# **TITAN project**

## META-CDM Workshop

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# TITAN N

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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.

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- Reduce Operational Cost by 20%.
- Increase Efficiency of airlines operations:
- Reduce the total delayed flights (>15min) by 9%.

# TITAN

## **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





### 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!





#### • 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.

	Actor 1 P Activity Activity	Actor 2					
	Unaccompanied minors	Accompany minors from check-in to aircraft and from aircraft to check-in.					
	Local/Tower controller	Responsible for the movement of aircraft on runways and in the vicinity of the airport. Start up authorization.					
ANSP	Ground controller	Responsible for the surface movement of aircraft on the airport					
	CFMU	Slot allocation Manage flight plans					
	Airport operator	Update resources availability					
		airport devices, e.g. cameras located to monitor passengers)					
		Inform passenger where to collect the luggage					
		Stand allocation Gate allocation					
rator	Marshallers and follow-me drivers	Guide the aircraft to the stand allocated					
Ope	De-icing staff	De-ice					
rport	Reduced Mobility assistance	Assist to disabled passenger					
Air	Automatic system/Load flow on terminal personnel	Locate ambuilit Baggage security process					
	Met office	Provide weather information reports and forecasting					
	Security personnel	Passenger security control					
	Duty Free Shop	Provide information about number and identity of passengers visiting it (first/last passenger of a particular flight)					

**Concept of Operations** 





## **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 (BEIS)** 

Cargo/mail Flow Information Service (CMIFIS)

Aircraft Status Report Service (ASRS)

Airport Information Report Service (AIRS)





## **Concept of Operations**

Ground Handling

Cargo agent

nd of baggage uncading ggage delivered at bagga Air waybill of baggage loading activi

Catering agent

Cleaning agent Start of crew cleaning aning - Cleaning agent is

Electric supply provider

Equipment operator

airs or bridge local Start deboarding

Flight dispatcher Rand and aircraft check I Fuel provider

Ground handling

SE (Ground Service I function of any resource

hecked in and its inf

Load control

Passenger agent

and LIMs

End of boarding Number of pax on bo

ANSP

ANSP

#### • 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.







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Maintenance staff

Stand and aircraft check fini

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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).



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## Validating the Concept

#### Gaming

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

MAIN MENU						
Home	Se BF	IS (Baggage Flow Information Sei	vice)			
AIRS	Alert level More Info:	0				
	Updated	General Information	Info			
WHO'S ON LINE		Declaration and liability release form				
CDC		Landing_M6				
GHOC		Take off_M16 (ATOT)				
DOGIN						
li Cockpit Crew,	Updated	Deboarding Information	Info			
Log out		End of baggage delivered at baggage belt				
					•	
	Updated	Unloading Information	Info			
		Open cargo doors				
		Start of baggage unloading				
		End of baggage unloading_M22				
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# T I T A N

## Validating the Concept

#### • TITAN Model

- Detailed scenarios based on different airport configurations that model the various turnaround operations
  - ✓ TITAN Services modelled
  - $\checkmark$  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).







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## **TITAN Model**

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**TITAN Tool** 

- Develop a decision support tool for airlines
  - Service oriented architecture
  - Airport CDM emulated
  - User role oriented access 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



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Homer Harris	AB255731	Y	2 bags	No connecting flight information	
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### 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/offairport) at appropriate granularity needs to become standard (benefits go beyond TITAN)
- Transition needs good sates effort otherwise not a major issue
- Engineering challenges relatively easy institutional challenges can be showstoppers. This is true also for other projects!

