

INTRODUCTION

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COCKPIT CREW TASK

Every single flight represents a mission, intended to be completed according to a plan that involves 4 dimensions (3 geographical coordinates plus time).

The environment the mission takes place in (i.e. the atmosphere) has strong interactions with the air vehicle.

During the progress of the mission, the cockpit crew shall basically take care of three tasks:

- **aviate**, i.e. controlling the vehicle.
- **navigate**, i.e. following the desired route.
- **communicate**, i.e. interact with Air Traffic Control (ATC)

TYPICAL MISSION

Percentage of fatal accidents and onboard fatalities | 2011 through 2020



Note: Percentages may not sum to 100% because of numerical rounding.

KNOWLEDGE OF FLIGHT DATA

In order to carry out safely and effectively the mission, value of flight data parameters needs to be continuously be acquired, processed and made available to crew.

IMPORTANCE OF INSTRUMENTATION

The success of the mission is therefore influenced by the proper operation of some devices and systems which are installed on board by may also rely on external infrastructures.

ON-BOARD INSTRUMENTATION

With *instrumentation* we include every single device or system that provides the conductor of the air vehicle the value of all parameters that may influence the success of the mission.

The course will concentrate on *manned* aircraft but will also underline the differences and potential benefits of unmanned vehicles.

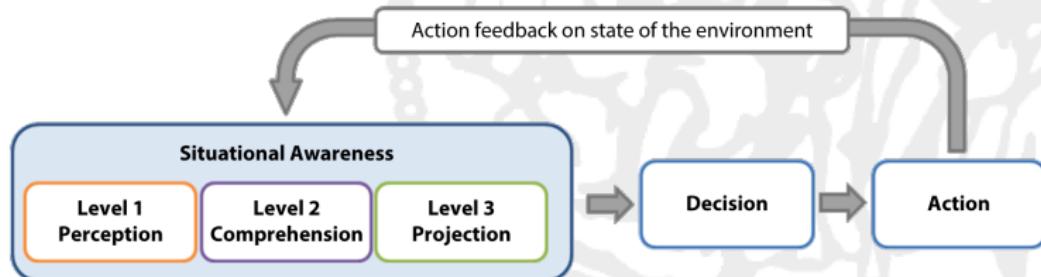
The reference vehicle will be a Jet Liner

SITUATION AWARENESS

On-board Instrumentation shall positively contribute to Situation Awareness (SA).

Situation Awareness - Endley, 1994

The perception of the elements in the environment, within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future.



SITUATION AWARENESS

Three subsequent phases need to be completed to get to full awareness:

- The first two permit the pilot to assess the situation they are in
- the third permits them to project its evolution in the short to medium term

It is **crucial** for, on-board Instrumentation to make this process:

- clear
- straightforward
- unambiguous

as much as possible minimising the resources requested to the pilot

INFORMATION AND DATA ADDRESSEE

The quantity of data made available on board has enormously increased in the last decades by the introduction of more sophisticated and powerful data acquisition and processing systems.

These system are being entrusted with the management of more and more complex tasks on board permitting a fully automatic management of the progress of the mission relegating pilot(s) to the role of mere supervisors.

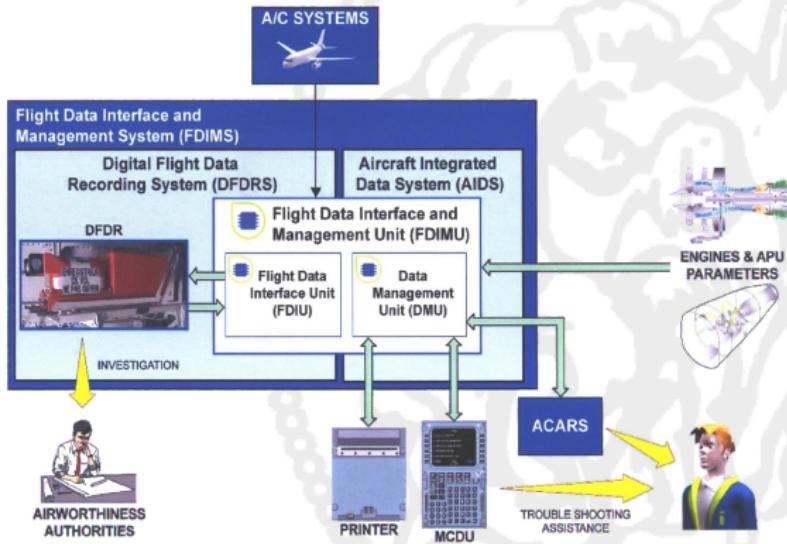
Information produced by on-board systems have therefore two different recipients:

- crew
- automatic systems

and must be accordingly prepared and made available.

INFORMATION AND DATA ADDRESSEE

The possibility to log the time history of a huge number of parameters and to deliver them in a flexible way has open unprecedented possibilities in the maintenance domain.



List of Acronyms

ATC

Air Traffic Control

SA

Situation Awareness

