INNOVATION FAIR

12 | 14 MARCH 2024

Session 7

A Digital World:

How Can Virtual Reality Unlock the Potential of Innovations in Aviation?

Paula V. de Almeida, LL.M., M.Ed.

CEO | JAA Training Organisation (JAA TO)

Session 7: A digital world: how can virtual reality unlock the potential of innovations in aviation?

1 **Setting the Scene by Moderator**
09:05 – 09:10

2 **Panelist Presentations**
09:10 – 09:50

3 **Panel Discussions**
09:50-10:15

4 **Q & A**
10:15-10:30

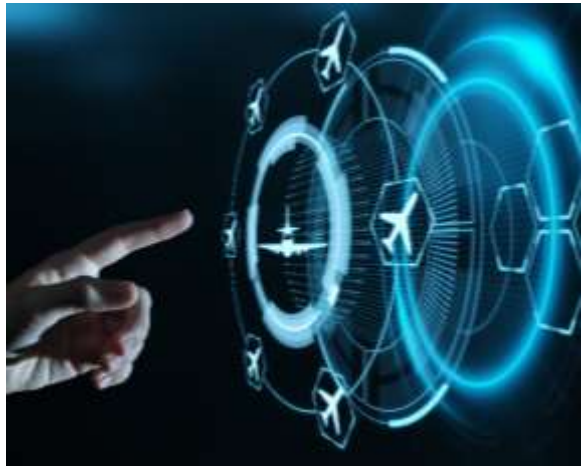
1

Setting the Scene by Moderator

ICAO INNOVATION

By mainstreaming VR and AR, are we entering a new era in aviation?

Digital Transformation through AI, AR, and VR



promises to revolutionize the aviation ecosystem

enables immersive and interactive learning environments

cultivates the next generation of aviation professionals

Enhanced operational efficiency and maintenance

Thinking with the customer

integral part of the journey itself

Collaboration and Innovation

concerted effort from various aviation stakeholders for the greater good of the industry

Technology Providers + Aviation Authorities + Educational Institutions

Panel Speakers

Christina Yan Zhang, PhD

CEO, The Metaverse Institute

Siegfried Usal

President and General Manager, Thales Digital Solutions Inc., Vice-president, Digital Innovation North America

Alexander Bellemare-Davis

Senior Manager, Data Science & Analytics, Data & Decision Intelligence, Boeing Global Services

Joseph Park

Leader, Strategy Solution Taskforce Team, Incheon International Airport Corporation

Marc Saint-Hilaire

Vice President, Special Projects and Expert Advisor to the Chief Technology and Product Officer, CAE

Christina Zhang

CEO

The Metaverse Institute


Christina Yan Zhang The Metaverse Institute
User Interface

Siegfried Usal

President and General Manager, Thales Digital Solutions Inc.

Vice-President, Digital Innovation North America

AVIONICS

Inventing a sustainable aerospace future together

THALES
Building a future we can all trust

Thales Avionics Business
Key Facts

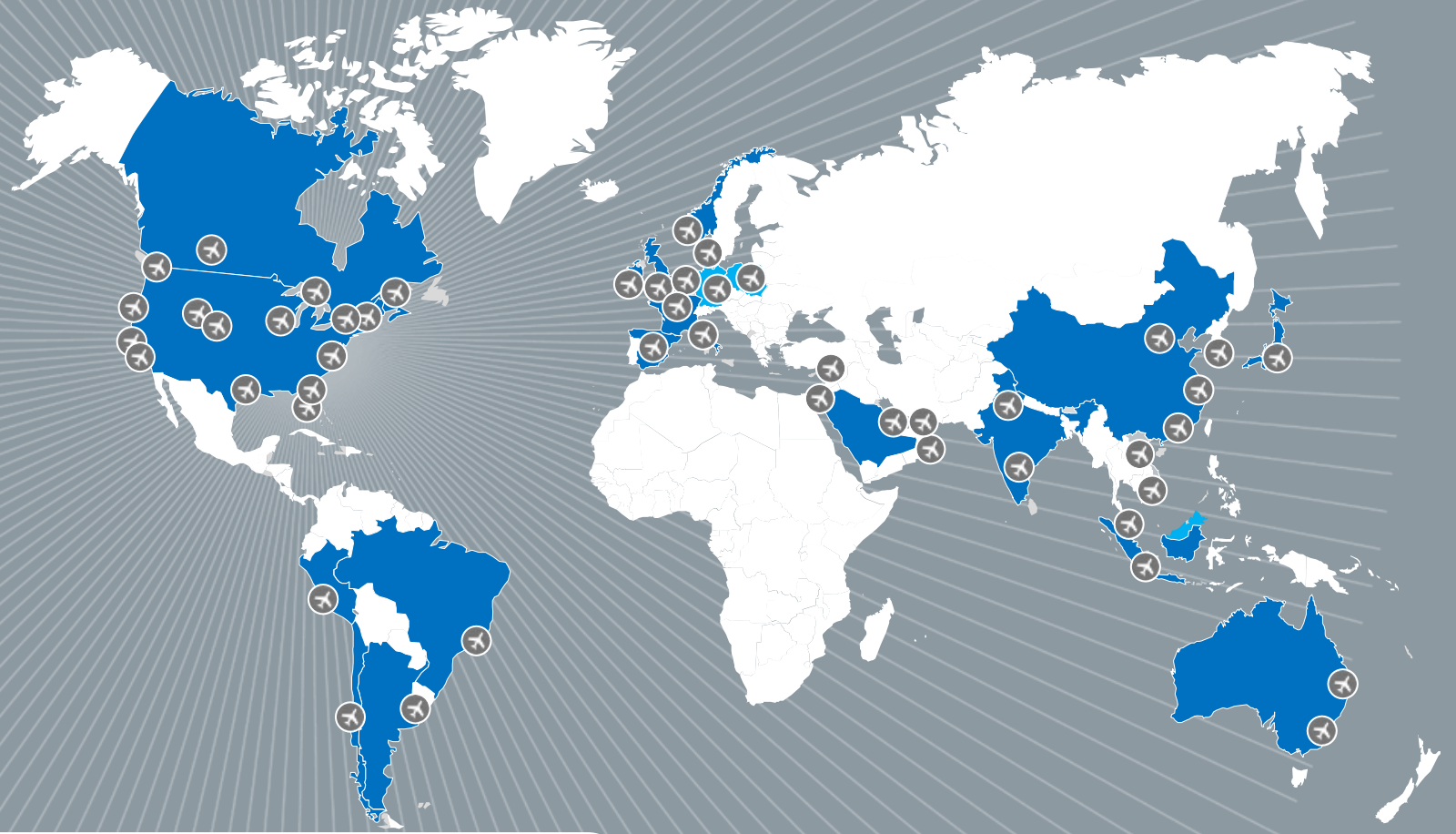
Employees
10,000

Global presence
30+

2 OUT OF 3 AIRCRAFT
in the world take off and land using Thales equipment

More than **1.6 MILLION**
passengers use Thales IFE systems every day

Over **1,000**
THALES SIMULATORS
in service worldwide



THALES
Building a future we can all trust

Serving Aerospace Markets

Worldwide leader from nose-to-tail, air-to-ground

MICROWAVE & IMAGING

#1 WW

FLIGHT AVIONICS

#3 WW

INFLYT EXPERIENCE

#2 WW

TRAINING & SIMULATION

AVIONICS SERVICES

THALES

Building a future we can all trust

From Air Transport Advanced Automation to Autonomous Air Taxi

Credits: The Fifth Element

INNOVATION

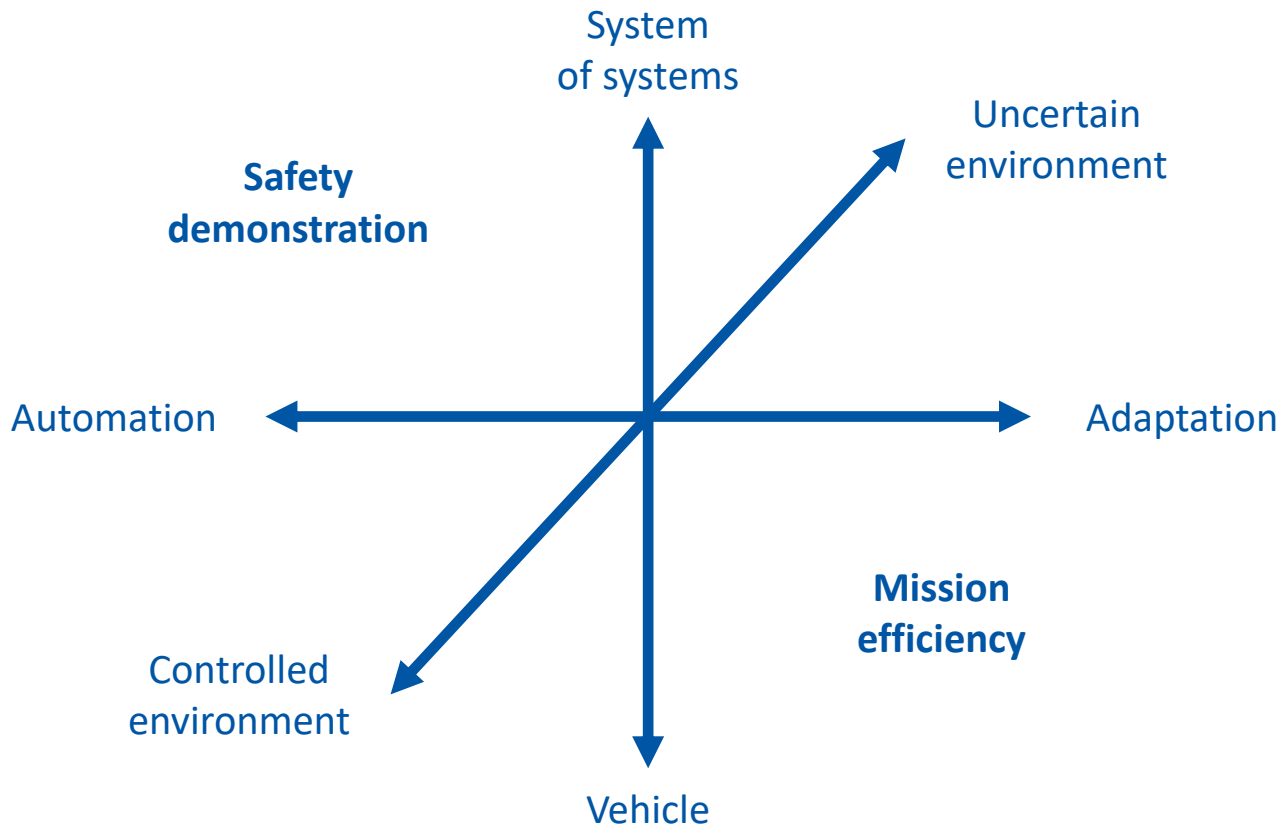
Segregated and controlled

Open and connected

Pilot as the last resort → ***Machine as the last resort***

Aeronautics to require different technologies, but key expectations remain

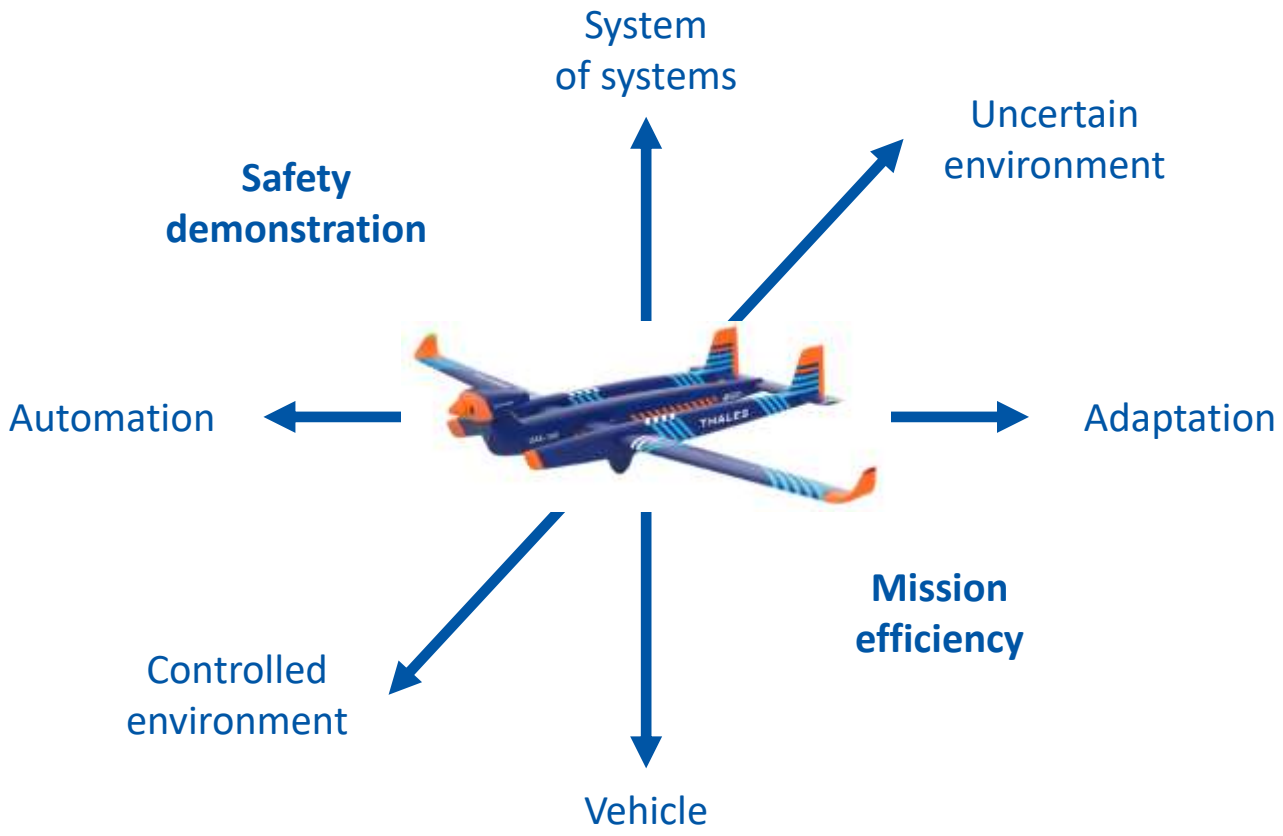
DETERMINISTIC SOLUTIONS



LEARNING MACHINES

Combine deterministic safety warranty with smart adaptation capability

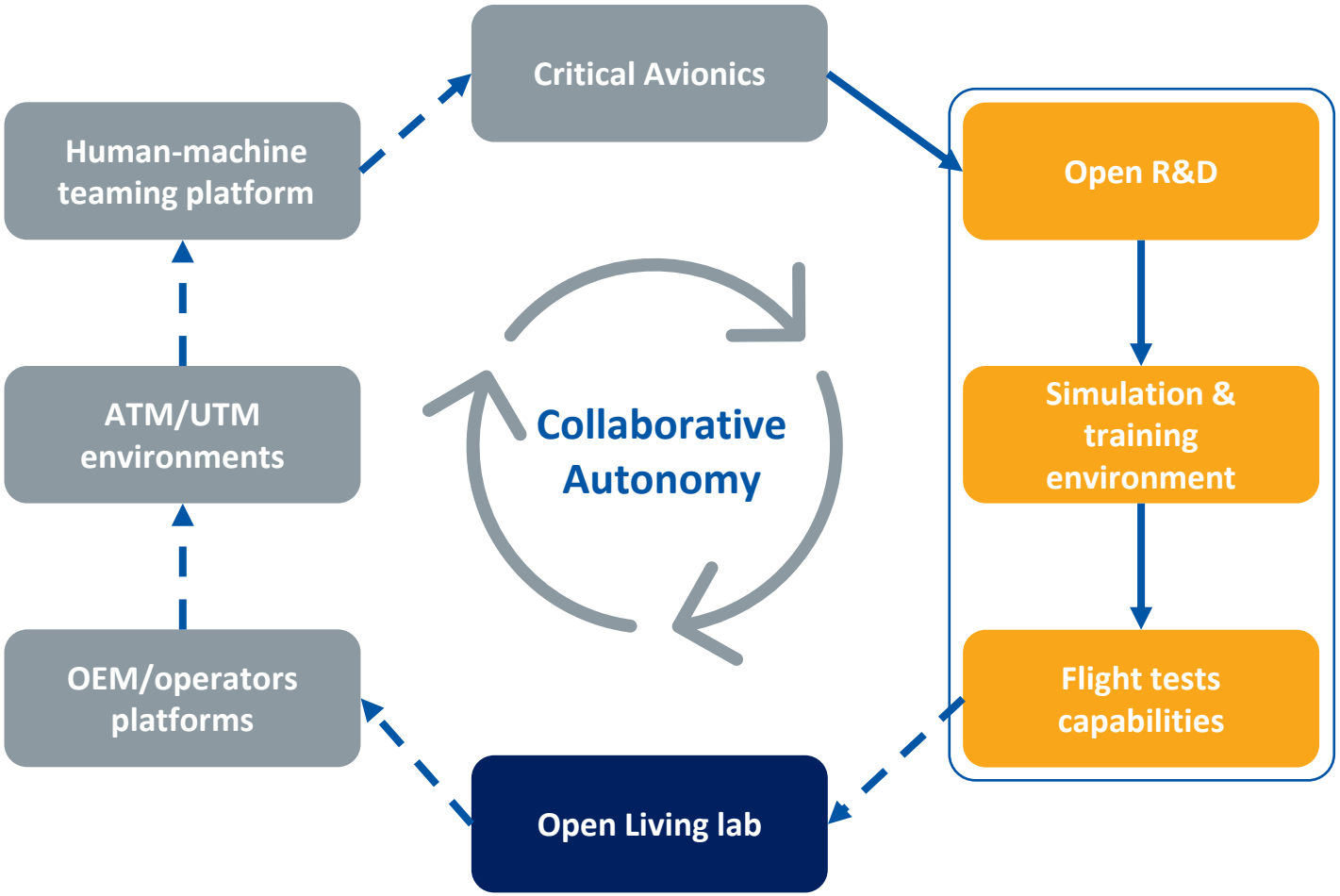
Autonomous flight in civil airspace needs to combine all dimensions:
from formal safety demonstration to mission efficiency



INNOVATION

Machine as last resort is the next frontier, drones as the perfect sandbox

A whole ecosystem to get there !



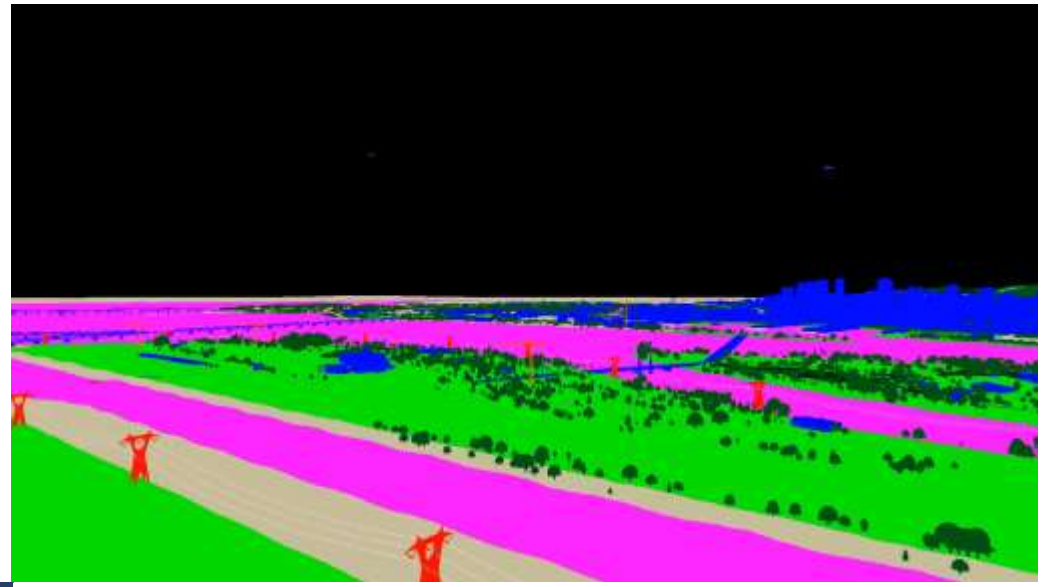
Open Living Lab leveraging a suite of digital workshops and tool

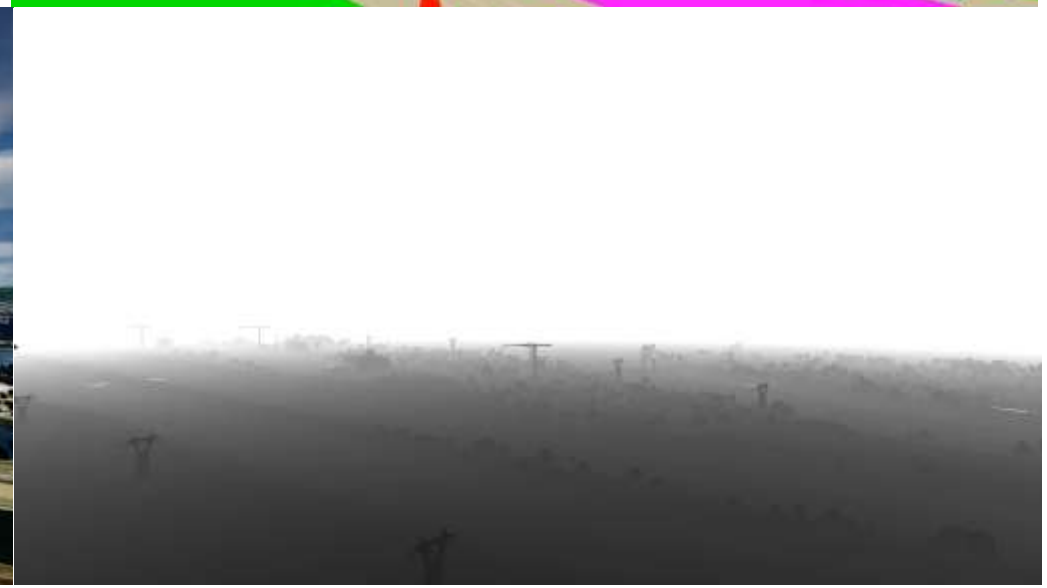
> Mixed Simulation and Reality

> High fidelity

> Operation validation

Obstacle detection: variability !!





Drones demonstrating autonomous flying

Alexander Bellemare-Davis

Sr Mgr, Data Science & Analytics

Digital Aviation Solutions

Boeing Global Services

Augmented Reality Maintenance

Tech Ops in the Future Reality

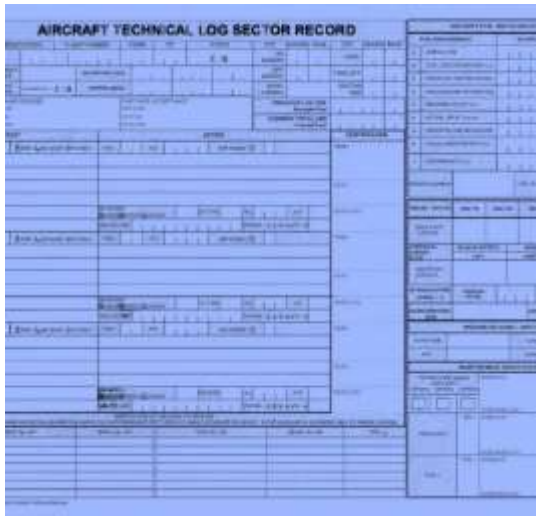
Boeing Digital Aviation Solutions

A World Connected by Flawless Flight

Flight/Mission Operations

Flight Deck Operations

Technical/Sustainment Operations

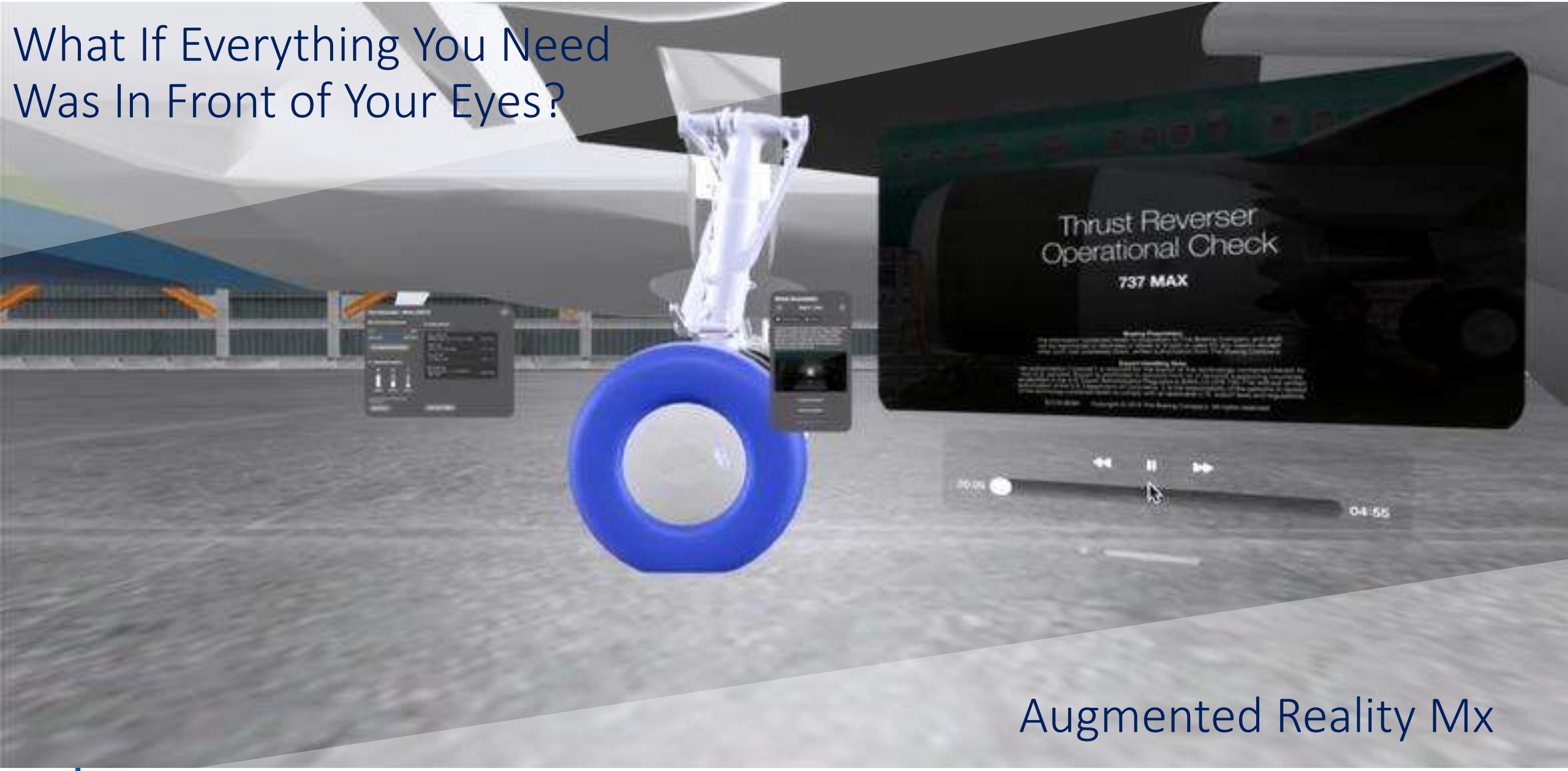


The Problem

Disconnected Mx

- Lots of reference documents and reading
- No hands-free operation
- Lengthy, supervised training periods
- Escalation/help is personnel-dependent
- Reliance on humans checking each others' work
- Separate documentation and recording systems

What If Everything You Need Was In Front of Your Eyes?



Augmented Reality Mx

What If Everything You Need Was in Front of Your Eyes?

Training, Expertise & Validation

What if you could train without special facilities?

What if your headset could **answer questions**?

What if you wore the same headset for **VR training** *and* **AR work**?

What if your headset could give you **instructional videos**?

What if it could automatically **validate/inspect** your work?

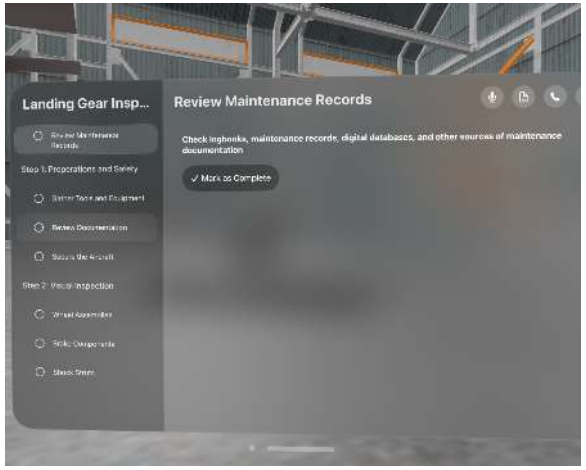
What if you could **escalate to experts** without moving from your spot?

What if experts could be **anywhere/everywhere** at once?

What If Everything You Need Was in Front of Your Eyes?

Environment, Recognition & Documentation

What if you had step-by-step access to **maintenance manuals**, fault isolation manuals?



What if you had access to **maintenance history**?

What if you produced automatic, **flawless documentation** as you went?

What if your headset could **recognize parts** that you're looking at?

What if your headset could spot **non-conformances**?

What If Everything You Need Was in Front of Your Eyes?

Part Information

Inventory
Lifetime
RUL
Faults/Alerts
MEL/SB/ACs
Catalogues

What if your **maintainer could know everything**
the reliability engineer, supply chain manager, maintenance planner would want them to know?

And More…

Large Language & Vision Models

Multi-Modal Models

Multi-Agent Models

Joseph Park

Leader, Strategy Solution Taskforce Team,
Incheon International Airport Corporation

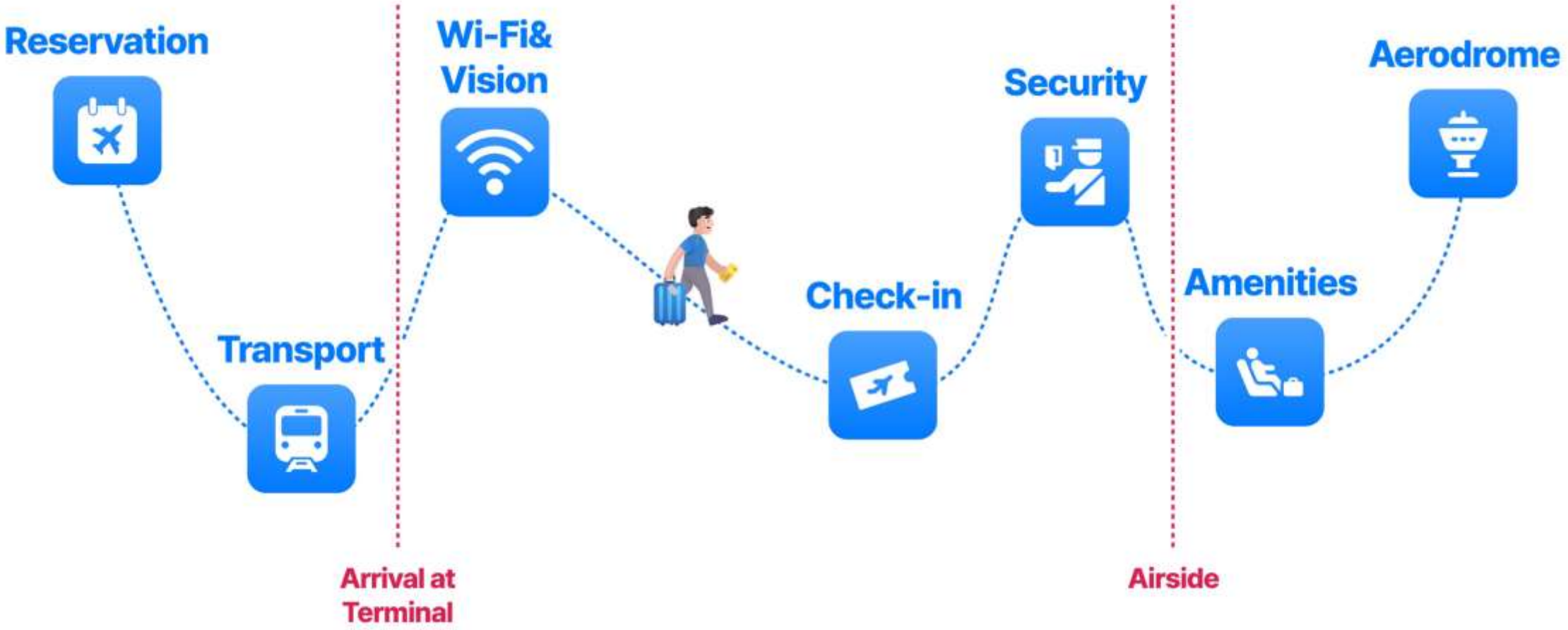
The Story within Every Single Passenger

Our Concept

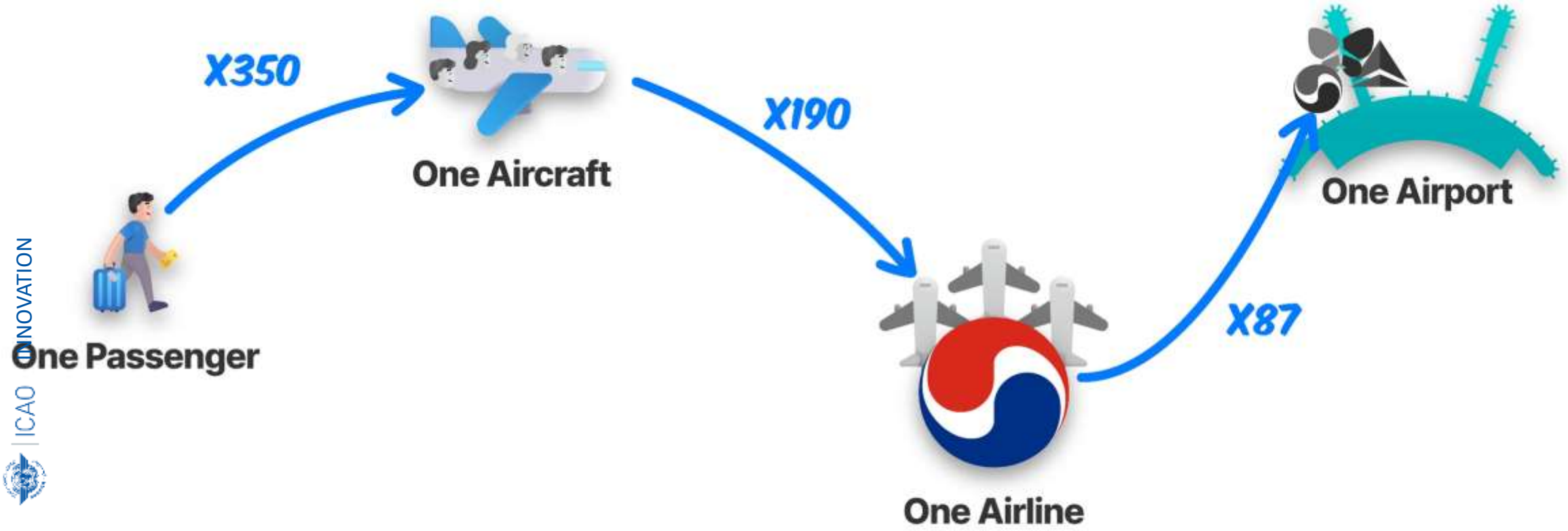
The airport is bustling with
Numerous passengers on a daily basis

Knowing each passenger means
“We understand the whole airport”

An enormous amount of data is generated at an airport every day.

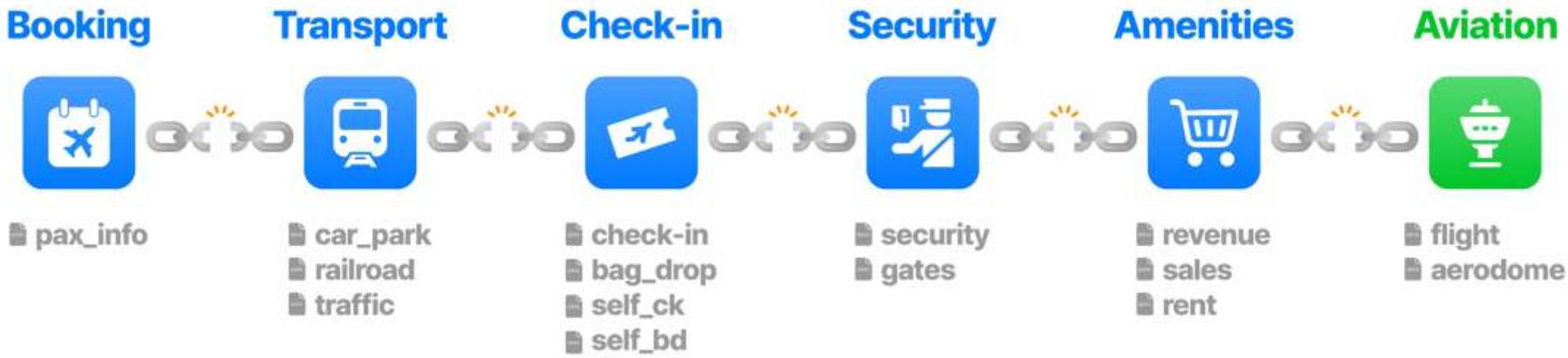


Most of the data is generated by passengers



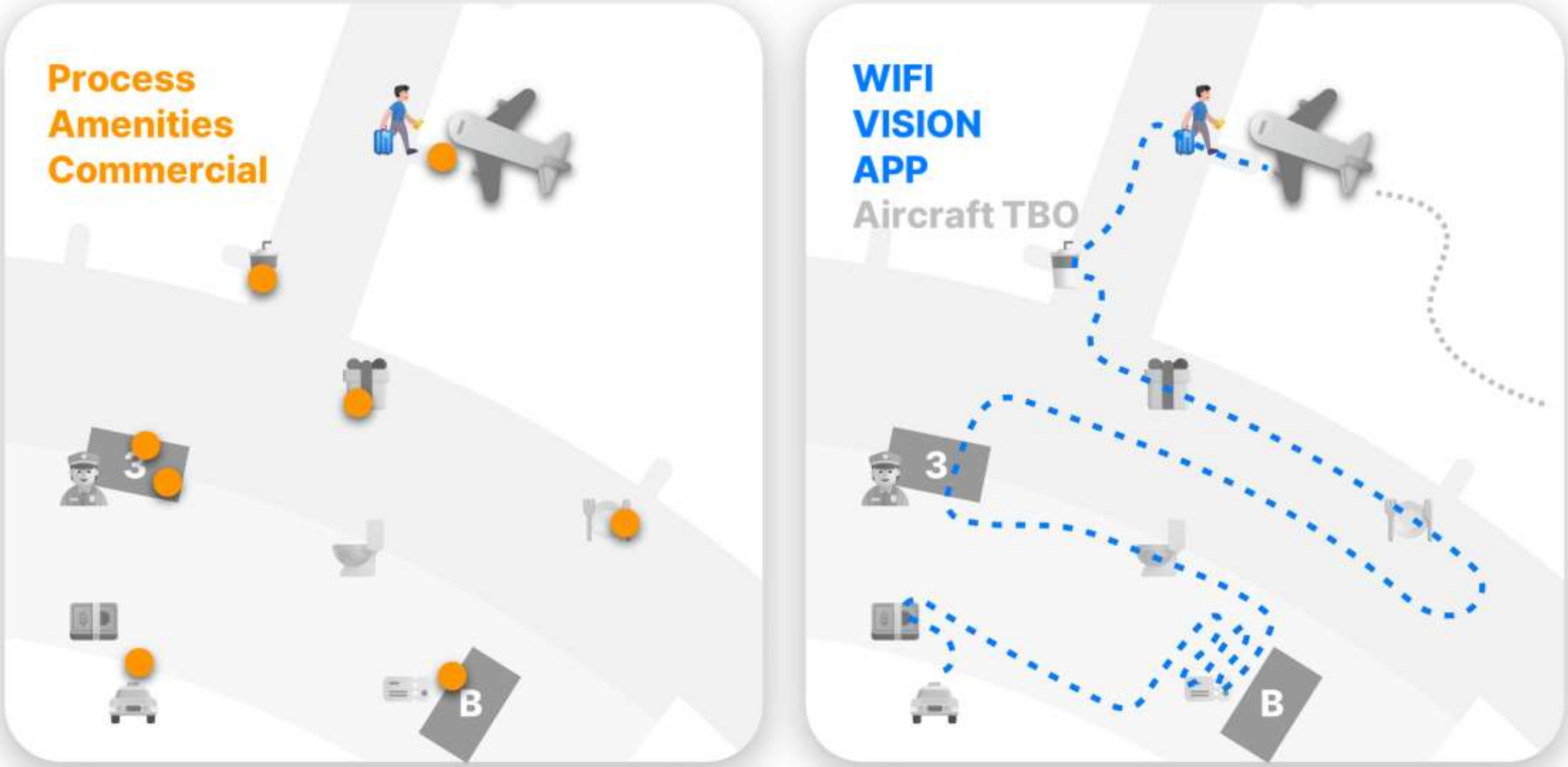
Problem

Every single data is disjointed and disconnected

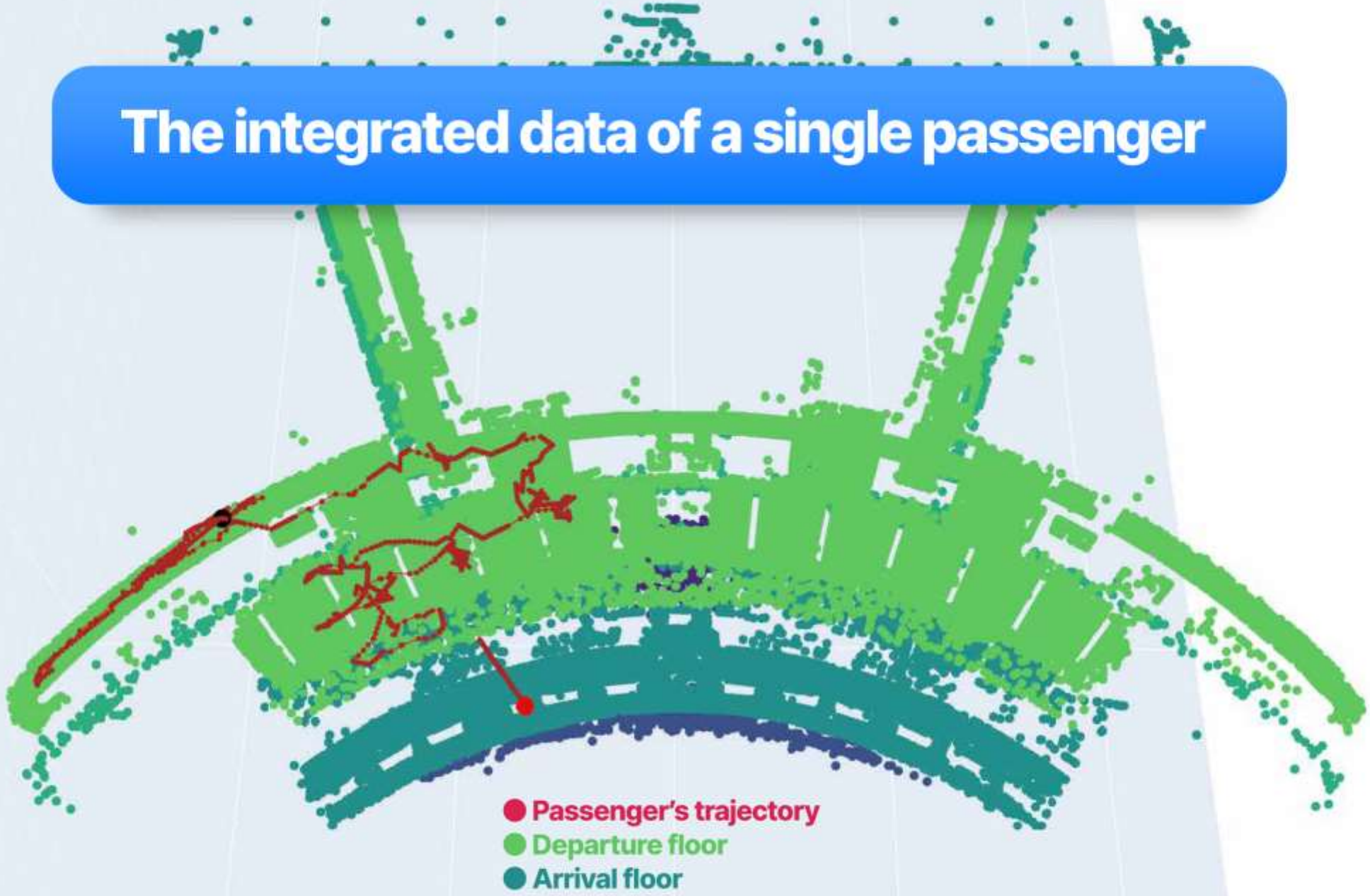


We aim to integrate all the data

Point data + Trajectory data



The integrated data of a single passenger



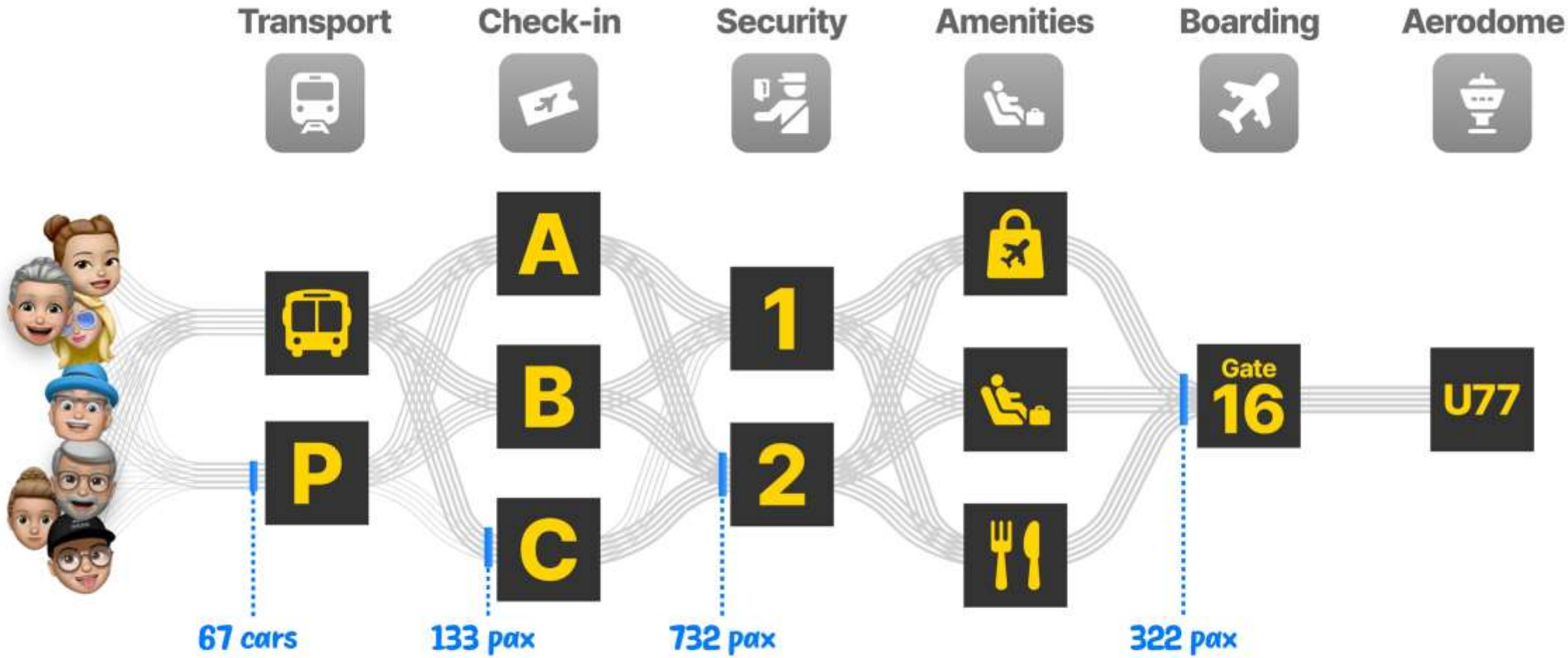
The integrated data of every passenger at specific time

The Shape of Integrated data

	Sex	Age	Flight	Check-in	...	Boarding	Trajectory
	M	38	KE722	17:38	...	19:27	D029182
	F	22	DL318	18:11	...	19:52	D092381
	M	51	EK182	18:22	...	20:58	D189241

Cannot distinguish the exact individual through the anonymization process.

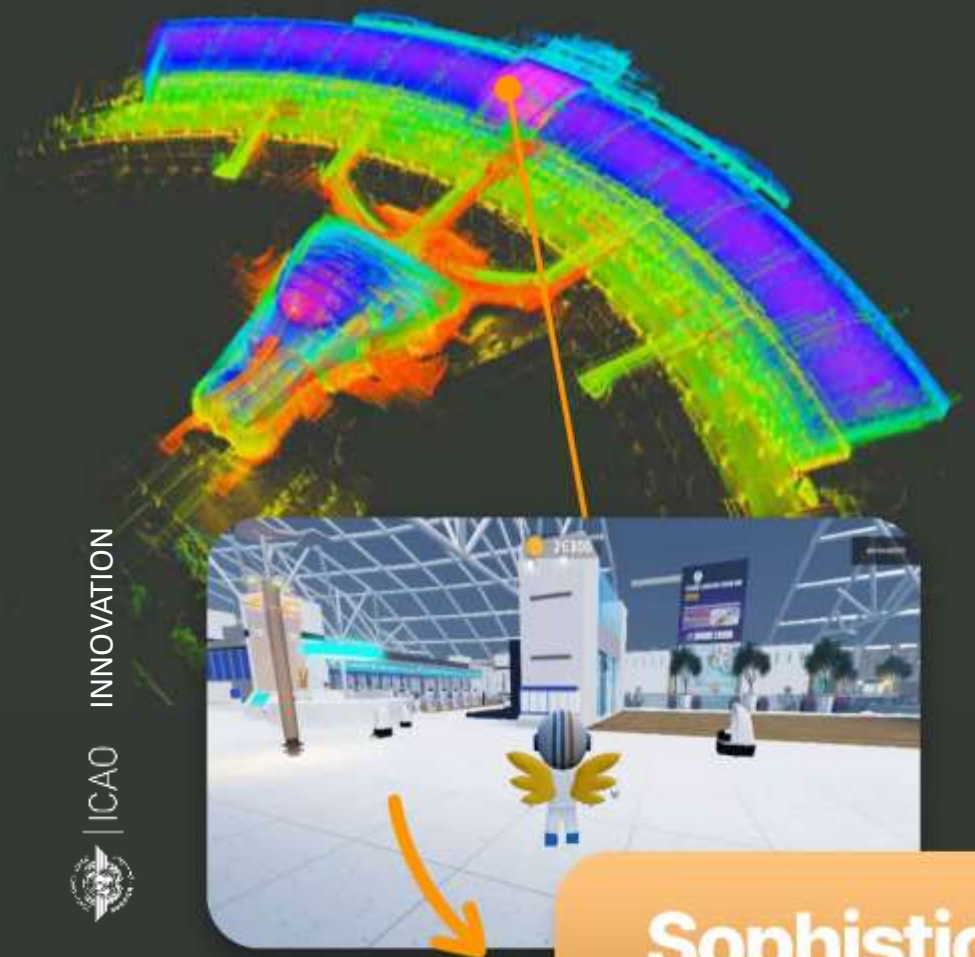
Integrated data includes all passenger information in one place



Integrated data makes it easier to understand the entire facility

Metaverse Airport Model 2023-

3D spacial information

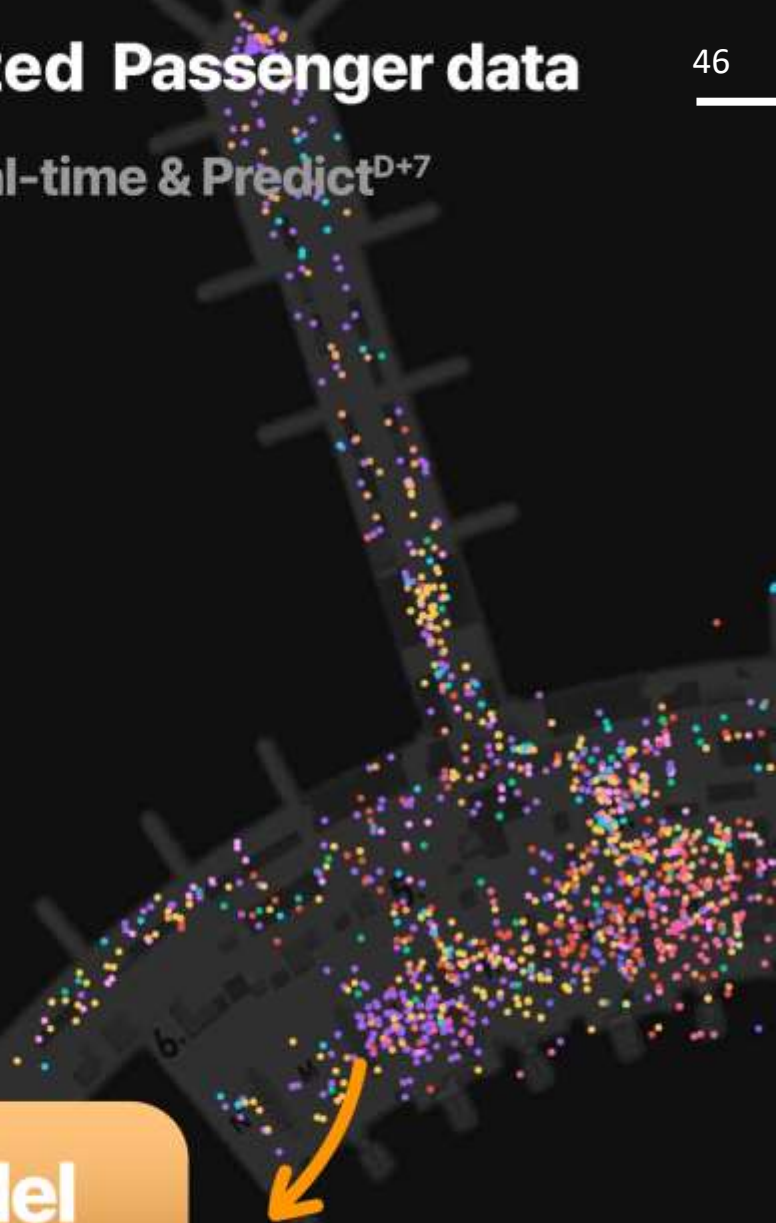


+

Unifying

Integrated Passenger data

Real-time & Predict D+7



Sophisticated digital twin model

Unifying metaverse and passenger data

Operations

Real-time & predictive utility management

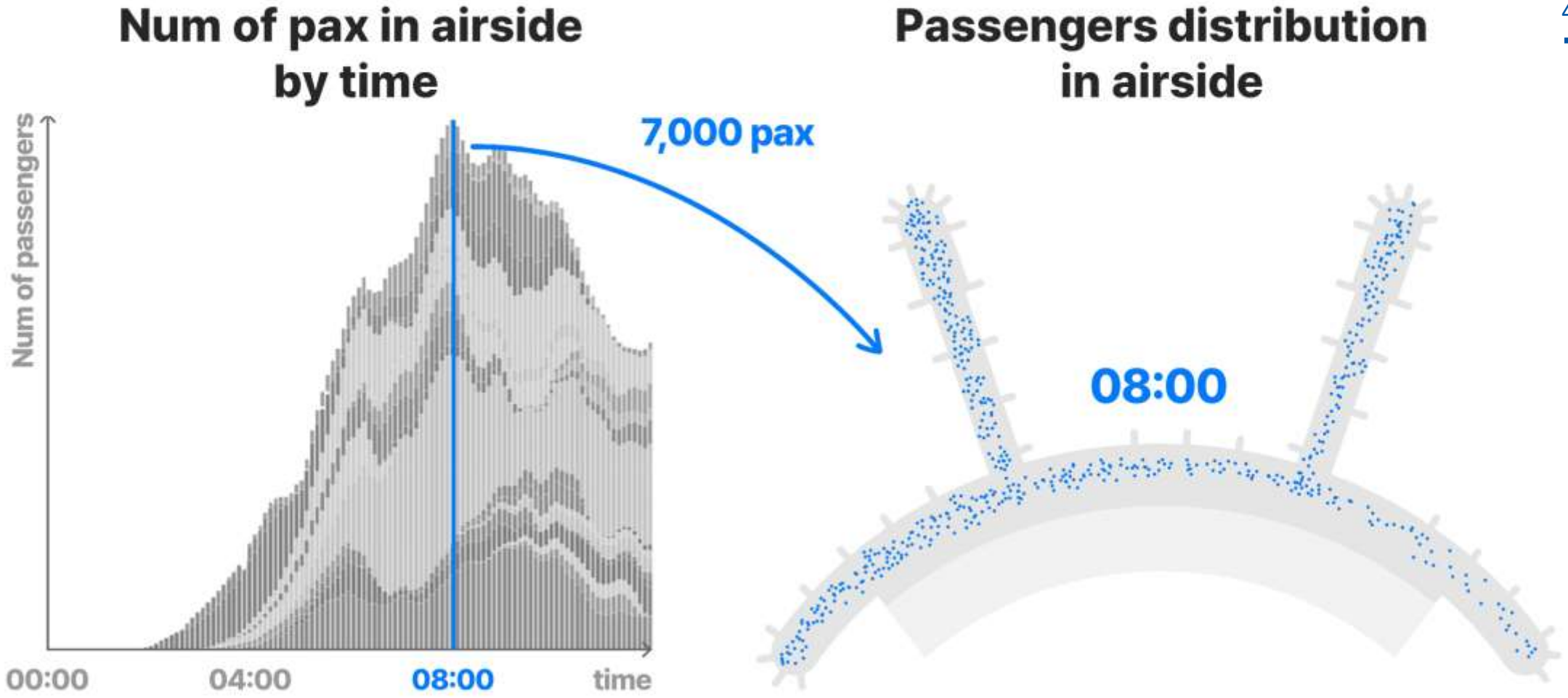
Pax Experience

Optimized wayfinding and navigation

Possible Applications

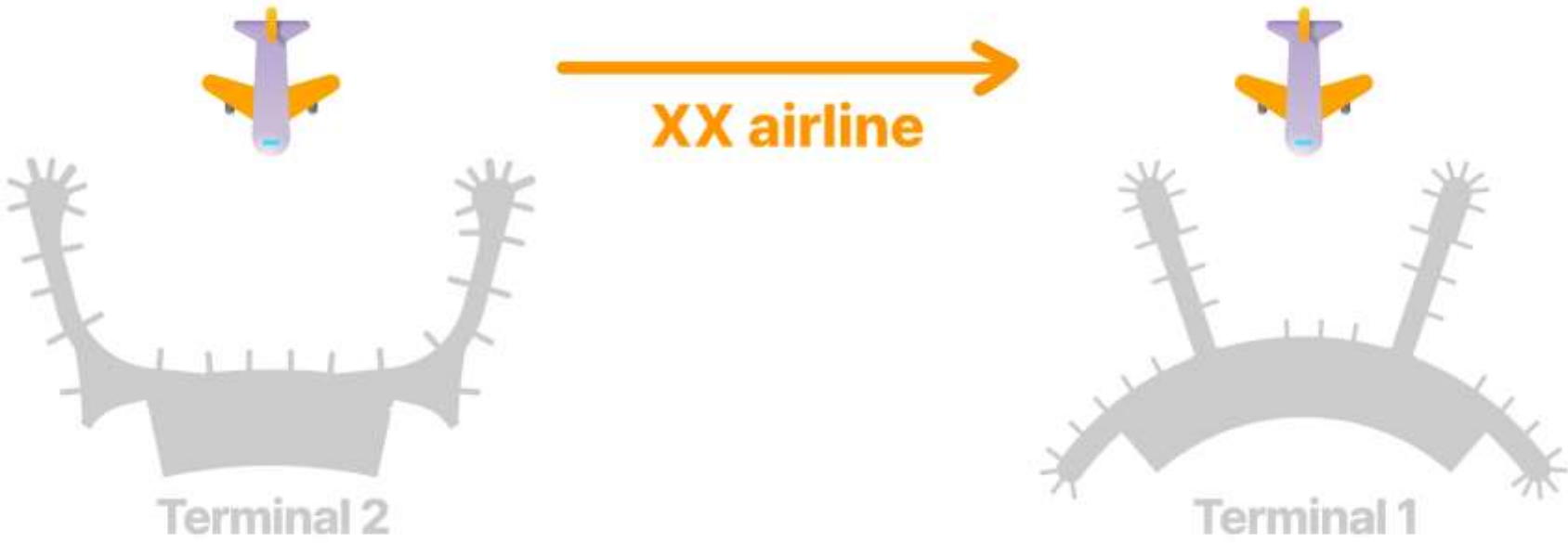
1 Enhance amenities Planning

2 Optimize with Monitoring

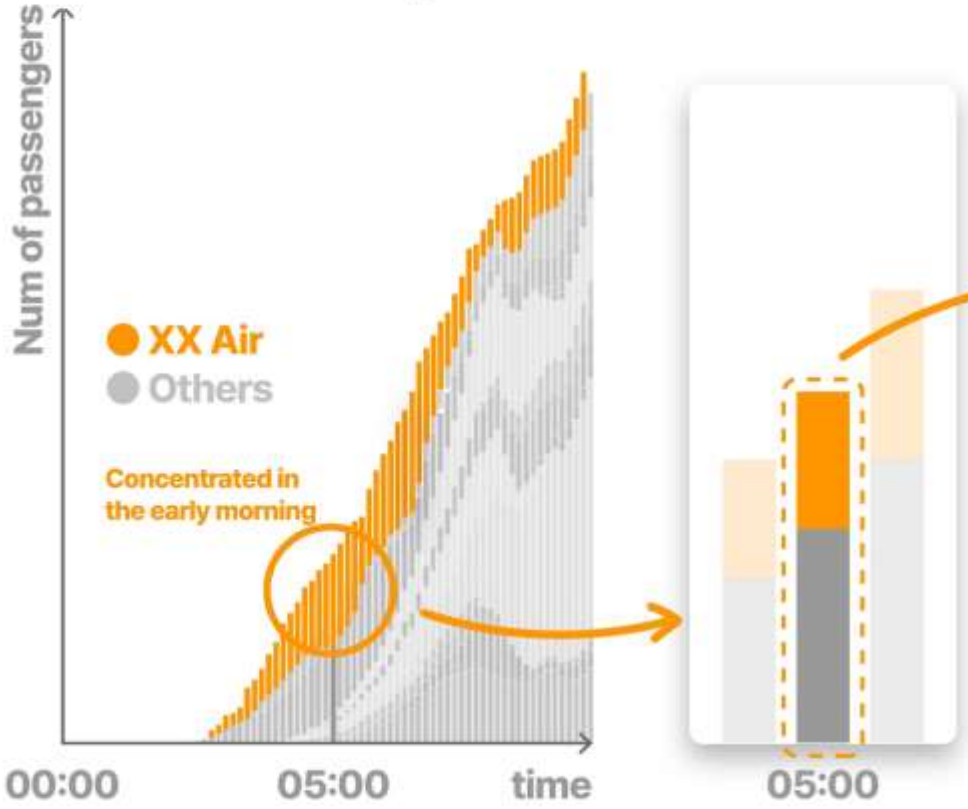


Passenger distribution over time and space

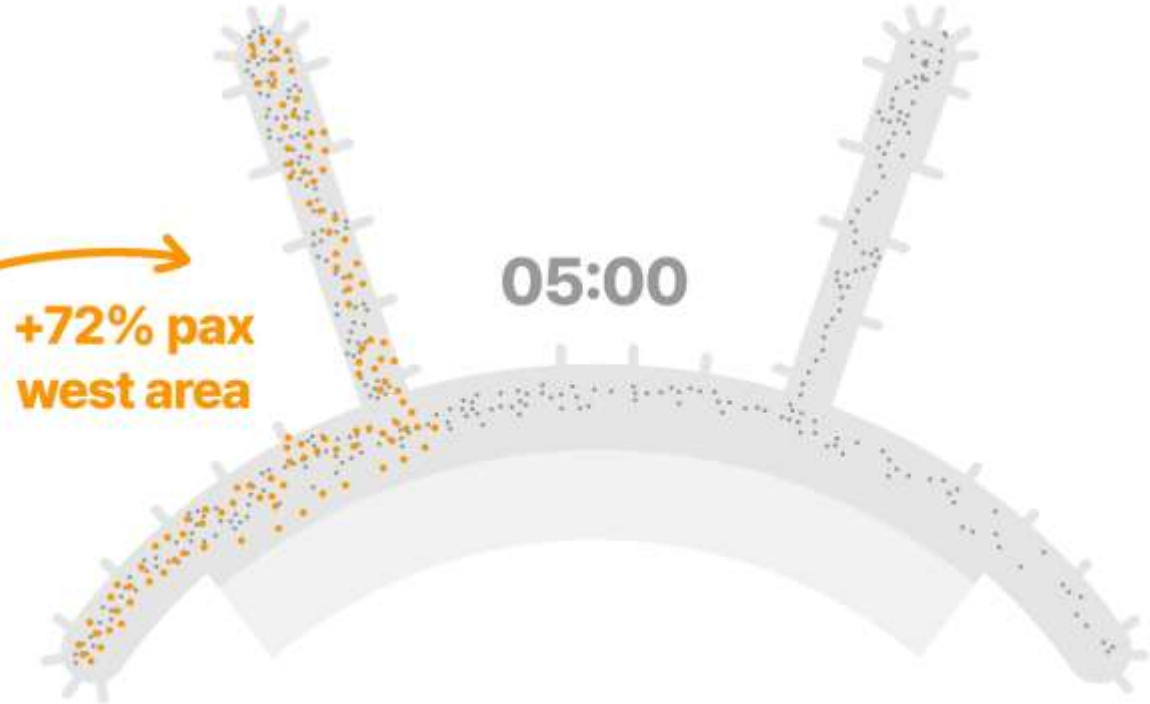
If an airline switches terminals, what impact does it have on amenities?



Num of pax in airside by time



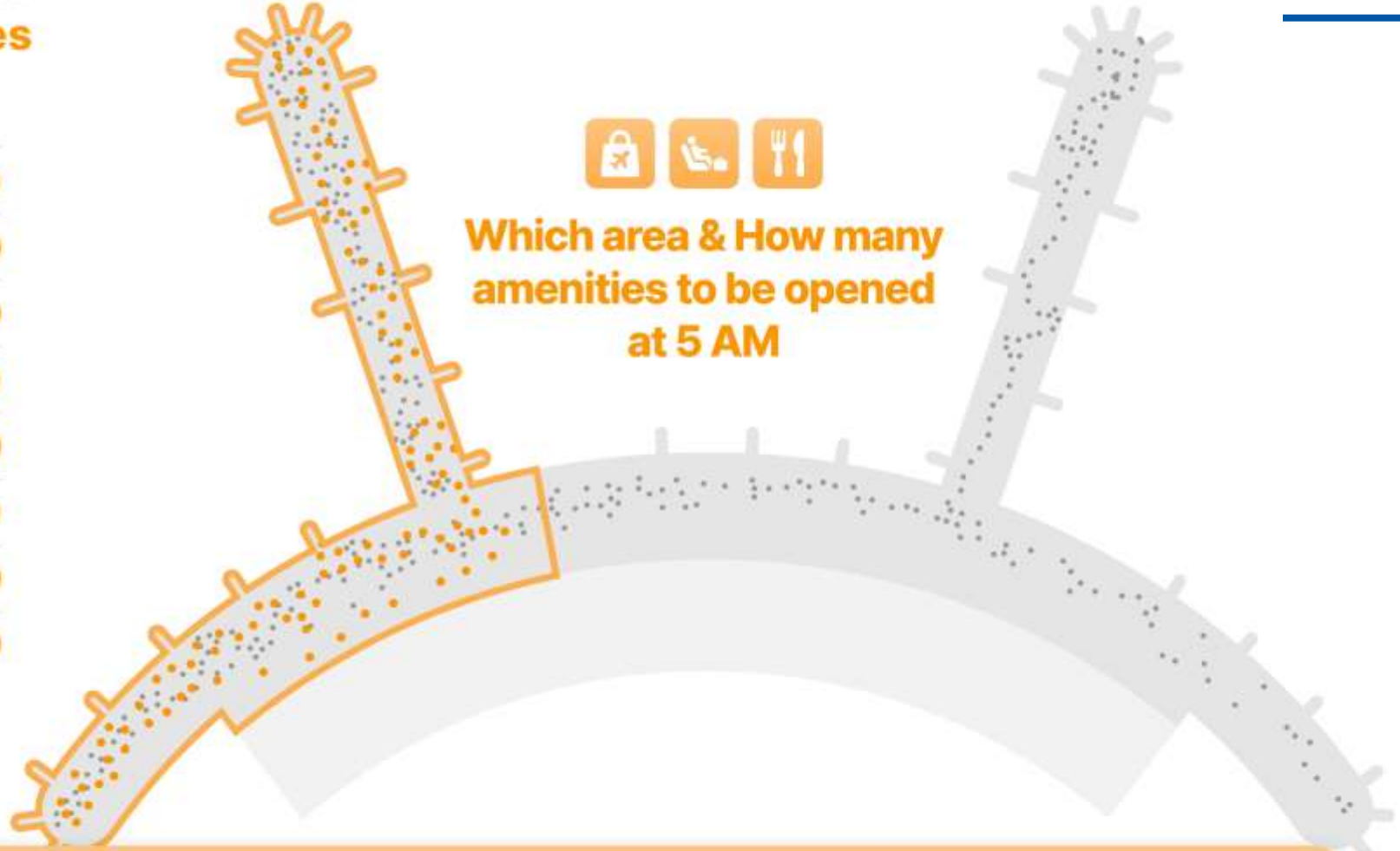
Passengers distribution in airside



Predict the impact of an airline relocation instantly

We can negotiate & plan the
Opening Hours of amenities

Amenities	Before	After
Dutyfree A	06:30	05:30
Dutyfree B	06:00	05:00
Lounge C	07:00	05:00
Cafe D	06:30	05:30
Restaurant E	07:00	05:00
Foodcourt F	07:30	05:30
Exchange	06:00	05:00
Shower	06:00	05:00



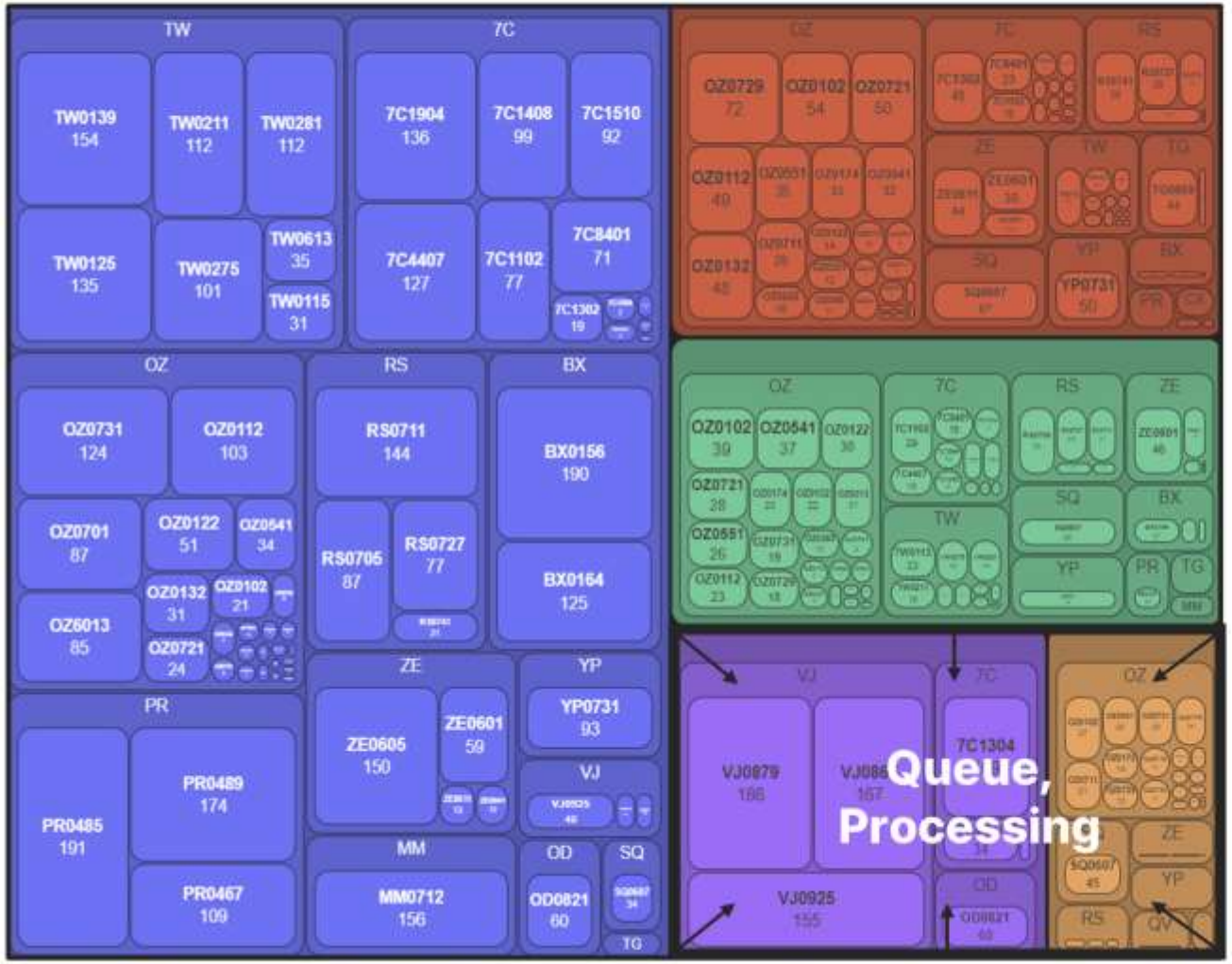
Operate amenities efficiently at the appropriate time & location

Possible Applications

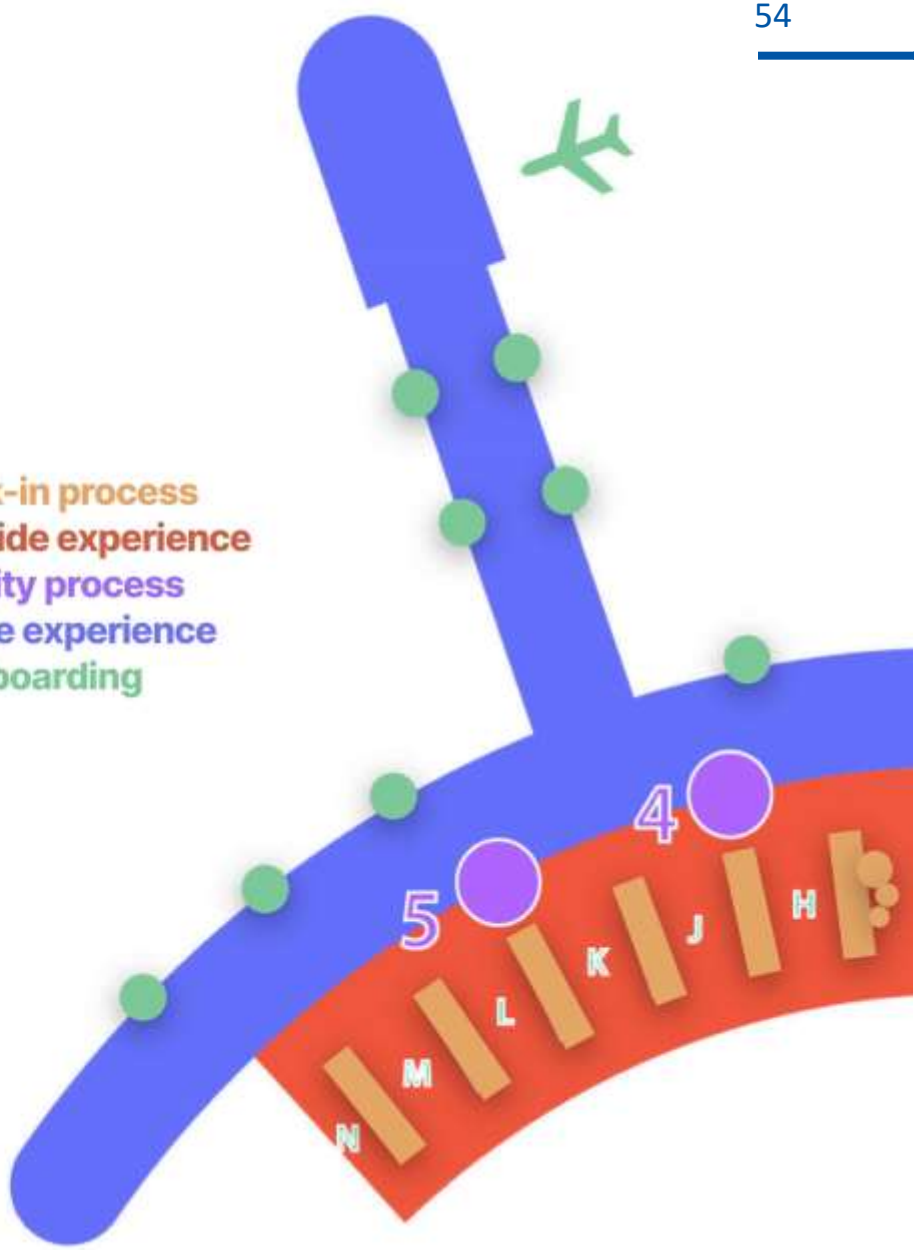
1 Enhance amenities Planning

2 Optimize with Monitoring

Passenger counts by location at specific times

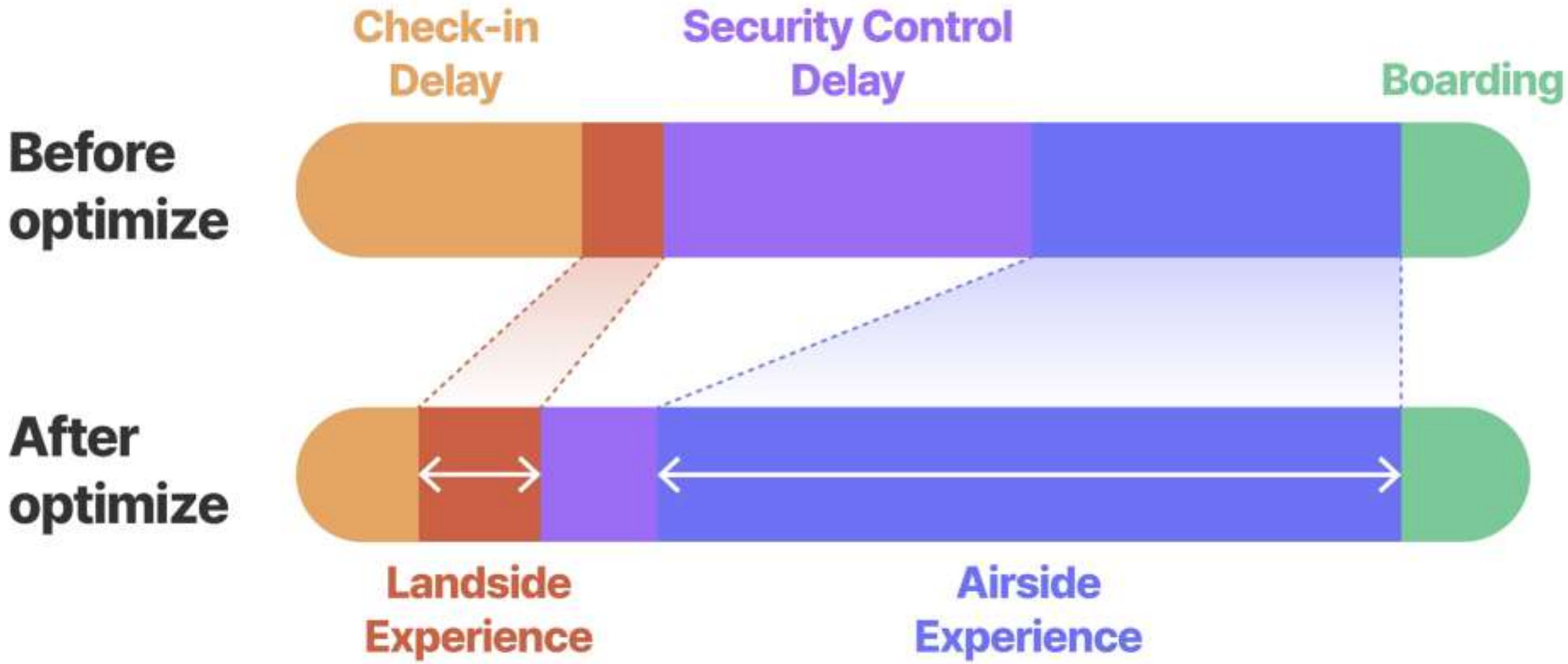


- Check-in process
- Landside experience
- Security process
- Airside experience
- After boarding



ICAO INNOVATION

Reducing delays for passengers means...



Not only enhancing passenger experience but also increasing operational efficiency and revenue

However, there are some limitations

Is it really possible to apply this to our airport?

Chasm

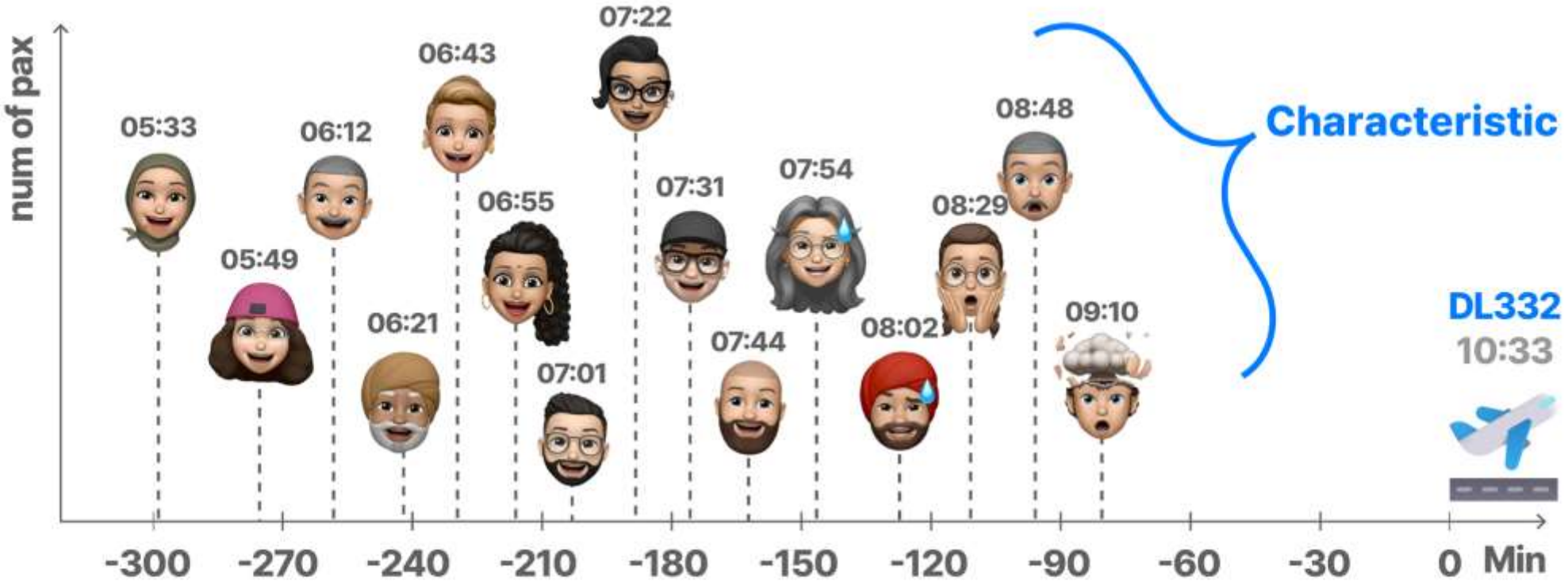
- We don't have **Data infra**
- We don't know **how to utilize it**

Digital twin for airports

The way to overcome  the lack of data infrastructure

We can Generate data through probabilistic methods

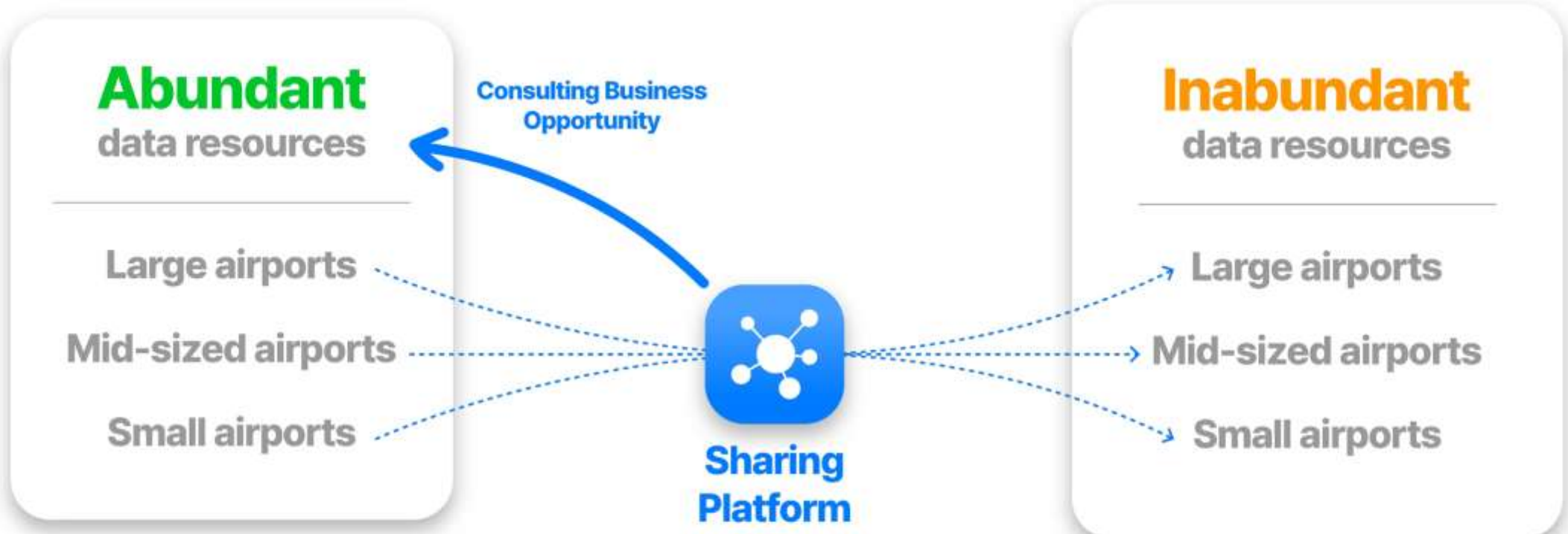
The characteristics of passengers can be similar across airport sizes and by region



However, we require characteristic data from similar airports to proceed

Suggestion

Global airport passenger Characteristic sharing platform



Narrow the data gap between each airport

Marc St-Hilaire

Vice President, Special Projects and Expert Advisor to the Chief Technology and Product Officer

CAE

Special Thanks

CAE is a high-tech company with a mission and vision focused on safety, efficiency and readiness

Our mission

To lead at the frontier of digital immersion with software-based training and critical operational support solutions to make the world a safer place

Our vision

To be the worldwide partner of choice in civil aviation and defence and security, by revolutionizing our customer’s training and critical operations with software-based and digitally immersive solutions to elevate safety, efficiency and readiness

World leader in training, mission, and operational support solutions

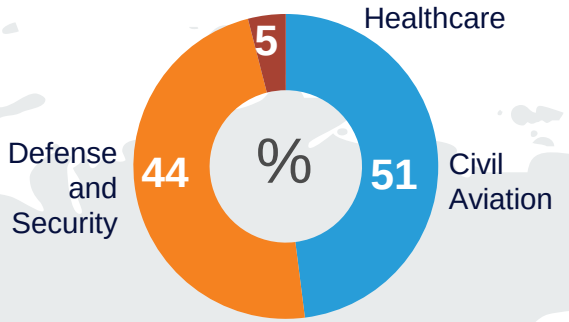
$4.2B
FY23 Revenue

40+
countries

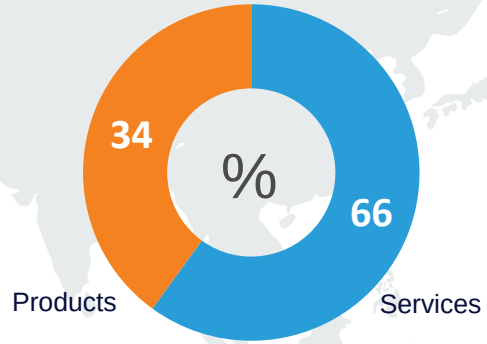
250+
locations

13,000+
employees

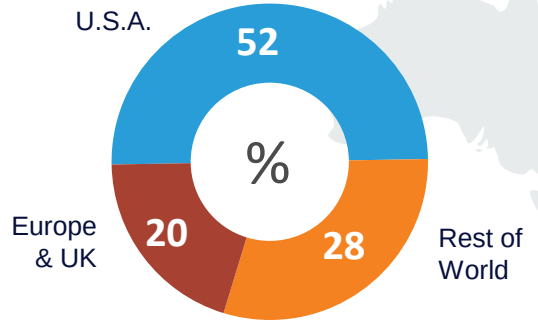
Total Revenue



Products/Services Mix*



Geographic Mix



For the year ended, March 31, 2023.
* Approximate value including JV sales

Virtual Reality

The headset

The hardware

The media

The experience

The content

The virtual world

The use case

Virtual Reality, the visual media technology

AUGMENTED REALITY

Google Glass

Microsoft HoloLens

Microsoft HoloLens 2

2013 — **2016** — **2019** — **2021** — **2024**

VIRTUAL REALITY

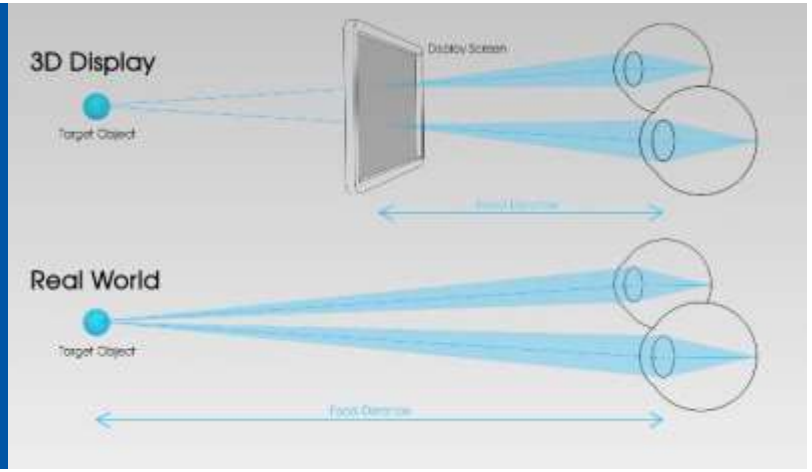
Oculus DevKit

optical performance threshold reached in 2019

5th generation devices in 2024

Challenges and choices

Optics
Vergence & Accommodation



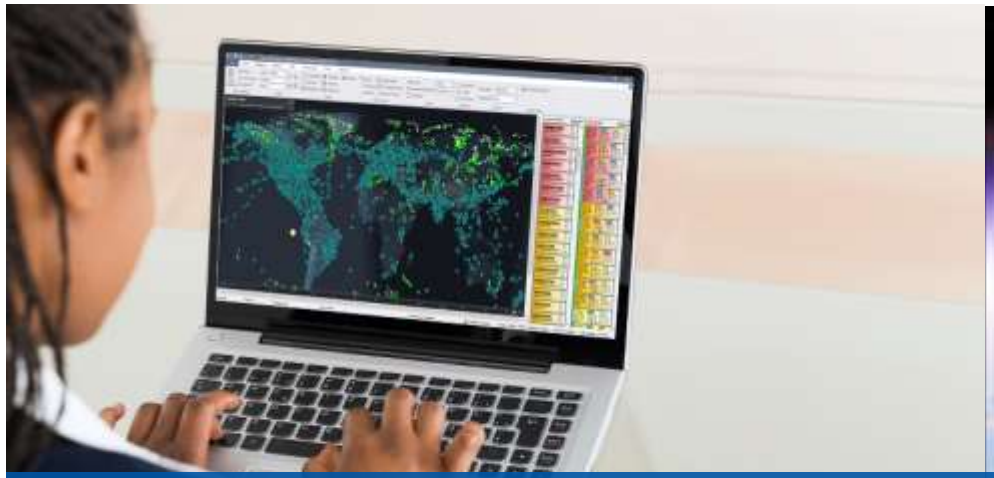
Hand Tracking & Latency

Resolution & Field of view

Physical interface

Virtual reality

What is on the other side of the media



Future challenges in aviation

Thank You

ICAO | INNOVATION

ICAO INNOVATION