Report of the SEAT sub-group on punctuality, delay and resilience

May 2011

Executive summary

Introduction

This is the report of the sub-group of the South-East Airports Taskforce (SEAT). The sub-group was established to propose ways in which the operational performance of Heathrow, Gatwick and Stansted, the three main airports in the region, could be improved within the constraints of the current capacity caps and Government policy of no additional runways, in keeping with the theme of 'better, not bigger'. The Government has also ruled out mixed operations at Heathrow airport to ensure that local residents can continue to benefit from the regular respite from noise provided by runway alternation[1].

The report concludes that there is scope for significant improvement through the adoption of a package of proposals combining local initiatives with enabling agreements at a strategic level. That said, the report also acknowledges that ultimately there is a limit to the improvement that can be achieved using the existing infrastructure.

Recommendations

The group recommends a package of proposals to improve the operational performance of Heathrow, Gatwick and Stansted. Key elements are:

- A set of **operational freedoms** specific to each airport, to allow certain tactical measures to be applied solely to prevent or mitigate disruption and facilitate recovery. Drafted in the first instance by the airports and their stakeholders within a framework agreed by the Department for Transport (DfT), the measures could include, for example, use of temporary departure routes and temporary enhanced modes of runway operation, but only against clear, pre-determined criteria.
- A **performance charter** specific to and developed by each airport taking into account local factors. This would be agreed by all of the airport's stakeholders, setting out performance objectives, the planning process (including each stakeholder's specific responsibilities), the performance management regime to be applied, incentives/sanctions and protocols for handling adverse conditions and disruption. The performance management scheme, could, subject to further work, form part of the future regulatory regime for airports through the service quality regime, treating the three strands of the overall package of sub-group recommendations as interlinked.
- Formulation of a set of **policy guidelines on capacity management** covering, inter alia, the criteria to be applied during the capacity declaration process in terms of economic, environmental and operational impact assessment and slot efficiency. Given the terms of the EU Slot Regulation and UK implementing legislation with which the guidelines will need to comply, this initiative would be led by airports, in conjunction with other stakeholders such as Airport Coordination Ltd, the DfT, NATS and airlines.

Within this strategic policy framework, each airport would be expected to accelerate and deliver the benefits arising from local initiatives to develop further planning and operational control processes.

Background

The airport and airspace system in the South-East is vital to the UK economy and commercially attractive to industry players. However, by any standards, it is also among the most challenging in the world. As the recent adverse weather has highlighted, the

[1] 7 September 2010 Written Ministerial Statement on "Heathrow Operations"

performance of the system can quickly tip from acceptable (although not necessarily good) to very poor.

There is an inherent relationship between, on the one hand, the utilisation extracted from the runways and airspace and on the other, the level of 'delay' and performance risk that is accepted in creating the buffer stock of aircraft queuing to land, take off and enter congested airspace. An optimum balance must be found between:

- utilisation of scarce and expensive assets of airports, airlines and airspace;
- operational performance, as measured mainly in punctuality;
- resilience, i.e. the ability to anticipate, withstand and recover from disruption; and
- environmental impact, in the form of noise and emissions.

The group's approach

There are already a number of on-going efforts to sustain and improve performance. For example, in the longer term major technology and airspace developments will emerge through the development and implementation of the Future Airspace Strategy and the European SESAR technology and process improvement programme.

The group's focus was therefore on augmenting and accelerating local collaborative initiatives and investment among stakeholders at individual airports, through appropriate policy support, that could run on a timescale of only a few years. The group's recommendations were founded on the fundamental principles that:

- the passenger experience should be improved, in terms of:
    - better service in normal operations; and
    - minimising disruption where it becomes inevitable and facilitating recovery and improved passenger welfare;
- sustainable environmental benefits should be achieved through reduced emissions and noise, benefiting local communities;
- efficiency and effectiveness in the use of scarce resources and assets should be improved;
- competition and the market should not be prejudiced and ideally should be reinforced; and
- optimum outcomes should be achieved through a collaborative approach between ANSPs, airlines and airports.

Current arrangements for managing capacity

Although there are differences from airport to airport, the strategic capacity of runways is typically set at relatively constant levels through the day and across seasons. This is judged to be a sustainable level of capacity. Scheduled demand (i.e. the published schedule) follows the strategic capacity at an hourly rate, although it can be more 'bunched' at a more granular level particularly around commercially attractive times of operation.

On the day, the pattern of actual capacity can vary for a number of reasons – often related to the impact of the weather. Likewise, the pattern of actual demand can vary for a number of reasons – at network-level most commonly according to the network punctuality of the airlines, the impact of the air traffic control (ATC) network and weather effects. Imbalance

between capacity and throughput causes anything from minor delay to major disruption; in general, the greater the utilisation, the greater the impact.

These mismatches between capacity and demand are managed (mainly by ATC and the airlines) through a series of tactical measures on the day – ranging from limited delays, such as one loop in the arrival stack, through extended holding on the ground at the departure airport, to major cancellation programmes.

The scheduling process has evolved continuously over time and, together with operational mitigations, has delivered performance improvement, for example in reductions in the magnitude of stack holding. However, inefficiencies remain. Work commissioned by the CAA in 2007/8 on runway resilience (in response to a request from the then Secretary of State) estimated the total annual cost of holding at Heathrow to be over £400m per year.

Airlines generally allow for potential delays in their schedules, in which case minor delays will not impact punctuality. Where airlines do not make an allowance, delays will result in poor punctuality and may well knock-on to other services in the schedule.

Current operational standards for airports are therefore a compromise taking into account these factors and the inherent conflict of high runway utilisation and variable demand. Historically, the airport's operational stakeholder community has attempted to balance these forces through the Runway Scheduling Limits process, using a simulation tool and a target maximum average 'delay' of 10 minutes per flight. However, this parameter is only partially representative of the passenger experience – airspace congestion, for instance, is not adequately considered in this process.

Historically, the Runway Scheduling Limits process has been essentially geared to finding increased capacity to cope with growing airline and consumer demand. However, considering the success of this process against the broader background of the passenger experience, it is apparent that:

- Delays, of different types, frequently exceed 10 minutes per flight in total, sometimes by a significant margin – and if incurred on both arrival and departure legs can add up to considerable amounts of time, carrying both a punctuality penalty and inefficiencies for passengers, airlines and airports.
- Airports typically experience 60–65 days per year of disruption, of which 10–15 are significant (including major cancellations). It is unrealistic to account for the worst days in the capacity planning process, but more could be done in the tactical management and contingency arrangements.
- While on-time performance is adequate against comparable benchmarks, there is scope for substantial improvement – an industry-typical 80% target implies one in five flights can be more than 15 minutes late.
- That said, across the year, the planned programme is completed on more than 80% of days – that is, there are only a few cancellations – implying that the gross assessments of capacity and demand are in reasonable balance.

Proposed interventions

The underlying theme of the interventions proposed by the group is to prevent, manage or mitigate the build-up of queues and their impacts in the complex system of airports and airspace – which can extend well beyond the UK.

Given the fundamental relationship between demand and capacity, it is initially attractive to consider reductions in planned capacity – i.e. further restricting the schedule. However, this is not recommended. Notwithstanding the substantial and permanent commercial, economic

and consumer impacts of reduced capacity, the level of reduction required to be measurable would likely be substantial, would not in itself be guaranteed to improve performance significantly on the majority of days nor address the peak periods (which account for the most significant problems) without other measures, such as performance management, being applied in parallel. Additionally, a reduction in capacity would be very difficult to implement within the current legal framework. Better to make the plan more fundamentally achievable and strengthen the governance and performance management processes.

The group proposes a framework for these interventions comprising three strands, based around those aspects over which local stakeholders have control or influence – accepting that these proposals need significant further work to develop into an implementation plan.

1. Operational freedoms – increasing operational tactical headroom

The objective of this intervention would be to improve the short-term tactical capability to handle peaks in demand or off-set potential reductions in operational capacity on a temporary basis when required according to clear, pre-determined criteria. This would largely be in the form of additional flexibilities to be made available to ATC in operating the runways and related airspace. However, this must be without increasing the strategic, declared capacity of the airport (i.e. additional slots would not be created or allocated based on this tactical increase in capacity).

There would be two main elements to this:

- Temporary operational enhancements triggered by the onset or anticipation of disruption and applied solely on days of disruption and only against clear, pre-determined criteria. In some cases these enhancements would require policy decisions to enable them to be applied (and to define the conditions under which they could be applied). Examples are temporary enhanced modes of runway operation, use of temporary departure routes, and a coordinated and integrated approach to cancellations defined and agreed by the airport and the main carriers.
- Accelerating the development of tactical tools to enhance airport and ATC operations bringing capacity benefits that would improve both disrupted and normal days. Again, this may require policy decisions (for example in relation to safety) to enable these tools to be implemented.

This intervention could be expected to have a beneficial environmental impact overall through a reduction in emissions. It could also change the pattern of noise around airports for temporary and limited periods; here the trade-offs are complex and could bring both benefits and disbenefits.

2. Performance charter – enabling improved adherence to plan

The objective of this intervention would be to improve and assure both the inherent feasibility of plans (schedules and resources) and the cross-stakeholder co-ordination and controls which manage adherence to plans and the minimisation of disruption.

There are three main elements to this:

- Assuring that the schedule is robust and achievable, which means that the plan must be formulated against a realistic and representative set of scenarios covering a range of foreseeable conditions, weighing up risks and likely outcomes to generate a more informed schedule. The schedule itself should be based on a more complete set of planning parameters, for example including all components of delay in the analysis and basing conclusions on predictability as well as average delay.
- Putting in place procedures to adapt the plan to take account of anticipated operational conditions, such as North Atlantic weather patterns or ATC disruption.

- Improvements in airport coordination and control, which should help ensure that all stakeholders pull in the same direction to achieve the plan. This would require greater operational leadership from the airport, setting out performance objectives, the planning process (including each stakeholder's specific responsibilities), the performance management regime to be applied, incentives/sanctions and protocols for handling adverse conditions and disruption. The performance management scheme, could, subject to further work, form part of the future regulatory regime for airports through the service quality regime, treating the three strands of the overall package of sub-group recommendations as interlinked.

3. Policy guidelines on capacity management – optimising the throughput-delay trade-off

The objective of this intervention would be to redress the balance between the utilisation of the scarce resource – effectively the runway – and the holding delays (and associated environmental emissions) associated with the level of utilisation.

A major part of this would be through improved governance, taking into account objectives other than solely delay. This would probably require an enhanced capacity management rule set or guidelines which would cover, inter alia, the framework for the impact assessments that need to be done in the capacity declaration process. Improvements in governance would also need to cover the implementation of a proper performance regime, which would include the definition of minimum performance standards, performance monitoring, feedback mechanisms and a sanctions and incentives regime.

Alongside improved governance, improvements would need to be made in the capacity management process to ensure that the capacity declaration reflects the full set of impacts and therefore that the capacity plan is robust and achievable. Recognising that capacity declaration is the responsibility of the airport, the improved capacity management process should, inter alia, utilise the full set of parameters needed to reflect operational realism (for example, all delays must be included, not just a partial set as at present), include a feedback loop ensuring that lessons are learned from previous years, and account for airspace capacity as well as runway capacity.

Continuing efforts to increase airspace capacity and performance

These proposals would run alongside airspace projects currently underway in the form of the Future Airspace Strategy (FAS) and efforts to improve performance across Europe. A related aspect is the need to ensure that airspace constraints do not impinge on the competitive freedoms of individual airports. Therefore developments in London airspace, to be delivered through FAS, are critical enablers to the interventions described above. In a wider network context, airports are key nodes in the structure and must be aligned with airspace developments. This will be a feature of future efforts in the National Performance Plan and in the Airports Working Group (a joint UK airspace/airports body set up to address common issues).

Benefits

Complex interdependencies imply that there is no one solution that will achieve a step change in operational improvement. However, the package of proposals can achieve a major improvement, particularly at Heathrow and Gatwick, which already have the basis for improvement initiatives. Stansted is currently under less stress.

This improvement would be felt in three ways:

- For the majority of days during the year, benefit would be measured principally in punctuality and a major reduction in the number of delay hours of aircraft and passengers. Not only will this improve the passenger experience, but it will also reduce environmental impacts and improve efficiency and effectiveness.
- In disrupted situations, there would be a reduction in the number and severity of cancellations. This is the scenario most strongly associated with enhanced operational flexibility, thereby maximising the number of passengers who achieve their planned journey and minimising the impact on the others.
- In severely disrupted situations, cancellations cannot be avoided, but the measures of success would be in how well stakeholders recovered the operation and mitigated the impact on passengers. Although it is almost impossible to eliminate adverse effects on passenger journeys, the basis is laid for better management of the situation and responding to passenger needs.

The scale of improvement achievable will depend on the scope of any improvement programme. It will also vary significantly in nature from airport to airport. While operations and recovery could be improved by process changes and investments within all current constraints, the group judges that there is much more value to be gained by incorporating strategic and policy levers in a broader programme. Experience strongly suggests that the integrated package of measures would achieve very much more than a piecemeal approach – the whole is greater than the sum of the parts.

Thus, while individual stakeholders have their own targets and aspirations, it might be possible to agree a more stretching set of collective auditable targets bracketed with the proposed policy changes (particularly on operational freedoms in times of disruption).

Although the focus of the group's recommendations was on punctuality, delay and resilience, the report also draws attention to the potential for much wider benefits that improved operational performance could bring. As well as the more obvious passenger benefits from flights operating to schedule, less immediately obvious are the benefits from passengers no longer having to build in contingency planning to their journeys and from being better informed at times of disruption through better industry co-ordination and control of operations. For the industry, improved operational predictability will feed through into many airport and airline processes, which in turn will help to improve punctuality, and so create a 'virtuous circle'. Indeed, the benefits could well ripple through the wider European and global network, given the prominence of South-East airports. Greater adherence to planned operations should also minimise environmental impacts for a given volume of traffic.

Risks

Implementation will be challenging for a number of reasons:

- The costs and benefits of change may occur in different organisations, effectively outside commercial arrangements. This will also influence any funding and resourcing requirements.
- Although there will almost certainly be a net benefit in terms of overall environmental impact, some of the proposed changes will change the noise profiles in some situations (albeit on a temporary, limited basis), and, therefore, may be unpopular with some local residents.
- If external confidence is to be built in the credibility of the proposed changes and their delivery, then governance arrangements will have to be strengthened, with greater transparency and possibly stronger incentives and sanctions.

- Assuming consumer demand continues to grow, even within existing structures, this will increase pressure on the system – if only through increased average aircraft size.
- The freedom to address fully all the issues may be inhibited by the EU Slot Regulation.

Contents

1 Introduction

1.1 Background

In order to explore ways to improve the efficiency of airports as key components of national transport infrastructure, and to help make the most of existing airport infrastructure, the Secretary of State for Transport established the South-East Airports Taskforce (SEAT), comprising a range of stakeholders from across the air transport industry. The focus of SEAT is on the region's three largest airports – Heathrow, Gatwick and Stansted. This document is the report of the sub-group tasked with addressing punctuality, delay and resilience.

1.2 Scope

The initial objectives of the Taskforce sub-group on punctuality, delay and resilience were to:

- define clearly the nature and extent of the problem of punctuality, delay and resilience and how this is manifested at different airports, with a focus on Heathrow, Gatwick and Stansted
- assess the degree to which this problem is driven by factors such as established processes, operational practices, airline/airport/other behaviours, or the more fundamental issue of the runway capacity/throughput balance
- make an inventory of current and proposed changes to operating processes or comparable initiatives to address the problem of punctuality, delay and resilience at capacity constrained airports and assess the degree to which these changes will improve the operational performance of the airport
- consider whether there are any further changes to operating processes or comparable initiatives that could improve further the operational performances of capacity constrained airports in terms of punctuality, delay and resilience, and whose responsibility it would best be to bring such changes forward
- assess the likely overall contribution to improving performance at capacity constrained airports, based on current and possible future changes to operating processes or comparable initiatives; compare the magnitude of this contribution with the scale of the problem remaining as a result of the tight balance of runway capacity and throughput.

The sub-group applied a value-chain approach to the analysis, whereby the linkages and influences between processes were identified allowing the impact of, for example, interventions at the strategic level to be traced through to operational outcomes, specifically in terms of the three main indicators. This approach is described in Section 1.3.

For the purposes of the analysis, the following definitions were used:

- the punctuality of a flight is the difference between the planned off- or on-blocks time as defined in the schedule and the actual off- or on-blocks time
- the delay for a flight is the time lost through holding in queues while it is waiting to access infrastructure and/or airspace. These queues take various forms, including airborne holding stacks, taxiway queues and being held on stand by air traffic control (ATC)
- resilience is defined as the ability to anticipate, withstand and recover from disruptions caused by adverse conditions.

In addition, environmental impact was also included as a performance area of interest.

Although the scope of the sub-group was strictly focused on the three airports, detailed consideration was also given to more general contextual issues, such as the performance of the surrounding airspace and European ATC that influence the performance of the airports.

The membership of the sub-group is as follows:

- Mark Swan, Director of Airspace Policy, Civil Aviation Authority (Chairman)
- John Bell, Head of UK Airport Operations, Virgin Atlantic
- Dan Edwards, Regulatory Policy Group, Civil Aviation Authority
- Ian Elston, Aviation Regulatory and Consumer Policy Division, Department for Transport
- Will Facey, Head of Operations Control, easyJet
- Tim Hardy, Airside Director, BAA
- David Hill, Head of Coordination, Airport Coordination Limited
- Stuart Lindsey, Directorate of Airspace Policy, Civil Aviation Authority
- Peter Lynam, Head of Network Operations, British Airways
- David O'Brien, Director of Flight and Ground Operations, Ryanair
- Jon Proudlove, General Manager, Air Traffic Services Heathrow, NATS
- Scott Stanley, Chief Operating Officer, Gatwick Airport Limited
- Trevor Waldock, Head of Airside Operations, BAA Stansted.

The work of the sub-group was supported by Michael Fairbanks, Helios and Graham Howarth, XPX Consulting. Secretariat was provided by Matthew Buffey, James Wiltshire and Trevor Metson, Regulatory Policy Group, Civil Aviation Authority.

1.3 Approach

A structured approach to the analysis was developed, allowing the impacts and interactions of processes at the strategic and policy; planning and delivery levels to be related to each other. This framework is illustrated in the following figure.

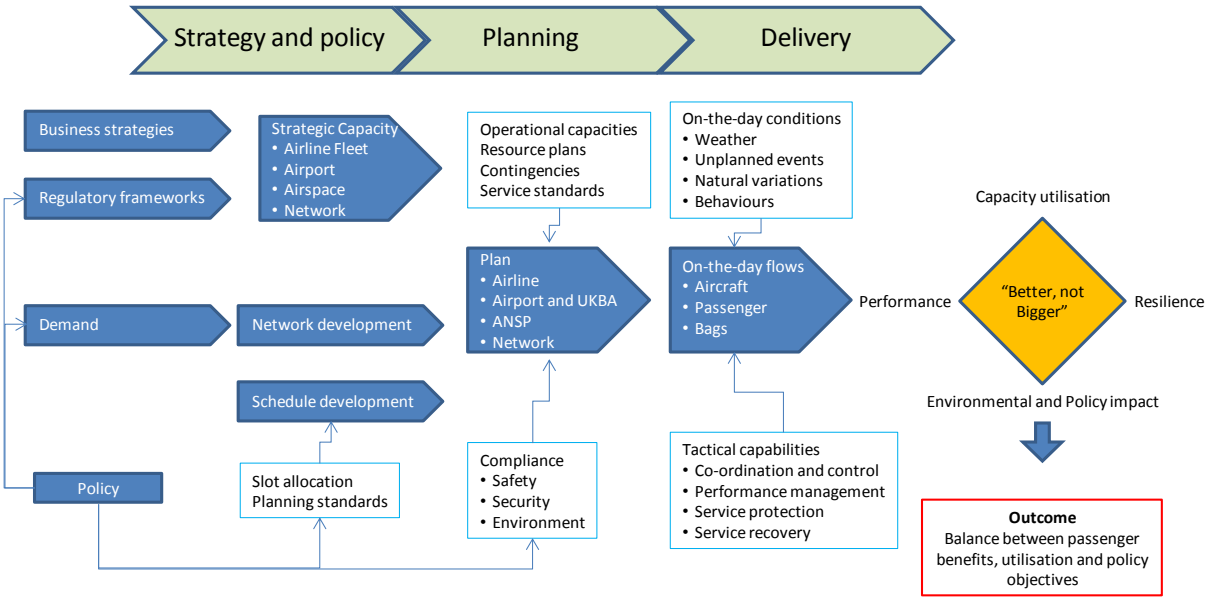

Figure 1: Analysis framework

The outcomes of the processes considered in the analysis were assessed at the four vertices of a performance diamond as illustrated in the following figure.

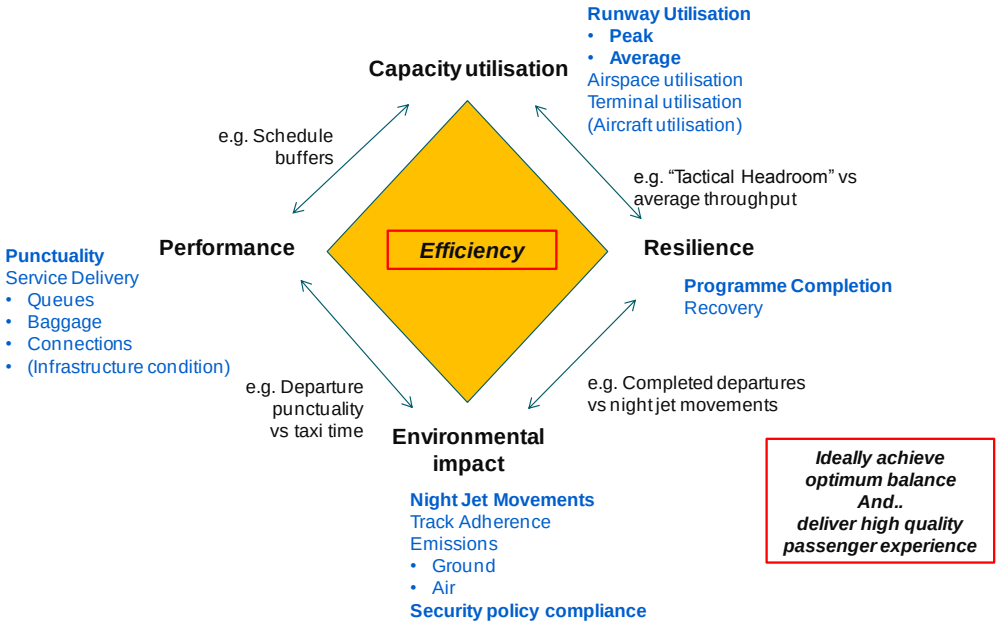

Figure 2: The performance diamond

The *diamond* provides a useful framework through which the tensions between the performance areas can be identified, noting that these tensions can be either: opposing, where improvement in performance in one area might imply degradation in another; or complementary, where improvement in one area leads to improvement in another. Performance impacts and associated trade-offs were assessed by applying a set of basic principles:

- the passenger experience should be improved in terms of levels of delivered service in normal operations and, importantly, in terms of minimising situations of disruption and facilitating recovery and improved passenger welfare when disruption becomes inevitable
- environmental benefits should be achieved through reduced emissions and noise, benefitting local communities
- efficiency and effectiveness, in the use of scarce resources and assets, should be improved
- competition and the market should not be prejudiced and ideally should be reinforced
- ANSPs, airlines and airports should adopt a collaborative approach to ensure, jointly, that optimum outcomes are achieved

Initially, the sub-group considered the end-to-end airport journey from the perspective of the passenger, considering all airport processes. Based on the expert judgement of the sub-group participants, those processes associated with the movement of the aircraft (approach, landing, taxi-in, turnaround, taxi-out and departure) were identified as priorities for detailed analysis. However, some additional processes, such as immigration processing and security, are being addressed separately and are therefore outside the scope of this report.

Thus the key criteria analysed as the vertices of the diamond are:

- performance, characterised mainly by punctuality, considering arrivals, departures and turnarounds
- capacity utilisation and its associated delays, focused mainly on the runways but with some consideration given to airspace
- resilience, quantified principally in terms of cancellations
- environmental and policy impact, focused on emissions and noise.

This report describes the detailed, quantitative data-driven analysis undertaken by the sub-group subsequent to its initial prioritisation based on judgement. The report also highlights the conclusions and recommendations resulting from this analysis and represents the consensus view of the sub-group.

1.4 Structure of the report

The report is structured as follows:

- Section 2 describes the overall context in terms of the four main performance areas. These are quantified using data from 2008, which is the last representative busy period prior to the impacts of the economic downturn depressing demand and events such as volcanic ash distorting both demand and performance.
- Section 3 identifies proposed interventions to address the issues identified in Section 2 in a coherent way.
- Section 4 further proposes a set of actions consolidated into a package of measures at policy/strategy, planning and delivery levels. While recognising that a one-size-fits-all approach would not be appropriate, the package would need to be delivered in its entirety to deliver the benefits.
- Section 5 quantifies the benefits that are likely to be delivered by this package of measures.
- Section 6 lists the risks associated with delivery.
- Section 7 provides a high-level roadmap for delivery.
- Section 8 highlights the wider benefits that will be derived from the proposed package of measures.

2 Context

2.1 Background

London has the busiest and most complex city-airport system in the world. There are five major airports (Heathrow, Gatwick, Stansted, Luton and London City) and a number of secondary airports (Farnborough, Northolt, Southend, Biggin Hill, Oxford, etc) interacting with each other within a small geographical radius, and sharing extremely busy and complex terminal airspace. Heathrow, Gatwick and Stansted together account for over 90% of the passenger traffic at the South-East's airports, more than 50% of the total traffic for the UK as a whole and more than 60% of the UK's international passengers[2].

The global links provided by London's airports are vital to sustain the economy of the region and of the country as a whole. For example, London First highlights the economic contribution of the region, noting that London and the South-East contribute one third of the country's gross domestic product (GDP) and that London is: (i) the UK's principal gateway to international capital and labour; (ii) Europe's leading recipient of foreign direct inward investment totalling more that £50 billion per year; and (iii) the hub of the UK's service sector, particularly for finance and business, accounting for approximately one third of the country's exports in services. High quality and reliable connectivity by air is critical to sustaining London and the South-East's – and, ultimately, the UK's – economic competitiveness.

The quality of service – in terms of punctuality, delay and resilience[3] – delivered by London's airports is roughly at the same level as that delivered at credible comparator airports, especially when the constraints of limited infrastructure, traffic growth, and congested and complex airspace is taken into consideration. Significant progress has been and continues to be made in improving punctuality, reducing delays and managing disruption. Indeed, some of the processes and procedures in place in the UK – such as the scheduling and slot allocation processes at Heathrow, Gatwick and Stansted – are viewed as global best practice. In this context, continued performance improvement would be expected to evolutionary and gradual rather than as an abrupt step-change.

However, there is always room for improvement, not least because of the continuously changing and ever-more challenging environment in which the airports operate, for example with the introduction and expansion of A380 aircraft operations. Moreover, merely adequate performance compared with competing hubs, such as Paris, Amsterdam, Frankfurt and Munich, is no longer considered acceptable. Performance – both tangible in terms of hard measures, such as punctuality and cost (both direct and indirect) and more intangible, in terms of factors such as passenger experience and confidence – needs to be world class for the South-East, its airports and home-based airlines to retain and improve competitiveness. The need for performance improvement also has to be set in the context of the need to mitigate environmental impacts, notably emissions of greenhouse and other gases and noise.

Given all of the above, the following sections highlight the performance of Heathrow, Gatwick and Stansted airports in terms of punctuality, capacity utilisation, resilience and environmental impact. The performance indicators are derived from 2008 statistics – prior to the traffic downturn due to the recession and free from the impacts of distorting events such as the volcanic ash crisis. This performance is therefore a representative baseline for a scenario with busy traffic, current infrastructure and unimproved processes and procedures. It also highlights the differences between the three airports, emphasising the need to avoid one-size-fits all solutions.

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[2] Source: CAA airport statistics for 2010

[3] Resilience can be defined as the ability to anticipate, withstand and recover from adverse conditions – see Section 2.4

2.2 Punctuality

Performance

Punctuality is defined and measured relative to the scheduled time for an aircraft to reach its stand on arrival (on-time arrival punctuality – OTAP) or to push-back from its stand (on-time departure punctuality – OTDP), comparing the actual times to the planned times within the schedule. It is current practice to quantify punctuality performance as the proportion of flights that are less than 15 minutes behind schedule; that is a flight is counted as punctual if it is less than 15 minutes late or better. In absolute terms, this is not a very ambitious target[4]. The following table[5] summarises the OTAP and OTDP performance at the three airports as observed over the summer season (April to October inclusive), in terms of the average number of minutes each flight is late and the proportion of flights arriving or departing less than 15 minutes behind schedule. This performance varies by airline and by time of day where, generally, morning flights are more punctual than those later in the day.

	Arrivals		Departures	
	Average # minutes late per flight	%age of flights < 15 minutes late	Average # minutes late per flight	%age of flights < 15 minutes late
Heathrow	7.9	72	10.6	74
Gatwick	8.6	73	12.0	72
Stansted	7.4	76	8.0	79

Table 1: Typical punctuality performance at the three airports

The table above is an indicator of average performance. It should be noted that:

- on disrupted days, punctuality is considerably worse than average, with the proportion of flights operating less than 15 minutes late typically being reduced by 10 to 20% during moderate disruption and being reduced to zero in severe disruption
- on good days punctuality is often good and considerably better than average.

These observations indicate that from the airport's perspective, the focus should be on addressing punctuality issues during periods of disruption, essentially a resilience issue. However, it should be remembered that the achieved levels of punctuality compared to the timetable account for many millions of passenger delay minutes per year, as illustrated in the following table.

[4] For example in the rail sector, punctuality for the end-to-end journey is measured against a 10-minute criterion for long journeys and a 5-minute criterion for commuter journeys with targets set at the 90% success rate.

[5] It should be noted that current (early 2011) punctuality performance is considerably better than that reported in the table above

	Millions of passenger delay minutes per year (typical punctuality performance)	
	Arrivals	Departures
Heathrow	131	128
Gatwick	65	64
Stansted	50	52

Table 2: Approximate passenger delay minutes compared to the timetable

Turnaround time can be used as a further measure of performance. The turnaround time is the difference between an aircraft's arrival time and its departure time. Turnaround performance can be measured by comparing that derived from the schedule and that achieved in reality. Analysis indicates that, in general, actual turnaround performance does not achieve the planned performance – quick turns generally take longer than planned. Again, turnaround performance – both planned and achieved – varies by airline and by airport.

Analysis also indicates that there is little or no relationship between punctuality and any holding delays directly attributable to the airport other than when such holding delays are greater than approximately one hour. With the caveat that the recording of data identifying the causes of delays is very unreliable, Eurocontrol's Centre of Delay Analysis reports that the two most significant causes of delay are the 37% that is attributable to aircraft rotation and the 33% that is attributable to airline processes. In addition, external and uncontrollable factors, such as disruption of the air traffic control network (for example that experienced in 2010 in France and Spain), can significantly degrade punctuality.

Comparison of the punctuality performance of the three airports to that reported by Eurocontrol for a range of (not necessarily comparable) European airports shows that the UK airports have lower punctuality performance than their European counterparts. This difference is important in terms of public perception, whether or not it is statistically significant, or whatever the causes, be they due to infrastructure constraints, operational processes or measurement techniques.

Issues to be addressed

Punctuality performance needs to be addressed both during periods of disruption and during normal operations but for different reasons. During periods of disruption the focus needs to be on the airport, whereas during normal operations additional attention needs to be given to external processes, including both ATC and airlines. The main issues that need to be addressed concerning punctuality performance are:

- interdependency between punctuality and resilience during disrupted operations
- poor on-the-day predictability during normal operations:
  - factors beyond the control of local stakeholders, including European ATC performance
  - factors with local control or influence, for example turnaround performance
- poor availability of reliable data to identify root causes.

2.3 Capacity utilisation

Airport capacity utilisation

At each of the three airports, capacity utilisation is managed as part of the scheduling and slot allocation process within the rules defined in the EU Slot Regulation[6] and the IATA Worldwide Scheduling Guidelines. All three airports are slot coordinated as defined by the Slot Regulation. Under the legal framework, the airport managing body is required to declare capacity for the airport on a seasonal basis, against which the slot coordinator – Airport Coordination Limited – allocates slots on a well-defined basis accounting for historic ('grandfather') rights. Spare slots are allocated following a well-defined order of priority, accommodating airline requests as far as possible within the capacity declaration, and complying with the rules of precedence set by the Slot Regulation, augmented by local rules where relevant.

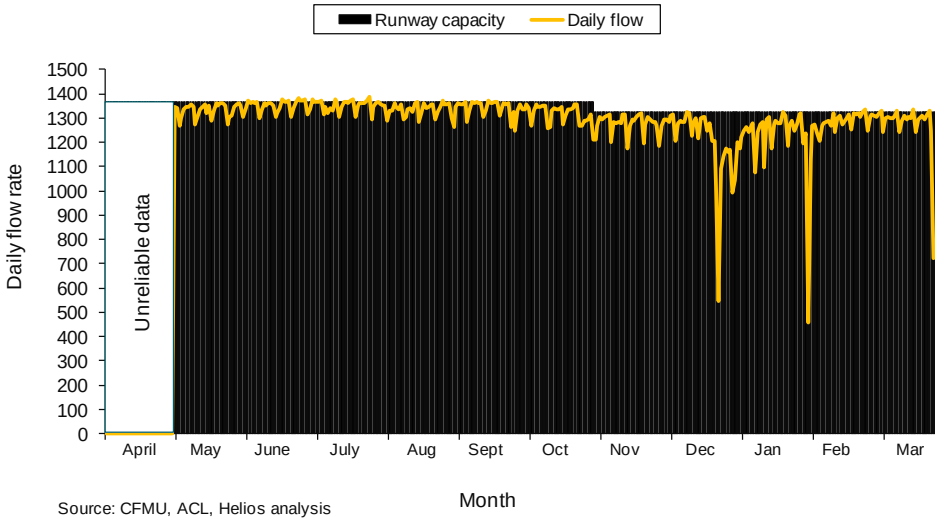
There is no simple or single definition of 'capacity'. Declared capacity is essentially a judgement of a sustainable utilisation level, dominated by the runway, and should, ideally, be lower than the tactical/operational ability which might be achievable in certain circumstances. Effectively, therefore, the capacity declaration is made by trading-off capacity against agreed thresholds for holding delays to optimise the utilisation of the airport infrastructure. These holding delays are most visible as time spent in holding stacks for arrivals and time spent queuing for runways for departures. Holding delays are often built into airline schedules and do not necessarily lead to poor punctuality, although they do imply inefficient use of assets and have direct costs such as additional fuel burn with associated negative environmental impact

Although the capacity declaration process applied at Heathrow, Gatwick and Stansted is acknowledged within the industry as best practice globally, it has some shortcomings that need to be addressed:

- the delays that can be attributed to holding or queuing to use airport infrastructure are only partially included in the process. The delays that are included are limited to airborne and ground holding. Other delays attributable to the airport, such as air traffic flow management (ATFM) restrictions and the impacts of taxiway congestion, are not included. Therefore the actual delays experienced can be considerably greater than those anticipated in capacity declaration
- the capacity declaration is based on a limited amount of historical data, potentially producing optimistic results
- the criteria applied to slot compliance are fairly loose and only apply to deliberate, severe and persistent abuse, thereby missing general and low-level poor performance, which can be equally damaging.

Heathrow's runway experiences greater than 98% average capacity utilisation across the summer season and greater than 94% average utilisation across the winter season, as shown in the figure below, where the actual daily utilisation is compared to the declared capacity. Within a day, the average to peak utilisation ratio is 0.96, indicating consistently very high capacity utilisation. Utilisation here is measured against declared capacity.

[6] EU Slot Regulation 95/93, and its amendment Regulation 793/2004 *on common rules for the allocation of slots at Community airports,* and the related UK statutory instrument 2006, no 2665, The Airports Slot Allocation Regulations 2006.



Source: CFMU, ACL, Helios analysis

Figure 3: Typical runway capacity utilisation at Heathrow during summer and winter seasons

The 480,000 annual movement cap (imposed as a Terminal 5 planning condition) means that it is not possible for the airport to reach 100% utilisation. This is beneficial from the point of view of punctuality, delay and resilience, because it preserves operational headroom in the demand to capacity ratio, albeit relatively little. The net effect of this utilisation level is that:

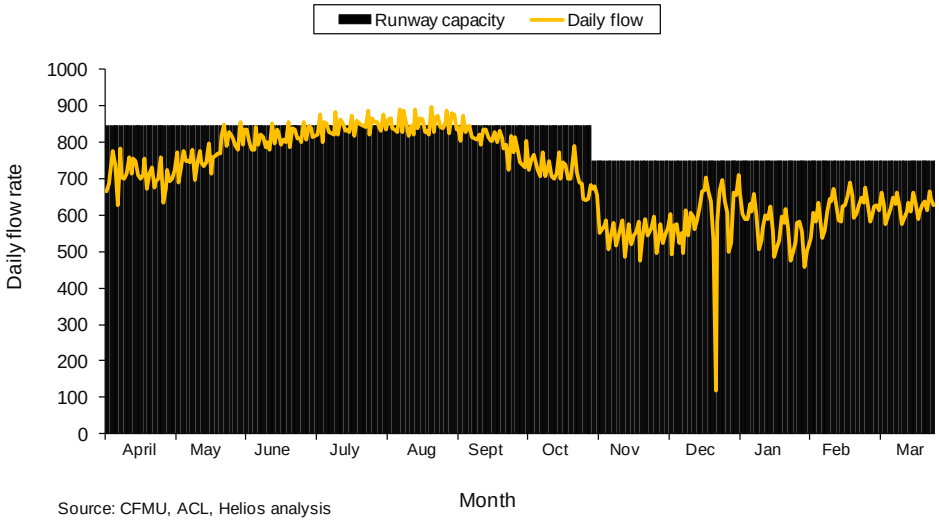
- there is considerable queuing for runways, manifested as holding delays:
  - up to 15 minutes on average per flight for arrivals
  - up to 20 minutes on average per flight for departures
- queue lengths and hence delays are unpredictable with peaks potentially much greater than averages
- queues are not necessarily equitably distributed, with short-haul traffic experiencing proportionately higher delays than long-haul traffic[7], and the first-in-first-out system incentivising early arrival, creating bunching and exacerbating holding delays.

Gatwick's runway utilisation is more variable than Heathrow's, but reaches a consistent level of 100% during the peak period in mid-summer, as shown in the figure below[8]. Average runway utilisation levels are around 80% during winter. On a summer day, the average to peak utilisation ratio is 0.90, and, as with Heathrow, this indicates very high and consistent capacity utilisation.

The effect of this runway utilisation level is that queuing for the runway is moderate at peak times and lower at off-peak times: up to 10 minutes on average per flight for arrivals and up to 15 minutes on average per flight for departures.

[7] Air traffic flow management is a technique used to moderate traffic flows by holding aircraft on the ground at the departure airport. It is only currently applied to traffic departing a point within the jurisdiction of Eurocontrol's Central Flow Management Unit – effectively limiting it to short-haul inbound traffic

[8] The utilisation at Gatwick in the summer peak exceeds 100% because night movements are not included in the capacity declaration

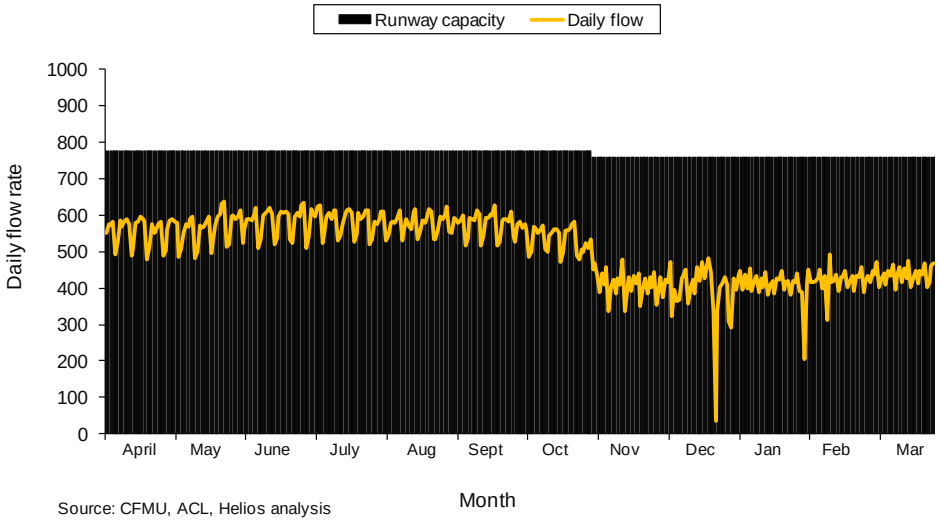


Source: CFMU, ACL, Helios analysis

Figure 4: Typical runway capacity utilisation at Gatwick during summer and winter seasons

Stansted's runway is moderately utilised only at peak times, reaching approximately 75% utilisation across the summer season and 55% utilisation across the winter season, as shown in the figure below. The effect of this utilisation level is that the amount of queuing for the runways is relatively small, even at peak times.

The observed levels of queuing at peak times are: up to 5 minutes on average per flight for arrivals; and up to 8 minutes on average per flight for departures.



Source: CFMU, ACL, Helios analysis

Figure 5: Typical runway capacity utilisation at Stansted during summer and winter seasons

Airspace capacity utilisation

The three airports share common airspace within the London terminal manoeuvring area (LTMA). This airspace also, of course, serves all of the other airports in the London area and access is granted on a first-come-first served basis irrespective of traffic type or the impact of delays. For example, a business jet carrying a few passengers has the same access rights as an A380 carrying 500 passengers.

2010 European ATC delays excepted (see section 2.4 below), the LTMA is the single most significant cause of ATC delays experienced by traffic inbound to or outbound from the three airports. Within the LTMA a relatively small number of sectors are responsible for the majority of delays, as illustrated in the following figure for both inbound and outbound traffic.

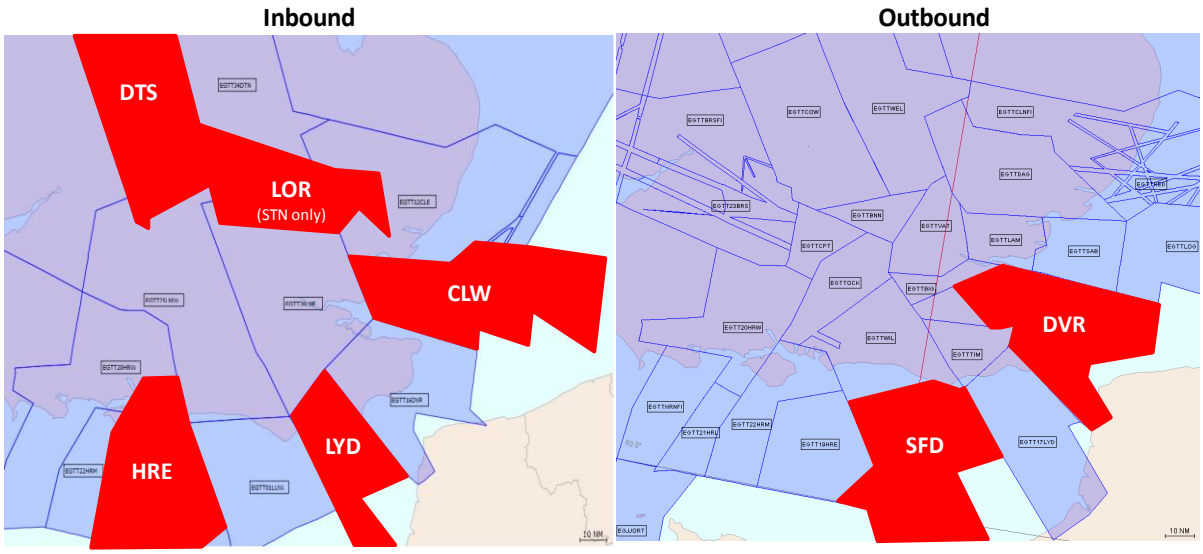


Figure 6: Airspace hotspots in the LTMA, for Heathrow, Gatwick and Stansted traffic

Typically, the LTMA causes approximately 3 minutes per flight air traffic flow management delay for arrivals and departures at the airports. In addition, tactical measures imposed at Heathrow and Gatwick due to constraints on departures through the LTMA contribute to start-up delays of up to 6 minutes on average per flight at Heathrow and 4 minutes on average per flight at Gatwick. Data is not available to enable analysis of similar delays at Stansted.

Delay outcomes

Both demand and capacity are subject to variations due to a range of reasons. For example:

- tactical capacity is subject to weather effects, as well as other factors such as the availability of infrastructure, which may be restricted because of works, equipment reliability and staffing levels
- short-term, as opposed to planned, demand is also subject to weather affecting flight times, as well as other factors such as:
  - delays upstream or downstream in the network (airline and/or ATC)
  - mismatches in the scheduling process where airline block times do not match actual flight times
  - behaviours and gaming where airlines can try to gain competitive advantage by being first in the queue, which is generally managed on a first-in-first-out principle[9]; this can particularly apply to arrivals in the early morning peaks.

The balance of demand and capacity is managed tactically by ATC using a range of tools with the objective of optimising the utilisation of scarce resource, mainly runways or airspace. The

[9] Access to airspace and infrastructure is controlled, generally, on a first-come-first-served principle whereby the flight that files the flight plan that predicts the earliest arrival at a given point is placed at the head of the queue. More operationally, within the constraints of sequencing because of wake vortex considerations, an aircraft that enters the stack first would expect to be the first to exit. This incentivises flights to be as early as possible to reach a given flight milestone so that they are as near to the front of the queue as possible

main tactical tools applied by ATC result in queues or holding delays and are:

- air traffic flow management (ATFM) where the aircraft is held on the ground at the departure airport to ensure that declared capacity anywhere along its route is not exceeded. This results in ATFM delays attributed to a specific location along the flight path. In this analysis three types of ATFM delay are identified: that due to the airport (only applicable to arrivals), that due to the LTMA and that due to continental European airspace
- start-up delays, where the aircraft is held on stand at the airport due to congestion on its departure route (the so-called tactical measures, referred to above)
- ground holding for departures, which in this analysis is a combination of queuing for the runway and the impacts of taxiway congestion
- airborne holding, mainly in stacks, as aircraft queue for and are sequenced to maximise the utilisation of the runway.

The average delays per **departing** flight by cause for each hour of the day over a representative summer season at each of the airports is shown in the following figures.

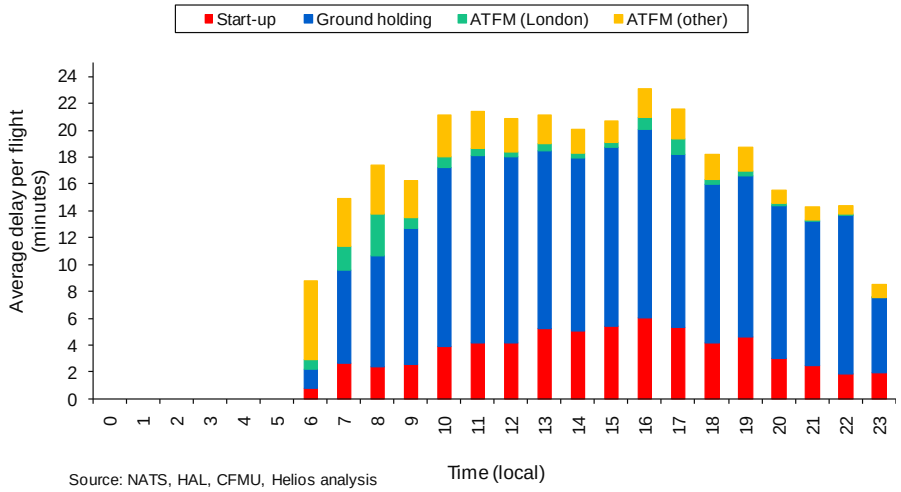


Figure 7: Representative magnitude and cause of departure delays experienced at Heathrow

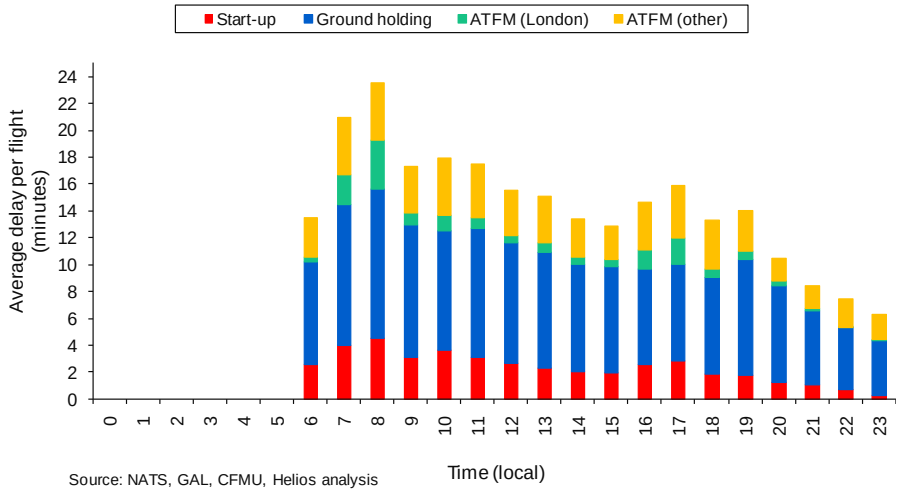


Figure 8: Representative magnitude and cause of departure delays experienced at Gatwick

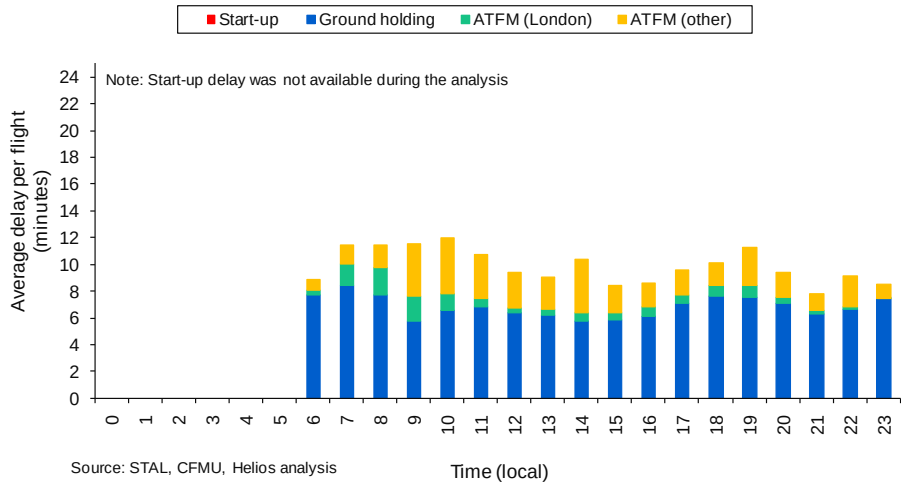


Figure 9: Representative magnitude and cause of departure delays experienced at Stansted

The figure shows that for departures, holding delays are significant and can exceed 20 minutes per flight at Heathrow for much of the day and at Gatwick during the morning. Stansted departure delays are less severe. Departure delays are dominated by queuing on the ground at the airport but also have significant contributions from airspace restrictions both in the LTMA (ATFM (London)) and in continental Europe (ATFM (other)).

Similarly, the average delays per **arriving** flight by cause for each hour of the day over the same summer season at each of the airports are shown in the following figures.

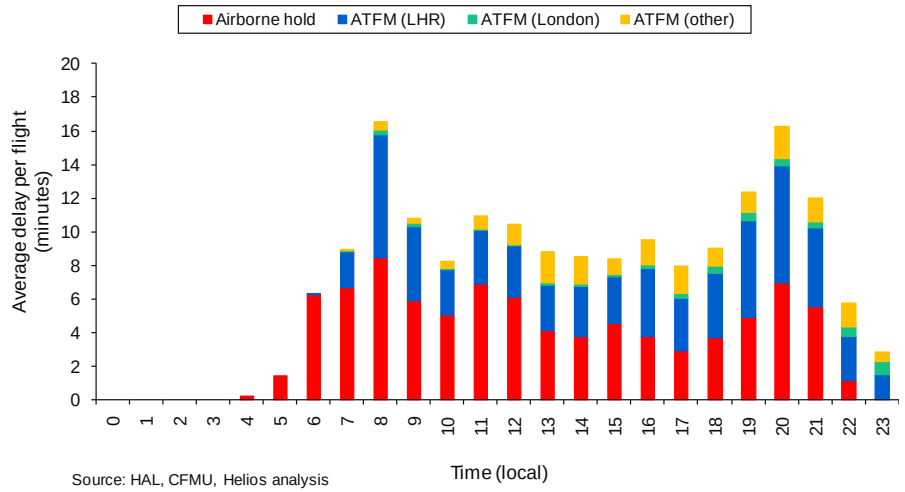


Figure 10: Representative magnitude and cause of arrival delays experienced at Heathrow

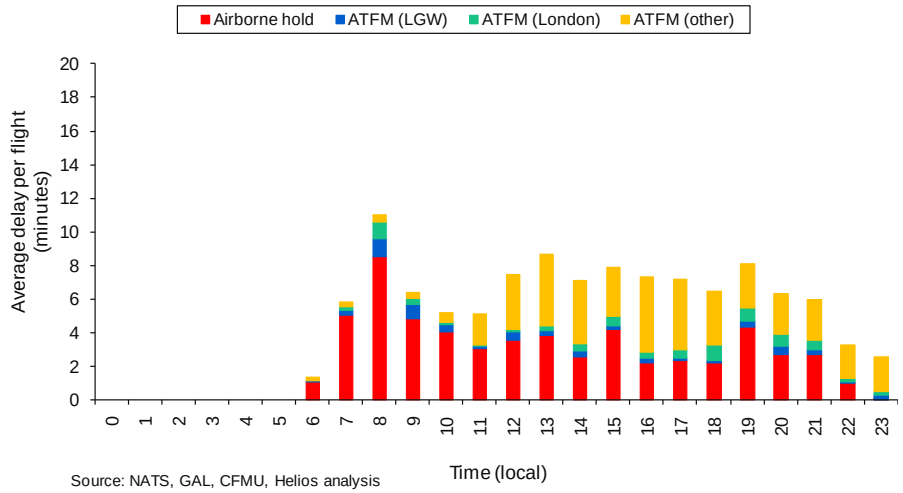


Figure 11: Representative magnitude and cause of arrival delays experienced at Gatwick

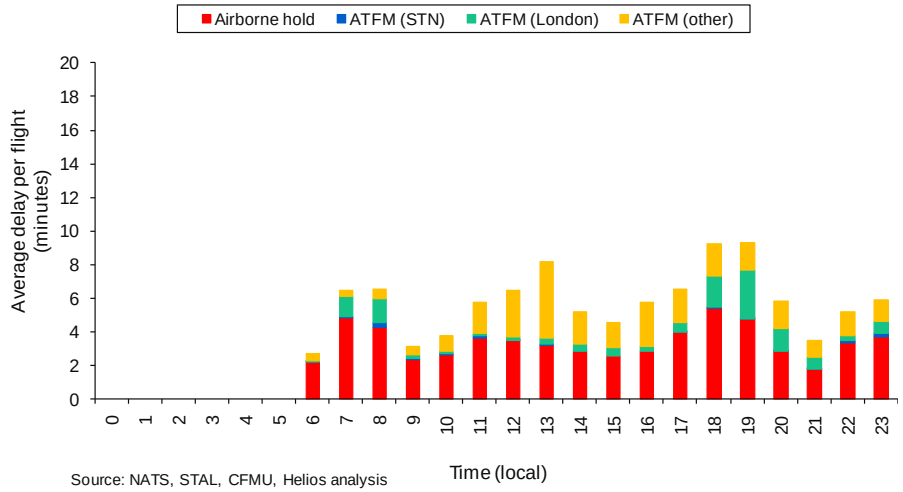


Figure 12: Representative magnitude and cause of arrival delays experienced at Stansted

The figures show that arrival delays are slightly less severe than departure delays. Arrival delays attributable to Heathrow are more severe than those for both Gatwick and Stansted, principally because of its higher runway utilisation. Noticeably, Heathrow suffers from significant ATFM restrictions over most of the day whereas such restrictions are minimal at the other airports. The LTMA causes inbound delays at Gatwick and Stansted at peak times in the morning and evening. This is probably masked at Heathrow by delays attributed to the airport itself[10].

Airspace restrictions in continental Europe (labelled as ATFM (other) in the figures) cause significant delays to inbound traffic, as they do for outbound.

[10] This masking effect is caused by the Central Flow Management Unit (CFMU) process that only records the largest delay along a flight path. For example, if Heathrow caused a delay of 5 minutes and LTMA caused a delay of 4 minutes, then only the 5-minute delay would be recorded.

Issues to be addressed

Optimising airport capacity utilisation is a delicate balance between making the most of the scarce resource (usually the runway) and ensuring that the queues (holding delays) for the resource are not too long. The issues that need to be addressed are:

- optimisation of the throughput-delay trade-off made during the capacity declaration process
- modification of the first-in-first-out process to prioritise punctuality, for example by moving to an on-time-first-out principle
- management of on-the-day demand/capacity patterns where actual utilisation varies with demand peaks (due to the schedule, inclusion of buffers in flight timetables or bunching caused by behaviours) and capacity restrictions (for example caused by weather restrictions). Such variations can lead to long queues even in good conditions and is particularly prevalent in the early morning where:
  - long-haul arrivals land as early as possible after the night period has ended – leading to queues in the stacks at 06:00 hours
  - short-haul arrivals bunch and cause holding delays, due, to a degree, to buffering in the airline schedules
  - uncertainty in long-haul arrivals causes delays to short-haul arrivals through ATFM restrictions
- improving on-the-day predictability by:
  - ensuring the appropriate levels of contingency necessary to off-set manageable risks, for example due to adverse conditions, are available without the need to revert to cancellations and/or long delays
  - ensuring that the plan is not so stretched that it becomes completely unpredictable, even under normal conditions
  - predicting and adapting the plan to medium-term effects, such as weather variations, that are predictable a few days prior to operations
  - managing the behaviours and processes that lead to bunching and, hence, short-term imbalances between demand and capacity resulting in long queues

The majority of operational and technical issues for the **LTMA** will be addressed through the **Future Airspace Strategy**. The FAS is a critical enabler, will need to deliver its stated benefits on time, and will therefore need to address:

- transparency/equity of access rules allowing potential for *'de facto'* competition for airspace among airports and addressing the unequal impacts of first-come-first-served rules
- limited capability in current planning tools to predict airspace flows and loading arising from the airports' schedules
- related limited integration with airport planning processes

2.4 Resilience

Resilience can be defined as *the ability to anticipate, withstand and recover from adverse conditions.*

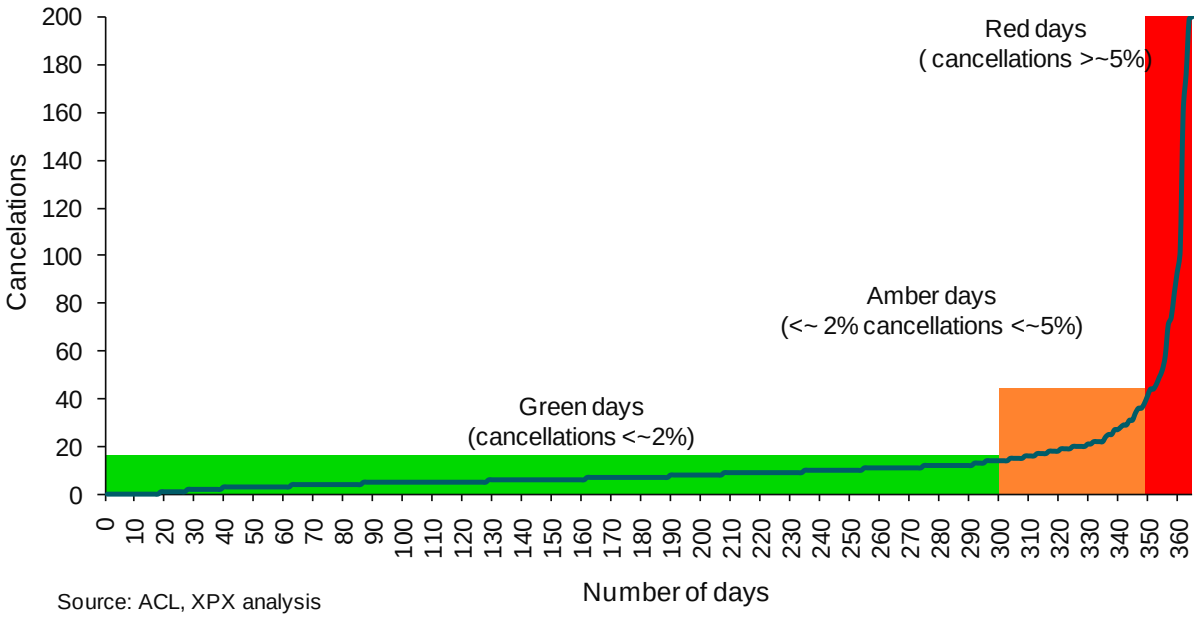
Airports

Resilience issues affect all three airports, with the main causal factor being lack of tactical headroom to withstand and recover from disruption. This lack of headroom is caused by the combination of high levels of utilisation and restrictions on operational procedures that could otherwise be applied to mitigate the effects of the disruption.

In terms of resilience it is useful to classify the operational year as green, amber and red days where:

- normal operations occur on **green** days
- moderate disruption is experienced on **amber** days. This disruption is manifested as long delays attributable to the airport and moderate levels of cancellations, with some dispensation on night jet movement restrictions needed to enable recovery
- severe disruption on **red** days experienced as very long delays attributable to the airport and a high cancellation rate, with no on-the-day recovery being possible despite extensive night jet movement dispensation.

The following figure, derived for Heathrow but applicable to the other airports, shows that the ratio of green:amber:red days is approximately 300:50:15 across the year.



Source: ACL, XPX analysis

Figure 13: Illustration of green, amber and red days at Heathrow over a calendar year

All three airports suffer from resilience problems in severe weather conditions, such as snow and low visibility, leading to red days. Usually, but not always, disruption is caused by restrictions on runway flow rates. In some cases, however, the ability to move aircraft on- and off-stand also causes major disruption.

However, Heathrow also suffers resilience problems during periods of high wind, whereas Gatwick and Stansted are more robust because of their different mode of runway operations (mixed mode as opposed to segregated mode at Heathrow). The availability of higher tactical headroom at Gatwick (mostly but not always) and Stansted facilitates recovery at these airports during amber days, where in general they recover more quickly than Heathrow.

In addition to bad weather, other events can cause major disruption including:

- interaction between airports, for example departures from London City and arrivals at Heathrow, which can restrict traffic flows; and special events, such as flying displays at Farnborough, which can also disrupt traffic at Heathrow
- slot-exempt Head-of-State visits, mainly using Heathrow or Stansted. Increasingly such visits are using multiple aircraft to reduce the risk of multiple high-level government figures being subject to a single aircraft accident. The arrival and departure of these small fleets can cause significant short-term disruption to the schedule
- the designation of Stansted as the UK's hijack airport. Clearly this is a rare event, but can be extremely disruptive to the airport's operations.

In addition, the airports are dependent on their surface access infrastructure. For example, during the recent snow events, road and rail restrictions due to the weather impacted on Gatwick operations where it was not possible for arriving passengers to depart the airport, resulting in the cancellation of inbound flights.

European ATC

Although not strictly in scope in the sub-group terms of reference, it is worth noting that in summer 2010 disruptions in European air traffic control, most notably in France and Spain, caused significant disruption at UK airports. The following figure shows the main locations causing ATC delay for traffic inbound to Gatwick during summer 2010. The figure shows that:

- over 40% of the delays were attributable to French airspace
- approximately 15% of delays were attributable to Spanish airspace.

At individual air traffic control centre level:

- Marseille and Brest control centres each accounted for more than 10% of the total delay
- Bordeaux, Reims, Madrid, Barcelona, Karlsruhe, Zurich and Athens each accounted for more than 5% of the total delay. However, it is likely that the delays attributed to Zurich were a knock-on effect caused by flights re-routing via Switzerland to avoid heavy delays in France.

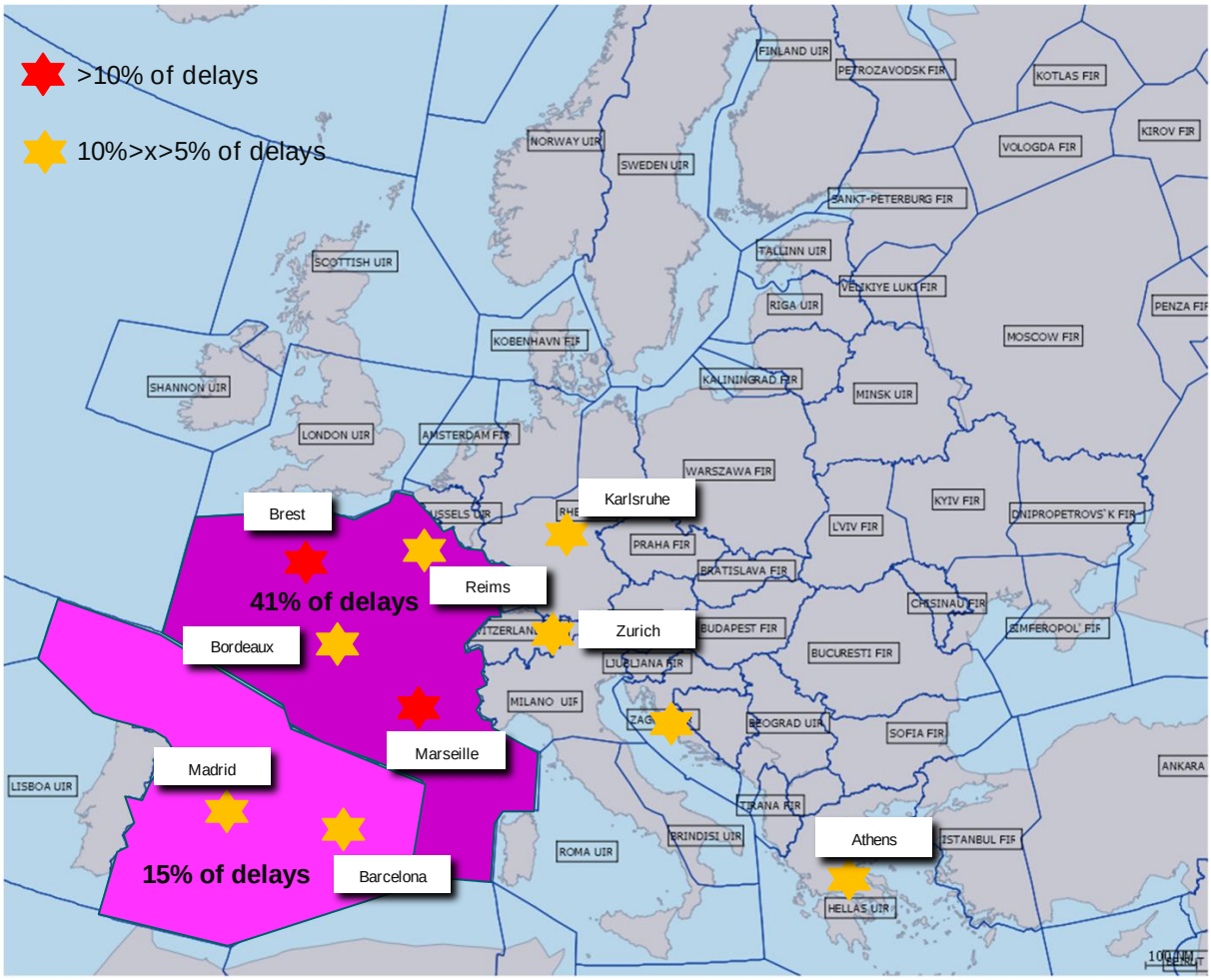


Figure 14: Main airspace hotspots for traffic inbound to Gatwick, summer 2010

Issues to be addressed

A number of challenges arise in addressing **airport resilience**:

- excessive actual on-the-day demand/capacity patterns, principally but not always caused by capacity restrictions due to adverse weather conditions. Due to high utilisation levels there is limited headroom for recovery and the roll-up or knock-on effects can be compounded by airspace issues
- restrictions on operational procedures hinder resilience
- weak interfaces in stakeholder operational processes. There is no fully accepted or common view/plan on actions to be taken in the case of severe disruption, for example the distribution of cancellations in major snow events, and individual stakeholders understandably act in their own best interest rather than that of the system as a whole.

Although it is out of scope, **European ATC** can severely impact on the resilience of the UK airports and airspace system causing large, unpredictable en-route ATFM delays and knock-on rotational/reactionary delays at South-East airports.

2.5 Environmental and policy impact

There is a comprehensive compliance and reporting regime in place to manage environmental impact, including:

- monitoring of noise and track keeping both against noise preferential routes and more generally, which is currently being extended to a community noise monitoring and reporting programme at Heathrow
- runway alternation at Heathrow
- restrictions on night jet movements, both by number of movements and noise quotas
- monitoring of the use of auxiliary power units
- promotion and monitoring of the performance of continuous descent approaches (CDAs)

Within this regime, performance is generally good. However, there are some shortcomings:

- the high capacity utilisation under current operations, as reported above, leads to queues in the air and on the ground which cause significant emissions both of greenhouse gases, and gases and particulates that impact on local air quality
- consistent bunching of arrivals in early morning, not least to arrive as early as possible after the cessation of night restrictions at 06:00, can also cause significant CO_2 emissions.

Operational and behavioural improvements without any increase in traffic, such as reducing stack holding and removing first-in-first-out incentives, would therefore deliver environmental benefits – whereas imposing any inappropriate environmental restrictions could decrease operational performance, for example by increasing ATFM delays markedly to reduce the time that aircraft spend in stacks.

As well as capacity constraints, airport operations and the airspace structure also impose some operational constraints on arrivals and departures at the airports:

- CDAs are restricted by the need to use airborne holding procedures to manage the arrival flow rates at the airports. This means that: (i) CDAs cannot commence at the top-of-descent but more often commence at the holding stack; (ii) CDAs, rather than being continuous, include some segments of level flight; (iii) at Stansted, interaction with traffic at Luton means that CDAs cannot generally be performed when operating in an easterly direction. These factors reduce the effectiveness of CDAs in terms of fuel burn, associated emissions, and reduced noise. That being said, however, the achievement of currently defined CDAs at the airports is generally high
- continuous climb departures (CCDs) are generally not possible[11] because of the altitude cap imposed on departing traffic to manage its interaction with arriving traffic.

[11] Although Stansted is currently trialling CCDs under certain conditions on an experimental basis

Issues to be addressed

Environmental issues are best tackled through improved operational processes, for example:

- initiatives implemented under the Future Airspace Strategy, including improvement of the success rate and effectiveness of CDAs, introduction of CCDs, and removing the need for holding stacks
- addressing the queues, both in the air and on the ground, caused by high capacity utilisation both during periods of disruption and normal operations, noting that there might be a noise-emissions trade-off in some situations

In general, for any specified level of traffic and airspace design, the optimum environmental impact is likely to be achieved by adherence to a planned schedule which has been built taking into account a full range of planning parameters.

3 Proposed interventions

3.1 Overview

Although the scope for improvement will continue to be limited by infrastructure constraints, there are three themes of change which could address the issues identified in the previous section and deliver measureable improvement to the balanced performance of the airport/airspace system in the South-East. These are:

- ***Operational freedoms – increasing operational tactical headroom*** – improving the short-term tactical capability within the current capacity constraints to handle peaks in demand or off-set potential reductions in operational capacity. This is largely in the form of flexibilities available to ATC in operating the runways and related airspace.This is without increasing the strategic, declared capacity and would not replace any capacity increase that could be achieved through infrastructure expansion. This can, however, have implications for the patterns of noise around airports, although are generally beneficial to environmental impact
- ***Performance charter – enabling improved adherence to plan*** – by improving and assuring the inherent feasibility of plans (schedules and resources) and the cross-stakeholder co-ordination and controls which manage adherence and the minimisation of disruption
- ***Policy guidelines on capacity management – optimising the throughput-delay trade-off*** – introducing more sophisticated parameters for the efficient use of capacity, strengthened performance management and extension of sanctions and incentives. This will all need to be within the appropriate externally-imposed regulatory frameworks

These proposals would run alongside airspace projects currently underway in the form of the Future Airspace Strategy and efforts to improve performance across Europe. A related aspect is the need to ensure that airspace constraints do not impinge on the competitive freedoms of individual airports.

These interventions are discussed in more detail below, and are translated into a specific package of tangible actions or measures in Section 4.

Given the fundamental relationship between demand and capacity and the current position very high on the demand-capacity curve of Heathrow (all year round) and Gatwick at certain times, it could be seen as initially attractive to consider **reduction in planned capacity** – i.e. further restricting the schedule. However, this **is not recommended**. Notwithstanding the commercial, economic and consumer impacts, the level of reduction required to have a significant effect would be substantial, would not significantly improve the performance on the majority of days and would not necessarily address the peak periods, which account for the biggest problems. Additionally, it would be very difficult to implement within the current legal framework. It is better to make the schedule more fundamentally achievable, put in place mitigations for relatively rare but highly disruptive events, and strengthen the governance and performance management processes.

The nature and scale of benefits will vary from airport to airport, and the proposed changes will affect the three classes of day – **green, amber, red** – differently. The themes put forward can form the broad basis of improvement programmes.

3.2 Operational freedoms – increasing operational tactical headroom

Description

The objective of this intervention is to increase tactical headroom to mitigate the effects of disruption – not to provide strategic capacity for additional traffic. The headroom created would not be included in the capacity declaration process other than being noted as a contingency.

There would be two main sets of activities in the intervention:

- the first aimed solely at **improving disrupted days**, principally through **temporary operational enhancements** that would be triggered by the onset or anticipation of disruption. These operational enhancements would be limited to disrupted days and would in some cases require policy decisions to define the conditions under which they could be applied
- the second aimed at **accelerating the development of tactical tools** that would **improve both disrupted days and, on normal days**, sustain performance against some of the pressures that create disruption.

Improving disrupted days:

The main temporary operational enhancements that could be envisaged to mitigate the impact of severely disrupted days are:

- increased flexibility in the use of runways under pre-specified conditions. Tactically enhanced arrivals measures (TEAM) is already deployed at Heathrow under certain conditions. This could be extended to tactically enhanced departures, and temporary variants on use of the two runways at Heathrow and use of the emergency runway at Gatwick[12]
- definition and use of temporary departure routes
- better management of night jet movements on a temporary basis and according to specified criteria
- a coordinated and integrated approach to cancellations defined and agreed by the airport and the main carriers. The cancellation programme would be defined so as to, inter alia: (i) minimise overall disruption to passengers; (ii) facilitate recovery; and (iii) mitigate the impacts of infrastructure limitations, for example stands to disembark arriving passengers and space in the terminal to accommodate delayed passengers (especially if local access infrastructure is also disrupted and arriving passengers cannot depart the airport). A factor would also be equitable distribution of the cancellation programme among the airlines

The following qualitative benefits are expected:

Scenario		
Severe disruption	**Moderate disruption**	**Normal operations**

• Reduced impact
  ○ fewer cancellations
• Quicker recovery (by next day)
• Better managed passenger experience
	• Reduced impact
	  ○ few cancellations
	  ○ lower delays
	• Quicker recovery (same day)
		• Not applicable

[12] The feasibility of this option would need to be tested

Tactical tools:

A number of tactical tools are currently under development to enhance airport and air traffic control operations. The development and deployment of these tools should be accelerated but the capacity benefits that they deliver should be retained as operational 'headroom'. The main tools are:

- the arrival manager, the departure manager and target start approved times (**AMAN/DMAN/TSAT**). These planning tools are principally aimed at helping air traffic controllers to optimise flow rates and reduce queuing times by optimised aircraft sequencing
- time-based separations and cross-wind operations (**TBS/CROPS**). These tools are aimed at helping air traffic controllers to maximise runway throughput, particularly: (i) to overcome capacity reductions that can occur in high-wind conditions (TBS); and (ii) to take advantage of increased flow rates that might be achievable in cross wind conditions (CROPS) when aircraft wake vortices are dissipated more quickly than normal by the wind.

The following qualitative benefits are expected:

Scenario		
Severe disruption	**Moderate disruption**	**Normal operations**

• Limited	• Lower impact
	  ○ few cancellations
	  ○ lower delays
	• Quicker recovery
		• Improved punctuality and predictability/consistency
		• Lower holding delays
		• Reduced emissions
		  ○ greenhouse gases
		  ○ local air quality

3.3 Performance charter – enabling improved adherence to plan

Description

The objective of this intervention is (i) to ensure that the operation of flights complies to the maximum extent possible with the schedule; (ii) to reduce the degree of on-the-day 'surprise' in operations; and (iii) to ensure that stakeholders' behaviour is aligned with the best outcomes for the system/network, both in normal and disrupted conditions, rather than being driven, principally, by self-interest.

There are thus three main aspects to this intervention:

1. assuring that the **schedule is robust and achievable**. This means that the plan must be formulated against a realistic and representative set of scenarios covering a range of foreseeable conditions, rather than, for example, against a limited number of good weather days as at present. The performance should be tested against the various scenarios weighing up risks and likely outcomes to generate a more informed schedule. The schedule itself should be based on a complete set of planning parameters, rather than the partial set used at present to ensure that impacts are fully captured, for example in terms of holding delays. The planning process should be integrated as far as possible across all stakeholders to overcome the inconsistencies that are inevitable when each of the stakeholders creates an individual detailed plan within the overall broader framework that is the schedule. Finally, continuous improvement should be supported through formal feedback, and a lessons-learned procedure should be incorporated into the planning process to augment the basic reporting (again generated from a limited number of sample days) currently in place.

2. **adapting the plan on a pre-tactical basis** to account for anticipated operational conditions. Often conditions elsewhere within the network, such as weather patterns in the North Atlantic or ATC disruption, are known reasonably well in advance. These conditions can be disruptive in that they result in traffic flows diverging from the plan in terms of their (i) timing and volume and (ii) geographical location in airspace. Improvements in pre-tactical (i.e. before the day of operation) planning would allow the impacts of these inevitable occurrences to be mitigated, for example by better adapted deployment of resources, including air traffic controllers, and improved tactical routing.

3. ensuring that **all stakeholders pull in the same direction** to achieve the plan. This will require the airport to play a greater role in operational leadership to deliver:

    - **coordination and control**: including (i) the development of protocols and procedures for all stakeholders defining actions to be taken in the case of adverse conditions and disruption; (ii) the definition of procedures and trigger points for the deployment of tactical tools (see below) by air traffic control; (iii) the management and provision of information to all stakeholders via the collaborative decision making platform ensuring that everyone is in a position to make informed tactical decisions both in normal operations and during disruption; and (iv) improved crisis management, including centralised command and control and information dissemination

    - **performance management:** where the airport defines a performance improvement regime, essentially based on punctuality. For example, a regime which modifies the first-in-first-out principle to reward good performance; measures the performance of stakeholders against targets set within this regime; establishes a mechanism for disseminating feedback; and applies incentives and penalties to promote performance improvement, while accounting for the different business models in place by different carriers at different airports. Components of performance that could be measured include: arrival punctuality (both on-stand and within local airspace); departure punctuality (pushback and line-up at the runway) and turnaround performance (actual compared to the plan). The performance of all stakeholders would be included in the regime, including the airport, airlines, air traffic control and ground handlers. The performance management scheme, could, subject to further work, form part of the future regulatory regime for airports through the service quality regime, treating the three strands of the overall package of sub-group recommendations as interlinked.

Qualitative benefits

The following qualitative benefits are expected:

Scenario		
Severe disruption	**Moderate disruption**	**Normal operations**

• Better response
• Quicker recovery
  ○ consistent approach
• Less bad passenger experience
  ○ better information
  ○ consistency
	• Better response
	• Lower number of moderately disrupted days
	• Quicker recovery
		• Improved punctuality and predictability/consistency
		• Lower holding delays
		• Reduced emissions
		  ○ greenhouse gases
		  ○ local air quality

3.4 Policy guidelines on capacity management – optimising the throughput-delay trade-off

The objective of this intervention is to balance the utilisation of the scarce resource – effectively the runway – with the holding delays (and associated environmental emissions) associated with the level of utilisation. Currently, the balance is defined in terms of an average holding delay, not taking into account other factors including resilience, predictability/consistency, economic impacts, environmental impacts and passenger experience.

Bearing this in mind, there are two main action areas needed to optimise the throughput-delay trade-off:

- **Improved governance**: taking into account objectives other than solely delay. This would likely require:
    - an enhanced capacity management rule set/guidelines which would cover, inter alia, the efficient use of slots and the framework for the impact assessments that need to be done in the capacity declaration process, with the overall policy objectives for airports in mind. This would need to be in compliance with the Slot Regulation and IATA Worldwide Scheduling Guidelines
    - definition of minimum performance standards, the performance monitoring regime, interpretation of performance indicators, feedback mechanisms and a sanctions and incentives regime.
- **Improved capacity management process**: this is the process improvement needed to ensure that the capacity management process is robust, complete and reflects priorities in terms of balancing the use of capacity and its associated impacts. Not only will this intervention facilitate the assurance that the plan is robust and achievable (see 1.2 above); it will ensure that capacity declaration reflects fully the full set of impacts. The improved process should be defined in the framework of the guidelines mentioned above noting that: (i) capacity declaration is the responsibility of the airport; and (ii) the process (or changes to it) might need to be enshrined in local rules adopted by the airport's Coordination Committee.

  The improved capacity management process should:
    - utilise the full set of parameters needed to reflect operational realism; that is, for example, all delays must be included not just a partial set as at present
    - consider other impacts, as defined in the guidelines
    - explore concepts of slot efficiency, recognising the EU regulatory framework
    - include a feedback loop ensuring that meaningful lessons are learned from previous years and that these lessons are applied as appropriate
    - ensure that capacity planning is undertaken in an integrated way, considering not only the runways but also airspace, accounting for airports that use or complete for common blocks of airspace. This may require the definition of rules for equity of access to airspace.

Qualitative benefits

The following qualitative benefits are expected:

Scenario		
Severe disruption	**Moderate disruption**	**Normal operations**

• Limited	• Lower frequency of disruption	• Improved economic return on slots
		• Improved punctuality and predictability/consistency
		• Lower holding delays
		• Reduced emissions
		  ○ greenhouse gases
		  ○ local air quality

3.5 Airspace capacity and management

The Future Airspace Strategy and the associated development plans of NATS constitute a step change in the policies and systems for airspace management in the UK.

Although the Future Airspace Strategy and associated airspace change proposals are outside the original Terms of Reference of the sub-group, broader airspace issues do have a major impact on the ability of airports to achieve planned operations. Hence it is appropriate to comment on some of the major interactions and opportunities.

In the first instance, proposed technical elements of the emerging Airspace Strategy for the UK would have a significant benefit, for example:

- re-design of airspace to eliminate the conventional approach to 'stacking' of arriving aircraft – as a queue-management technique. Assuming that this is done in a way which avoids the build-up of ATFM delays – i.e. holding aircraft at European outstations – then the resulting management of the arrival queue through precision routing, speed control and sequencing should have significant environmental impact benefits and produce a more predictable operating pattern
- continuous climb departures (CCDs) with associated changes to the transition altitude would also free up airspace and save a substantial amount of fuel burn and emissions
- the potential for the need for 'minimum departure intervals' should also be reduced
- some acknowledged bottlenecks would be alleviated through better interfaces to other functional airspace blocks (FABs) and management of potentially competing military and civil demand.

In general, the value of enhancing capacity through re-sectorisation has been exhausted, so a major re-design is called for. From an airport perspective, it is vital to remove airspace limitations as a potential constraint on airport capacity. Apart from the obvious operational problems, which would be difficult to foresee, it would become increasingly challenging to manage the allocation of capacity, i.e. slots, at congested airports. The slot management processes, including regulation, do not envisage this kind of constraint, and of course, this would become a contentious issue among airports which are competing commercially.

The policy of '**equity of access'** to airspace would also need to be investigated if there were continuing significant constraints. At present, the interactions of one airport's airspace requirements with another are not fully understood and are the subject of continuing project work within the NATS 'Hotspots' initiative. Although there are, currently, only limited ATC regulations applied as a result of LTMA airspace constraints, there is prime facie evidence to indicate that airport performance improves as airspace demand decreases, suggesting that there may be a link. The nature of regulation and the coding of only the most penalising cause could also mask underlying problems.

All this points to the value of accelerating airspace re-design and ATC operational concepts as quickly as possible to remove potential influences on airports. In the short term, early regulatory evaluation of the tactical ATC tools mentioned above would also be beneficial.

A final factor is the performance of the rest of the European ATM network. There are continuing pressures from increasing demand in certain geographies and frequent tactical problems associated with lack of capacity and/or disruption caused by industrial action and related problems. While clearly outside the remit of this report, these issues do constitute a significant drag on performance, as the impacts are both highly disruptive and too variable to be incorporated into strategic planning. Hence efforts should be made to reach European solutions, reinforced through the appropriate channels.

No specific benefits are ascribed to this area of airspace development, but the actions outlined above will be major enablers of continuing airport performance improvement.

4 Recommended actions

4.1 Introduction

The approach to analysis and recommendations has been based on the diagram described in the introduction and repeated below.

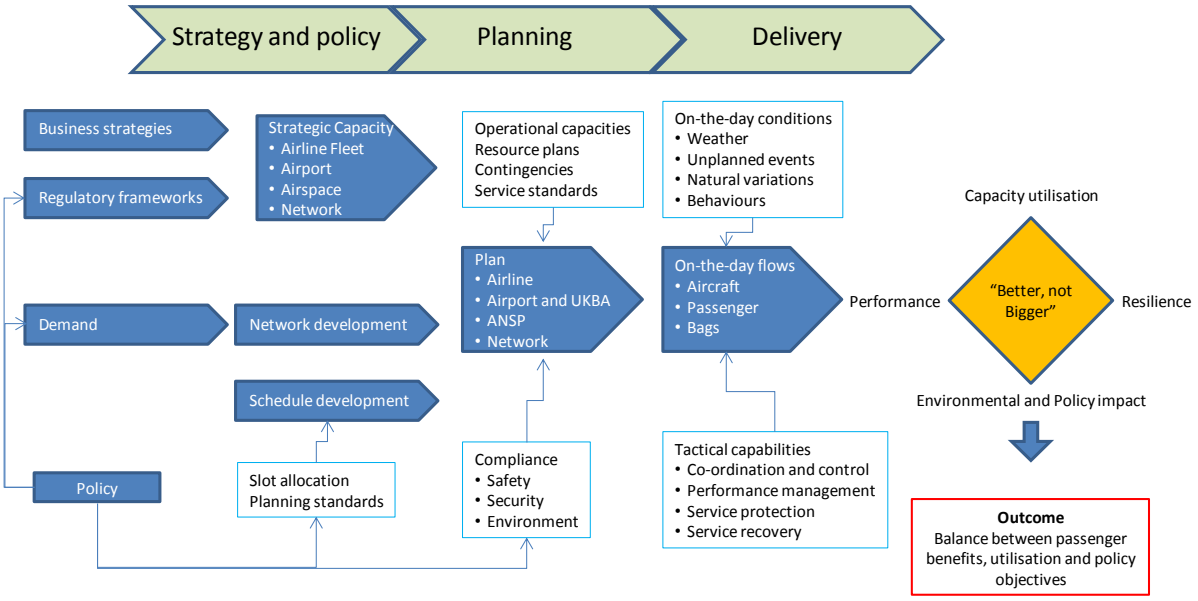


Figure 15: Framework for recommended actions

Thus, the recommended actions are classified under the headings of:

- ***Strategy and policy*** **–** Issues which require some input of government/regulatory policy or guidance. These are essentially enablers to the planning and operational delivery at each airport. Some aspects may require detailed consideration within wider policy objectives and, at a minimum, could imply consultation. Hence, recommendations are made on the basis of potential action, if they can be achieved within existing policy boundaries, or can be treated as input to the evolution of a policy review
- ***Planning*** **–** Opportunities largely in the area of better co-ordination and integration of the plans of individual stakeholders, where individual objectives might inhibit the achievement of collective performance
- ***Operational delivery*** **–** Reinforcement of the types of initiative which are going on at each airport as part of continuous improvement, but where some added focus from collective attention can add impetus

These are discussed in a little more detail below. They reflect the three themes of intervention discussed in Section 3 – one particular aspect is the value of viewing the proposals as a 'package'. Although action on individual recommendations could be beneficial, one of the lessons of previous work in this field, and the conclusions of the analyses, is the strong interdependencies of the different systems – and the synergies from moving on a relatively broad front. The proposals are organised in a way which might help assign accountabilities for detailed development and implementation.

4.2 Strategy and policy

The recommendations are to:

- Create a set of **operational freedoms** specific to each airport, drafted in the first instance by the airports and their stakeholders within a framework agreed by the DfT. These freedoms could then be reviewed by DfT and granted to allow certain tactical measures to be applied solely in the context of disruption: i.e. to prevent/mitigate disruption and facilitate recovery. The operational freedoms could define the conditions under which these tactical measures should be applied. The tactical measures could include, for example, use of temporary departure routes and temporary enhanced modes of runway operation.

  Many freedoms already exist, for example in night jet movement dispensations and application of TEAM at LHR in certain circumstances, but a fuller evaluation of the full impacts of wider options should be made. More work needs to be done to establish a set which could be put forward, but there are potential overall environmental benefits and the possibility of more rapid recovery of operations if the ATC operator, in particular, has more options at its disposal in times of disruption. There is no suggestion of changes to the core operational modes at each airport. There will also need to be measures and re-assurances that these facilities are not being abused relative to other environmental policies and agreements.

- Create a **performance charter** specific to, and developed by, each individual airport, taking into account local factors and to be agreed by all of the airport's major operational stakeholders, laying out: performance objectives and targets, the planning process (including each stakeholder's specific responsibilities), the performance management regime to be applied, incentives/sanctions, and protocols for adverse conditions and disruption. It would be appropriate for the general shape to be similar at different airports, but local stakeholders must engage with the local ambitions.

  Of course, there are already measures in place on certain aspects, for example slot performance, but a more comprehensive regime with sanctions and incentives (to be developed) would help target and achieve improved performance across all operators including those with secondary but important influence. For example, this might integrate aspects of ground handling performance with overall airport outcomes.

  This would also set the policy framework within which more detailed performance management would occur (as recommended within operational delivery); and similarly the conditions for the deployment of a capacity reduction rule-set in times of severe disruption, such as major weather events or prolonged runway closure. The performance management scheme, could, subject to further work, form part of the future regulatory regime for airports through the service quality regime, treating the three strands of the overall package of sub-group recommendations as interlinked.

- Formulate a set of **policy guidelines on capacity management** compliant with the Slot Regulation and IATA Worldwide Scheduling Guidelines, covering, inter alia, the criteria to be applied during the capacity declaration process in terms of economic, environmental and operational impact assessment and slot efficiency. Given the terms of the EU Slot Regulation and the UK implementing legislation it is appropriate that the development is led by airports, but in conjunction with other stakeholders such as ACL, DfT, NATS and airlines.

Although the local capacity declaration process is the responsibility of each airport, it seems valuable that there should be a collective view of how a number of factors are reflected in each process. For example, how to consider projected ATFM delays, airspace issues and potentially environmental impacts in the process; and guidelines on slot efficiency. There will need to be recognition of potential influences on slot mobility within exchanges and secondary markets, so there should be as little intrusion as possible, but it is important to reflect operational reality and the overall objectives of the system. Not all factors need to be reflected as co-ordination parameters but it might be helpful to progressively monitor and target as factors become more significant.

This policy/strategic framework is necessary to extract full value from the recommendations below and the existing initiatives at each airport.

4.3 Planning

The recommendations are to:

- Introduce measures to **assure plan feasibility and robustness:** Within the context of the Capacity Management guidelines, it is recommended that the local development of operational plans and resourcing should be strengthened and integrated. Thus, there would be deeper testing of potential disruption scenarios, a fuller set of planning parameters (reflected from the guidelines), feedback from recent operational performance, and more structured evaluation of local and network airspace feasibility.

  In addition, mechanisms should be developed to ensure that resource plans will not impose unacceptable risks on overall performance. Some are already covered by service quality regime requirements, but there are others, for example coaching and towing capacity, which are not necessarily tested at an airport level. Likewise, infrastructure plans, for example taxiway adjustment or stand changes, can be incorporated, as they are currently part of the capacity declaration process.

  Insofar as this involves scheduling assessment and implications, the work could be managed through the Coordination Committee structure – otherwise, the airport should lead enhancement to the local planning procedures.

- Improve **planning for potential disruption:** This is already the subject of local development and policy review in the light of the Winter Resilience responses – but there are additional processes which might be developed locally, short of the protocols for significant capacity reduction. For example, a more visible status level indication with accepted changes to decision-making processes and roles, with associated triggers and procedures. In practice, this would be implemented in conjunction with the improved 'pre-tactical to day-of-operation' planning cycle recommended below.

- Incorporate **LTMA planning:** Although improvements have been initiated recently with the creation of the Airports Working Group, there is scope for further development in the way in which LTMA plans are reflected in the planning processes at airport level. For example, ways of improving tactical knowledge of aircraft arrival at 'top of stack' or entry to cordon, and the impact of projected loadings on standard instrument departure (SID) routes.

4.4 Operational delivery

All stakeholders already have continuous improvement efforts to deliver the best possible outcomes for passengers. The recommendations below reflect areas where additional focus would be particularly valuable.

- Strengthen the **pre-tactical planning processes:** Airlines are typically well structured in the ways they manage operations in the tactical timeframes – with network and/or hub control centres which manage aircraft changes, maintenance planning and responses to issues in the network of outstations. Airports, however, tend to be less well prepared in terms of the aggregate effect on airfield demand and capacity.

  Therefore, the recommendation is for a tactical planning cycle which uses more predictive indicators of tactical capacity and demand patterns, incorporating known events, weather conditions, and probable navigation routings; and includes better anticipation of the need for the recommended operational freedoms. The details would be different at different time horizons and the related tasks and communications would be put into operation through the strengthened co-ordination and control recommended below.

  The work should be led by airports with appropriate input from other stakeholders.

- Improve **control and coordination of airfield/airport operations:** The collaborative decision making (CDM) programmes already underway at Heathrow and Gatwick, and planned for Stansted, will significantly improve the quality and distribution of the status and projected plans for aircraft movements. However, this should be viewed as a platform for better-integrated action on, for example, stand planning and allocation, sequencing and turnaround compliance.

  While there are, typically, acknowledged mechanisms for crisis management and recovery within terminals, there are often gaps in the way early indicators are used. Therefore, we would envisage changes to organisation, roles and systems capabilities to better use the planning cycle mentioned above and co-ordinate with the relevant control structures of stakeholders. This should result in better and earlier decision-making.

- Introduce mechanisms for the **deployment and operation of tactical tools:** The operational freedoms described earlier will need mechanisms and decision processes for their deployment within the agreed rule-set. Clearly, these are yet to be evaluated in terms of full environmental impact and policy compliance, but even within current flexibilities available to the airport community, there would be value in improving the way in which changes to operational conditions are communicated and implemented. In practice, this would be managed through the strengthened co-ordination and control structures with the CDM system possibly used as the vehicle for much of the communication. For example, status on visibility levels, flow rate regulations, temporary runway closures, probable night jet movement requirements and SID routing demands might all be incorporated.

  The work would be led and implemented by collaborative effort at an airport level – clearly NATS would play a significant role as it would in practice be responsible for applying many of the changes.

  Of course, some of the tactical tools mentioned would be applied permanently, such as AMAN, and the TSAT tool within CDM. Others would be deployed automatically in response to certain conditions, for example Procedural TBS and CROPS, while the most complex, for example temporary standard instrument departure (SID) routes, would require strategy/policy agreement and then a very clear rule-set as to when and how they can be deployed. It can be seen how the different levels of the proposals come together to achieve real operational performance improvement.

- Strengthen **performance management:** The shape of the performance management regime will have been set within the Performance Charters recommended above. This needs to be translated into a hierarchy of metrics and performance reports and analyses which can help the airport and the operational community understand performance better and feed back the lessons into the planning cycle.

The lowest level will be the real-time information available through CDM systems, but there will be significant opportunities to extend the range of metrics covered, for example to airspace and navigation, and to develop the local governance and review structures.

Of course, this will be become more significant if it has been agreed in the regime that incentives and sanctions might be applicable.

5 Operational benefits

5.1 Introduction

The complex interdependencies imply that there is no one solution which will achieve a step change. However, the package of proposals can achieve a major improvement, particularly at Heathrow and Gatwick, which already have the basis of improvement initiatives. Stansted is currently under less stress and, hence, would be expected to realise smaller benefits[13].

Improvement would be manifested in three main ways:

- for the majority of days in the year, benefit would be measured principally in punctuality and a major reduction in the number of delay hours of aircraft and passengers
- in disrupted situations the improvements would reduce the number and severity of cancellations. This is the scenario most strongly associated with enhanced operational flexibility
- under severely disrupted conditions, cancellations cannot be avoided, but the measures of success would be in how well stakeholders recovered the operation and mitigated the impact on passengers.

The scale of improvement achievable will depend on the scope of any improvement programme and will vary significantly in nature from airport to airport. While, clearly, operations and recovery could be improved by process changes and investments within all current constraints, there is much more value to be gained by incorporating strategic and policy levers in a broader programme.

Thus, while individual stakeholders have their own targets and aspirations, it might be possible to agree a more stretching set of collective auditable targets bracketed with the proposed policy changes (particularly on operational freedoms in times of disruptions) and accelerated regulatory approvals.

5.2 Scale of the benefits

It is not possible to project, for each airport, the scale of improvement independently associated with each recommended action – particularly in the light of the inter-dependencies. Experience strongly suggests that the integrated package of measures will achieve very much more than a piecemeal approach – the whole is greater than the sum of the parts.

For illustrative purposes, the analyses described in the study commissioned by the CAA in 2007/8 on runway resilience (in response to a request from the then Secretary of State) have been extended to give some rough order-of-magnitude indicators of the scale of potential impact on punctuality, holding delays and resilience.

[13] Of course, one intangible benefit for Stansted would be the avoidance of capacity-related and disruption costs in the future through application of enhanced capacity management and declaration processes

Punctuality

Achievement of a relatively unambitious 80% punctuality target (i.e. the proportion of flights less than 15 minutes late is 80% or better) from the levels of the baseline data would save a considerable amount of time relative to the schedule. These savings can be quantified in terms of:

- aircraft delay minutes; and/or
- passenger delay minutes, taking into account the size of the aircraft operating and their load factors.

These benefits can be quantified in terms of absolute savings of delay minutes and as the percentage savings of delay minutes compared to the typical baseline performance levels, as shown in the following tables.

	Absolute savings (millions of aircraft delay minutes)		Percentage savings of aircraft delay minutes	
	Arrivals	Departures	Arrivals	Departures
Heathrow	0.75M	1.01M	45%	53%
Gatwick	0.37M	0.55M	47%	57%
Stansted	0.16M	0.17M	30%	31%

Table 3: Savings in aircraft delay minutes that would be achieved by meeting an 80% punctuality target

	Absolute savings (millions of passenger delay minutes)		Percentage savings of passenger delay minutes	
	Arrivals	Departures	Arrivals	Departures
Heathrow	131M	128M	55%	47%
Gatwick	65M	64M	53%	43%
Stansted	50M	52M	70%	69%

Table 4: Savings in passenger delay minutes that would be achieved by meeting an 80% punctuality target

Delay

It has been established that airborne and ground holding delays behave as queues, with a fairly simple relationship between the queue length (holding delay) and the demand/capacity ratio (essentially one minus the tactical headroom in percentage terms as defined in this report).

Analysis shows that an increase in tactical headroom of 5% at Heathrow where the tactical headroom is zero (the demand/capacity ratio is approximately 100%) would result in a decrease of approximately 40% in airborne holding. The analysis also shows the positions in terms of tactical headroom at the other airports:

- Gatwick in summer (tactical headroom approximately 0) and winter (tactical headroom around 20%)
- Stansted in summer (tactical headroom approximately 25%) and winter (tactical headroom approximately 45%).

The relationship between holding delay and tactical headroom – derived from operational data – shows that the higher the current tactical headroom, the lower the incremental benefit obtained by increasing it. Conversely, significant benefits are delivered by small increases in tactical headroom when it is close to zero – where the airport is operating near to capacity. Thus most benefits in terms of reduced holding delay would be expected when the airport is operating near to capacity – as is the case at Heathrow and Gatwick in the summer. Lower benefits are expected where there is spare capacity – as is the case at Stansted and Gatwick in the winter. These benefits are quantified for the three airports in terms of percentage savings in holding delays for increases in tactical headroom of 5% and 10% respectively. These levels have been chosen as they are representative of the operational savings that might be expected from the range of tactical measures that could be implemented at the airports.

	Arrival holding delay savings (%age of typical levels)					
	LHR		LGW		STN	
	Summer	Winter	Summer	Winter	Summer	Winter
5% additional headroom	40%	40%	35%	6%	3%	-
10% additional headroom	60%	60%	57%	9%	6%	-

Table 5: Order of magnitude savings in airborne holding delays that would be achieved increasing tactical headroom by 5% and 10%

	Departure holding delay savings (%age of typical levels)					
	LHR		LGW		STN	
	Summer	Winter	Summer	Winter	Summer	Winter
5% additional headroom	10%	10%	10%	7%	6%	4%
10% additional headroom	18%	18%	18	12%	11%	8%

Table 6: Order of magnitude savings in departure holding delays that would be achieved increasing tactical headroom by 5% and 10%

Resilience

Analysis undertaken in the runway resilience study for the CAA suggested that as a rough rule of thumb:

- 5% tactical headroom would **allow same-day recovery on amber** days: that is, cancellations would not have to rise above normal levels, but there might be periods of delay during and after the period of disruption until recovery occurs. This level of headroom is available at Stansted all year round and at Gatwick in winter, but not at Gatwick in the summer nor at Heathrow at any time
- as a rough order of magnitude, 10% tactical headroom would give:
  - **50% saving on cancellations** and/or a **50% reduction on night jet movement dispensations** during red days
  - complete recovery on amber days (as above for 5% headroom)

This level of headroom is available at Stansted all year round and at Gatwick in the winter, but not at Gatwick in the summer nor at Heathrow at any time.

6 Risks

Implementation will be challenging for a number of reasons:

- The costs and benefits of change may occur in different organisations, effectively outside commercial arrangements. This will also influence any funding and resourcing requirements
- Although almost certainly beneficial to the total environmental impact, some of the proposed changes will temporarily change the noise profiles in some situations, and, therefore, may be unpopular with some local residents. Of course, there are protections in terms of consultation requirements in many situations – and a full impact analysis would be an early step before any substantive conclusion or recommendations were reached
- If external confidence is to be built in the credibility of proposed changes and their delivery, then governance arrangements will have to be strengthened, with increased levels of transparency and possibly increased levels of incentives and sanctions as indicated in the recommendations
- Assuming that consumer demand continues to grow, even within existing structures, it will increase pressure on the system – if only through increased average aircraft size
- It has been assumed that all recommendations would remain within the EU Slot Regulation framework. This Regulation is currently under review. Assuming no major revision to the Regulation, there are aspects of the changes proposed in this report which may require a 'Local Rule' within the terms of the Regulation. These would only be proposed if considered beneficial, but would have to pass the appropriate tests and be approved through that governance structure.
- The proposals are restricted to punctuality, resilience and delay, and the associated environmental impact. While these will clearly run through into passenger experience and perceptions, there are many other aspects which impinge on perception related to a wider view of operational performance – for example connections experience, baggage and terminal processes and management of passengers under disruption circumstances. Therefore, it will be important to integrate the proposed actions with other topics under consideration by the main Taskforce.

Although difficult, the group believes that the programme proposed offers a major opportunity to extract the best possible performance from the airport and airspace system, without recourse to significant infrastructure expansion.

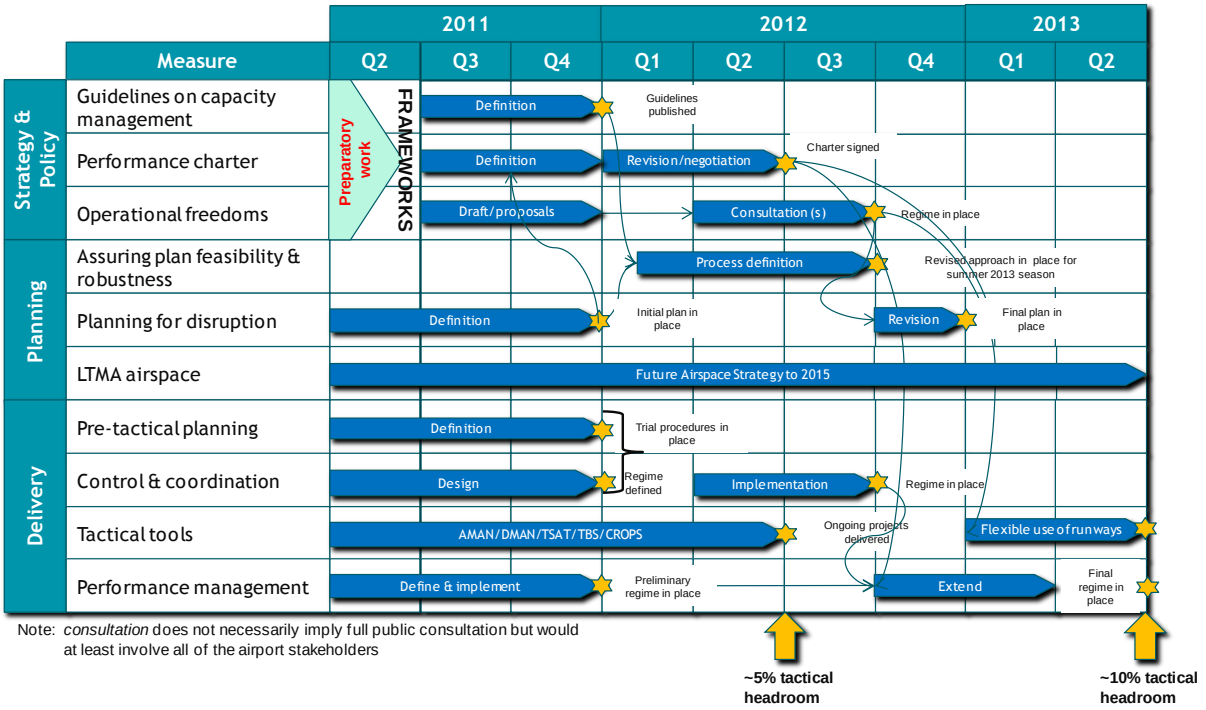
7 Programme delivery

The work of detailed design and development of these recommendations into fully evaluated and agreed actions for implementation will need to be organised into a resourced programme which is beyond the scope of this stage of the exercise.

Clearly, there are some policy and strategy aspects which would require central leadership and facilitation, while the majority could be the subject of local airport initiatives. Given that each airport, and the major stakeholders of each, have their own programmes at different stages of evolution, there will need to be extensive tailoring.

7.1 Roadmap

An indicative implementation roadmap is shown below. This has not been agreed with stakeholders and will need augmentation at each airport. Indeed, there may well need to be a preparatory stage to agree the programmes and the resourcing implications.



Note: *consultation* does not necessarily imply full public consultation but would at least involve all of the airport stakeholders

Figure 16: Potential roadmap for implementation

Delivery would require leadership responsibilities for parts of the initiative to be defined. These lead responsibilities could be as follows:

- SEAT supported by DfT/CAA would:
  - undertake preparatory work to define the scope and contents of the capacity management guidelines, the performance charter and the operational freedoms
  - review outline plans at individual airports
  - ensure consistency but allow for local specificities in emerging responses.
- DfT, supported by CAA, would define aspects of the operational freedoms framework, noting that this would ultimately be airport-specific, but would need to be consistent across airports

- each airport and its local stakeholders (comprising, but not necessarily limited to, the Coordination Committee, the airlines and handlers, NATS, ACL and the airline operators committee AOC) would:
    - propose a revised capacity management approach with related processes
    - define the airport's performance charter
    - develop and agree local plans (disruption, schedule feasibility, plan integration/testing, etc).
- each airport would define and implement its approach to pre-tactical planning, control and coordination and performance management, probably within the ongoing collaborative decision making (CDM) initiatives
- NATS would take the lead on investigating, implementing and operating tactical tools
- CAA and NATS would take the lead on addressing TMA issues.

8 Wider benefits

The report has recommended a number of interventions and reinforcement of existing initiatives to extract the best possible operational performance out of the system of airports and airspace in the South-East of the UK – within the policy constraint of no additional runways.

The focus, as reflected in the Terms of Reference, has been on punctuality, delay and resilience. But it is also important to draw attention to the way in which improved operational performance can lay the foundation for much wider benefits – and for the wider objectives of the South-East Airports Taskforce as a whole.

- The fundamental objective is clearly to meet the basic passenger expectation of flights operating to schedule. This will also translate into obvious benefits in fewer missed connections and lost bags. Less directly obvious is the impact on the levels of contingency which typically have to be built in to their journeys by passengers and operators alike. Improved operational predictability will feed through into many airport and airline processes – which in turn will help to improve punctuality, and so create a 'virtuous circle'.
- A similar argument can be made for the 'roll-up' benefits in airline operations – the South-East's main airports are very important nodes in both a European, and indeed global, network in which not just problems, but also improvements, ripple through the system.
- Improved operational co-ordination and control will enhance performance, efficiency and recovery, but it is also the basis for keeping passengers better informed during any periods where disruption cannot be avoided.
- There are environmental benefits. Assuming a given volume of traffic, the minimum environmental impact will be when airport operations deviate as little as possible from a plan which incorporates agreed environmental standards. This applies to both the aggregated impacts associated with, for example, stacking, and with local noise and air quality levels, for example through descent and ascent trajectories. Alongside existing initiatives, such as elements of FAS, the group's recommendations should also prove beneficial in this respect.

While recognising the challenges associated with improving a system which is already stretched, the group commends these findings and proposals for further development and eventual incorporation into the outcomes and actions arising from the Taskforce.