Innovation Hub

Regulatory Sandbox Guidance

For the Future Flight Challenge

CAP 2130

REGULATORY SANDBOX

1. Purpose of the Document

This guidance explains to Consortia how the CAA Sandbox services can help them to achieve the objectives of their Future Flight Challenge project.

The document covers:

- *Why Consortia should use the Sandbox services*: The Sandbox helps consortia to maximise the regulatory readiness of their innovation and increase the prospects of 1) Complying with future regulations, and 2) Obtaining the exemptions required to demonstrate their products and services in live environments, within the timescales for Phases 2 and 3 of the Future Flight Challenge.

- *The Sandbox framework*: This guidance describes the Sandbox process step by step, the milestones reflecting key achievements as consortia and the CAA progress through the Sandbox process, and the roles of the CAA and Consortia at each stage of the process.

- *How to access Regulatory Sandbox services through the slot system*.

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2. Abbreviations

CAA – Civil Aviation Authority

ConOps – Concept of operations

FFC – Future Flight Challenge

MoU – Memorandum of understanding

NDA – Non-Disclosure Agreement

PoC – Point of Contact

SME – Subject Matter Expert

UKRI – United Kingdom Research and Innovation

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4. Why the Regulatory Sandbox?

Existing regulations are not always fit for the purpose of the novel products and services developed by the consortia participating in the FFC. The CAA must look to change regulations or develop new ones, but the content and scope of future regulations remains unknown. As a result, obtaining exemptions from the CAA for the demonstrations of innovative products and services in live environments remains complicated, and sometimes unsuccessful. Also, new products and services are being developed without any guarantee that they will comply with future regulations. The CAA Regulatory Sandbox (The Sandbox) services address these challenges.

The Sandbox helps consortia to maximise the regulatory readiness of their innovation and increase the prospects of:
- Complying with future regulations, and
- Obtaining the exemptions required to demonstrate their products and services in live environments, within the timescales for Phases 2 and 3 of the FFC.

The Sandbox helps to maximise regulatory readiness by ensuring development activities address the key risks and unknows that innovation brings in terms of safety, security and consumer protection.

5. The Sandbox Approach

At the Engagement stage, the CAA and the consortia develop a common understanding of the innovation, the regulations that apply to it, and where there are gaps in regulations. Where there are gaps in regulations, the CAA clarifies the unknowns and risks that innovation brings with regards to safety, security and consumer protection. At the Planning stage, the consortia propose design mitigations for the unknows and risks. These are then explored through tests and simulations in safe environments (Testing stage) to encourage learnings (Learning Stage). Short iterative cycles of 'Planning, Testing and Learning' are favoured to eliminate unknowns and risks, and rapidly converge towards clarity and focus on how innovation addresses the fundamentals of safety, security and consumer protection.

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We offer Sandbox services prior to an application for regulatory approval being started:
The Sandbox service is an advisory service offered prior to an application for regulatory approval being started. Sandbox services stop as soon as a regulatory application process starts. The CAA individuals involved in the Sandbox services cannot process the regulatory approval. The separation between Sandbox services and regulatory approvals mitigates risks with conflicts of interest.
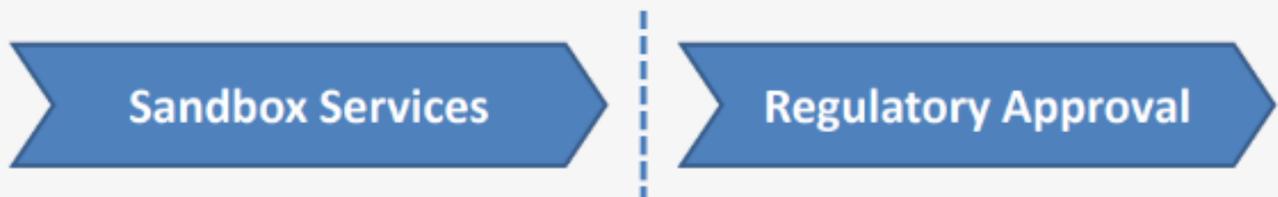
**Sandbox Services do not predispose regulatory decision making:**
Sandbox services are delivered in accordance with the CAA's Innovation Principles and do not, in any way, predispose regulatory decision-making. Regulatory decision making is made by the CAA's core regulatory teams that sit in another part of the CAA. Such outcomes remain the sole discretion of the relevant regulatory teams with reference to CAA's statutory duties.

6. The Sandbox Methodology

This section describes step by step the Sandbox process, as well as the roles of the CAA and the consortia at each stage of the process.

Engagement

1. Sign-off of the MoU and NDA.

2. Kick-off meeting to:
   - Introduce all project participants
   - Confirm key points of contact
   - Review consortium's project outcomes
   - Review project objectives (outputs) and plans for phase 2
   - Clarify the Sandbox methodology
   - Clarify the purpose and format of the ConOps (Concept of operations).

3. The Consortium prepares the ConOps document.
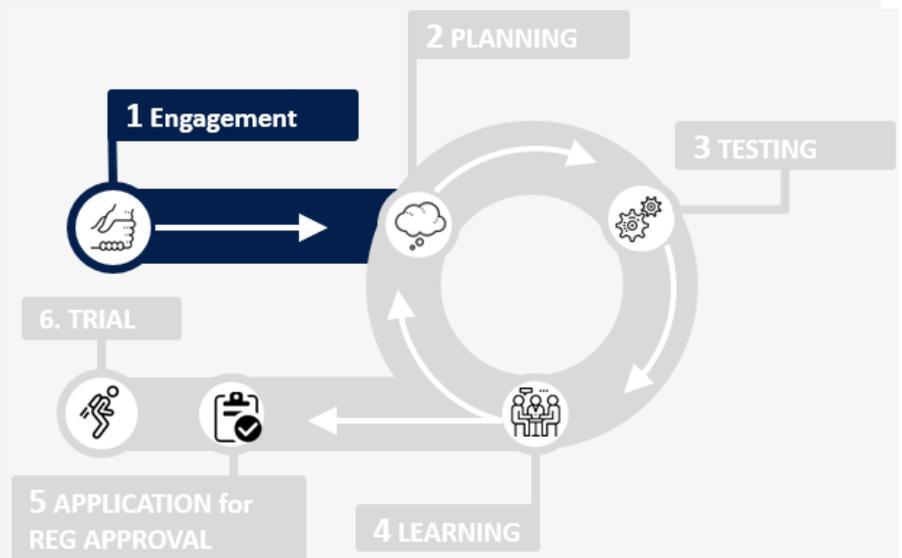
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4. The Consortium and the CAA develop a baseline of the regulatory environment applicable to the ConOps. The CAA clarifies the regulatory challenges:

   - The gaps in regulations, i.e. aspects of the trial that do not fit within the scope and content of existing regulations, and

   - For each gap in regulations, the unknowns and risks that the ConOps brings with regards to safety, security, the environment and choice, value and fair treatment.

5. The CAA prepares a Technical Proposal which sets out how it will help the consortia to tackle the regulatory challenges, and how the provision of Sandbox services could align with the consortia's project plan.

Planning

6. The Consortium proposes a Test Plan that defines:
   - The design specifications, technical specifications, and operational procedures that mitigate the regulatory risks and unknowns identified at the Engagement stage.
   - The evidence base that demonstrates the viability of the mitigations
   - Testing that is to be conducted to gather the evidence base.
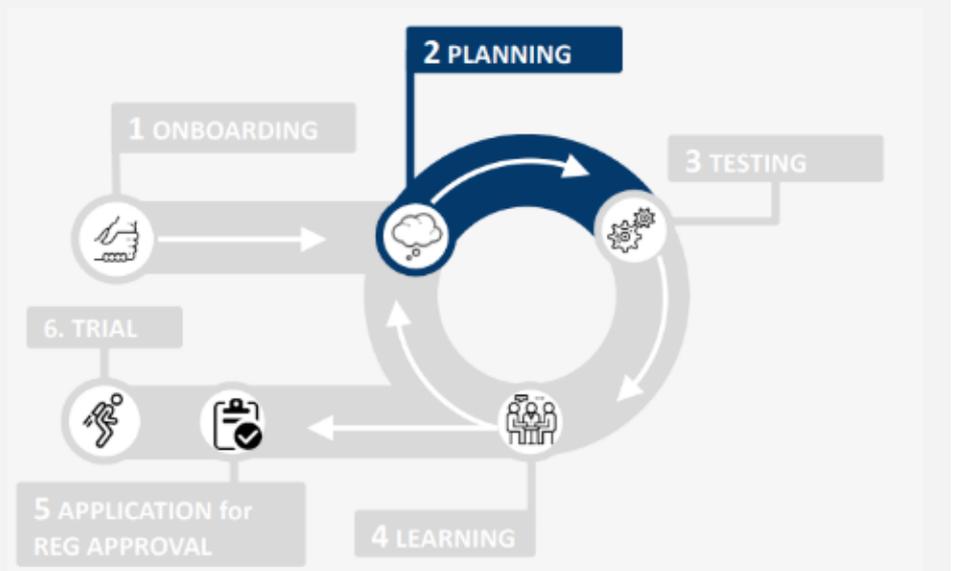
7. The CAA reviews the Test Plan and provides comments on the strength of it. Once the Test Plan has been finalised, the CAA and the Consortium sign-off the document.

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Testing

8. The Consortia applies for the regulatory approvals required to establish the test bed (the safe environment to conduct testing), if required.

9. The Consortia conducts testing in the test bed to gather the evidence base which demonstrate the viability of the mitigations. The outputs and findings of the testing are documented in the Test Report.
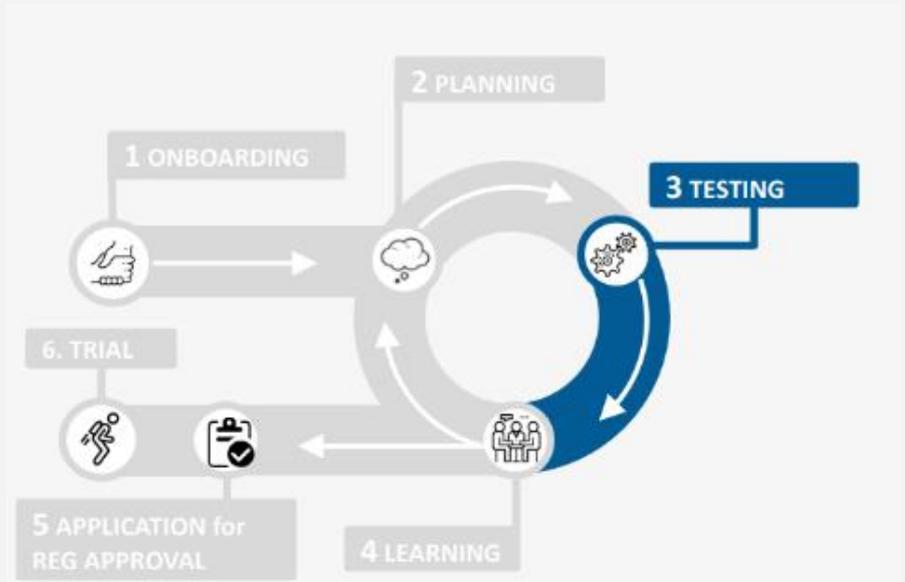
Learning

10. The CAA and the Consortia review the evidence that has been gathered, and discuss the lessons learned from the testing.

11. The CAA and the Consortia agree whether further testing needs to be done, or new emerging regulatory challenges need to be addressed. If no further testing needs to be done and no new regulatory challenges have emerged, the Consortia proceeds with its application for the trial.
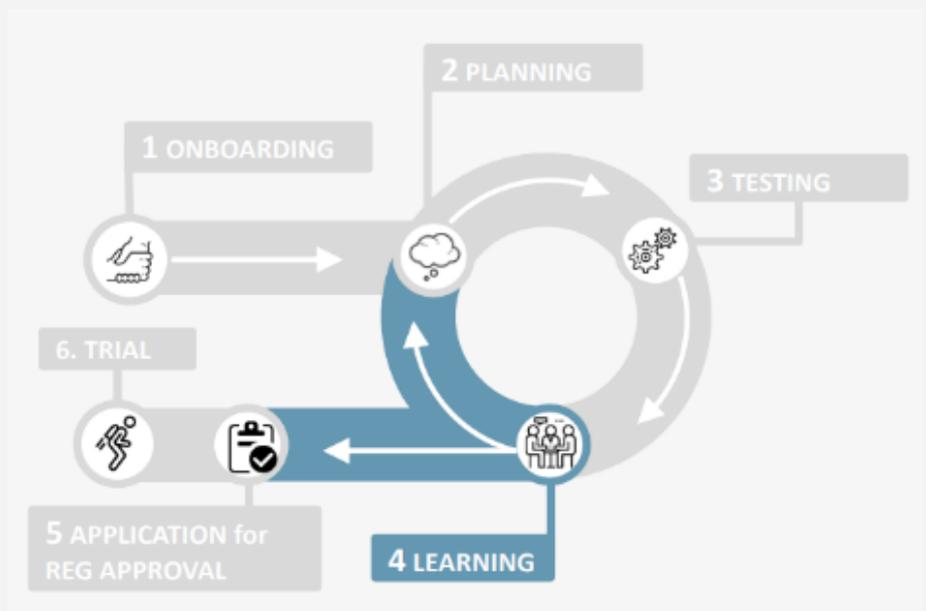
Otherwise, a new cycle of Planning, Testing, and Learning stages is initiated. CAA's recommendations are summarised in a Recommendations Note.

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Application for regulatory approvals, and trial (demonstration)

12. The Consortia applies for the regulatory approvals applicable to the trial.

13. The Consortia regularly will report about findings regarding the success (or otherwise) of trials. The Innovation Hub will share these with other CAA colleagues for the purposes of informing future decision-making, wider policy making, guidance and regulations.
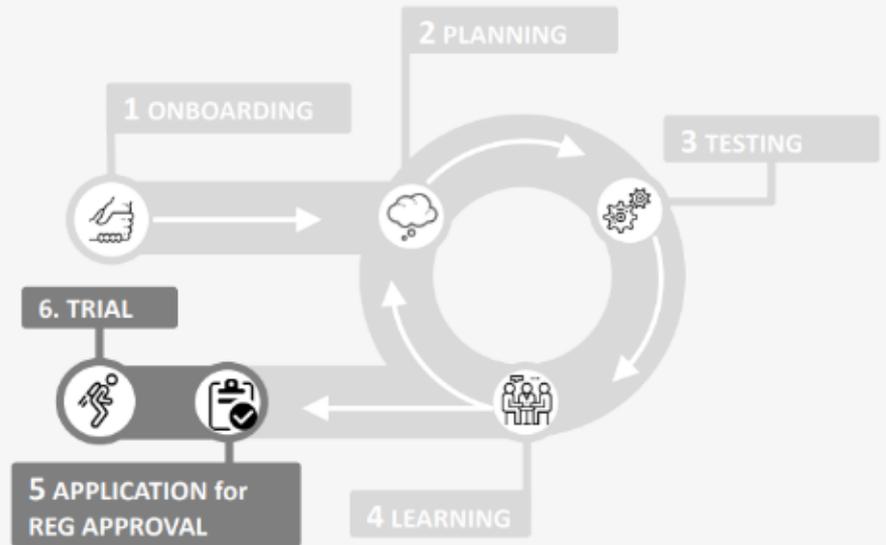
14. Your experience is important to us, and we would like to know what you think we did well, and those areas you feel we can improve. We would be keen to receive your feedback through a feedback report. Your feedback will be confidential and will only be used to improve the services we provide to you and others.

7. Sandbox Milestones

The following milestones indicate the key achievements as consortia and the CAA progress through the Sandbox process.

Engagement		
M 1.	Kick-off meeting between the CAA and Consortium.	
M 2.	Concept of Operation is signed-off by CAA and Consortia.	
M 3.	Technical Proposal is signed-off by CAA and Consortia.	
Planning		
M 4.	Test Plan is signed-off by the CAA.	
Testing		
M 5.	Testing has been completed; the outputs and findings have been documented in a Test Report and shared with the CAA.	
Learning		
M 6.	CAA has assessed whether or not the evidence generated during Testing is strong enough to support a regulatory application for the trial, and whether or not new regulatory challenges have emerged. *Please note that Sandbox services do not, in any way, predispose regulatory decision-making. Regulatory decision making is made by the CAA's core regulatory teams that sit in another part of the CAA. Such outcomes remain the sole discretion of the relevant regulatory teams with reference to CAA's statutory duties.*	

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Each FFC project has different objectives, and it addresses different regulatory challenges of various complexities. The CAA Sandbox services will be tailored to the specific need of each FFC project. We will adopt the following principles:

- Sandbox services are delivered in accordance with the process and milestones set in this document.
- The objectives of each FFC project will inform to what extent a Consortium must progress through the Sandbox process; Some Consortia will not need to full range of the Sandbox services. The scope of the Sandbox services will be agreed at the start of the project and clarified in the Technical Proposal prepared by the CAA.
- We will work towards one milestone at a time. We will keep maximum flexibility to adapt to changes and to define the pathway to achieve each milestone. We will not plan the project end-to-end using the waterfall approach to project management.
- We will keep flexibility in planning resources and time, using our slot system (See section 9, Slot System).

8. Roles and Responsibilities

Innovation Advisors

Each consortium will have access to a dedicated Innovation Advisor who will be responsible for:

- Acting as a single point of contact who convenes CAA subject matter experts, and coordinates information flow

- Explaining how the CAA can help the consortia in their projects and how to facilitate a means to reach their desired outcome

- Connecting them to the right subject matter experts within the CAA in a timely manner

- Discussing the regulations that are applicable to their innovation and the demonstration of their aviation system

- Giving advice on processes to seek regulatory approval

- Facilitating the delivery of the Sandbox projects

CAA Subject Matter Experts

A broad range of subject matter experts across the CAA regulatory functions will support the consortia. The subject matter experts will be responsible for:

- Discussing with the consortia the regulations that are applicable to their innovation and the demonstration of their aviation system

- Giving advice on processes to seek regulatory approval

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- Flagging any regulatory challenges, i.e. aspects of the demonstrations that don't fit within the existing scope of the regulations

- Communicating principles of regulation, i.e. fundamental considerations on safety, security, and consumer protection that guide CAA approval processes

- Supporting the creation of plans for iterative tests and trials. The tests and trials will build the evidence base supporting regulatory approval for the demonstration flights

- The access to subject matter experts will be coordinated through the Innovation Advisor

Consortia

Consortia are responsible for:

- Preparing Conops

- Proposing Test Plans

- Establishing test beds for conducting testing

- Conducting testing and/or simulations

- Sharing learnings from testing, and preparing Test Reports

9. Slot System

Many consortia will need to access our Sandbox services; We expect significant peaks in demand. The slot system will provide all consortia equal and fair access to CAA Innovation Advisors and Subject Matter Experts. It will also guarantee that consortia can access the CAA resources they need.

Principles

Consortia will be able to request time slots during which they will receive support from the CAA Innovation Advisor and Subject Matter Experts.

Consortia should contact their respective Innovation Advisor to request a slot.

Slot duration is variable. It will be agreed upfront and must not exceed two weeks. Beyond two weeks, the consortia will need to request a new slot. We understand that the delivery of innovation projects comes with uncertainties, and delays happen often for a good reason. Therefore, we will keep some flexibility to provide support beyond agreed time slots; but at our own discretion, and subject to resource availability.

Consortia can request as many slots as they want. However, they can only request one slot at a time, and they must complete a slot before requesting a new one.

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Slots are used for activities requiring significant intervention from Innovation Advisors and Subject Matter Experts. Such activities include:

- Reviewing and assessing the Concept of Operations document;
- Preparing and Signing-off the Technical Proposal;
- Reviewing and assessing the Test Plans;
- Reviewing and assessing the Test Report.

For simple queries, Consortia can contact their respective innovation advisors at any time, and they do not need to a request slot.

Guidance

Before requesting a slot, Consortia should ensure that their team is available for the duration of the two-week period. Also, they should ensure they can complete on time the relevant materials they want to review with the CAA during their slot. Such materials include Conops, Test Plan, or Test Report.

10. Questions and Answers

This section provides answers to the most common questions we have received from the FFC consortia:

Q1: Will the CAA be recruiting enough staff to handle the large amount of complex regulatory work associated with the FFC?

The UKRI is enabling the CAA to scale up resources in the necessary teams across the CAA to respond to the demand of the Future Flight Challenge.

The most complex regulatory challenges will demand more CAA resources. However, more CAA resources may not be enough to meet the timelines and objectives set by the consortia; Some consortia may need to scale down the complexity of their solution. The CAA will work collaboratively with the consortia to assess the regulatory challenges, clarify the support that the consortia will receive, and scale projects appropriately.

Q2: Will the CAA charge the FFC consortia?

The consortia will receive free advisory services through the Sandbox. The purpose of this service is to simplify the way consortia work with the CAA, identify the regulatory pathways for the demonstration of their aviation systems, and maximise the regulatory readiness of innovative aviation systems before the consortia start their application for regulatory approvals.

The consortia will need to pay a set fee for the processing of their applications for regulatory approval. These fees are specified in the CAA Schemes of Charge. The Innovation Advisor will confirm the application fees.

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Q3: Does Phase 2 provide sufficient time to complete the Sandbox process?

Timelines for completing the Sandbox process depend on the scale and complexity of the regulatory challenges. The Innovation Team will work collaboratively with the consortia to assess the complexity of the regulatory challenges, clarify the support that the consortia will receive, and scale projects appropriately. We may suggest to some consortia that they scale down the complexity of their solution if they want to meet their project timelines.

Q4: Will the CAA Sandbox be the only Sandbox that can be used by Consortia

Other regulators may offer Sandbox services. The access to their Sandbox services is not covered by the CAA support. The Consortia will need to engage with other regulators to understand the conditions to access their Sandbox services. Where we have connections with other regulators, the Innovation Advisor will be happy to make introductions.

Q5: Is my Future Flight project a Sandbox project?

The CAA Sandbox is a service we offer to consortia. It has been designed to help the consortia maximise the regulatory readiness of their solution before they start an application for regulatory approval. Should a consortium decide to use our Sandbox services, we would expect the Sandbox activities to run in parallel with the FFC project activities that the Consortium has planned.

Q6: Do we need to go through the Innovation Team for all our dealing with the CAA UAS Team for approvals?

For Sandbox services, the consortia will deal with the Innovation team. For applications for regulatory approval, the consortia will deal with the relevant regulatory teams in the CAA.

Q7: Can individual companies within consortia engage with the CAA privately?

Individual companies within consortia will be able to engage privately with the CAA on matters that are outside the scope of the FFC project.

Engagements with the CAA that are in relation to their FFC project will be coordinated through the respective innovation advisor AND consortium lead. These engagements will be conducted under NDA. Under the NDA, the CAA will not disclose confidential Information to any parties outside the consortium. Any commercially sensitive information which must not be shared with the consortia should not be shared with the CAA.

11. ConOps Guidance

The ConOps is the basis for the CAA and a Consortium to develop a common understanding of the regulatory environment applicable to the Consortium's innovation and its objectives for Phase 2 of the FFC. The ConOps should include the following sections as a minimum:

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Background of your innovation
- An outline description of your innovation system.
- The purpose of your innovation system, the application of your innovation system, the market needs and problems it is solving.

The Concept of Operations
- The target operating environment, including for instance flight location, altitude, aircraft, infrastructures, number of passengers, scale of the operations, time of the operations, etc.
- The users involved in the operations i.e. Pilots, Operators, Airports, Vertiports, Ground Operators, Air traffic Control, Airspace Users, and 3rd parties.
- The user journey, i.e. a series of events describing the operations from the point of view of the users.
- The capabilities and/or solutions you will be making use of, whether technological, operational, or otherwise of your innovation system. Explain which capability each of the organisations in the consortium is responsible for.
- The development maturity of your system.

Objectives for the FFC project
- The project plan including deliverables agreed with UKRI, timelines and major milestones.
- When applicable, explain in detail the nature of the trials the consortium is expecting to conduct in Phase 2 and Phase 3 of the FFC. Provide an overview of any progress made to date and what, if any, experimental operations have already taken place. Explain how the necessary and required capabilities will be developed and tested before commencement of the trials.

The ConOps should not cover any detailed design and implementation of your innovation solution at this point. These will be covered at the Planning stage when presenting design mitigations in relation to the risks identified during the Onboarding stage.