

Agility within Airport Business Communities

Guidance for business communities on how to improve resilience

Thornton Tomasetti

 RESILIENCE FIRST



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June 2019



Executive Summary

Resilience First commissioned a study of several airports in the UK and their business partners to identify best practice and areas for improvement in resilience.

Airports are key economic enablers for the UK economy. They are communities of businesses aligned around the interface between ground and air transport.

Resilience is an enabler that allows strategic ambitions to be met through protecting critical resources, and by also creating and sustaining opportunities for businesses to thrive. Resilience helps set the conditions for business stability - a pre-requisite for improving productivity.

This study focused on the agility aspect of resilience and included data review, interviews and an agility survey. Indicators around leadership, governance, corporate memory, culture, empowerment, learning, innovation and information sharing within business communities were examined.

Common strengths and weaknesses

From the agility survey, common strengths included:

- Sense of community
- Flexibility to change
- External collaboration
- Experimentation

Key areas for improvement included:

- Horizon scanning
- Corporate memory
- Focus on financial value
- Comprehensive situational awareness

The agility survey results were correlated with the interviews and data collected on performance. It was found that there was a strong correlation between agility and organisational productivity.

Recommendations:

Recommended actions from the study included:

Linking resilience to business outcomes - measure resilience benefits and the impact of disruptions. Link departmental business impact assessments to business goals using a systems approach.

Including resilience in new developments - make sure resilience objectives are included and systems are adaptable to future needs.

A community/systems approach - resilience cannot be managed by operating in silos - use a systems approach to understand all partners that contribute to business delivery and engage in resilience planning.

It is clear that adopting a comprehensive approach to resilience and cultivating a resilience culture within their communities will enable airports to be better prepared not only to withstand adverse events but also to adapt to future change in the dynamic business environment. It also helps set the conditions for improving productivity..

About Resilience First

Resilience First is a not-for-profit business organisation that aims to improve business resilience in communities in urban areas. It was launched in June 2018 and since then has gained a range of international supporters ('Champions') and associates who all believe that resilience can be better delivered by collaborative working through communities.

Behind the concept, there are four principal drivers – advocacy, alliances, communication, and tools & services – which steer the various work streams that deliver practical advice and best practices to business communities. This report address one of the chosen work streams, namely the communities around the land-side of airports. The Resilience First website can be found at:

www.resiliencefirst.co.uk

About Thornton Tomasetti

Thornton Tomasetti optimizes the design and performance of structures, materials and systems for projects of every size and level of complexity.

Dating back to 1949, Thornton Tomasetti is a 1,500-person, employee-owned organization of engineers, scientists, architects and other professionals collaborating from offices worldwide. We support clients by drawing on the diverse expertise of our integrated practices. We are committed to be a sustainable and enduring organisation and the global driver of innovation in our industry.

Resilience Consulting

Thornton Tomasetti has invested in a dedicated resilience practice providing a comprehensive, integrated approach to resilience at all scales from cities to buildings and organisations. We integrate input from our technical experts across the firm to offer a holistic approach to resilience. We support our clients to gain a comprehensive understanding of their risks, vulnerabilities and opportunities to create a set of resilience strategies; design a programme of aligned interventions; and build their delivery capability.

Our methodology provides a consistent framework through which existing and future measures can be coherently managed to deliver a city, organisation or building that is more resilient today and can evolve to meet the challenges of tomorrow.

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Introduction

In January 2019 Resilience First commissioned a study on the resilience of airport communities in support of its mission to build and strengthen resilience in business communities. The aim was to assist urban communities such as those around airports to become more agile and adaptable to overcome future challenges.

This report surveyed several airports in the UK and their business partners to identify best practice and areas for improvement in resilience.

Why Airport Communities?

Airports are business communities created by the airport, airlines, staff, passengers, infrastructure providers, baggage handlers and the surrounding residents. They are, in effect, micro-cities. It is vital that these partners work effectively together to ensure common outcomes are delivered.

The aviation industry supports 29 million jobs globally (directly and indirectly), amounting to a global economic impact of US\$2,960 billion. Therefore, when this sector is disrupted the economic impact is significant.

This was evident through incidents such as the volcanic eruption back in 2010 which caused an estimated impact of £1.1 billion to the airline industry. More recently, the drone incident at Gatwick caused cancellation of 400 flights over a particularly busy period with an estimated cost of £50-70 million.

In the UK, for every £1 of value created at an airport, £25 is created within the wider economy. This means that disruption at airports has an amplified impact on the wider economy and

society. Figure 1 shows how a relatively minor airport failure can cascade effects throughout the economy.

The aviation industry faces numerous current challenges, including a constrained capacity environment, cyber threats, and drone attacks.

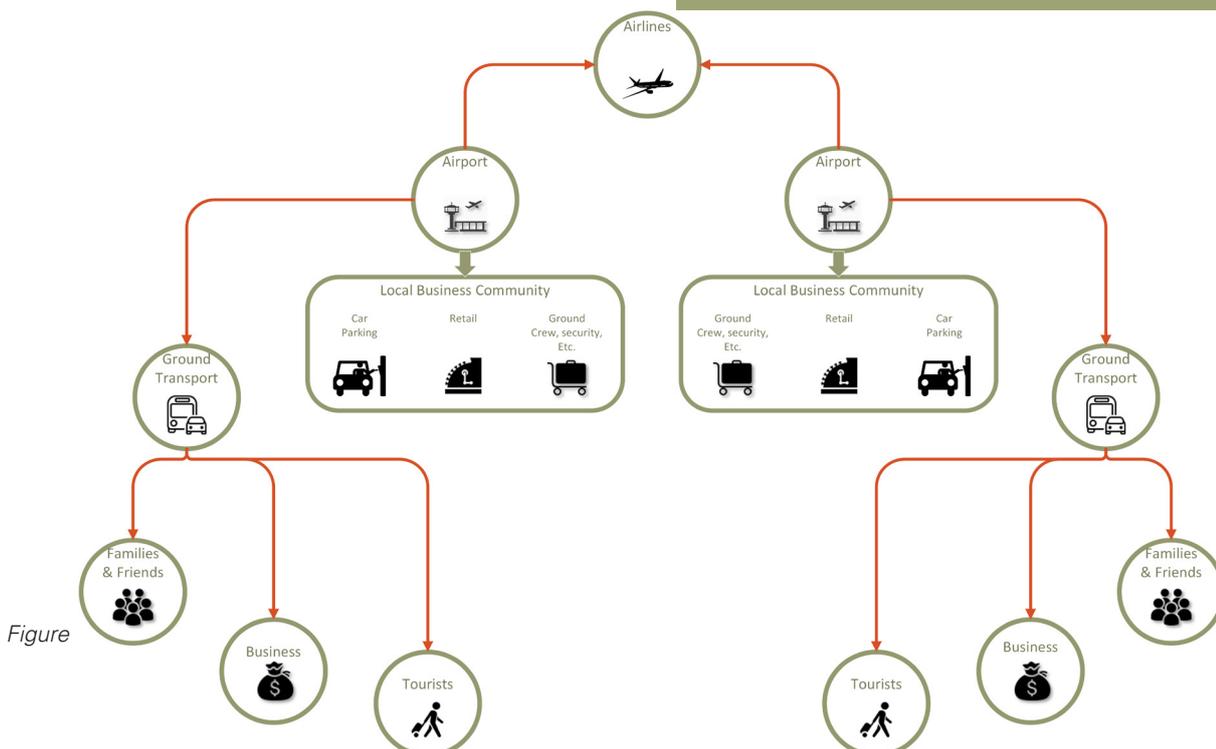
Airports also need to look forward to understand the threats and opportunities that new technologies such as automated vehicles and electric aircraft may bring.

By adopting a comprehensive approach to resilience and cultivating a resilience culture within their communities, airports will be better prepared not only to withstand adverse events but also to adapt to future change in the dynamic business environment.

Resilience is an enabler that allows strategic ambitions to be met through protecting critical resources; it also creates and sustains opportunities for businesses to thrive; and helps set the conditions for improvements in productivity.

Effective resilience will always deliver greater stability, and stability is key for investment, productivity, economic growth and improving standards of living.

According to BS65000 (Organizational Resilience), resilience is a common platform and shared understanding for adapting to a dynamic business environment, allowing leaders to take measured risks with confidence, responding quickly and appropriately to both opportunity and threat.



Figure

Overview of Study

This study focused on the agility aspect of resilience. This combines all the aspects of resilience needed to adapt an organisation to long-term strategic changes, medium-term issues, and short-term shocks and operational disruptions. It considers the softer aspects shown in Figure 2.

The study was approached in three parts:

Part 1: Data gathering

An initial, data-gathering exercise reviewed airport plans, community plans, documentation and data to determine a baseline performance level against key metrics, such as productivity and cost of disruptions.

Part 2: Interview

Well-informed members of each airport community were interviewed regarding resilience practice. Responses were collated using both qualitative and quantitative analysis.

Part 3: Agility survey

A survey was circulated to a broad cross-section of staff from their airport and business community partners. The survey included indicators around leadership, governance, corporate memory, culture, empowerment, learning, innovation and information sharing within business communities. The categories are shown in Figure 3.

The results of the survey were compared to the data collected in Part 1 and interviews in Part 2, allowing qualitative and quantitative information to be compared and correlated.



Figure 3: Framework for measuring agility



Resilience First Guide to Resilience Planning for Business Communities

Figure 2: Soft and hard skills associated with community resilience

Partner organisations

The following organisations supported the project in a number of ways including staff and management time to complete interviews, surveys, resources and data:

- Resilience First
- Manchester Airport Group:
 - Stansted Airport
 - East Midlands Airport
 - Manchester Airport
 - UK Power Networks
 - Affinity Water
 - Intel
 - Jearni
- Thornton Tomasetti
- Ryanair
- NATS

The study used a survey of 31 questions to poll the views of stakeholders from across the airports' business communities. Over 120 stakeholders responded to the survey with nearly half of responders coming from senior levels within their organisations. Figure 4 lists all the criteria against which questions were asked. The colour coding indicates how positively respondents collectively viewed the performance of their business community. The responses have been sorted into six framework areas. These results were aligned with the output from interviews and performance against collected data to generate an overall picture of each business community.

Common areas of strength

- Sense of community
- Flexibility to change
- External collaboration
- Experimentation

Common areas for improvement

- Horizon scanning
- Corporate memory
- Focus on financial value only
- Comprehensive situational awareness

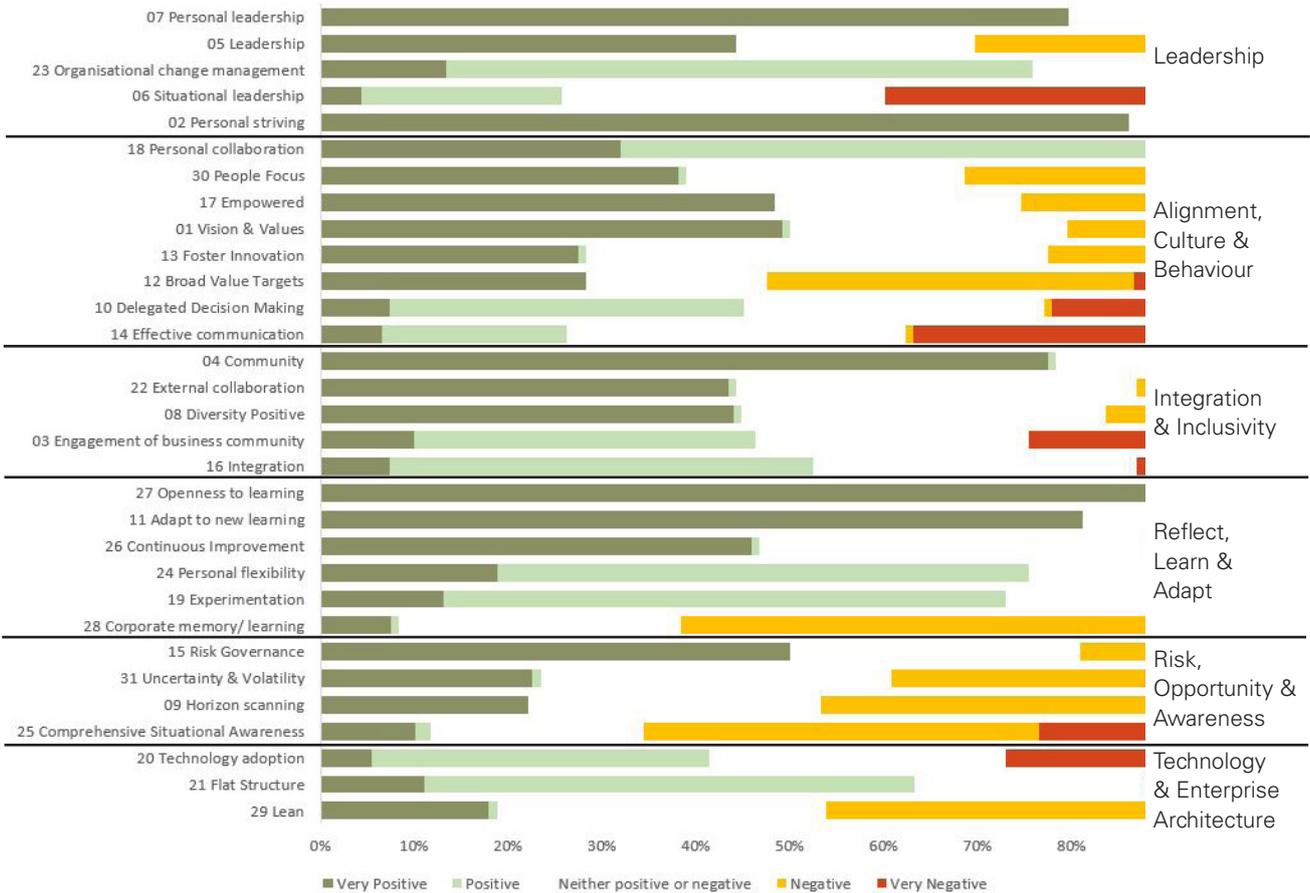


Figure 4: Average responses from participants surveyed

Trends and Observations

Leadership

In terms of leadership, the view was generally positive. The nature of Question 06 'Situational leadership' (see figure 4) suggests a strong leader within organisations who tends to make decisions based on gut rather than evidence. A strong leader is positive, provided that staff are aligned and feel empowered to make decisions. However, it is recommended to make evidence based decisions as much as possible.

The organisation with the most positive survey scores had very strong leadership that drove increased resilience capacity, making resilience a key organisational policy objective. This leadership was coupled with high levels of employee empowerment and alignment.

Alignment, Culture & Behaviour

Values

This category overall was positive, depending on the organisation. However, the question on whether the organisations valued brand, social, environmental or operational metrics more than financial metrics drew poor results.

According to the Chartered Institute of Management Accountants: 'fifteen years ago, before the internet revolution, on average 80% of a company's value was contained in the balance sheet, whereas today it is nearer 30%.' (CIMA, 2007)

Since this statement was made, this trend has continued. Despite approaches such as the balanced scorecard and other multi-factor data dashboards, financial metrics remain the key driver. This has a profound impact on how businesses are run.

Financial metrics tend to be focused on past performance or past performance projected into the future. This can drive conservative and short-term decision making. In an increasingly dynamic business environment, the validity of 'rear-view mirror' metrics diminishes.

Tools such as the balanced scorecard, Value-Based Management and Management of Value have been developed to overcome these issues.

This approach to management aligns policies, strategies, structures, infrastructure analytical techniques, and management processes to focus management decision-making on the key drivers of value, functions and value chains.

Resilience culture

In terms of development of a resilience culture, interviewees commonly used terms such as 'work in progress'. A majority of the organisations taking part in the study appeared to be only a short way into their resilience journey. Most of the resilience programmes were no more than three years old and many were much less mature.

However, in that time some organisations had made more progress by engaging the whole organisation and adopting effective change-management techniques to deliver cultural change.

Integration & Inclusivity

A majority of the organisations that took part in the study were regulated by government agencies and were also obliged to have contingency planning arrangements under the Civil Contingencies Act 2004. This resulted in high scores in this section due to mature approaches to integrating and liaison with other community organisations in support of contingency planning. *All the regulated organisations were part of regular liaison meetings and many had developed site specific co-ordination fora to improve overall operations.* Many of the organisations also had specific community engagement strategies including published action plans for investment in social programmes and infrastructure. Mutual support and community cohesion are important resilience foundations.

However, company values and resilience cultures were not necessarily understood or aligned within the airport communities which can create strains between partners and reduce performance.

Reflect, Learn & Adapt

Again, associated with regulatory and legislative requirements placed on many of the organisations, there were well-defined processes around learning from incidents and exercises to improve emergency plans. In a majority of cases, organisational learning was limited to contingency planning and incident response.

Best practice was exhibited by one of the support partners who is working to the BS65000 (Organizational Resilience) Guide. This is where the organisation had a formal learning and development team and a future leader's development programme. Most organisations had systems in place to allow ideas and improvements from throughout the organisation to be channelled and prioritized. However, these programmes were generally perceived to be low level and were not part of the resilience programme. Most organisations perceived themselves as flexible to change.

Corporate memory

This was the area where all organisations within the study were perceived to perform poorly. Poor performance in the area of corporate memory directly relates to a wider issue of poor learning infrastructure i.e. the applications, systems, networks, organisation associated with learning. Corporate memory directly impacts the quality of decisions and is intrinsically linked to power and influence. Studies have shown that erosion of corporate memory also impacts levels of productivity and therefore competitiveness.



Figure 5. The eight dimensions of learning power

Corporate memory can be enhanced through investment in learning infrastructure and the development of a culture that is open to learning.

Learning power

Agility and organisational learning are inextricably linked. Organisations with high levels of learning power are more agile and, therefore, more resilient.

A key contributor to the study, Jearni (<https://jearni.co/>) provided a useful framework through which individual and organisational learning power can be assessed and developed as shown in Figure 5.

The best organisations were those that were able to match an openness to learning and change from their staff with learning infrastructure. Learning infrastructure is the technological and social structures (i.e. applications, systems, networks, and organisation).

Risk, Opportunity & Awareness

In general, risk management had well-defined processes but with varying degrees of integration within the organisations. Most risk registers focused on shocks with no inclusion of stresses, trends or opportunities.

For some organisations, risk management and governance were treated as silo'd activities, mainly delivered at a strategic level with limited visibility to the rest of the organisation. There appeared to be limited co-ordination across partners when trying to understand the risks and how they would impact each part of the business community.

One organisation took a holistic resilience approach to risk management and developed principles and practices to ensure risks were understood throughout the organisation and high levels of engagement were undertaken to meet

these challenges both technically and culturally. This resilience approach delivered increased agility and productivity.

Horizon scanning

Horizon scanning is the 'systematic examination of information to identify potential threats, risks, emerging issues and opportunities, beyond the short term, allowing for better preparedness and the incorporation of mitigation and exploitation into the policy making process.' (Source: BS67000)

There can be a tendency to 'fight the last battle' rather than preparing for the next. *For example, we are rapidly approaching a tipping point where electric vehicles will be commonplace and they will be increasingly autonomous. These widely accepted facts have significant infrastructure and business model impacts for airports, especially those that draw significant revenue from parking.* Where will these vehicles charge and will these cars need car parks when they can drive themselves elsewhere?

Over the next decade there will also be significant advances towards electric planes; indeed, the CEO of easyJet recently expressed his belief that electric aircraft will be scheduled for service by 2030. This will have profound infrastructure and business model impacts that need to be addressed immediately.

Future threats/opportunities

The list at Appendix A highlights key issues relevant to the future of airports and are useful to take into account when horizon scanning and developing future scenarios. These change factors are all likely to impact and mature within the design life of current airport developments and therefore will have an impact on existing infrastructure as well as future infrastructure planning decisions.

Technology & Enterprise Architecture

Opinion about the uptake of new technology was divided. One organisation within the study scored particularly well. This was attributed to that airport being treated as a test bed for new technologies and as such was very open to new developments. *In certain key areas such as security, many of these organisations were open to adopting new technology to improve the customer experience. However, plans for other just over-the-horizon challenges such as future changes to mobility were less well developed.*

Fleet managers, operators, governments, and cities are seeking ways to alleviate the pressures of today's transportation challenges. Technology, analytics, and modern urban mobility policies are emerging as "smart solutions" to deliver sustainable, efficient environments for citizens and economic growth.

Intelligent transportation systems help enhance safety, traffic management, and environmental performance of roadways,

railways, aviation, and maritime. These systems include fleet management, predictive maintenance, vehicle autonomy, passenger entertainment, traffic management, video surveillance, passenger information, and 360-degree views.

Comprehensive situational awareness

A common area for improvement was around situational awareness. This was particularly focused on the gathering and sharing of real-time information.

In a business community setting, situational awareness should aim to draw information about every aspect of the business environment. As a minimum, a combination of security, operations, marketing, risk management, and information management is needed.

Ideally, these systems would be integrated into an enterprise-management system that includes enterprise-risk management. For large business communities, these complex systems need to be supported by an enterprise architecture to engineer situational awareness and ensure data are tuned into useful information. Tools such as 'the open group architecture framework' are useful in this regard. Correlation between agility survey and performance metrics

The agility survey results were correlated with the interviews and data collected on performance.

It was found that there was a strong correlation between agility and organisational productivity in terms of both staff and assets.

The picture with regards to disruption was more nuanced. What became clear was that the airports with higher productivity also have a higher proportion of delayed flights. This was largely due to the very efficient airline operations that the most productive airports serviced. These airline operations carry very little contingency and therefore, there was very little scope to absorb or respond to disruption.

Outcomes

The outcomes of the study were some key lessons on how resilience and agility can be enhanced. They are as follows:

- Linking resilience to business outcomes (measure resilience benefits and the impact of disruptions)
- Including resilience in new developments
- Looking further ahead
- Harnessing technology
- A community/systems approach

Linking resilience to business outcomes

Modelling

It was common practice for airports to be in the process of developing business impact assessments (BIAs) for each department as part of a business continuity process. However, when asked whether resilience positively affected the company bottom line the answer was 'undoubtedly, but it is difficult to prove'.

By developing a comprehensive value and systems-based model of the airport, as illustrated in Figure 6, it is possible to understand the importance and

interdependencies between departments and systems and then link these BIAs to business value delivery.

This allows the business case to be clearly understood and prioritized for investing in resilience building activities.

Measuring

The study saw a correlation between productivity, agility and reduced disruption. This relies on gathering the right data. *It is important to quantify the impact of disruption on the airport and partners as accurately as possible, as this assists in building the business case.* Equally, measuring change in value metrics (financial, etc) helps quantify the benefit of investing in resilience building activities.

Include resilience in new developments

It was observed that current client requirements for expansion projects were not clearly articulating resilience objectives, particularly with reference to adaptability. Very often expansion projects were opting to fulfil short-term objectives as cheaply as possible, with no consideration for adaptability to future change, such as changing system demand and new technological developments. This means that infrastructure needs to be replaced more frequently, therefore costing more in the long term.

It is recommended that airports articulate clear resilience requirements in the assessment of expansion

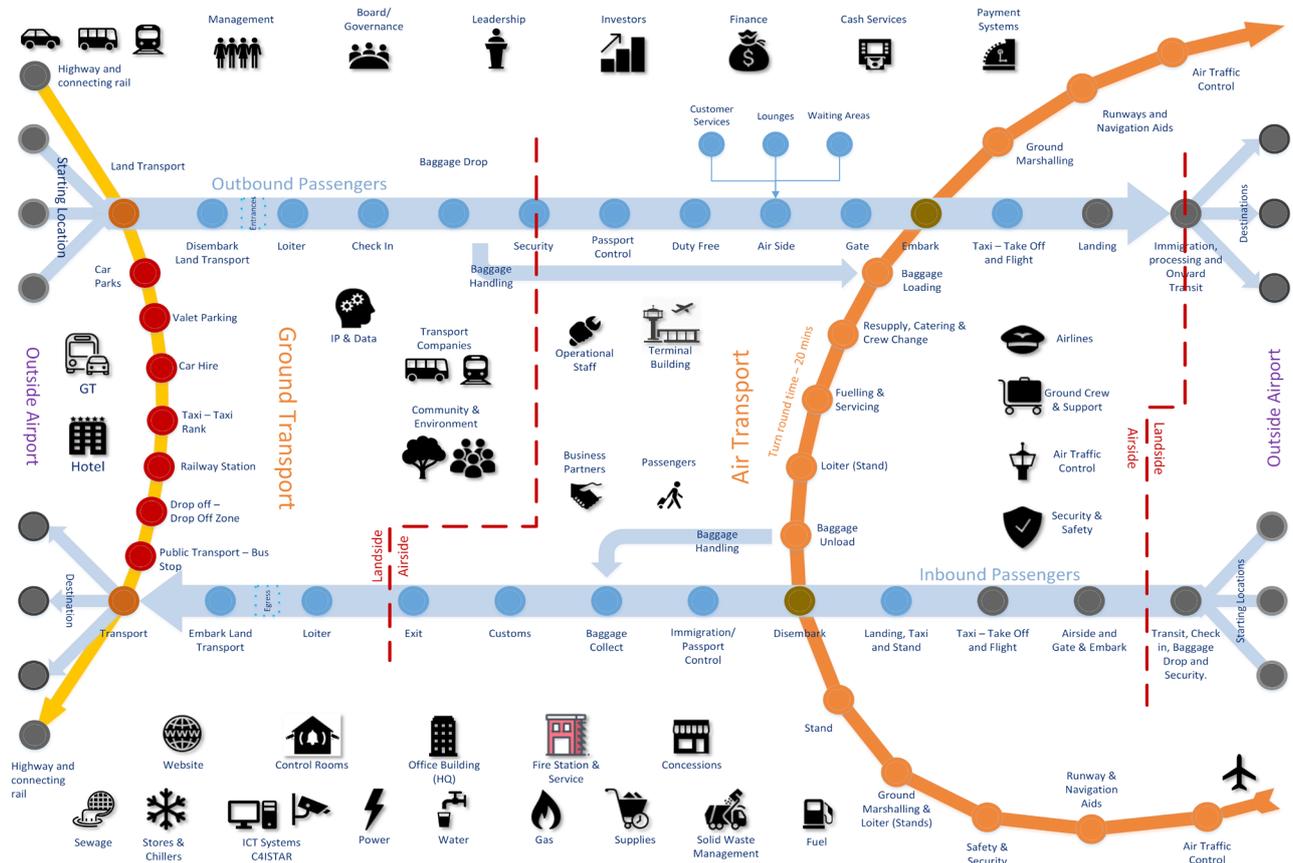


Figure 6. Generic value chain map of an airport operation

master-planning options that include building in robustness and redundancy to systems as well as adaptability/flexibility to future potential change.

Looking further ahead

Most risk registers contain, well, risks. But it is good to include opportunities and issues as well. *Automated vehicles and new technologies represent significant opportunities and the first business communities to tackle these issues head on have the potential to gain an advantage over their competitors.*

Future scenario planning is a useful way to address such issues. These narratives describe several likely possible futures for the medium and long term. They take into account projections around climate change, demographic change, population migrations and population growth. They also use the best available data around further market trends and technological advances. These narratives can then be used to plot general visions and develop staged strategies to ensure organisations, business communities, and societies are developed to minimise future threats and realise opportunities. This foresight enhances the stability of the business and helps deliver opportunities and drive improved productivity.

Harnessing new technologies

Organisations that most effectively harness technology will have an advantage over their competition. There are significant opportunities for airports to improve customer experience through real time data and machine learning, to streamline security processes with the latest scanning technology and to embrace electrification by investing in autonomous vehicles and the infrastructure to support this and electric aircraft.

Smart Airports will leverage new technologies to share data between the various stakeholders of airport operations, allowing airports to both increase revenue and decrease operating costs through enhanced operational performance, improved passenger experience and continued safety improvements. Keeping ahead of competition by implementing solutions spanning from security to passenger information systems that can enhance critical airport operations will be key to improve the passenger's experience and increase revenue stream.

Community systems approach

Business communities rely on each other to protect, sustain and improve business outcomes. However, few communities understand the value that each delivers in this system of systems.

Business communities should work together to develop a collective understanding of value delivery, value chains and system vulnerabilities through utilising standards such as BS67000 (City Resilience).

Programmes of combined action and investment can then be developed so that these business communities can thrive together.

Concluding remarks

Agility is essential to resilience. It is the part of the resilience that will deliver competitive advantage and most aid the long-term prosperity of business communities.

Most mature organisations have a well-structured foundation for agility but those organisations that have actively tackled developing a resilience culture are those that are most agile and productive.

It is imperative that business communities such as airports work together to share, align and improve their collective resilience. This will improve productivity and performance at a community and for airports, a regional scale.

Appendix A: List of Threats and Opportunities

Opportunity/ Threat	Identified Likely Impacts
Self-Drive Cars	Reduced parking revenue - car able to drive elsewhere to park
Electric Cars	Growing need for electric charging points Greater power requirement for site
Electronic/ Biometric ID	Rapid change in ID technology - rapid redundancy of old equipment
Increasing size and range of aircraft	Design implications on runway, apron, stands and terminal/ gates
Electric planes	Redundancy of fuel capability Greater demand on power infrastructure
Personalised Air Transport	Increased peak levels of demand significant infrastructure changes
AI in control systems	Automation of control systems - all
Brexit	Friction on establishing routes Compliance issues Increased regulatory burden Greater demand on limited boarder control staff
Terrorism	Move to cyber terrorism and attacking infrastructure electronically Huge burden on airport security
Employment – AI unemployment – welfare – focus on front facing services	Back office functions reduced - face to face contact remain
Greater gap between rich and poor	Growth in personalised travel and economy travel. Middle squeezed
Workers – skills shortages	Key driver for automation of services
AI in public transport	Us of AI in all systems of control including public transport
Housing – pressure on green belt Growth urbanisation	Land scarcity and increased land prices
Population growth	Larger market, greater demand
Ageing population	Greater demand from the grey pound Greater willingness to travel outside of peak Greater assistance needed for those with limited mobility
BREXIT – possible economic slowdown – impede growth	Reduced economic activity = reduce travel
Possible recession	Reduced economic activity = reduce travel

Lack of investment in infrastructure by Government	Airport development is unlikely to be matched by off-site infrastructure
Continued productivity deficit – reduced attractiveness of UK as market	Reduced economic activity = reduce travel
Structural stress on Airport	Airport development is unlikely to be matched by off-site infrastructure
Sunk costs of infrastructure	Sunk costs of existing infrastructure reducing ability to adapt to changing market
Climate change – hotter, drier summers; warmer, wetter winters	Increased flood risk Change in infrastructure life and degradation Greater cooling and drainage
Greater regulation around environment, security and data – resilience	Increased regulation on security, anti-discrimination, cyber and the environment Zero carbon by 2050 Use of drones
Power – ever greater demand	Stress on power supply
Rising costs of power through sunk costs of big infrastructure	Case for onsite generation and storage increasing
Reduced demand for fossil fuels	Fuel facilities requirement reducing
Greater accountability on polluters for impact of poor air quality	Potential litigation Greater regulation and closer scrutiny Reputational risks
Ever greater reliance on technology	Greater need to provide support to technologies – e.g. Wi-Fi, 5G etc
Social media	Bad news travels fast and cannot be stopped Media management becomes key capability

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