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CIVIL AVIATION AUTHORITY
QATAR قطر

ICAO

MIDANPIRG/22 & RASG-MID/12

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Integrated Controller Working Position System for HIA & DIA

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Project Overview

The Integrated Controller Work Position (ICWP) project, contracted to Fusion and Honeywell, is designed to develop and implement a sophisticated fully integrated ICWP system with the capability of up to ASMGCS Level 5, enhancing the management of surface movements at both Hamad International Airport and Doha International Airport.

Project Deliverables:

- Design, engineer, procure, install, integrate, test, and commission all existing and future system elements of the ICWP system at HIA and DIA.
- Provide operational and technical training for the ICWP system.
- Establish a fully redundant operational ICWP system at HIA and DIA.
- Set up an ICWP Testbed at HIA.
- Develop an ICWP Simulator interfaced with the MicroNAV system at the QATCC building.
- Implement up to ASMGCS Level 5 capabilities across all systems.

What is an ICWP, and Our Integration Scope

The Integrated Controller Working Position (ICWP) is a system designed that provides enhanced functionalities for Air Traffic Controllers.

The system will provide the capability for full integration of all existing and future airport operations into a single unified screen.

This integration will enable air traffic controllers to access real-time information from multiple systems such as:

- ASMGCS
- ACDM
- ATM system
- Met system
- Airfield Ground Lighting
- Airport Video Cameras
- GDS (General Display)
- SAM / VGDS
- Onboard Aircraft and Vehicle Guidance systems
- ATFM
- DMAN
- AMAN
- EFS

ASMGCS Levels – Identification, Definitions and Requirements

Level 1 - Enhanced Surveillance

Improved surveillance and procedures, covering the manoeuvring area for ground vehicles and the movement area for aircraft concerning identification and the issuing of instructions and clearances by ATC.

Level 2 - Surveillance + Safety Nets

Further safety systems that are designed to protect runways and the chosen areas along with associated practices. Warnings and alarms are created for ATC in case of any conflicts between vehicles on runways and aircraft incursions into restricted zones.

Level 3 - Conflict Detection

The detection of all conflicts in the movement areas, as well as improved guidance and planning for use by ATC.

Level 4 - Conflict Resolution, Auto Planning & Guidance

Pilots and ATC are provided with resolutions by the mean of automatic planning and automatic guidance to resolve conflicts.

Level 5 (Onboard Guidance

Digital Onboard guidance to aircraft and vehicles

These levels progressively build upon each other, offering a higher degree of automation, conflict detection, and resolution, ultimately enhancing operations and safety.

Reference: ICAO

ASMGCS and ICWP

The ICWP will enable ASMGCS Level 4, which is an essential milestone in surface movement control. This level will be supported by the Follow the Green system, an airport infrastructure solution that guides aircraft and vehicles along optimized pathways on the ground, enhancing traffic flow and safety. This integration will reduce surface congestion and improve ground handling by providing clear, automated guidance for both controllers and ground vehicles.

For ASMGCS Level 5, the ICWP will enable full automation of surface movements. The system will support onboard equipment by ensuring seamless connectivity between the automation of ATM (Air Traffic Management) and the aircraft / vehicles operating at both Hamad International and Doha International Airports.

Furthermore, the ICWP will allow controllers to manage Airfield Ground Lighting (AGL) and view Electronic Flight Strips (EFS). With precise aircraft positioning and movement coordination, controllers will have full visibility of operations, ensuring safer and more efficient surface traffic management.

Stakeholder Identification

ANS (CAA-QATAR)

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QATAR AIRWAYS/OTHER AIRLINE

QATAR AIRWAYS القطرية

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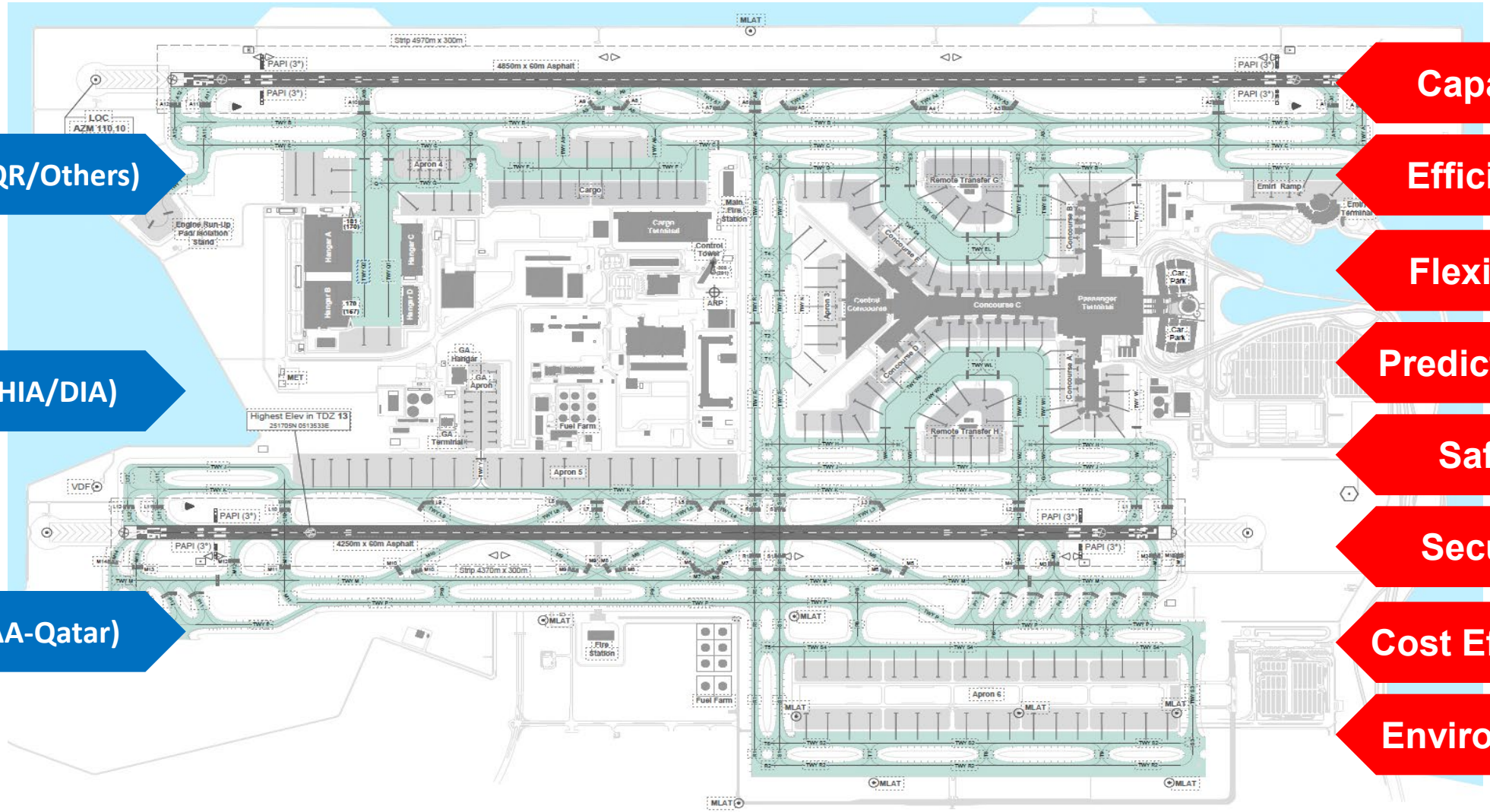
Driving Outcomes for Stakeholders

Airlines(QR/Others)

Matar (HIA/DIA)

ANS (CAA-Qatar)



Capacity

Efficiency

Flexibility

Predictability

Safety

Security

Cost Effective

Environment

CAA & Air Navigation Department

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Benefits

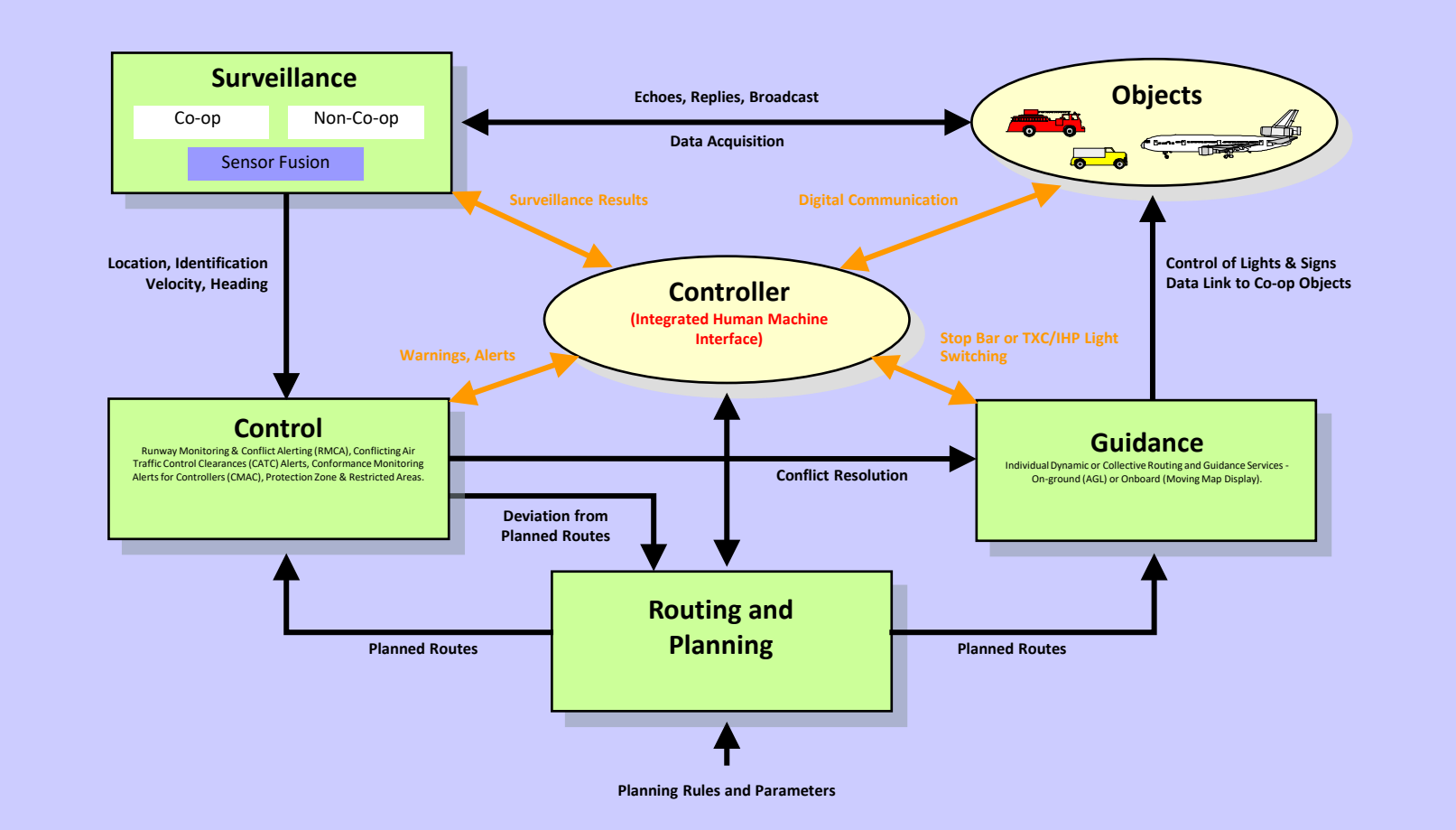
- Improved situational awareness
- Enhanced decision-making capabilities
- Streamlined air traffic management
- Increased operational safety through redundancy and failover systems
- Faster response times to operational events
- Simplified workload distribution among controllers
- Support for advanced air traffic management capabilities (e.g. Level 5)
- Better integration with existing ATM and Stakeholders systems and technologies
- Increased system reliability and uptime
- Facilitated training and simulation for operational scenarios

Redundant Operational ICWP System

HAMAD INTL AIRPORT
DOHA INTL AIRPORT
SIMULATION and TESTBED SYSTEMS

- Allows adaptation testing before live ops
- ATC procedure testing and validations
- ATC Training
- Other required activities in accordance with the concept of operations and training requirements.

Integrated Tower Working Position



Integrated Tower Working Position

ENHANCED ATCO PRODUCTIVITY & EFFICIENCY

VDGS
Gate/Apron Status Information.

VIDEO
Augmented views

GSE
Improved safety for ground vehicle movement

AIR & GROUND SITUATION DISPLAY
Efficient tracking and enhanced situational awareness

SAFETYNETS, ROUTING & GUIDANCE
Alerts/Alarms, Individual & Collective Routing, On-Ground Guidance

ACDM
Increased milestone adherence

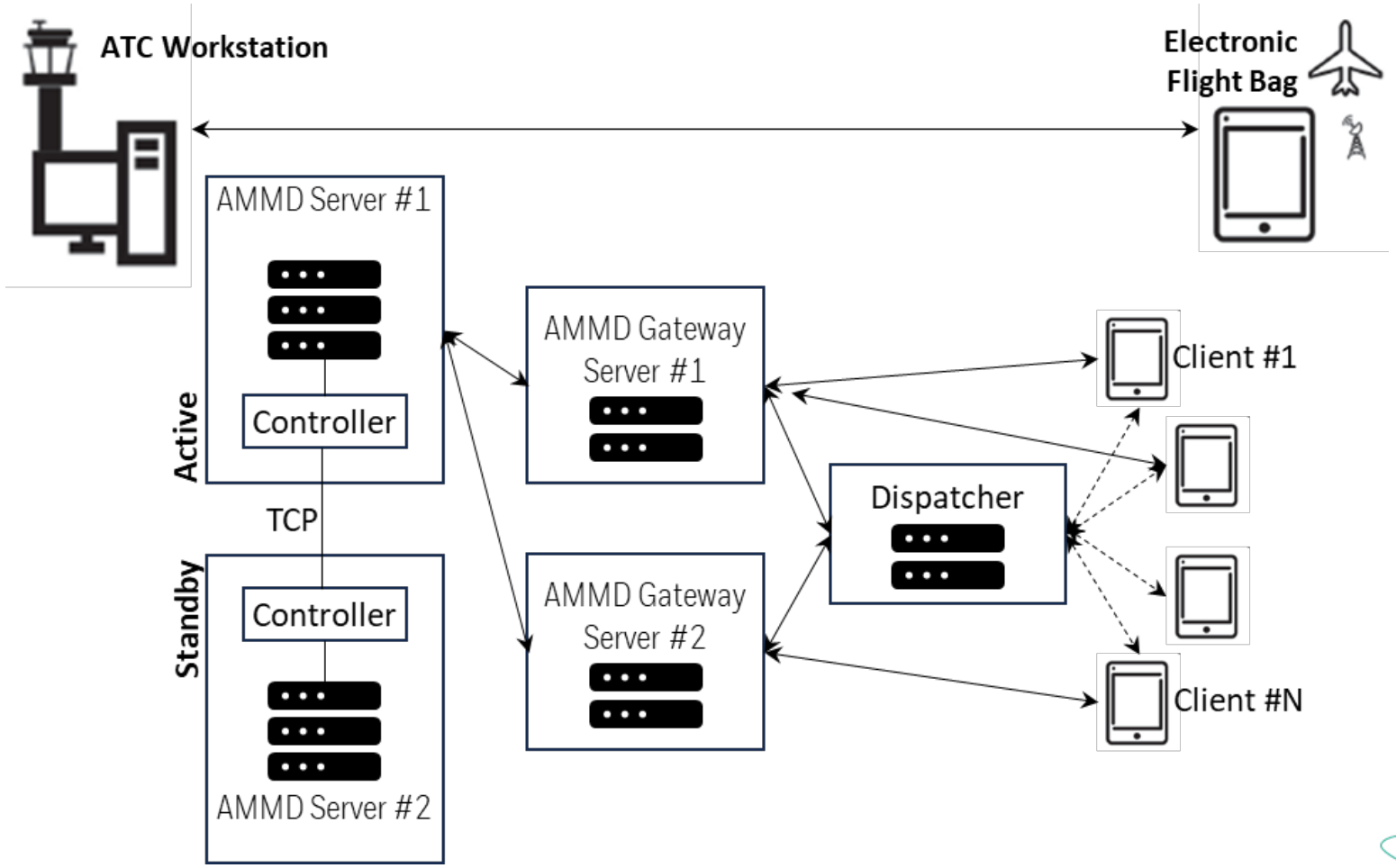
MET
Improved situational awareness, enable faster reaction to weather change, reduction in preparation for AOM changes

AMAN/DMAN TOOLS
Reduced workload through optimized operations

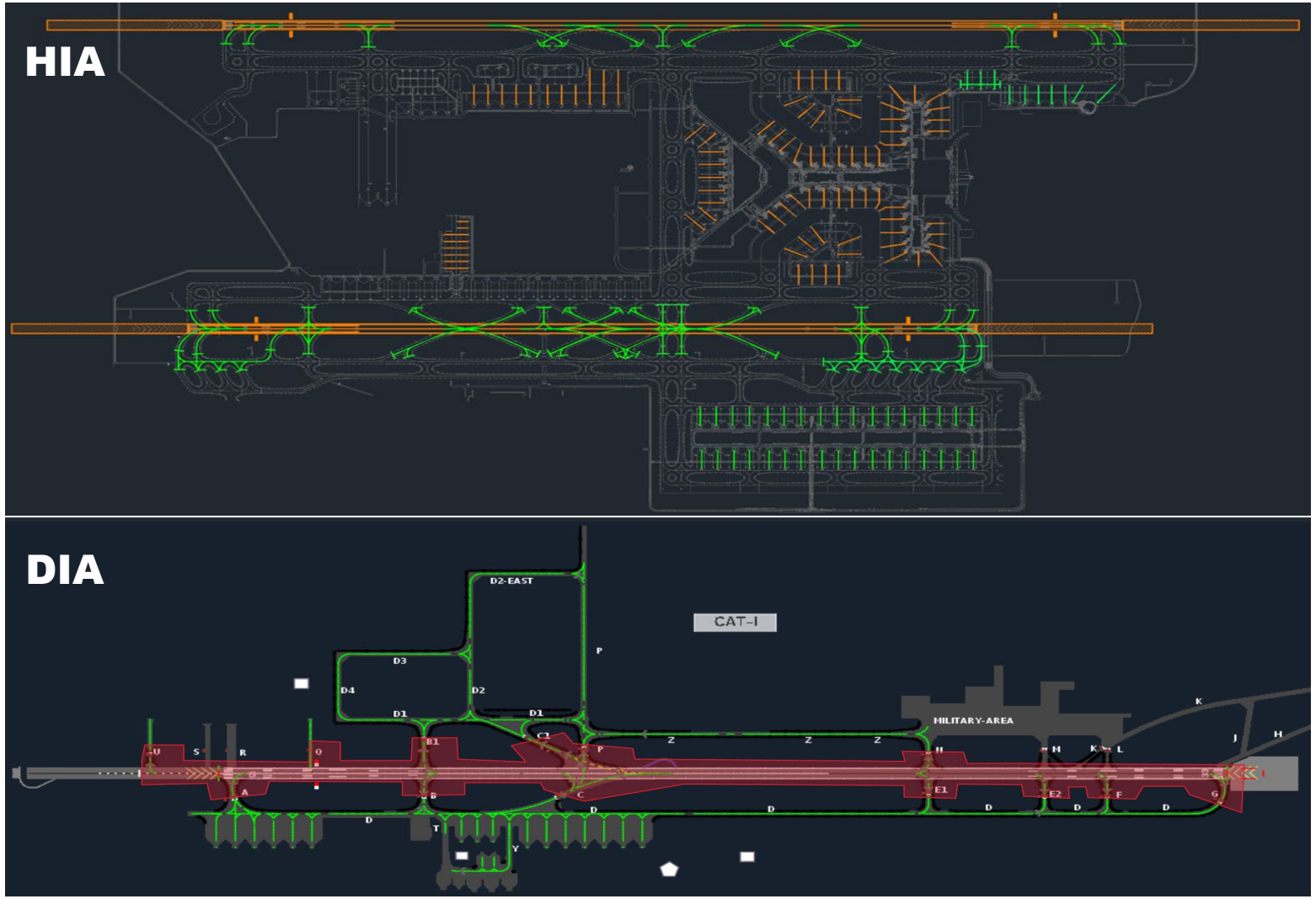
EFPS
Harmonized workflow, effective clearance handling

Striking Balance between Cognitive Workload, Interaction & Automation

Level 5 | ONBOARD GUIDANCE SERVICES



On Ground Guidance | Airfield Lighting



- AGL infrastructure to provide unambiguous guidance across airfield
  - Complete and standard spacing between lights
  - Fully segmented and logically sectioned circuits
  - Additional lights for separating traffic
- Low command latency and high-performance redundant systems to support Floating Greens separation:
  - AGL Control & Monitoring System
  - Single Lamp Control & Monitoring for individual lights to provide guidance

Qatar Airways

Benefits

- Reduced Delays: The automated surface movement management and Follow the Green system allow for faster and more predictable taxiing, reducing ground delays and improving overall flight schedules.
- Increased Efficiency: Optimized departure sequencing, supported by the Departure Manager (DMAN), ensures that aircraft depart on time, minimizing idle time on the ground.
- Improved Safety: Real-time aircraft positioning and precise movement coordination reduce the risk of runway incursions and surface collisions.
- Operational Cost Reduction: With better management of surface traffic and fewer delays, airlines can reduce fuel consumption and improve the efficiency of their ground operations.
- Single-Engine Taxiing: The ability to use single-engine taxiing efficiently—supported by route protection—allows airlines to save fuel and reduce costs during taxiing operations.
- Enhanced Customer Satisfaction: Efficient ground handling and timely departures contribute to better service delivery, enhancing the passenger experience.

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Benefits

- Enhanced Capacity Management: With fully automated surface movement management and seamless integration with all systems, airports can handle higher traffic volumes without compromising safety.
- Optimized Ground Operations: The Follow the Green system and real-time data integration allow airports to optimize runway and taxiway usage, leading to more efficient ground operations.
- Cost Efficiency: By reducing the need for manual oversight and improving the utilization of airport infrastructure, airports can lower operational costs.
- Improved Coordination: The integration of all systems into a unified platform enhances communication and coordination between airport operations, ATC, and other stakeholders, resulting in smoother overall airport management.
- Sustainability: The more efficient use of airport resources, such as runways, taxiways, and ground handling, leads to a reduction in emissions and fuel consumption, contributing to more sustainable airport operations.

Guidance Services

On Ground & Onboard

Automated Switching of Stop Bar

- Runway Protection
- Stop Bar Locking
- Runway Access Control
- Taxiway Intersection

Stopbar Lights | Intermediate Holding Position Lights

Automated Switching of Taxiway Centerline Lights

- Runway Exit
- Taxiway Route
- Longitudinal Separation
- Intersection Protection
- Intersection Sequencing
- Lateral Separation
- Give Way To
- Hold Short/Hold

Taxiway Centerline Lights | Land and Hold Short Lights

Automated Switching of Stand Guidance

- A-VDGS Activation
- Lead-in Lights

Lead in Lights

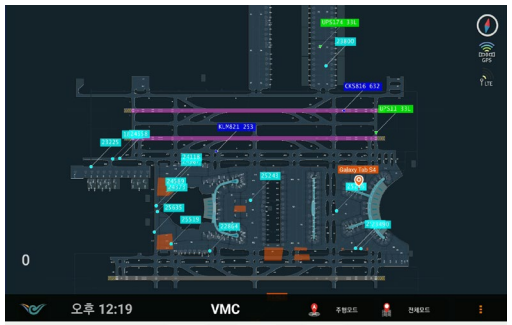
Visual Docking Guidance Systems

Modes & Monitoring

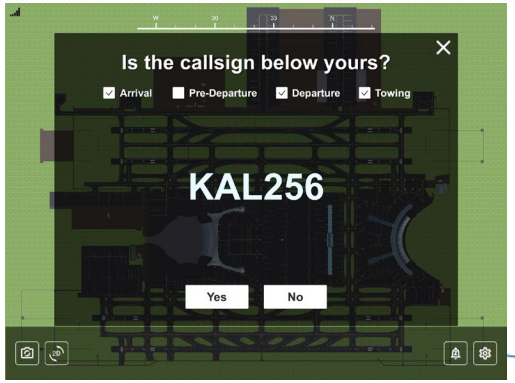
- General Mode Handling
- Stop Bar Control Modes
- Serviceability Monitoring

Onboard Guidance

- In-vehicle Guidance



- In-cockpit Guidance

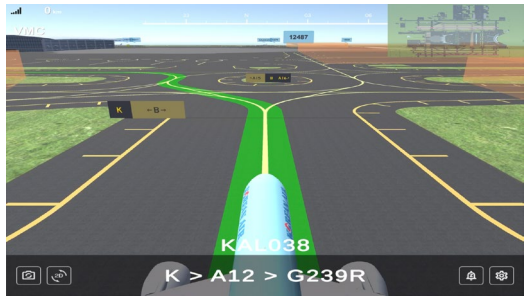


INCHEON AIRPORT Operational Results

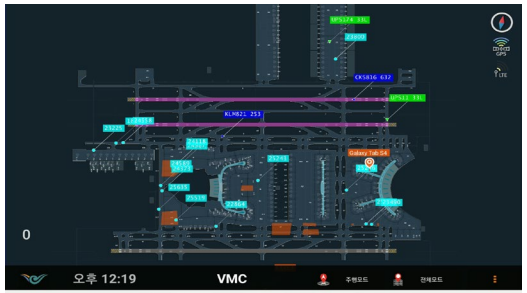
- Increased SAFETY (Reduction of 78% route deviations, highest level of conflict)
- Reduced TAXI TIMES (>30% reduction in low-vis, >10% reduction in CAVOK)
- Increased TRAFFIC FLUENCY (~80% less stops in low-vis, ~50% reduction in CAVOK)
- Reduced FUEL BURN (up to ~50% less fuel used, depending on environmental condition)
- Reduced EMISSIONS (13,500MT reduced)
- Improved AIRPORT TAXI PERFORMANCE, e.g., no loss of performance in low-visibility at night
- Reduced MOVEMENT DELAY (~50% reduction of time between taxi request and initial movement)
- Reduction of ROT by presentation of all optimized runway exits and real time routing after detection of the pilot's choice

Integrated Controller Working Position

Pilot – Airport Moving Map Display



Vehicle – Airport Moving Map Display



Project Phasing Plan

PHASE 1

Replacement of the existing operational and test bed ASMGCS at HIA with similar functionalities including operational levels (Like to like replacement of the HIA operational system)

PHASE 2 & PHASE 3

- Upgrade of Phase One delivered HIA ASMGCS to an ICWP with EFS functionality & FTG,
- Deployment of DIA ICWP system with EFS functionality & FTG
- Deployment of Simulator
- Upgrade of Phase Two delivered ASMGCS to Level 5 ICWP

Sep 2024

Thank You