AN AIRPORT'SVIEW ON THE SESAR OPERATIONAL CONCEPT

M. Huhnold

Fraport AG
60547 Frankfurt
Germany

Overview

Within the SESAR definition phase, one of the key deliverables is the future operational concept. By this concept, all technical and procedural developments coming in the next phases of SESAR are influenced to a large extent. It is commonly agreed within the stakeholder groups contributing to the operational concept, that the airports have to play an increasingly important role within this concept. Therefore a very close linkage of the airport processes to the rest of the ATM process chain is an essential factor for success.

The involvement of the airport and its operational entities into the ATM process will be described in more detail. The focus from an airport's perspective has to be an "enroute-to-enroute" one rather than a "gate-to-gate"-oriented view. As a basis for the concepts foreseen for 2020, a system wide information management is a prerequisite. Based on this, a common, collaborative decision making process has to involve the taxiing phase as well as gate and stand allocation and aircraft ground handling.

Not only the optimisation of the process in terms of capacity and throughput but also environmental and safety aspects have to be considered to ensure a sustainable growth of the air traffic with respect to the goals set by SESAR.

1. The Goal of the SESAR Operational Concept

The SESAR Concept of Operations defines the requirements on the ATM system in Europe for 2020 and beyond.

It also aims to satisfy the four high level expectations set by European Commission Vice-President Jacques Barrot:

- Enable up to a 3-fold increase in air traffic movements whilst reducing delays,
- Improve safety performance by a factor of 10,
- Enable a 10% reduction in the effects aircraft have on the environment,
- Provide ATM services at a cost to the airspace users which is at least 50% less.

2. Introducing the Concept of Operations

The heart of the SESAR Operational Concept consists of trajectory based operations combined with new methods of separation provision. These core elements are accompanied by enhanced collaborative planning processes, associated airspace organisation and management, and a redefinition of the airports' role within the ATM system.

The over-arching principle is that a Business Trajectory with a minimum of constraints, representing the best business outcome for the airspace user, will be established for each flight. Airports and ANSPs will facilitate the execution of this trajectory, disturbing it only for reasons of separation and/or safety or when the user and network goals relating to capacity, environment and economic performance are best met through maintaining capacity and throughput rather than the optimisation of an individual flight.

3. The Role of Airports within the Concept

Airport growth is limited by physical and environmental constraints. Constructing new runways is one of the most difficult and lengthy processes within today's aviation industry. A situation that is especially true for the European Core Area. It is therefore necessary to seek out other initiatives and best practices to make full use of available yet underused capacity in addition to long term planning for the development of new runways. One possibility

is to link airports within a certain distance by ground transportation (e.g. high speed trains) to free up capacity on a congested hub and transfer some proportion of the passengers to a nearby smaller airport.

In the SESAR concept the airport is a fully integrated element in the entire transport system both as a major component in a seamless air transport process and also as a "good neighbour", working with and complementing other modes of transport to the maximum benefit of the community and the environment. Airports, and groups of airports, will be integrated into the overall regional transport infrastructure.

The airport view of the ATM system is from the perspective of "en-route to en-route". Not only the runway and surface movement is part of the concept but also the ground handling- see fig. 1. In the SESAR concept the current gate-to-gate approach moves towards one of considering and managing aircraft and flight operations as a single continuous event. Thus Collaborative Decision Making (CDM) is a key building block of the future airport concept in order to maintain network performance with predictable arrivals and departure times.

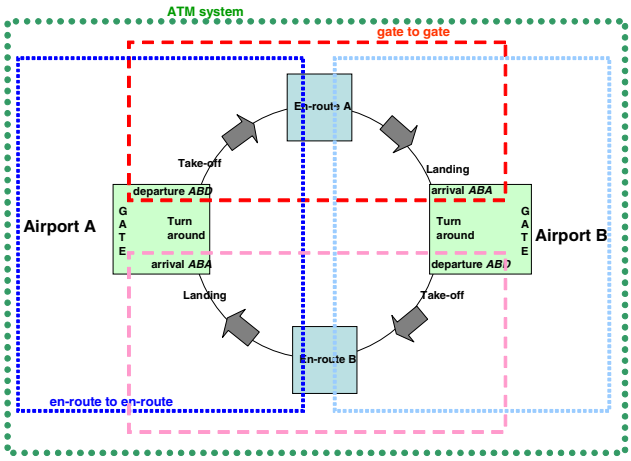

Fig. 1: From "Gate-to-Gate" to "Enroute-to-Enroute"

The Airport's role in the Concept of Operations should reflect the following principles:

- A Common understanding of the assumptions inherent in the capacity planning process and the interactions between the demand mix and the airport resources
- A Common Planning Process to enable the use of a single demand data source or repository, reflecting customers' expectations and used as a reference for the execution phase.
- A Common Situational Awareness of traffic evolution during the execution phase with early and accurate information of traffic deviations to allow the recovery of the planned situation by launching timely corrective actions.
- A Common Performance Framework to all stakeholders sharing a common target, aiming at on schedule performance meeting the business needs of the airspace users.

In consequence, the airport operation has to be an integral part of the business trajectory: The airport's sector crossing time equals the taxi times in and out as well as the turn around time. To achieve this, all essential airport processes work collaboratively, embodied in a physical or virtual Airport Operations Centre (APOC) using CDM principles in a SWIM (System Wide Information Management) environment- see fig.2.

For an optimized process, the link between all the depicted components is essential. Only by sharing the information between the affected operational actors on a system level a seamless information can be achieved. The Advanced Surface Movement Guidance and Control System (A-SMGCS) will become an essential component to monitor and control the movement of aircraft on the ground. Hence not only the ground based A-SMGCS components have to be enhanced, but also the communication with the cockpit and the system onboard the aircraft have to be capable of interacting in an appropriate way.

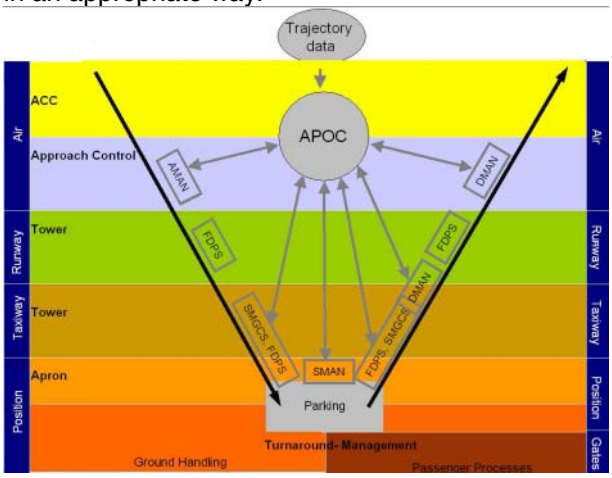

Fig. 2: Process Model

The inclusion of the aircraft turnaround in the trajectory based process is essential, because in this operational stage some minor disturbances can cause huge amounts of delay.

Another important aspect of the future operation will be the reaction mechanisms to deviations from the

agreed operations plan caused by external influences like weather or internal factors such as aircraft inoperability or runway closures. Only by sharing information about such occurrences and deciding on common rules in a collaborative way, their impact can be kept on a minimal level.

Besides the process optimization, all methods of increasing airport and runway throughput will be utilised as appropriate. These will include:

- Reducing the dependency on wake vortex separation through improved classification, prediction, detection and avoidance,
- Minimising runway occupancy time through improved runway and taxi way design, and "brake to vacate" procedures,
- Improved spacing on final approach through the use of controller and airborne tools,
- Reduced departure spacing through improved wake vortex separation and use of airborne spacing tools,
- Optimising runway configurations and dependencies between multiple runways through more accurate surveillance techniques and controller and airborne tools,
- Interlaced take-off and landing procedures where beneficial,
- Increasing throughput in low visibility conditions through the use of new landing systems, integrated on-board sensors, and airborne mapping and guidance tools.

Most of the technologies and systems required for throughput improvements will also have a positive aspect on the process side- e.g. better surveillance systems provide more accurate data and therefore systems like the Arrival Manager can operate in a more exact way.

4. Safety Aspects

All possible measures towards runway incursion prevention have to be taken by a harmonised effort. Involvement of A-SMGCS and situational awareness on board the aircraft is essential to achieve the required quantum leap. The technology used for this purpose is to some extent the same as for the process optimisation.

Common safety-reporting standards are required for local safety management teams, where incident reporting will be discussed and actions agreed on, and lessons learned distributed to the wider community. Safety assessments have to be carried out when implementing new procedures and systems, by the definition of objective and commonly accepted indicators and reference levels.

5. Environment

The environmental impact of the rapidly growing aviation industry is more and more in the focus of political discussions. For the airports it is essential to act as a "good neighbor", which means, that all possible measures to mitigate the environmental impact have to be taken.

The operational concept of SESAR incorporates improved planning and queue management processes to reduce inbound and outbound holding and by this the amount of gaseous emissions in the vicinity of the airport will be minimized.

The main environmental factor related to the airport and its surroundings is the aircraft noise. With respect to this, a major step forward can be achieved by the introduction of curved approaches. If a variation in the glidepath angle can positively contribute, is subject to further research. In consequence, all possible measures have to be taken in a joint effort by the airports, the airspace users and the ANSPs to achieve a sustainable growth for the whole aviation business.

6. Conclusion

To reach the goals of SESAR, the airport will have to be an integral part of the air transport chain. The first steps in this direction are already taken on some airports by establishing management systems or CDM strategies. However, for a seamless ATM system throughout Europe, these techniques have to be applied on a broader scale. Only by involving all affected process parts the global optimum can be achieved. For the airports- and especially the large hubs- this will lead to a much deeper involvement in the ATM process by incorporating airport activities such as turnaround into the aircraft's trajectory.

The environment and especially noise will become a major factor potentially limiting the growth of the aviation. Only if all available technologies are applied in a common effort between airlines, ANSPs and airports, a further growth will be accepted by the majority of the public.

7. Literature

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