Integrated Vehicle Health Management for RPAS using AIS

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What is demonstrated

Why does an Uninhabited Aircraft need Integrated Vehicle Health Management (IVHM)?
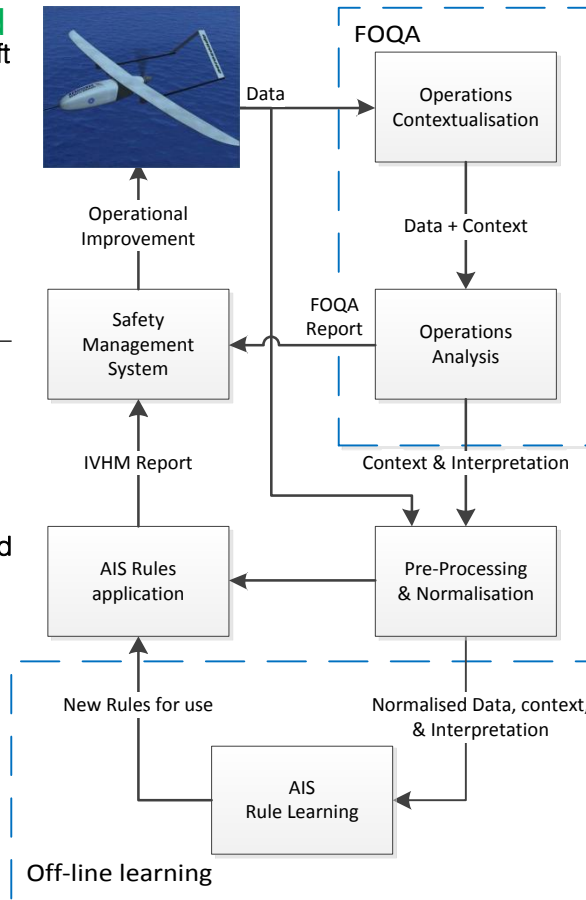3D's → UA are for tasks too Dull, Dirty, Dangerous for manned aircraft.
4th D → Missions significantly longer Duration than manned aircraft. Reliability challenge of multi day flights
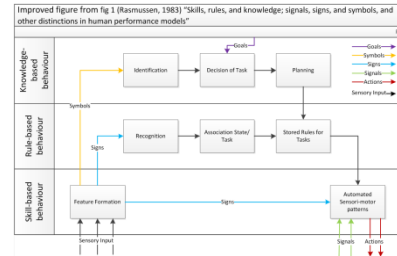
UA have a poor reliability record – Mishap rate 10 to 300% higher than General Aviation
Poor Public Perception of "Drones"

How could IVHM be Implemented on an Uninhabited Aircraft?
Use of aircraft flight data to record and assess flight disturbances and impact on airframe life and equipment. Improve usage through better understanding of aircraft health state for RPA operator.

What was improved

Cognitive Aircraft Management
During the life of the aircraft data generated through multi use sensing and other means will be analysed to help give a better picture of the use of the aircraft and its health. This will also inform future management of the aircraft.

AIS (Artificial Immune System)
An AIS is used to characterise normal system behaviour to enable abnormal events to be identified and antigens automatically developed to identify their occurrence within flight data. Tasks can then be associated to each antigen to guide the operator response.

Antibodies can be deployed to the aircraft flight computer.

FOQA (Flight Operations Quality Assurance)
FOQA is used to build a picture of operations so that abnormal behaviour has a basis of comparison against which it may be contrasted. The retention of flight data and summarising allows flight variations from normal operations to be determined quantitatively and used as a measure of variation to determine if action is needed to improve operations, training, or maintenance.

Hardware Information

- Single board flight computer
- PC as Ground Control Station & simulation asset

Source code or detail technical information availability

GCS, GCS, & Mission Simulation www.dronecode.org
AIS & FOQA code part of PhD work by J Pelham
Source Code to be made open source after completion
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