TITAN project

META-CDM Workshop

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What is TITAN?

- TITAN stands for Turnaround Integration in Trajectory and Network
- R&D project which belongs to the 7th FP.
- Managed by the EC (DG-RESEARCH) and coordinated with SJU

- **Duration**: 3 years (1/12/09 - 30/11/12)
- **Budget**: €3.6M; **EC funding**: €2.6M (~ 70%)
- **The team**: 11 European firms
- **Target**: TITAN objective: to develop a new advanced operational concept for the optimization of the turnaround process:
  - Increase Predictability: Reduce turnaround process std to 3 min.
  - Reduce Operational Cost by 20%.
  - Increase Efficiency of airlines operations:
  - Reduce the total delayed flights (>15min) by 9%.
Project rationale

- The problem
  - Airports are becoming a bottleneck in the air transport network
  - Departure delays are mainly due to the turnaround processes

- The reasons
  - Inefficiency of daily airports operations
  - Insufficient or unreliable information of the various turnaround processes
  - Standalone information systems independently developed and run
  - Different companies providing services to the same flight
  - No common standardised language
  - Undetected or unreported deviations from planning
  - Lack of continuous monitoring and updating
Context and Methodology

PROBLEM
Turnaround delays

Current situation

Analysis

Users’ needs

Model + Gaming

Validation

Results

TITAN Concept

TITAN Tool

CBA

Conclusions
Analysis

- **Turnaround:**
  - Sequence of *ground operations* required to service the aircraft.
  - Scope: *from the in-block to the off-block time.*
  - Included those *external services* which have a direct influence.
  - *Extended handling view* to ensure the inclusion of processes in the Collaborative Decision Making view.

- **Principles of the Concept:**
  - Integration with ATM Trajectory Based Operations
  - Builds on A-CDM but goes further (e.g. better granularity)
  - Net-centric and Trajectory Based Operations compatible
  - Service oriented (a first in CDM)
  - Looks at land-side also!
**Concept of Operations**

- **Sequence of the processes**
  - Interdependent and linked procedures which consume one or more resources to convert inputs into outputs. Integration with airport and network CDM.

- **List of actors and responsibilities**
  - An **Actor** is any entity that interacts with the ATM Network. They are consumers or providers of services.
  - A **Role** is a set of related activities or tasks assumed by an actor.
Concept of Operations

• Services provide the information required to run a process
• Support end-user applications which are the operational interface to external environments
• TITAN services:

- Passenger Flow Information Service (PFIS)
- Baggage Flow Information Service (BFIS)
- Cargo/mail Flow Information Service (CMFIS)
- Aircraft Status Report Service (ASRS)
- Airport Information Report Service (AIRS)
Concept of Operations

- **TIS**
  - TITAN Information Sharing is a virtual common repository of information including pieces of information from all actors involved, CDM information and Milestones

- **TITAN Milestones**
  - Significant events that occur during the planning or progress of the aircraft trajectory that may have an impact on coming events;
  - Aim: link the air and landside, improve current information flows and predict forthcoming events.

<table>
<thead>
<tr>
<th>TITAN Milestones</th>
<th>Rationale</th>
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<tbody>
<tr>
<td>M17. Close check in</td>
<td>Boarding can start. Passengers and baggage list closed.</td>
</tr>
<tr>
<td>M18. Last passenger crossing security control</td>
<td>Passengers monitoring. Means to know whether a passenger arrives to boarding gate on time or not.</td>
</tr>
<tr>
<td>M19. Last passenger crossing passport control</td>
<td>Passengers monitoring. Means to check whether a passenger has been rejected at passport control.</td>
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<tr>
<td>M20. End of deboarding</td>
<td>Ground handling activities on passenger cabin can start.</td>
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<tr>
<td>M21. Last baggage delivery to hold baggage bay</td>
<td>Baggage monitoring.</td>
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High Level Operational Scenario

- **Describe** the **turnaround** process related to one aircraft **when** implementing TITAN ConOps:
  - TIS
  - Milestones approach

- Assume the **implementation** of A-CDM operational procedures

- Break down into different services provided during turnaround (passenger/baggage and aircraft).
Validating the Concept

- Gaming
  - Assess the feasibility and usability of the information exchange in the TITAN concept
    - Qualitative Results about:
      - TITAN information
      - TITAN services
      - Implementation of TITAN concept
  - Web tool to present the information of the TITAN services (including chat)
Validating the Concept

- **TITAN Model**
  - Detailed scenarios based on different airport configurations that model the various turnaround operations
    - TITAN Services modelled
    - Travel times in the airport
    - Traffic sample
    - Resources available
    - Sequence of processes
    - Constraints between processes
    - Disruptions
  - Non-TITAN simulation scenarios (TITAN services disabled) VS TITAN simulation scenarios (TITAN services enabled).
• **Develop a decision support tool** for airlines
  - Service oriented architecture
  - Airport CDM emulated
  - User role oriented access to information & HMI look

• **Establish interfaces** to all external actors and stakeholders (ground handling, ATC, AOC)
  - User role oriented access to information & HMI look

• **Verify the TITAN tool** against the Operational Concept developed in TITAN
TITAN Tool

Missing Passenger Details

Flight AB9739 has 3 passenger(s) not boarded.

Time to find passenger before delay=5 minutes

Calculated acceptable delay=9mins

- Steve Rubble AB471094 Y 1 bags
  Bag: AB471094-1 Loaded - loose Est offload: 7mins

- Jeff Gossow AB358764 Y 1 bags
  Bag: AB358764-1 Loaded, pallet=1 Est offload: 3mins

- Homer Harris AB255731 Y 2 bags
  No connecting flight information.
  Bag: AB255731-1 Loaded, pallet=2 Est offload: 6mins
  Bag: AD255731-2 Loaded, container=1 Est offload: 2mins

Connections for Jeff Gossow

Connects with AB9346(class F) with 228 min transit.

Close
Air Transport System Integration

• It is essential partners understand SOA and the business trajectory concept
  • Service orientation has not been used to any significant extent in the past in the ATM context
  • The services helped to focus on the processes to be completed for a successful turnaround while also helping to manage the information involved.
  • Services helped the developers to get a very detailed and well organized helicopter view of TITAN

• One way data handling concept must become two way or even better, SWIM-based
Sum up of the project

- Analysis of the **current situation** and **user needs**.

- Development of the TITAN **Concept of Operations** (new milestones, better information and more efficient management).

- The **Validation** of the TITAN ConOps:
  - **gaming sessions** and
  - the **TITAN Model** (simulations of different airport scenarios).

- The design of the **TITAN Tool** for the monitoring and management of the turnaround process by the different involved stakeholders.

- The development of the **TITAN Tool Demonstrator**.

- A **Cost Benefit Analysis for the** implementation of the TITAN Tool at a generic airport.

- **Integration** of TITAN in the Air Transport System
Problems Found

- SOA based systems not yet widespread in the airline and airport context (legacy environments)
- Existing systems able to receive TITAN information but providing information to TITAN may need workarounds
- Getting all the information TITAN needs may be a challenge and may prove expensive in some cases
Lessons learnt

- TITAN can be useful even at relatively simple airports
- New partners need special attention (data quality, security)
- Smooth integration with the business trajectory is possible (TITAN design)
- Passenger/baggage flow monitoring (including land-side/off-airport) at appropriate granularity needs to become standard (benefits go beyond TITAN)
- Transition needs good sales effort – otherwise not a major issue
- Engineering challenges relatively easy – institutional challenges can be showstoppers! This is true also for other projects!
Questions and Answers

All public documents are available at TITAN webpage:
www.titan-project.eu