Low Noise Aircraft technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aero-acoustic integration of UHBR turbofan propulsion system</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Advanced nacelle acoustic technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current status</td>
</tr>
<tr>
<td>Analytical analysis in NICEFAN1 has shown the potential of Low Frequency liner with complex shapes. BETTERFAN2 has proven the potential of these LF liners in flow conditions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vision towards final TRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>The next step is to go to a Fan Rig test for acoustic TRL4 validation and in parallel increase MRL with 3D manufacturing of double curved liner panels, bla bla bla. Full scale ground tests bla bla bla. TRL X/MRL Y is needed for entering into commercial exploitation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Advanced flow physics simulation application to fan &amp; turbomachinery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current status</td>
</tr>
<tr>
<td>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vision towards final TRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.</td>
</tr>
</tbody>
</table>

[www.anima-project.eu](http://www.anima-project.eu)
2. Assess what techno can do and **what it cannot**

* ENGE: Existing New Generation Engine (neo/MAX)
** ENGE + New aircraft design + Noise Reduction Technologies (NRT)
*** NAP: Noise Abatement procedures

PULSAR aims at updating & extending the ANIMA noise recommendations to meet the 2050 net zero prescription

ANIMA legacy

www.anima-project.eu
Thank you for your attention!

Contact: Laurent.leylekian@onera.fr
hOListic & Green Airports (OLGA)

Virginie Pasquier, OLGA Project Coordinator
Groupe ADP

ARC’s annual spring conference – 16th May 2024

Grant Agreement n° 101036871
OLGA innovates to reduce environmental impact

**OLGA objectives**

- Reduce the environmental impact of the aviation sector
- Reduce CO2 emissions
- Optimise energy efficiency
- Preserve biodiversity
- Improve air quality and waste management

**Key developers**

- Paris Charles de Gaulle (France) – lighthouse airport
- Milano Malpensa (Italy), Zagreb (Croatia), and Cluj Napoca (Romania) – fellow airports

**Main goal**

- Foster replication of these innovations at airports worldwide
Partners

Groupe ADP
ADDAIR
Air France
Air Liquide France Industrie
Airport Regions Council
Assaia International
ARMINES
Austrian Institute of Technology
BatiRIM
Bureau Veritas Exploitation
BS RESONET
Centro Tessile Cotoniero e Abbigliamento
Cluj Airport
Cluj-Napoca Municipality
COMOTI
Direction générale de l’Aviation civile
ENGIE
Env-isa
ECATS International Association
ERICSSON NIKOLA TESLA
EUROCONTROL

GDI
IFP Energies nouvelles
INFRA PLAN
Zagreb Airport
Interuniversity Consortium for Optimization and Operation Research
ITW GSE
L-UP
Parco Lombardo Valle del Ticino
PROAVIA
RINA Consulting
Safety Line
SEA Milan Airports
SMART Airport Systems
Snam
Technical University of Cluj-Napoca
TRANSDEV Group
Université Paris XII Val de Marne
University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture
University of Zagreb, Faculty of Transport and Traffic Sciences
WaltR

25 M€
34 M€
4
41
17
10
60
10
40
27

Funding request
project
airports (CDG, MXP, ZAG, CLJ)
partners
third-parties
countries
months project
work packages
tasks
advisory board members

Third parties

Air Liquide | Bureau Veritas Italy | DLR | EASA
ECOLE NATIONALE SUPERIEURE DES MINES DE PARIS
ENGIE ENERGIE SERVICES | ENGIE GLOBAL MARKETS
ENGIE INEO Energie & Systems | HUB ONE | IMMOBLADE
INGELUX | Manchester Metropolitan University
MZLZ – Zagreb Airport Operator | MZLZZU – Ground Handling Services
RINA TECH UK | RSB – Roundtable on Sustainable Biomaterials Association
University of Modena and Reggio Emilia
OLGA Work Plan
Holistic environmental performance at airports
Environmental improvement on full life-cycle
- Green runway renovation
- Boosting CO2 decrease in concrete
- Increasing circular economy in construction/deconstruction

Low carbon multi-energy offer
- Airside electrification optimization software
- H2/NGV station
- H2 production and use cases
- Biodiesel 100% for HDVs

Improved air quality
- Emissions and Air Quality Pollutants Modelling and Monitoring
- Air Quality Source Apportionment

Airline perspective: Mrs. Moreau is on a business trip between Paris and Milan via a green corridor
Passenger perspective:
John comes as a tourist to Paris/Milan. He transits through the green airport.

At the terminal
- Exiting aircraft through solar equipped boarding bridge
- Terminal innovative lighting
- Improved energy consumption and thermal comfort in pre-boarding bridge
- Optimized energy and CO2 efficiency optimization in terminal
- Waste reduction with reusable kits

Leaving the airport in a low carbon mode
- Mobility on demand shuttles
- e-buses connection with cities optimization
- Multimodal traffic flow optimization
- Autonomous mobility
- BioNGV buses

Improved biodiversity measurement (landside and airside) using IT
Improved air quality
Local Communities

- **Improved air quality** and **soil contamination prevention**. This will lead to a **healthier environment for people** living in the vicinity of the airport.

- **Reduced noise** annoyance as well as **air quality improvement**, creating a **healthier working environment** for the tens of thousands of people who work at or around the airport.

- Recommendations for **best practices and ad-hoc operational procedures improving for air quality**: reduced APU usage, green taxiing, use of SAF, electric GSE etc.

- Also, OLGA is largely addressing **low-carbon mobility and infrastructures**, that are also beneficial for local communities.
WP4.3 Biodivers.IT

Leader : Groupe ADP

Partners : UPEC and STAC
General overview: biodiversity in Paris-CDG

Surface in airside area: approx. 2140 ha including 1144 ha of green spaces (53%)

Number of species: 152 wildlife species (including 92 bird species), 249 flora species
Objectives of the project

- Indicators in line with airport activities
- A dashboard for operational monitoring and management
- A decision-making tool to preserve biodiversity
- A tool recognised by external organisations
- Alignment with international regulatory and voluntary standards
- A collaborative project involving airports with different structures and ecosystems
Deliverables

1. An application for **rapid, standardised collection of field observation data**.

2. A tool for **automatic detection** of undesirable weeds.

3. A **dashboard** compiling the data collected and external databases for **monitoring and operational management of biodiversity**.

4. A **decision-making tool** including personalised recommendations based on the results of the dashboard.

5. **Global performance indicators** to meet international biodiversity monitoring standards, measure improvements in practices and enable us to compare with other airports.

6. An implementation guide.
The Project

Automatic detection tools for species
- Dedicated to invasive species

Application of field observation reports
- Standardised and rapid collection

Internal resources
- Regulatory fauna-flora inventory
- Landscape and biodiversity plans
- Others

External resources
- Urban plan
- Maps of protected areas
- IUCN red list
- Etc...

Calculation methodology and data compilation algorithms
- Methodology adapted to the airport sector
- Can be replicated at airports with different structures and ecosystems
- Compliant with European regulations
- Compliant with international framework standards
- Recognised by third-party reference organisations

Dashboard:
- Identification of sensitive areas
- Can be personalized (assignment of alert levels)
- Interactive (dynamic data)
- Visual results (maps, histograms)
- Global performance indicator

Dashboard, interfaces and familiarisation

Management interfaces and indicator monitoring

Implementation guidelines
Progress overview: detection tool

3 POCS realised

- Development of existing algorithms
- Image labelling tools
- Choice of detection equipment
- Data standardisation

1st test by drone

2nd test by on-board camera V1

3rd test by on-board camera V2
Progress overview: decision-making tool

Algorithm evolution:

1st binary results, without georeferencing
Next steps

WP4.3 - Biodivers.IT

- **S2 2024**
  - Definition of relevant operational and global indicators
  - Request for advice and support from reference organisations
  - Finalisation of internal and external data acquisition system

- **S1 2025**
  - Interface development

- **S2 2025**
  - Validation test of the first version of the interface
  - Adjustments based on feedback

- **S1 2026**
  - Deployment of the IT interface in airport systems

- **S2 2026**
  - Production of a guide to support the use and learning
OLGA project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement n° 101036871

olga-project.eu
Thank you!
Stargate

Charlotte Verreydt
ARC – May 16th 2024
Stargate: Accelerating Greener Aviation

- **3 Goals**
  - Modal Shift
  - Decarbonisation
  - Local Environmental Quality

- **22 Partners**

- **2021-2026**

- **30+ Projects**

- **24,8 mio**

- **Grant EU Green Deal**

- **30% Funding by Stargate Partners**
A strong and diverse European partnership

- Three Fellow Airports
  - toulouse blagnac
  - Budapest Airport
- Airport Community Partners
  - Skytanking
- Consultants in Energy, Mobility & Digitalisation
  - sopra steria
  - LUXMOBILITY
  - IES
  - to70
Our mission & vision

The **mission** of the STARGATE consortium is to develop, test and deploy a set of innovative solutions aimed at making the airport ecosystem significantly more sustainable.

Our **vision** is to build with STARGATE a sustainable eco-system benchmark and be source of inspiration to other airports in Europe and the world.
Three major axes, over thirty projects
Enhancing Further Decarbonisation

- Digital Twin
- E-Ground Handling
- Sustainable Aviation Fuel
- Hydrogen Ground Handling
Improving Local Environmental Quality

- Local Air Quality & Noise Reduction
- Digital Green Logistics
- Collaboration Local Community
Long-term ambitions, concrete realisations.
We test and develop a set of green energy solutions to further decarbonize ground & airline operations and green terminal operations.

**Promote the use of** [SAF at airports & enabling on airport blending at high ratios](#)

**Testbed** to demonstrate the benefits of [renewable (electric & hydrogen) alternatives](#) for mobility

**Identify opportunities** for [resource saving and waste reduction in the terminal](#)
Enhancing Further Decarbonisation

On-airport SAF blending

Objectives:

 ★ Produce high blend ratios SAF
 ★ Inject SAF in the central fuel storage system of the airport
 ★ Offer a targeted fuel supply to aircraft carriers that wish to fly on higher SAF blends
 ★ Accelerate the migration to higher blending ratios
To address the regulatory, technical, and operational challenges, a Proof of Concept (POC) consisting of a small-scale, modular and transportable blending installation was developed.

This installation can easily be deployed at other (remote) airports where, e.g., there is no pipeline supply, or it can be used for targeted fuel supply for general aviation flights that wish to fly on high ratio blends.

The small-scale blending installation also gives the opportunity for smaller SBC producers on the market to blend their products (as big players currently dominate the market).
Open access principle: give the opportunity to new SBC producers to access the supply chain
Open up the market and offer custom ratio blends
Targeted Use of Aviation Fuel to Maximize Climate Benefits (use the little available SAF for the most polluting aircraft)
Lower the number of road trucks (in case of truck supply to airport)
Stimulating modal shift

We reduce the environmental impact of airport activities and access by innovative infrastructure, technology, equipment, digitalization and human engagement.

Sustainable Airport Mobility Plan: shift to low-carbon alternative multimodal mobility

Real-time mobility management and decision-making system for a seamless door-to-door mobility around the airport
Increase accessibility and sustainable transport to the airport
Goal, vision & targets

Offer and facilitate comfortable, reliable, smart and sustainable transport options and mobility solutions to and from Brussels Airport, for passengers, staff, commuters, visitors and others.

★ Targets:

- **Hub connectivity**: improving quality of our network for passengers and freight, increasing accessibility & ground transport connectivity
- **Reduce CO2 emissions**: supporting an environmentally sustainable transportation system, reducing traffic volumes and car dependency
- **Stimulate modal shift** (60%-40% Global modal split by 2027) to increase accessibility and reduce congestion
Baseline

- **Target group:** passengers, commuting staff, visitors, (cargo & logistics)
- **Functions:** all modes of transport
- ...

- **Accessibility baseline:**
  - Key metrics per transport mode
  - Capacity
  - PAX satisfaction surveys
  - ...

- **Mobility baseline:**
  - Modal split

- Use baseline metrics to define **SWOT**, to identify bottlenecks, needed investments, quick wins,...

- Start from baseline, vision and targets to develop measures and **actions**
Green versus Growth? Lift the mode!

- (Shared) Soft mobility
- Public transport
- Private common transport
- Shared car mobility
- Transport on demand
- Private car

Staff & Airport community

passengers

Sustainable Airport Mobility Plan

Stargate within EU Green Deal
Define & select actions

Selection based on impact & effort resulted in more than 60 measures

**Hub connectivity**
Improving quality of the network for passengers and freight, increasing accessibility & ground transport connectivity
- Measures for PAX
- Measures for Commuters
- Measures for cargo & logistics

**Reduce CO2**
Supporting an environmentally sustainable transportation system, reducing traffic volumes and car dependency
- Measures for PAX
- Measures for Commuters
- Measures for cargo & logistics

**Modal Shift**
Support measures for a shift towards 60%-40% by 2027
- Measures for PAX
- Measures for Commuters
Cycling

First implementations

- Welcome to Bicycle manager
- Contest and bike test @ BRucargo
- Survey on cycling infrastructure & potential
- Awareness raising actions & communication
- Bicycle parkings & facilities
- Development of cycling strategy
- New (motor) bike parking for pax
- Signage for cyclists & pedestrians
- Shared bicycle & step service

Measure package

- 61 participants for bike test from 11-29/09/23
- 709 participants for Mobility Week Bike contest
- 235 participants for Bike Survey

Bike Path Audit of the 14 km BAC bike path

3 Installed bicycle counters
We need you as Stargate ambassador!

Stay tuned and subscribe to our newsletter!

Stargate - EU Green Deal
@Stargate_EU_gd
www.greendealstargate.eu

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement GA101037053.
Smart Energy Hubs for airports

Fokko Kroesen,
Royal Schiphol Group,
Coordinator for TULIPS
Overview on WP1 to WP8 & involved demonstrators

**WP1: Intermodal services**
- Single source data & distributing information to services
- Increase use of:
  - electric freight transport
  - modal shift to green commuting modes
  - mobility as service
  - digital solutions for international green travel

**WP2: Energy supply future aircraft**
- Feasibility study incl. energy demand forecast (link with WP3)
- Demonstrate:
  - Unattended charging
  - Modular charging system
  - Airport-facilitated hydrogen flight

**WP3: Smart energy hub**
- Implementing:
  - Improved Airside electricity traffic incl storage and direct PV charging
  - Fully integrated heat storage systems into existing hotel infrastructure

**WP4: Zero emissions airside operations**
- Development & operation of:
  - H2 GPU with a hydrogen fuel cell (H-GPU)
  - Large size H2 tow tractor (able to move A380, B777 aircraft) which uses hydrogen powered fuel cells

**WP5: SAF infrastructure**
- Scale-up of SAF market
  - Set up EU Clearing house
  - Enable airports to support the scale-up of SAF supply
  - Demonstrate:
    - Large scale SAF supply
    - Incentives for airports to increase SAF usage

**WP6: Circular airports**
- Set up circular baseline for airport and circularity management system
- Demonstrate:
  - Application of circular building tooling
  - Elimination of operational consumer/passenger waste

**WP7: Green air & land**
- Focus at cross-cutting aspects through:
  - Airside UFP mitigation measures and monitoring
  - Airport land carbon sequestration with biochar, including nature-based solutions

**WP8: Performance monitoring**
- Establish robust baselines for comparative analysis and implement an extensive data aggregation and collection toolkit
- Implement an extensive data aggregation and collection toolkit to facilitate the transfer of observable metrics and key data from demonstration activities
- Model target KPIs for emission and energy reduction
- Determine the achieved performance for each demonstrator activity
- Develop predictive scale-up scenario forecasting for use within deployment assessments (WP9) and building roadmaps (WP10)
Airports as energy hubs

External supply
- Tube Trailors
- Pipeline

Sustainable energy sources
- Solar
- Wind
- Hydrogen
- SAF

SMART ENERGY HUB

Storage
- Chemical storage (green fuel)
- Thermal storage (heat)
- Battery (electricity)

Deliverable 3.1
Concept designs of the smart energy hub at the airports for various scenarios

Deliverable 3.2
Heat supply facilities demonstration

Deliverable 3.3
Airside electricity traffic demonstration

Deliverable 3.4
Lessons learnt and the upscaling and knowledge transfer approaches developed for smart energy hub

Users
- Buildings
- GPUs
- Aircraft
- Ground vehicles

Energy strategies and control systems
Task 3.3. Airside electricity demo

FAT measured data at 75 kW power

Power and SOC

Electrical diagram including the battery
WP4: Zero Emissions Airside Operations

- Developing a GPU and a tow tractor which uses hydrogen-powered fuel cells.
- Demonstrating H2-GPU at the lighthouse and selected fellow airports and demonstrating the H2-tow tractor at the lighthouse.
- Establishing an economically and technically sound development plan for the evolution of the hydrogen supply chain to the airport.

- Reducing carbon and noise emissions at the airport.
- Diversion from the dependence on fossil fuels on the ramp.
- Mixed GSE fleet with electric and hydrogen equipment ramp.
- Operational benefits of hydrogen GSE (comparable to Diesel GSE but without emissions).
Zero emissions equipment for airport ground operations

Integrate Hydrogen fuel cell technology into current diesel-electric ground support equipment to enable zero emissions operation of essential ground operations

H2 - GPU operating with a hydrogen fuel cell (H-GPU)

H2 - Develop and operate tow tractor with hydrogen fuel cells.
First results for electric & hydrogen-powered aircraft by 2030-'50: number of flights and energy requirements

<table>
<thead>
<tr>
<th>Power Source</th>
<th>Airport Type</th>
<th>Number of Movements</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
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<td>169</td>
<td>4666</td>
<td>8238</td>
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<tr>
<td></td>
<td>Hub</td>
<td></td>
<td>8796</td>
<td>91213</td>
<td>99483</td>
</tr>
<tr>
<td>Electric</td>
<td>Regional</td>
<td></td>
<td>196</td>
<td>673</td>
<td>826</td>
</tr>
<tr>
<td></td>
<td>Hub</td>
<td></td>
<td>81</td>
<td>638</td>
<td>857</td>
</tr>
</tbody>
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Source: TULIPS – D2.1, Feasibility study NLR - Airports delivering energy supply for future aircraft, dd. March 2023
(L)H2 supply lines in the Netherlands
Thanks for your attention

For more info see: https://tulips-greenairports.eu/
Coffee Break

15:15 - 15:30
Session 5 - The social dimension

Pia Pakarinen, CEO of Helsinki Region Chamber of Commerce
Pia Illikainen, Director, Finish Aviation Museum
Airport Regions Dealing with Old & New Challenges in a Changing World

-The social dimension

How does the talent shortage shape Helsinki Metropolitan area?

CEO Pia Pakarinen, Helsinki Region Chamber of Commerce
We are the biggest Chamber of Commerce in the Nordics

The Helsinki Region Chamber of Commerce has over 7000 members across all business sectors.
Helsinki Region Chamber of Commerce

Goals
The most respected business life thought-leader in the Helsinki Metropolitan Area.
A validated, thriving, progressive internal operating culture.
Successful companies belong to the Helsinki Region Chamber of Commerce.

Values
To promote better working communities.
For economic freedom.

Mission
We boost the sustainable success of companies.

Vision 2027
The main force driving the working life, business culture, and professional capabilities of the Helsinki Metropolitan Area.

I lead people to succeed and appreciate all my colleagues.
A key advocate for the internationalisation of the Helsinki Metropolitan Area.
An important partner for developing the professional skills of company employees.

For companies - to make society better.
Predicted change in the working-age population in Nordics and Baltics

- Change within one generation
- In 2023, the total fertility rate was 1.26. This figure is the lowest in recorded history, for the second consecutive year.
- In 2023, net immigration reached the highest level in recorded history, at 58,496 individuals.

”New normal”: only net immigration from abroad sustains population growth
Every tenth person living in Finland speaks other language than Finnish/Swedish at home

- 570,000 non-native Finnish/Swedish speakers in Finland
- Highest proportion of non-native speakers in
  - Vantaa 27.2%
  - Espoo 23.9%
  - Närpiö 21.2%
  - Helsinki 19.8%
  - Kerava 16.5%

In the Statistics Finland database, non-native Finnish and Sámi languages have been combined, which has resulted in the exclusion of Enontekiö, Inari, and Utsjoki. The data for 2024 are preliminary.
Fast rise in the share of people with a foreign background in the Capital Region

- Net immigration in 2023, Top3
  - Helsinki 8003
  - Espoo 4664
  - Vantaa 3188
The number of international experts is increasing in the capital region

The professional categories "managers, specialists, and experts" include employed persons with a foreign background, number

- Espoo +59 %
- Helsinki +37 %
- Vantaa lower starting level, +60 %

Ref. Statistics Finland
Has your company recruited or hired international talent (within the last 5 years)?

- Yes: 42%
- No: 57%
- N/A: 2%
Why haven't you recruited or temporarily hired international talent?

- The work requires native-level Finnish or Swedish language skills (56%)
- We do not need additional workforce (no recruitment needed) (34%)
- Recruiting/temporarily hiring international experts is more difficult (17%)
- Our work community does not have sufficient language skills (9%)
- Other reason (9%)
- We are unable to attract international experts with our salary level (7%)
- The permit process for international experts coming from outside Finland is too complicated (6%)
- We do not want to recruit/temporarily hire international experts (5%)
- Recruiting/temporarily hiring international experts is more expensive (4%)
- Our work community is not prepared for multiculturalism (4%)
- The permit process for international experts coming from outside Finland is too slow (4%)

Why haven't you recruited or temporarily hired international talent?
Is the skilled workforce your company needs available at the moment?

Year and Availability:
- 2020 Autumn: 0%
- 2021 Spring: 10%
- 2021 Autumn: 20%
- 2022 Spring: 30%
- 2022 Autumn: 40%
- 2023 Spring: 50%
- 2023 Autumn: 30%
- 2024 Spring: 8%

Categories:
- A lot of oversupply
- Oversupply
- Balanced shortage
- Severe shortage

Percentage Distribution:
- Balanced shortage: 52%
- Severe shortage: 30%
- Other categories: 0%, 9%, 8%
What level of education is there a shortage of experts in?

- Vocational secondary education degree: 48%
- University of applied sciences degree: 45%
- Master's degree in university of applied sciences (YAMK): 33%
- University master's degree: 32%
- University bachelor's degree: 15%
- Primary school: 8%
- General upper secondary education degree (high school): 7%
- University doctoral degree: 4%
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Helsinki Offices: Kalevankatu 12, 00100 Helsinki
Espoo Offices: A Grid, Otakaari 5 A, 3. krs, 02150 Espoo
Vantaa Offices: Leija Yrityspalvelukeskus, Elannontie 3, 01510 Vantaa
The museum as part of the airport area ecosystem

Pia Illikainen, CEO, Finnish Aviation Museum
The Finnish Aviation Museum
The Finnish Aviation Museum

- We are an aviation-themed specialized museum run by the Finnish Aviation Museum Foundation.
- Around 50,000 annual visitors
- We are a non-profit expert organization, tasked by government to coordinate the national preservation of aviation history and heritage in Finland.
- Our key target groups include families with children, as well as aviation and technology aficionados.
- In addition to our exhibitions, we offer a wide range of services, for example flight simulator experiences. We are also known as an active public event organizer.
Our **mission** is to **help understand aviation** – especially how it affects the everyday lives of people, regardless of whether they actively fly themselves or not.
“It’s about people, not about planes”
The Museum’s Superpowers
Doing together

- Voluntary work
- Connecting generations
Cultural Wellbeing

- Open to all
- Accessibility
- Encounters
Expertise

Start with the future and work yourself backwards.

1. What is most important today, to reach future goals?

2. Find the aspects of the past which relate to those goals.

Anders Houltz 2022: History Marketing
Core Values

- Respect
- Humanity
- Curiosity
The Museum as a part of the Airport Area
“The Heart and the Glue”

- A lifelong relationship with the museum
- Inspires a career in aviation
- “Our Museum” - professional identity and professional pride
Prospects & Benefits

• Living room
• Aviation hub
• Commercial cooperation
• Corporate cultural responsibility
• How does the company get the best possible benefit?
Glimpse into the Future
The New Aviation Museum
The New Aviation Museum

Location of the current Museum
• We are planning to renew the Museum into a modern event center and visitor attraction, in a newly-built building right next to our current premises.

• The New Museum is to become a key attraction of the developing Aviapolis area.

• According to the current estimate, the New Aviation Museum should open by the end of 2027.

• Our goal is to increase our annual number of visitors to at least 100,000, including both local inhabitants and international visitors from the airport.
Thank you!

Pia Illikainen
The Finnish Aviation Museum
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pia.illikainen@ilmailumuseo.fi
Final words

Turkka Kuusisto, CEO of Finnair
Tuija Telén, Helsinki-Uusimaa Regional Mayor
Closing remarks

Turkka Kuusisto
CEO, Finnair
Finnair today

- 100 years of connecting Finland to the world
- A network of almost 100 destinations in Europe, Middle East, Asia and the US
- A team of ~5 600 employees
- Listed on the Helsinki Stock Exchange
- Best airline in Northern Europe according to Skytrax, for the 13th year in a row
Aviation is collaboration
We are faced with multiple pressures
Thank you!
See you in Brussels at our 30th anniversary on the 28th of November!