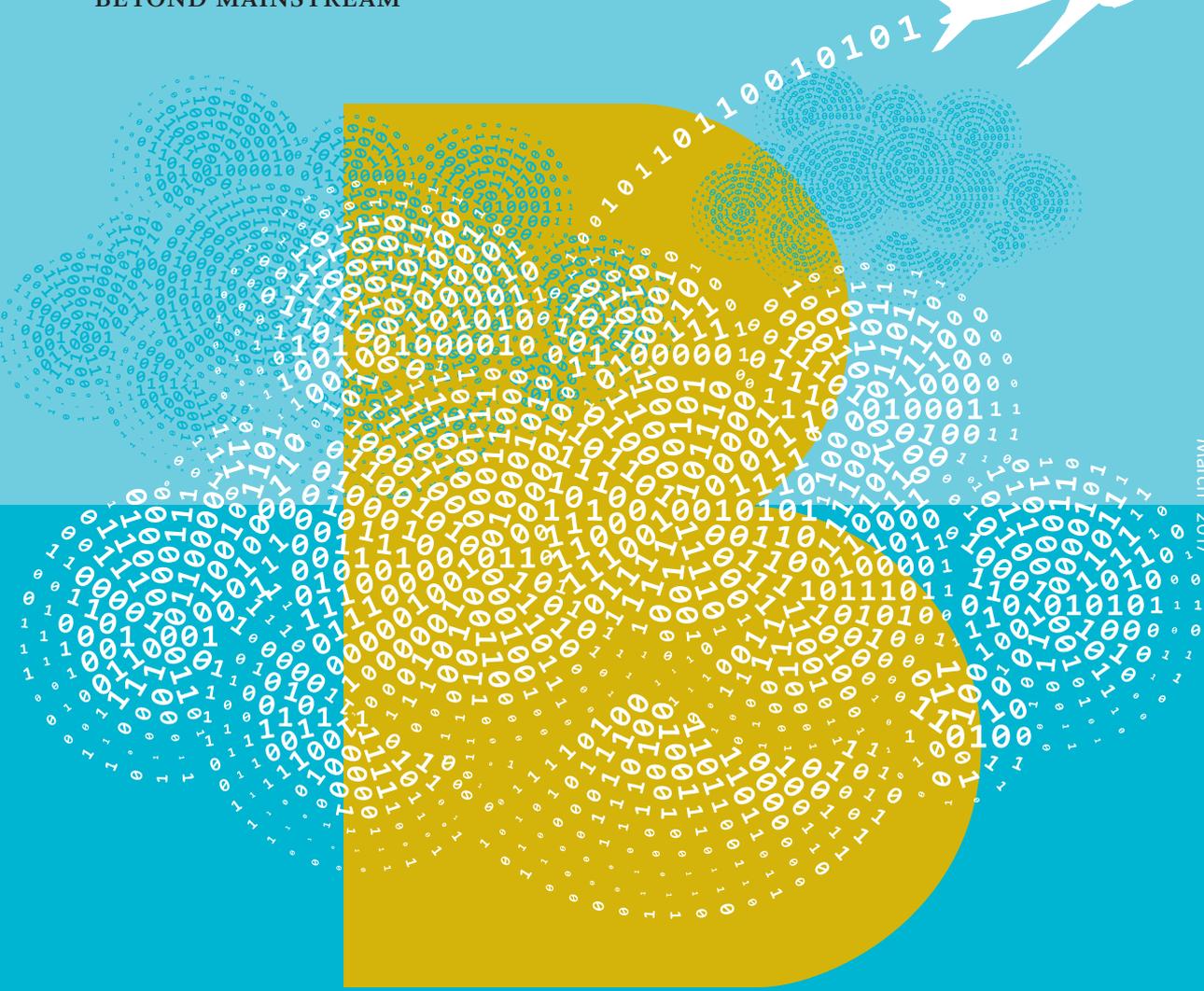


THINK ACT

BEYOND MAINSTREAM



March 2017

Rise to the challenge

The risks and opportunities of digitization for airports

THE BIG

3



USD 2.5 to 5 billion

in revenues could be lost by airports over the next five years unless action is taken.

Page 8

3 to 6%

is the associated share of operating margins at risk.

Page 8

60%

of European airports have a Chief Digital Officer driving digital innovation.

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Industry pundits are hailing digitization as the golden ticket to generating new opportunities at airports. We sound a note of caution.

Today's airport industry is awash with buzzwords. Mobile check-in apps, self-service bag drop, indoor geo-location, electronic bag tags, interactive digital displays – everything boils down to one thing: The digital revolution is here and it's transforming the airport industry.

In the airport business, digitization is considered synonymous with opportunity. Industry pundits are hailing the changes associated with digitization as the golden ticket to generating new revenue-earning possibilities at airports. Those changes, the pundits imply, are almost exclusively positive.

We sound a cautionary note. It's not that we don't believe that digitization will revolutionize many aspects of airports or that this could have a positive effect on the airport industry. Indeed, we touch brief-

ly on some of the exciting opportunities for airports below.

Alongside the undeniable opportunities for airport operators, a whole swathe of new challenges and threats have emerged, from mastering the technical, cultural and legal challenges of digitization to the risk of losing passengers to alternative flight experiences, hemorrhaging duty-free sales and a decline in the use of airport parking services. Airport operators need to find a way to deal with these threats now if they are to avoid a sizeable dent in their operating margins. The time has come to rise to the challenge.

Understanding the passenger and operations journey is key to grasping the potential of digital change.

To understand the full potential of digital and to prepare for the risks it involves, we need to look at the airport process from two perspectives: the passenger journey and the operations journey.

The passenger journey essentially represents the customer perspective. Improving the customer's journey and experience is of strategic importance for airports as it will enable them to attract airlines to the terminal, enhance customer loyalty and develop ancillary revenues from areas such as shopping, food, leisure, and parking. The limited potential for increasing aeronautical revenues makes these activities even more important than in the past, and airports need to make them a matter of priority.

We divide the **passenger journey** into nine separate stages, from arriving at the airport to boarding the aircraft. Opportunities for generating revenue through digital initiatives arise at all stages. For example, in stages 1 and 2 airports earn significant revenue from parking and vehicle-related services. Current digital initiatives involve pre-booked parking offers and smart parking systems that can manage capacity in real time. Offsite parking can be offered, combined with transportation direct to the terminal, managed online.

Car-sharing, again supported by digital technology, is another option for the journey to the airport. → [A](#)

We divide the **operations journey** into five stages, from arrival, check-in and baggage to ground and apron. Again, digital opportunities arise at all stages of the journey. For example, in stage 2 – terminal operations – digital initiatives include lighting and heating optimization using real-time software connected to the Internet of Things (IoT), instant feedback from bathrooms allowing for an immediate response by maintenance or cleaning teams, passenger flow monitoring based on connection to the airport's wireless Internet network, and location-based task allocation to gate agents from the control desk via smart watches. → [B](#)

So far we have only looked at the upside – the myriad possibilities for innovative applications generated by the ongoing digital revolution. But we should remember that one man's gain is another man's loss: There is no guarantee that the airport operators will be the ones to benefit from this shifting landscape rather than existing competitors or new entrants. Add to that the multiple challenges for airport operators in getting to grips with digital and it soon becomes clear that it won't all be wine and roses on the journey ahead.

A

FOLLOW THE DOTTED LINE: THE PASSENGER JOURNEY IN 9 STAGES

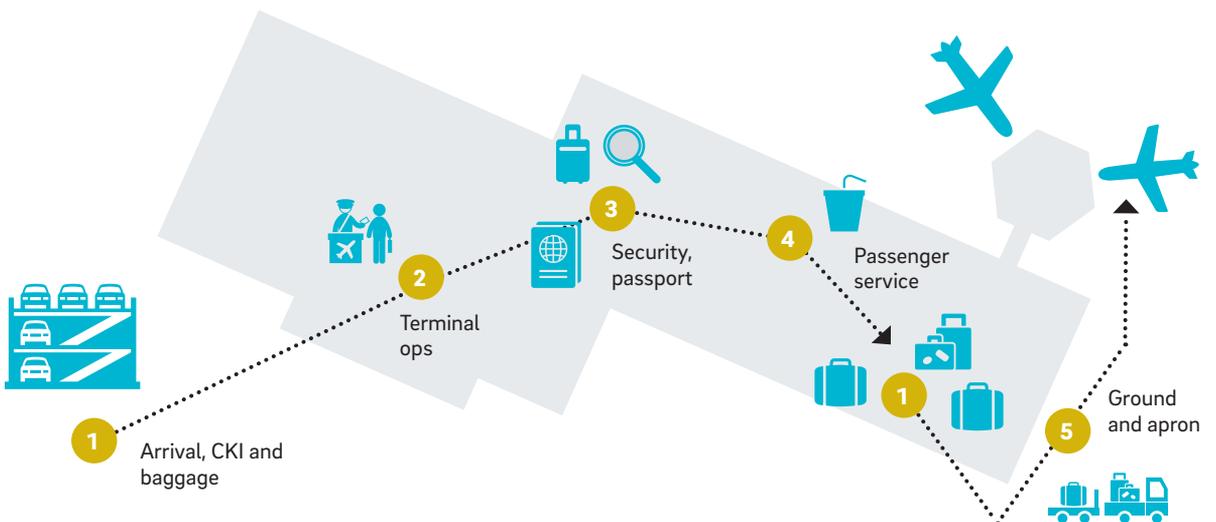
Airports can apply different levers for creating value at various points along the line.



B

FROM ARRIVAL TO APRON: THE OPERATIONS JOURNEY IN 5 STAGES

Again, as in the passenger journey, digital opportunities arise at every step of the way.



Amid all the hype about digital, airport operators need to keep their feet firmly on the ground. Digitization means challenges as well as opportunities.

Look around today's airports and it would appear that airport operators are constantly launching new digital initiatives. Dig a little deeper, however, and it turns out that things are not moving as fast as one might expect. Operators remain attached to their traditional business model, based on a combination of aeronautical revenues and non-aeronautical revenues – the latter from areas such as retail, parking, real estate, and advertising. All operators are trying to increase their non-aeronautical revenues, using digital levers wherever possible. But digital has yet to become a truly disruptive lever in the industry.

Airport operators face a multitude of challenges when it comes to mastering digitization. This includes technical challenges, cultural challenges, legal challenges, and financial challenges. The combined effect of

these hurdles is to slow down the overall pace of digital innovation. A key technical challenge is the lack of standardized architecture and technology. Airport operators currently use various technologies, such as Wi-Fi, Bluetooth, NFC, or iBeacon. No standard exists as yet.

They also face the challenge of multiple data sources, including the airport itself, airlines and numerous service providers. Stakeholders need to be prepared to share this data and airport operators need to know how to use it. This is particularly difficult due to the vast amount of data that needs to be analyzed, often in real time. And the scale of this data is set to increase dramatically in the future with the IoT and smart machines. Players will need appropriate IT infrastructure and computing power, which may require significant capital investment on their part.

Cultural and organizational challenges represent another hurdle. Airports have captive customers and often enjoy a monopoly in their particular geographical area. As a result, they have not traditionally developed customized services for passengers. This situation is now changing, especially for large international hubs, where attracting passengers and airlines to the terminal is key.

The International Air Transport Association (IATA), the trade association for the world's airlines, launched a Fast Travel Program aiming to offer 80% of global passengers in 2020 a complete range of relevant self-service options throughout their journey to provide better convenience and reduce queues.

IATA

The digital transformation is complex, encompassing the entire airport value chain and relying on multiple technologies. Without a clear strategy and roadmap, airports can find it difficult to know where to focus their efforts, which frequently results in them flitting from one idea to another. An effective way to overcome this is for airports to appoint a Chief Digital Officer, who acts as the catalyst for digital initiatives. However, fewer than two-thirds of European airports currently have such a CDO in place (2015).

Many digital initiatives are, by their very nature, spread between different stakeholders – the airport, the airlines, duty-free shops, service providers, and so on. They also cross different devices and channels, such as websites, smartphones and digital screens. Airports cannot go it alone on such innovations. They need to form partnerships with other players.

Sydney Airport shows one way of going about this. The airport has established a unified approach by creating a single platform for all stakeholders. This strategy has made a significant contribution to the airport's bottom line. The airport can now leverage its unified platform to develop additional services, such as pre-booked parking deals, online travel guides to Australia in collaboration with commercial partners, and in-app duty-free shopping with delivery upon arrival at the airport.

As well as the technical, cultural, and organizational hurdles mentioned above, airports also face legal challenges. For example, in the area of data security: To support the development of digital initiatives, airports must guarantee data security and privacy – not just to meet the legal regulations but to keep their customers happy too. Cyber security is also key in the area of operations.

Finally, airports face various financial challenges. Investment by airports to date has been limited compared to the airlines, to say nothing of the major players in the digital world – Google, Amazon, Facebook, and the like. Few airports except for the major hubs can rely on economies of scale. Often, they operate in local areas with only their own budget to rely on. This contrasts with the major airlines, which are frequently several times larger than the airports in terms of their revenue and footprint. Moreover, as with all legacy players considering digital initiatives, quantifying the impact of digital initiatives, such as return on investment, is notoriously difficult.

Digitization creates certain threats to airports' revenues. Between USD 2.5 and 5 billion are at risk over the next five years.

Obviously the risk of a complete disruption of airports' core business of connecting passengers and airlines is limited. But the threats to their high-margin non-aeronautical activities, which represent a vital part of their revenue streams, are potent. In two key areas – retail and parking – airports face the risk of incumbent players leveraging their digital potential and new entrants developing innovative solutions.

We calculate that airports could in total lose somewhere between USD 2.5 and 5 billion in global revenues over the next five years unless they take action to counter these threats. That translates into a three to six percent hit on their operating margin (EBIT).

1. GLOBAL THREATS – THE RISK OF LOSING YOUR PASSENGERS

Airport operators, especially large international hubs, are in competition with each other when it comes to attracting airlines and passengers. Here, they can use digital tools and practices to stand out from the crowd.

Changi Airport, for example, has introduced its first-class Changi Experience for passengers. Check-in agents now focus on higher value-added services, such as addressing passenger queries, while boarding agents provide personalized services to passengers rather than simply processing their tickets.

Another area where significant risks arise is regional flight-sharing. Three main models have emerged in recent years, particularly in the United States, with a number of start-ups investing in new Uber-like models. The biggest threat for airports appears to come from models targeting first and business class passengers by offering alternative private jet solutions at competitive prices.

In a private plane-sharing model, private pilots share the cost of flights with passengers without being authorized to earn money through this activity. Companies operating in this area provide websites where private pilots can post their next flights and offer seats for passengers to share the ride – a sort of BlaBlaCar for air travel.

In the United States, the FAA has forbidden this kind of flight-sharing. Pilots may only share seats on flights with their relatives and may not make revenues without a commercial license. This decision has halted the development of start-ups operating in this field, such as Flytenow.

In Europe, by contrast, the European Union has given the green light to the development of flight-sharing activities as long as the pilots do not earn money from this activity. Some countries, such as France, are more restrictive than others: The company Wingly offers only 30 to 50 flights in France compared to more than 3,000 flights in Germany, despite the fact that France accounts for a major share of European private pilots.

We do not consider private plane-sharing a major game-changer. Passenger traffic is expected to grow strongly in the coming years and pilots lack a strong incentive if they are not allowed to earn money from plane-sharing. Depending on the level of restrictions going forward, anywhere between 100,000 and 700,000 passengers could use this model in France in the coming years, of which only about half would be captured from airports, that is to say less than one percent of total air passengers.

The second model of flight-sharing is all-you-can-fly jet-sharing. In this model, passengers pay a monthly membership fee and can then fly as often as they want on scheduled routes. This model has primarily emerged in the US – the largest market by far for private jets – with start-ups such as Rise and Surf Air. Rise is planning to expand its services in the United Kingdom to serve the rest of Europe, while Surf Air is expected to start European operations in the second quarter of 2017.

The all-you-can-fly jet-sharing model targets frequent first and business class passengers. It relies on the underutilization of private jet fleets, which are used on average around 300 hours a year, compared to an optimal utilization of 1,100 to 1,200 hours. This model poses a direct threat to commercial airlines on regular scheduled business routes, with an estimated 80 to 90 percent of clients never having used a private jet before.

The third model of flight-sharing that has emerged in recent years is empty-leg jet optimization. Around 30 percent of jets travel empty, and companies such as Cojetage and Le Jet provide potential customers with direct access to this unused capacity at discounted prices. Although drastically reduced, ticket prices remain relatively high, however. Moreover, passengers need to be highly flexible as they cannot plan flights far in ad-

vance. We see this model as more of a solution for optimizing the utilization of airplanes than a true disruption to commercial routes.

Taken together, these three regional flight-sharing models represent a credible threat to commercial aviation traffic and thus to airports. We estimate that they could cannibalize airport traffic by 0.5 to 1 percent in the next five years as a result of both the increase in the load factors of jets currently flying, notably on empty legs, and the increase in the average number of hours flown per aircraft, especially due to all-you-can-fly models. This will impact both aeronautical and non-aeronautical revenues. We estimate the global risk to airport revenues to be somewhere between USD 0.5 and 1 billion.

2. THREATS TO SPECIFIC SEGMENTS OF THE VALUE CHAIN

The digital revolution represents an even greater threat to airports' non-aeronautical activities, especially in the areas of retail and parking. We estimate the total risk to airport revenues here at between USD 2 and 4 billion.

In the area of travel retail and duty free, airports currently enjoy the largest piece of the cake, capturing 58 percent of total spend (source: Generation Research). Airports have developed cutting-edge display and merchandising in this area and they continue to enhance customer experience with technologies such as immersive shopping, digital walls and robot retailers, alongside services such as gate collection.

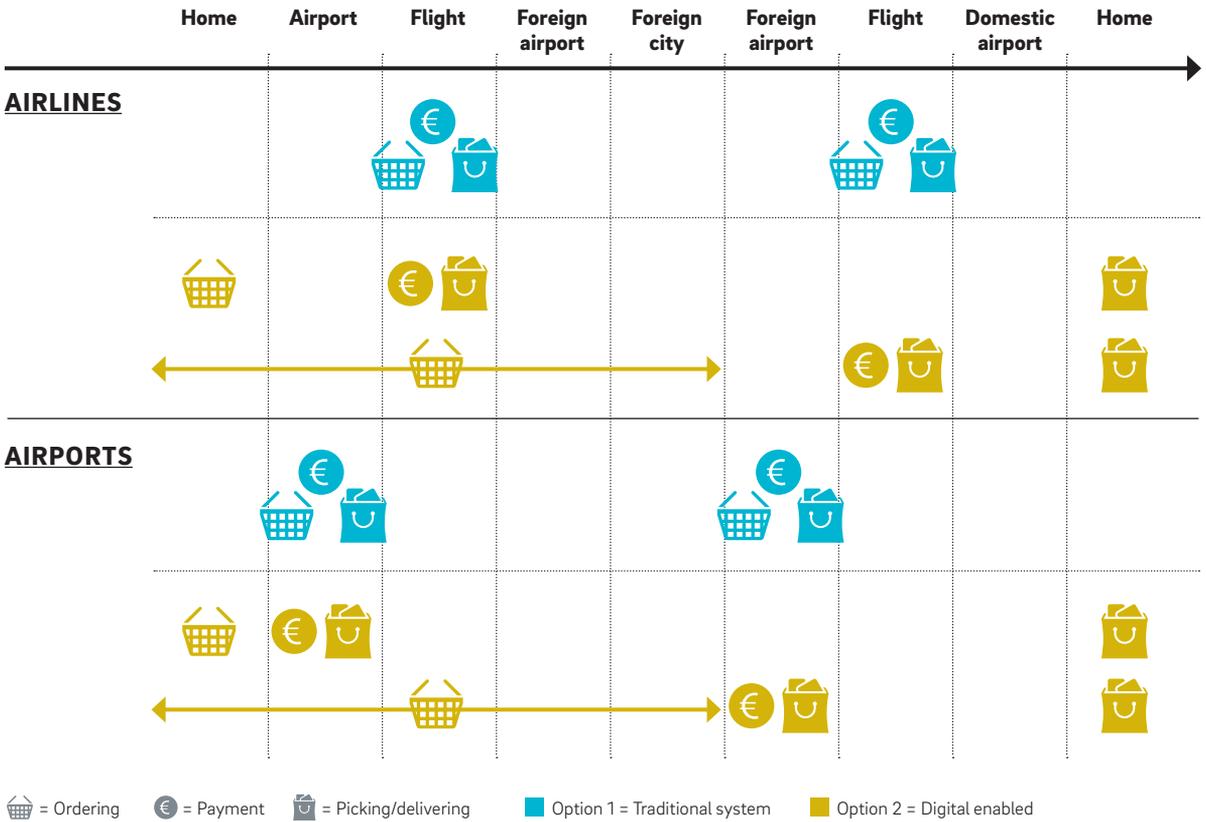
However, airports' domination of the travel retail and duty-free market could face challenges in the coming years from both incumbent players (i.e. airlines) and new entrants. Here, we observe a number of disruptive developments. → [C](#)

At present, airlines only account for five percent of the global travel retail and duty-free market, on a downward trend from a high point of seven percent in 2006-2007. Unlike airports, airlines are perceived as outdated and unattractive, with their old-fashioned trolleys and limited product catalog. But airlines are busy experimenting with new approaches. Several airlines have developed online duty-free platforms, enabling customers to pre-order items and collect them either on board or at home on arrival. For instance, British Airways employs this concept in its High Life Shop. Some airlines have even developed on-board duty-free shops by eliminating some of the seats in the aircraft, for example on Korean Air's flagship A380.

C

TRAVEL RETAIL IS EVOLVING

But the airports' high-margin, non-aeronautical activities are at stake due to digitization.



Source: Roland Berger

A number of airlines provide access to their shopping portals on passenger devices or seat screens, allowing customers to purchase items during the flight. The main categories at risk here are fragrances and cosmetics, tobacco, personal accessories (watches, jewelry, and fine writing), and wine and spirits – precisely the items sold most at airports. In luxury clothes and goods, the second-largest category in airport duty free, the necessary customer interaction with the product means that on-board sales probably represent less of a threat.

Depending on the pace of Internet penetration for travel retail and duty free, we anticipate that airlines will capture a share of online sales somewhere between three and seven percent within the next five years – a share stolen from airports.

Special websites and apps are also making it easier for customers to compare prices between bricks-and-mortar stores, airport retailers, and airlines. Depending on their positioning, airlines could attract either price-sensitive customers by offering better prices for retail or food and beverages than airports, or service-sensitive customers who don't want to carry their purchases around the airport.

So far, the results of airlines' in-flight retail initiatives appear to be mixed. Not all airlines believe in the potential of this segment. For example, Delta and American Airlines ceased selling duty-free products on their flights in 2015.

A new threat to airports' retail revenues could come from the arrival of companies such as Amazon, DHL,

and PostNL. These players have begun allowing customers to order online and collect their items from dedicated pick-up machines at airports, thus targeting the segment of products bought for use on arrival back home. Amazon, for example, introduced lockers at Birmingham Airport in the UK in September 2014. Although the airport claims that this has not diluted its retail activities – lockers are located landside and purportedly serve visitors and staff, rather than passengers – this may well develop into a significant threat in the medium to long term. Indeed, the presence of such machines can encourage passengers to compare prices, which are typically lower on Amazon than in airport stores. A possible counter-strategy for travel retailers would be to develop specific product ranges or luxury products not available online, thereby limiting the opportunities for price comparison.

New external players are also entering the airport ecosystem by providing orientation solutions. Google, for instance, has developed MapsIndoors, an indoor navigation service that can be integrated with apps, websites, and information kiosks throughout the airport. This allows airport operators to send location-based marketing via push notifications or inform passengers of any disruptions that might affect their trip. This solution is already in operation in Copenhagen and El Dorado international airports, for example.

While such a service represents an opportunity for airport operators, allowing external players such as Google to interact with customers is a risky strategy. The new players are able to control the promotion process and influence passengers' decisions about which shops and restaurants to visit. It is possible that such players will become integrated in loyalty programs, on a revenue-sharing basis.

Passengers on average spend 150 minutes at the airport. However, only around 20 percent of these two and a half hours is what is known as commercial dwell time or CDT – time that the passenger actually spends in a commercial environment, where there are opportunities for spending money. In fact, passengers spend most of their time standing in line and waiting about. The digitization of airport processes such as check-in, baggage drop-off and security will inevitably reduce the total amount of time spent by passengers at the airport and, crucially, the level of uncertainty about how much time they need to pass through these processes, affecting the "buffer" that passengers build in to their time at the airport.

Although these improvements may have a positive impact on CDT, any unexpected delay in processing times will also cut CDT time radically. For instance, assuming that full online check-in (including printing a luggage tag) is introduced widely and passengers stop adding in a buffer as a result, a delay in security processing of five minutes for 25 percent of passengers could have a negative impact on total retail spend of two to three percent. Similarly, a study of passenger flows at Toronto Pearson International Airport (source: Passenger Terminal World, September 2016) revealed that cutting average security wait time by one minute would translate into USD 1.5 to 2.3 million in additional gross revenue. At the same time, the study also found that totally eliminating lines at security could have a negative impact on revenue, as passengers prefer to stay landside as long as possible before passing through security.

The second major area where the digital revolution poses threats to airports' non-aeronautical revenues is parking. A number of challenges are emerging in the use of private cars to and from airports. This is exemplified by changes in the share of private car use at the main UK airports. → [D](#)

The mobility landscape is set to rapidly evolve in the near future, creating a major threat for airports' parking activities. At present, such activities represent around 20 percent of airports' non aeronautical revenues (excluding revenues from car rental companies) and an even larger share of operating margins. The negative impact on parking revenues could be between 7 and 15 percent, creating an overall risk of USD 1 to 2 billion in the coming years.

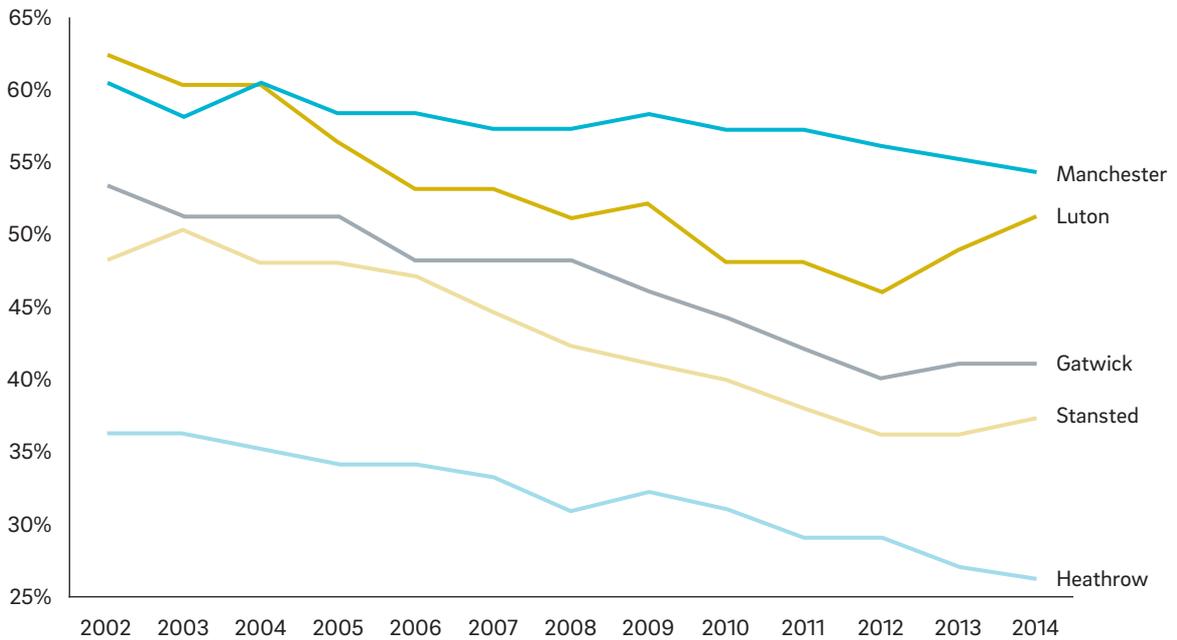
Four new mobility solutions threaten traditional passenger vehicle use and the need for car rental, the basic driver of parking revenues. We classify these threats as alternative parking solutions and car-sharing, ride-sharing, B2C ride hailing, and robocabs. New solutions include off-site parking with or without valet or automated shuttle and car-sharing, offered by companies such as Carhood, TravelerCar, Tripndrive and Turo.

TravelerCar, launched in late 2012, has developed two offers for customers. By forming partnerships with hotels close to airports and other parking facilities to maximize their parking space utilization, it is able to offer discounted parking fees to customers. It provides free shuttles for customers to and from the airport and pays the hotels and owners of parking facilities a share

D

DRIVING A PRIVATE VEHICLE TO OR FROM THE AIRPORT IS GOING OUT OF FASHION

Changes in the share of private car use at the main UK airports.



Source: Civil Aviation Authority

of the revenues generated. The second offer, currently only available in France, is peer-to-peer car rental, whereby passengers drive to the airport, park their vehicle, and then leave the keys there so that other drivers can rent out their car while they're away. This constitutes a direct threat to both traditional parking revenues and earnings stemming from car rental companies.

TravelerCar claims to have satisfied over 100,000 customers in 2015 and is aiming to reach 500,000 in 2016 through international expansion. To promote its services, the company has formed partnerships with airlines such as Aigle Azur and travel retailers such as Opodo, in exchange for a share of revenues.

Although somewhat less relevant for short and medium-length trips, ride-sharing also has a negative impact on airports' parking activities. Ride-sharing increases the number of passengers per vehicle and so cuts the total number of vehicles parked at the airport, impacting parking revenues. More specifically for air-

ports, the development of B2C ride-hailing by companies such as Uber is making taxi-like services accessible to a broader passenger base, reducing the need to reach the airport by one's own means of transportation. When combined with ride-sharing services such as Uber Pool, this trend clearly eats into airports' parking activities. For example, the small US airport Lehigh Valley International estimates the negative impact of Uber-like companies on parking revenues at a seven percent drop – just one year after the introduction of such services.

In the longer term we may see the emergence of autonomous vehicles or robocabs owned by large players such as Google, Uber, or the vehicle manufacturers themselves. These vehicles could offer any type of rides on journeys of any duration, as is already being tested by Uber in Pittsburgh. If successfully developed, services like these could drastically reduce the use of private and rental vehicles and thus the need for parking in the longer term.

Airports must wake up to the fact that digitization is a potential threat to their future business.

Various steps are possible, including both standalone and partnership-based solutions.

How should airports be responding to the threats posed by digitization? A number of global and specific countermeasures are possible. Some of these solutions are standalone defensive moves, while others are only possible in cooperation with other players.

For example, in specific areas such as travel retail and duty free, airports could ban players such as Google and Amazon from the terminal. Alternatively they could partner with these firms to offer integrated online and offline retail. In the area of orientation, airports could continue to develop their own apps or disable Wi-Fi access to competitors' apps. Or they could

work with other airport operators to develop a unified, single app.

In the area of parking, airports could similarly restrict access to specific vehicles such as Uber vehicles or off-site parking shuttles, or charge such vehicles fees for access to the airport. An alternative would be to develop an integrated off-site parking offer with a partner or introduce revenue-sharing mechanisms for players like Uber.

On a global basis, standalone counterstrategies could involve airport operators maintaining complete ownership and decision-making power for themselves

and focusing on their core activities. A useful approach here is to clearly assign responsibility (by appointing a Head of Digitization, say), to institute an appropriate organizational setup, draw up relevant business cases, and implement quick wins wherever possible. In parallel, the company should lobby both internally and externally on the topic of digitization. It can support the overall process by defining clear key performance indicators (KPIs), tracking progress, and taking corrective action where necessary.

Partnership strategies could involve other airport operators, airlines, technology providers, or even startups. The aim here would be to leverage the different partners' knowledge and expertise, share costs and increase speed and time-to-market.

Airlines can be valuable partners as they already have apps that are used by customers to book flights, check in, and generate electronic boarding passes. Integrating airport navigation systems and marketing would mean that passengers only have to download one app. In this scenario, the various partners would have to establish clear revenue- and cost-sharing principles.

Partnering with Google, Amazon, Facebook, and the like would enable airport operators to leverage social media data and offer personalized coupons, deals, and recommendations. The risk here is that these major players would in so doing enter the airport ecosystem and could subsequently leverage their scale to expand their activities. An alternative would be to create a link between the orientation apps and the airport app.

Developing a consortium with other airport operators would make it possible to design tailored solutions, such as a single app for all airports. Airport apps are currently downloaded 14 times less often than airline apps (source: Passenger Terminal World, September 2016, C J Ignition study) so it would make sense for airports to join forces and develop an unified app that could be used around the globe. Revenue-sharing would also be easier as it is simple to track which airport the app is used in.

Partnerships between airports can enable members to reach the necessary size for certain investments. They also allow airport operators to keep control of digital developments and ensure that they are appropriate and customized to their particular environment.

Several examples of successful partnerships exist. In 1949, eleven airlines decided to pool their existing communications equipment and networks for the sake of cost efficiency and created the cooperative SITA (Société Internationale de Télécommunications Aéronautiques). Over the last 65 years, airports, airlines, air-freight forwarders, and other air transportation industry stakeholders have gradually joined SITA, allowing to the company to become the world leader in ICT technology for the air transportation industry. SITA currently supports 2,800 customers, including almost every airline and airport in the world, and delivers value to the air transportation community through technology, performance improvement, and sharing innovations.

Another example of a successful partnership is Amadeus, the global distribution system set up in 1987 by four European airlines to create a common infrastructure for distributing airline tickets in real time. Today the company is one of the leading players worldwide, with more than EUR 3.9 billion in revenues reported in 2015 and a presence in more than 190 markets. The company has expanded into all travel segments, from hotels and travel operators to trains and cars.

CONCLUSION

Airport operators need to engage full on with the digital world. That means more than just leveraging the many opportunities in the passenger and operations journeys. It means anticipating the potential threats that come with digitization – threats that could deprive airports of a substantial part of their operating margins.

A number of strategic initiatives present themselves as possibilities. Besides standalone strategies, one effective approach would be to form consortia with other airports as a way of focusing investments in digital. This would give airports the critical size they often lack and provide them with access to new solutions. It would also make it easier for them to maintain control of digital developments and adapt them to the specific nature of airports.

Whatever approach airport operators decide to follow, it is clear the race has already begun. Airports need to rise to the challenge before it is too late. ♦

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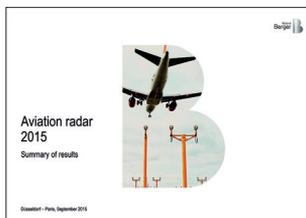
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SPREAD YOUR WINGS

In-flight connectivity is a new opportunity for the airline business

Today's airline passengers, of whom there are one billion and counting, are an underserved market waiting to be captured. Already, 83 percent of travelers carry a smartphone on board, and almost half have a laptop with them. People are increasingly booking air, hotel and travel packages online. On-board Internet is not just a service that is demanded by customers: It is a valuable channel for selling additional services to them.



AVIATION RADAR 2015

Views of 75 top managers from the aviation industry

Jointly hosted by Roland Berger, the DLR, and the RWTH Aachen University, the Aviation Convention 2015 brought high-caliber speakers and aviation managers together in an international platform to exchange ideas and discuss both future trends and current issues. The ideas discussed at this event are the focus of our publication Aviation Radar 2015.

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