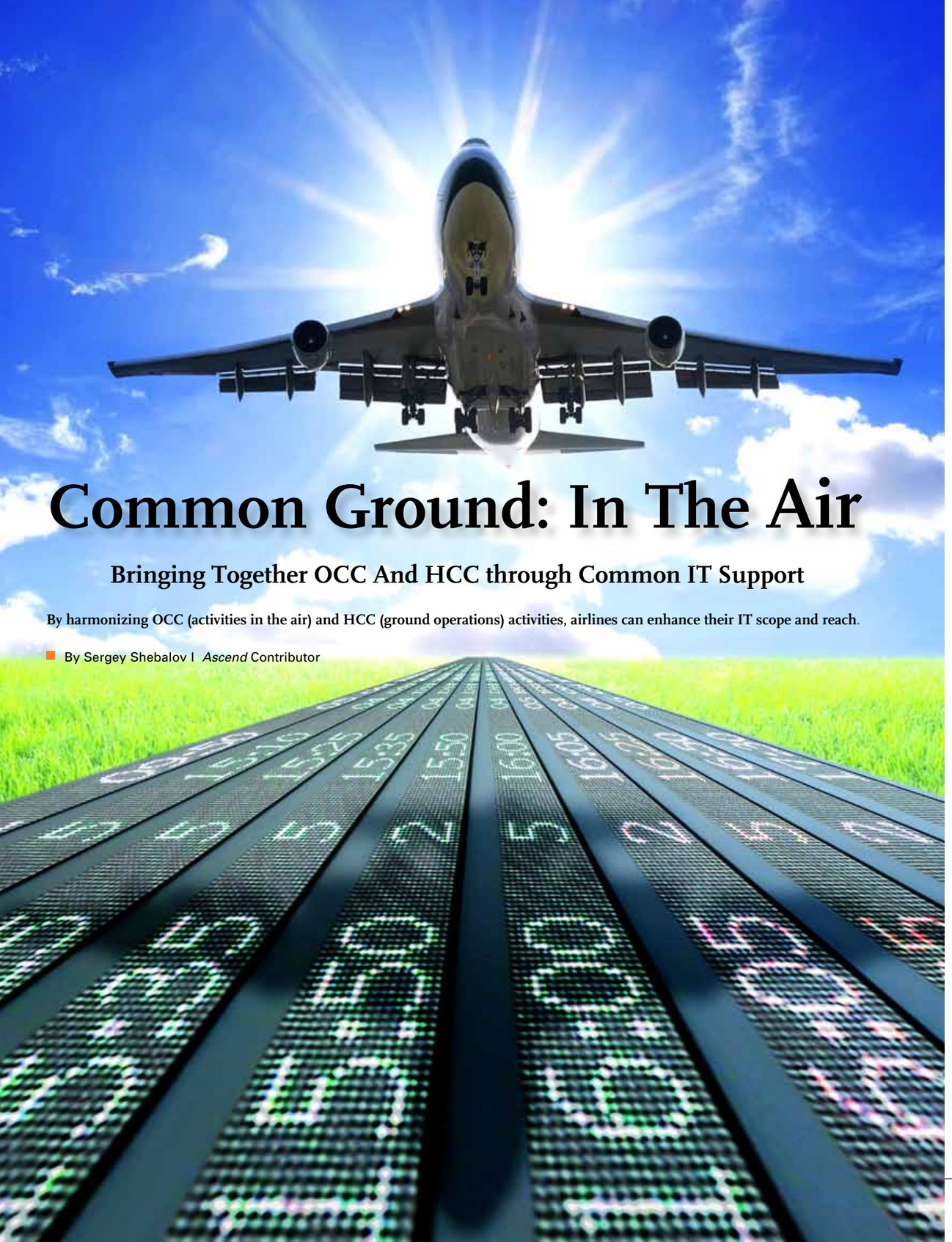


Common Ground: In The Air

Bringing Together OCC And HCC through Common IT Support

By harmonizing OCC (activities in the air) and HCC (ground operations) activities, airlines can enhance their IT scope and reach.

By Sergey Shebalov I *Ascend* Contributor

Before a pilot can say "we're ready for takeoff", all systems must truly be "go." Behind that "go" are complex systems that must work together or planes remain on the ground.

An airline's operations represent a complex and multifaceted process — requiring both collaboration among numerous groups within the carrier's purview and communication with customers and service providers.

Different procedures performed on the day of operations — both in the air and on the ground — are interlinked by complicated relationships. Quite often, their effect on one another can be very difficult to predict.

In addition, weather, special events, security needs, labor actions, catastrophes and other irregular events require continuous refinements to plans. It becomes critical to reevaluate different scenarios and select the best strategy within an extremely short timeframe.

On the day of operations, operational plans are developed in two different environments:

- The airline operations control center (OCC), also referred to as the systems operations control center (SOCC) or the integrated operations control center (IOCC),
- The hub control center (HCC), also commonly known as the airport control center (ACC) or hub control (HC).

The OCC is responsible for overall network operations and processes as well as people involved in activities in the air. The HCC focuses on ground operations at a station.

A carrier that has significant operations from several airports might consider having several HCCs. This may include consolidating operations of co-terminus airports under one HCC.

There are several organizational and administrative setups for OCCs and HCCs. In all of them, consistency and availability of information for decision-making processes is crucial for organizing efficient operations.

OCC Responsibility

The operations control center is responsible for overall network performance and operations management.

There are six primary components of operations management controlled by an OCC:

1. Schedule management tracks flight operations and reacts to disruptions by adjusting arrival and departure times, diverting or canceling flights.
2. Flight management extends schedule management to individual flight planning. It ensures that each flight has an optimal trajectory; complies with airport, airspace and aircraft restrictions; and manages disaster recovery needs.
3. Aircraft management starts with logical lines of flying created by a planning department. It assigns those lines to specific tails, while adhering to operational and maintenance restrictions.
4. Maintenance management keeps track of and updates flying hours, cycles and calendar-day counters for each tail. It also schedules maintenance activities to ensure that all tails are fully eligible to fly their assignments.
5. Crew management controls tactical planning, tracking and recovery procedures for cockpit and cabin crew. It also includes access capabilities that enable two-way interaction between the OCC and crewmembers.
6. Passenger and payload management monitors expected passengers and cargo loads by receiving continuous updates from revenue management or inventory systems. On the day of operations, it interacts with the departure control system, controls critical connections and special-service requests, and interacts with the reaccommodation system to create new itineraries for disrupted passengers.

All these activities are automated within *Sabre® AirCentre™ Enterprise Operations*, a suite of solutions that supports:

- Movement control,
- Crew management and services,
- Flight operations,
- Weight and balance,
- Flight tracking,
- Maintenance control,
- Irregular operations management.

These products provide an integrated environment for decision making and collaboration.

HCC Functionality

Operating on a more detailed level than the OCC, the HCC uses the overall operations framework defined by the OCC. HCC implements this framework by managing ground resources required for aircraft turnaround activities, passenger and payload connections, terminal operations, and other processes.

The HCC must also provide feedback to the OCC on decisions that might result in various effects at the network level.

Similar to the OCC, the operational data and decision-making process for HCC operations can benefit significantly from integration. In addition, the IT tools and infrastructure used by the HCC enables two-way communication with multiple parties who support those operations.

Sabre Airline Solutions® offers an integrated hub control decision-support system that includes four management capabilities — schedule management, passenger and payload, aircraft turnaround management and resource management. They are based on a unique optimization engine and employ a "same-feel" user interface.

Schedule Management

Schedule management is responsible for tracking flight operations during the day and reacting to disruptions by adjusting arrival and departure times and gate assignments. The module interacts with aircraft tracking and movement management solutions as well as irregular operations management used by an airline's OCC.

Passenger And Payload

Passenger and payload management handles passengers, luggage and cargo connections using information from the departure control system and aircraft tracking and movement management solutions. In advance, multiple transfer and recovery options are identified, and information is collected for their accurate evaluation. For example, possible transfer options for passengers might include:

- Regular terminal transfer, including an analysis of hard-stand parking that consists of a bus trip from an aircraft to a terminal, transfer within the terminal (or between terminals, as required) and possible transfer from the terminal to an aircraft.
- Fast terminal transfer is similar to regular transfer — except that transfer within a terminal is assisted by allocating designated personnel and equipment. It might also involve going through

Process Separation Between OCC And HCC

OCC and HCC Responsibilities OCC is responsible for operations on a network level while HCC is focused on operations in and around the airport. Depending on the origin of a disruption, either OCC or HCC acts as a leader in recovery procedures.

fast-track processes governing security- and immigration-check corridors.

- Ramp transfer, whenever possible, eliminates trips to the terminal by picking up passengers directly from an aircraft and transferring them using a special transfer vehicle.
- Reaccommodation to the airline's next available itinerary, which requires evaluating its schedule and availability so the best reaccommodation can be made. The evaluation involves estimation of delay-compensation costs and hotel accommodations as well as meal vouchers in case of an overnight stay.
- Reaccommodation to a flight operated by a different airline presents another viable option. In addition to the costs associated with delay compensation, this option also includes the costs of booking passengers on a different carrier.
- Departing flight delay and restoring the connection might be feasible. The cost associated with this option is estimated based on either an average delay-cost-per-minute or a more detailed analysis that can be prepared in advance with regard to delay consequences for a particular flight. The feasibility of the delay relating to the airline's own network as well as airport and airspace restrictions must also be checked.

Evaluation of each option depends on the multiple passenger-compensation rules and contracts a carrier might have with other carriers, local hotels and other service providers.

User controls allow airlines to set parameters that specify a value for each resource and define restrictions for the selection process. In this case, recovery procedures will automatically pick the best option and transfer it for execution, or a controller will have multiple choices from which to manually select the best option.

Aircraft Turnaround Management

Aircraft turnaround management focuses on tasks and processes associated with turning an aircraft around and continuing its operations. It identifies tasks that must be completed between chocks-on and chocks-off, defines relationships among them, and constructs a task network. Time intervals note the time in which each task must be completed. It recognizes "critical tasks" as those that cannot be delayed without causing further disruption.

Turnaround networks are prepared in advance for each airport, aircraft type, season and time of day, among other variables. They might also have other features specific to the conditions under which a turnaround must be performed.

The aircraft turnaround management solution uses an event-tracking mechanism that reevaluates task status each time external factors result in arrival- or departure-time change or delay of a task that affects other tasks. Leaders of the ground teams are equipped with mobile devices to enable a two-way connection with the HCC. Ground team members record when each task is complete. They then either proceed with another planned task or receive a new assignment.

Ground-service coordinators at the HCC monitor the process of a turnaround and determine if they need to intervene. The intervention may include assigning additional staff, rescheduling and restricting task sequences, and/or working with other HCC groups.

Resource Management

The resource management capability is an extension of staff and gate planning systems. It works in a hub-control environment so multiple tasks can be automatically generated for airport resources. These include passenger buses, bag tags, baggage carousels, terminal personnel and fast-transfer equipment.

Data and process integration significantly improves decision making and minimizes the effects of operational disruptions. For further efficiency, a system can be programmed to interact with airport security and third-party service providers including catering and fueling.

OCC/HCC Integration

Neither OCC nor HCC — in isolation — can successfully recover from a complex disruption. That is why integrating data and decision-making processes is considered to be a priority for any future airline operations decision-support systems.

The OCC does not have access to detailed status information for ground processes and availability of airport resources. Even if the information was available, the high speed at which decisions must be made at an airport level does not allow waiting for an optimal solution for the entire network.

On the other hand, if the HCC makes decisions without accounting for a network effect, it might cause even more problems at down-line stations.

From an HCC perspective, for example, a flight delayed at a hub should be rushed to departure to minimize the delay. But even a short delay might cause passengers to miss their connections. The cost to reaccommodate these passengers might be much higher than if they were viewed from a "network" perspective and moved to a different route with the same destination.

Complexity of airline operations does not allow the OCC and HCC decision-making processes to be combined in one automated system. Yet, critical interdependencies of the operations will not permit these processes to be completely separated.

To help solve this problem, *Sabre Airline Solutions* offers two decision-support systems that focus on the separate areas of airline operations. They continuously interact with one another and account for each other's objectives, restrictions and priorities.

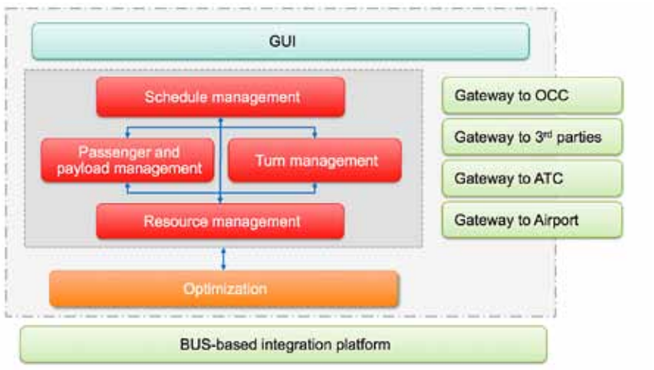
An essential prerequisite for establishing a truly integrated business process between the OCC and the HCC is data integration.

Both entities must have instantaneous access to all relevant information. This data may come from multiple internal systems, such as:

- Departure control,
- Revenue management,
- Ground resource management,
- Aircraft movement management.

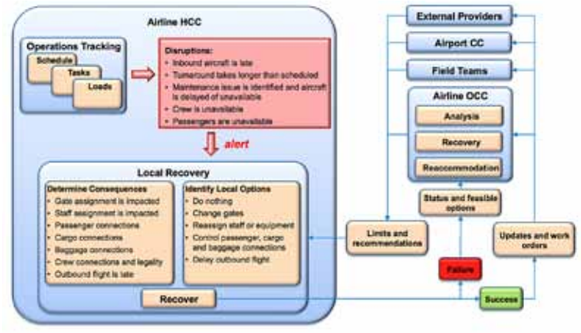
In addition, data from external sources, such as the airport management system, catering and fueling providers, is required. This information must be consolidated, verified for consistency and transformed into a format to make it usable by all automated systems that support airline operations.

Schematic Structure Of An HCC Decision-Support System



Instant Information Exchange The core of *Sabre AirCentre Enterprise Operations* includes traditional airport RMS, passenger and payload connection management, aircraft turn-around control and schedule management that allows instantaneous information exchange with OCC. These modules use the same format GUI and an integrated optimization engine that guarantees consistency of decision making. HCC DSS access all required information through a BUS-based integration platform and provides gateways for which to collaborate with other airport agents.

HCC/OCC Recovery



Local Recovery A local Recovery procedure is initiated in the event a disruption originates at an airport. If HCC is able to recover within regularity buffers predetermined by OCC, it generates necessary adjustments to plans, issues work orders and informs OCC. If not, control is transferred to OCC and a global recovery procedure is initiated. OCC takes into account airport capabilities, generates a solution that minimizes recovery cost for the entire network and communicates the plan to HCCs of all affected hub stations.

To fulfill this requirement, *Sabre Airline Solutions* developed interfaces that use an enterprise-service, bus-based integration platform for multiple sources and providers.

Such integration enables airlines to process a large volume of transactions and easily manage errors. This is especially critical in situations in which data quality may often vary from one source to another.

Once all necessary data has been verified and made available, an integrated framework for decision-making processes in the OCC and the HCC can be established.

To provide a structural approach for recovery operations, *Sabre Airline Solutions* has introduced a two-level procedure: "local" recovery and "global" recovery. Prior to the day of operations, the OCC must develop a set of regularity buffers that are defined on two levels: "hard" and "soft."

A hard buffer cannot be violated without OCC involvement. A soft buffer can be violated by the HCC but a penalty will apply. Penalties are estimated by the OCC in advance and must reflect the cost of a delay spread throughout the airline's network.

The OCC, for example, may predict that a 15-minute delay for a departing flight would not cause any ripple effects and, therefore, set it as a soft buffer. Any delay between 15 minutes and 30 minutes can be recovered by increasing the flight speed. Therefore, 30 minutes might be set as a hard buffer, and the cost associated with additional fuel burn should be assessed as a penalty.

Under the integrated-recovery concept, both the OCC and the HCC monitor operations. If a deviation from plan occurs, either the OCC or the HCC is specifically designated to analyze and react to the deviation.

If a disruption originates at an airport — for example, one of the turnaround tasks is delayed — the HCC first examines the situation and decides whether the incident can be resolved within the buffers provided by the OCC. If a resolution is possible, the necessary adjustments to plans and work orders are performed, and the OCC is informed about those adjustments. This is a local recovery.

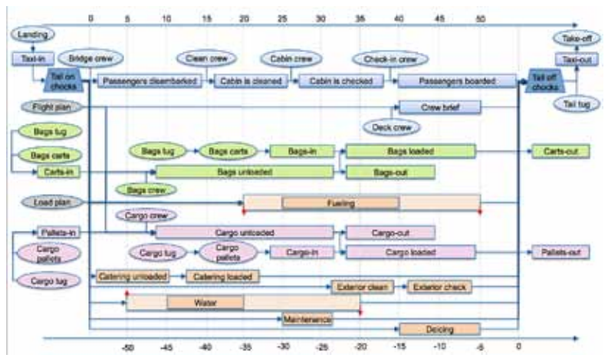
If the HCC is not able to recover within regularity buffers provided by the OCC, it transfers control to the OCC — along with all identified feasible recovery options. The OCC then considers an airport's capabilities, generates a solution that minimizes recovery costs for the entire network and communicates the plan back to the HCCs of all affected hub stations. This collective effort is a global recovery.

If an irregular operation originates outside of an airport, the OCC initiates a global-recovery procedure and acts as the leader. The OCC might also then request the HCC to analyze the possibilities of recovering within the HCC's scope. If such recovery is possible, the procedure is downgraded to local-recovery status, and the HCC assumes control.

Integration of numerous procedures evolves quickly to a complexity level that requires automated solutions and experience. *Sabre Airline Solutions* can help airlines enhance their end-to-end operations with integrated systems and strategic processes that bring together OCC and HCC activities. As a result, airlines will save money and customers will have a better travel experience.

This concept will be validated and tested within one of the SESAR projects led by *Sabre Airline Solutions*. This project defines requirements related to commercial airline operations in the air and on the ground. This engagement allows *Sabre Airline Solutions* to align the design of operations solutions with latest industry standards and ensure that product functionality is consistent with best practices use by leading European airlines and airports. These solutions are compliant with key SESAR concepts that will become mandatory for airlines and airports operating within European space once this program is implemented.

HCC Planning — Aircraft Turn



Aircraft Turnaround A turnaround network consists of all tasks and processes associated with a turn of an aircraft that have to be completed between chocks-on and chocks-off. It also defines relationships between them, time interval when they must be carried out and recognizes "critical tasks" as those that cannot be delayed without disruption propagation. Turn-around networks are prepared in advance for each airport, aircraft type, season and time of day among other variables.

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