Demystifying Standards and Regulation in Future Flight

Webinar

October 2024

UKRI Innovate UK

The UK's innovation agency

bsi

UK Civil Aviation Authority

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UKRI Innovate UK

Demystifying Standards and Regulation

Chris Gee
Head of Sector, Aviation
10th October 2024

Agenda

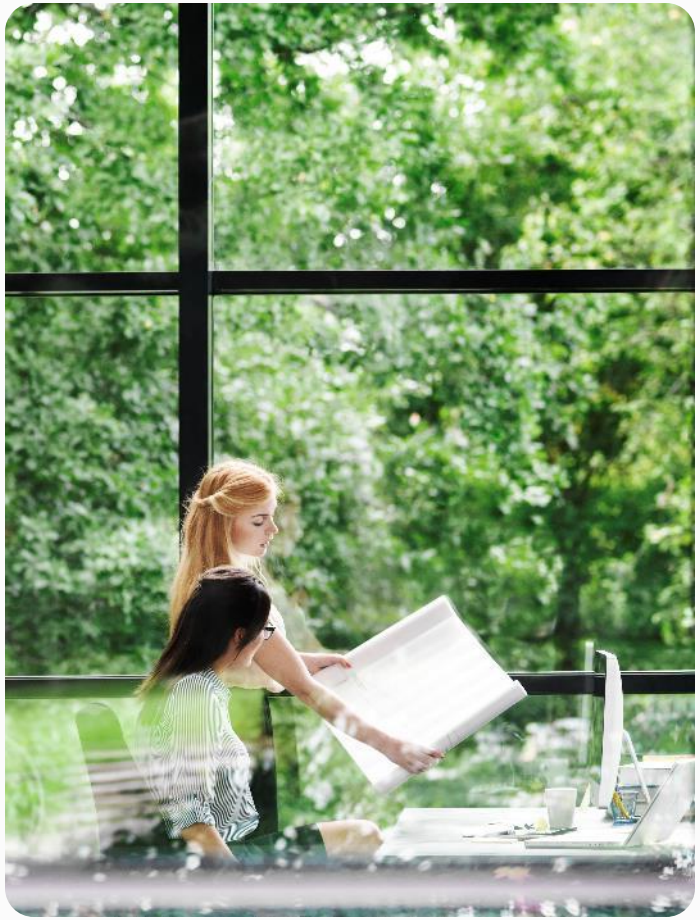
01 BSI Future Flight programme

02 Detect and avoid case study

03 Standards roadmap

04 Q&A session

UK’s National Standard Body with global footprint



Founded in
1901

84,000
clients

Clients in
193 countries

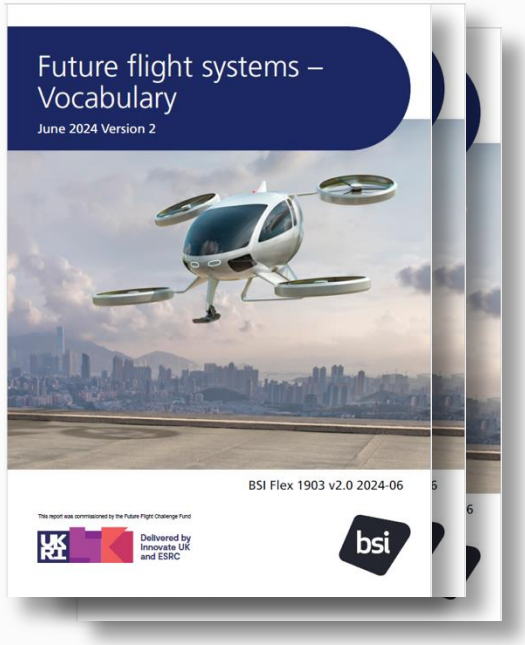
5,518
colleagues

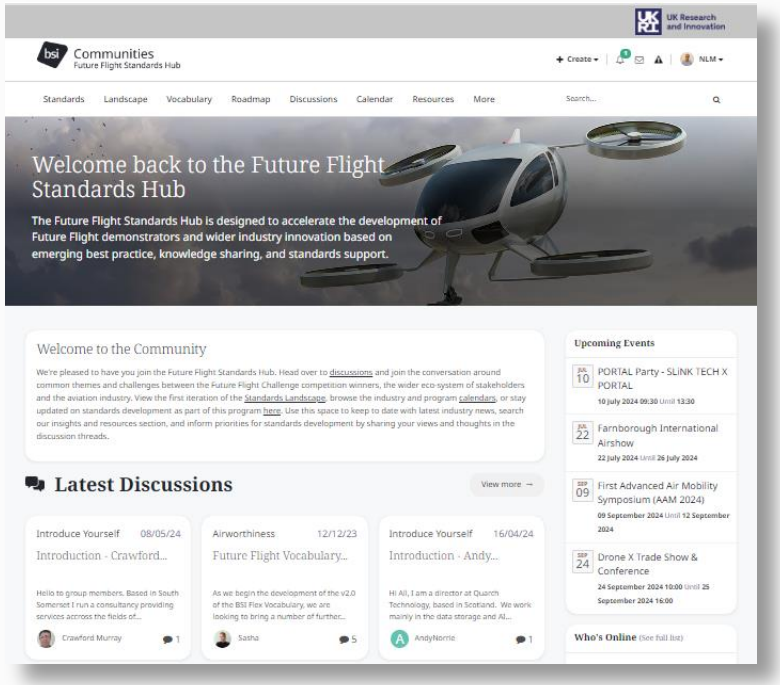
12,200
technical experts

UK member of:

The standards landscape for aviation is complex

Future Flight Standards Programme: Enabling safe trials and industrialization





Landscape and roadmap

- Interactive standards landscape
- Roadmap development – enabling industrialization

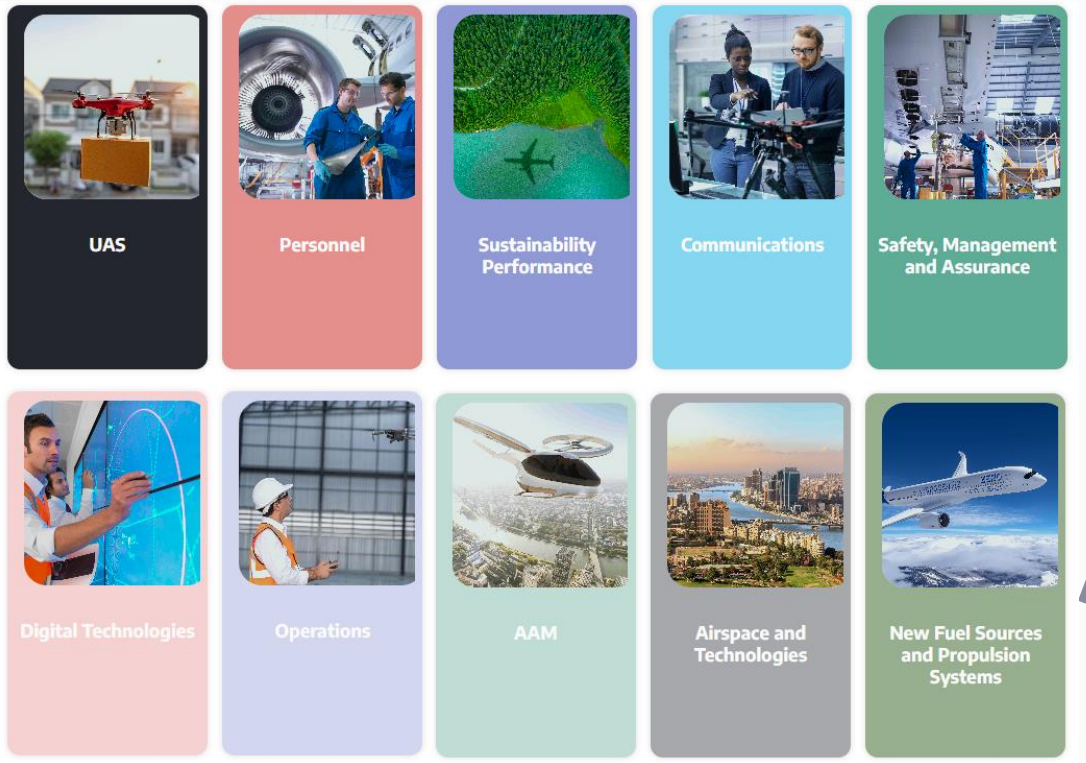
New standards

- **Flex 1903** - Vocabulary
- **Flex 1904** - Operational Design Domain
- **PAS 1905** – Guidance for new entrants and scaleups
- **Flex 1906 –** Means of compliance for SORA

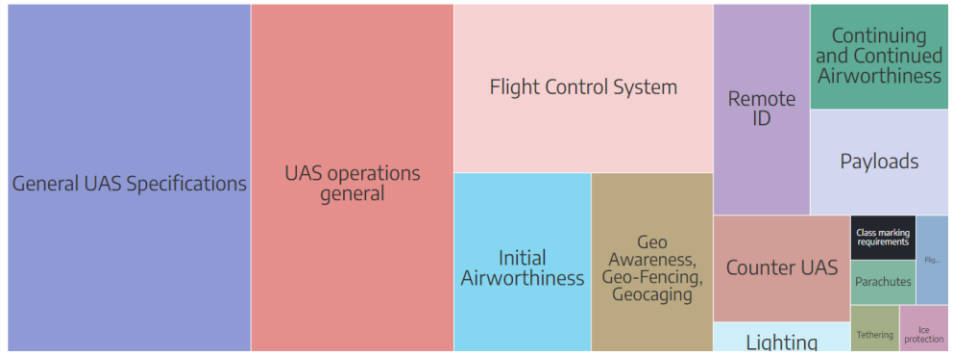
Future Flight Standards Hub

- Access and understand standards
- Explore the landscape
- Help drive future standards development
- **Join: future-flight.bsigroup.com/**

Future Flight standards landscape



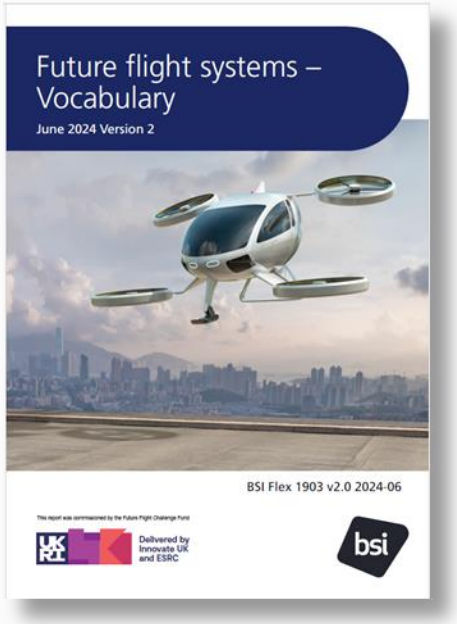
- 3rd iteration currently being updated
- Focus on what is different about Future Flight
- Standard body agnostic
- Contains nearly 500 standards
- Baseline for the roadmap



Standards and regulation

Standards

- Voluntary
- Developed with industry
- Consensus based
- Complement regulation
- Focus on the “how” rather than the “what”



Regulation

- Mandatory
- Developed by the CAA
- Guidance material (GM)
- Acceptable Means of Compliance (AMC)
- Focus on the “what” rather than the “how”

Growth of the sector

- Transition from demonstrations to commercial operations
- Interoperability and harmonization
- Repeatable and scalable

Use of technical standards within the Detect and Avoid (DAA) Policy Concept

BSI Lunch & Learn

10th Oct 2024

DAA Specific standard examples

- **Traffic Collision Avoidance System (TCAS) – *UK CAA, Certified category***
- **Detect and Avoid (DAA) – *FAA, Certified category***
- **DAA – *FAA non-certified***
- **UK CAA DAA Policy Concept**

TCAS-II (Certified)

ETSO-C119e

Initial Airworthiness Adopted CS-ETSO Amendment 17.pdf (caa.co.uk)

UK Civil Aviation Authority

Basic

3.1.1 Minimum Performance Standard

The applicable standards are those provided in EUROCAE Document ED-143, 'Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance System II (TCAS II)', dated September 2008, Section 2 as modified by Change 1 dated April 2009, Change 2 (Version 7.1) dated April 2013, and by Appendix 1 to this ETSO and EUROCAE Document ED-221A, 'Minimum Operational Performance Standards (MOPS) for Traffic Alert and Collision Avoidance System II (TCAS II) Hybrid Surveillance', dated December 2015, Section 2, as modified by Appendix 2 to this ETSO.

RTCA DO-185B

3.1.2 Environmental Standard

See CS-ETSO, Subpart A, paragraph 2.1.

EUROCAE/RTCA ED-14D

3.1.3 Software

See CS-ETSO, Subpart A, paragraph 2.2.

EUROCAE ED-12 / RTCA DO-178

3.1.4 Airborne Electronic Hardware

See CS-ETSO, Subpart A, paragraph 2.3.

Specific

3.2.1 Failure Condition Classification

See CS-ETSO, Subpart A, paragraph 2.4.

Failure of the function defined in paragraph 3.1.1 of this ETSO resulting in misleading information is a hazardous failure condition.

Failure of the function defined in paragraph 3.1.1 of this ETSO resulting in a loss of function is a minor failure condition.

DAA (certified)

Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, D.C

TSO-C211

Effective
Date: 9/25/17

UK Civil Aviation Authority

Technical Standard Order

Subject: *Detect and Avoid (DAA) Systems*

- **Failure condition classifications** →
- **Functional performance** → RTCA DO-365
- **Environmental qualification** → RTCA DO-365
- **Software qualification** → RTCA DO-178B
- **Electronic hardware qualification** → RTCA DO-254B

Class	Equipment[1]	Criticality: Loss of Function	Criticality: Misleading Information	DAA Article Designation[2&3]	DAA Equipment Article Name	Function
1	DAA – Basic	Major	Major	A	Active Surveillance	Air Traffic Control Radar Beacon System (ATCRBS)/Mode S Intruder Detection, TCAS II Mode data, Collision Avoidance coordination data
				B	Unmanned Aircraft (UA) DAA Processor	Track Processing, DAA Alerting[2] and Guidance[2]
				C	Control Station (CS) DAA Processor	DAA Alerting[2] and Guidance[2]
				D	CS DAA Control Panel	DAA Mode Control
				E	CS DAA Traffic Display	Display of Traffic, Alerting, and Guidance Information
2	DAA with TCAS II	Major	Hazardous/ Severe Major (See 3.b.(2)(b))	A	TCAS II, Version 7.1	ATCRBS/Mode S Intruder Detection, TCAS II Resolution Advisories (RA)Status and coordination data, Collision Avoidance System Logic, Hybrid Surveillance
				B	UA DAA Processor	Track Processing, DAA Alerting[2] and Guidance[2]
				C	CS DAA Processor	DAA Alerting[2] and Guidance[2] with TCAS II integration
				D	CS DAA Control Panel	DAA Mode Control with TCAS II integration
				E	CS DAA Traffic Display	Display of Traffic, Alerting, Guidance, and RA Information

DAA
(FAA non-certified example exemption)

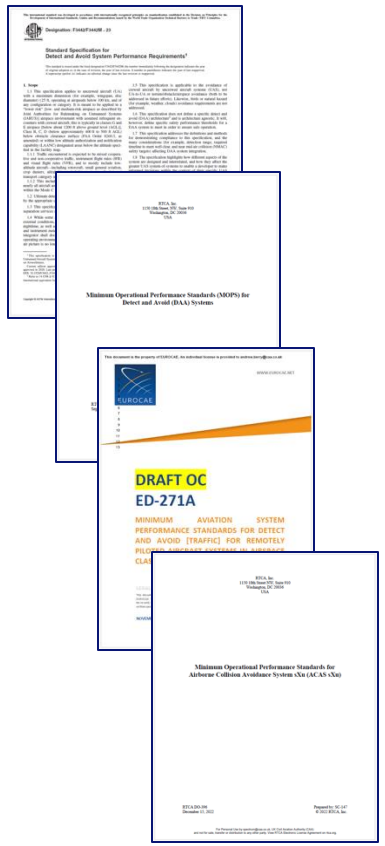
https://www.regulations.gov/docket/FAA-2018-0835

41. The operator must maintain a conflict management capability to ensure that the PIC is able to keep the UA clear of any manned aircraft and other UA.
    a. For management of conflict with manned aircraft, this capability may include use of a DAA system if approved by the FAA in accordance with Condition and Limitation No. 48. In operating locations where DAA is not used or is not available, use of VOs is required to maintain the capability.

48. For FAA approval of a system to support conflict management, the operator must complete the following process:
    a. Submit the following to the FAA:
        i. Information detailing the system's conformity with pertinent sections of industry standards related to collision avoidance systems, ground based surveillance systems, and detect and avoid systems.
        ii. A declaration, and provide evidence supporting its declaration, that its system has been tested and determined to meet these requirements. This evidence should include documentation of the testing, including the specific encounter sets used in the tests, to verify system's performance.
    b. Once these documents have been submitted, an operational suitability evaluation may be required.
    c. Once the system is evaluated, an operational validation may be required under part 135 prior to amendment of the petitioner's OpSpecs to authorize use of the system and define the permitted operational areas where the system may be used.

UK CAA DAA Policy Concept

Tech standards



- Performance requirements?
- Test procedures?
- Detailed algorithm specification?
- Operational services & environment definition?

- Intended function
- Terminology
- Metrics
- Requirements – *performance, reliability, data-integrity, assurance*

The key drivers for standards in aviation innovation

FFIG Action Plan

- UAS and eVTOL pathways
- Standards a key building block within the strategy
- Specific areas of standardization required to achieve strategic outcomes

Regulation Acceptable Means of Compliance (AMC)

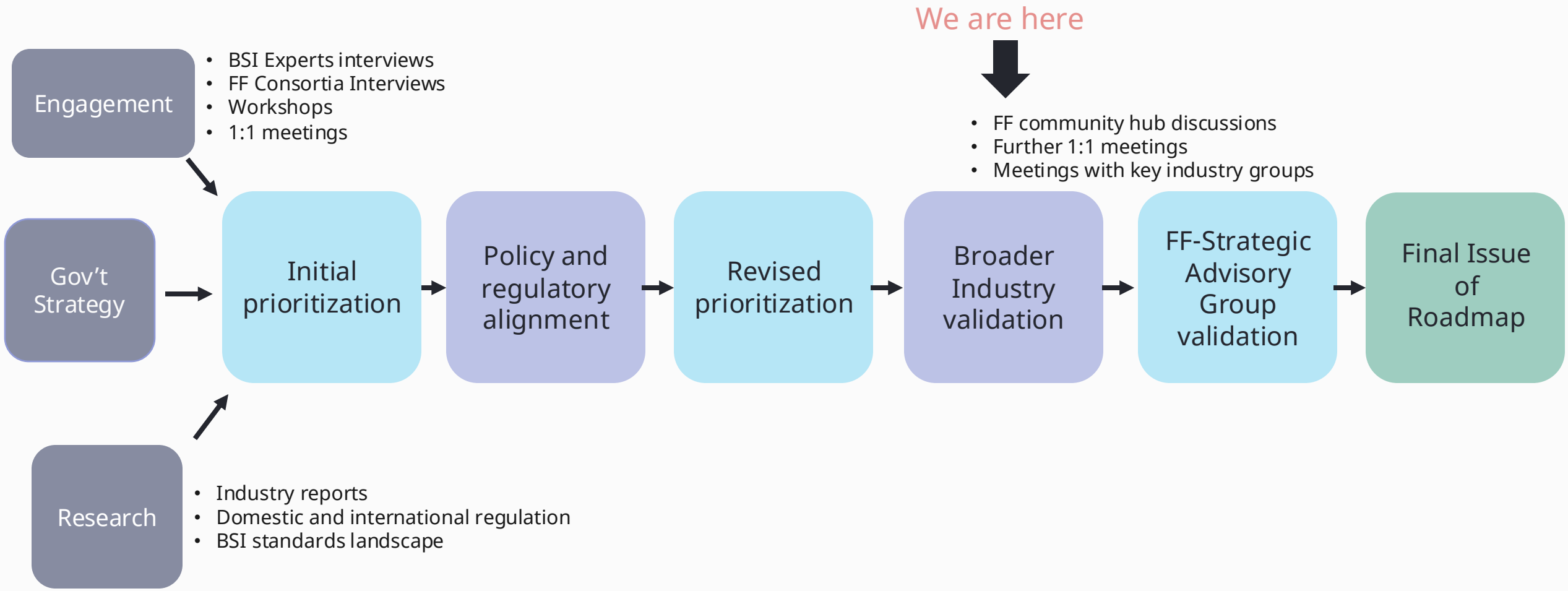
- Drone class marking
- Implementation of SORA
- Flightworthiness
- eVTOL certification
- AMS and airspace integration
- Non-aviation regulation e.g. OFCOM, HSE

Industrialization

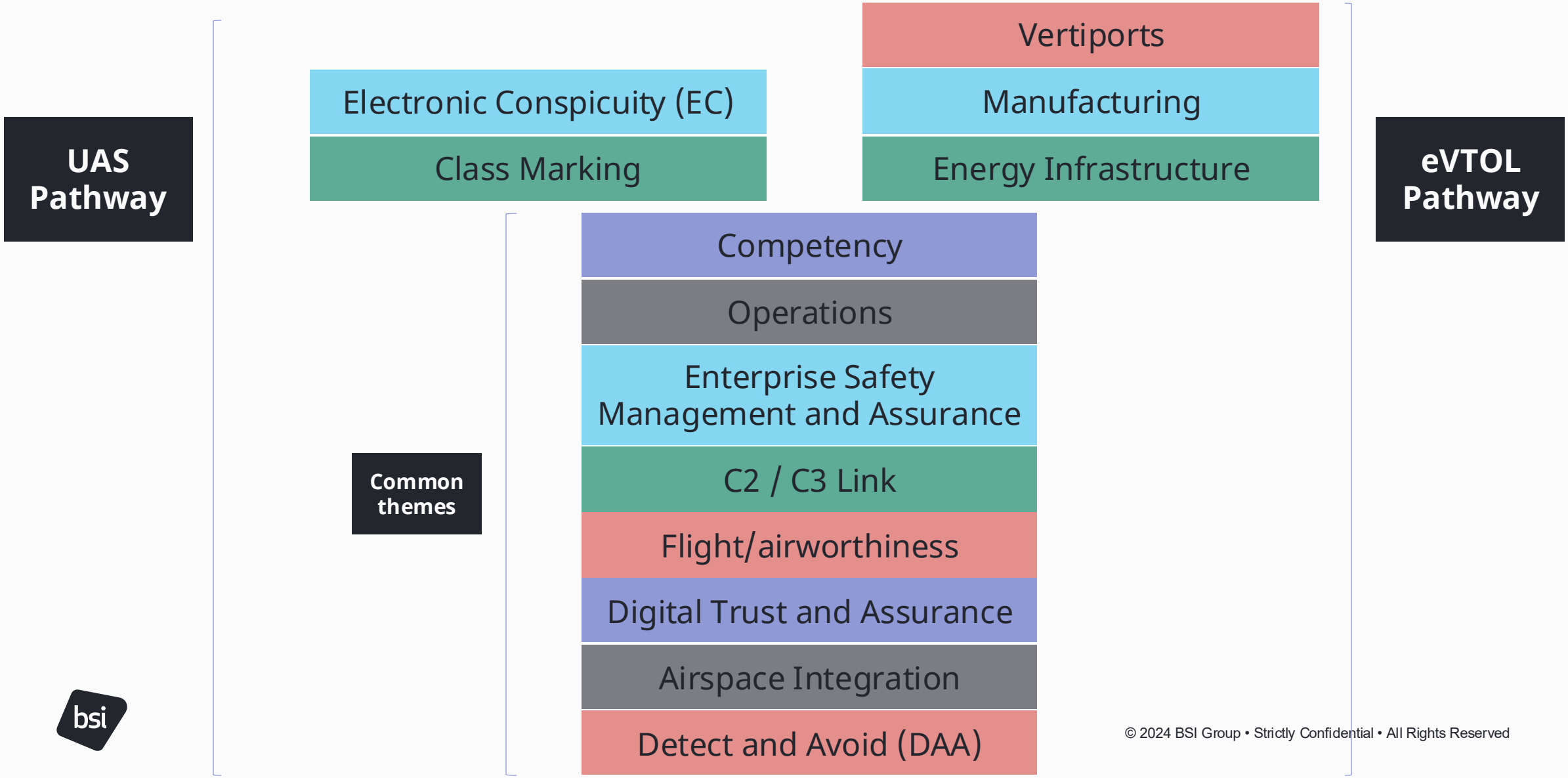
- Transition from demonstrations to commercial operations
- Interoperability and harmonization
- Repeatable and scalable

FFIG = Future of Flight Industry Group

Standards roadmap development process



Standardization themes for UAS and eVTOL



Roadmap structure

	Published	In Development	Recommendations
Detect and Avoid (DAA)	**ASTM F3442/F3442M – 23** Standard Specification for DAA System Performance Requirements	**ASTM WK85788** Revision to **F3442/F3442M – 23** Standard Specification for DAA System Performance Requirements	Collaborate with the CAA to establish which standards will be used as AMC for DAA
	RTCA DO-366A MOPS for Air-to-Air Radar for Traffic Surveillance	**ISO/DIS 15964** DAA System for UAS	Develop standards for DAA solutions not relating to aircraft-to-aircraft hazards, e.g. hazardous weather, terrain and other obstacles (e.g. buildings and birds), and during ground manoeuvres
	EUROCAE ED-275/ RTCA DO-386 MOPS for ACAS Xu (Volumes I and II)	Revision to **RTCA DO-366A** MOPS for Air-to-Air Radar for Traffic Surveillance	
	EUROCAE ED-256A/RTCA DO-385A MOPS for ACAS Xa with ACAS Xo Functionality (Volumes I and II)	**ASTM WK62669** New Test Method for Detect and Avoid	
	RTCA DO-365C MOPS for DAA Systems	Revision to RTCA **DO-387** MOPS for Electro-Optical/Infrared (EO/IR) Sensors System for Traffic Surveillance	
	RTCA DO-396 MOPS for ACAS sXu (Volumes I and II)		
	EUROCAE ED-313 OSED for DAA (Traffic) in Class A to G Airspaces under IFR		
	RTCA DO-381A MOPS for GBSS for Traffic Surveillance		

Roadmap feedback and questions

1. Are we missing any major themes?
2. Are there significant standards being used that we have missed?
3. Are you aware of standards in development that we need to include?
4. Do you agree with the recommendations?
5. Are we missing recommendations?

Links to the review of the UAS roadmap and the eVTOL roadmap will be shared in the chat.

Questions?

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