



Meta CDM – January 15th, 2013 - London

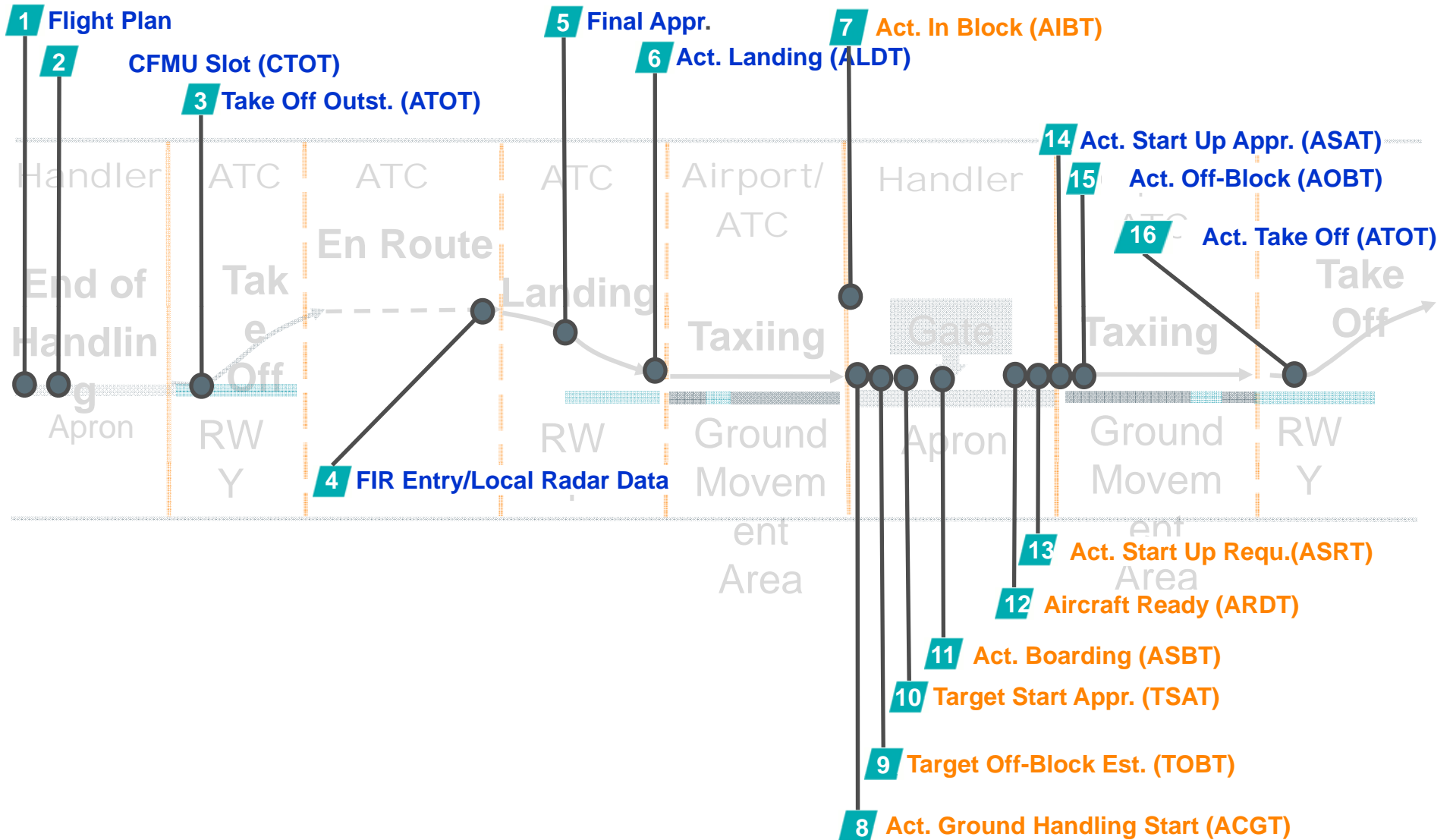
Integrated „Air2Air“ Management

Taking Aviation Management beyond CDM

A-CDM Framework Defines Basis



GroundStar™
Efficient Airport Operations





INFORM

Air2Air Steering

TMAN Turnaround Manager

SMAN Surface Manager

A/DMAN Arrival & Departure

Integration

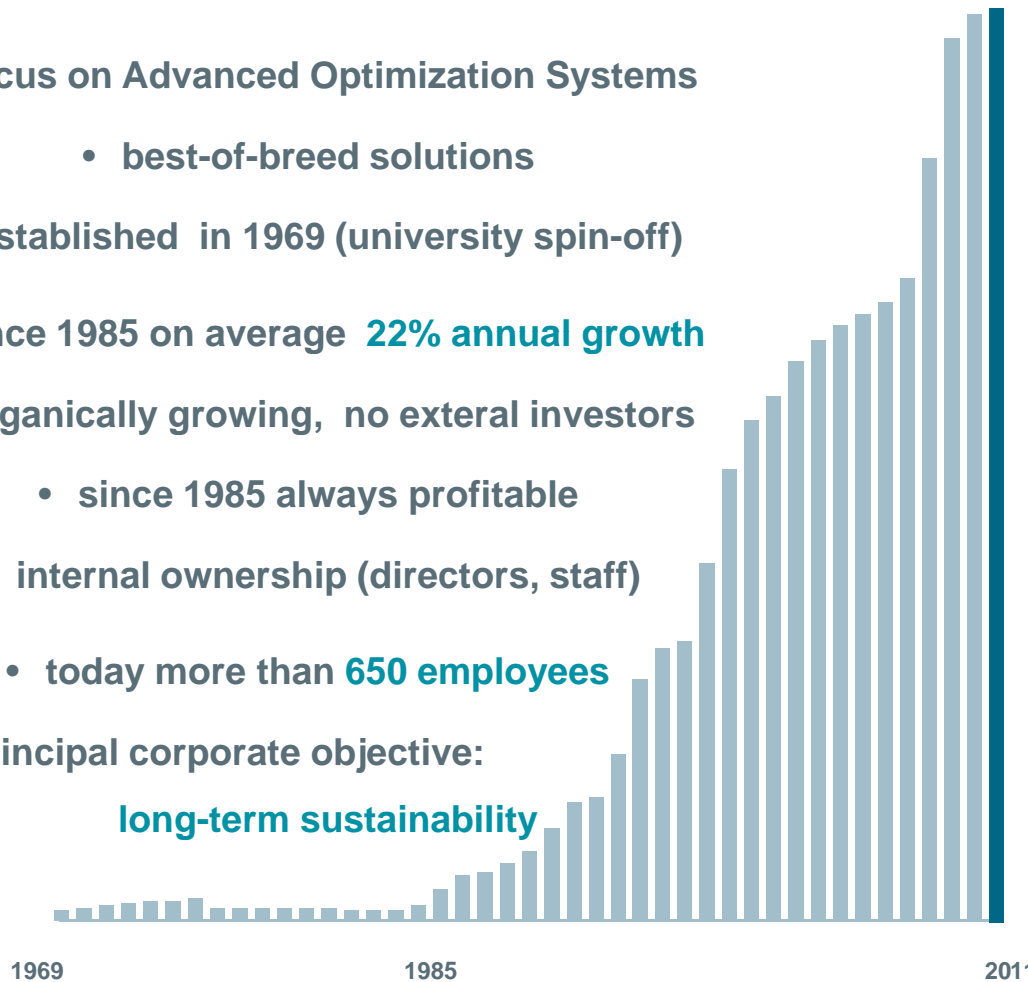
Results

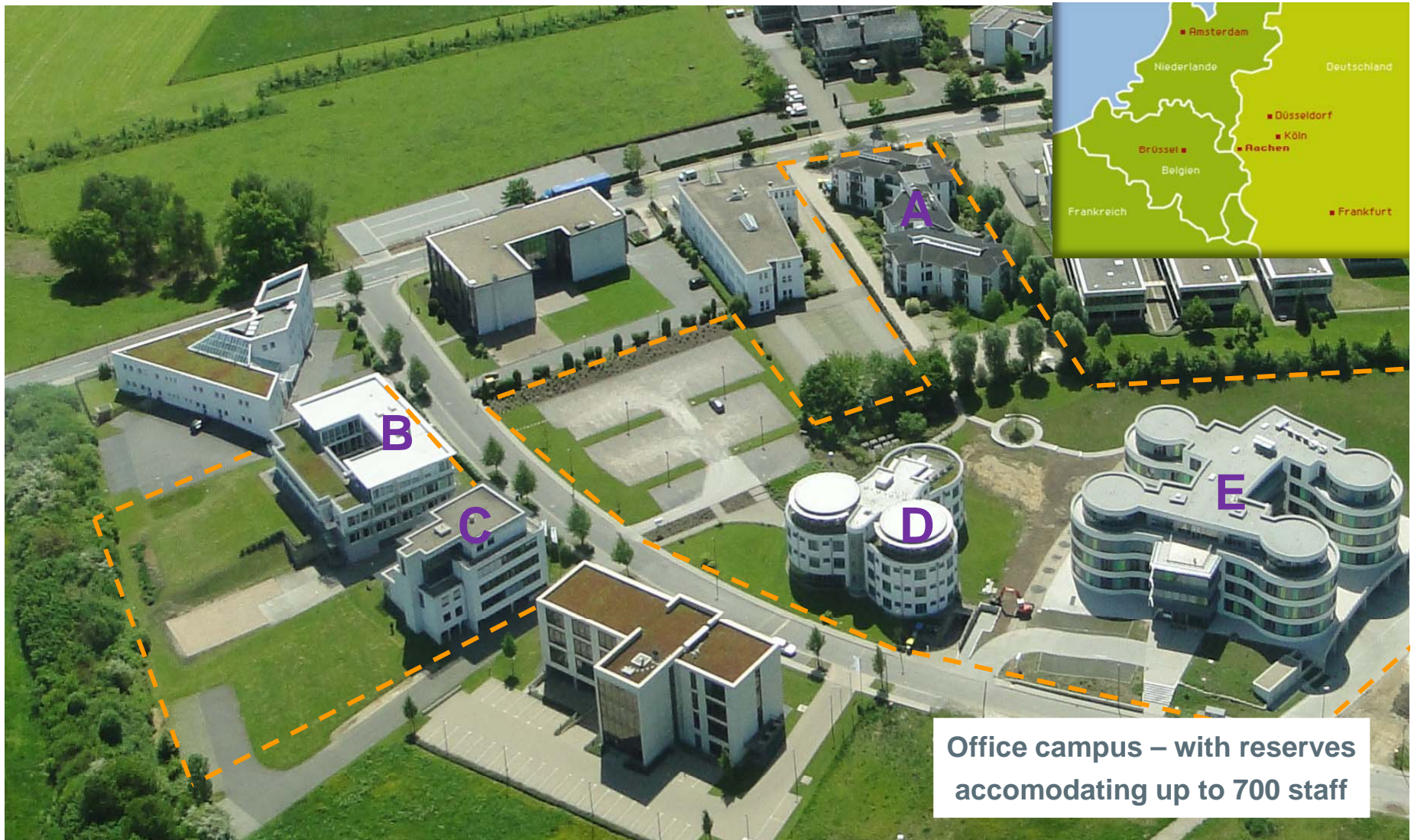
Company Introduction



GroundStar™
Efficient Airport Operations

- focus on Advanced Optimization Systems
 - best-of-breed solutions
- established in 1969 (university spin-off)
- since 1985 on average **22% annual growth**
- organically growing, no external investors
 - since 1985 always profitable
 - internal ownership (directors, staff)
 - today more than **650 employees**
- principal corporate objective:
long-term sustainability







- HQ in Aachen, Germany
- Offices in D, USA, HK, Australia
- Worldwide customer systems
- INFORM staff originating from more than 30 different countries



Aviation



Airport Logistics and Airport Resource Optimization for

- **Stands and Terminal Resources**
- **Passenger Services**
- **Ramp Services**
- **Catering**
- **Fueling**
- **Hub Management**
- **and other airport and ground handling operations**

Logistics
Manufacturing Logistics
& Healthcare



Optimized planning and real-time dispatch of

- Truck Fleets
- Container Transportation
- Building Materials Deliveries
- Intermodal Terminal Ops.
- In-plant Materials Handling
- Health Care Logistics

Inventory &
Supply Chain



As an add-on to existing IT systems, add*ONE optimizes procurement and inventory control.

INVENT optimises stock taking and goods inwards inspection by applying advanced sampling techniques.

Production



As an add-on to existing ERP systems, FELIOS optimizes production scheduling for make-to-order type manufacturing companies

Risk & Fraud



RiskShield optimizes fraud detection and prevention for the banking and insurance industries

Around 120.000 employees are being managed by GroundStar worldwide!

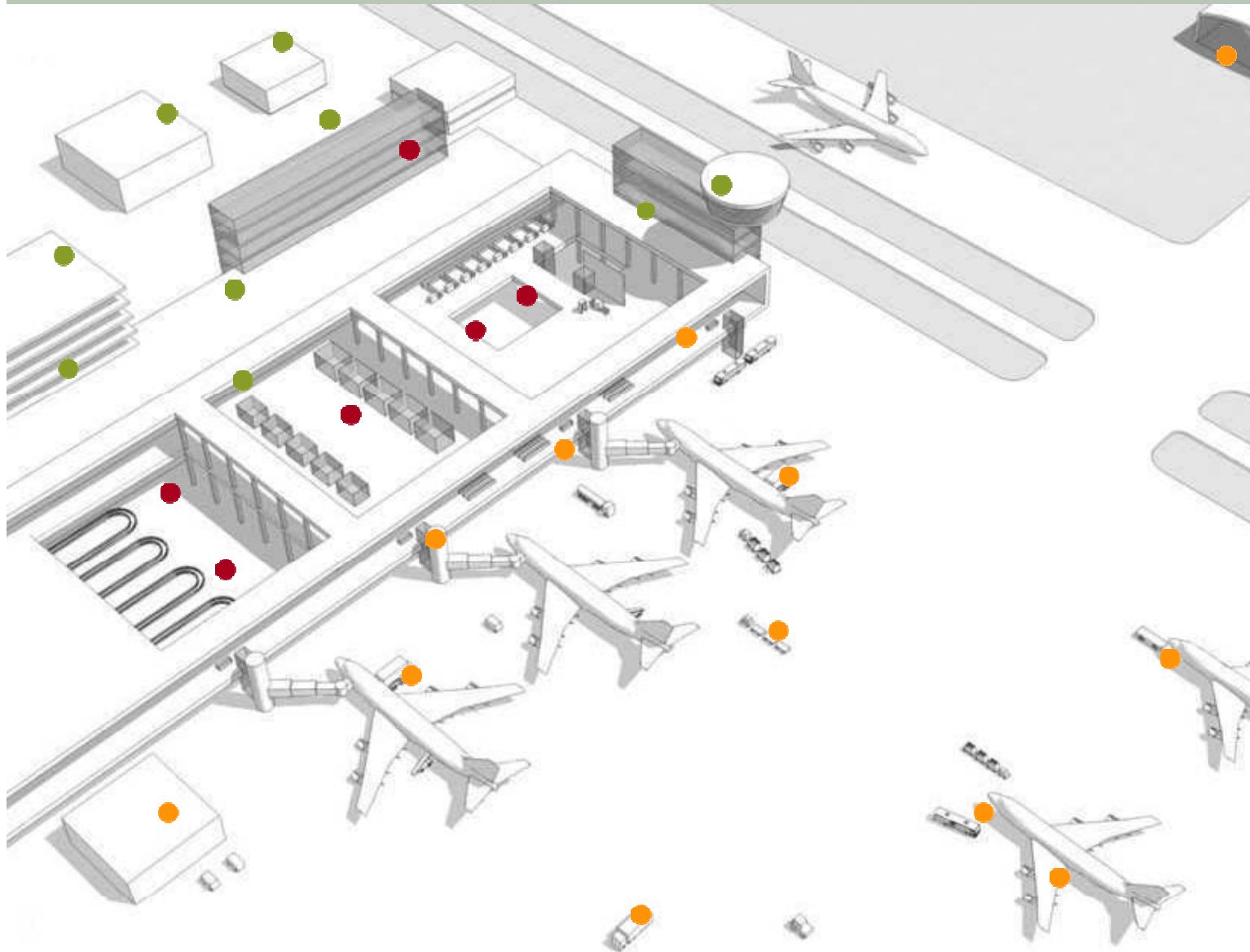
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Optimization of logistics processes in...



GroundStar™
Efficient Airport Operations





Terminal Applications

- Terminal Resources
- Passenger Service
- Check-in
- Security
- Borderpolice
- Immigrations

Ramp Applications

- Ground Transportation
- Loading
- Cargo Handling
- Baggage Service
- Catering
- Stands/Gates
- Towing and Push-back
- Aircraft Services
- Cleaning
- Water and Toilet Services
- De-Icing
- Fuelling
- Maintenance

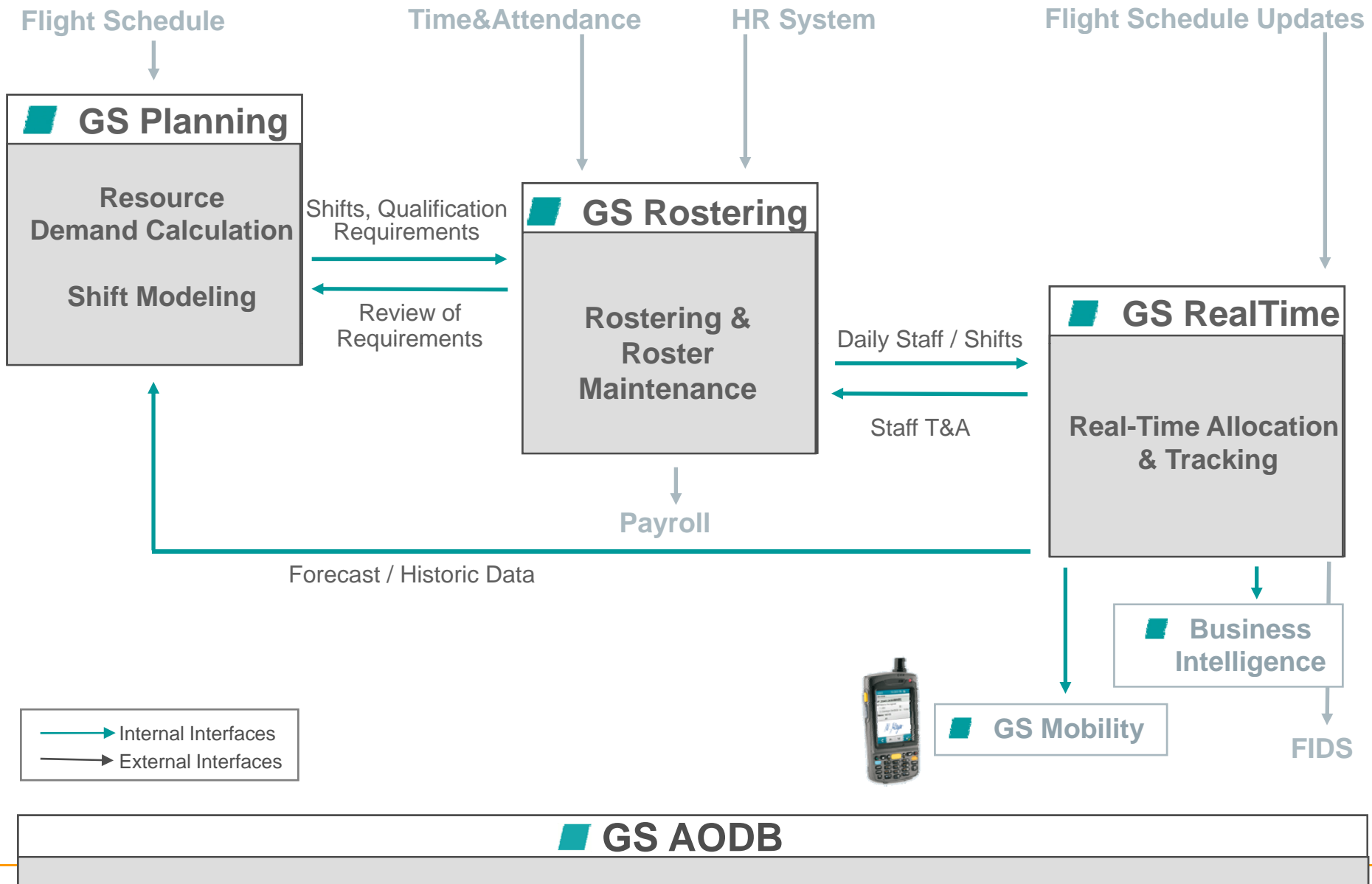
Overall Applications

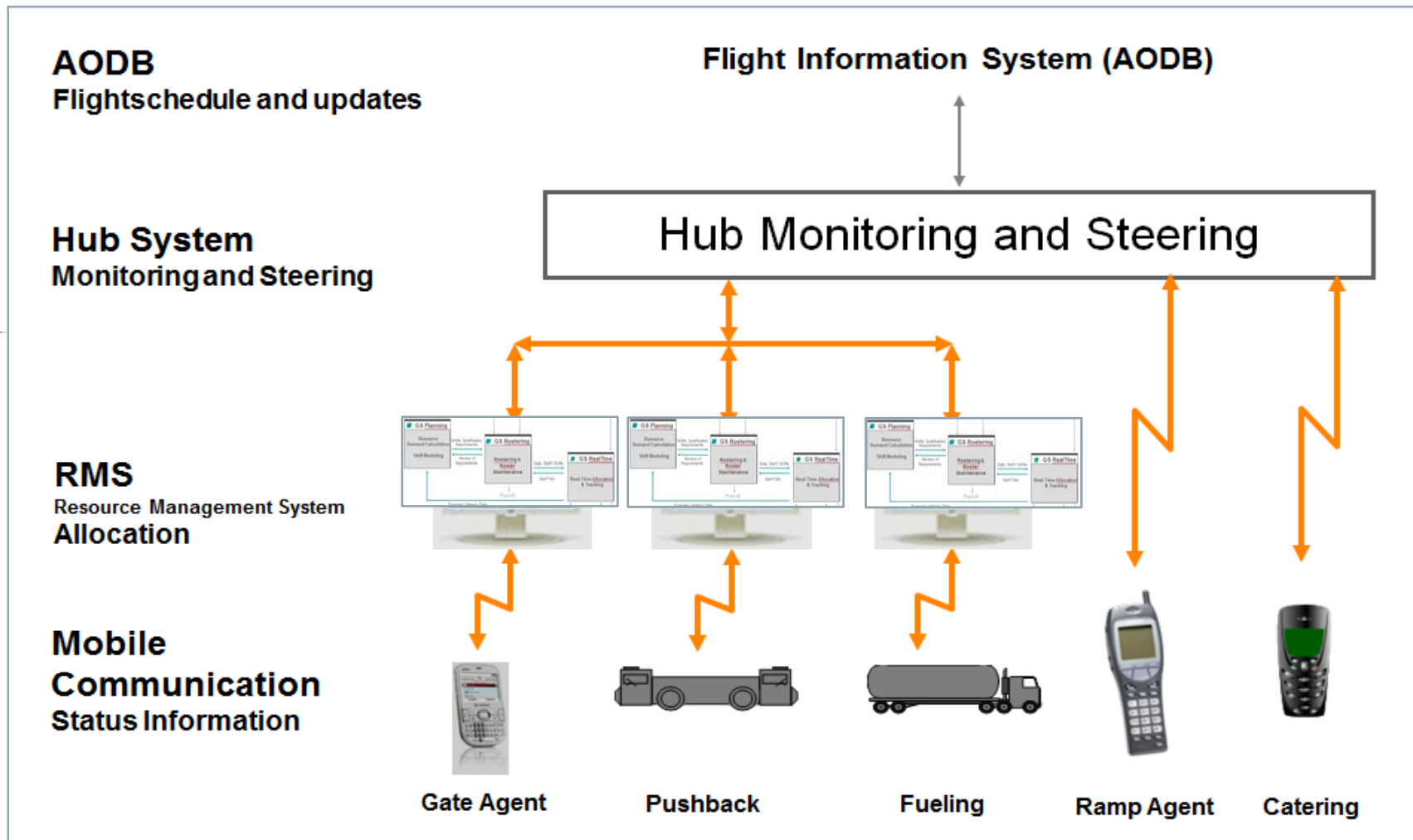
- Airport Control
- HubControl
- Capacity
- Flight Information
- Contract and Billing

Typical Setup



GroundStar™
Efficient Airport Operations







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Air2Air Steering - Motivation

TMAN Turnaround Manager

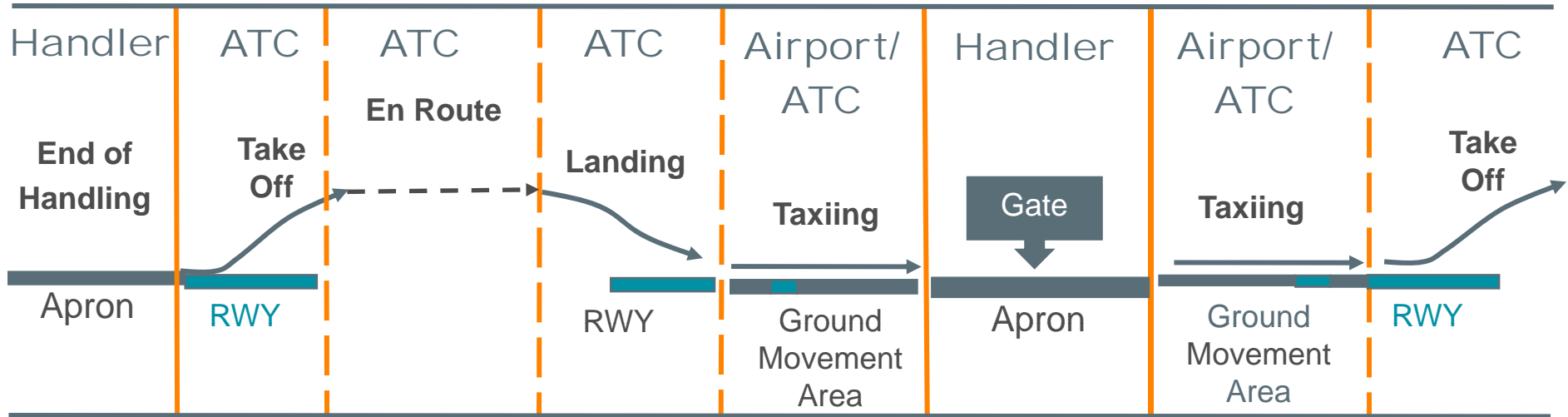
SMAN Surface Manager

A/DMAN Arrival & Departure

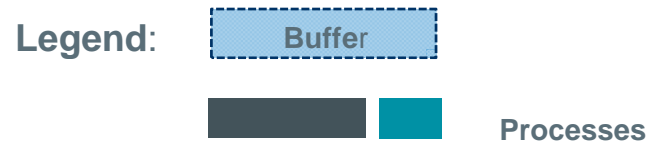
Integration

Results

Motivation



Due to different functional and organizational areas of responsibility – the air transport industry has traditionally worked with process hand shakes and buffer times in each area.





The result of this independent area's handshakes approach is the possibility to facilitate a different main focus on the airtransport logistics chain for each of the stakeholders.

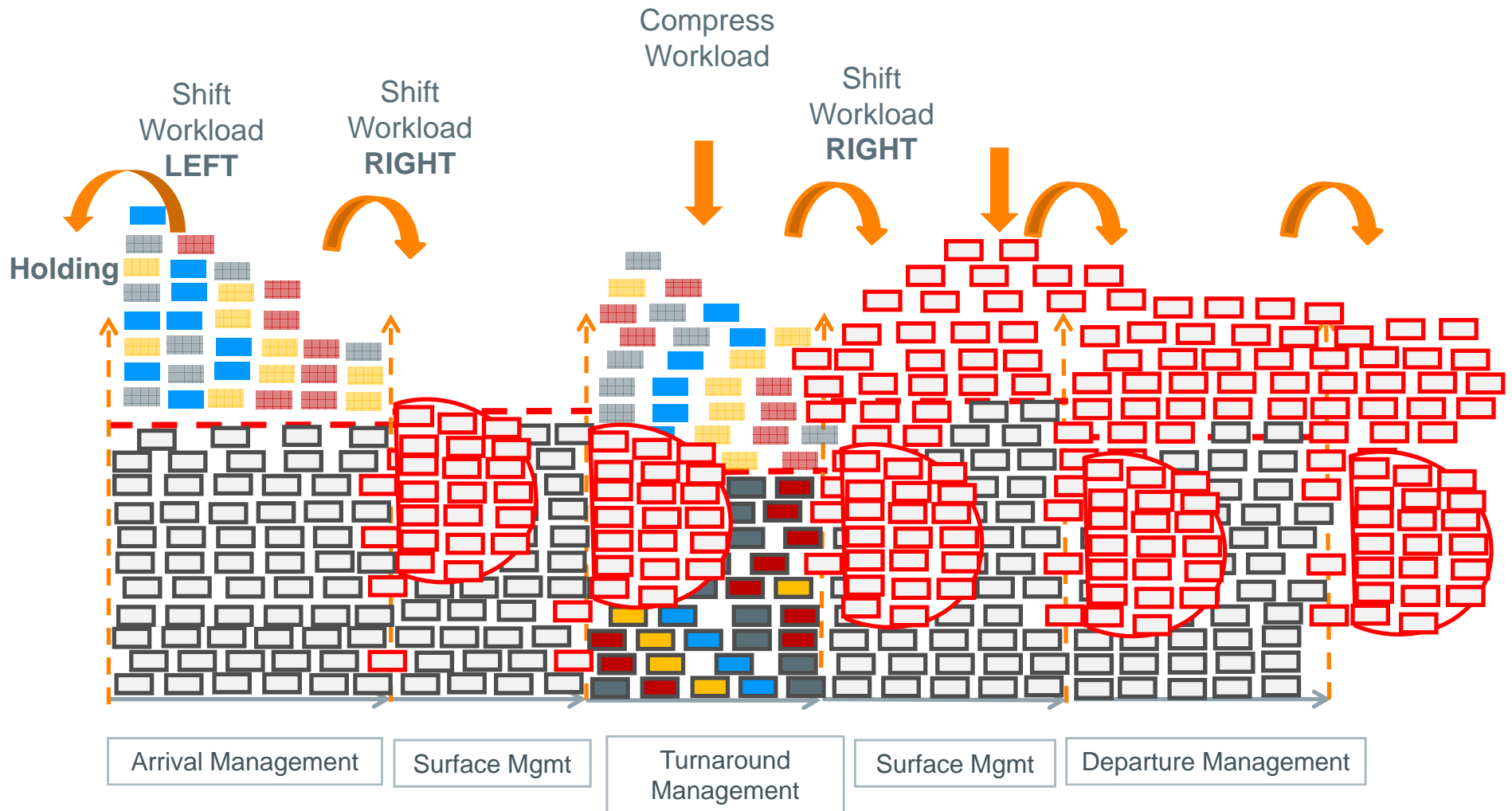


... Try that in any other area of public transport, i.e. railway systems or public busses..... 😊

Today's Steering at Capacity Limits



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Air2Air Steering

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A/DMAN Arrival & Departure

PaxMAN Passenger Flow

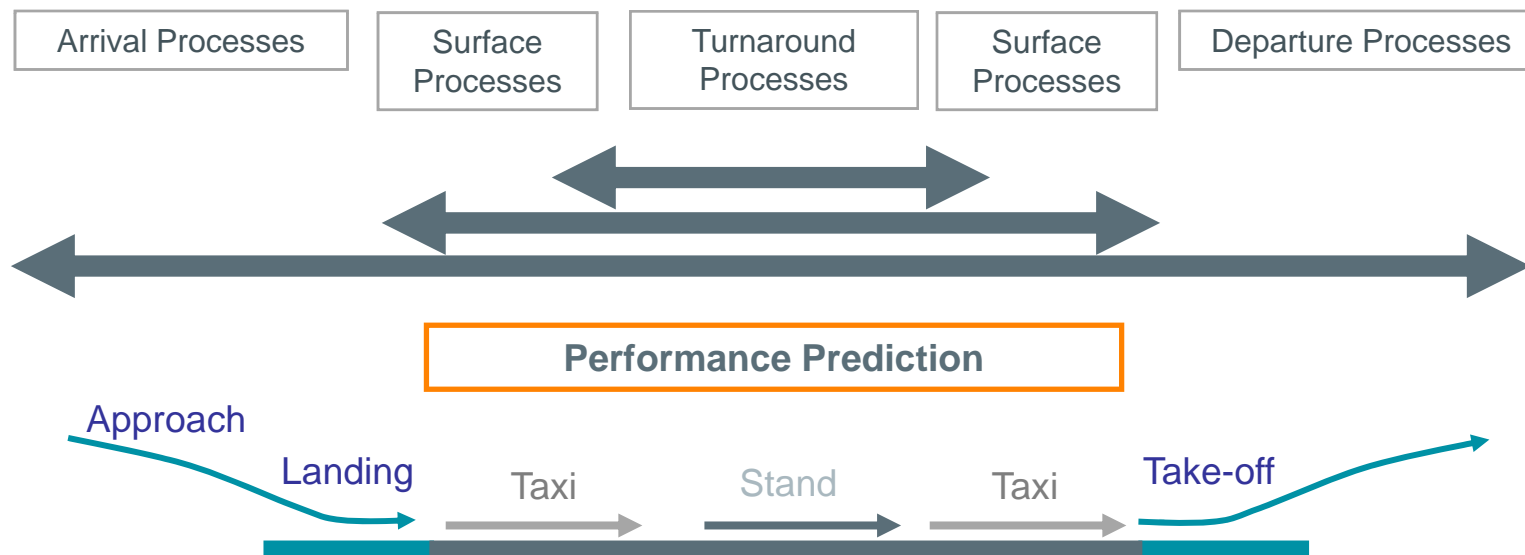
Integration

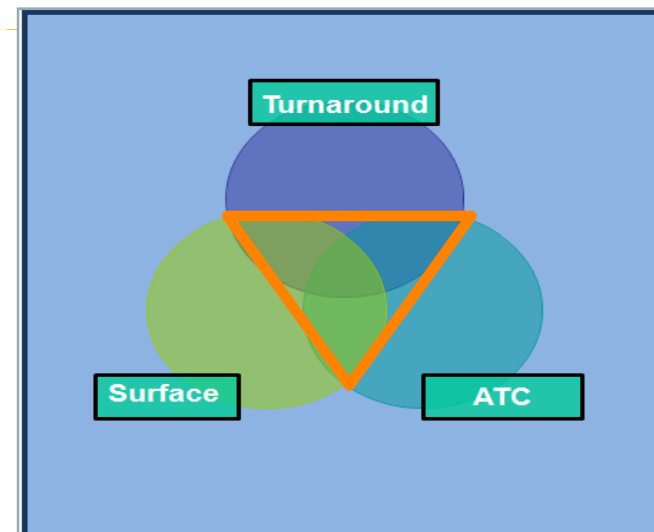
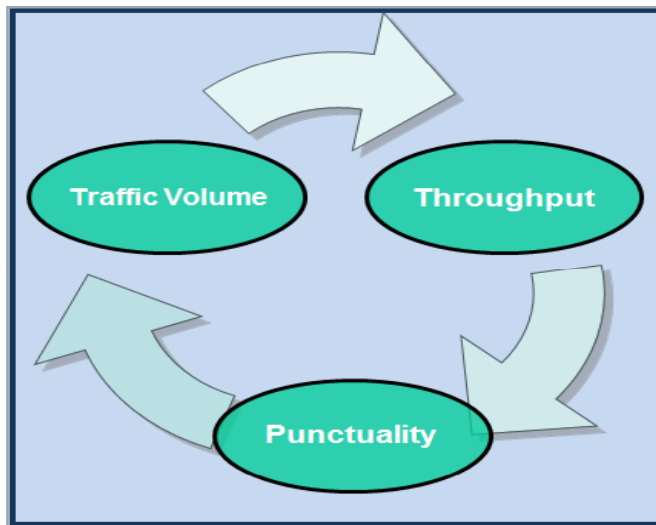
Results



Air2Air Steering is the capability to jointly steer the necessary sequential processes of the aircraft turnaround at an airport from prior to landing until just after take-off.

With full knowledge about the performance predictions of ATC, Local Aerodrome Control and Ground Handling







Motivation

Air2Air Steering

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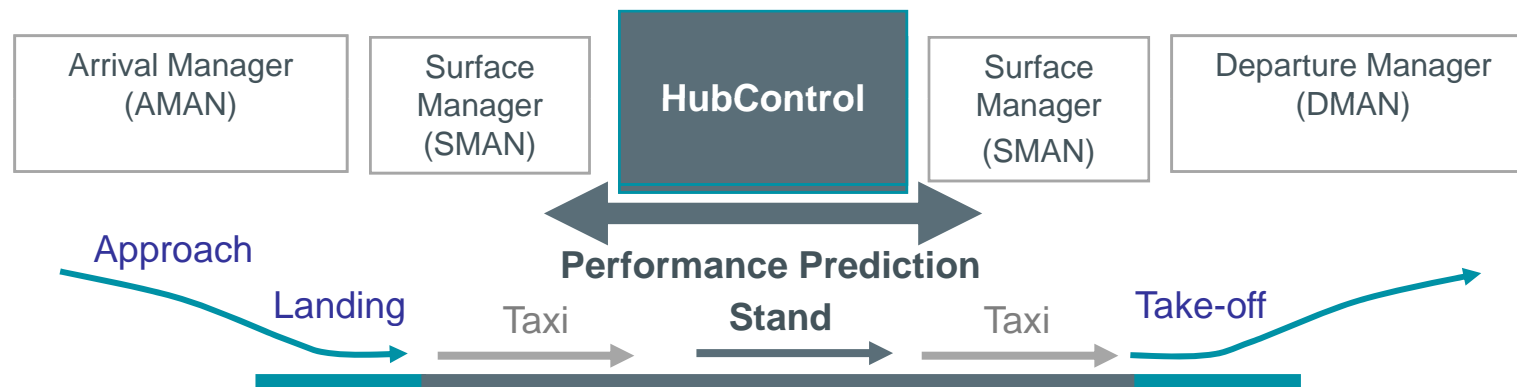
Integration

Results



■ Major contribution to Air2Air:

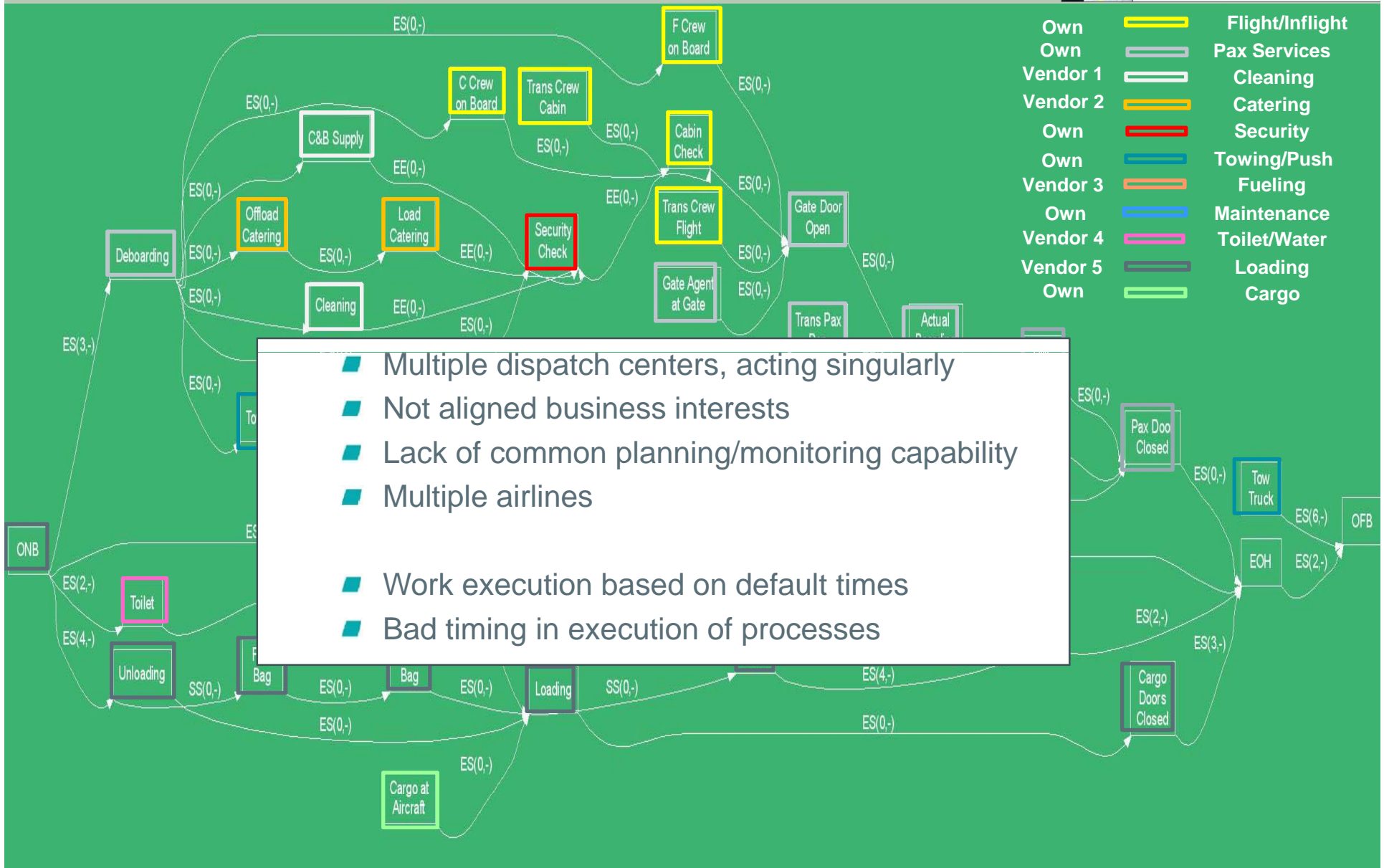
- Ground Handling operational transparency
- Critical path handling awareness
- Transfer connectivity awareness
- Situational revenue and cost awareness
- Steering capability
- AODB integration for Air2Air



Turnaround - Distributed Situational Awareness



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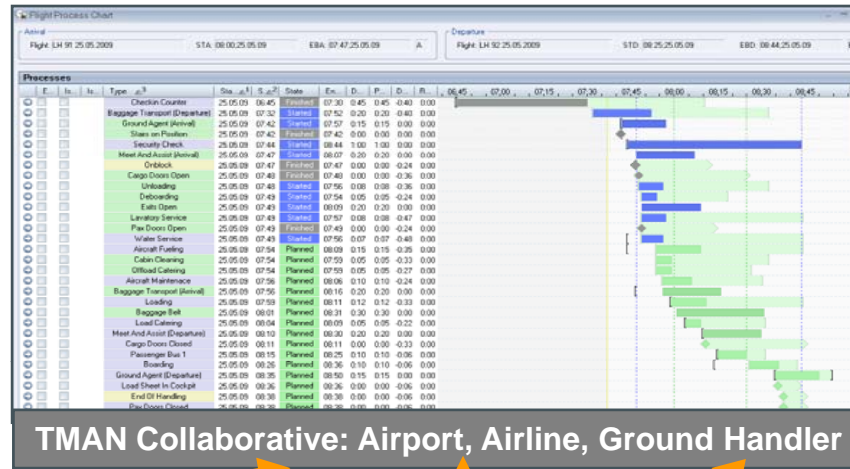


Decision Support - TMAN Collaborative



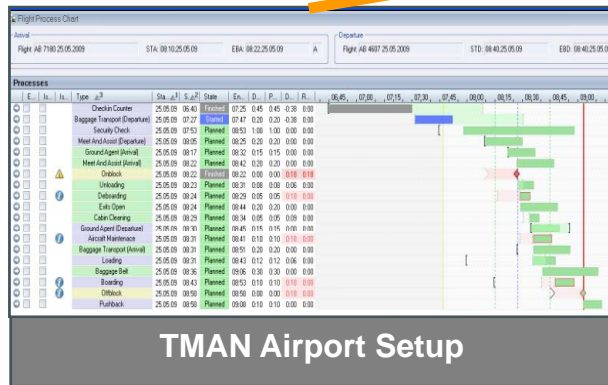
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Aggregated Information on APOC Level only

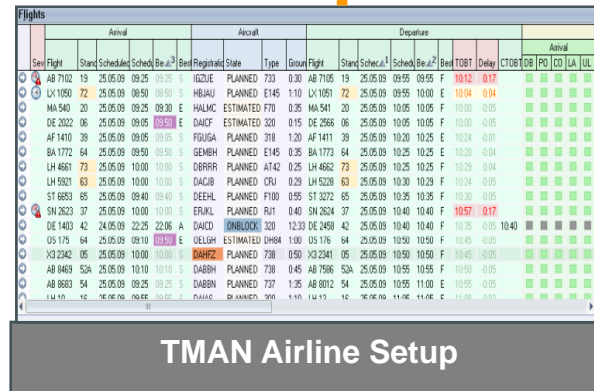


Similar Data Model – Different Levels of Detail

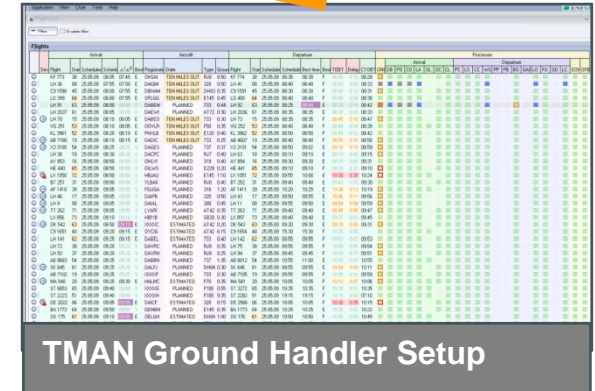
TMAN Collaborative: Airport, Airline, Ground Handler



TMAN Airport Setup



TMAN Airline Setup



TMAN Ground Handler Setup

TMAN Decision Support - Features



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A-CDM Milestones integral with
turnaround critical path

TMAN for Subcontractors

Transfer Pax/Bags Connect

Priority Flights Costmodel

Quick Turn Around

TMAN What-if

Service Recovery Key
Performance Indicators

GS Integrated Airport Map



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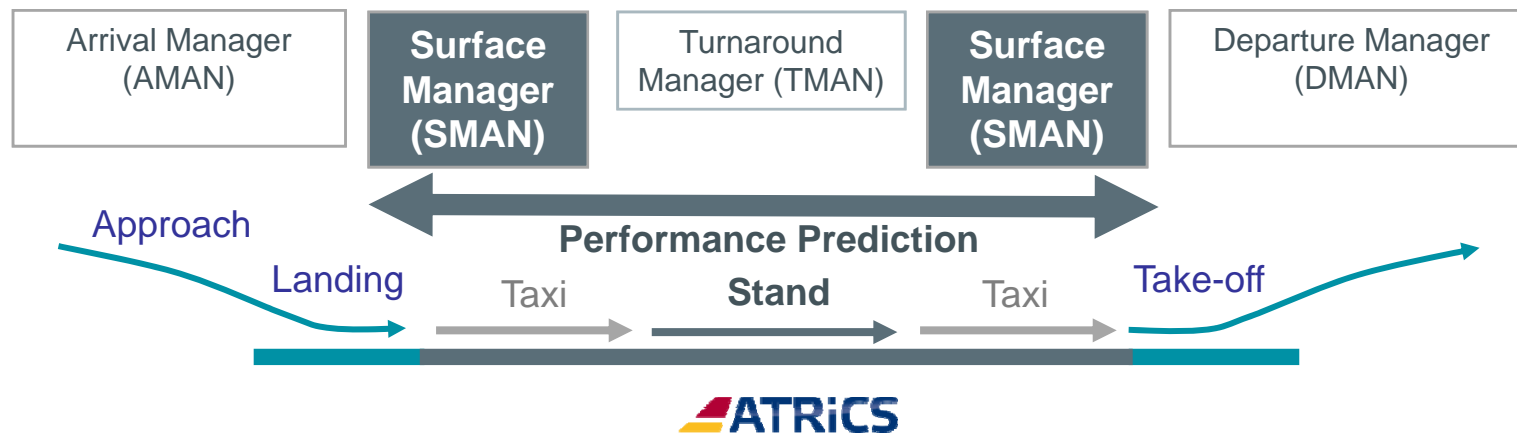
Integration

Results



■ Major contribution to Air2Air:

- Advanced taxi time calculation
- Pre-departure-, off-block and taxi-sequencing
- Automated guidance – “follow the green”
- Situational Awareness





Taxi Sequencing



What-if Alternative Routing

Aircraft Ground Movement Map

Pre-Departure Sequencer

Follow the Green








Motivation

Air2Air Steering

TMAN Turnaround Manager

SMAN Surface Manager

A/DMAN Arrival & Departure

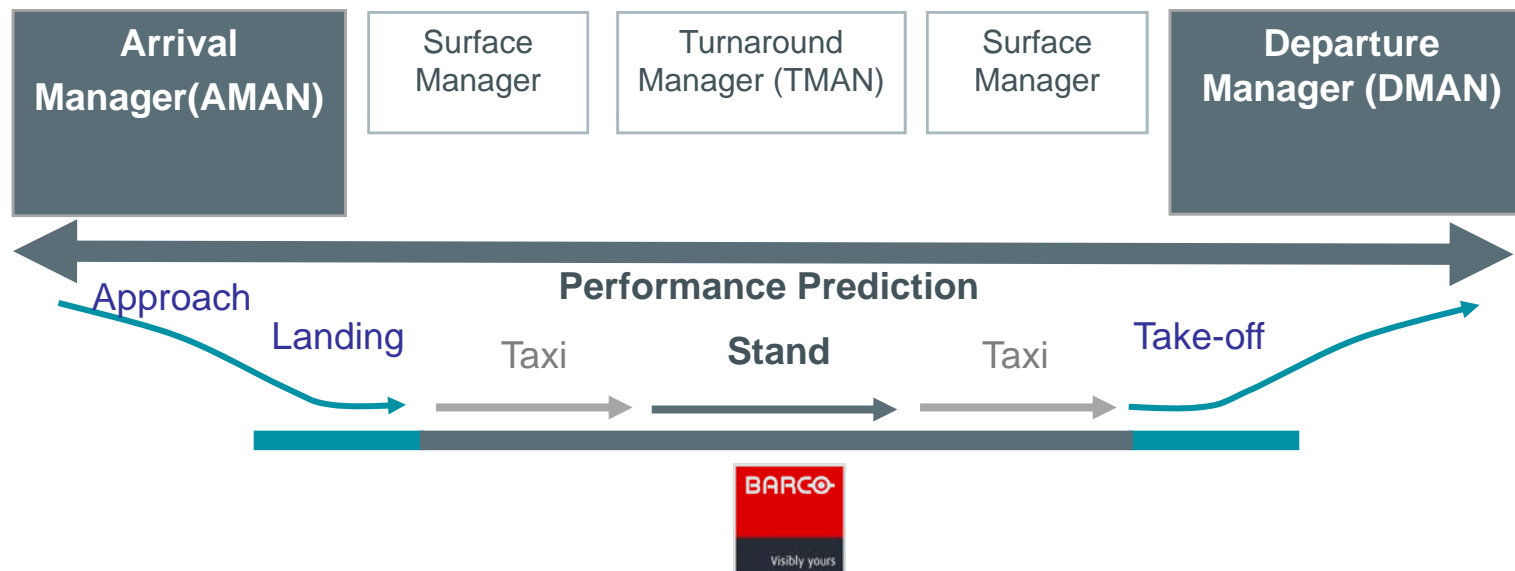
PaxMAN Passenger Flow

Integration

Results



■ Major contribution to Air2Air:





Motivation

Air2Air Steering

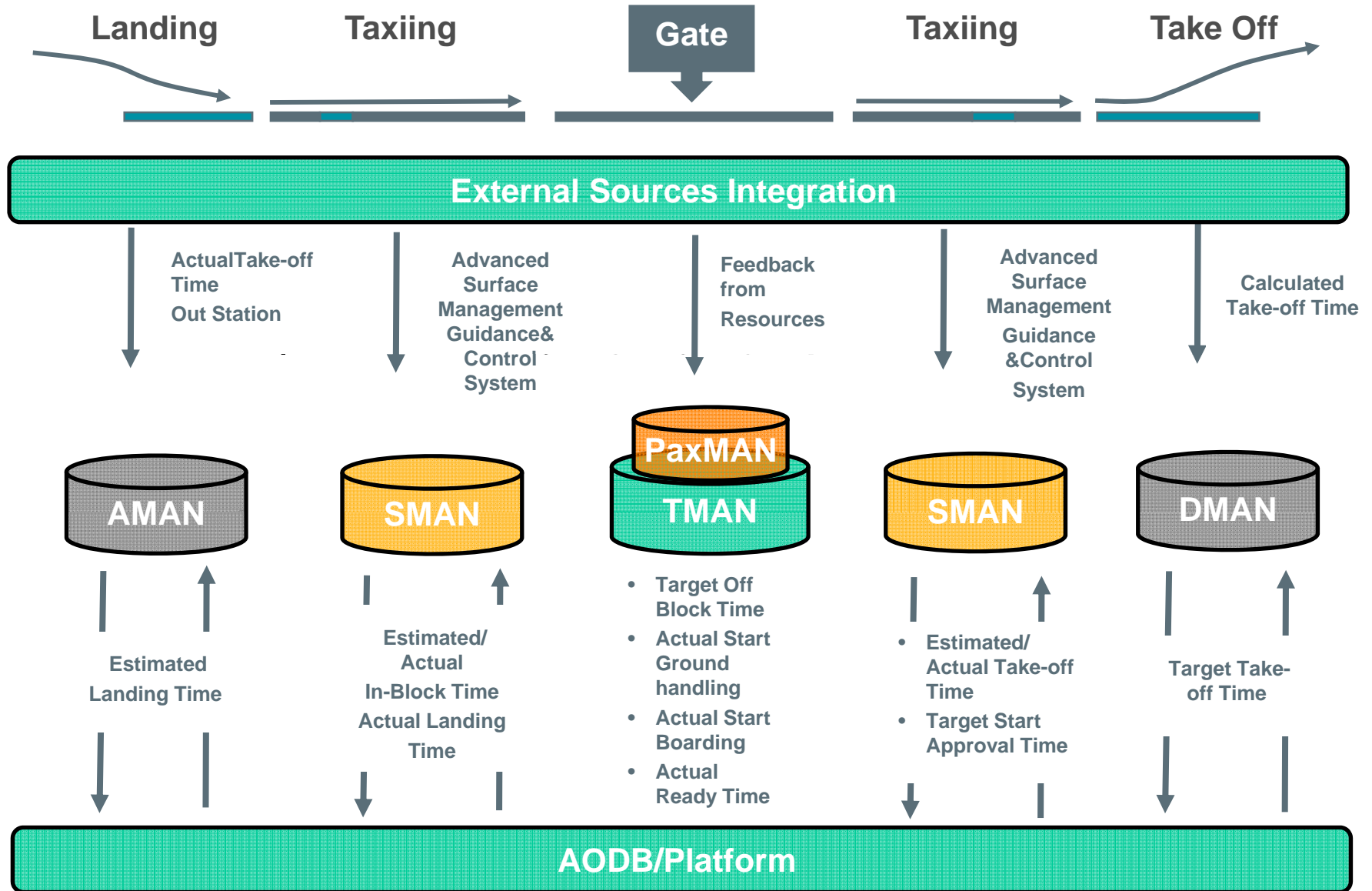
TMAN Turnaround Manager

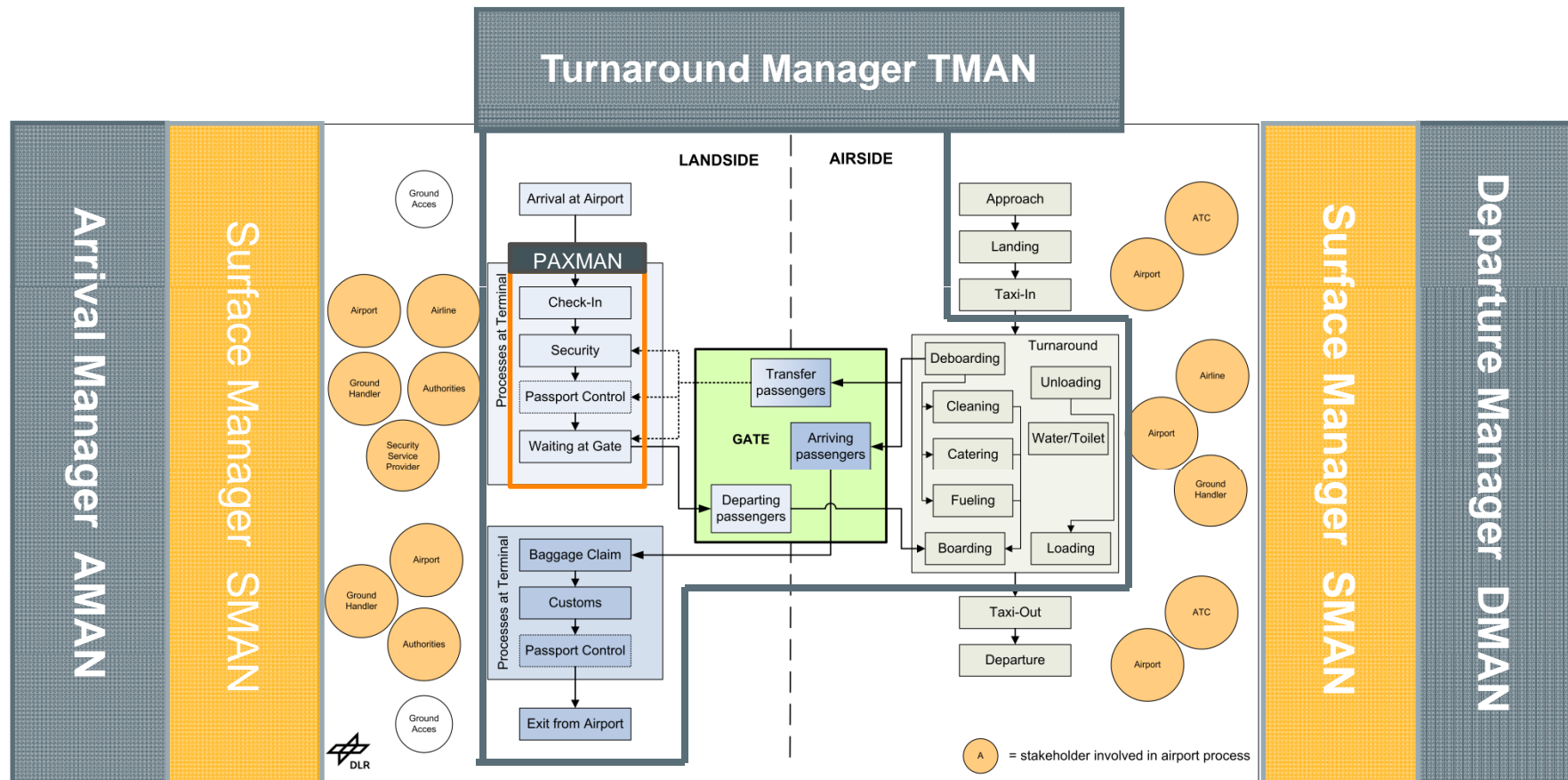
SMAN Surface Manager

A/DMAN Arrival & Departure

Integration

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Motivation

Air2Air Steering

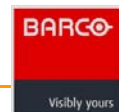
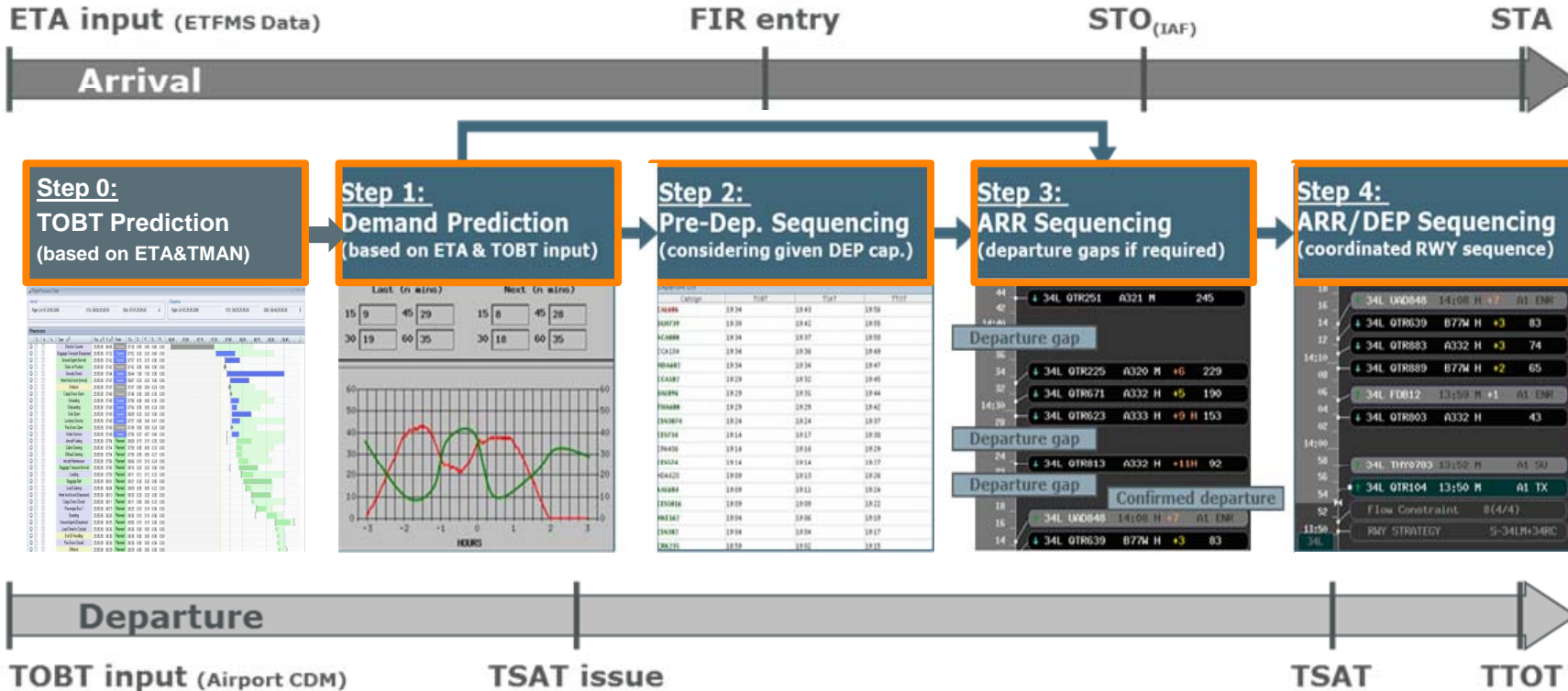
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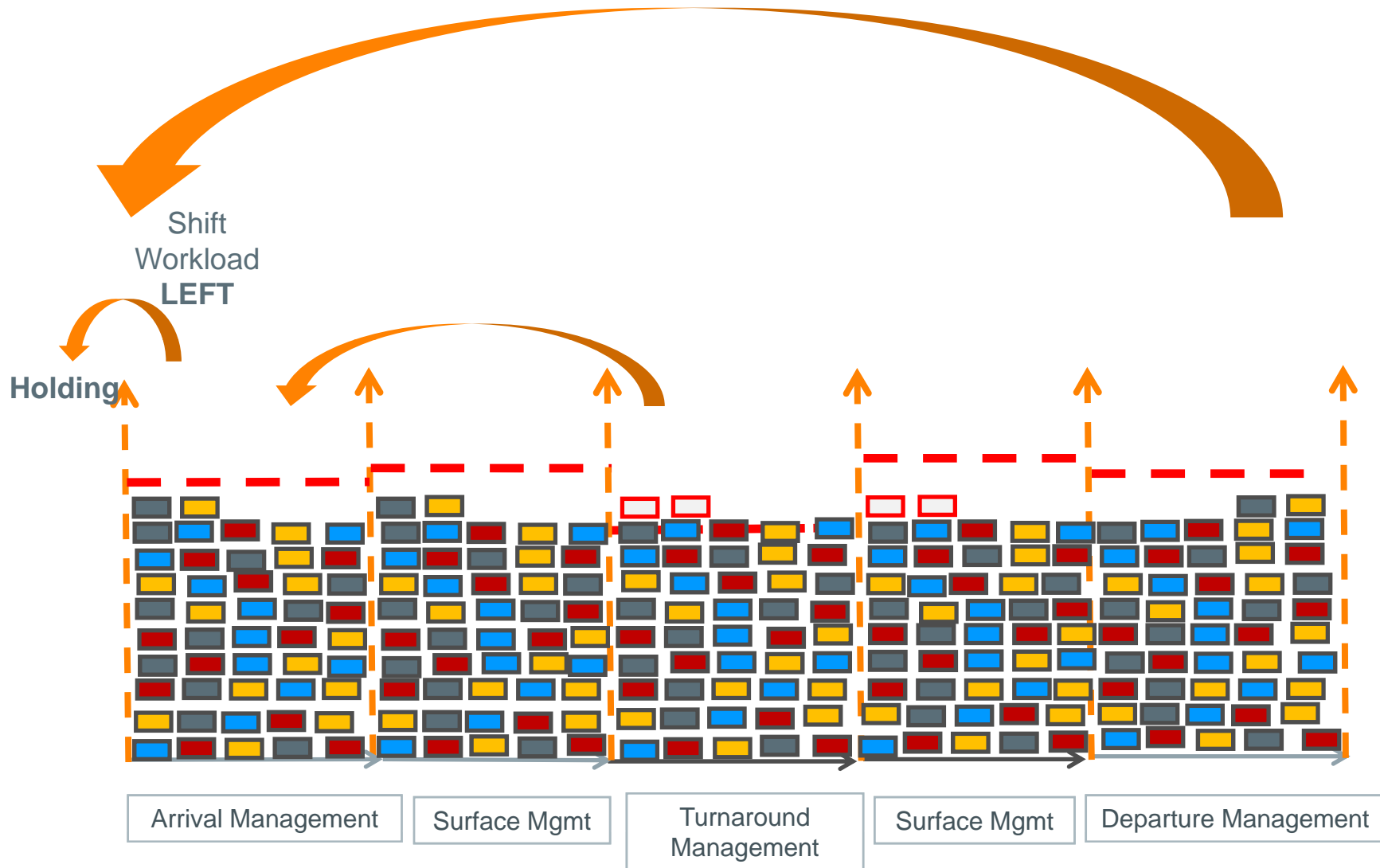
Results



Integrated Steering at Capacity Limits



GroundStar™
Efficient Airport Operations





- **42% improved airline ground handling punctuality** by TMAN
- measured and reported effects at KLM in Schiphol
-
- **26% improved airport departure punctuality** at the R&D Project Airport
(integration of A/DMAN-SMAN-TMAN-PAXMAN)
 - **12% saved engine run time after off-block** at the R&D Project Airport
(integration of A/DMAN-SMAN-TMAN-PAXMAN)
 - **21% saved waiting time between end of taxiing and take-off** at the R&D Project Airport (integration of A/DMAN-SMAN-TMAN-PAXMAN)
 - **62% of formerly denied passengers successfully boarded in a bottle-neck situation** at the R&D Project Airport (integration of A/DMAN-SMAN-TMAN-PAXMAN)



Motivation

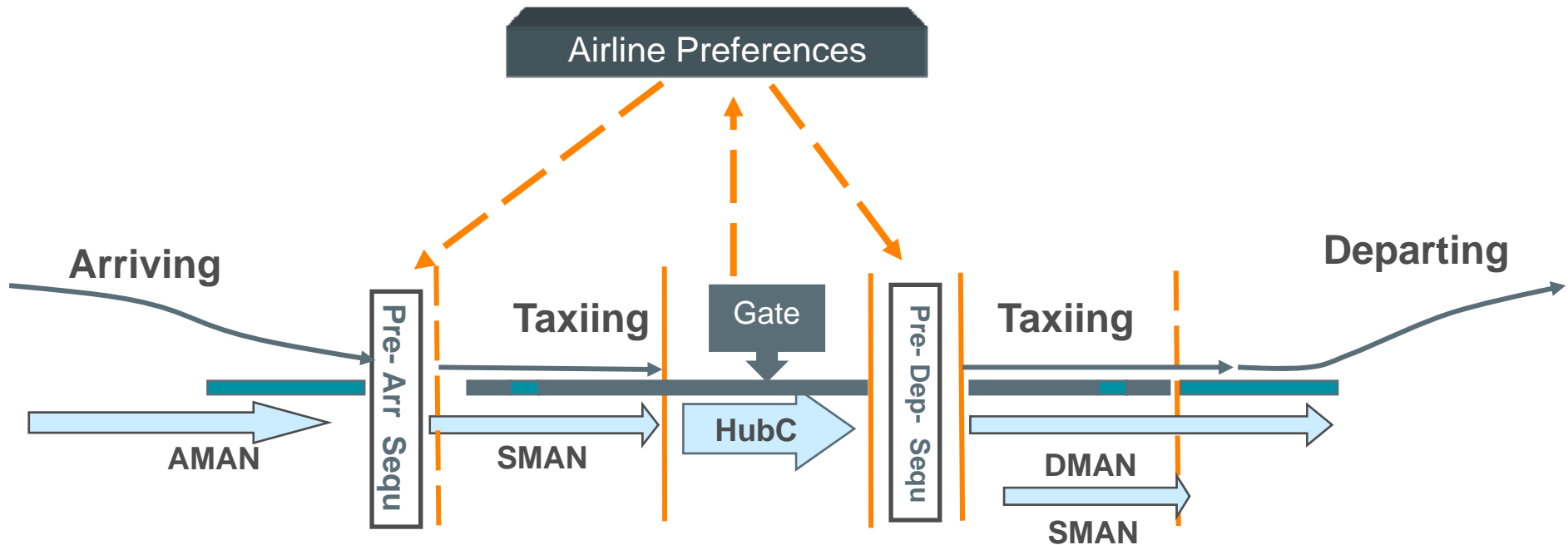
Air2Air Steering

Results

Customer Preferences

Tactical Joint What-if

Optimization Outlook



A dynamical steering capability between NASP, Airport and AO has become possible



Motivation

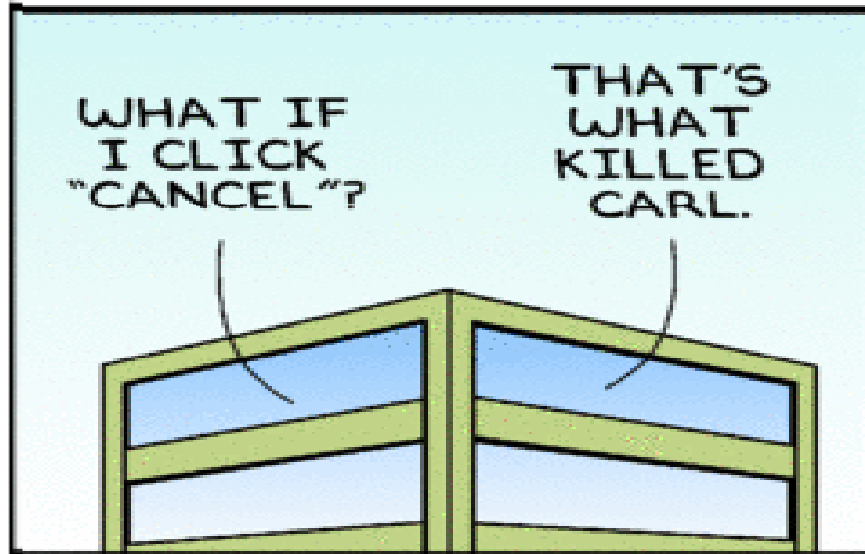
Air2Air Steering

Results

Customer Preferences

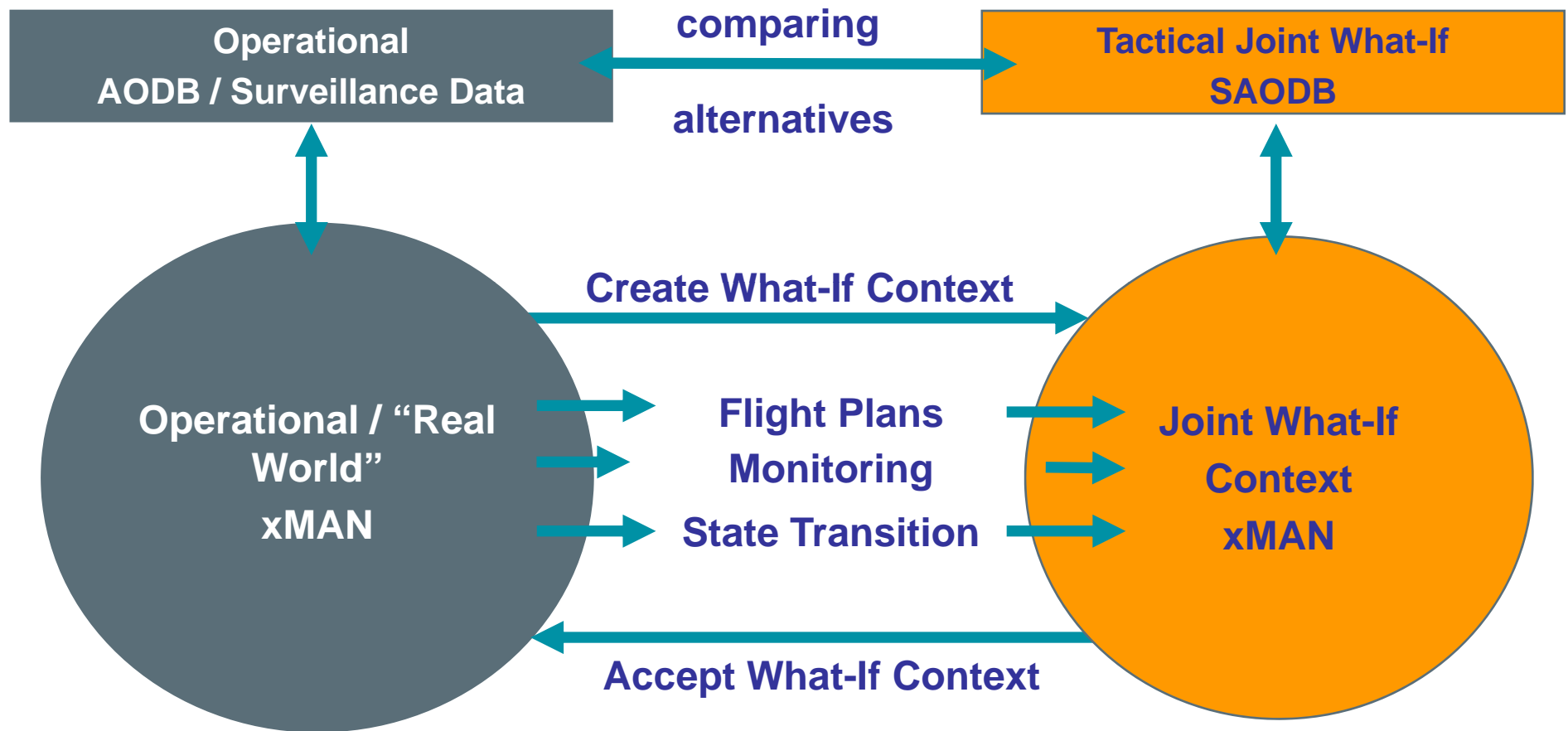
Tactical Joint What-if

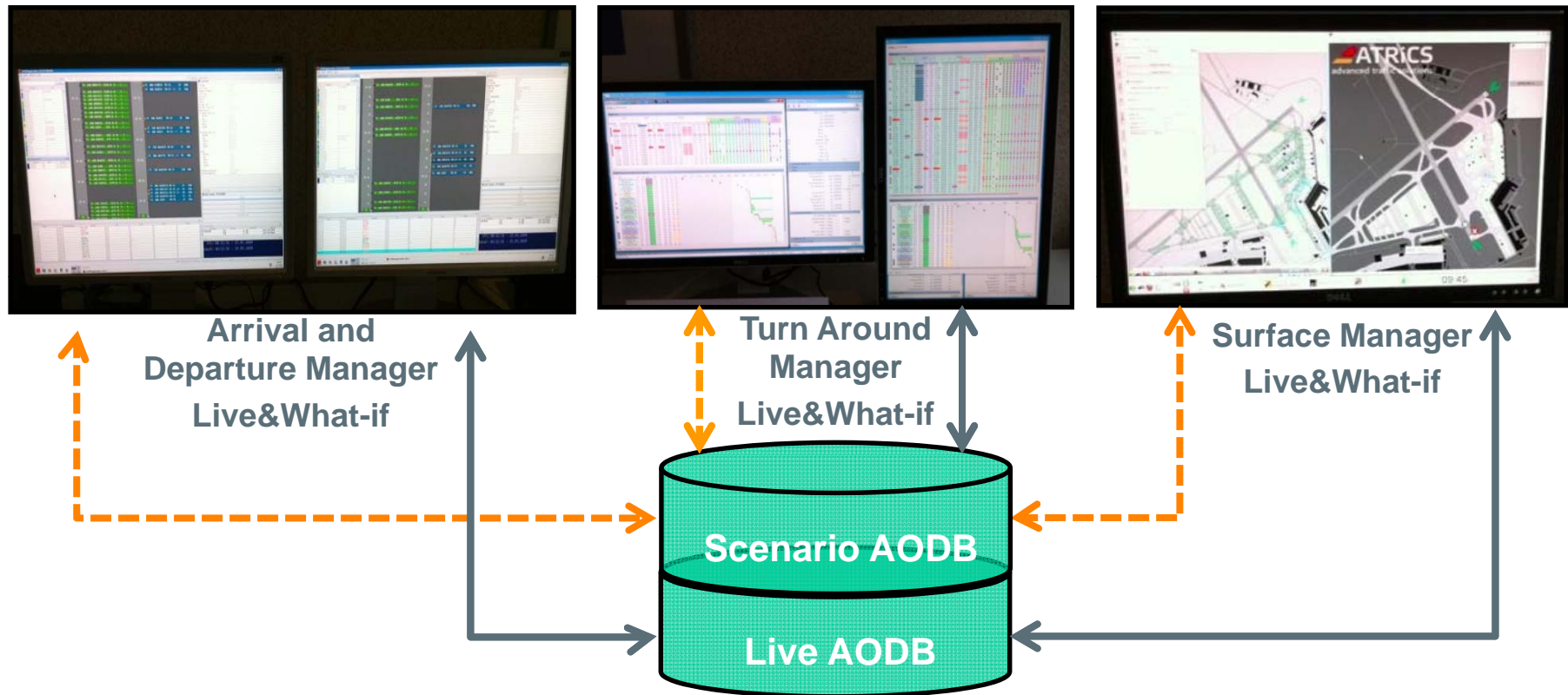
Optimization Outlook



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Motivation

Air2Air Steering

Results

Customer Preferences

Tactical Joint What-if

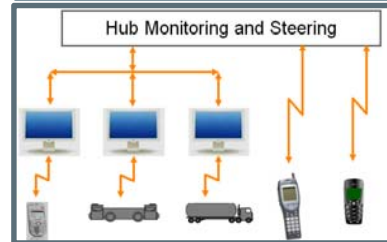
Optimization Outlook



ARR/DEP Sequencing (coordinated RWY sequence)

13	34L U90848	14:05 H +7	A1 ENR
14	34L QTR639	B77W H +3	83
12	34L QTR883	A332 H +3	74
14:15	34L QTR889	B77W H +2	65
06	34L F0812	13:59 H +1	A1 ENR
02	34L QTR803	A332 H	43
14:00	34L THY0783	13:52 H	A1 SU
56	34L QTR104	13:50 H	A1 TX
52	Flow Constraint: 8(4/4)		
13:50	RWY STRATEGY: 5-34LR+34RC		
34L			

Optimization Parameters

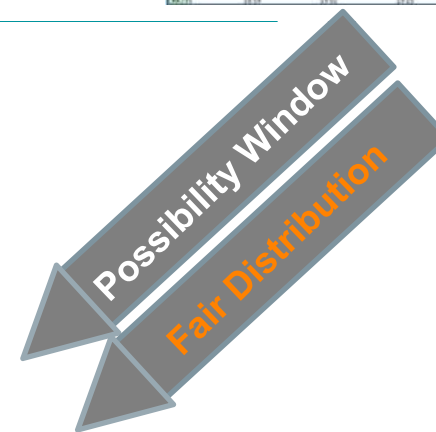


Pre-Dep. Sequencing (considering given DEP cap.)

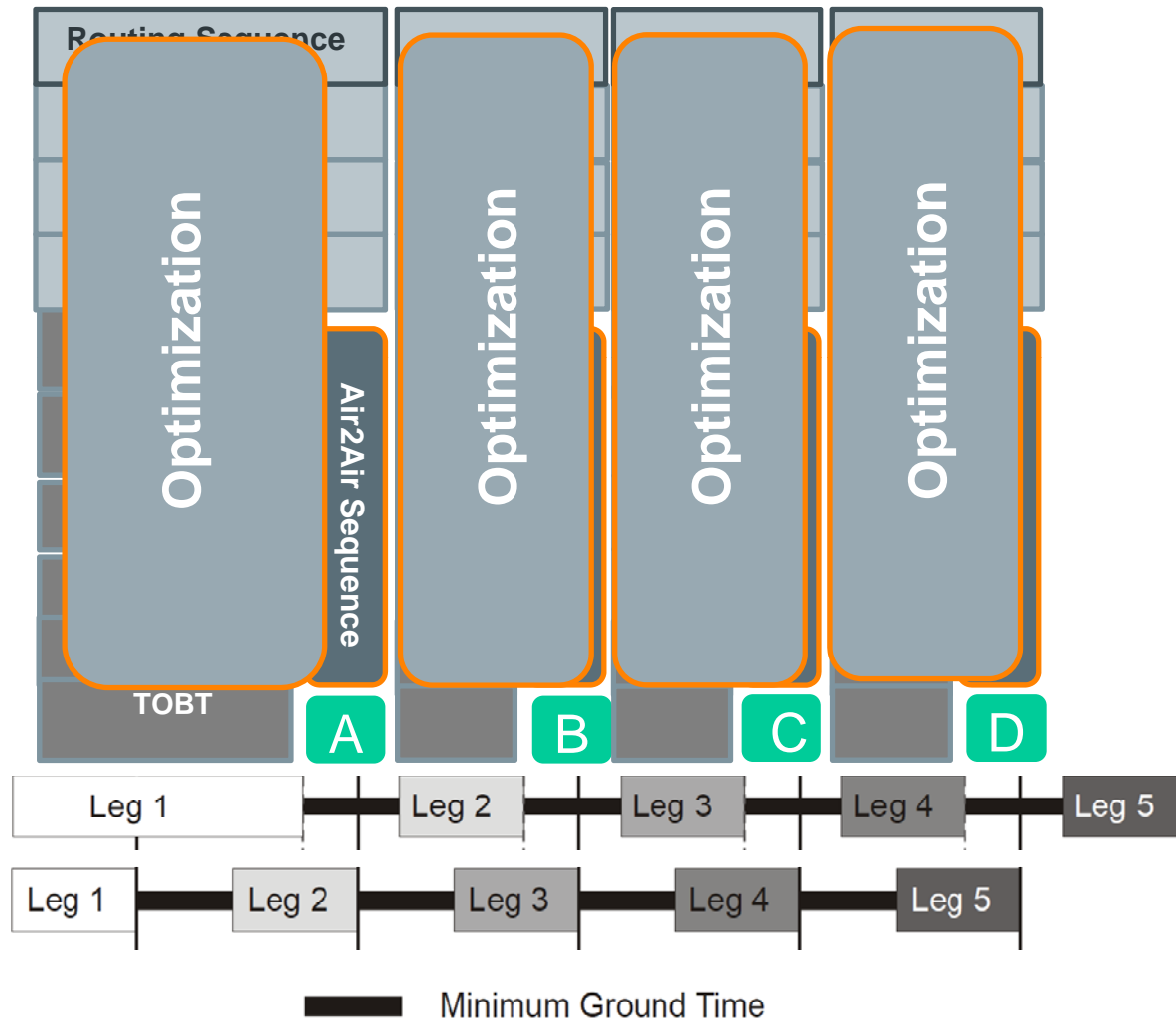
Departure Unit	SLIP	SLIP	SLIP	SLIP
34L886	13:34	13:43	13:54	13:56
34L839	13:39	13:42	13:55	13:56
34L888	13:34	13:37	13:50	13:50
34L224	13:34	13:36	13:48	13:48
34L887	13:34	13:34	13:47	13:47
34L887	13:29	13:32	13:45	13:45
34L876	13:29	13:31	13:44	13:44
34L888	13:29	13:29	13:42	13:42
34L848	13:24	13:24	13:37	13:37
34L734	13:14	13:17	13:30	13:30
34L404	13:14	13:14	13:29	13:29
34L524	13:14	13:14	13:27	13:27
34L225	13:09	13:13	13:24	13:24
34L884	13:09	13:12	13:24	13:24
34L884	13:09	13:09	13:22	13:22
34L847	13:04	13:06	13:18	13:18
34L887	13:04	13:04	13:17	13:17
34L221	13:03	13:03	13:15	13:15



- Revenue
- Connectivity
- Delay Cost
- Recovery Cost
- Resources Availability
- TOBT



Feasible Optimized Air2Air Sequence

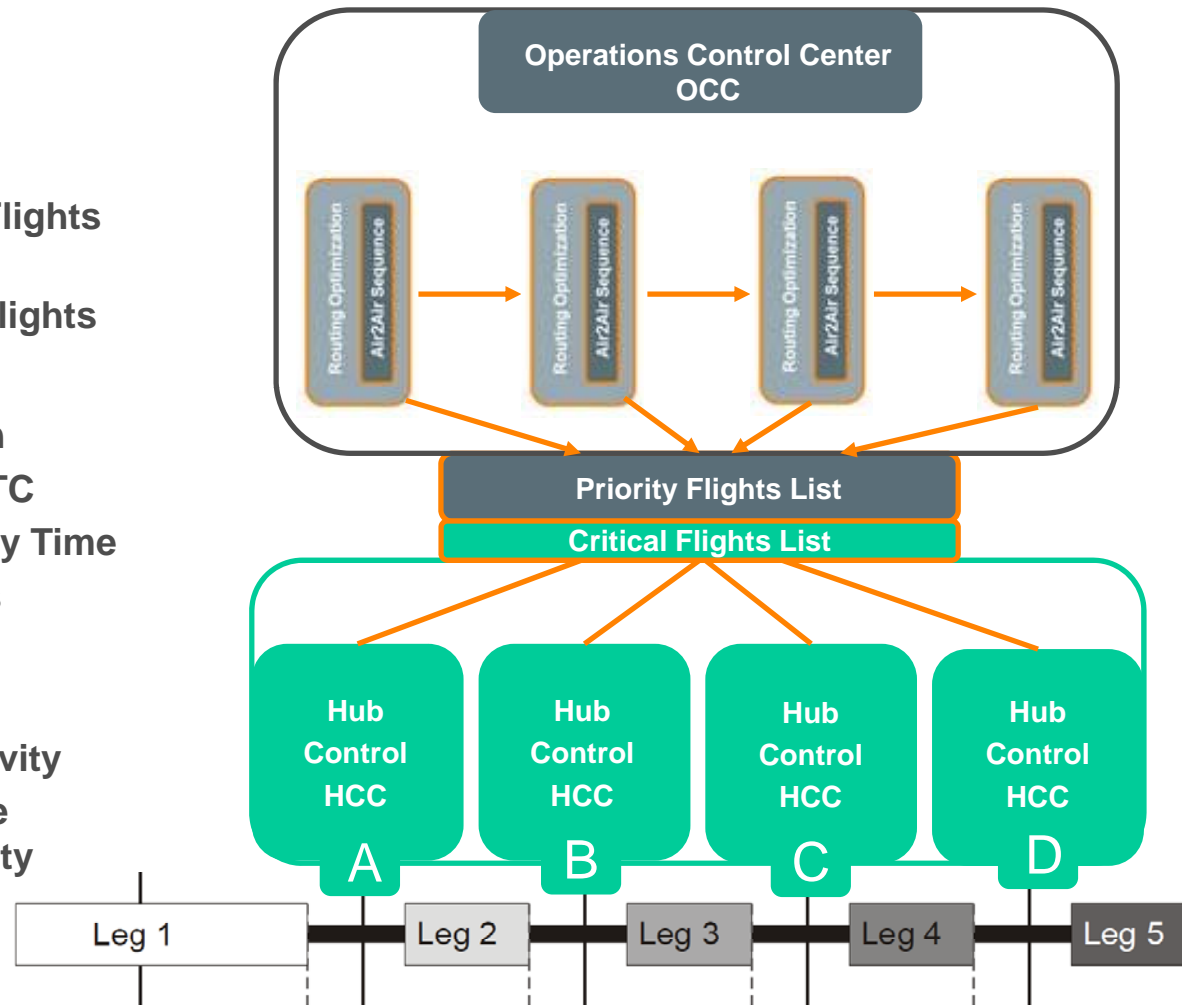




■ Integrated Optimization

- Priority Flights versus
- Critical Flights

- Based on
- Actual ATC Feasibility Time Windows
- Revenue
- Cost
- Connectivity
- Resource Availability





Lets think about it