



MINISTÈRE DE LA DÉFENSE

Open & Evolutive UAV Architecture

13th June UAV 2002



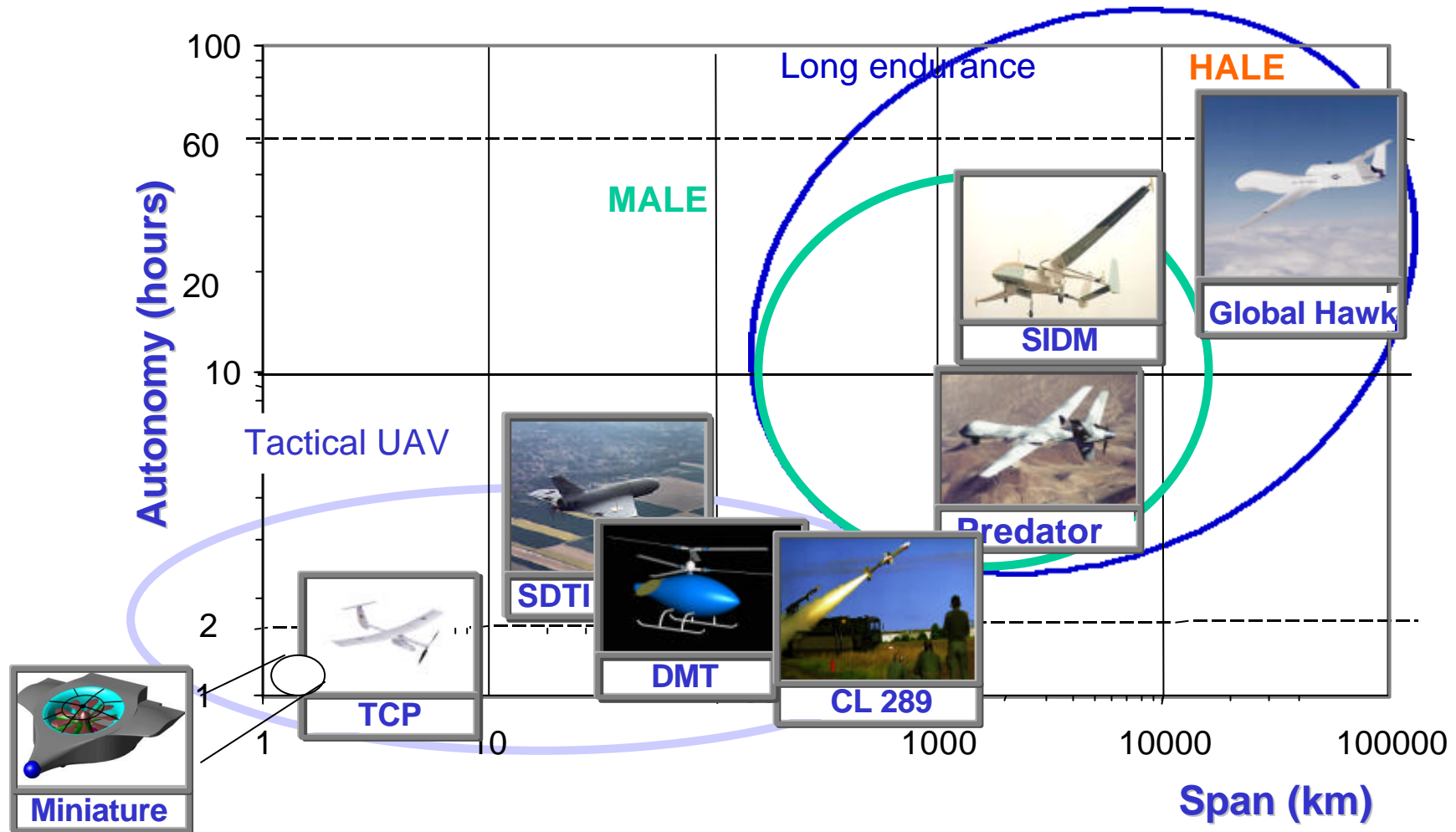
Report Documentation Page

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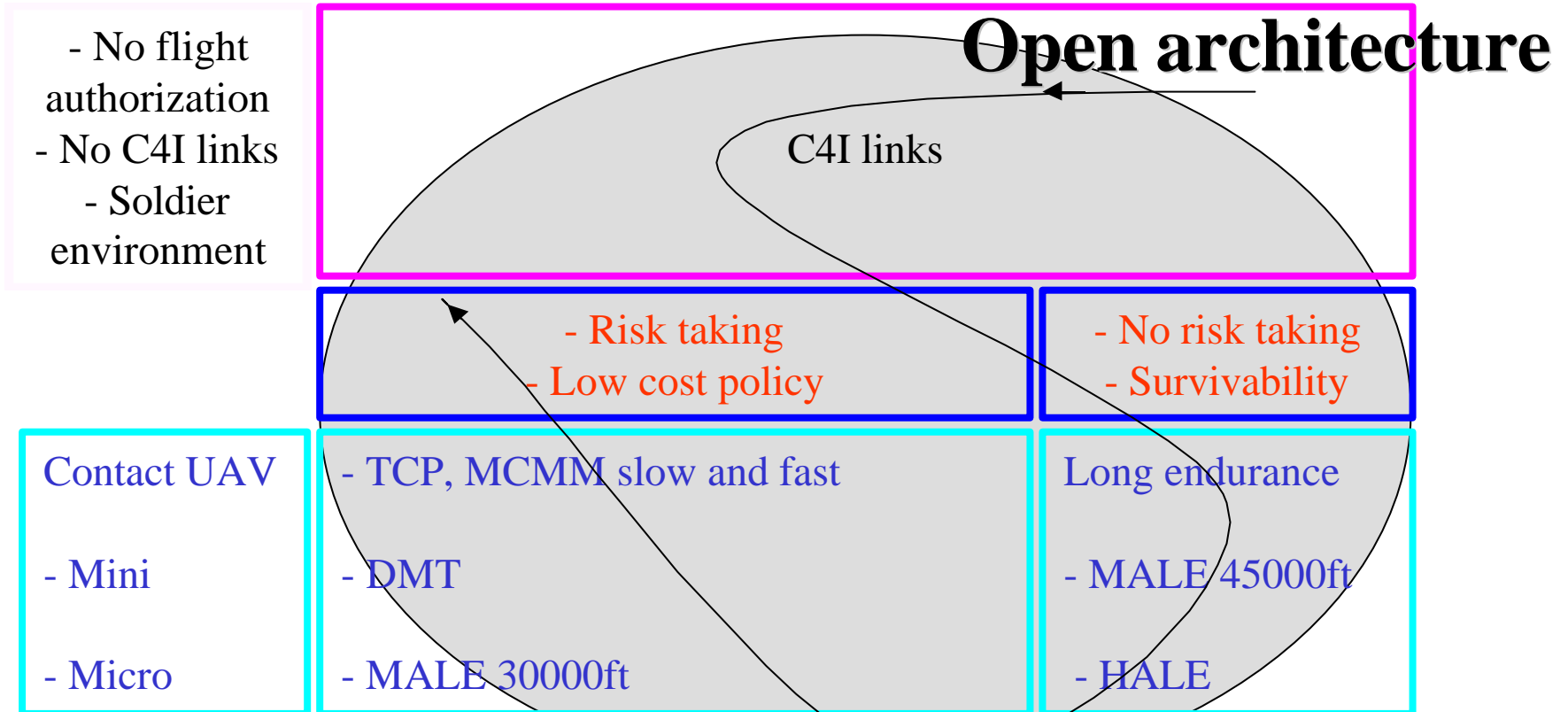
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Class of UAVs under study in France

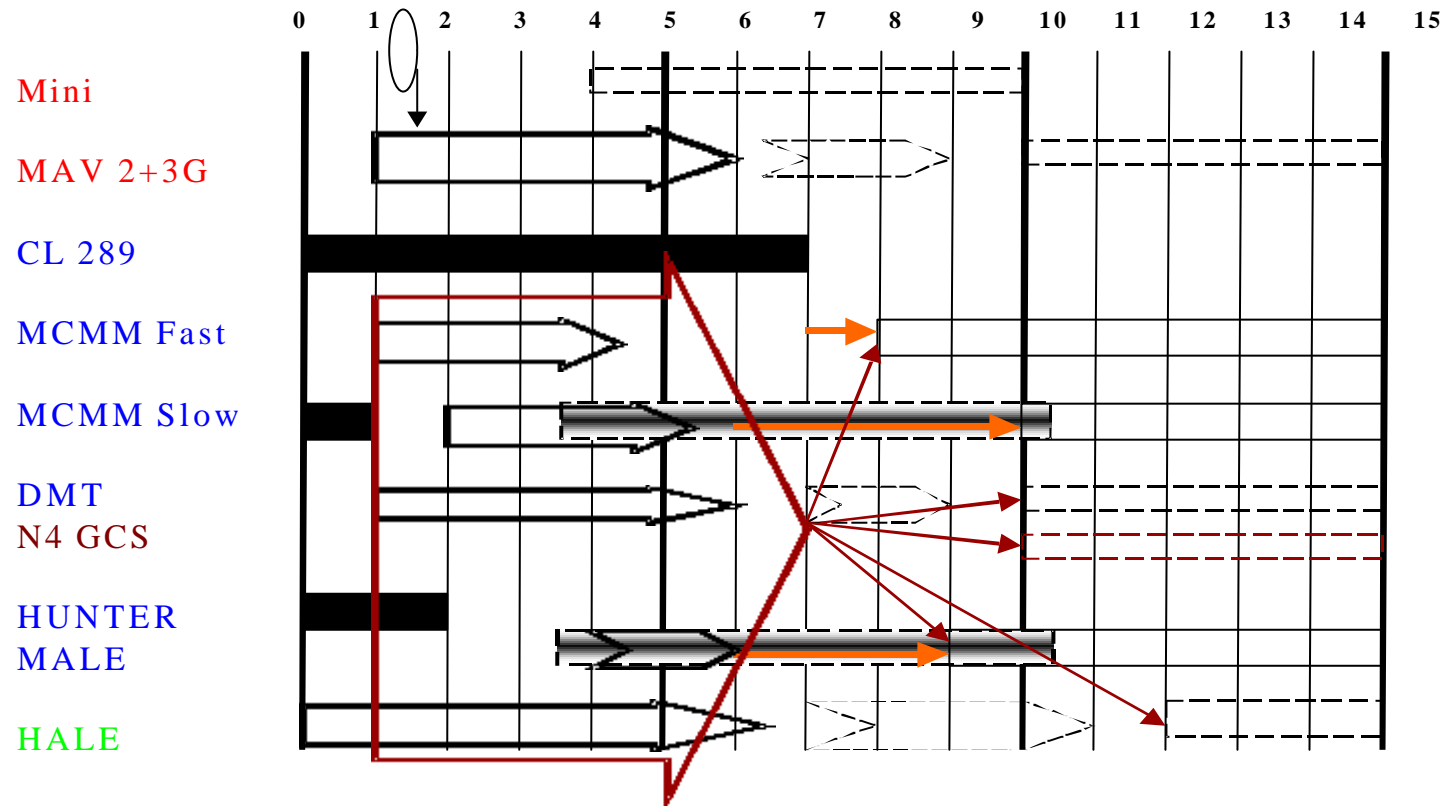


Domain partitioning

Environment constraints



Procurement roadmap



Stakes of architecture effort

Information mastering

Ease European cooperation

Procurement process : modularity,
sub-system low cost, life evolution

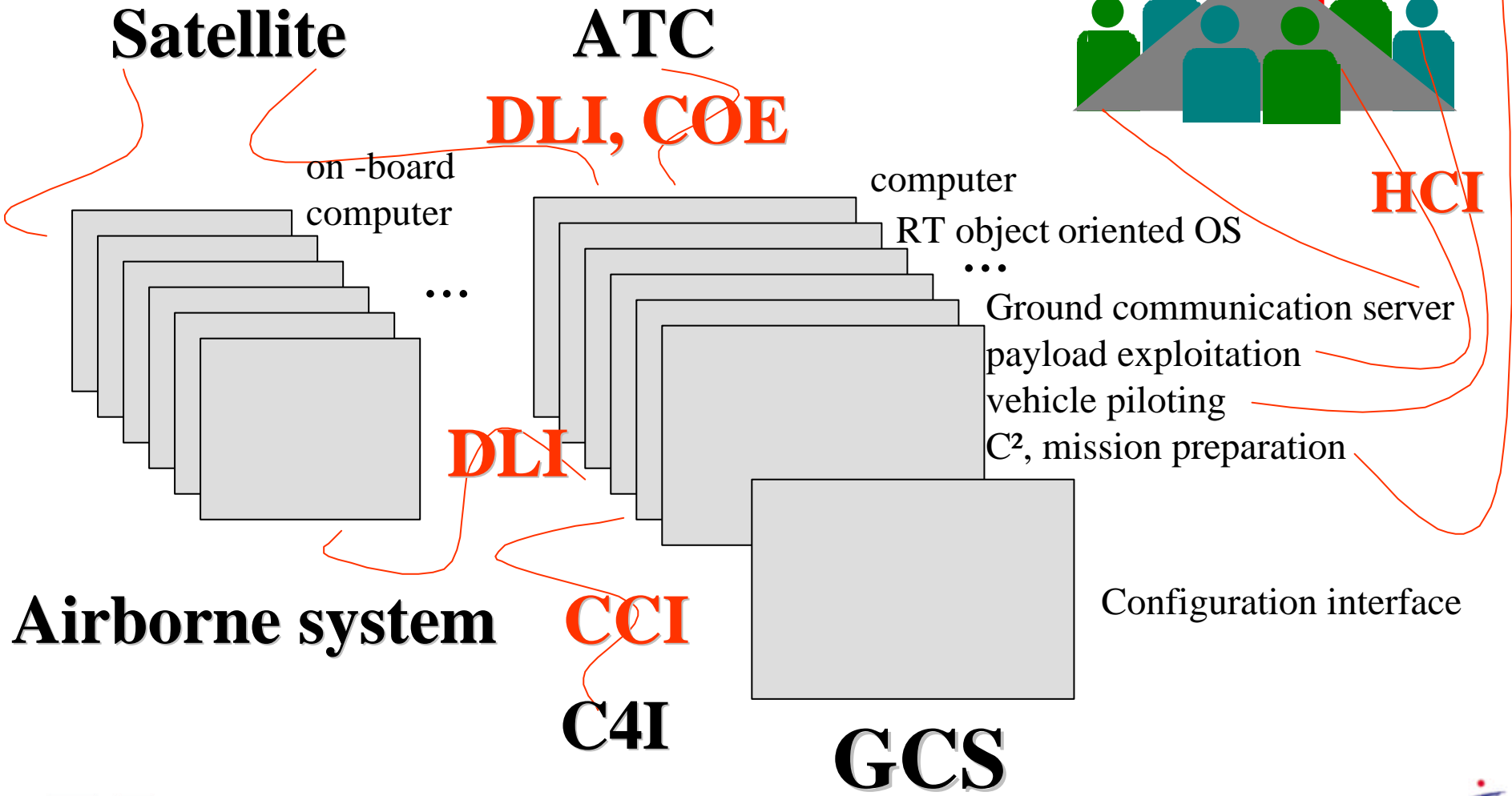
Operators endurance

UAVs coordination
Team action intelligence
Saturation Partition
Diversion Association

Friendly use
de-skilling



Multi-layer object oriented approach



Peripherals

- All components considered as hardware or software “peripherals” to the host structures, on-board and on the ground control station.
- Preferably, a peripheral will support only one function, either operational or technical.
- Peripherals exchange through the host structure and have no specific links between them.

Host structures are meant to

- interface with all software or hardware peripherals of their sub-systems,
- recognize the presence and the type of a peripheral,
- monitor peripherals according to configuration,
- configure heterogeneous networks,
- monitor exchanges between peripherals,
- control the execution of functions and services at different levels : operating system, mission level, including supervision of teaming with operators.

Different levels of configurations 1/2

- Configuration process managed through instantiating generic models of system and sub-systems.
- Partly automated
 - Computer : hardware, software, support services
 - UAV system : UAV type + evolutions
 - Procedures :
 - degraded modes - ATC
 - operators handovers - air vehicles handovers
 - launch and recovery : deck landing, ...

Different levels of configurations 2/2

- Automated / Plug and Play
 - Mission : payloads plug in
 - Air vehicle : parameters
 - Network : data links with C4I, with or without relay,...
 - Interoperability :
 - level applied during an operation
 - levels of authority given to the different operators and control commands

Configuration software and MMI

- Configuration MMI vary according to level of authority :
 - “system manufacturer”
 - “maintenance level”
 - “software administrator”
 - “user”.
- Configuration software tools allow formal proof of coherence of choices.
- Semantic structure and interfaces defined through “taxonomy” tool that also secures compatibility between versions.

Open architecture contracting process

- Two types of approach
 - R&T “ACTD”
 - “Feasibility” study to write program requirements
- Two UAV systems involved in ACTD demo
 - one for full open architecture implementation
 - the other one only for GCS modification.
- The ACTD contract :
 - 30 - 36 months
 - starting from end of 2002
 - including 6 work packages (WP).

Part I Definition studies

- WP1 : for all types of UAV and operational needs
 - Define open and modular architecture
 - Assess compatibility with STANAG 4586
- WP2 : Define for the UAV systems participating to demos
 - flight and static demos
 - flight testing equipment
 - performance and system tests for host structures and interface components acceptance
 - integration path

Part II Development and demos 1/2

- WP3 : Realize for the UAV systems participating to demos
 - testing equipment
 - host structures
 - interface components
- WP4 :
 - Proceed to sub-systems validation and acceptance
 - integrate
 - prepare the flight security documents for flying

Part II Development and demos 2/2

- WP5 : Fly the two systems in order to demonstrate
 - interoperability level 3 and 4
 - hand over and retasking
 - scenarios : air vehicle trajectory controlled through payload tracking target, ...
- WP6 : Assess openness and plug and play capacity
 - by changing the payload of the UAV system
 - Write final report with further work and STANAG 4586 recommendations.

Open architecture ACTD roadmap

- TCP

- MCMM
slow / fast

- DMT

- MALE
30000ft

Long
endurance

- MALE
45000ft

- HALE

