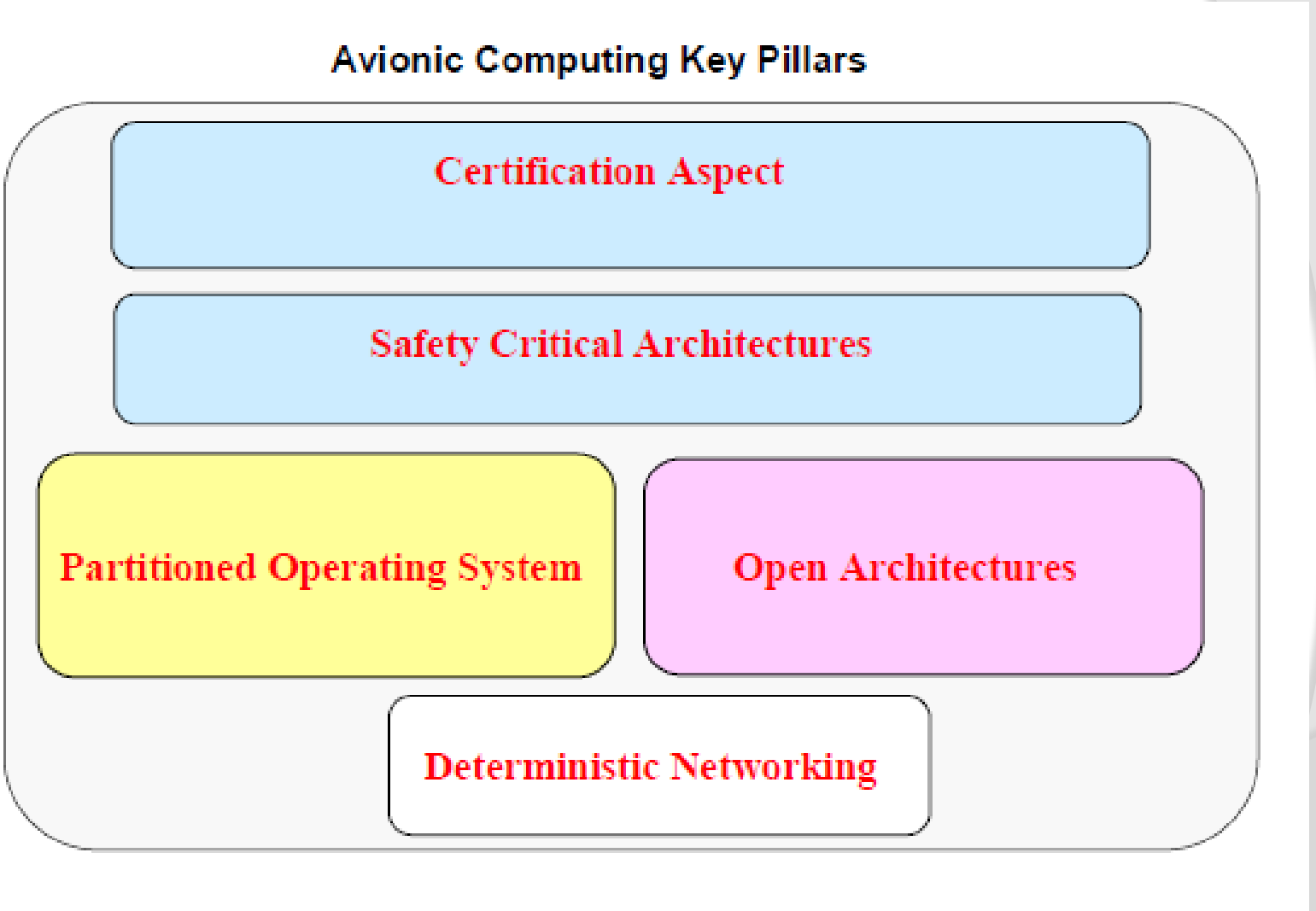
From Annex B.2 – Dependable Avionic Computer



A certified version is required

The established standards for development of avionics are these:
Software: DO-178B (USA)/ED-12 (Europe) and
Hardware: DO-254 (USA)/ED-80 (Europe)

ED12B-C/DO-178B *Level A* is governing situations where a defect would result in catastrophic accident.

Certification is expensive, costing approx. $40-50 per line of code *)
One manufacturer estimates full UAV/RPA code of its new UAV to be 65mill lines of code… (50% more than Windows)
***) Source: http://www.windriver.com/solutions/aerospace-defense/**

DO 178B/ED 12 Software restrictions

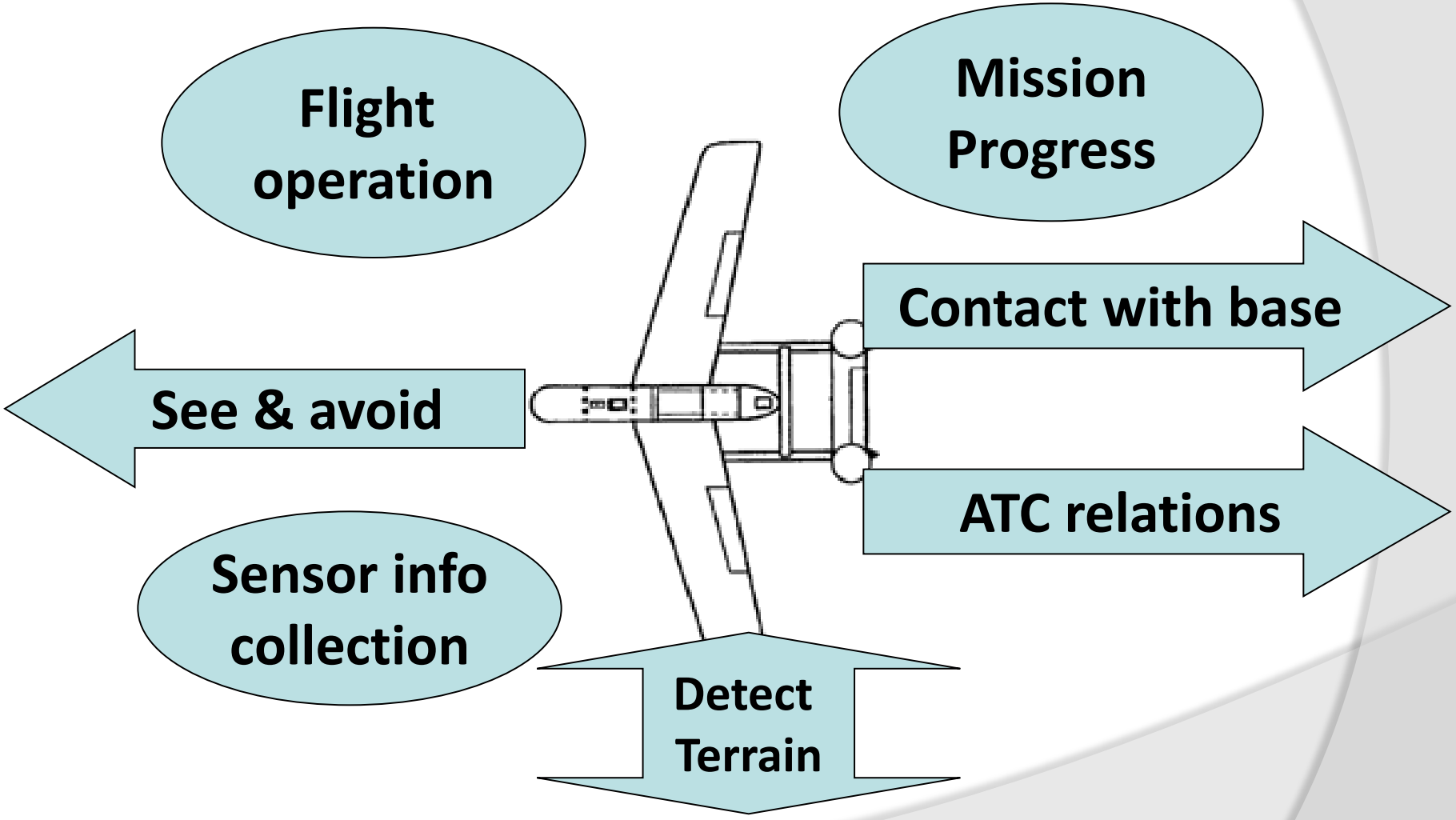
- **Compilers are limited to certified ADA or C,**
- **Operating system must be certified RTOS***
- **Choice of hardware is limited (ARINC)**
- **Fully deterministic behaviour is required ****
- **No surplus code allowed, only net usable code (including subsystems) *****

*** Real Time Operatins System**
**** Excludes Neural Networks**
***** Excludes ordinary DBMS systems**

DO-178B/EB 12 software projects
involve this documentation:

1. ***Plan for Software Aspects of Certification (PSAC)***
2. ***Software Development Plan (SDP)***
3. ***Top-level Design Document for the RTOS (Arinc653)***
4. ***Detailed Design Document for (Arinc653)***
5. ***Tested software system executable as standalone system***
6. ***Test suite for acceptance test and Q&S verification***
7. ***Manuals & Certification Evidence***
8. ***Regular Reporting of progress***

IQMotor – a task structure example



IQ_Engine System Structure

Knowledge def.
Knowledge structure
Variable def.
Mission def.

IQ_Edit
Database
import/export

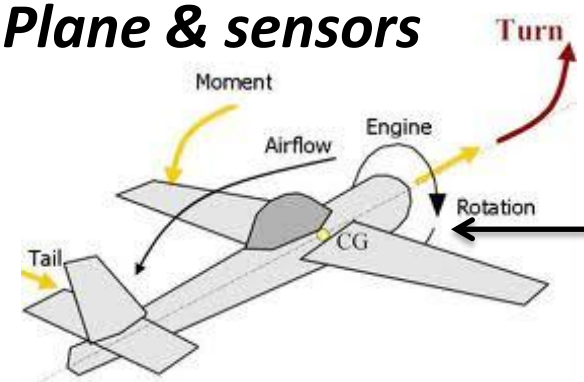
Off-line
database

Embedded system

Knowledge
database

Off-line system

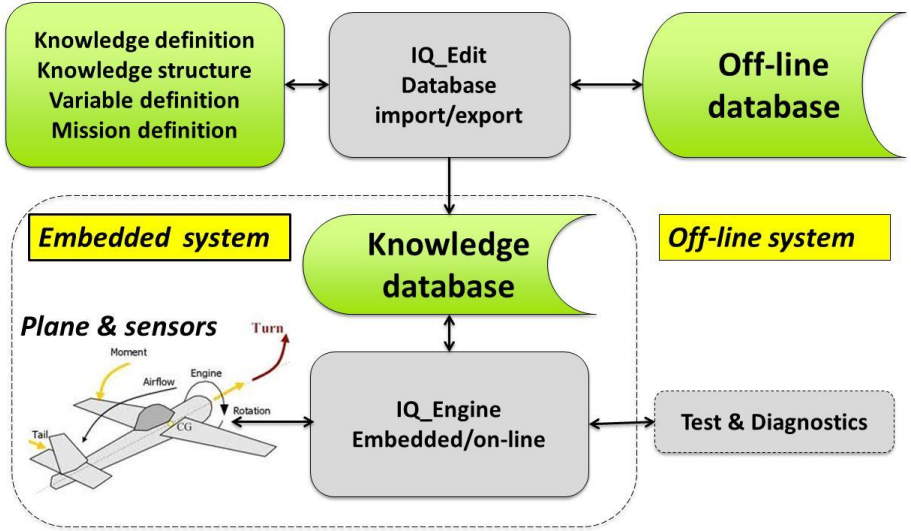
Plane & sensors



IQ_Engine
Embedded/on-line

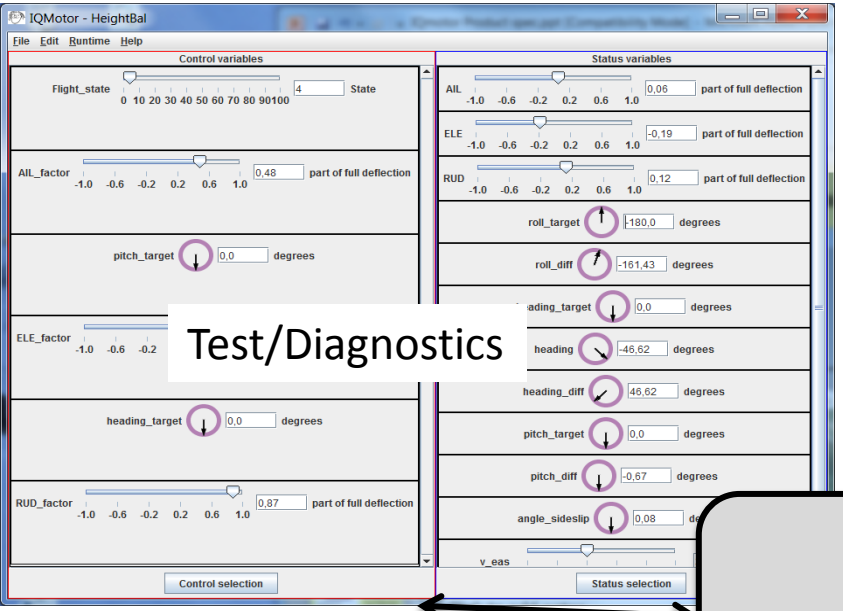
Test & Diagnostics

IQ_Engine System Structure



- Knowledge can be made manually or automated on the ground
- The Knowledge is fragmented into maneageable pieces
- Off-line DB is used to create the online Database
- Search Engine gets input from real sensors and ground control station
- Search Engine enquiries the Knowledge database
- On-board Search Engine SW has to be certified
- On-bord DB has to be certified
- First certification has same cost of traditional SW certification
- Advantage: after a change, only incremental certification is required. Not necessary re-certify the full Search Engine (and DB)

Full Demonstrator



Test/Diagnostics

IQ_Engine Embedded/on-line

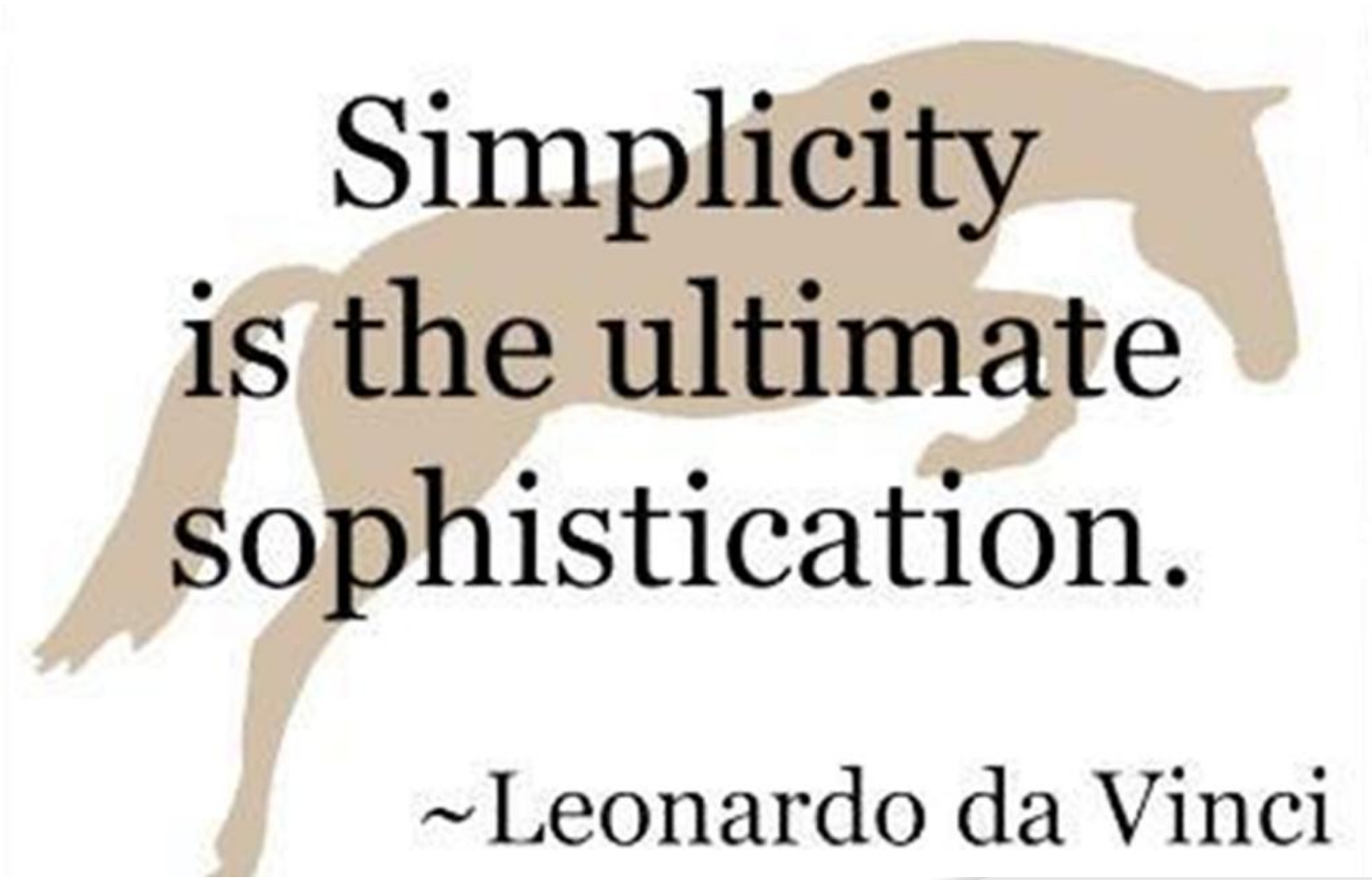
Knowledge database

Ground Control Dashboard

nSHIELD

The key to solving complex systems

Tor Olav Steine - tos@alfatroll.com



Source NASA