ICNS 2018, Washington
External Drivers on CNS Evolution

Fraport AG
An airport operator’s perspective

Simon Graf, Fraport AG
Agenda

Where are we?

What have we done regarding CNS?

What are current opportunities and issues?

What happens next?
Where are we?
Status Quo @ FRA
Traffic Development

<table>
<thead>
<tr>
<th>Year</th>
<th>Passengers</th>
<th>Change</th>
<th>Year</th>
<th>Passengers</th>
<th>Change</th>
<th>Year</th>
<th>Passengers</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>60,800,000</td>
<td>+6.1 %</td>
<td>2017</td>
<td>64,500,000</td>
<td></td>
<td>2018 (January)</td>
<td>&gt; +7 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,150,000</td>
<td>+3.6 %</td>
<td></td>
<td>2,200,000</td>
<td></td>
<td></td>
<td>≈ 0 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>460,000</td>
<td>+2.7 %</td>
<td></td>
<td>480,000</td>
<td></td>
<td></td>
<td>&gt; +8 %</td>
<td></td>
</tr>
</tbody>
</table>
Status Quo @ FRA
Traffic Development

 Movements per year

 Passengers per year

380,000 400,000 420,000 440,000 460,000 480,000 500,000 520,000 540,000 560,000 580,000 600,000 620,000 640,000 660,000 680,000 70,000,000 72,000,000 74,000,000

Movements  Passengers

Fraport AG - An airport operator’s perspective, April 11, 2018
**Status Quo @ FRA**

*Infrastructure*

- **Runways**
  - 25R 07L
  - 25C 07C
  - 25L 07R
  - 18
  - LDG: Dependent T/O & LDG
  - T/O

- **Terminals**
  - T1
  - T2
  - T3

- **Operating Hours**
  - Midnight
  - 5 AM - 11 PM
  - Midnight
Status Quo @ FRA

- Traffic growth
- Legal regulations
- Technological progress
- Environment
- Processes Operations
What have we done regarding CNS?
GBAS
GBAS Operations

- GBAS Operations are in use since 2014 for noise abatement reasons
- Possible applications have been increased gradually
  - ILS look-alike Approaches
  - Raise of the Approach Path Angle from 3.0° to 3.2°
GBAS Operations
Development & Issues

Application of curved approaches cannot be foreseen

- There is no legal basis and further research in curved approaches

GBAS airborne equipage and usage remains at a low level

- Airlines/Crews often have no benefit from GBAS approaches in FRA
- Although, we have an incentive program in Frankfurt, airlines rather use ILS

No independent approaches in combination of ILS/GLS & GLS/GLS

- Implementation of the legal requirements needed
- Expected in 2018

GBAS CAT II/III

- If the industry wants to implement CATII/III-operations, it is vital that all stakeholders work together to achieve the desired outcome
- We monitor the development and are open for updates
- Equipage and ILS will still be an issue
RNP
RNP Operations

Frankfurt

More interesting alternative High airborne equipage rate

<table>
<thead>
<tr>
<th>Arrival</th>
<th>Departure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2016:</strong></td>
<td><strong>2017:</strong></td>
</tr>
<tr>
<td>• Project (AAL Project) to realize curved approaches</td>
<td>• One RNP Departure route which is used regularly</td>
</tr>
<tr>
<td>• Trial flights to assess environmental and capacity benefits/impact of curved approaches using RNP1 + RF to xLS</td>
<td>• Monitoring of track and noise emissions</td>
</tr>
<tr>
<td>➔ <em>It was not possible to completely avoid populated areas w/o reducing capacity</em></td>
<td>• Conventional routes cannot completely be transferred to RNP routes</td>
</tr>
<tr>
<td>➔ <em>High complexity of mixed straight-in and curved approaches</em></td>
<td>➔ <em>First results show precise compliance with the track</em></td>
</tr>
<tr>
<td></td>
<td>➔ <em>New RNP routes are supposed to get implemented</em></td>
</tr>
</tbody>
</table>
What are current opportunities and issues?
Stakeholder Cooperation
Stakeholder Cooperation
Many stakeholders are involved in air-to-air and passenger processes

Stakeholders optimize their own fields of activity
Problems, irregularities, standard operations, etc. effect all and not least the passengers
Future Stakeholder Cooperation

Ground Coordinator

- Participants still possess their province but work together for a collaborative set target
- Participants have the same information and a common overview of the situation
- Timely recognition of irregularities and a suitable reaction to them
- The airport system and passengers profit of all participants’ professional knowledge

Problems, irregularities, standard operations, etc. are faced together as a team and operations runs fluently
**Future Stakeholder Cooperation**

*Ground Coordinator at all airports for an optimal airspace and airport utilization*
Drones/UAV
Drones/UAV at airports

- Number of Drones/UAV is expected to increase to nearly 70m till 2021.
- They are and will be very different in weight, size and area of application.
- Drones/UAV are a hazard and opportunity for airports at the same time.

Source: https://dronelife.com/2015/08/19/why-pilots-should-really-be-afraid-of-drones/
Source: http://fastsalttimes.com/sections/obzor/1629.html
Drones/UAV at airports
Challenges & Issues

Safe integration of drones into airport operations

- Standards have to be developed by cooperations from airports, ANSPs, airlines and authorities.
- There should be generally applicable rules for drones. Different rules for each States have to be avoided.

Drone detection

- Drones which pose a risk to the airport system have to be easy detectable.
- It should be possible to take over the control of/neutralize the drone without interfering other airport or aircraft systems.

ATM for drones

- A concept has to be worked out by all relevant stakeholders (ANSP, airlines, airports, authorities and manufacturers) how aviation can benefit from drones.
- This should include ATC procedures, authority approvals, safety cases, airport operations, etc.
What happens next?
Outlook
Future Technologies

Voice recognition in aeronautical radio service
- Highly occupied frequencies could be relieved
- Communication could become more simple

Saving & sharing of operational data
- A lot of data is collected during a flight
- Relevant data should be available to flight's stakeholders (ANSP, other A/C, airports, etc.)
- Data should be easy accessible (e.g. via Data Link)

Runway Status Lights
- Fully stand-alone lighting system which indicates if a runway is occupied or not
- Pilots get an additional lighting information which is totally independent of other systems

Enhance safety and reduce workload
Smother ATM
Enable 4D-Navigation
Summary

- We see no chance right now to implement curved approaches with GBAS.
- RNP is the better alternative for us.
- The Ground Coordinator Concept seems to be a good opportunity to get more out of the whole system.
- Drones/UAV and their functions will have an impact on airport operations – a safe integration into the system is paramount.

*Isolated applications hamper further improvements.*

*We have to work together to achieve future goals and to contribute to a smoother air traffic system.*
Gute Reise!

We make it happen
Back Up
GBAS Operations
Airborne Equipage @ FRA

Data: Eurocontrol CNS Dashboard
GBAS Operations
Airborne Equipage @ other airports w/o GBAS

Data: Eurocontrol CNS Dashboard
Ground Coordinator
Umbrella Concept

Ground Coordinator

Landside
Airside
Door-to-Door