Building the airport of the future

Satisfaction reimagined, for everyone under your roof
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Picture this: You’re running the airport of the future.

An airport optimized for the satisfaction of your passengers, employees and partners.

Operations run at peak efficiency, stakeholders’ expectations are met and all disruptions are resolved immediately.

All because an intelligent central planning system is hard at work. The system is constantly calculating all the ripple effects of a disruption, alerting planners to the consequences and offering suggestions on how to deal with them. For example, the system might calculate that in 30 to 40 minutes, disturbances in various parts of the airport will result in bottlenecks at immigration, and suggest how best to respond.

In need of higher scheduling flexibility? No problem. At this airport, the planning system allows for different working patterns over weeks and months. It’s much simpler to move resources around when disruptions occur. You can identify who can be assigned an extra shift without violating labor rules and affecting employee satisfaction.

Now here’s the interesting thing. This powerful system exists and is already working behind the scenes at some of today’s best run airports.
Managing airport disruptions: No more foggy trips

Dear Airport Operations Director,

I missed a connecting flight the other day. The airline blamed the delay on fog. I wasn’t so sure.

By the time the delay was announced, the fog had long since cleared. What remained was another kind of fog: the fog planners face when trying to reschedule personnel and equipment at short notice.

In December 2010, the CEO of British Airways talked about the effects of heavy snowfall on his rosters. He referred to those rosters as ‘a giant global jigsaw puzzle’ that had been ‘torn up’ by the disruption.

‘A giant global jigsaw puzzle’ certainly captures the complexity planners face when managing airport disruptions. What are the consequences of redeploying this person? Does he or she have the right qualifications for the task? How will subsequent schedules be affected if I allocate this piece of equipment rather than that one? How are my decisions going to affect passenger satisfaction, punctuality, service level agreements, safety and overall operational costs?

Planners fumble their way through questions like these, struggling to come up with a feasible schedule. There is simply no time to look for better ways of using limited capacity.

After the catastrophic disruptions of 2010, the UK’s Civil Aviation Authority (CAA) produced a report entitled ‘Aviation’s response to a major disruption.’ In it the CAA noted that “Many of the issues that arose as a result of the recent disruption... were not specific to the event, but rather were the result of the knock-on effects of disruption to airport and airline operations more generally.” Right at the top of the list of areas requiring improvement was ‘maintaining operations’.

I’d second that. As I watched the hours go by in that airport lounge, I was reminded of a line from that Neil Young classic ‘Like a hurricane’: ... When time just slips away between us on our foggy trip.

Time doesn’t have to slip away just because there’s been a disruption. In an uncertain world, disruptions are inevitable. Significantly disrupted services aren’t.

So...

What if your planners could see the consequences of their decisions, and correct course even before implementing those decisions?

What if they had immediate insight into the impact of various rescheduling options and scenarios on your KPIs?

And finally, what if a foggy trip didn’t have to turn into a hurricane of delays and cancellations?

Sincerely,

Marcel Dreef

By Marcel Dreef, Quintiq Director Aviation Planning Solutions

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What great airports do differently

So here’s the scenario. You’re on a late flight home and will be arriving way past your bedtime. You’re staring morosely at the flight path on your entertainment screen when the intercom crackles to life. It’s the captain and he has some good news. Thanks to tail winds, the plane has enough fuel to take you straight to your destination. No refueling stop necessary. You can all expect to arrive an hour ahead of schedule. The plane erupts in cheers.

Three hours later, you’ve arrived. And just as the captain promised, you’re an hour early.

What’s likely to happen next?

A) You disembark, collect your luggage, and get home an hour early.
B) You wait thirty minutes to disembark and another half an hour for your baggage to turn up.
C) You disembark, hurry to baggage reclaim, and spend the next hour at the carousel waiting for your baggage to arrive.

It’s B) or C) isn’t it?

It’s a frustrating experience for passengers, and you’re probably left wondering: Why can’t airports be more efficient in managing their processes?

What’s the answer to better airport management?

One of the most famous scenes in operations management takes place in an airport. O’Hare, in fact. It’s where Alex Rogo, the hero of Goldratt’s novel ‘The Goal’, bumps into his mentor, Jonah.

Alex is excited about the robots he’s introduced in his manufacturing plant. Jonah is sceptical.

“You say your plant uses robots?” he asks.

“In a couple of departments, yes,” I say.

“Have they really increased productivity at your plant?”

“Sure they have,” I say. “We had – what?” I scan the ceiling for the figure. “I think it was a thirty-six percent improvement in one area.”

Jonah’s reply was extremely thought-provoking: “Then you didn’t really increase productivity.”

When the weakest link leaves the strongest impression

Many of the technology innovations for airport management center around automation and, yes, automation is needed. But it isn’t enough.
Automating parts of an interconnected system isn’t necessarily going to improve the performance of the system as a whole. The complex interdependencies among airport operations – check in, security, gate allocation, ground handlers, and the list goes on – mean that the weakest link creates the strongest impression on passengers.

If you’re a terminal manager, you will probably say: “Do you really think my planners have time to work with oh... ten, eleven, twelve other departments, each with their own rules? Do you know how painful it is to get the planning done for their own team. There’s no time for collaboration. It’s impossible.”

Indeed, it is humanly impossible. Which is why forward-thinking airports need a single planning platform with advanced optimization capabilities that provide up-to-the-minute data from all stakeholders, for accurate planning decisions.

Automating parts of an interconnected system isn’t necessarily going to improve the performance of the system as a whole.
Airport CDM: Head start or headache?

A major airline once claimed that Airport Collaborative Decision Making (Airport CDM) was responsible for poor on-time performance by an airport. Whatever the reasons for that complaint, it did raise an important question: Does integrating information flows and encouraging collaborative decision making among airport partners necessarily result in improved efficiency and fewer delays?

Making that jump to implement collaborative decision making is an important first step. However there is another jump in the Airport CDM initiative that’s seldom addressed: the leap of faith required to believe that collaborative decision making necessarily leads to improved performance.

As with many great ideas, the devil is in the details. Airport CDM integrates information flows from all stakeholders in the aviation system: aircraft operators, airport operators, ground handlers, air traffic control and central flow management units.

That’s a lot of information.

The overwhelming advantage of Airport CDM – the tsunami of detailed, real-time information that gets shared among all stakeholders – also creates its greatest challenge: mastering complexity.

Take this real-life case, for instance: One of Europe’s busiest airports needed to assign the most appropriate gates and stands to incoming flights. Part of the input for those decisions came from constantly changing updates of estimated arrival times. Once it was clear that a plane would be significantly delayed, there were a host of options to consider:

Should the flight be assigned to another gate? How would this affect other arrivals and departures? Would the required personnel and equipment be available at the new location? How would rescheduling them affect other scheduled tasks?

Could alternative equipment be used and – if so – would personnel with the required qualifications be available? Was the alternative equipment available for the required time slot?

All this – and more – for a single flight.

**When more is less**

With Airport CDM, planners will have enormous quantities of information to consider. Lurking somewhere in all that information will be opportunities to take decisions that transform punctuality and increase airport capacity.

Will planners be able to find and seize all those opportunities?

Not in a million years.

Will they perform any better because they have access to all that information?

Probably not.

Research seems to indicate that more information doesn’t necessarily lead to better decisions. Quite the opposite, in fact.

A study conducted by Angelika Dimoka, director of the Center of Neural Decision Making at Temple University, has revealed that as participants are given increasing amounts of information to apply to a problem, activity in the area of the brain responsible for decision making drops dramatically. According to Dimoka, “The participants started making stupid mistakes and bad choices because the brain region responsible for smart decisions had essentially left the premises. With too much information, people’s decisions make less and less sense.”

Turning Airport CDM’s tsunami of information into better planning decisions won’t happen automatically. The key lies with intelligent planning systems that stand at the center of multiple sources of data and help planners and dispatchers transform all those inputs into intelligent decisions. Instead of being overwhelmed by streams of data, such a system rapidly and effortlessly applies all that input to enable airport operators to update plans on the fly and respond swiftly to changing circumstances.
Instead of post-mortem analytics (that enable you to explore the results of decisions when it’s too late to make a difference), such a system provides real-time feedback on forward-looking KPIs so that planners and dispatchers can take corrective action even before decisions are taken. They would be equipped to:

- Translate demand into required capacity, while incorporating unique business rules, relevant skills, and regulations
- Gain real-time insight into the implications of decisions – such as possible conflicts or rule violations
- Swiftly identify cost-effective options that ensure safety and improve passenger satisfaction and comfort

Airport CDM is creating exciting opportunities for significant gains in performance and efficiency. Intelligent decision support will make it happen.

The overwhelming advantage of Airport CDM – the tsunami of detailed, real-time information that gets shared among all stakeholders – also creates its greatest challenge: mastering complexity.
Of course you’ve seen the surveys. Airports around the world are investing in solutions to reduce queues, improve passenger satisfaction and reduce operational costs. Many of these technologies begin with the word ‘automated’: Automated check-in kiosks, automated baggage handling, automated boarding gates, and the list goes on.

Will they help airports achieve their goals?

Yes – but only if they are supplemented with something else.

There are obvious benefits to automation, particularly in reducing bottlenecks that impede a passenger’s progress through the airport. However – and it’s a big however – automating parts of an interconnected system isn’t necessarily going to improve the performance of the system as a whole.

You don’t need me to remind you that airports are complex, interconnected systems. As the Australian ‘Airports of the Future’ website puts it, “They are characterized by complex interdependencies between different parts (e.g. check-in, security and retail areas) and different aspects of airport operations.”
These complex interdependencies mean that even a relatively small disturbance, such as a ten-minute flight delay, can have disproportionately large knock-on effects. The reality is that there is never just one small delay. There are many disturbances throughout the day and night, and each of them ripples through the system to create waves of chaos: peaks and troughs that are impossible to predict and, therefore, difficult to plan for.

**The Big Brain: Intelligent visibility and optimization**
What’s often missing from high tech shopping lists is the one item that’s going to be indispensable: the overarching technology that the airport of the future will need to integrate the planning of all its processes, equipment and personnel. I call this overarching technology the ‘Big Brain’ – or central intelligence – that integrates and constantly optimizes an airport’s operations. This Big Brain is invisible, but as a famous aviator once said in another context, “What is essential is invisible to the eye.”

There are two parts to this Big Brain. The first is about enabling integrated planning or intelligent visibility.

To get a feel for what’s possible, imagine an airport where planners have full visibility into all the consequences of any disturbance, in real time. In this airport of the future, the Big Brain is constantly calculating all those ripple effects, alerting planners to their consequences, and offering suggestions on how to deal with them. For example, the Big Brain might calculate that in 30 to 40 minutes, disturbances in various parts of the airport will result in bottlenecks at immigration, and suggest how best to respond.

The second is about using the Big Brain to constantly optimize airport operations based on the relevant KPIs.

Using its...
(i) insight into all the consequences of hundreds of disturbances
(ii) knowledge of the KPIs that need to be optimized (such as length of queues, waiting times, turnaround times, operational cost etc.)
(iii) information about personnel, equipment, relevant regulations and business rules...

the Big Brain will intelligently and continuously answer the big question: Given everything that’s happening at the airport, which decisions will optimize the airport’s goals of maximizing passenger satisfaction and minimizing operational cost?

**Enabling the airport of the future**
I’m not talking about a situation where an all-knowing black box spits out decisions. I’m referring to a planning and optimization platform where planners interact with the system to respond flexibly and intelligently to new developments. Such a system will enable planners to tweak the weight given to certain goals or even override a decision.

The effects of this Big Brain go beyond handling day of operation disturbances. An airport with this capability can use it to make more intelligent maintenance schedules, or look months ahead to predict how much capacity will be required and plan accordingly.

And here’s the really interesting thing. This Big Brain is real and already working behind the scenes to enable the intelligent airport of the future.

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What’s often missing from high tech shopping lists is the one item that’s going to be indispensable: the overarching technology that the airport of the future will need to integrate the planning of all its processes, equipment and personnel.
Imagine you’ve been asked to predict whether someone will choose to travel from airport A or airport B. (Assuming that both offer regular flights to the relevant destination.) What’s the first question you should be asking?

If you want to know which airport is nearer, you’re spot on.

According to a survey of passengers’ airport preferences, distance is the best predictor of which airport a passenger will choose to fly from. Passengers prefer airports that are nearby.

Here’s another question you probably know the answer to: What do passengers dislike most about airports? In another survey by the UK’s Civil Aviation Authority, the most frequent sources of passenger dissatisfaction were:

• Long waiting times
• Long walking distances
• Insufficient staff or facilities

So here’s the really interesting question. If passengers value proximity and speed, how are big airports faring in the popularity stakes, compared to their regional rivals?

The big airport blues

Last year, the Freakonomics website polled readers for their best and worst airports. The results seem to suggest that some of the big airport ‘Goliaths’ are no match for regional ‘Davids’.

The most heated responses came from Freakonomics readers who’d been ‘condemned’ (the actual word used by one respondent) to fly out of certain big airports:

• “Complete hell. Lines are long (and slow).”
• “Chaos 100% of the time.”
• “Big, sprawling and complicated.”

But it’s not really a case of David vs Goliath

Why? In a word, Incheon.

South Korea’s Incheon International Airport is one of the largest and most successful airports in the world. For the past nine years, Incheon has been voted the world’s best airport in the ACI Airport Service Quality Survey. It has been reported that a passenger departing from Incheon has all the necessary processes completed within 19 minutes. Arrivals take just 11 minutes. Incheon’s operator is quoted as saying that these figures are “three times faster than ICAO’s recommended level”.

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If a big airport like Incheon can achieve this, why can’t the others? What is it that separates the Incheons from the ‘airports from hell’?

**Learning from the Copenhagen experience**

Copenhagen Airport is the Nordic region’s busiest hub. Over a four-year period its one-hour morning peak increased by 150%, leaving its operator with a tough question: Invest in more capacity or embrace a new way of thinking?

New thinking won the day – and has made for very satisfied passengers. Copenhagen Airport has reduced process times, increased employee productivity by 42%, and was recently awarded Skytrax’s ‘world’s best security’ for the second year running.

At the Düsseldorf edition of the Quintiq World Tour 2014, Kasper Hounsgaard, head of operational and business analysis at Copenhagen Airport, identified what this ‘new thinking’ involves: “The thing about airport management is that you are managing so many different things. If you change something in one area, it will have an effect somewhere else...” In other words, “[You need to] focus on the entire value chain.” Hounsgaard also reveals that the way ahead for Copenhagen Airport has been a platform that integrates the planning and optimization of 11 different departments that have completely different rules and processes.

The David vs Goliath debate isn’t necessarily about big versus small. It’s between those who are slow and inflexible, and those who are agile. And as Incheon proves, a big airport with the right tools and processes can be a big winner.
How far are you from the airport of the future?

What do travelers remember most about your airport? Is it the 20 things that go smoothly, or the one thing that goes wrong? To continuously meet the expectations of passengers and all other stakeholders, your airport needs to operate at the highest level of efficiency at all times.

But first, let’s examine what may be standing in your way:

1. Silo thinking

Airport operations are characterized by complex interdependencies - check in, security, gate allocation, ground handlers. But many airports still rely on piles of spreadsheets instead of integrated plans. Each planner focuses on the plan for their own resources. As a result, each department is driving their own objectives rather than overall airport goals.

**What will help:** An integrated planning system solves all these problems. Shared data enables planners to make changes in one place, and the system would update information across the board. Operations are smoother and all stakeholders are happy.

2. Poor handling of costly disruptions

If a disruption occurs and you can’t reassign employees and resources quickly, customer satisfaction takes a nosedive. You can’t afford to have disgruntled employees, passengers, airlines or service providers.

**What will help:** Choose a system that allows you to quickly create, select and implement optimized plans for fast recovery from any disruption. It should let you choose which parameters to optimize, for example, allowing you to prioritize a return to normal operations above cost control.
3. Lack of visibility
Limited visibility means limited control. When you don’t know exactly where your people, equipment and vehicles are, you can’t see what effect a change in plans will have across the whole airport.

What will help: To make informed decisions quickly and respond swiftly to changes, you need a full view of your resource usage. For instance, you want to be able to see the impact of a gate change on the rest of the day’s flights, staff and equipment, as well as on your KPIs such as costs and delays.

4. Demotivated employees
Your employees are constantly putting in the hours beyond their working time restrictions, or having their leave application rejected due to shortage of staff – hallmarks of planning that is unable to take into account employee preferences. When their morale drops, so will their work performance. That’s bad news for your service-oriented business.

What will help: A planning system that factors in staff preferences gives you an immediate, direct overview of the impact of roster changes. Allowing employees to provide input on preferred work shifts and vacation schedules will result in happy employees. And happy employees will want to do their best for you and your customers.

5. Excessive buffering
Buffers that result in inefficiency and additional costs are characteristic of sub-optimal plans. Without optimization, you over-rely on buffers just to keep to the initial plan for balancing staffing and managing capacity. These buffers make it difficult for you to keep to budgets, deploy resources efficiently and fulfill service level agreements. Nor can you produce plans that drive your KPIs.

What will help: Transform your sub-optimal plans into profitable ones with KPI-based planning. With technology that helps you make accurate decisions and create optimal plans, you no longer need to rely on excessive buffering.
How do leading airports take customer satisfaction to the next level?

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**Brussels Airport** serves over 100 airlines and air traffic continues to grow. By implementing a state-of-the-art planning solution, Brussels Airport has seen higher planning efficiency, better utilization of resources; and more visibility on location of parked aircrafts. With the solution, the airport is able to cope with expected growth and improve service to both airlines and passengers.

**Frankfurt Airport** tackled winter woes – including delays and operational disturbances – with an optimized shift planning solution. The solution ensures quick and accurate allocation of trained employees to the right vehicles while complying with labor rules. With the staff all in place to handle winter service operations more efficiently, travelers look forward to a stress-free experience at Frankfurt Airport, with or without snowfall.
Every decision you make needs to balance profitability with satisfaction in a constantly changing environment. Your planners must ensure that passengers are processed with speed, safety and comfort, while managing complex variables including employees, equipment, facilities, airlines and flights.

This is where Quintiq comes in. What do you get out of the Quintiq solution for airport management? End-to-end optimization of your processes and resources.

Combined with a 100%-fit business model that uses world-record-breaking technology, the integrated planning platform gives you accuracy and flexibility – so your airport is ready to deliver satisfaction to everyone under your roof.

The Quintiq advantage lies in the ability to push real-time input into the AODB. More than that, the planning system is able to use the real-time input from the AODB to help with immediate decision-making.
Worried about your KPIs? All covered. By including KPIs for quality, efficiency and safety in all planning decisions, the Quintiq solution ensures:

- Optimal utilization of all resources
- Full compliance with rules and regulations
- That each task is performed at the right time by the right person with the right training and qualifications
- Quick reaction to disruptions, assessing impact and recommending the best countermeasures
- Greater employee satisfaction and retention through flexible work scheduling that considers personal preferences
- Constantly updated demand planning based on the most recent data, including the latest flight information

Ready to learn more? Contact Quintiq for further information and a customized demonstration. See firsthand how the Quintiq solution can significantly impact your airport operations efficiency – helping you deliver the experience of the airport of the future to everyone who matters in your business.