Network Manager
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EUROCONTROL

Safety Nets for Airborne Collision Avoidance

2014 Safety Forum: Airborne Conflict

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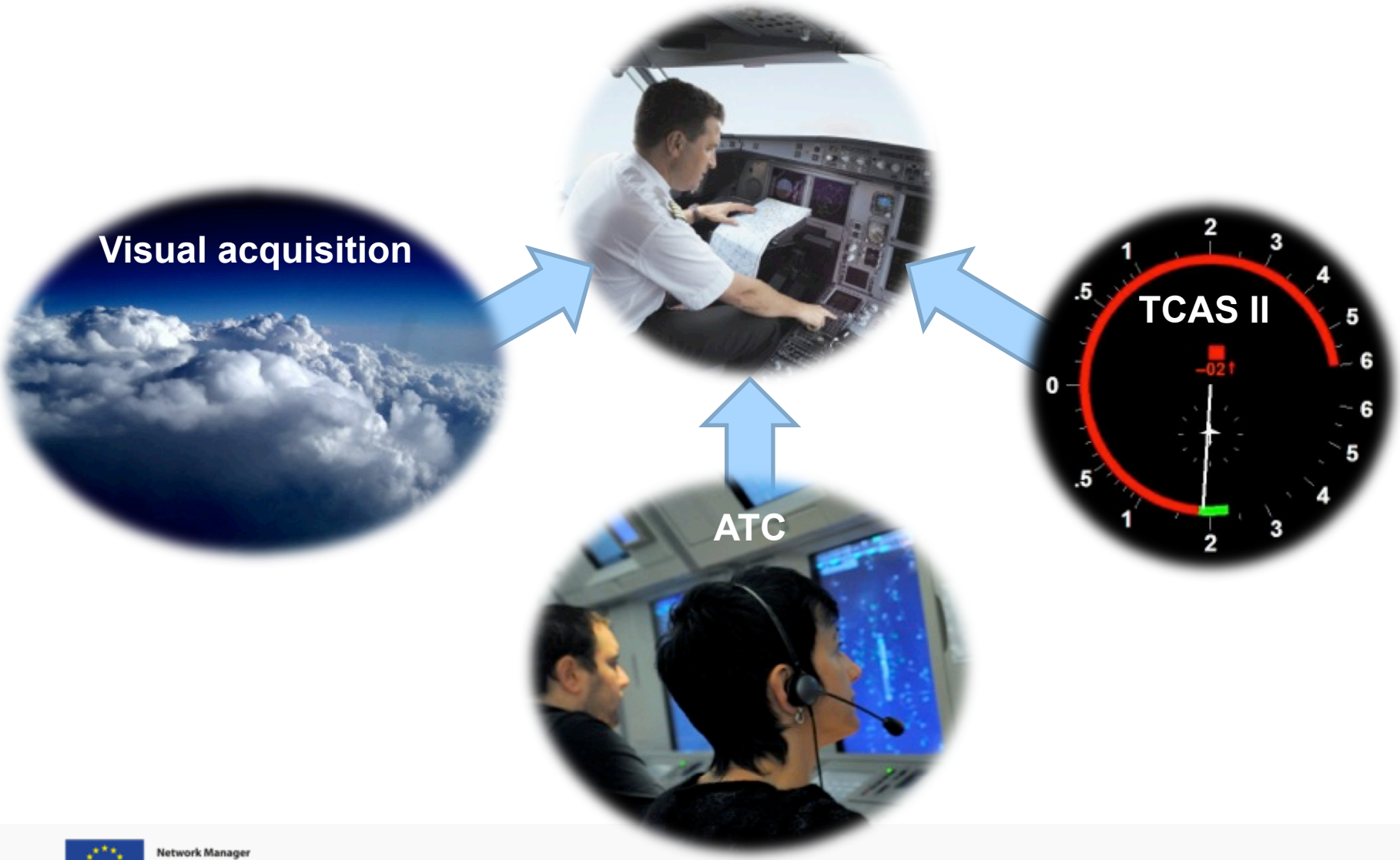
“Let’s build another one…”

Today's collision avoidance



Visual acquisition

- First and still the principle collision avoidance method
- “See” and “Avoid” habitually mentioned together
  - However, visually acquiring threat does not guarantee that collision is avoided
  - Inherent limitations are often forgotten

ATC

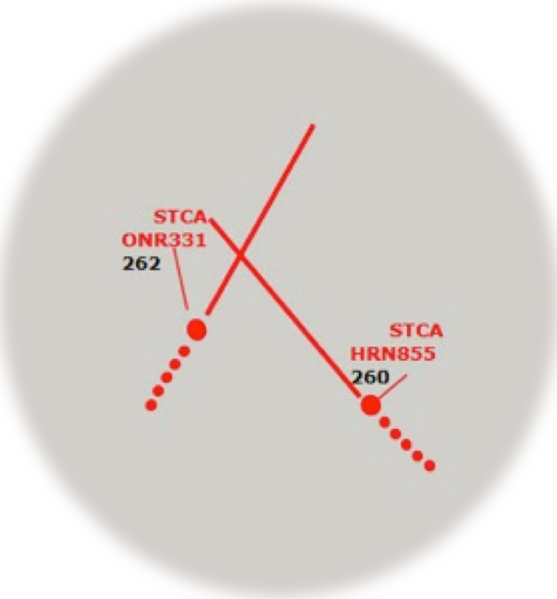
- ATC role is to provide separation provision
- But… ATC will **not** stop when the separation is lost

- Avoiding instructions can be contrary to TCAS resolution advice
- In most cases ATC will not know of RAs until reported by pilots

- Controller supported by safety nets

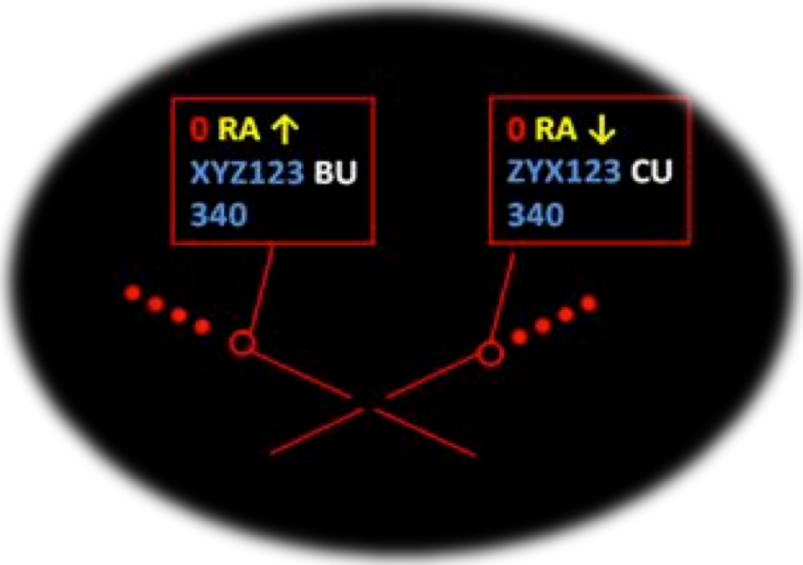
STCA – Short Term Conflict Alert

- Alerts potential or actual infringement of separation minima
- No resolution advice
- Implementation details vary
  - Different detection algorithms
  - Different alerting thresholds



RA downlink

- Commercially available



Implementation

- Some States have implemented
- Being considered by others

Divided opinions

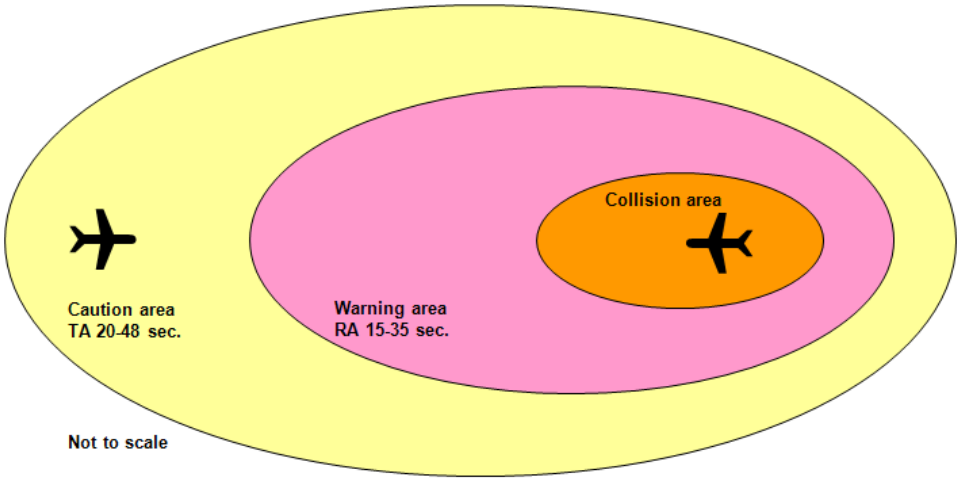
- Situational awareness of the controller is improved
- Several open issues

TCAS II (ACAS II)

- TCAS II is an avionics system that uses transponder technology to detect and track other transponder equipped aircraft

- Alerts are issued against aircraft that are diagnosed as posing a risk of imminent collision with own aircraft

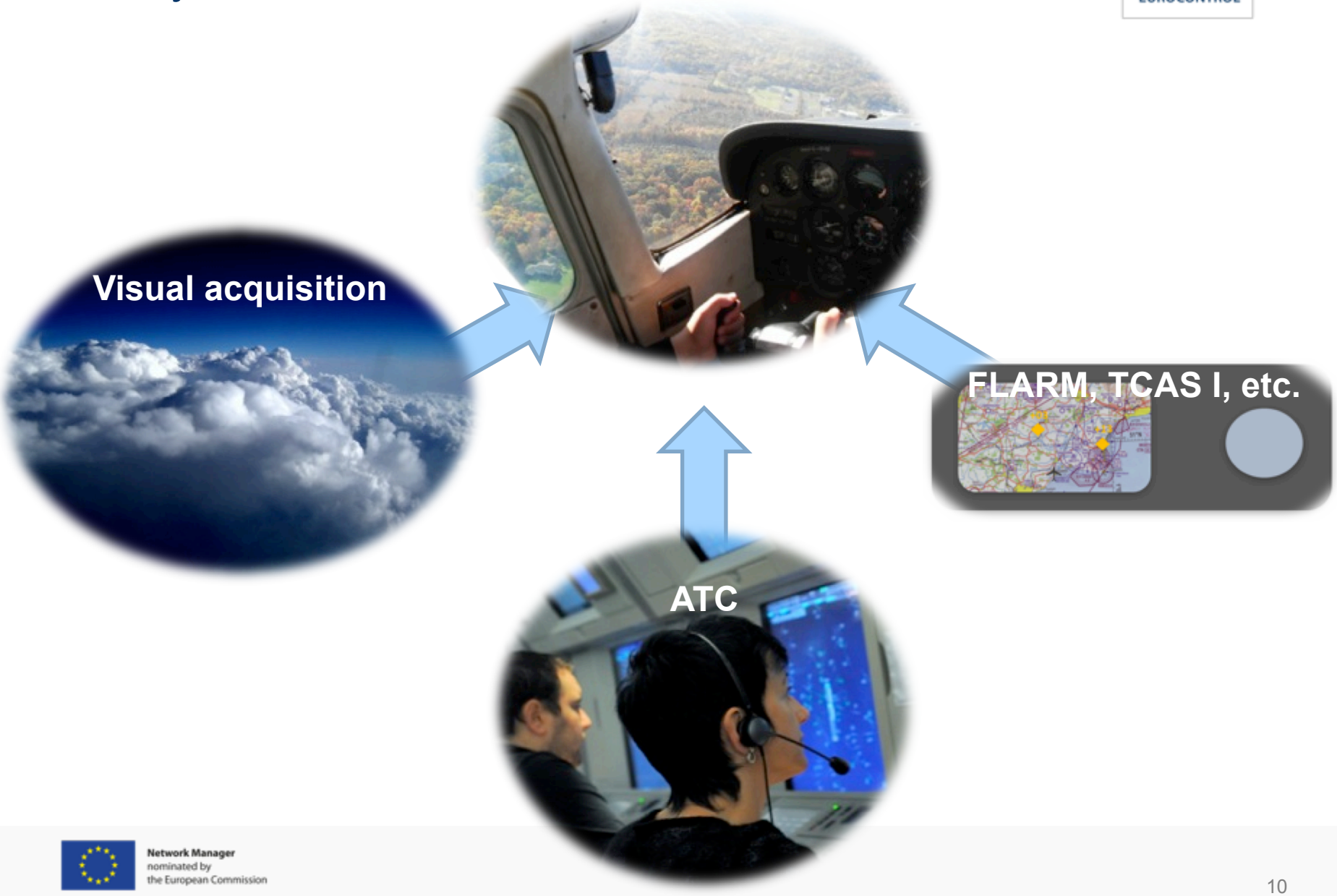
- Nominal range = 14 NM
- Processing cycle = 1 second



TCAS II: Limitations

- Detects only cooperative targets
- Fails if the input from the aircraft's barometric altimeter, radio altimeter or transponder is lost
- Does not track threats with a closure speed of over 1200 knots or vertical rates over 10,000 ft/min.
- Alerts can be generated before ATC separation minima are violated and even when ATC separation minima will not be violated.

Today’s collision avoidance



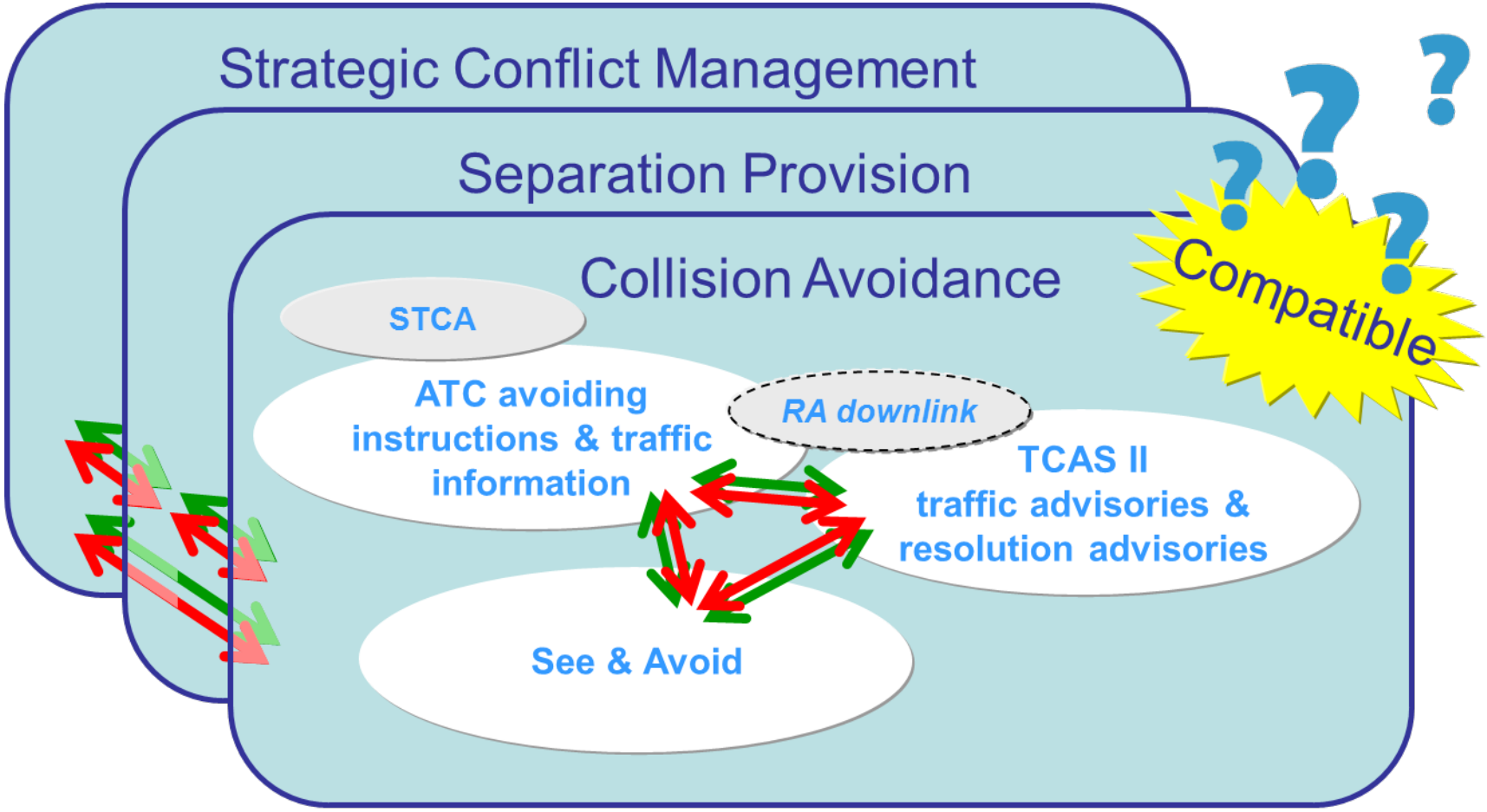
FLARM, TCAS I, TSAA, ….

- Assist in visual acquisition – not collision avoidance systems
  - Enhance prospect of visual acquisition, through alerts and traffic display

- Limitations of visual acquisition:
  - Requires line-of-sight and good visibility
  - Requires reasonable threat size and closing speed

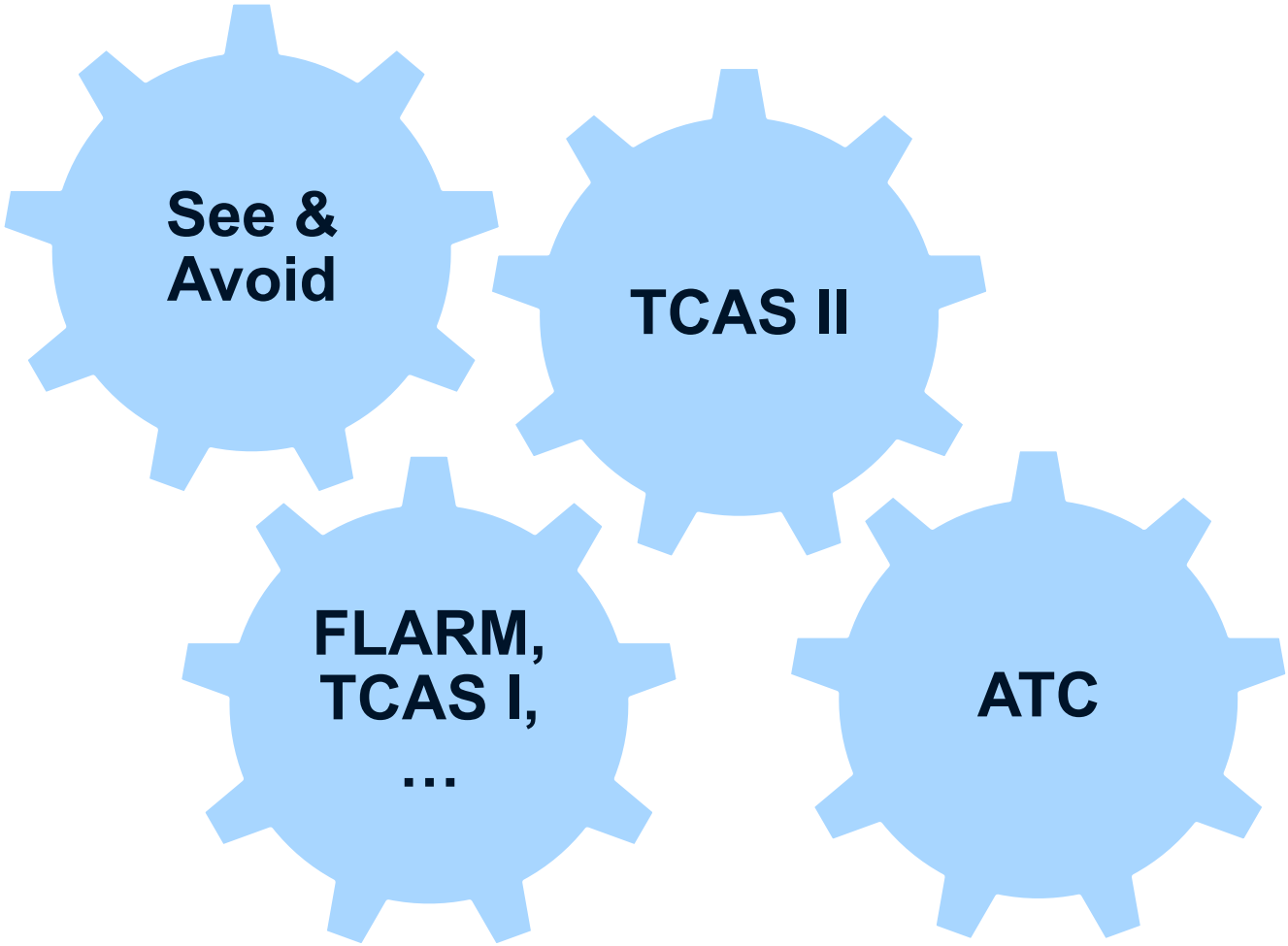
- Avoidance manoeuvres based on visual acquisition:
  - are uncoordinated
  - can make the situation worse

Collision avoidance

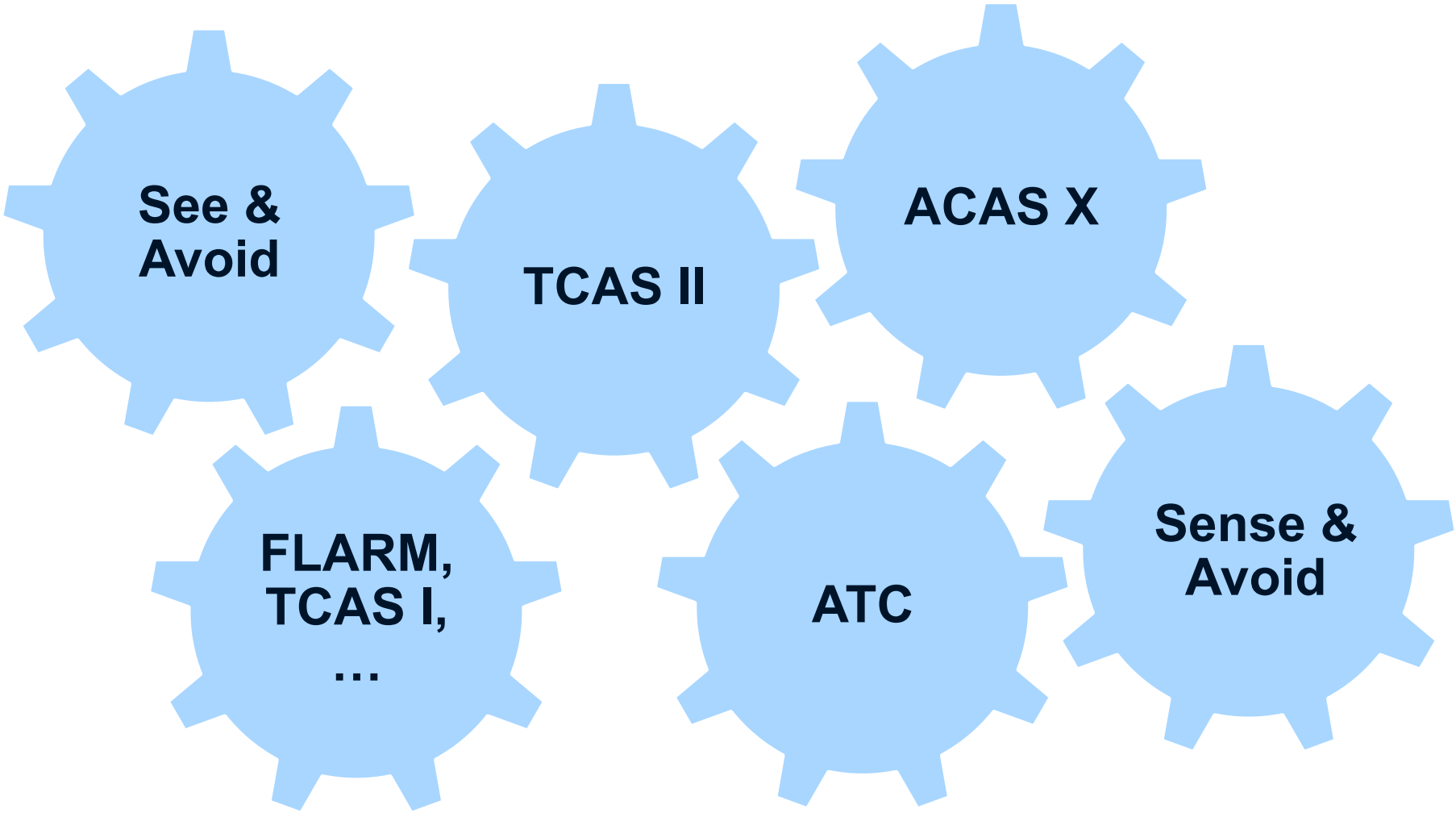


Interactions are complex and not well understood

Today's collision avoidance elements



Tomorrow's collision avoidance elements



Questions?
More information?

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