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1. Airport management challenges

- As passenger volumes increase faster than new airports or terminals can be built, demand is placed on airport management for more complex and timely decision.

- Cost must be controlled, **productivity must be improved and security enhanced**.

- And all of this must be done at the same time as meeting the **increased expectations of passengers** for smooth and efficient services which ensure hassle-free travel.
Center on Interactions Among Passengers, Baggage, and Customer Groups

Ground Handling

Cleaning, catering, cargo handling, aircraft maintenance, and fueling

Collaborative Decision Making

Cabin door closes

Pushback

Take-off

Taxiing

Airfield

Departure

Arrival, check-in, baggage drop, security check, waiting, and boarding

Arrival

Deplane, customs clearance, baggage claim, transfer, and hotel

Terminal area

Dispatch and Command

The designated stand

Cabin door opens

Cabin door

Touch-down

Taxiing

Public area

Travel plan

VIP services

Center of interactions
2. Airport 4.0
- digital airport -

- A performant airport
  - An airport focused to the customer
  - An airport innovative
- An agile airport
  - An airport connected by network (ACDM)
  - An airport flexible
- A responsible airport
  - A clean airport (using green energy)
  - An airport centered on human
Airport 4.0

- Digitalization
- Environment
- Intermodal transport
- Human resources
3. The basic steps of digital transformation

1. Airport environment assessment
   – A multidimensional review of airport’s characteristics

2. Airport plan and objectives
   – Agreement on the priorities and actions of specific digital plans

3. Internal organisational review and requirements
   – An assessment of current organization and competencies versus what is needed to remain flexible and agile through the digital transformations.
4. The axes of work for digitalization in the airport sector

4.1 Increasing connectivity
- Smart airport services (ACDM 2)
- Connected airport (ACDM)
- Connect humans
- Lead airport (APOC)

4.2 Development of software that communicates
- Huawei
- iAirport Operations
- NIIT technologies

4.3 The virtual for supporting decisions
- Development of appropriate models
- Simulate the functionality of airport
- Lead the airport
4. The axes of work in the airport sector (continuation)

4.4. Changing of the workstation
- Reduce hardship
- Human-machine interaction
- Accompany the staff
- A new organization of work
- New skills required

4.5. Security of data and processes
Airport missions:
Ensure Safety First, Optimize Services, Achieve Normal Flight Operations

Shorten incident response time and improve collaborative emergency response capabilities
Cut aircraft turnaround time
Minimize passengers’ time at customs and security checks to increase shopping/meal time

Big Data  AI  Video  IoT  Cloud Computing  Mobility

Continuous innovation in technology

Challenges in digital transformation
Smart Airport Solution: Situational Awareness, Cloud-and-Network Synergy, Application Enablement, and Visualized Businesses

**E2E Visualization and Collaboration**
Integration + Verification
(Comprehensive operations control, security, and services)

**Data management**
Cloud, Big Data, AI, Data mining
Integrate industry capabilities
(Platform + Ecosystem)

**Cornerstone of Digital Transformation (Technologies for communications)**
Mobility + IoT+ Smart processes
Virtual reality, Digital twin, Augmented reality
Video
(Wireless, wired, and chips)

Challenges in digital transformation
5. International Henri Coandă Airport toward Airport 4.0

Annual passenger traffic on HCIA (in million pax)
International Henri Coandă Airport toward Airport 4.0

Categories of problems identified and which could be solved by digitalization methods:

- High volume of passengers vs. the airport capacity
- Outdated infrastructure in the old departure terminal
- Airport congestion

Benefits of applying digitalization methods on HCIA

- Airport operations management optimisation
- Passengers flow optimization
- Relation of the airport with stakeholders
Departure control system analysis at HCIA – capacity management

1. Implementation of another 13 self-service counters

- 41.9% increase in processing capacity from 2790 to 3960 pax/peak hour/flow

<table>
<thead>
<tr>
<th>Passenger processing</th>
<th>Present processing time</th>
<th>Optimistic approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing time/pax</td>
<td>2 min/pax</td>
<td>30 sec/pax</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger processing</th>
<th>Current processing</th>
<th>Optimistic processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>93 counters considered</td>
<td>2790 pax/peak hour/flow</td>
<td>3960 pax/peak hour/flow</td>
</tr>
</tbody>
</table>
2. Security control

- automatic security control systems
  - 1811 pax/hour/control point

<table>
<thead>
<tr>
<th>Passenger processing</th>
<th>Current processing</th>
<th>Optimistic processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 security checkpoint considered</td>
<td>1249 pax/hour/control point</td>
<td>1811 pax/hour/control point</td>
</tr>
</tbody>
</table>
Departure control system analysis at HCIA

3. Border control
   - replacement of half of the control points with biometric passage gates
   - an increase of apx 62.5% (i.e. 3380 pax/hour) of processing capacity

<table>
<thead>
<tr>
<th>Passenger processing</th>
<th>Current processing</th>
<th>Optimistic processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considered hypothesis</td>
<td>2080 pax/hour</td>
<td>3380 pax/hour</td>
</tr>
</tbody>
</table>
Departure control system analysis at HCIA

4. Boarding
- implementing an automatic boarding system

- 22 minutes for a flight (for an average of 150 pax/flight, 8.8 s / pax)

<table>
<thead>
<tr>
<th>Passenger processing at boarding</th>
<th>Number of passengers/flight</th>
<th>Optimistic processing time/pax</th>
<th>Optimistic processing time/flight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 pax</td>
<td>3.3 sec</td>
<td>8.25 min</td>
</tr>
</tbody>
</table>
6. Management of Human Resources

The changing nature of work
## The changing nature of work

Emerging occupations (Examples)

<table>
<thead>
<tr>
<th>ATC/ATM VIRTUALIZATION AND AUTOMATION</th>
<th>AUTONOMOUS SYSTEMS</th>
<th>SECURITY AND CYBER-SECURITY</th>
<th>ELECTRIC AND SUSTAINABLE AIRCRAFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote tower controllers</td>
<td>Drone operators</td>
<td>Software and AI engineers</td>
<td>Energy and maintenance engineer</td>
</tr>
<tr>
<td>AI engineers/VR experts</td>
<td>Automated vehicle operators</td>
<td>Big Data and analytics experts</td>
<td>Electrical engineer/ Alternative Vehicle Developers</td>
</tr>
<tr>
<td>Big data analysts</td>
<td>Designers of autonomous vehicles</td>
<td>Security (&amp; cyber security) experts</td>
<td>Climate Change Reversal Specialist</td>
</tr>
<tr>
<td>Robotics engineering</td>
<td>Safety officers for unmanned systems</td>
<td>Legal services personnel and ethics and privacy protection specialists</td>
<td>Consumer Energy Analysts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Battery Technician</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solar Flight Specialists</td>
</tr>
</tbody>
</table>
Interdisciplinary master “IT applied in aviation”

- The purpose of this advanced Master’s programme is to provide students with a broad range and depth of interdisciplinary knowledge.
- Will be organized by modules, function of background of graduates.

- Will use new modes of delivery:
  - distance, through new forms of personalized learning
  - strategic use of open educational resources, virtual mobility
  - European internships in the main air transport employers.
Master Study Programme

“GREEN, SMART AND INTEGRATED TRANSPORT AND LOGISTICS”

Organized in the UNESCO Department "Engineering for Society"

Master taught in English
- 2 years, 4 semesters, 120 ECTS
- 30 students subsidized,
- 20 with fees

In partnership with universities and aviation institutions abroad, in line with UNESCO’s mission to provide education for sustainable development.

International interdisciplinary group of teachers and lecturers, combined with professionals from professional practice:

Constantin BRĂȚIANU, Miheea COSTOIU, George FIRICAN, Cătălin RADU, Mihaela POPA, Dorinela COSTESCU, Florin RĂDULESCU, Pepina MITEVA, François MARMIER, Sorin Eugen ZAHARIA
Thank you for your attention!