



# Intelligent and Autonomous Engineering in Aeronautics

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# Challenges for designing autonomous systems



Modular architecture important

Won't know all requirements up front

May operate in unforeseen environments

May need dynamic functional allocations

System may need to learn continuously

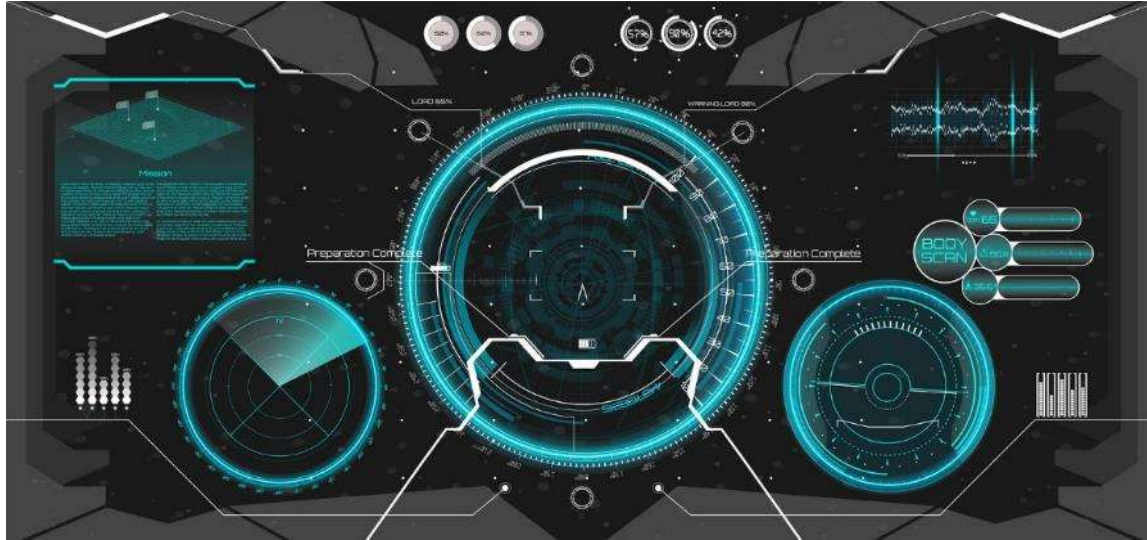
Open design/open source may enhance innovation

# Challenges for building autonomous systems



- Complexity
- Connectedness
- Functional allocations
- Trust

# Impact of complexity

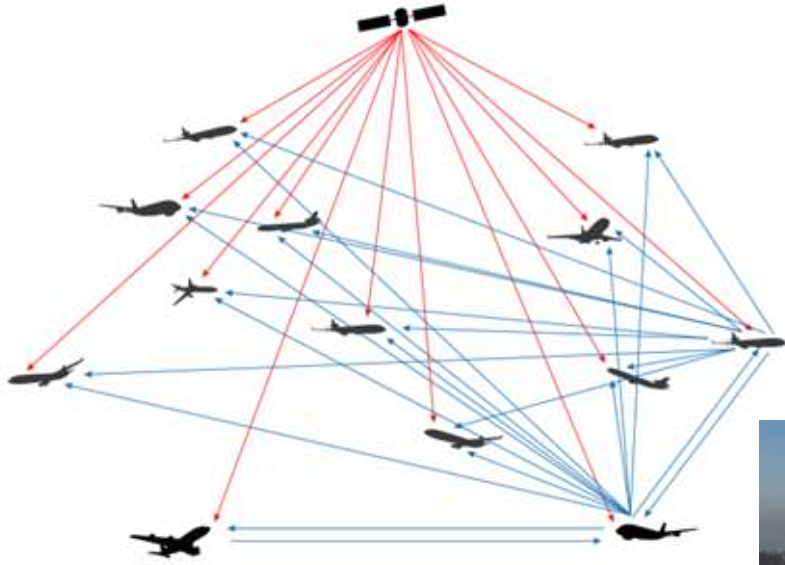


Emergent behavior  
Continuous and asynchronous delivery  
System will continuously change  
System boundary may be hard to define  
Human/machine interface issues



# Impact of connectedness

Aircraft-to-aircraft communication  
in the ADS-B system



System boundary ever-changing

New interfaces the norm rather than exception

Large attack surface for vulnerabilities

Coupling issues

Information overload and interface to human team members



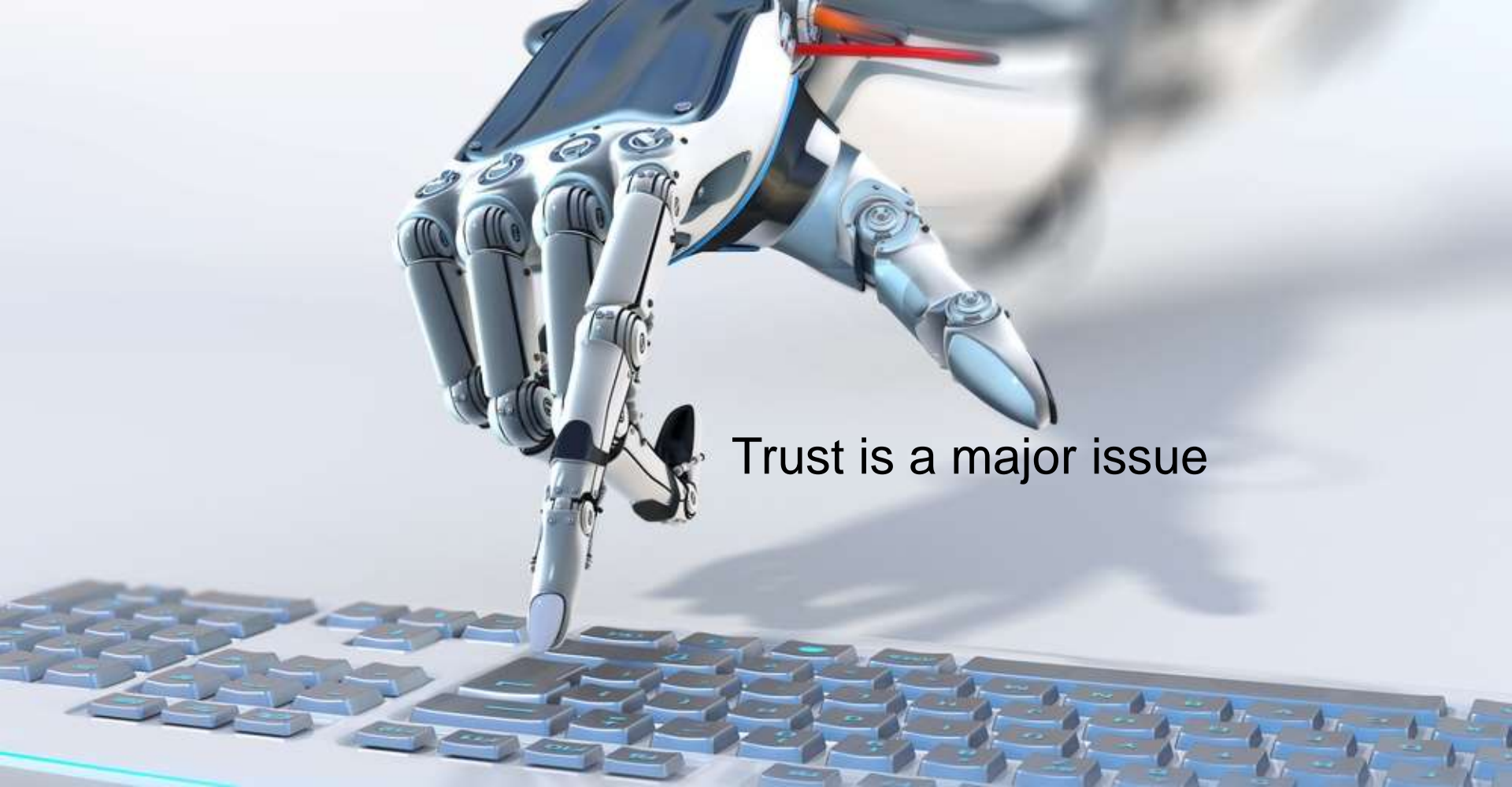
# Functional allocation issues

Human/computer allocations  
will evolve with time

Human/computer allocations  
may be dynamic

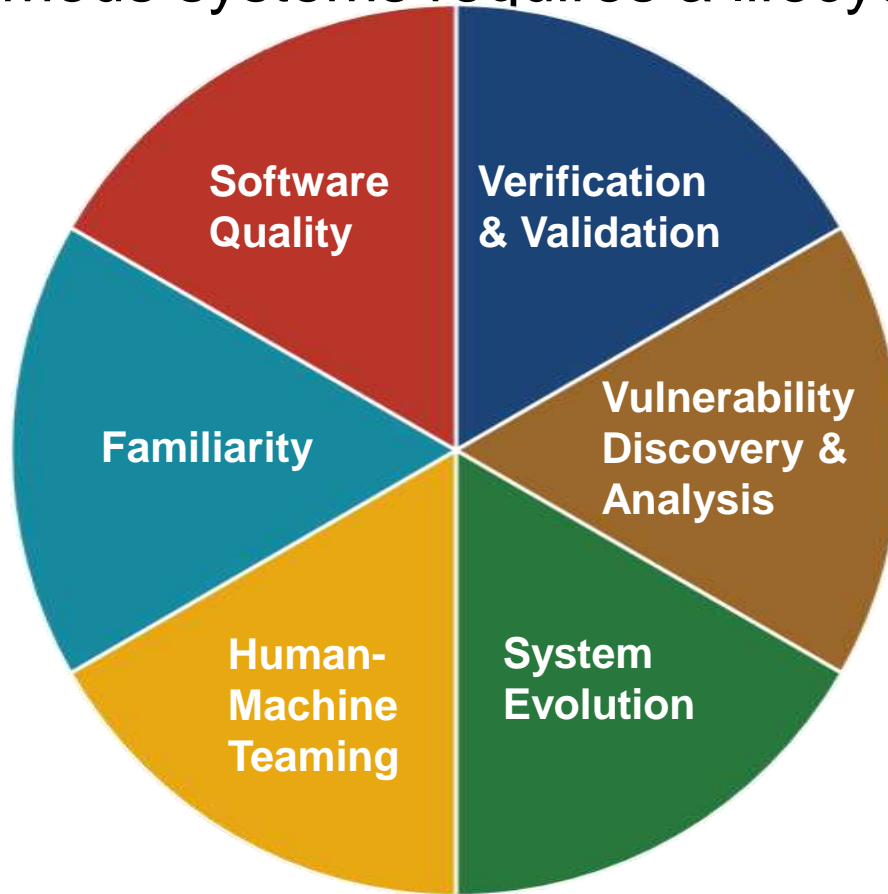
Safe modes desirable

Possibility of high-level  
commander's intent



Trust is a major issue

# Trust in autonomous systems requires a lifecycle approach





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