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# Step into the future

The future of collaborative decision making

**C**DM – collaborative decision making – appears often in daily industry talk, publications, conferences and official documents. Eurocontrol, the ACI and IATA have defined CDM, especially Airport CDM, as one of its primary activities and have started their respective initiatives. So, what is the objective of Airport CDM? A statement from Eurocontrol gives a clarification: “Airport Collaborative Decision Making, CDM, enables information sharing and facilitates decision making processes by ensuring that stakeholders are provided with timely and accurate information essential for the planning of their operations.”

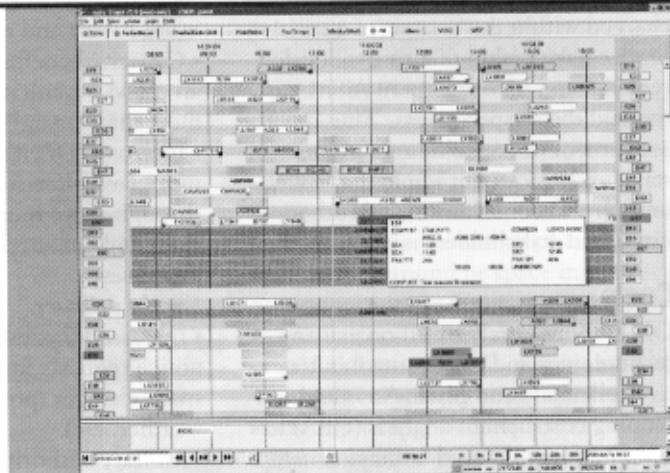
There is no doubt that this step (enabling airport partners to make decisions on the basis of generally

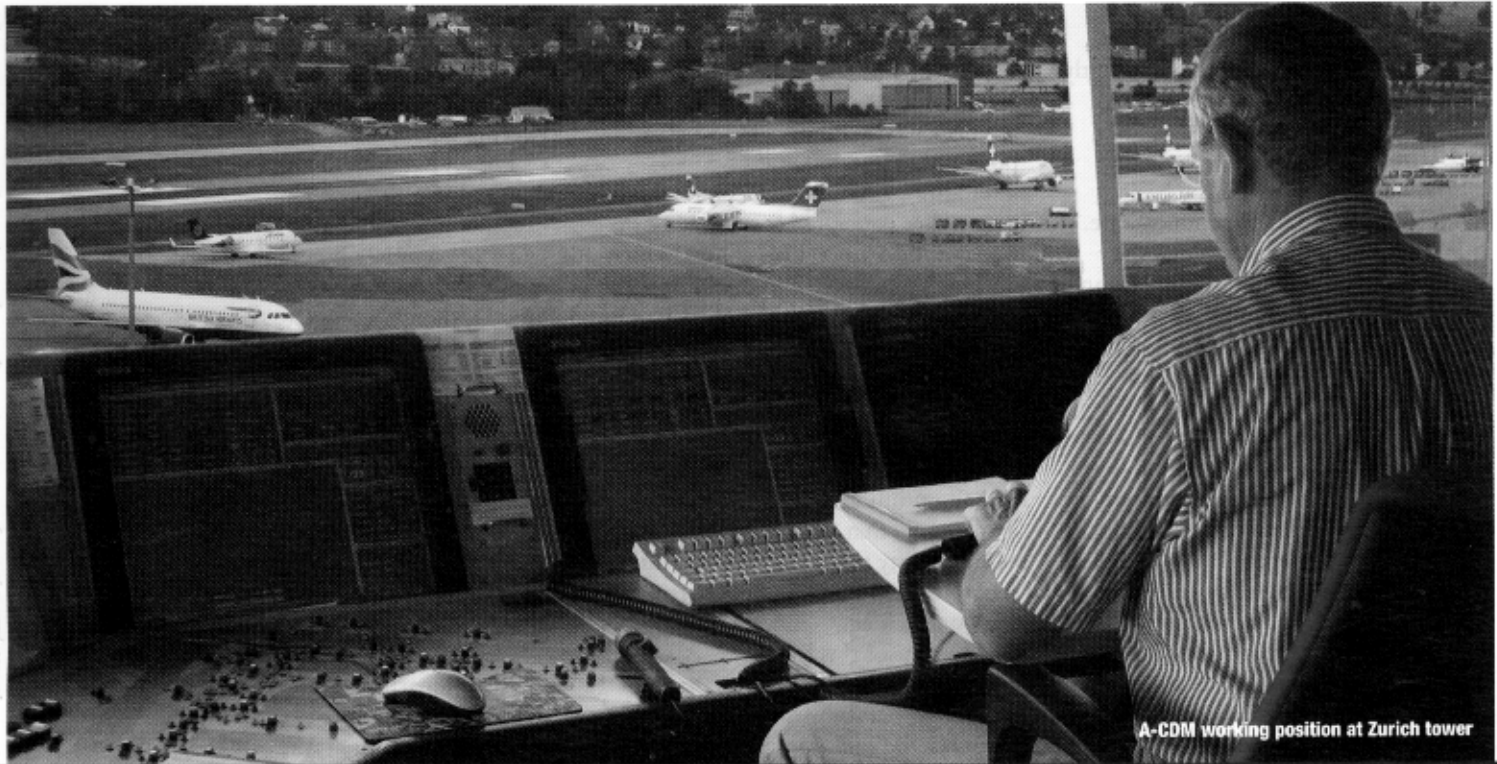
accessible, precise and actual information) is extremely important. It synchronises the activities in the respective organisations and it is the precondition for an improved use of the available resources.

But is it good enough to use the resources optimally? By no means. To use the resources optimally there is a need for sophisticated planning and optimisation tools. To meet the objective we developed a suite of A-CDM (Advanced-CDM) products. This is the first and only product platform worldwide that enables planning and operational optimisation of the whole airspace process of an airport. Our A-CDM system environment has been in operation at Unique Zurich International Airport since spring 2003.

Due to demand often exceeding capacity, especially at peak times, air-

Right: sally display  
Centre: Apron display  
Far right: ADC display





A-CDM working position at Zurich tower

ports are becoming bottlenecks. The main cause is the lack of optimal synchronisation between the stakeholders (ATC, airport, airline). The lack of optimal synchronisation results in:

- Long queues at the runways and successive departure delays;
- Arrivals on the ground without available parking positions;
- Supply of tow trucks to aircraft that haven't completed the handling process;
- Missing of ATC slots;
- Dissatisfied passengers;
- Loss of revenue.

This is where A-CDM starts. The data provided by the stakeholders (e.g. real-time ETAs, ETDs, ATC slots, aircraft changes, ground handling state) is linked and fused in the A-CDM platform. The data is then used by different tools of the product suite to plan and

optimise the entire airside process independent of organisations and systems.

The results of the optimisation are then available for every stakeholder organisation to subscribe to. Once the results are fed into each stakeholder's internal optimisation process (e.g. airport, airline or ground handler) they are able to optimise their own processes.

The partners are also actively integrated into this process. They report to the A-CDM platform any deviation of the actual from the planned situation. Deviations or missing reports automatically result in re-optimisation. This procedure enables an update of the planning and guarantees the continuous availability of optimal and synchronised planning results.

A statement from the users at Zurich

International airport<sup>2</sup> also pointed out the positive effect of this anticipatory, synchronised planning:

"Thanks to the display of planned off-block time and calculated take-off time via the terminal management system, aircraft crews are now kept constantly up to date with the flight schedule. In fact the binding nature of STD/ETD represents an advantage for handling agents, as they stand to benefit from helping to meet the specified deadlines, thus making sure their clients receive efficient and punctual services. The new Airport Steering section at Zurich Airport is able to maintain an up-to-date overview of everything that is happening in the apron zones, on the remote de-icing pads and on the taxiways. The availability of up-to-the-minute data permits smooth and efficient operations right across the



board, even in the most adverse weather conditions, as we have recently been able to discover for ourselves.”

### A-CDM platform

The A-CDM platform is the basic module of the A-CDM product suite. It is the only interface between the A-CDM tools and the systems that are used by different organisations, so no direct interfaces between any A-CDM tool and ‘external’ systems have to be established.

All data received via the interfaces from external systems is analysed in the A-CDM platform and linked to one common internal data record. Thus the data integrity is guaranteed at all times. Data elements received by several data sources can be supplied with priorities, which guarantees further data input for the A-CDM tools, even when a system or an interface breaks down.

The data is provided by the external systems in different formats – ICAO

(IAF), are calculated based on the sequence. The sequence, the corresponding times and suggested actions are displayed at all relevant working positions.

Additionally individual control indications are generated for the work stations in the area control centre, which enable the controllers to hand over the arrivals at the IAF to the approach sector in time. The feasibility of the planned sequences and times is monitored continuously. Each deviation is automatically detected by the system and initiates an update of the planning and an optimisation of the sequence. This means that planning can be guaranteed at any time, and consequently accurate arrival times for all partners can be provided.

The role of the Departure Manager is to determine and propose the optimal runway and the optimal take-off sequence for each runway. This is achieved using the flight plan and con-

engines and push-back times for terminal positions. The calculations are based on a wide array of data including parking positions and aircraft types.

For all partners the result is the target times for their own processes. For example the airline now knows exactly when to complete boarding of passengers and ground handling knows exactly when to complete their process (e.g. catering and fueling). If the partners cannot meet the target times they are obliged to communicate a new estimated time of departure. This time is then taken by Darts and a new planned departure time is calculated and communicated. This procedure guarantees the availability of a consistent, valid, optimal and achievable planning result at any time.

The departure manager of Darts is the first departure manager in use worldwide. It has been operating at Zurich International Airport since March 2003.

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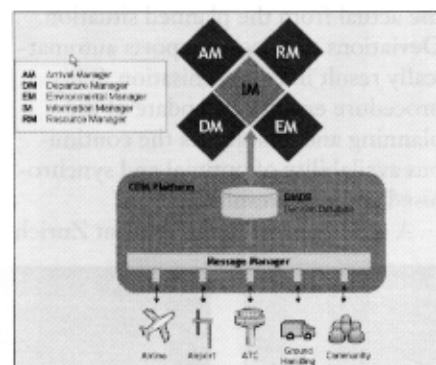
and IATA. In the A-CDM platform the correct interpretation and fusion of these different data formats is processed automatically. All planning and optimisation results generated by the A-CDM tools are automatically distributed and forwarded to the interfaces of the respective systems according to the specific formatting.

### darts

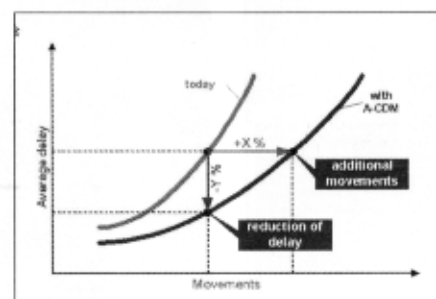
With darts (departure and arrival traffic management system) the A-CDM product suite provides a system that optimises the use of the available runway capacity and reduces arrival and departure delays. The complete sequence of arrivals and departures at an airport is optimised with regard to all external conditions. darts has two components, the Arrival Manager and the Departure Manager.

The Arrival Manager optimises the arrival sequence for the available runways. The optimisation is primarily based on the flight plan and radar data and the current situation at the destination airport (e.g. departure situation). Individual landing times and planned over-flight times for defined over-flight points, e.g. the initial approach fixes

continually updated data such as handling state, ATC slot, and arrival situation. Based on the planned take-off sequence the corresponding take-off times are calculated. This is then followed by calculating the start-up times of the



A-CDM product suite



Capacity/delay curves

### sally

sally (reSource ALlocation management sYstems) is a product family that optimises the use of various resources. In the context of A-CDM the planning of stands and gates is of specific interest – they are the resources that directly influence the processes of arrivals and departures.

A flexible and user-configurable rule-based environment allows users to plan the best resource allocations for a specific time range, e.g. for one operation day. This avoids time-consuming preplanning. During the actual day of operation update messages are processed continuously and automatically. Based on these messages the planning is updated permanently and potential conflict situations are indicated immediately.

The experience in Zurich and Frankfurt has pointed out the advantages of sally. Jürg Suter, Head of Flight Operations, Unique Zurich Airport, commented: “The implementation of sally reduced the staff costs for the stand planning by approximately 50 percent, compared with the previous system. The planning on the previous day doesn’t have to be applied any more and the responsible employee can execute other tasks. The effective planning time is very short.”

Ulrich Imhof, Fraport AG – Frankfurt Airport Services Worldwide, added: “The necessary effort to set up

and to perform planning scenarios could be reduced clearly with sally due to the automated planning process. Planning results are comparable. This is a fact that is strongly accepted by our internal and external customers."

What are the advantages of our approach? The decision-making tools of the A-CDM product suite can operate standalone or as one or more integrated modules linked through the A-CDM platform. Each additional module builds on the results of other modules and contributes to the quality of overall optimisation.

There are two main effects that can be achieved with A-CDM. Using A-CDM offers an airport the ability to move the complete movement-to-delay curve. The working point of an airport is defined as the possible number of movements based on an accepted delay value. Additional movements result in an exponential increase in delays. A-CDM redefines the curve, which makes it possible to increase the number of movements without an increase in delays. Alternatively A-CDM enables decrease in delays for the same number in movements. Both options are critical for peak hour scenarios.

Both effects are being demonstrated daily at Unique Zurich airports:

- During peak hours up to two additional movements are generated.
- Departure queues at the runways are reduced from about eight to three, resulting in reduced fuel burn.

The A-CDM architecture allows for an incremental implementation of the tools into an existing system environment. The existing systems don't have to be replaced; they can simply be linked to the A-CDM platform with interfaces and used later on. The existing investment is protected.

At the same time the modular approach does not require the customer to embark on the implementation of an all-encompassing A-CDM environment. Add-ons can be installed at a later stage as the customer progresses in the development of its operation, and additional capacity requirements emerge.

### Outlook

With its products delair focuses on the optimisation of airside processes at airports and the surrounding airspace. This optimisation takes into consideration the data and constraints of all

organisations involved in this process. In addition to these constraints, which originally result from air traffic, major airports are limited in their operations by noise and emission conditions. As these influences and limitations increase in the future, the challenge to operate an airport optimally without suitable assistance tools is increasing. This situation existed in Zurich before the A-CDM tools from delair were implemented.

Based on this background, delair is already taking the next step through its cooperation with Lochard, the world leader in noise and flight track monitoring systems. By joining forces, delair and Lochard have created a unique product suite that caters for all aspects of airport capacity, from airport process management all the way up to environment management.

### References

1. APR - Airport Operations Programme; brochure published by Eurocontrol
2. Darts - a major step towards optimized flight operations; Jürg Suter, Head of Flight Operations, Unique Zurich Airport. Published in: International Airport Review, Issue 2, 2004

## Delay problems? Lack of capacity? Environmental restrictions?

delair has the solution:

The Advanced-CDM optimization suite based on

- darts (departure and arrival management system)
- sally (resource allocation management systems)

How can we help you to manage your  
airport process optimally?

Come and see our systems  
in operation at Frankfurt, Zurich, ...

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