Airport Control Centers of the Future

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Overview

- Today’s Control Centers at Airport
- Total Airport Management improving Operations
- Intelligent & integrated security/safety solutions
- Outlook to future
How a command and control center looks like …
Multiple Control Centers at Airports

On-time, smooth, efficient, safe, secure, green airport operations and processes
How can we do even better in the future?

Areas of Improvements

- Support cognitive Functions
- Technology and Workspaces
- Integration and Collaboration
Command and control center processes

**Management processes**
- Operational and support organization
- Development of standards and strategy
- Set targets and verification

**Operational processes**
- Emergency call taking
  - Overview of live situation
- Automatic alarms
- Define actions
- Start actions
- Control operations
- Keep records

**Other requests**

**Support processes**
- Information material and knowledge management
- Risk management / emergency phone
- Data analysis
Situation Assessment: What can be improved?

- John Naisbitt: *We are drowning in information but starved for knowledge*
- Embedding information into the right context
- Presentation of information considering human factors aspects
- Prediction capability, anticipating risks instead of reacting to problems
- Diagnosis support, understanding the reason why
- Automatic Monitoring & Alarming, transferring boring tasks to IT
Planning: What can be improved?

- What-If Scenarios to analyze decision consequences beforehand
- Linking decisions to overall (performance) goals
- Automatic Assistant Systems

Today’s Driver Assistance in Cars

Available Operator Assistance (ATC)
Coord. & Communication: What can be improved?
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On-time, smooth, efficient, safe, secure, green airport operations and processes
From Airport CDM
towards Total Airport Management (TAM)

Today’s Standard

Concept Elements:
- Information Sharing Platform
- Milestone-Approach
- Variable Taxi Time Calculation
- Collaborative Flight Updates
- Pre-Departure Sequencing
- CDM in adverse conditions

Tomorrow’s Standard

Additional Concept Elements:
- Airport Operations Plan (AOP)
- Seamless Planning
- Integration of Airside and Landside
- Integration of Airport into the Network
- Airport Operations Control Center (APOC)
TAMS
Overall Solution Approach

Picture provided by DLR in TAMS project
SIAMOS APM
Airport Performance Manager

- **Features:**
  - Holistic situation awareness with full transparency of processes
  - Airside and landside KPIs
  - Consistency of layered Views

- **Functions:**
  - Process & Performance Forecast
  - Deviation monitoring and alerts
  - Manifold presentation means
  - Flexible reporting possibilities

- **Best A-CDM support**

**Performance**
(e.g. punctuality)

**Traffic flow**
(e.g. departure-queue)

**Main processes**
(e.g. landing)

**Detail processes**
(e.g. boarding)
SIAMOS APM
contextual situation awareness on video wall

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**SIEMENS**

16:05:28 UTC  19:05:28 local

15:56  Threat in T2 security area 1 detected
15:58  Information Chain triggered
16:00  PAX evacuated
16:05  PAX routed to T1 security area 1 and 2
16:08  Impact on Departure Schedule published
16:20  4 add. Security Gates at T1 area 1 and 2
16:50  re-open T2 security area 1 expected

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...T2 Security Closure until 16:50 UTC...

...Sandstorm expected from 18:00 UTC...
TAMS R&D project, SIAMOS backbone
Results

Departure Punctuality

- TAMS reduces the number of delayed departures significantly.
  - 47% decrease in number of flights delayed for more than 15 min
  - $\chi^2(1) = 6.90, p = 0.01$

- TAMS reduces departure delay significantly.
  - Mean delay for each flight: 563 sec (baseline) vs. 417 sec (TAMS)
  - 26% delay reduction with TAMS

F(1, 28) = 5.30
$p = 0.01$
$\eta^2 = 0.16$
Results

Passenger Missing Rate

- Percentage of passengers left behind
- TAMS reduces the percentage of passengers left behind significantly without increasing resource costs.
  - Mean rate per flight: 8.37% (baseline) vs. 3.10% (TAMS)
  - Reduction of 63%

\[ F(1, 37) = 12.39 \quad p = 0.00 \quad \eta^2 = 0.25 \]
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On-time, smooth, efficient, safe, secure, green airport operations and processes
Airports need comprehensive and integrated security solutions

- Intelligent devices and secure networks
- Interoperable solutions
- Protecting people, processes and assets
- Safety solutions based on Intelligent prevention, detection, response and recovery
Three main Elements of command and control for security/safety Intervention Forces

- **Telephony**
- **Real-time Location**
- **Alarm Systems**
- **Wide area Surveillance**
- **Airborne Surveillance**
- **Traffic information**

- **GIS**
- **Resource status**

- **Policies & Scenarios**
- **Decision Support**

**Situational Awareness**

**Decision Making**

**Command & Control**

- **Radio / TETRA / GSM / P25 Communication Networks**
- **Resource Dispatch, Operations Control**

- **Wide area Surveillance**
- **Alarm Systems**
- **Real-time Location**
- **Telephony**
- **Traffic information**
- **GIS**
- **Resource status**

**Decision Support**
Engineered security and safety solution control room modules

- Command Mobile
- Resource Mgmt
- TETRA
- Authorities
- Crisis Mgmt.
- Archive
- Video Analytics
- Object Detection
- Subsystems
- Emergency calls
- Communication
- SDK
- Internet
- Video Surveillance
- 2D GIS
- 3D GIS
- Site Plan
- Video Wall Control
- Roster
- Reporting
- Knowledge Base
- Workflow Engine
- Reports
- Configuration
Wide area security management platform
Live viewing and intelligent perimeter security control

Integrated World View
Intuitive Graphical Interface
True 24x7 Coverage
Object Detection, Classification & Tracking
Early Detection of Threats
Reduced Camera Count
Proactive Threat Response
Consistent Policy Enforcement
Scalable System
Adjustable Alert Levels

Live video
Adjustable alert levels
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New Working Environment Concepts
New Human-Machine-Interaction
Thank you for your attention

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