Automation Design using Real Time Simulations
Follow-the-Greens Case Study

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Modelling and Simulation in ATM
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• Trajectory-based operation provided by air navigation services

• balance efficiency (provided by automation) and human capability
  – improve ANS operations productivity
  – reduce ATCOs’ need for intervention
  – automate routine task (ATCOs to concentrate on value-added tasks)
  – balance efficiency (provided by automation) and human capability
Automation Design Process

- Multidisciplinary, iterative approach
- Performance-driven concept of operations
Automation Functions and Levels

- Information acquisition
- Information analysis
- Decision and action selection
- Action implementation
Operational Scenarios

The flight crew of AB1310 expects an ILS approach for runway 27R. During the approach briefing, the crew decides to use the runway via RW and downloads a corresponding data link message. On the Primary Tower Display the intended runway exit is displayed in the flight details.

The pilot contacts AIR NORTH by RTF and reports established on location 27R. AIR NORTH confirms procedure of the aircraft on the Primary Tower Display and approves the runway exit via RW. The aircraft is anticipated by AIR NORTH.

Note: For aircraft without data link capabilities the flight crew can request their intended runway exit and runway via RTF in their initial call to AIR NORTH. If AIR NORTH established an alternative runway 27R, and via AB1, AIR NORTH then manually enters the exit into the Primary Tower Display.

(A) Runway
1. AIR NORTH issue a landing clearance on the Primary Tower Display which is displayed in the flight details.
2. All runway stop bars are activated and locked.
3. The Take-Off and Landing Guidance lights are extinguished.
4. The centerline lights on the selected route together with the corresponding Runway End Taxiway indicator lights are illuminated.
5. AIR NORTH transmits the landing clearance by RTF, which is read back by the pilot.
6. AB1310 confirms the threshold. The Holding Position Indicator lights on turnway A and B are illuminated at the intersection with AB1. To keep the runway exit clear of traffic.
7. AB1310 passes the touch down zone and the Take-Off and Landing Guidance lights are illuminated again.
8. During taxi and takeoff, the runway stop bars behind AB1310 are unlocked. In addition, the Aircraft Guidance and Alerting System provides distance remaining...
Validation SESAR / SEAC

Project start: 28-Jan-2015
Validation start: 20-Apr-2015

https://youtu.be/vLpmkB_mV7U
Adaptation and Configuration (DXB)
Results

Improvement

- Situational awareness
  in LVO: +80%
  in VMC: +40%

- Controller workload
  in LVO: -70%
  in VMC: -50%

- Taxi times
  in LVO: -40%
  in VMC: -20%

- Fuel burn and CO2
  in LVO: -40%
  in VMC: -20%

- Throughput
  in LVO: +100%

DXB
- 83.7 m Pax
- 420,000 Mov

FRA
- 60.1 m Pax
- 463,000 Mov

MUC
- 42.3 m Pax
- 394,000 Mov

Commercial Benefits
Live Trials at DXB
Regular Operations (since Oct 2015)

UAE AIP AD 2.0MDB-36
• Cockpit crew will be guided by green taxiway centreline lights in front of the aircraft to provide dedicated, safe and efficient ground movement.
• The system at OMDB is designed to provide pilots with visual guidance while taxiing during day and night operations as well as during periods of low visibility.