ITEC 2019 – M-346 ITS Interoperability by Design

Abstract — The world of military training is by nature conservative, typically customers planning future training systems base their ideas and expectations on how were trained. M-346 ITS design and development have been built around an innovative training paradigm where the Aircraft, the Ground Based Training Systems and the Interoperability functionality are strictly connected. Based on a number of developments and experiences, the user community is seeking to blur the boundaries to get more training value from an Interoperable System. Furthermore, the introduction of advanced Fighters (4th and 5th generation) implies a new Concept of Operations (CONOPS) of level of interoperability during training joint events.

1 M-346 Advanced Trainer Aircraft and Interoperability

The M-346 Advanced Trainer Aircraft has been designed around the concept of interoperability, as a key factor in order to provide improved Teaching Effectiveness capabilities compared to the other existing trainer aircrafts, with the final aim to achieve the most cost effective training by downloading training tasks from 4th/5th generation combat aircraft.

Since the first design phases the Aermacchi M-346 has been considered not only as an aircraft but as a networked element of the Leonardo's Integrated Training System (ITS); this also includes Ground Based Training System (GBTS) and Mission Support Station (MSS) assets, able to provide a Live Virtual Constructive (LVC) capability.

The M-346 ITS training philosophy phases the modern operational mission needs/environment, where the steady trend is to move from the previous syllabus where military pilots were mainly prepared for psychomotor tasks to a new concept with a blending of psychomotor and cognitive tasks. The more complex cognitive tasks are the most difficult and expensive and present the greater opportunity for training downloading from OCU (Phase V) to LIFT (Phase IV).

In order to maintain a full focus on modern training philosophy, the whole M-346 ITS has been designed with an intrinsic interoperability capability that take into account a logical thread going through Avionics, Embedded Simulation, Human Machine Interface (HMI), GBTS and MSS.

Last but not least, a suitable syllabus fully integrating the trainer aircraft and GBTS training capabilities allows to exploit the interoperability improving the training effectiveness.

Today, the M346 ITS platform, completed with its Live Virtual Constructive capability, has officially entered in service with the Italian Air Force (ItAF) at the 61st Wing based in Lecce.

LVC is definitively a System-of-System made by the most modern system integration technologies and it is one of the core components of the ITS that includes real aircraft, simulators and additional training aids and ground/support stations.

Besides, the M-346 ITS platform has been involved in international Red Air missions achieving considerable success.

2 M-346 ITS "Networked architecture design" starting from an advanced TNA

M-346 ITS was conceived around specific Requirements derived from a Training Need Analysis (TNA) to fill the gap generated by new generation combat aircraft.



New generation Fighters features Technologies that, with the modern era operational Scenarios, generates specific Training Needs.



Such philosophy allowed M-346 ITS concept to improve the training effectiveness in terms of piloting skills, situational awareness and airmship, complex system operations, information management, tactical awareness and decision-making, effective employment of sensors and weapons.

The interoperability concept coupled with M-346 airframe agility allowed M-346 ITS to be a step ahead to fulfill the gaps for the future training.

3 M-346 ITS "SPARTAN ALLIANCE 18-8" participation

M-346 ITS has recently participated to a Mission Training through Distributed Simulation (MTDS) event consisting of a military exercise called "SPARTAN ALLIANCE 18-8" which involved the participation of four Eurofighter Typhoon from 36th Wing based in Gioia del Colle, -two Tornado from the 6th Wing based in Ghedi, one UAV Predator from the 32th wing based in Ghedi, one UAV Predator from the 61st Wing based in Galatina, in addition to lots of foreign assets linked to the Italian ones through the Warrior Preparation Center (WPC) of the United States Air Force in Europe (USAFE) based in Ramstein (Germany). The total number of involved simulators were 22, 12 of them from the Italian Air Force.

Spartan Alliance event showed an excellent level of interoperability among all the involved assets, highlighting in particular the multirole capability of the AermacchiM-346 platform in a virtual scenario: M-346 simulators participated to different missions with different roles, acting both as Red Air and Blue Air force.

One of the next steps for increasing the interoperability training level will be the possibility to use LVC and MTDS capabilities in a unique training scenario where real aircraft, simulators and Computer Generated Forces (CGFs) can operate within the same and geographically distributed network, linked to each other through ground networks, data links and radio transmitters. This additional capability will permit the execution of complex scenarios hardly available and feasible in traditional training framework, with a significant costs and environmental impacts reduction.

The common Combat Training System environment is conceived as a single wide area where different assets contribute to a full scale real-time scenario.



4 Giuseppe Pietroniro's Biography

Giuseppe Pietroniro is the Head of Ground Based Training System (GBTS) & Mission Support Systems (MSS) for Trainers Aircraft in Leonardo Aircraft Division.

He has been working in Training Simulation for a long time in collaboration with biggest simulation company in the world as CAE, Boeing Company, Raytheon, L3 and Elbit Systems.

He started in 2006 in Alenia Aeronautica in Turin as Simulation S/W engineer for C-27J Cargo Aircraft and Eurofighter Typhoon.

In 2010 he moved to Alenia Aermacchi as Project Engineer of M-346 Simulator Program and in 2014 He became Project Manager

of M-346 GBTS Italian Air Force, M-346 GBTS Singapore Air Force and M-346 GBTS Israeli Air Force.

Giuseppe Pietroniro became head of whole Trainers GBTS including MSS in 2017.

During his career he got lots of experience in S/W simulation, and Live Virtual Constructive technology.