Future Internet Technologies for MANufacturing

Unione degli Industriali della Provincia di Varese

lombardia aerospace cluster

"LE FRONTIERE DELL'INNOVAZIONE:

Tecnologie del futuro per il manifatturiero

12 ottobre 2015

LIUC-Università Cattaneo

AgustaWestland Pilot

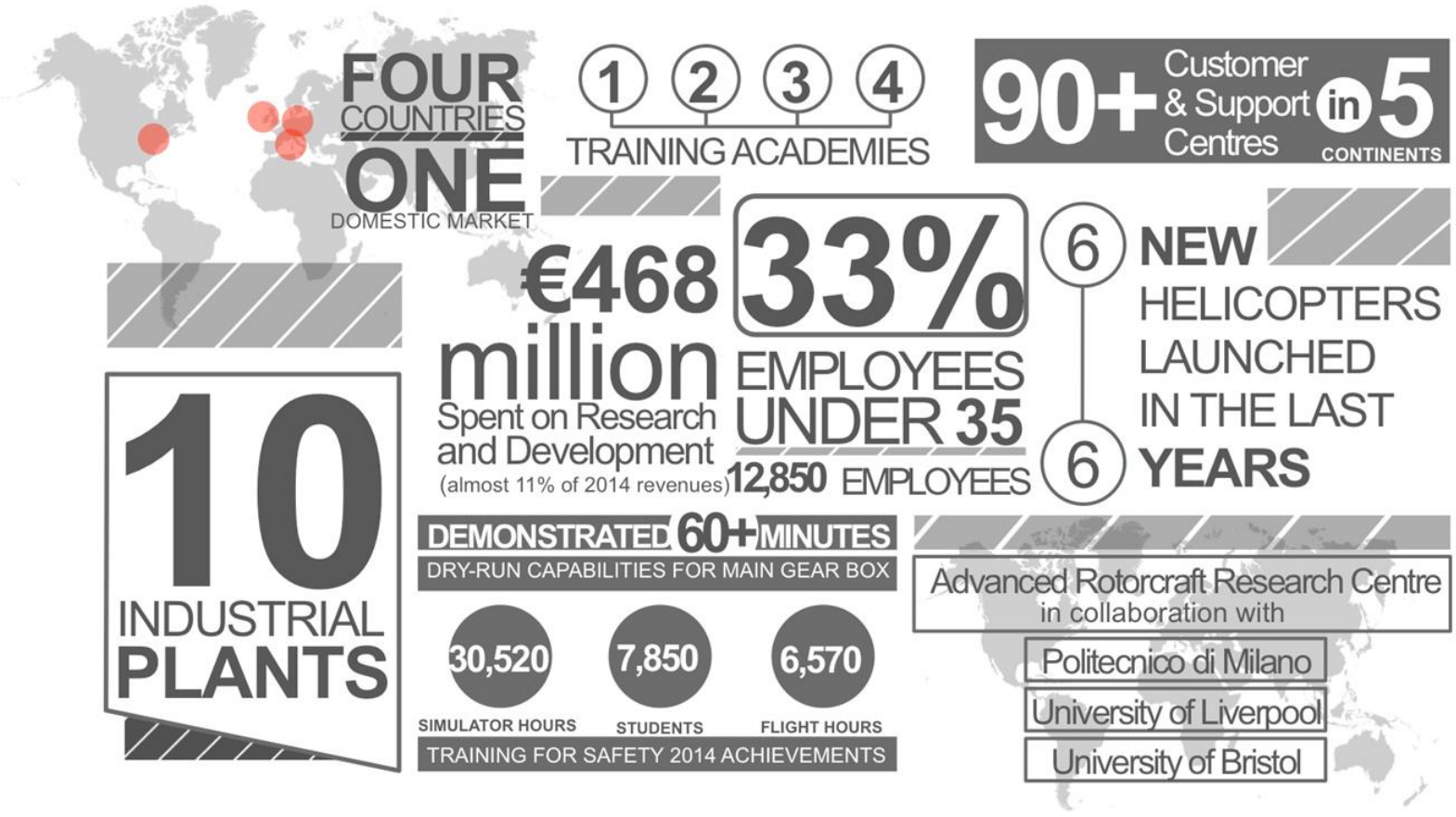
European Commission

SEVENTH FRAMEWORK PROGRAMME

FUTURE INTERNET PPP

AW Presentation

AgustaWestland 2014 Key Data



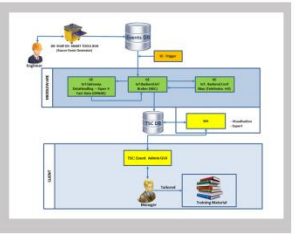
AW Use Case Background

AgustaWestland
A Finmeccanica Company

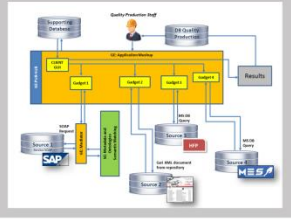
FITMAN – INDUSTRIAL TRIAL

SMART FACTORY & DIGITAL FACTORY

SMART TRIAL
Support for monitoring and tracking purpose linked to tools FOD prevention during operations and Support for training purpose linked to tailored training material preparation referring to Tools FOD prevention in FAL and Service Centre.



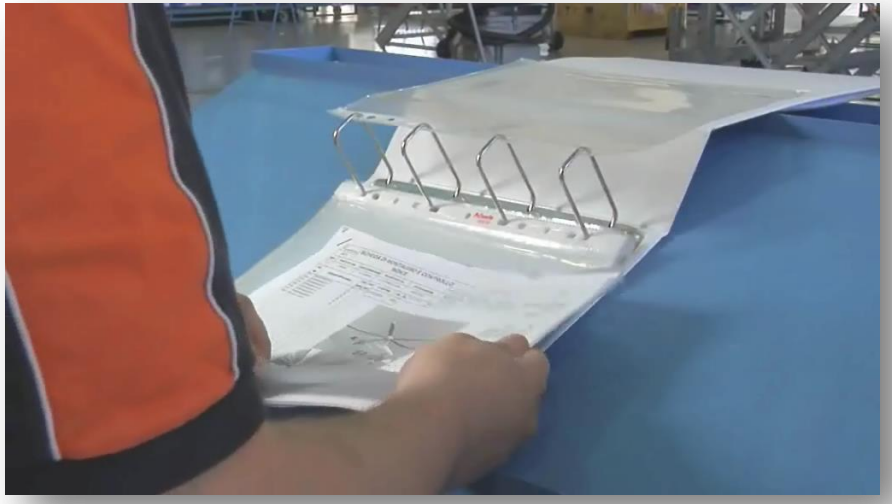
AW FTMAN ARCHITECTURE
AW trial is entirely developed inside a test environment: GE, SE and TSC are entirely instantiated in the AW System architecture. For experimental and safety/security reasons the AW FTIAMN solution is not directly connected to the real data sources but using simulated copies.



DIGITAL TRIAL
Support for management of documentation and reduction of average time to make data available in a digital format to different departments after/before the DV/AV implementation.

Powered by FITMAN

FUTURE INTERNET PPP



AW Use Case Background

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AW Use Case Background

AgustaWestland FAL Vergiate

The Final Assembly Line is the location in which helicopters are manufactured. The FAL is responsible for creating processes that center around reliability and efficiency, both in the supply and management of materials and in guaranteeing Quality during the assembly and delivery to the final customer.

The FAL key activities are:

- assembly of AgustaWestland helicopters and their delivery to the final customer;
- daily monitoring of the production progress, verifying the constraints in terms of availability of materials and production media;
- production scheduling, with corresponding analysis of constraints and proposal of the alternative solutions with respect to consolidated business plans;
- quality check on the assembly methods and painting activities related to the helicopter;
- management of the non-conformities in the completion phase, coordination of the activities for fixing them through corrective actions;
- improvement of the information flow between AgustaWestland Production Organisation and Design Organisation.

Future Internet Technologies for MANufacturing

AgustaWestland
SMART Factory Use Case Scenario

AW Smart Factory

Case:

- Support to tools tracking based on IoT (smart toolbox) in order to prepare a data base of events for two purposes:
  - Periodic report with relevance to Tools events.
  - Provide data for support the preparation of tailored training material linked to Tools FOD (Foreign Object Debris) prevention.

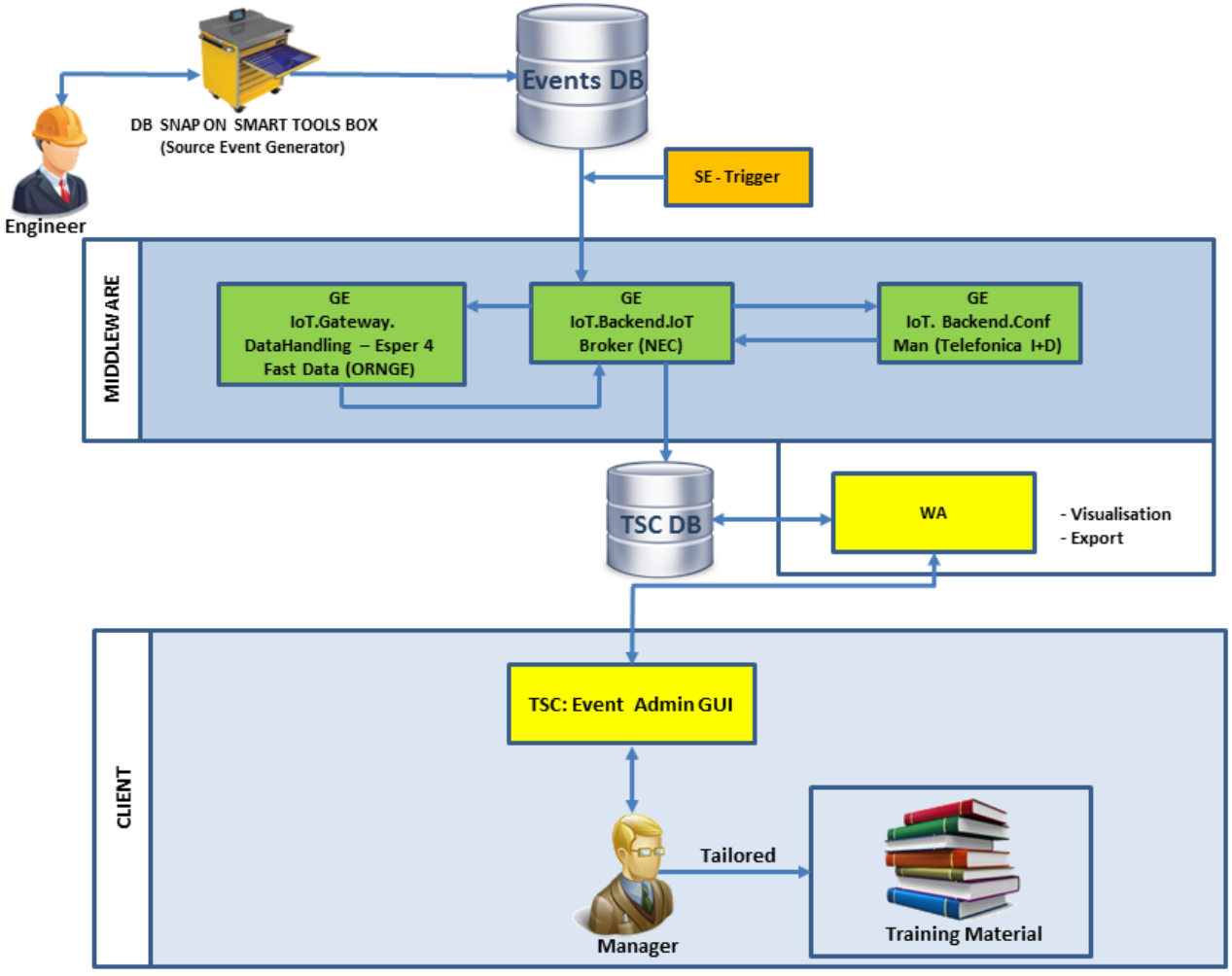
Location of FITMAN Experimentation:

- FAL (Final Assembly Line)/LiVo (Flight Line) Vergiate.
- THSS (Training & Helicopter Support Systems).
- Service Centre for Helicopter Maintenance.

Possible Future Application:

- Synergy with TELL ME R&D project.

AW Smart Factory - Architecture



AW Smart Factory - Architecture

GE (Generic Enabler**) /SE** (Specific Enabler) **/ TSC** (Trial Specific Components):

- SE – trigger
- GE: IoT. Gateway.Datahandling – Esper 4 Fast Data
- GE: IoT.Backend.IoT Broker (NEC)
- GE: IoT. Backend.Conf Man (Telefonia I+D)
- TSC: events DBs

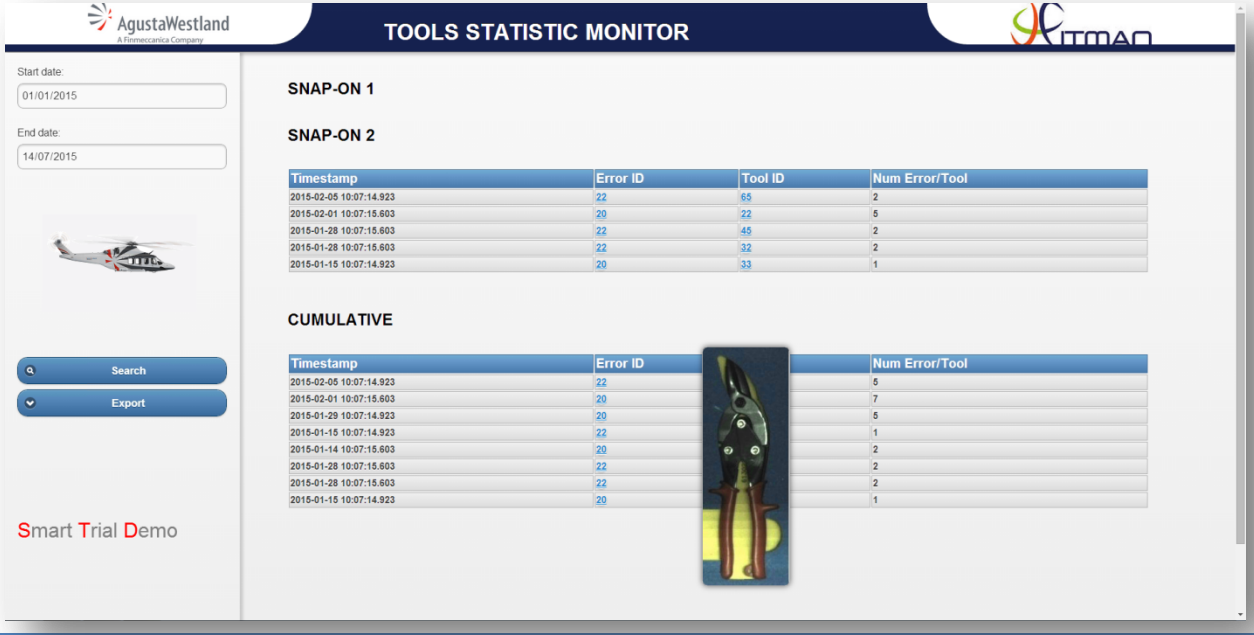
Trial Integration Components developed:

- Simulated data from Smart Tool Box Snap Source
- Web Application for visualize and export the data
- Event Admin GUI (Graphical User Interface)
- Periodic report with relevance to Tools events
- Data for support the preparation of tailored training material linked to Tools FOD Prevention

AW Smart Factory

How the system works:

- The end-user (manager) launches a search inserting a period (start and end date)
- Events are presented to the user in a table view including:
  - Timestamp is the last date in which the event happens.
  - Error ID is the typology of event, for the experimentation (e.g.: Error 22 corresponds to not correct position of tool in the smart toolbox).
  - Tool ID is the tool connected associated to the logged event.
  - Num Error/Tool is the number of time that the event linked to the selected tool happens (this is linked to the entire chronology).
- Data can be also exported in CSV format by the end-user



Future Internet Technologies for MANufacturing

AgustaWestland
DIGITAL Factory Use Case Scenario

AW Digital Factory

Case:

Support for management of documentation used/produced in the helicopter FAL (Final Assembly Line) in order to reduce the average time to make this data available, in a digital format, to different company departments. The system searches the data linked to a specific helicopter through query/requests in different sources and compile the Db Quality Production that will be used for the Logbook preparation file.

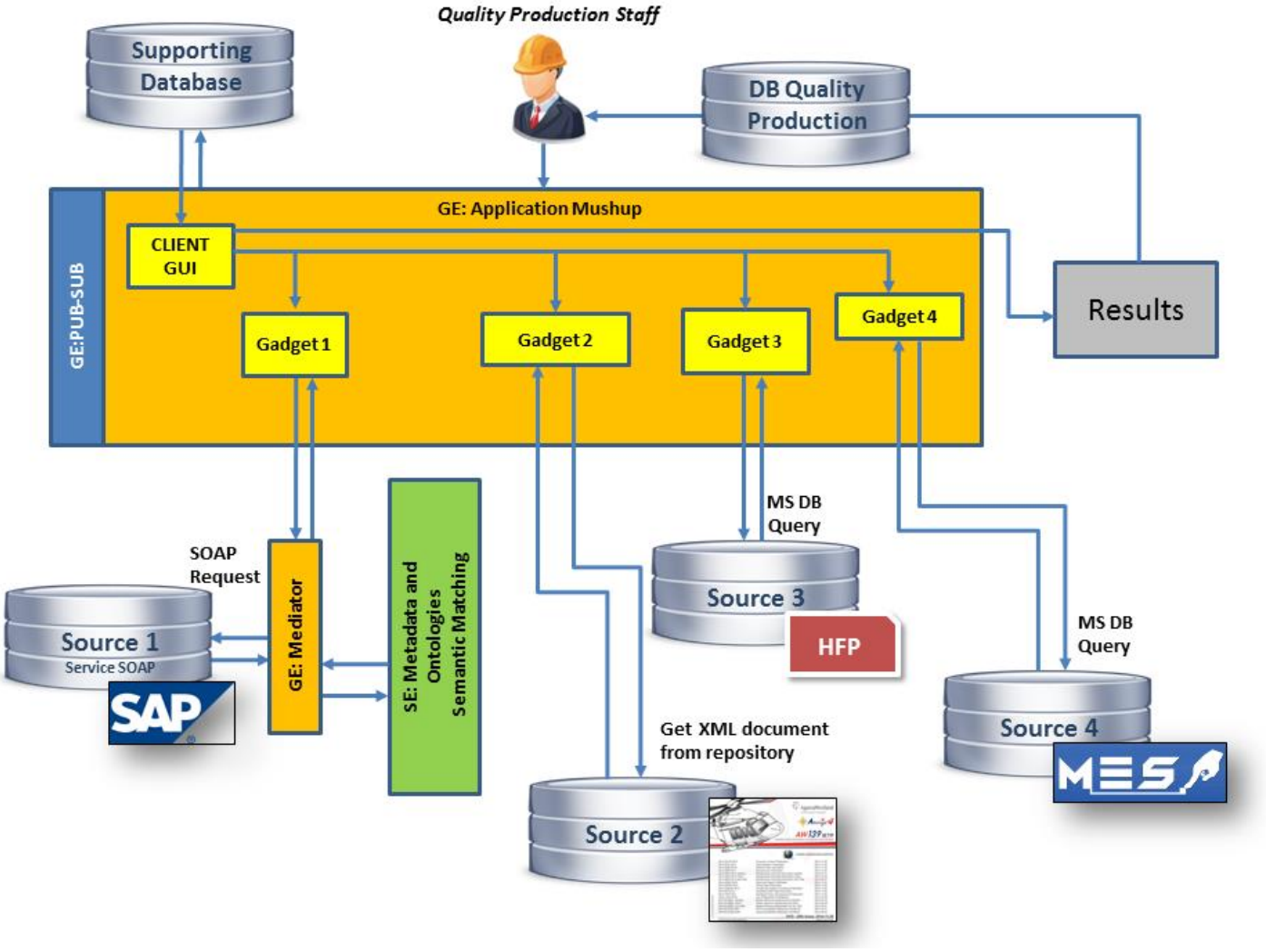
Location of FITMAN Experimentation:

- AW Vergiate plant FAL (Final Assembly Line).
- THSS (Training & Helicopter Support Systems).

Possible Future Application:

The same system, changing sources, could be used for different purposes of search and files compiling.

AW Digital Factory - Architecture



AW Digital Factory - Architecture

GE (Generic Enabler**) /SE** (Specific Enabler) **/ TSC** (Trial Specific Components):

- GE: PUB –SUB.
- GE: Application Mashup.
- GE mediator (client soap).
- SE: Metadata and Ontologies Semantic Matching.
- TSC db –SERVICE SOAP - GUI - Gadgets.

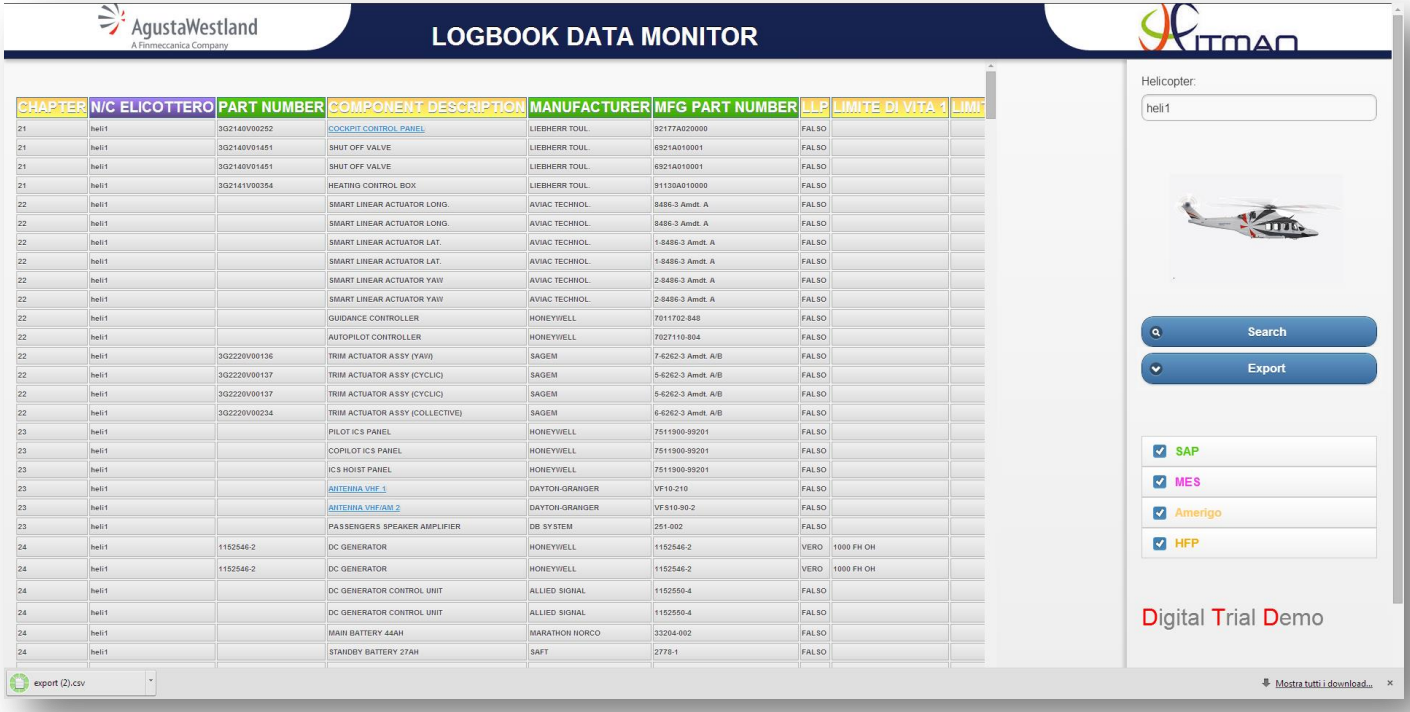
Trial Integration Components developed:

- DB (support DB for the results exposition display).
- Gadgets (for query/search).
- Client GUI.
- Db Quality Production.
- Data Sources.

AW Digital Factory

How the case works:

- The end-user (from quality department) launches a search by helicopter Id
- A DB Quality Production is filled by the system with the data found in the different sources (N/C Helicopter, P/N & s/n Installed Components, Time limit, etc.)
- Results are displayed to the user that can navigate them
- Data can be exported in CSV format by the end-user



CHAPTER	N/C ELICOTTERO	PART NUMBER	COMPONENT DESCRIPTION	MANUFACTURER	MFG PART NUMBER	LLP	LIMITE DI VITA 1	LIMI
21	heli1	3G2140V00252	COCKPIT CONTROL PANEL	LIEBHERR TOUL	92177A020000	FALSO		
21	heli1	3G2140V01451	SHUT OFF VALVE	LIEBHERR TOUL	6921A010001	FALSO		
21	heli1	3G2140V01451	SHUT OFF VALVE	LIEBHERR TOUL	6921A010001	FALSO		
21	heli1	3G2141V00354	HEATING CONTROL BOX	LIEBHERR TOUL	91130A010000	FALSO		
22	heli1		SMART LINEAR ACTUATOR LONG.	AVIAC TECHNOL	8486-3 Amdt. A	FALSO		
22	heli1		SMART LINEAR ACTUATOR LONG.	AVIAC TECHNOL	8486-3 Amdt. A	FALSO		
22	heli1		SMART LINEAR ACTUATOR LAT.	AVIAC TECHNOL	1-8486-3 Amdt. A	FALSO		
22	heli1		SMART LINEAR ACTUATOR LAT.	AVIAC TECHNOL	1-8486-3 Amdt. A	FALSO		
22	heli1		SMART LINEAR ACTUATOR YAW	AVIAC TECHNOL	2-8486-3 Amdt. A	FALSO		
22	heli1		SMART LINEAR ACTUATOR YAW	AVIAC TECHNOL	2-8486-3 Amdt. A	FALSO		
22	heli1		GUIDANCE CONTROLLER	HONEYWELL	7011702-848	FALSO		
22	heli1		AUTOPILOT CONTROLLER	HONEYWELL	7027110-804	FALSO		
22	heli1	3G2220V00136	TRIM ACTUATOR ASSY (YAW)	SAGEM	7-6262-3 Amdt. A/B	FALSO		
22	heli1	3G2220V00137	TRIM ACTUATOR ASSY (CYCLIC)	SAGEM	5-6262-3 Amdt. A/B	FALSO		
22	heli1	3G2220V00137	TRIM ACTUATOR ASSY (CYCLIC)	SAGEM	5-6262-3 Amdt. A/B	FALSO		
22	heli1	3G2220V00234	TRIM ACTUATOR ASSY (COLLECTIVE)	SAGEM	6-6262-3 Amdt. A/B	FALSO		
23	heli1		PILOT ICS PANEL	HONEYWELL	7511900-99201	FALSO		
23	heli1		COPILOT ICS PANEL	HONEYWELL	7511900-99201	FALSO		
23	heli1		ICS HOIST PANEL	HONEYWELL	7511900-99201	FALSO		
23	heli1		ANTENNA VHF 1	DAYTON-GRANGER	VF10-210	FALSO		
23	heli1		ANTENNA VHF/AM 2	DAYTON-GRANGER	VFS10-90-2	FALSO		
23	heli1		PASSENGERS SPEAKER AMPLIFIER	DB SYSTEM	251-002	FALSO		
24	heli1	1152546-2	DC GENERATOR	HONEYWELL	1152546-2	VERO	1000 FH OH	
24	heli1	1152546-2	DC GENERATOR	HONEYWELL	1152546-2	VERO	1000 FH OH	
24	heli1		DC GENERATOR CONTROL UNIT	ALLIED SIGNAL	1152550-4	FALSO		
24	heli1		DC GENERATOR CONTROL UNIT	ALLIED SIGNAL	1152550-4	FALSO		
24	heli1		MAIN BATTERY 44AH	MARATHON NORCO	33204-002	FALSO		
24	heli1		STANDBY BATTERY 27AH	SAFT	2778-1	FALSO		

Enabling Conditions and Obstacles

The main issues faced during the development of the application were as follows:

- Problems occur with the virtual machines in order to manage multiple services.
- Some GEs must be installed in an UNIX machine but difficulties occur to connect it with AW infrastructure based on Microsoft OS. It is better to develop all the App with a single OS, preferably UNIX.
- Problems occur to create a “sandbox” in a VLAN to correctly develop the components and set up a testing environment in AW intranet to test the requirements.
- Issues to simulate and develop a SOAP Client.
- Gadget: resolution of query implementation to correctly request the information.
- Difficulties in identification of the necessary parameters for the correct function on local network.

In general other concerns to report are:

- A really effective technical support by some of the GE providers and documentation sometimes is lacking.
- Limitations of current GEs and SEs functionality have been faced.
- Sometimes, the GE has been found not yet mature and not very stable.
- Get clear information about licensing model of the GEs/SEs is mandatory.

Manufacturing Innovation in the Open Web

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