Managing Airport Disruption: Achieving Resilience through Collaboration
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EXECUTIVE SUMMARY

Today’s major airports are highly complex operations with increasingly significant limitations on valuable capacity. Threats to that capacity are numerous – recent events including volcanic ash, major snowfall, industrial action, typhoons and hurricanes provide numerous examples around the globe. When an event reduces capacity, an airport must rely on its operational resilience: the ability to prevent, manage and recover from disruptions. Achieving and maintaining operational resilience should be a strategic priority. The risk of not being resilient is substantial, both financially and reputationally, not just for the airport but for its entire community of airlines and other stakeholders.

Our review of resilience capabilities and practices at nearly 30 of the world’s leading airports provides valuable insight into how best practice is defined and achieved. The best airports proactively work to address the most manageable factors of resilience – including clearly defined command and control, collaborative planning with stakeholders, coordinated management of passenger welfare, and dedication of operational equipment and resources. We offer 10 specific recommendations to enhance and achieve operational resilience, and encourage major airports to prioritize their most critical areas for improvement as part of a coherent strategy with airport stakeholders.
In December 2010, nine centimeters of snow fell in just over an hour at London Heathrow Airport. The sudden intensity of the snowfall caught much of the airport community, and indeed much of greater London, off guard. The resulting airport closures and cancellations of over 4,000 flights impacted nearly one million passengers on the last travel weekend before the Christmas holiday and the days that followed.\(^1\) The reputation of Heathrow Airport as well as its airline stakeholders suffered greatly.

Such situations are of course not limited to Heathrow, nor are they limited to snow. Typhoons in Asia, earthquakes in the US and Asia, volcanic ash spreading across Europe and South East Asia, hurricanes on the US Eastern Seaboard, civil protests, as well as industrial action from airline staff, security officers, air traffic controllers and immigration officers – the list of actual and potential events is extensive. However, whether brought on by Mother Nature, industrial relations or other predictable and unpredictable incidents, these events all have one factor in common – they substantially reduce operating capacity. Airports and their airlines must be prepared.

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\(^1\) Report of the Heathrow Winter Resilience Enquiry, March 2011
Today’s major airports are highly complex with increasingly significant limitations on capacity. The ability to make the most effective use of that capacity is a daily operational priority. When an event disrupts capacity, an airport’s resilience is exposed. Specifically, we view operational resilience as the ability of an airport to prevent, manage and recover from disruptions. The ability to address all three components is paramount:

**Prevent**
It is indeed possible to prevent, or at the very least, mitigate, the extent of disruption from an event. To be clear, we are not suggesting that the event itself can always be prevented (as much as airport and airline management would certainly like that power), but rather that the negative implications can be minimized. If an event is accurately forecast, the airport and airlines can prepare accordingly – positioning staff and equipment in the right place at the right time to ensure operational continuity. In the case of a well-forecast snowfall, overnight pre-treating of runways may eliminate the need for closures for snow clearing. And airlines and their ground handlers can plan ahead for de-icing requirements as well. Similarly, a scheduled industrial action can be planned for and mitigated. Of course an inaccurate forecast or an event that is not forecast at all presents the greatest challenge. But with adequate preparation – including collaborative planning, robust contingency protocols, a clear understanding of the potential system weaknesses, appropriate system redundancy and staff training – significant operational disruption from an event can be limited if not prevented altogether.

**Manage**
Once a disruptive event is underway, the airport, together with its stakeholders, must be able to effectively manage it. Incident or crisis response protocols must be executed, contingency plans need to be followed, additional staff may need to be deployed and all participants must adhere to clear roles and responsibilities. Perhaps most important is the required collaboration to manage and address the situation. Major airports are complex webs of operational and non-operational stakeholders. It is rare that a disruption of any significance can be managed by just one stakeholder alone. Indeed, isolated and uncoordinated responses by airports and airlines are likely to make situations worse. Airports, airlines and other stakeholders must be prepared to work together to manage the event and maximize operational continuity. Planning tools which allow real time trade-off analysis can help decision-makers understand the “least bad” course of action (e.g. proactively cancelling a flight when disruption is threatened can avoid stranding passengers from a flight that might otherwise be cancelled during an event).

**Recover**
So much effort and attention is given to managing events, that the third component of operational resilience is often overlooked. But we would argue that just as there must be contingency plans for how to manage a disruptive event, there should also be clear plans for how to transition the airport community back to business-as-usual. Response protocols should be gradually stood down and robust communications and situational awareness should ensure key operational issues have indeed all been addressed. The trade-off planning tools can help to identify the best sequence for rescheduling delayed operations. And then comes an invaluable opportunity that is often mishandled: the ‘wash-up’ or ‘hot wash’ as many call it – the consolidation of what happened, how well the airport community responded and the lessons learned. Truly resilient airports and airlines take full advantage of the opportunity to learn from experience, refine ways of working and be better prepared for the next event.
Achieving and maintaining operational resilience should be a strategic priority. The risk of not being resilient is substantial – both in terms of finance and reputation. Major and even minor operational disruptions not only impact travelers, but lead to significant revenue losses, require massive response costs and cause broader economic losses at the local, regional and even national level. Examples are numerous. The 2010 spread of Icelandic volcanic ash over European airspace resulted in the cancellation of more than 100,000 flights over a six day period and a financial impact to the aviation industry and tour operators of an estimated US$2 billion.\(^2\) Heathrow’s December 2010 snow event cost nearly US$60 million for the airport operator alone.\(^1\) And in October 2012, Hurricane Sandy was responsible for the cancellation of approximately 20,000 flights on the eastern seaboard of the US from south of Washington, DC to north of Boston – costing US airlines an estimated US$250 million in lost revenue.\(^4\)

Beyond the immediate financial losses, airports and airlines that gain a reputation for mishandling disruptive events risk long-term business impact from passengers who make other travel choices and from regulators who seek stricter controls and penalties.

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\(^2\) European Commission, April 2010  
\(^3\) Financial Times, December 2010  
\(^4\) Flight Global, November 2012
RESILIENCE DRIVERS

An airport’s level of resilience results from the combination of numerous factors that fit into three broad categories – the factors can be considered circumstantial, structural or managed. Circumstantial factors are entirely or nearly entirely outside the control of the airport management and its airlines. They include an airport’s geographic location and susceptibility to weather as well as vulnerability to security threats and potential political instability. Other factors can be considered structural with airport and airline management able to exert varying, but often limited, influence. These factors include the airport’s infrastructure and overall capacity utilization in normal operations, regulatory restrictions, stakeholder landscape and operational complexities. Finally, there are resilience factors that can be fully managed. These include collaborative planning, command and control, use of information and technology, dedication of resources and continuous improvement.

Any review of the resilience level of an airport must therefore take into account the range of both controllable and non-controllable factors that determine an airport’s ability to prevent, manage and recover from disruptions.

Exhibit 1
Factors Affecting Airport Resilience

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INTERNATIONAL BEST PRACTICES

Over the last two years we have directly engaged 27 of the world’s leading international airports to review and discuss specific aspects of operational resilience. These airports include twelve of the busiest twenty global hubs and represent Asia-Pacific, Europe, North America and the Middle East. Given that circumstantial factors are largely beyond an airport’s control, our discussions focused on the managed and structural qualities of each airport’s resilience capability.

Specifically, we reviewed a range of topics within four primary areas:

1) Command and Control
2) Collaborative Planning
3) Passenger Welfare Management
4) Operational Equipment and Resources

For each area, we examined a number of criteria we view as key to assessing an airport’s level of resilience, as summarized in Exhibit 2.

Exhibit 2
Managed and Structural Criteria for Assessing Operational Resilience

- Clarity and scope of governance procedures
- Inclusion and buy-in of essential stakeholder groups in procedures
- Monitoring systems and situational awareness technology deployed
- Type of integration of command and control facilities
- Involvement of stakeholders in planning
- Level of senior sponsorship
- Regularity of process reviews
- Use of performance indicators in continuous improvement
- Range of planned scenarios
- Use of appropriately exercised training and testing programmes
- System and equipment redundancies and capabilities, including power and baggage
- Availability of snow clearing machinery, staff and consumables
- Organization and preparation of relevant equipment and staff
Our discussions and analysis based on these criteria enable us to share examples of operational resilience ‘best practice’ among leading international airports. While no single airport can be suggested as exhibiting best practice across all four of these areas, there are a number of airports that provide strong examples for one or more.

Command and Control

Hong Kong (HKG)
A single Integrated Airport Centre (IAC) comprises seven individual control centers and provides real time management of airport operations including facility use, communications, security and IT. An Airport Emergency Centre (AEC), located adjacent to the IAC, handles major incident response. The airport conducts more than 90 seminars and drills each year and has facilitated recent simulations drills with more than 1,000 participants. Airport-wide information is consolidated into and available from a single airport operations database.

Dallas-Ft. Worth (DFW)
In 2006, the airport consolidated its Maintenance Service Center, Airport Information Center and Operations Control into a single, integrated Airport Operations Center (AOC). The AOC is manned 24 hours daily and is led by an Airport Duty Manager who reports directly to the VP of Operations. The AOC is co-located with the Emergency Operations Center (EOC), a facility operated by the Department of Public Safety during incident preparation, response and recovery. The AOC has enabled harmonization of DFW systems, with an integrated tool now in place for call tracking, work orders, asset management, transportation management, vehicle maintenance and proactive maintenance.

Collaborative Planning

Minneapolis-St. Paul (MSP)
For disruptions such as snow events, the airport and base carrier Delta Airlines leverage a common interest to minimize passenger volumes in terminals while enabling a fast recovery to full operations. This results in a conservative approach of proactive flight cancellation and passenger notification when a major event is forecast. The airport benefits from joint planning and strong stakeholder coordination, including clear definition of responsibilities. In addition, the airport annually shows stakeholders incurred costs and capacity figures to emphasize the cost / benefit of response preparation and deployment.

Amsterdam Schiphol (AMS)
The airport effectively combines a strong relationship with base carrier KLM and a well-choreographed timeframe in the days leading up to a forecasted event. Plans and stakeholder communications are typically mobilized five days in advance, with clear roles and responsibilities activated in a pre-agreed sequence in the hours that follow. Final decisions on capacity planning are made jointly by the airport, airlines and ATC eight hours before the event. Similar to Minneapolis-St. Paul, the airport cites proactive capacity and cancellation decisions among its key success factors for event response and recovery.

Passenger Welfare Management

London Heathrow (LHR)
As part of his 2011 Winter Resilience Program, London Heathrow established itself as a leader for how an airport can be prepared to step in and support airlines in fulfilling their passenger welfare obligations. Heathrow led the joint development of a passenger welfare charter that clearly articulates the common ambitions of all airport stakeholders to support the passenger during times of disruption. The charter is accompanied by clear roles and
responsibilities for airlines and the airport. Heathrow also launched a formal Reservist Program – over 900 non-operational airport staff were trained for passenger assistance roles and are now deployed in terminals during both disruptive incidents and peak travel periods.

**Hong Kong (HKG)**
The airport combines a customer service culture with well-coordinated protocols. Though not specifically outlined in contracts, airport staff are expected and willing to assist with passenger welfare when needed. There is a clear understanding of roles, with staff deployed across pre-arranged zones and posts. The airport and airlines jointly established a dedicated area for stranded passengers, including separate facilities for passenger rebooking that ensure regular operations are not disrupted. Additional WiFi, power points and data signal links are made available to facilitate rebooking and check-in.

The airport keeps its own stock of passenger provisions such as blankets, mats and bottled water, while also pooling provisions with airlines. The airport also proactively communicates with embassies and consulates to escalate larger passenger group needs and visa requirements.

**Operational Equipment and Resources**

**Chicago O’Hare (ORD)**
Chicago O’Hare has robust levels of equipment and resources on site to support one of the world’s busiest operations and its most common threat of major disruption – winter snow. But its position as part of the City of Chicago also provides an enormous off-airport contingency force that can be called in for specific requirements, including additional emergency response staff, tactical units and transport resources such as city buses. O’Hare has also built in extensive security to its power supply with multiple levels of redundancy.

**Frankfurt (FRA)**
A number of major airports make effective use of 3rd party contractors to respond to events. At Frankfurt, full-time ground operations personnel are complemented by a large pool of contractor staff who can be onsite with eight hours notice. For major winter events, the airport uses an external company to handle all snow disposal from the airfield. The airport also benefits from having the primary de-icing provider as an airport subsidiary – a large team of de-icing personnel is on call 24 hours daily.

The above airports are of course not the only examples of strong operational resilience – there a number of others around the world that can also be cited as good or best practice on a number of levels. But importantly, these airports provide real examples of what can be achieved through concerted planning, collaboration and refinement.
Even the best managed and best performing airports have room for improvement; indeed, continuous improvement should be an objective itself. While some circumstantial and structural factors of resilience may be outside management’s control, the above examples demonstrate there are certainly other factors which are very much addressable. Our work with major airports and our detailed assessment of global airport resilience enables us to articulate what we believe are ten key recommendations for enhancing and achieving operational resilience:

1) Ensure resilience is a strategic priority
Resilience cannot be an afterthought within an airport’s organization. It should be key part of the CEO’s agenda and be continuously championed by an executive sponsor. A senior manager should be dedicated to operational resilience and business continuity, with a supporting team of staff as appropriate. To the extent that major resilience initiatives are needed, they should be prioritized as part of a consolidated agenda of strategic programs.

While some circumstantial and structural factors of resilience may be outside management’s control, there are certainly other factors which are very much addressable.
2) **Collaborate extensively with stakeholders**
Airports must prioritize strong working relationships with key airport stakeholders, especially base carriers and providers of priority services such as air traffic control, emergency response, security and immigration – it is not just good for business, it is critical for resilience. Regular meetings of representative forums should take place throughout the year to jointly develop and share resilience plans and ensure readiness is coordinated. Daily operational calls can ensure alignment during business-as-usual, while pre-determined incident response forums should be activated when needed. Airports can help ensure adequate capital investment is made available for resilience capacity by helping airlines, regulators and other stakeholders understand the cost of disruption – balanced against the cost of spare capacity and other resilience precautions to minimize disruption.

3) **Enable proactive ways of managing**
Too many major airports are almost entirely reactive in their response to major events. Airports that increase their capabilities to manage proactively develop competitive advantages. Proactive management requires clearly defined early warning indicators (EWIs) and response triggers that are actively monitored and acted upon. It also helps to have a consolidated airport operating plan (AOP) that ensures decisions are made in the best interest of the entire airport rather than any of its individual components. Finally, it is important to have stakeholder forums with delegated authority to make decisions in advance of a forecasted event. Preemptive agreement on operational limitations can often help ensure the entire airport is best positioned to manage and recover from a disruptive event.

4) **Leverage information**
The amount of historical and real-time information available to an airport is massive. The best airports figure out how to consolidate and use it. Core to this ability are information platforms such as an Airport Operating Database (AODB), which is a means to bring together various data and relevant information on operational performance, forecasts and threats – everything from the status of expected transfer passengers to the vehicle flows on priority roadways for airport access. Key to the success of AODB use is both the sharing of information among relevant stakeholders as well as the capability to use the information on the day and beyond. For example, detailed analysis of the impact of past decisions can provide critical decision support for preventing or managing future disruptions.

5) The AOP is a specific recommendation of the European Union’s SESAR Program (Single European Sky Air Traffic Management Research), as part of its emphasis on ‘Total Airport Management.’
5) Measure performance and impact
Few airports have robust protocols to quantitatively measure resilience performance and impact. Yet the ability to articulate exactly what worked well and what did not can provide a valuable basis for response assessment and improvement. Best practice airports will employ a response scorecard with easy-to-capture key performance indicators (KPIs) and other relevant measures. Measurement should not be limited to purely operational factors – an airport can also assess impact to its reputation by reviewing media coverage and evaluate financial impact by tracking revenue losses and response costs. Such a complete view of the situation will not only help to identify specific areas for improvement, but can also be used to justify major investments.

6) Coordinate command and control
A number of major airports have modern integrated control centers to cross-functionally support both business-as-usual operations as well as incident response. Others continue to manage operations from a number of individual and functional control centers, then activate a crisis response center as needed. Either approach can actually prove effective – what is most important is that levels of coordination are high with roles and responsibilities clearly defined. If key command roles are not going to be physically collocated, then they should at least be connected as part of a strong virtual team.

7) Employ new technologies
There are many innovative technologies available to airports and airlines that can be argued to in some way enhance operational resilience, many of them by improving situational awareness. Examples include CCTV with automatic incident detection, airside and landside vehicle tracking, and monitoring of passenger flows through the use of chip-embedded boarding passes. Any new technology opportunity must be carefully assessed for both its cost and benefit to the airport community.

The ability to articulate exactly what worked well and what did not can provide a valuable basis for response assessment and improvement.
8) Be ready
Most major airports have a robust schedule of regular training and testing, often a requirement to meet regulations. However, it is important that airports and stakeholders exceed regulatory requirements with the additional scenario planning, training and testing seen as most relevant based on recent disruptions and expectations of future events. A well-structured program that includes both desktop and physical drills with and without stakeholders should be actively managed and refined regularly.

9) Remember the passenger
During disruptions, airlines have the first responsibility to take care of their passengers. But when airlines fail to meet their obligations (often the international carriers without a significant presence at the airport), best practice airports are prepared to step in. An airport passenger welfare plan, developed jointly with airlines to ensure it complements their own commitments, can clearly articulate roles and responsibilities. A coordinated program for deploying trained airport staff into passenger care roles can also be an effective way to both limit passenger discomfort and protect the airport’s reputation.

10) Continuously improve
At least annually, airports should have a structured process to review and refine contingency plans, both internally and jointly with stakeholders. Such reviews should account for experiences over the prior period to ensure the entire airport community is ready to respond in a manner that reflects past experience. And as previously mentioned, it is essential that a robust process be in place to consolidate the lessons learned from any major disruptive event, to ensure the negative aspects of a response are not repeated and positive aspects are celebrated and built upon.

To enable continuous improvement, it is essential that a robust process be in place to consolidate the lessons learned from any major disruptive event.
Successfully addressing all of above recommendations would surely improve the operational resilience of any major airport. However, many of these recommendations require substantial and often transformational change to organizations and their ways of working. It is therefore important that each airport, along with its major stakeholders, assess its level of operational resilience and prioritize the most critical areas for improvement. Most importantly, resilience initiatives should be part of a coherent strategy that addresses both the short- and long-term priorities of the airport as a business and the interests of the entire community of airport stakeholders. There is too much at stake to do otherwise.

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