MOSA Sensors
A Development Proposal

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Advanced UAS Architectures

Hypothesis
UAVs will be predominant in the skies in 10-15 years time.

Then
They must be as safe as, or even safer, than current manned aircraft. Autonomous flight and other automation mechanisms must be a solution, not a problem.

Advanced UAS Architectures

Safety orientation

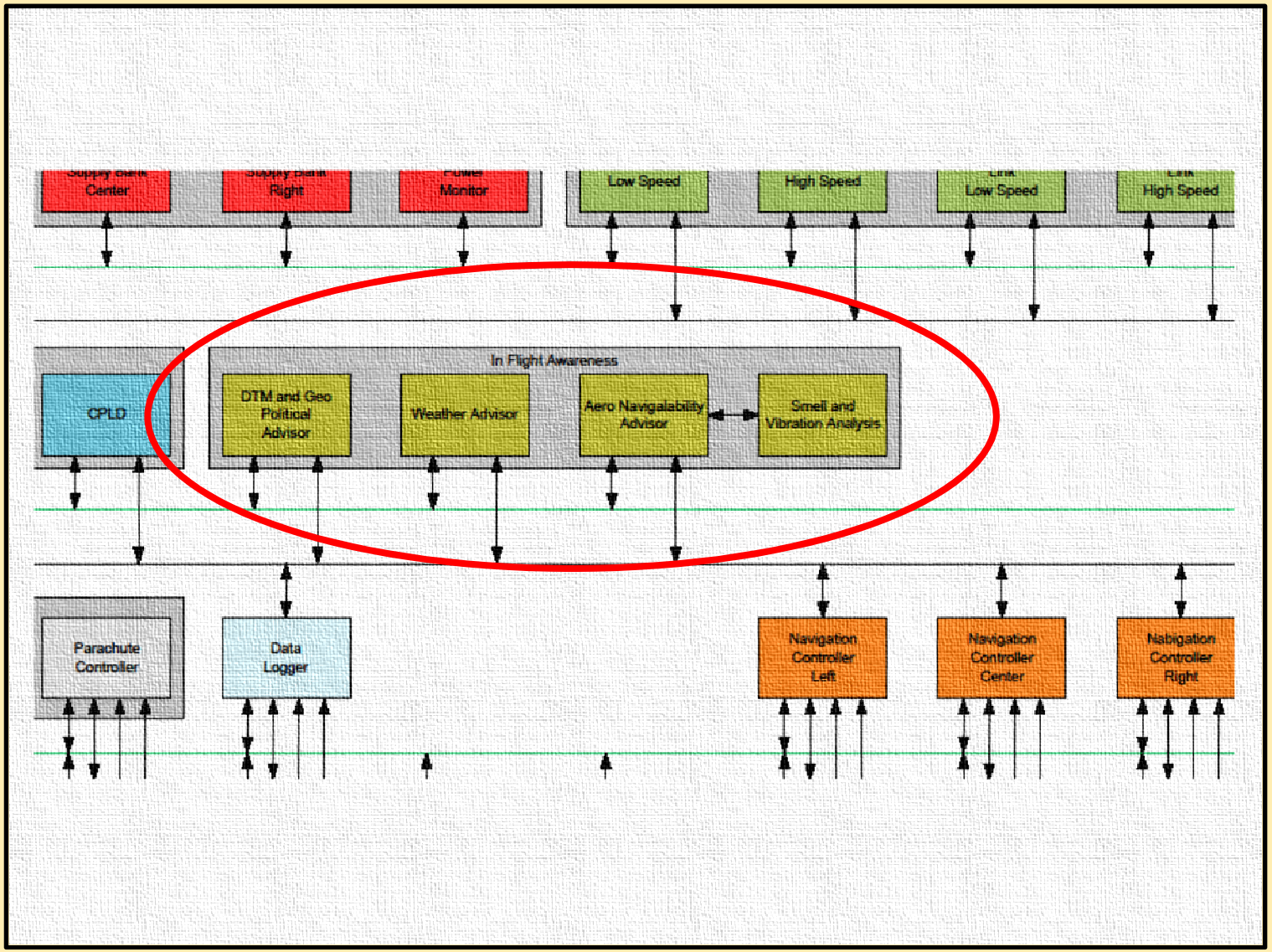
- Smart systems, based on sensing and other information (stored on-board, available for search or made available by trigger events)
- Well defined interface between payload (mission, not critical) and aircraft (flight services, critical)
- Redundancy to improve reliability in the critical parts
- Awareness of all factors that can spoil safety

Advanced UAS Architectures

Mission orientation

- Aircraft is just a mean of transportation for the mission sensors
- Flight navigation is provided by the mission sensors that define most flight parameters
- The aircraft can, for safety reasons, not follow the flight sensors commands, eventually terminating the flight
- Flight sensors can provide data for mission controllers but aircraft controllers must not use data provided by mission sensors

New Concepts
IFA – *In-Flight Awareness*



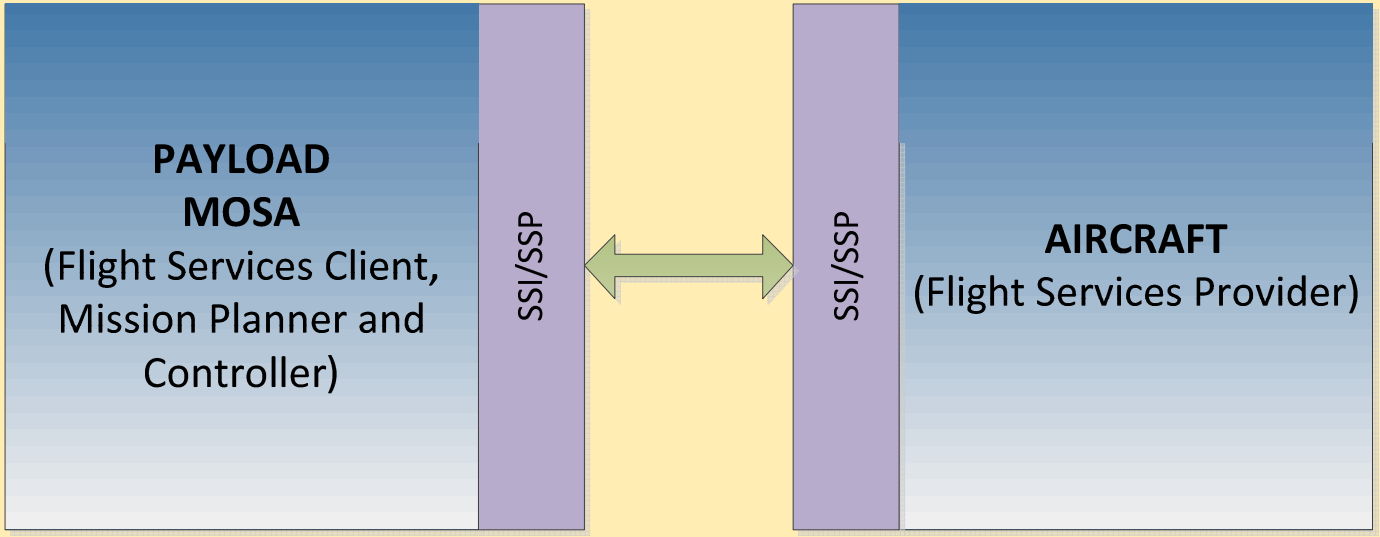
Goals

- Take back to the aircraft the human pilot expertise that has been taken out from UAVs
- Geo-politics awareness (DTM, country boundaries, human occupation, landing options, ground elevations, etc...)
- Airworthiness and weather awareness
- Air traffic conditions awareness

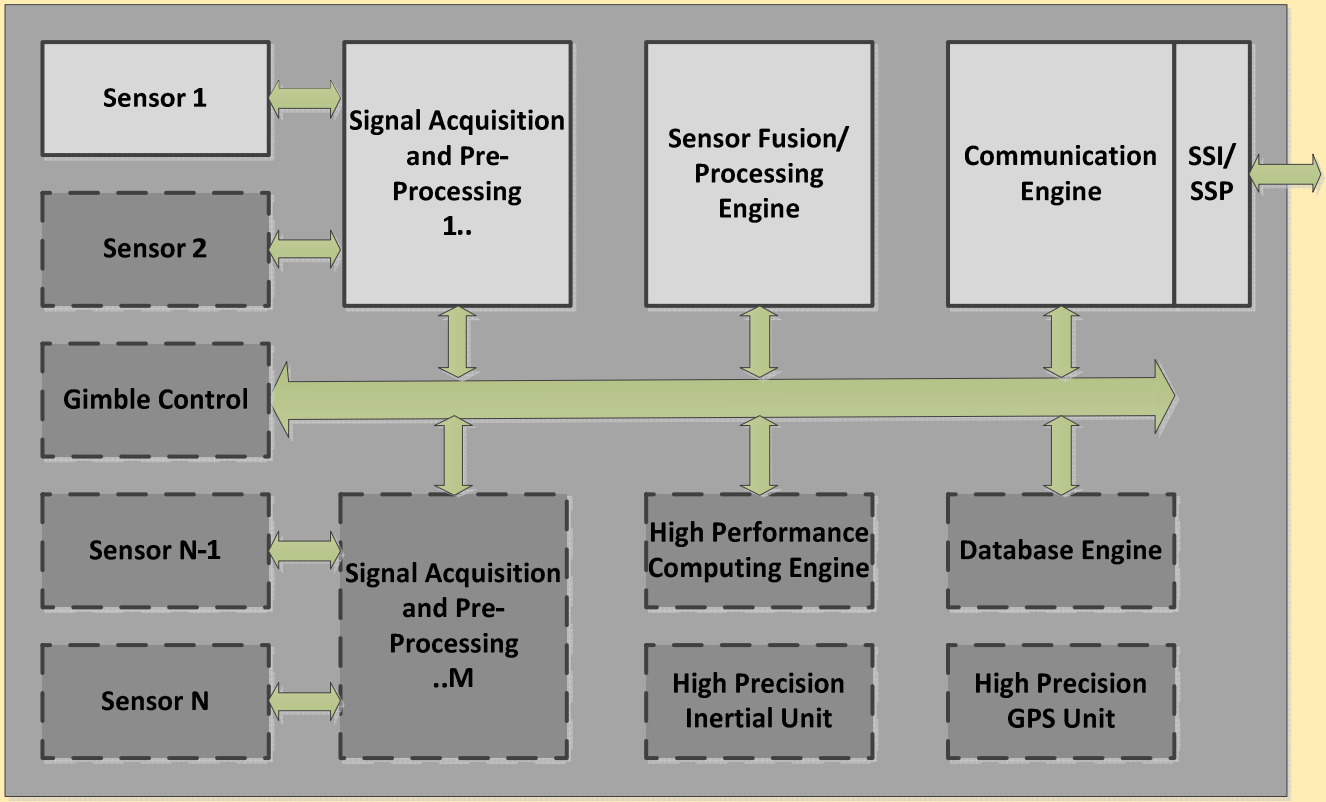
New Concepts
MOSA – *Mission Oriented Sensor Arrays*

Goals

- Real time data processing (or pre-processing), avoiding the transmission of raw data
- Different applications can run in parallel from the same sensor sources
- Safety orientation
- Well defined and standard interface between payload (mission) and aircraft (flight services)
- Interchangeable sensors among different aircraft



MOSA – Basic Architecture



MOSA basic architecture

MOSAs under development

- Sniper locator
- Eucaliptus plagues and diseases automatic mapper
- Roads condition automatic mapper
- Automatic counter of migratory birds

Envisaged MOSAs

- Automatic environmental protected areas evaluator
- Crop spraying quality (drift included) automatic evaluator

MOSA – A Development Proposal

The MOSA Toolkit

Hardware

- Modular, backplane-based for larger systems
- Single board, for smaller systems

Software

- MDD based (Simulink ?), with an increasing library of basic signal and image processing blocks
- Automatic code generation and mapping onto the target hardware

Distribution

- GPL

Final Remarks

- UAVs are currently available for civilian applications ranging from low cost, electric powered, to big size, high endurance units.
- Although fancy to see flying, UAVs must provide useful work and a good cost/benefit ratio to be worth using them.
- Civilian UAV missions normally are based on image sensors, generating tons of images each flight hour.
- Applications are, normally, closely related to the geographic region, activity, and specific necessities of the users, leading to a great diversity of different sensor arrays and processing procedures for each application.
- Sensor automation, based on the MOSA approach, sounds promising in this scenario.