The Responsible Use of AI in FCAS
An Initial Assessment of Ethical and legal challenges

PFIA 2021 Défense et IA
June 2021 - Bruno Carron
Dirk Hoke: The Future Combat Air System – or FCAS for short – was initiated by the heads of state of France and Germany. […] it will make use of technologies such as artificial intelligence that, despite being cutting edge, also face critical discussion. […] As the industrial partner with chief responsibility for the German part of the project, Airbus attaches great importance to these issues and will of course consider the social, ethical and legal questions involved.
Airbus White Paper

The Responsible Use of Artificial Intelligence in FCAS – An Initial Assessment

- Linked to FCAS Forum, the German Multi-Stakeholder forum driven by Airbus and Fraunhofer
- Engineering viewpoint & initial approach
- Identification and definition of a pre-selected set of eight Operational Use Cases for AI in FCAS
- Application of EU AI High Level Experts Group (HLEG) Assessment List for Trustworthy AI (ALTAI)

www.fcas-forum.eu
FCAS Operational AI Use Cases …

… aim to clarify role of AI in FCAS system functions
Command & Control Phases
Artificial Intelligence as Enabler for Operational Capabilities & Performance

CONOPS
- Concept of Operations

Planning
- Air Operational Directive

Tasking
- Master Air Operation Plan
- Air Task Order
- Air Task Coordination Order

Preparation
- Delegated from headquarters

Non Real-Time (Pre-Mission)

Mission Execution
- F²T²EA-Cycle
- Self-Defence

Real-time

Report
- Campaign report
- Hit/Missed targets
- Employed weapons

Assessment
- Right things done?
- Achieved goals?

Estimate
- What if continuing?
- Need to adapt?

Non Real-Time (Post-Mission)
Spotlight on Real-time and RoE
OODA-Loop & Targeting Cycle

Real-time

Mission Execution

Find ➔ Fix ➔ Track ➔ Target ➔ Engage ➔ Assess

Ascertain Rules of Engagement (RoE)

Decide ➔ Act ➔ Orient ➔ Observe

BIG DATA

AI
Pre-selected Operational AI Use Cases for FCAS

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Acronym</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission Planning and Execution</td>
<td>MPE</td>
</tr>
<tr>
<td>Detection, Recognition, and Identification</td>
<td>DRI</td>
</tr>
<tr>
<td>Situational Awareness</td>
<td>SA</td>
</tr>
<tr>
<td>Guidance, Navigation, and Control</td>
<td>GNC</td>
</tr>
<tr>
<td>Threat Assessment and Aiming Analysis</td>
<td>TAA</td>
</tr>
<tr>
<td>Cyber Security and Resilience</td>
<td>CSR</td>
</tr>
<tr>
<td>Operator Training</td>
<td>OPT</td>
</tr>
<tr>
<td>Reduced Life Cycle Cost</td>
<td>RLC</td>
</tr>
</tbody>
</table>

And there is room for more…
Use Cases in Targeting Cycle

New Generation Fighter (NGF) | Combat Cloud (CC) | Remote Carrier (RC)

Pre-planned | Ad-hoc

Find | Fix | Track | Target | Engage

RLC | CSR | OPT | MPE | DRI | SA | GNC | TAA
Target Detection, Recognition, and Identification DRI
European High Level Expert Group (HLEG) on AI Guidelines and Assessment List (ALTAI)

What makes an AI trustworthy?

- Human Oversight
- Accountability
- Technical Robustness
- Data Privacy
- Sustainability
- Diversity
- Transparency
Do you continuously survey the users if they understand the decision(s) of the AI system?

Did you establish mechanisms to inform users about the purpose, criteria and limitations of the decision(s) generated by the AI system?

Did you consider establishing an AI ethics review board or a similar mechanism to discuss the overall accountability and ethics practices, including potential unclear grey areas?

Did you put in place measures to continuously assess the quality of the output(s) of the AI system?

Did you ensure that the AI system can be audited by independent third parties?
Summary

Achievements

- An initial set of Operational AI Use Cases has been defined for FCAS
- ALTAI was partially applied → It proved to provide valuable guidance

What is coming next?

- Extend/refine set of use cases
- Complete ALTAI methodology & investigate extensions for military domain