Leading the way

"

The main question revolves around how we can achieve growth in a responsible and therefore sustainable way.

The Future of Aviation,

International Civil Aviation Organization

https://www.icao.int/Meetings/FutureOfAviation/Pages/default.aspx

AVIATIONS'S CHALLENGES

Demand exceeds capacity at an increasing number of airports: from 160 in 2012 to 195 in 2022.
Travel Weekly and IATA

Lack of expansion possibilities at congested airports requires new operating concepts.
Travelweekly

The shortage in air traffic controllers leads to increasing delays and cancellations (€ 800 million in Europe, 2022).
Cntraveler.com and eurocontrol

56 percent would switch airline for "more environmentally friendly options."
Travelpulse and McKinsey

12% of the world's airports experience staffing shortages.
Werk&Ik and Nezasa

Aircraft noise is the cause of adverse community reaction to airports.
Internation Civil Aviation Organization

Aviation is one of the fastest growing sources of greenhouse gas emissions (currently 3 percent).
Saur Energy International

As new airplane engines operate suboptimal on the ground, the impact of emissions needs to minimized in ground operations.
IATA

Balancing the need for growth and sustainability, there is a requirement for a future-proof operational concept for handling air traffic.
Onderzoeksraad.nl

GROUND OPERATIONS AT THE BASIS OF AVIATION
WHAT GOES UP, MUST COME DOWN

USHERING IN A NEW ERA
EFFICIENT AND PLANNABLE GROUND OPERATIONS

CENTRAL AUTOMATIC ROUTING OF GROUND MOVEMENTS

SUPERVISORY SYSTEM: USHER
Centralized routing optimizes airport efficiency as well as fluency of aircraft movements.

STANDARD AIRPORT PROCEDURE

FOLLOW-ME
The follow-me procedure is an existing procedure today, used when needed (or desired).
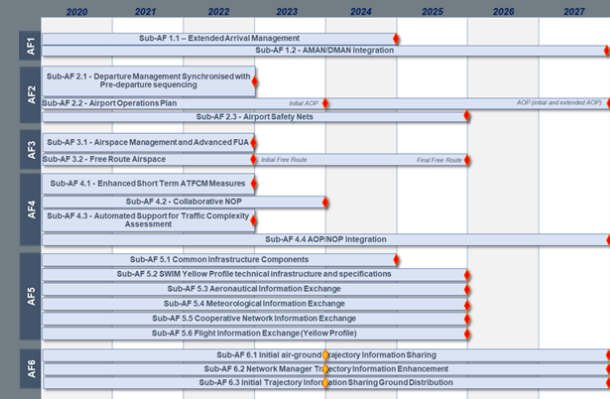
AUTONOMOUS VEHICLES FOR GUIDANCE

AUTONOMOUS VEHICLES
For automatic guidance of aircraft, dedicated vehicles ensure safety and monitor progress.
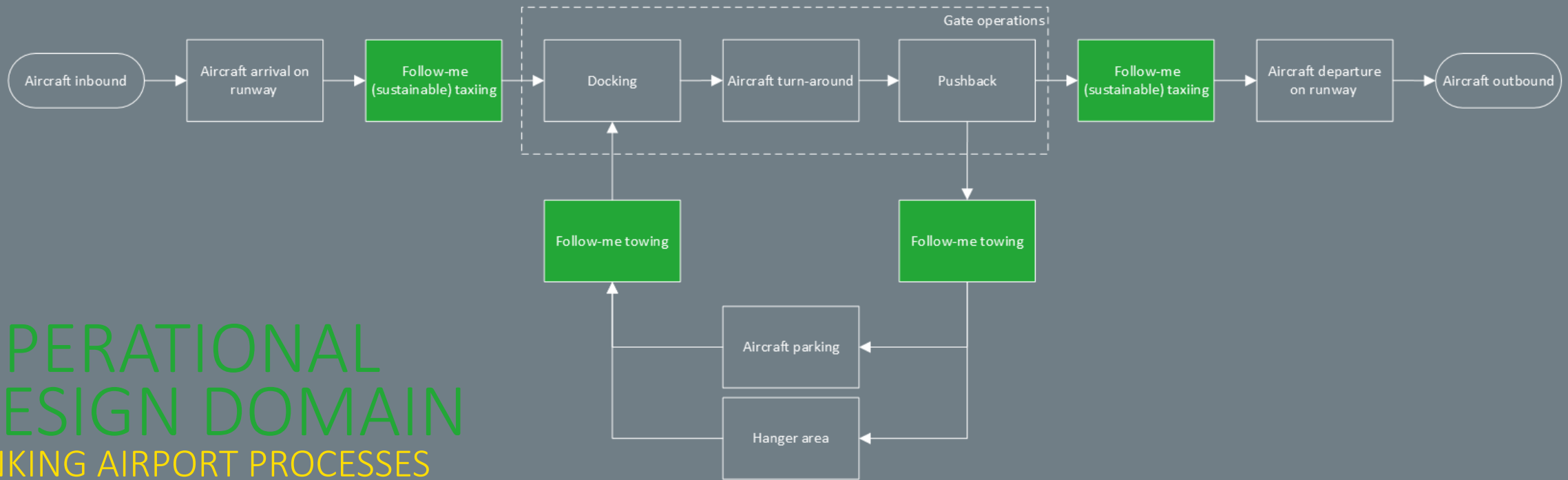
INTRODUCTION GROUND REGULATIONS CP1, BY 2030

IMPLEMENTATION A-SMGCS
An Advanced Surface Movement and Guidance Control System will be a requirement.

Usher AI provides fluent, deadlock-free routing for all ground movements to optimize sustainability, capacity and safety.

OPERATIONAL
DESIGN DOMAIN
LINKING AIRPORT PROCESSES

INBOUND CONOPS
HIGH LEVEL OVERVIEW PROCESSES

Legend:
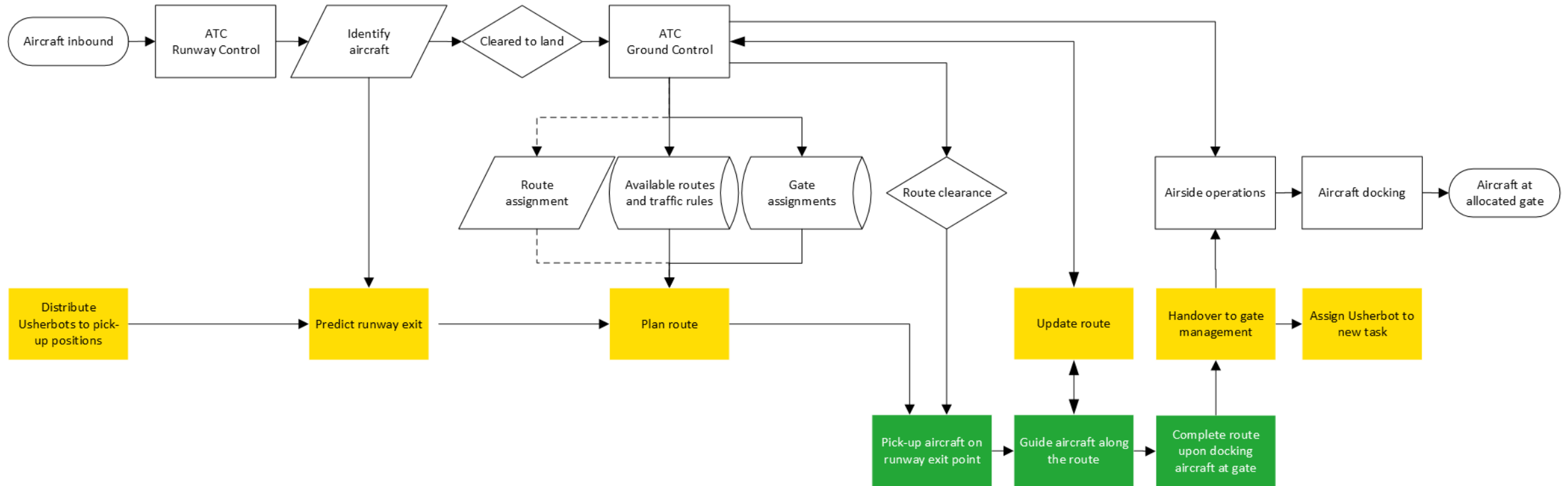
☐ Airport processes	🟨 Usher AI application	🟩 Usherbots
⬭ Start/end process	◇ Decision	▱ Data ⬓ Database ☐ Process
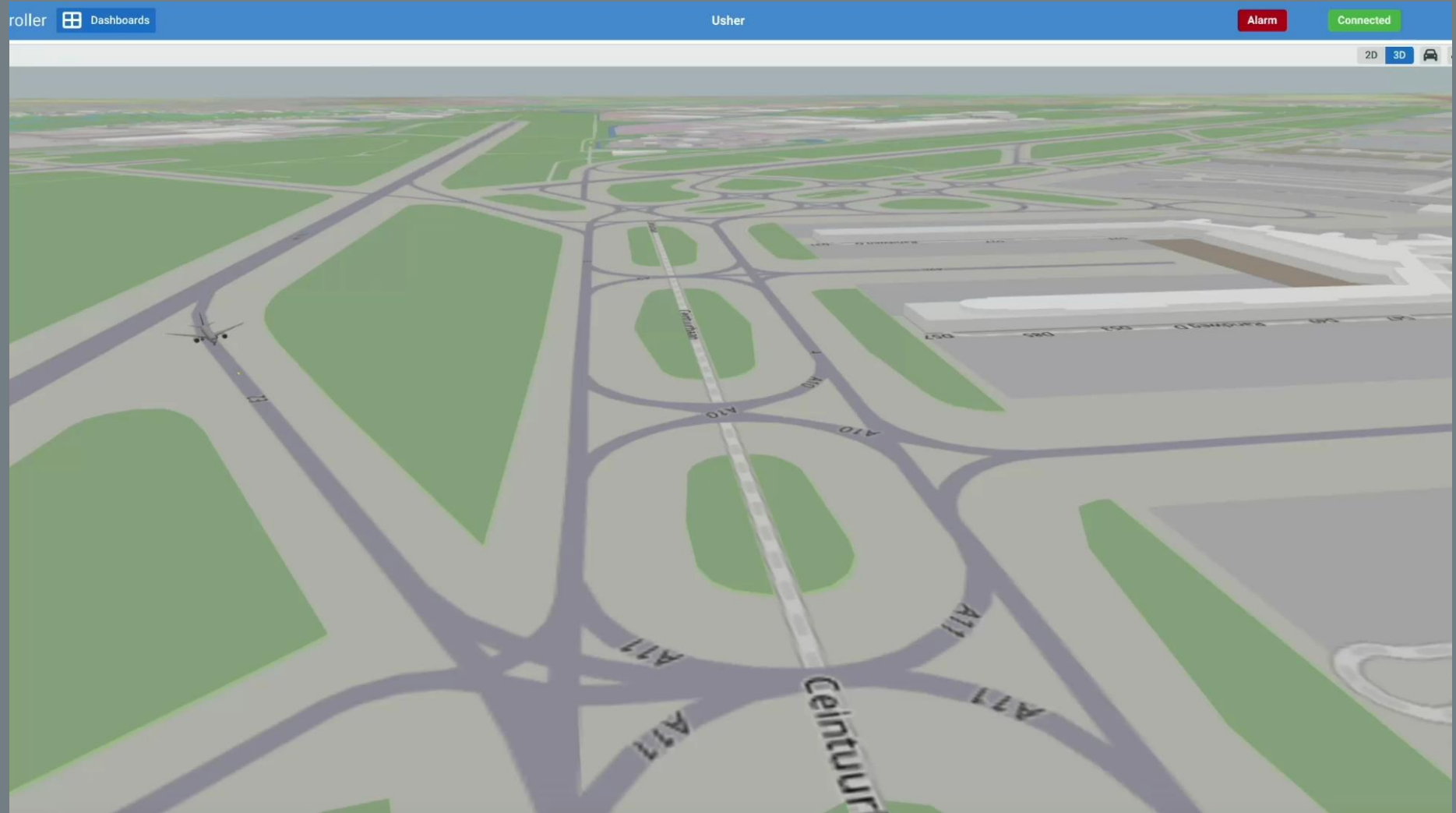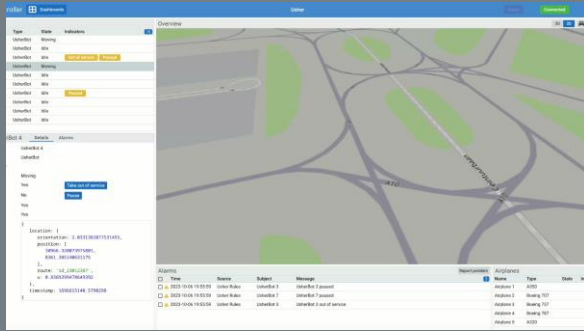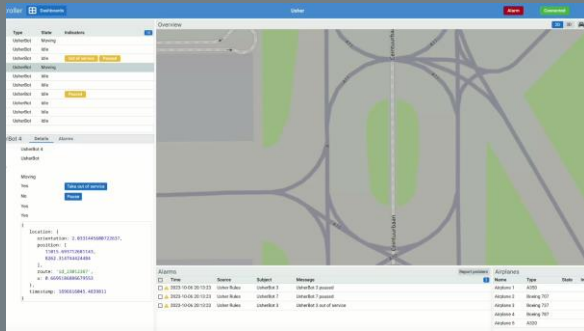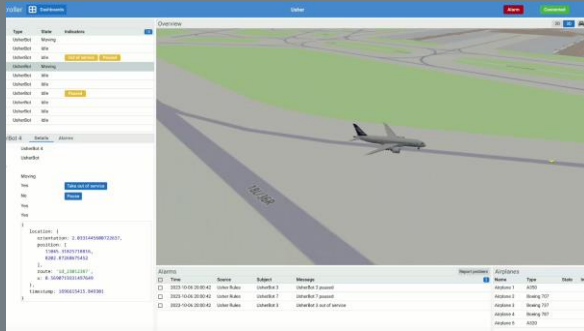
USHER ROUTING AND GUIDANCE

OUTBOUND CONOPS
HIGH LEVEL OVERVIEW PROCESSES

Legend:
- ☐ Airport processes
- 🟨 Usher AI application
- 🟩 Usherbots
- ⬭ Start/end process
- ◇ Decision
- ▱ Data
- ⎔ Database
- ☐ Process

SYSTEM TECHNOLOGY
ROUTING, GUIDANCE AND INFRASTRUCTURE
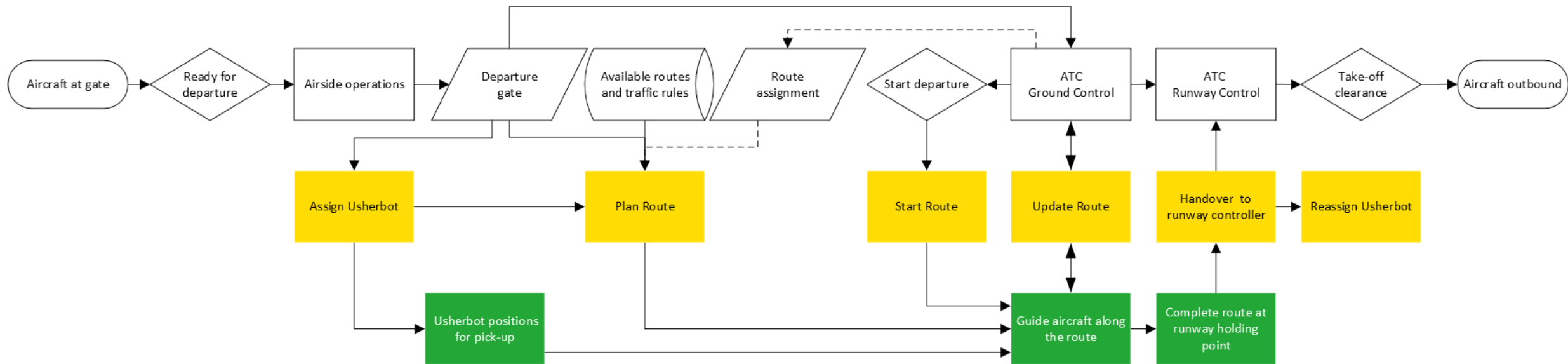
SYSTEM DELIVERY
Usher AI delivers turn-key, fully modular systems for guidance of apron surface movements, including software, vehicles and the required communication and charging

SOFTWARE STACK
Usher AI delivers a full-stack solution for autonomous guidance of aircraft through electric vehicles. The software stack includes the supervisory system, vehicles and the associated tools and interfaces.

ICT NETWORK

FACILITIES

VEHICLES

VEHICLE SOFTWARE

FLEET MANAGEMENT

TOOLS AND USER INTERFACES

INFRASTRUCTURE

GUIDANCE

ROUTING

usher ai

ADDED VALUE

SUSTAINABILITY

CAPACITY

SAFETY

Implementation of the Usher AI concept:
- minimizes stop-and-go during taxiing, reducing fuel usage up to 20%;
- enables sustainable and single engine taxiing, indirectly reducing fuel usage up to 70%;
- supports new operational processes, reducing (ultra)fine particle emissions by up to 50%.

With Usher AI operational:
- airports operate with less staff, as no RT is needed;
- taxi times become predictable, leading to better performance of scarce assets;
- taxi fluency improves, reducing time on the ground.

Usher AI improves the operational safety:
- as runway incursions and taxi route deviations are reduced, while exceeding the capacity of holding points is avoided;
- by providing increased situational awareness to pilots, ensuring higher safety margins.

Usher AI improves safety, capacity and sustainability through efficient ground operations that result in lower costs to airports, airlines and ANSPs.

USHER'S POTENTIAL
IMPROVING SAFETY, CAPACITY AND SUSTAINABILITY

Improves safety by preventing incidents.

Improves capacity by avoiding slow taxiing.

Improves sustainability to counter shrink arguments.

usherai

THE BUSINESS CASE

Usher AI delivers **savings worth up to $219 per flight,** ranging from $167 to $269 depending on the airport operations, configuration and location.

In addition, it also enables a capacity increase worth up to **$77 revenue per flight** for constrained airports.

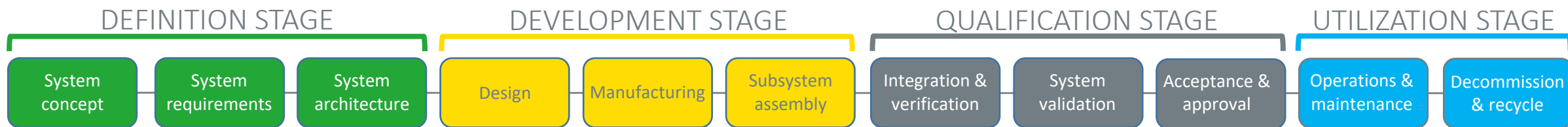| FUEL SAVINGS	TIME SAVINGS	DELAYS SAVINGS	EMISSIONS SAVINGS	DAMAGES SAVINGS	CAPACITY INCREASE (up to)
$54	$78	$27	$10	$50	$77
PER FLIGHT	PER FLIGHT	PER FLIGHT	PER FLIGHT	PER FLIGHT	PER FLIGHT

usherai

BRINGING AUTONOMY AIRSIDE
SYSTEM APPROACH IN PROJECT DELIVERY

Usher AI will follow a system life cycle for the delivery of an application to any airport, in alignment with the ISO15288 (INCOSE Handbook) and ISO26262 standards.

DEFINITION STAGE	DEVELOPMENT STAGE	QUALIFICATION STAGE	UTILIZATION STAGE

System concept	System requirements	System architecture	Design	Manufacturing	Subsystem assembly	Integration & verification	System validation	Acceptance & approval	Operations & maintenance	Decommission & recycle

In the first stage the concept, requirements and architecture are defined for the system elements: routing (Usher), guidance vehicles (Usherbots) and infrastructure.

In the next stage the system elements, subsystems and components are designed and manufactured in parallel before assembly. Before release of shipment all will be tested.

In the subsequent qualification stage, all interfaces are verified. Validation (commissioning) includes operating checks and adjustments to verify the system meets the requirements.

The start of the utilization stage requires completion of the design safety case (supplier) and operations safety case (operator).

usherai

SAFETY APPROVAL FOR OPERATIONS

Operational approval requires a design and operational safety case. The cases provide a clear, comprehensive and defensible argument, supported by evidence, that the system is acceptably safe (free from unreasonable risks) when operated in the intended context.
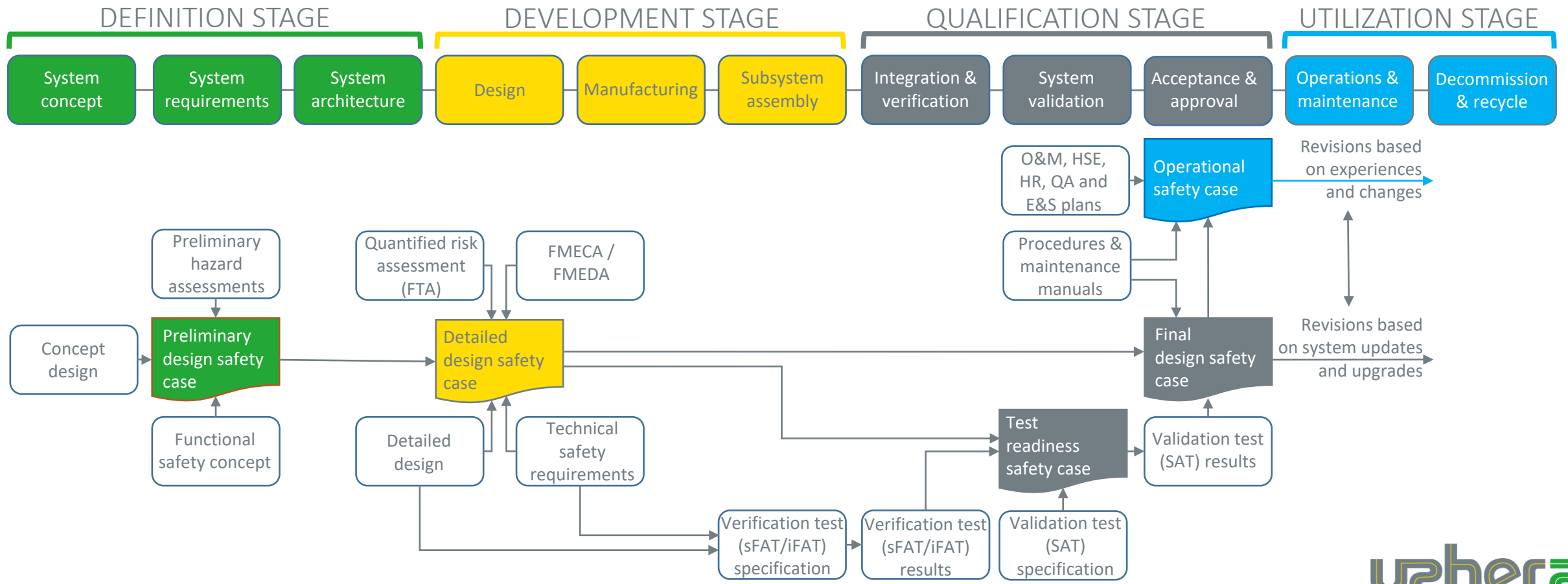
Notice of Funding Opportunity (NOFO): Airfield Autonomy Initiative (AAI) – Next

NCMS is pleased to announce a funding opportunity in support of the **Airfield Autonomy Initiative (AAI)-Next.** This initiative represents a partnership with the Federal Aviation Administration (FAA), the National Technology Research Park (NARTP), US Transportation Command (USTRANSCOM) and the Air Force Air Mobility Command (AMC).

AAI-Next is focused on advancing the state of automated capabilities operated on a central, common command and control system (C2) for active airfields. The FAA, NARTP, and AMC together are seeking to expand the use of autonomous vehicles for active commercial and DOD airfields.

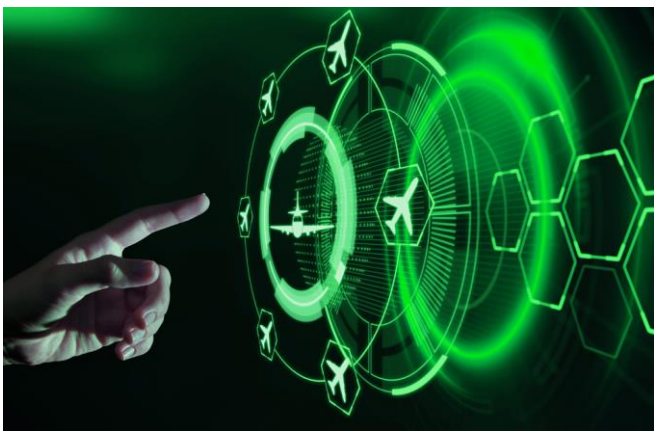This exceptional opportunity comprises a 12-m development, integration, and test demonstration

ncms.org

AUTONOMY IN AVIATION 2050: ONE PROJECT STEP AT THE TIME

Autonomy holds the great promise of safety, if implemented correctly. It avoids distraction, miscommunication, reliance on NOTAMs, errors in judgement and any other human mistakes.

The key to the introduction of autonomy will be to find the innovative stakeholders willing to 'learn by doing'.