## Agenda

1. **What is Airport 4.0?**
2. A holistic view at digital airport economics
3. Key success factors of a digital transformation
Airports are at the fore-front of global challenges and innovations of our society and business, among which Digital Transformation.

**Global trends**

- Scarcity and stability of resources
- Rise of emerging economies
- Social & demographic shifts
- Rise of emerging economies
- New health & wellbeing demands
- Urbanization and integrated mobility
- Hyper-competition
- Digital revolution
- New customer power and sophistication
- Fast changing business ecosystems
- Disruptive technological advances

**Business trends**
The airport expenses into “smartization”, i.e. into digital based solutions, should grow by ~40% in 2020 vs today with the objective of better customer experience and improved operations.

- As a public service infrastructure, an airport is a processor / connector between the flow of aircrafts and the flow of [passengers + baggage]…

- …Hence the strong focus on airport operations for “smart airport” spending (see besides)

- As an economic entity, it leverages this position in the value chain to monetize those flows through many different approaches, at each step of the journey…

- …Smart airport investment should then demonstrate an attractive business case, with high impact on growing revenues and lowering the costs and capital expenditures

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**Smart airport spending – in Bn$ 2014**

<table>
<thead>
<tr>
<th>Category</th>
<th>2014</th>
<th>2020</th>
<th>+39%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car parks</td>
<td>9.517</td>
<td>13.214</td>
<td>39%</td>
</tr>
<tr>
<td>Building Operation</td>
<td>1.704</td>
<td>2.393</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>1.012</td>
<td>1.513</td>
<td></td>
</tr>
<tr>
<td>Baggage sorting</td>
<td>3.154</td>
<td>4.44</td>
<td></td>
</tr>
<tr>
<td>Check-in</td>
<td>2.704</td>
<td>3.87</td>
<td></td>
</tr>
<tr>
<td>Apron</td>
<td>444</td>
<td>444</td>
<td>0%</td>
</tr>
<tr>
<td>Airside Resource Mgt</td>
<td>1.126</td>
<td>1.126</td>
<td>0%</td>
</tr>
<tr>
<td>ATM</td>
<td>1.513</td>
<td>1.513</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: Smart Airports Market Forecast 2014-2020, Profound Market Intelligence
Airports are currently mature to implement 2.0 digital solutions but should look forward for the next 10-15 years in order to implement an Airports 4.0 model.

### Airport models

| Airport 1.0 | All about manual and analogic processes  
| Long lag-time between resource solicitation and the airport answer |
| Airport 2.0 | Implementation of self-service thanks to the automation of some key flow processing tasks (bag-drop, passport check) |
| Airport 3.0 | Several focused initiatives to leverage digitalization so that to optimize flow monitoring and processing |
| Airport 4.0 | Full-connected with all stakeholders  
| Superior proactivity and reactivity to adapt to the real-time solicitation of the airport (operational needs, customer requests etc…) |
Agenda

1. What is Airport 4.0?
2. Economics of Full Digital 4.0 Airports
3. Key success factors of a digital transformation
A Full Digital Airport leverages 6 technology clusters to optimize its economics by increasing capacity of existing facilities, lowering OPEX and boosting revenues.

**Clusters for airport digital technologies**

- **Flow monitoring & management**
  - Capacity increase: Wifi / Bluetooth or Imaging based or flow monitoring, Indoor geo-localization…
  - OPEX optimization: Check-in & Bag Drop, Self-Boarding, Baggage lifters, Automated Taxiing, New Security check points (?), Automated-Docking,…
  - Revenue growth: Total Airport Management Center, Real-time operation management

- **Process automation**
  - BIM, real-time energy and utilities management, intelligent preventive maintenance, data-based asset management,…

- **Collaborative Decision Making (Air & Ground Ops)**
  - Beacons, Digital & interactive display, CRMs systems

- **Intelligent Building Management**
  - Automated planning management for key use of airport resources

- **Customer engagement**
**Digital transformation as clearly a great impact on capacity utilization and therefore on required CAPEX for extension**

<table>
<thead>
<tr>
<th>Asset Base 2.0</th>
<th>Asset Base 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway &amp; Apron</td>
<td>24.0%</td>
</tr>
<tr>
<td>Terminal Building &amp; Systems</td>
<td>41.0%</td>
</tr>
<tr>
<td>Ground access &amp; Car Parks</td>
<td>24.0%</td>
</tr>
<tr>
<td>Energy &amp; Utility</td>
<td>11.0%</td>
</tr>
</tbody>
</table>

- **Non-CAPEX focused solutions**, i.e. process optimization through data-analytics:
  - Runway capacity increase by +10% (LGW)
  - Check-in capacity >20% (CPH)

- **CAPEX-based solutions**:
  - Automated bag-drop +30% (ORY)
  - IATA future security check-point concept
  - …

Source: ACI average world airport P&L 2014, Arthur D. Little analysis

**Examples of capacity increase**

- **Airside**: 10% to 15% capacity increase
- **Landside**: up to 30% capacity gain, but unit cost +15% for intelligent building & equipment
Process automation and Energy & Building management could have a great impact on OPEX

Examples of OPEX optimization

- Automation of passenger treatment processes saving 20% to 50% of staff
- Sharing of real-time situation awareness for ground operating staff of airports, handlers, airlines and other 3rd parties: -10% supervision costs
- Reduced labor-cost and external purchasing for maintenance (linked to CAPEX optimization and intelligent assets)
- Automated administrative processes (revenue accounting and billing, basic training etc...)
- Reduced energy consumption (lighting, heating...)

Organizational challenges are also key to be considered to leverage those gains potential

Source: ACI average world airport P&L 2014, Arthur D. Little analysis
From an helicopter-view the impact of the Digital Transformation of airports on revenues seems quite significant.

### Revenue Growth Accelerator

- Increased dwell-time thanks to better operation efficiency driven by digitalization
- Enhanced interaction with customers:
  - Better flow knowledge and tracking of individuals at the airport terminal
  - Ability to push sales and to propose hyper-segmented offers, instantly
- Dynamic pricing (today in car parks, tomorrow in retail with discount coupons / bundled offers etc…)

### Potential threats on airport revenue streams

- Moving some transactions away from the airport:
  - Duty-free online…
  - … with pick-up on-board of goods purchased
- Disintermediation of services providers operating at airports:
  - Car sharing solutions using long-term parked vehicles
  - …
Obviously, more efficient and faster processes are the key for customer spending increase at airports

Split of passenger dwell time at airports

Correlation between dwell time and spend-per-pax at airports

Source: Dolby & Holder, Arthur D. Little projects

Impact of digitalization

Billion-hours lost at airports

<table>
<thead>
<tr>
<th>Impact</th>
<th>Check-In</th>
<th>Security &amp; Passport</th>
<th>Orientation</th>
<th>FIDS</th>
<th>Gate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process time</td>
<td>600</td>
<td>330</td>
<td>225</td>
<td>330</td>
<td>650</td>
</tr>
<tr>
<td>Queue, Watch &amp; Wait</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Dwell-Time</td>
<td></td>
<td></td>
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</tbody>
</table>

Spending ratio

- Billions per hour at airports
- +40.0% Spend-per-pax: +2€ to +3€ per additional hour

Source: Dolby & Holder, Arthur D. Little projects
Digital Transformation is also key to address the current and future Digital consumers, that are representing ~40% of the world population today.

Source: United Nations

Current and future digital consumers: 40% of pop.

Current and future digital consumers: 33% of pop.

Current and future digital consumers: 33% to 50% of pop.
Actually, revenue increase lead by Digitalization is still uncertain today: revenue upside can be threaten by “digital competitors”; nevertheless digital interaction is a must-have.

### Examples of revenues upsides and downsides because of digitalization

<table>
<thead>
<tr>
<th>Source: ACI average world airport P&amp;L 2014, Arthur D. Little analysis</th>
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</table>

**Retail + F&B**:  
- +5% to +15% thanks to increased dwell-time  
- > +10% (?) potential from enhanced customer interaction  
- ? competition from online dutyfree?  

**Advertising**:  
- Spectacular sales increase for products being advertised digitally today (but will it last?), … hence higher revenues for advertising operators…  
- … but that are not converted into higher advertising fee for airports has ad operators claim for higher CAPEX for digital displays  

**Car park and car rental**:  
- Yield management enables +6% to +10% sales increase…  
- but price comparators or car sharing solutions might take-way 10% to 20% of revenues
Overall, unleashing the potential value of Airport 4.0 economics looks quite attractive vs the current Airport 2.0 business model with a significant EBIT improvement potential.

A “full-digital greenfield” airport would generate more than +10pts EBIT margin:

- Capacity increase by 15-20% minimum, but CAPEX reduction only by -10% (cost of intelligent building & equipment)
- OPEX reduction by 15%
- Revenue growth mainly induced by the “side-effect” of better customer satisfaction and increased dwell-time

Challenges for airport operators are the following:

- At what pace can we achieve our full digital transformation? What are the key success factors?
- How to preserve most gains for the airports while sharing part of this additional profit between stakeholders?

Source: ACI average world airport P&L 2014, Arthur D. Little analysis
Agenda

1. What is Airport 4.0?
2. Economics of Full Digital 4.0 Airports
3. Key Success Factors of a digital transformation
A Digital Transformation requires new skills and talents; it should involve the entire airport organization.

### Key Success Factors of a Digital Transformation

- **Revenue focused departments**
  - Airline marketing
  - Commercial revenues & passenger marketing
  - Real-Estate
  - Other internal service providers (handling, security…)

- **Operation focused departments**
  - Airport Operations – Airfield / Terminal
  - Airport Maintenance / Facility Management
  - Flight statistics & forecast

- **Airport planners, designers & developers**
  - Program & master-planning
  - Engineering (when in-house)
  - Project management

- **Support functions**
  - Strategy
  - Finances
  - Human Resources
  - …

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**New business analytics department:**

- Small team: 5-20 people
- Data & fact-based-driven, process agnostics: mix of new comers and some grey-hair process experts
- Ability to gain autonomy in developing tools and analysis in-house…
- … and to embrace open-innovation
- Transverse approach, no hierarchical linked towards existing departments, but could be split into revenue focused experts vs operation focused experts
- Commando spirit
Achieving a Digital Airport Vision and Business Model requires the combination of (1) a usual strategic planning approach and of (2) Design Thinking bricks

3. Key Success Factors of a digital transformation

- **Strategic Vision**: Ambition target, alignment of priorities for change, impact on airport economics
- **Ideate solutions**
- **Sourcing strategy**: in-house / open-innovation Customized / vendor solution …
- **Prototyping**
- **Implementation**

Boosting creativity, shortening “go-to-market” cycles, winning the buy-in of the organization… … while focusing efforts and managing potential conflicts of interest
A successful Digital Transformation must provide tangible and economic benefit to every stakeholders of an Airport 4.0

**Airports & Investors**:
- Implement lean & agile business model:
  - Skills and activities of tomorrow?
  - Integrator vs Orchestrator?
  - “Flexible” CAPEX?

**Airports & Airlines**:
- Transform into a « Smart airport », consider risk-sharing and value-based relationships
- Find a modus vivendi with airlines to manage the battle for consumer ownership through digital media

**Airports & The City**
- Contribute to the aviation industry green effort
- Contribute to & prescribe mobility strategies based on digital-enabled solutions

**Airports & Consumers**:
- Leverage big data & technology to understand « hyper-consumers » and boost both customer experience and commercial revenues
- Find the right balance between being “a connector” and a “place of enjoyment”
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