Pilots and Trials Guidance

April 2020

Introduction

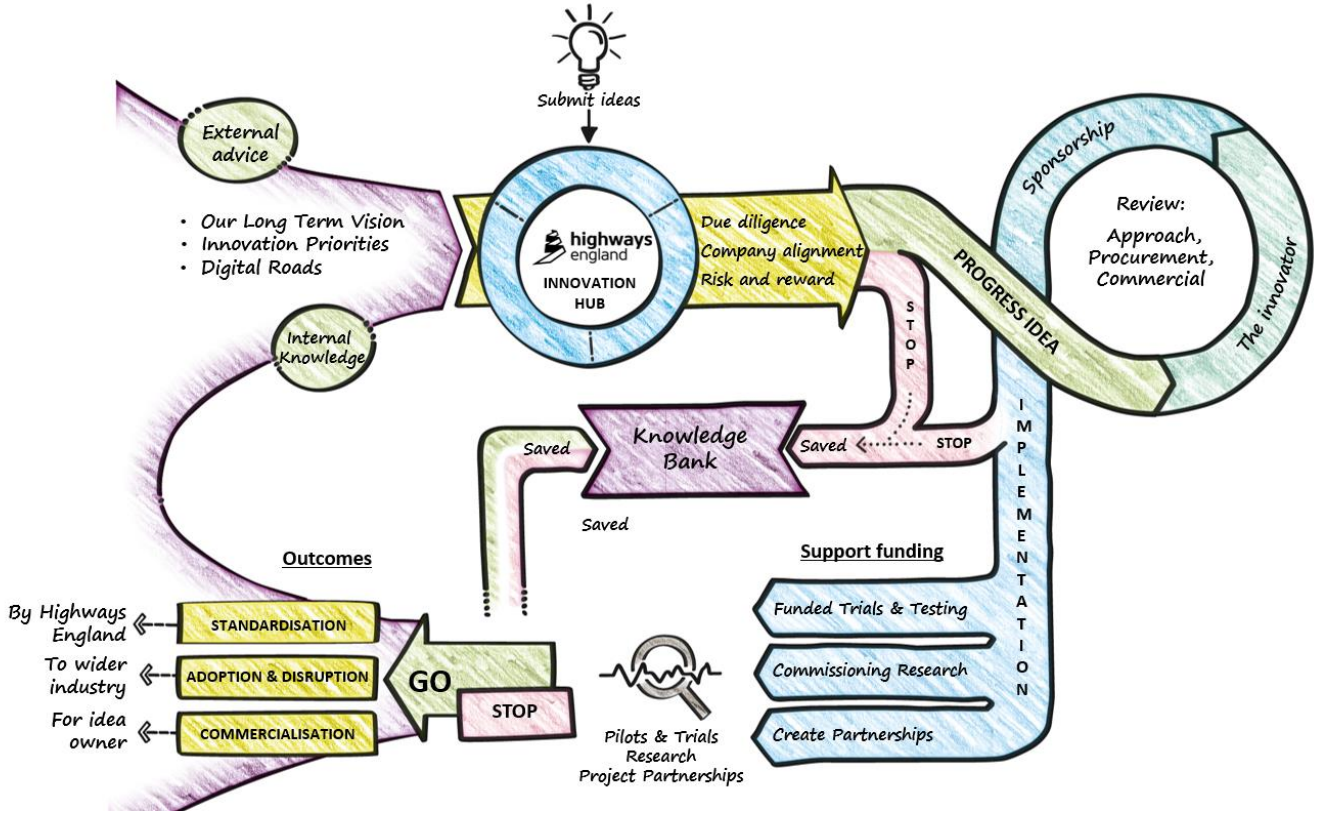
This document provides a guide for Project Managers for the design, management and delivery of pilots and trials on the Highways England network when an innovation, whether a service, system or item/product, is proposed for consideration.

We created this guide to help practitioners, small medium enterprises and start-ups that are involved in the delivery of both small and large pilots and trials. It is recognised that the extent and relevant depth of each stage and review will change depending on the scale of the innovation under consideration.

This guide has been developed through consultation with a range of practitioners involved in the delivery of pilots and trials for Highways England and a review of international best practice and experience.

Through the early consultation with practitioners it was clear that there are several common issues that need to be addressed to ensure the successful delivery of a pilot or trial, whatever the size and scale of the pilot or trial being delivered. The issues identified have been addressed in this revision of the guide.

This guidance supersedes the previous versions hosted on standards for highways.



Highways England Innovation Journey

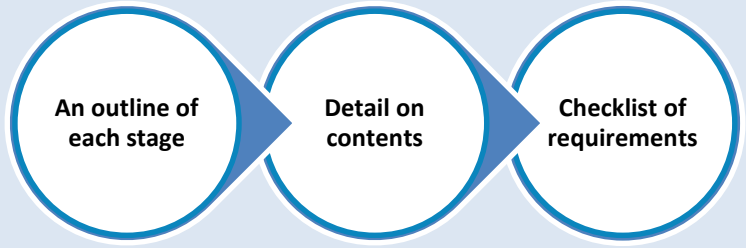
IMPORTANT NOTE FOR USERS OUTSIDE HIGHWAYS ENGLAND:
This document contains hyperlinks (blue signposts) to a number of internal HE documents, some of which cannot be accessed externally at the present time. These are marked "HE internal only". To obtain and view a copy of these documents please contact your HE project sponsor.

How this guide works

A ***trial project*** - tests the implementation approach of a product , technique or material and the risks associated with potential rollout or wider pilots. Trials maybe used to develop innovations prior to wider piloting. E.g. Simulator studies for new signage or off-road testing of new equipment, small scale road tests for new carriageway markings.

A ***pilot project*** - is an initiative that sits outside of current Highways England standards, policies or management systems and is used to prove the full viability of a project idea or innovation. Pilots are more significant projects normally designed to prove more mature ideas which have previously been tested or trialled off-road, on the SRN or elsewhere. E.g. Incident detection in live carriageways.

For consistency 'trial' is used throughout the rest of this guide as a general term for both a pilot and a trial project.



Each stage in this guide contains an outline of the basic requirements followed by itemised details. These are arranged to follow an approximate order; however this may change depending on your project. The end of each section has a stage checklist design for the project team to review. Each checklist can be tailored to your project's specific requirements, maturity or trial categorisation.

This designates a key signpost for those designing a proposed future pilot or trial. The signpost links to required forms, information or key documents which might be relevant to your pilot or trial concept.

Denotes an attention point. You should review if this applies to your project.

Denotes a stop point. Do not move to the next stage of planning unless this area has been completed or reviewed.

The tool bar can be used to navigate between different stages of the guide via clicking on the relevant icon.

For tablet users the guide can be viewed in PDF full screen mode and navigated using the toolbar, arrows and homepage icon.

Pilots & Trials stages

The guide is split into five different stages to reflect the activities and issues that need to be addressed through the life cycle of a pilot or trial. The guide process for the design, management, delivery and evaluation of pilots and trials is divided as follows:

01 **Concept submission** – We review the alignment to HE aims & objectives, and ensure support is available

02 **Feasibility design and sizing** – Ensuring a concept is reviewed by the right people and at the correct scale

03 **Detailed design** – Preparing pilots and trials for decision panels via consistent assurance and validation

04 **Implementation** – Conducting and running pilots and trials on our network

05 **Closeout and review** – Dissemination of lessons learnt and the outlining the next steps for your ideas

The subsequent progression from one stage to another will be managed with stage gates which will review the feasibility, attainability, viability, validity and impact of the pilot or trial. Within the guide there is advice on the level and type of activities needed at each stage. Progression and funding decisions for projects however will always be dependent upon the specific requirements of each fund route. For example, the Innovation & Modernisation Designated Fund.

Single view of trial project stages

The essential steps for each pilot & trials stage is presented here, from initial concept consideration to the later implementation of the trial and subsequent close out and review. For most funding routes requiring our investment review gates will be present to progress at each stage, however this is generic structure and may not apply for all projects. Many projects will be approved funding in phases to develop certain stages (i.e. 2 to 3) before receiving the final go ahead for trial implementation.

Concept

1

The initial stage in the development of any project, i.e. concept design, should provide an overview of how the project aligns with Highways England's aims and objectives. The potential required support should also be identified within this stage

Feasibility

2

Through this stage the initial feasibility assessment will be continued to determine the overall scope of the pilot or trial. In Stage 2 you will move an untested value proposition with key assumptions to a more detailed proposal for enhanced funding and support.

Detailed design

3

The initial trial design will now need to be developed so that by the end of Stage 3 the trial is ready to be implemented. Through this stage you should be building on the assumptions and early design concept from Stage 2. At this stage the project is validated.

Implementation

4

Your progress to this Stage is dependent on securing approval (and possible subsequent funding) for your detailed pilot design. This Stage involves the implementation of your pilot following your design.

Close out & review

5

The post-trial period of the project includes two sections. Firstly the review and dissemination of the project this is followed by the identification and options for the next phase for the project.

Review Stop/Go, redirect

Review Stop/Go, redirect

Review Stop/Go, redirect

Review Next steps

- Modernise
- Repeat or refine
- End and close

Key Outputs

Concept

- ✓ Idea pitch
- ✓ Value proposition
- ✓ Resource requirements for seeding / development phases known

Feasibility

- ✓ Low detail concept complete, agreed and frozen.
- ✓ Early adopters and owners identified
- ✓ Estimation of cost vs investment considered
- ✓ Safety risk assessment starts
- ✓ High level organisational impacts known
- ✓ Develop envisaged plan for commercialisation / next steps

Detailed design

- ✓ Project / idea requirements fully defined
- ✓ Refinement and agreement of pilot methodology
- ✓ Safety risk assessment update
- ✓ Change management review
- ✓ Trial impacts and risks considered and reviewed
- ✓ User & impact groups fully consulted
- ✓ Assessment metrics agreed

Implementation

- ✓ Pilot project delivered
- ✓ Study validation and analysis
- ✓ Decommissioning or hand over of pilot site

Close out & review

- ✓ Closeout report complete
- ✓ Trial disseminated within Highways England
- ✓ User groups & key stakeholders groups informed
- ✓ Next stages, commercialisation or scaling plan outlined.

Our approval and consultation routes

Different funding approval and governance routes exist for any pilot or trial project. Below gives a snapshot on some of the major routes which your trial might align to, before using this guidance it is worth considering the likely approval options and relevance to your trial. For all routes innovation projects as good practice should identify and liaise with their envisaged business, product and service owners during the trial design stages outlined in this document.

Innovation & Modernisation Designated Funds

- Designated Funds are used to support projects that are over and above the traditional focus of road investment.
- This fund aims to transform the way we build, maintain and manage our network. It helps us to research, develop and deploy emerging technologies.
- Please see the I&M section of the Designated Funds Plan to understand what projects will be considered for funding

Designated Funds Plan

- **Projects will have to submit the relevant documentation to the DF team for approval to pass to the next project lifecycle stage – see DF Plan**

Projects being undertaken as part of Designated Funds must comply with DF Governance requirements, as detailed in the Designated Funds Governance Plan

IT projects – Definition of an IT project is as follows:

- Any device that connects to the internet and/or NRTS
- Any software installed or run on HE IT hardware or cloud environments
- Any service, including externally hosted SaaS or websites, that specifies, collects, collates, evaluates, analyses, visualises, exposes, or archives HE's data, or data pertaining to HE's operations, or provides external data to HE users.

ITRC - Customer journey (HE internal only)

- **Clear IT projects should gain approval in Stage 1 from ITD**
- **Projects with smaller IT impact should engage in Stage 2**

If it is unclear if the trial or innovation is an IT project currently or could become one in the future it is recommended ITD are approached during Stage 2 initial design.

Operations – All on-road trials and trials with impacts on Operational processes and methods

- Any innovation, idea or project that is likely to impact on Highway England's Operations
- All projects that require Innovation Modernisation Designated Fund IMDF funding

Operations – Change Decision Meeting (HE internal only)

- **Role is to consider all projects on behalf of Operations**
- **Any required following support from OE for projects given go-ahead to be identified by the panel**

If it is unclear if the innovation, idea or project needs to be presented to Operations, it is requested that the Change Decision meeting owner (Operational Excellence TMO team) is approached as early as possible.

Customer Behaviour – All trials which seek to influence customer behaviours

- If your project is seeking to influence customer behaviour in any way refer to Highways England's behaviour change manual (DRIVES).
- This will give you the best possible approaches to get the behavioural outcomes you want.

DRIVES – Behavioural change Manual (HE internal only)

- **Role is to advise behavioural change and social research trials and provide possible approaches**

It is recommended if applicable the Social Research & Behaviour Change Team is consulted in Stage 2. Email: **SR&BCTeam@highwaysengland.co.uk**

Concept submission

The initial stage in the development of any project, i.e. concept design, should provide an overview of how the project aligns with Highways England's aims and objectives. The potential required support and the proposed Project Sponsor within Highways England should also be identified within this stage. The information below should be captured in-line with your approval pathway, for all Designated Funds this is via the Project Summary Form.

The submission should also provide a brief overview on how Highways England will be required to support the project, at this stage only a brief description is needed and information is subject to change. This information will include:

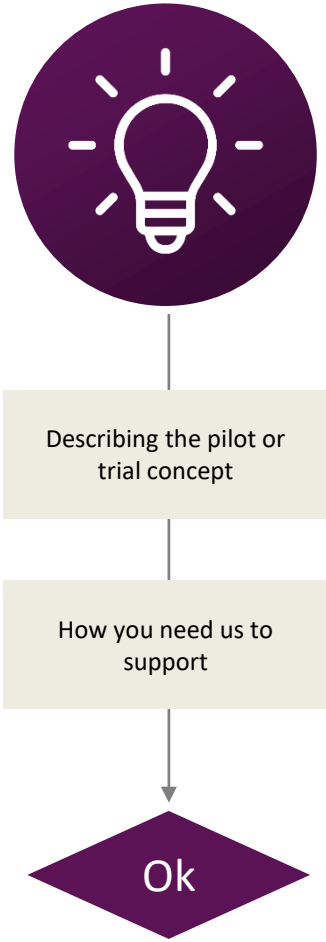
Key information expected for a pilot or trial concept submission:

Describing the pilot or trial concept

- Concept or innovation description
- Aims and objectives
- Strategic fit and KPIs
- Past trial evidence

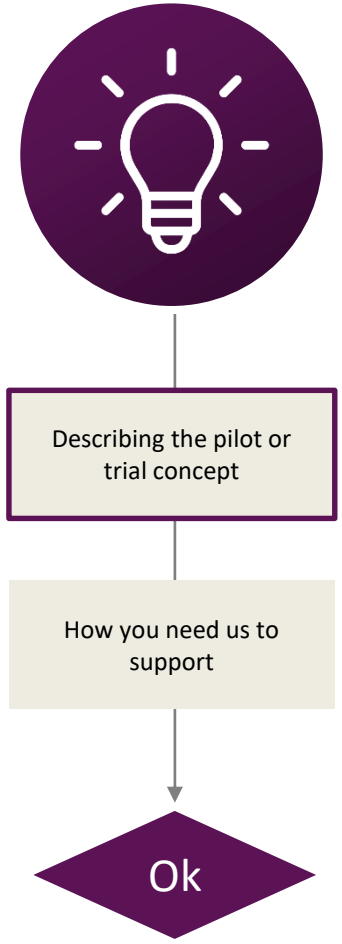
How will Highways England support the project?

- Governance and management
- High Level Risk Assessment
- Project Sponsor Identification
- Early view on proposed funding and duration



Concept submission

Describing the pilot or trial concept



Concept or innovation description

The applicant must provide a high-level description of the concept or innovation being trialled in their application. The intent is to not to force applicants to reveal commercially sensitive intellectual property but to allow Highways England to initially assess the potential safety and operational considerations for the trial.

Aims and objectives

The applicant must identify user needs for the project and determine clear aims and objectives for which the success of the trial will be assessed against.

An initial proposal for the trial's expected outputs and benefits to Highways England, its customers and the wider public should be made. The envisaged key users for innovation if fully developed should be identified alongside why the innovation would help.

Strategic fit and KPIs

An essential element of the user needs analysis is alignment with Highways England strategy and aim of developing services to deliver safe roads, reliable journeys and more informed travel.

The trial should support our 3 company imperatives (Safety, Customer & Delivery) and relevant fund plans which are openly available. If the project is known to support our performance indicators you should highlight this.

Past trial evidence

One of the first steps should be collecting and reviewing previous experience. This should be from within Highways England, other parts of government and from the broader user community or internationally. This can help to ensure the previous lessons are learnt and adequate capability and resources within Highways England are determined for the pilot or trial. If the project links to any previous work on ongoing investments this should be clearly highlighted.

A evidence review should be conducted to determine whether potential solutions to the problem existed elsewhere. The review would collate the analysis, statistics and lessons learnt from previous experience globally and consider potential impacts on the Strategic Road Network

Concept submission

How will Highways England support the project?

Governance and management

By the end of stage 1 it is expected submission should have a early governance process in place. This would identify which part of our business may help support the trial, how the trial will be managed and delivered, and the key stakeholders to review the concept. In determining objectives for a Highways England trial, it is useful to have appropriate cross directorate input and to include specialists who can provide advice on the likely measurability of the expected outcomes and benefits.

Early view on proposed funding and duration

An early assessment on the planned duration(s) and estimated costs or funding requirements may be required in stage 1 depending on your route to funding, designated fund applications will require this information. If possible you should indicate if you require funding support for the feasibility and design stages (2 & 3) or just implementation and review (4 & 5). Additionally highlight if the project is using any other external funding contributions or arrangements.

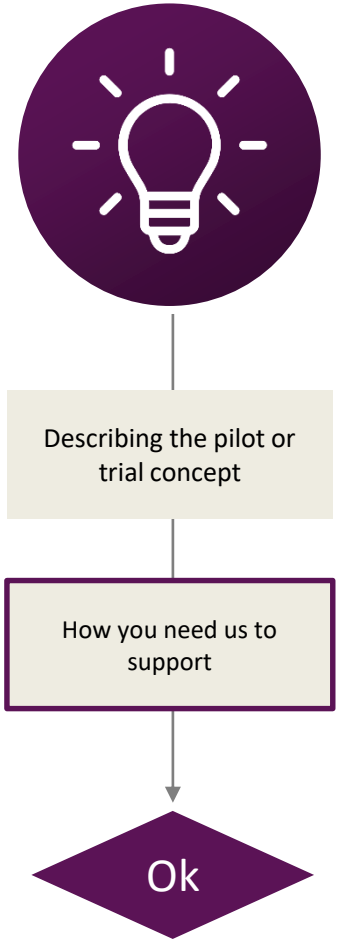
High Level Project Risk Assessment

Applicants must develop a high-level risk assessment outlining relevant risks for the trial and how they will be mitigated or eliminated. The assessment must be provided as part of the application. This initial assessment will be further considered and developed throughout the stages.

Project Sponsor Identification

Using the information provided in the initial submission Highways England shall appoint a suitably qualified Project Sponsor to support the applicant if the concept is seen as applicable and relevant.

The project sponsor will then work with the applicant to reassess the project summary form, and ensure the following checklist of items is known and in place before they progress the project to the next phase of development: Feasibility design and sizing where you start to define the trial parameters, requirements and resource needs.



Designated Funds Plan

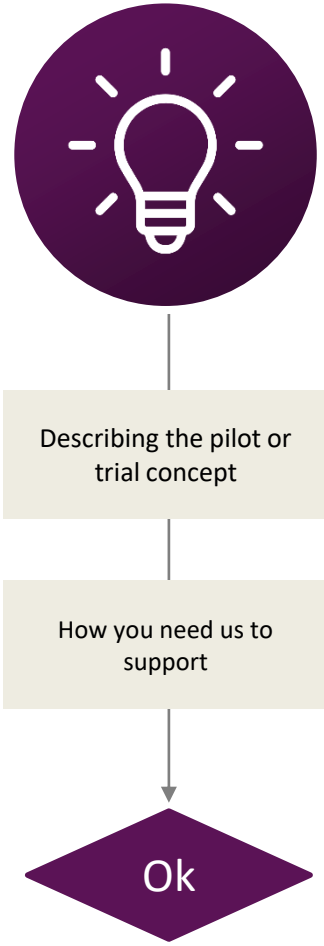
Ensure you have started and completed Stage 1 of the Project Summary Form (PSF) if applying to designated funds. If a Project Sponsor is not already known the Innovation team can support you at this stage.

For clear IT projects under the definition on Page X should engage early with the IT customer journey.

Concept submission – Checklist

Considerations which should be known or assessed prior to moving to the next stage of development by the project sponsor or responsible SRO.

SG1 (Stage Gate)	Describing the pilot or trial concept	SG1	How will Highways England support the project?
☐	Describe how this innovation addresses a major issue or concern.	☐	Have you identified the likely directorate owner? Are they the envisaged business, product or service owner?
☐	Is the innovation in line with the our imperatives, vision and fund plans?	☐	Do you expect HE have the required capability & experience to trial/pilot the innovation?
☐	Have the outline requirements and objectives of the innovation been clearly expressed?	☐	Has the project identified its early funding needs? All stages or just implementation and review?
☐	Is anyone else working in this area, or are previous trials referenced?	☐	Has an initial risk assessment been created?
☐	How does this innovation differ from business as usual approaches?	☐	Is a project sponsor in place?
☐	Are there any other similar innovations globally we could consider?	☐	Has the primary approvals pathway and funding route been identified, liaised with and subsequently agreed?
☐	What is the probability of success?	☐	Can the project suggest estimated benefits for its required funding?



Designated Funds Plan

ITRC - Customer Journey Approval (HE internal only)

Operations Change Meeting Approval (HE internal only)

Prior to starting Stage 2 feasibility work ensure you have completed any stage gate approvals for your chosen funding pathway to initiate early trial design.

It is recommended an early discussion or review of potential intellectual property is held at an early stage

Initial design and sizing

Through this stage the initial feasibility assessment created during Stage 1 will be continued to determine the overall scope of the trial, defining the scope, type of trial and the associated methodologies required. In Stage 2 you will move an untested value proposition with assumptions to a more detailed proposal for enhanced funding and business support.

By the end of Stage 2: Feasibility design and sizing the trial concept will have been established and becomes static, with all low-fidelity prototyping (brainstorming) completed, this should include:

- **Identification, initial communication and consultation with the stakeholders associated with the innovation trial. This includes the envisaged business, product and service owner for any Trial or Pilot**
- **Early adopters and planned business impacts recorded against each identified stakeholder**
- **A first cut of any system, technology, management or engineering requirements for the successful trial**
- **Potential features and boundaries of the proposed system or solution should be explored and proposed**
- **An estimation in the scale of investment and required risk for the trial**
- **Options for the preferred procurement and later go to market approach later in development if the trial successful**

What are we proposing and designing?

Have we defined the possible impact and requirements?

Is the concept sound, feasible, safe and supported?

Ok

The overall level of detail required at this point should be sufficient so that we can assess the estimated resources, cost, and risk associated with the project.

Whilst the innovation under trial might at a low maturity it is important that the future steps and plans for deployment are known to Highways England. Modernisation planning at an early stage allows us to understand how we might best support successful innovations and align our expertise. If a future roll-out or tender is envisaged, early engagement with the relevant HE commercial team should be made.

Initial design and sizing

What are we designing?

Following feedback from us at stage gate 1 or any changes to the innovation boundaries, the aims and objectives may have changed. If this is the case, they will need to be refined in conjunction with relevant stakeholders and can later be used to develop your research questions. Ensure that any proposed changes from Stage 1 are recorded along with any alterations to the perceived trial benefits.

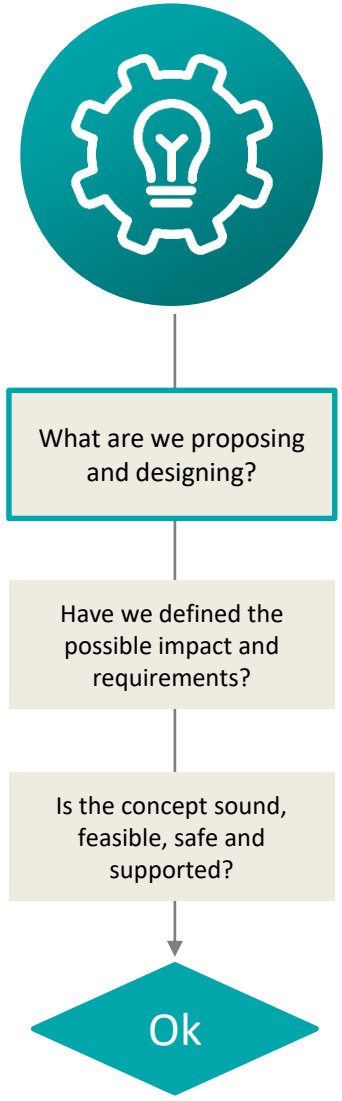
In this stage you should define whether you are designing a wider scale pilot or a trial. You will need to confirm what the innovation will provide in terms of the services it will deliver and the key goals for the project. This will also include ensuring that the proposed project pilot or trial aligns with the overall Highways England strategy and vision. The innovation requirements should be defined so that all parties including stakeholders and implementers, have the same understanding of the innovation.

A trial project - tests the implementation approach of a product , technique or material and the risks associated with potential rollout or wider pilots. Trials maybe used to develop innovations prior to wider pilots. (Level 1 to 3 most likely)

A pilot project - is an initiative that sits outside of current Highways England standards, policies or management systems and is used to prove the full viability of a project idea. (Level 3 to 5 most likely)

Once you have defined what you want to accomplish, the trial should be aligned to our Innovation Maturity Levels. Although it is unlikely that trial concepts will be higher than maturity level 3, it is important to consider how you aim to commercialise, deploy and scale the innovation post this current phase/level. A description of each level is below, more information is held in Annex A.

Innovation Maturity Level		Description - key activities expected for each level
1	Initial Research	Understanding the problem and exploring possible solutions
2	Concept & feasibility	Developing or testing a concept, designing the solution and testing feasibility of solutions
3	Development and verification	Developing the preferred solution, verifying the design through prototype demonstration in a real world (or near real world) environment
4	Validation and optimisation	Scaling up the solution for roll-out or commercialisation
5	Deployment and post launch	Implementing or rolling out the solution and assessing its impact



Innovation Maturity Levels - Annex A

Initial design and sizing

What impact and requirements could my trial have?

At this point, the scale category for the trial should be defined by our range of A (Low Scale), B, (Medium Scale), and C (High Scale) trials. The scale category is related not only to resources or cost but also possible impact on Highways England's operations or stakeholders during its implementation and post-trial. The category determines the level of detailed design that is needed for approval and implementation.

Categorisation of the trial is based on four factors:

Impact on Highways England

The effect that the project could have on current Highways England processes, procedures, structure, roles and responsibilities, competencies, polices and strategy, in addition to contractual, commercial and workforce arrangements.

Stakeholder impact and interest

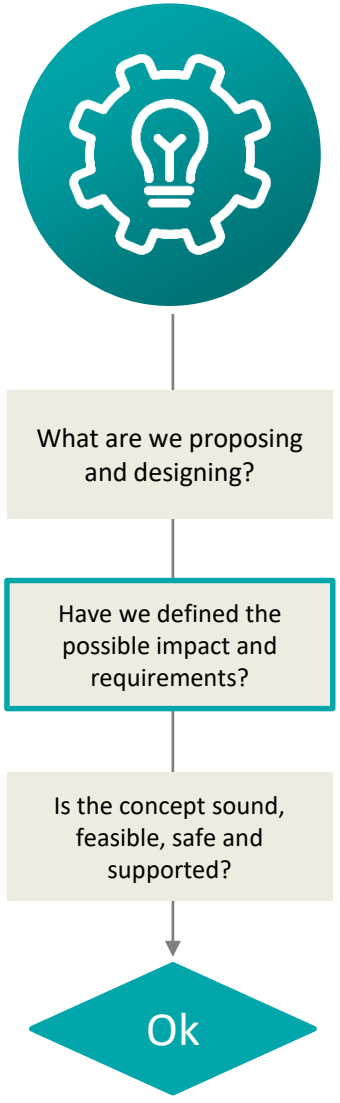
The quantity and/or impact of stakeholders, their interest in and resulting ability to influence or/impact on the activity. Projects with numerous, complex stakeholder interactions or conflicts of interest should highlight and plan for this at an early stage.

Capital outlay and resource requirement

An initial cost estimate for the trial competition should be determined. This would include; purchase and installation costs for equipment, resources associated with data collection and later analysis and reporting costs.

The assigned innovation maturity level

The pilot or trial should be aligned to our Innovation Maturity Levels. Early maturity projects are more likely to be related to research and proof of concept work. Higher maturity projects are often related to validation testing on-road.



You should first define the impact the trial will have on these features before assigning it to a category. The level of detail required at this stage is low however your understanding of these factors should be enough to accurately assign a category to the trial. You should provide justification for your category selection. More information on our scale categories is available in **Annex B**.

Innovation Maturity Levels - Annex A

Trial Category Assessment - Annex B

Initial design and sizing

What impact and requirements could my trial have?

Before progression to Stage 3, in addition to the previous sections where you sized your project you should provide sufficient detail of the following in order for Highways England and the project team to assess potential project impacts and areas for further consideration in detailed design.

Trial programme and estimated cost to Highways England. The team should have a proposed programme in place. Durations of any trials off or on-road should be made clear, including possible mitigations or arrangements for programme change.

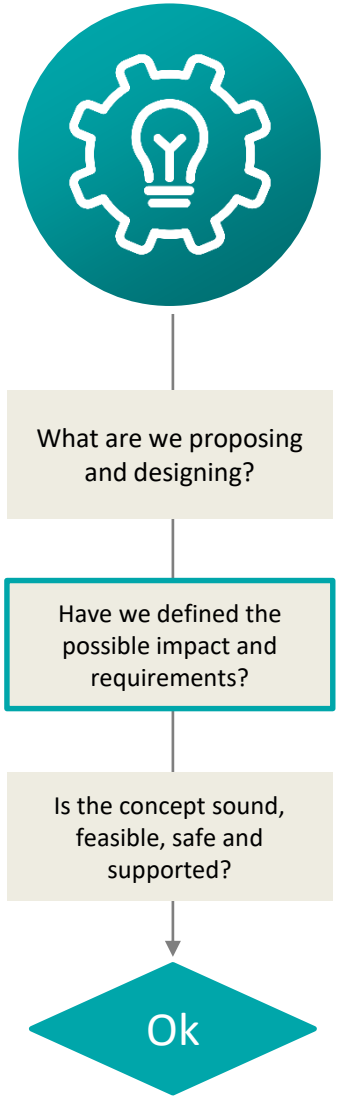
Expected benefits and how these will be measured, what baseline will be used? At a minimum success criteria need to be formalised. Benefit management and VfM assessments might be required for larger trials, support materials are available.

Resource requirements or demands (non-capital) such as skilled staff or data. Requirements on HE or external partners should be highlighted. If the case an outline approach to how this will be managed should be included in any Stage 2 submission.

Infrastructure and network requirements, access and availability needs for the trial to the SRN or systems. If access to the SRN or sites is required trials must be categorised to reflect, specific arrangements must be considered early in the trial design.

Location requirements, definition of criteria to select a suitable trial site. Site selection could require site visits and considerable consultation, if relevant this needs to be highlighted in Stage 2.

Legal and ethical issues (including intellectual property). Does the project have legal or ethical implications? Any trial involving the collection of data or personal information, impacting on users or involving participants should have a legal and ethical review.



Benefits Management Manual (HE internal only)

Analytical Assurance (HE internal only)

The guide does not cover project governance and management requirements for trials it is expected appropriate management principals are employed depending on each project.

Initial design and sizing

Is my concept sound, feasible, safe and backed by the company?

Safety risk assessment

An initial safety risk assessment is required before progression to stage 3. Health and safety are Highways England's primary business imperatives and any activity that does or can have an impact on safety on Highways England's network should follow the GG 104 requirements for safety risk assessments. GG 104 provides a flexible approach allowing safety risk assessments to be as simple or as complex as the activity being assessed requires. It can be applied appropriately for the many and varied activities undertaken across the business, including all pilots and trials.

At this stage tasks include: Defining the safety question your SRA will answer, determining options, categorising your activity (within GG104), definition of SRA scope and documentation of your decisions, assumptions and considerations

For more details on the safety risk assessment framework process, please click the signpost for GG104. The "Safety Risk Requirements Team" are available to help with assessments and guidance of GG104 use in trials.

Consultation

You should also formalise your stakeholder consultation at this point as the initial design becomes more defined and understand the necessary approvals from different groups in Highways England that you require. We recommend the project team creates a stakeholder consultation plan, this can then be maintained through Stages 3, 4 and 5.

The consultation needs for each trial will vary, but should start within the directorate most likely to own, support or be impacted by any successful trial.

Key questions which should be asked include?

Further info is on page 5

Appropriate review – All category C trials will require significant review and approval
IT projects – All trials with an IT element require input and consideration by ITD
Operations – All on-road trials should involve Operations Directorate in Stage 2 prior to submission
Customer Impact – All trials which will directly or indirectly impact on, or interact with, our customers

During this stage you must consider a safety risk assessment (SRA) for your trial

Safety risk assessment (GG104)

ITRC Customer journey (HE internal only)

Designated funds Plan

Innovation SharePoint Resources (HE internal only)

What are we proposing and designing?

Have we defined the possible impact and requirements?

Is the concept sound, feasible, safe and supported?

Ok

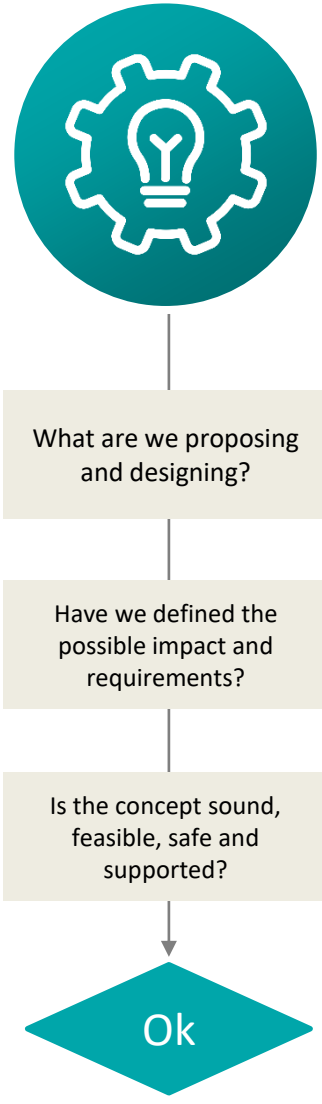
Do not move to detailed design (Stage 3) without categorising your trial, reviewing the requirement for an SRA and reviewing the checklist provided at the end of this section.

Initial design and sizing – Checklist

Considerations which should be known or assessed prior to moving to the next stage of development and submission by the project sponsor or responsible SRO. At this stage your trial concept design should be frozen with buy-in from key stakeholders to the trial concept. The design should have a defined scope, with clear objectives and success criteria which can be assessed. The team must have agreed the feasibility of the concept prior to moving to Stage 3.

In Stage 2 the checklist is scaled to the selected trial category

SG2	For all categories of trials (A,B,C)	SG2	In addition for Category B and C consider:	SG2	In addition for Category C consider:
☐	Have the aims and objectives changed? Scope fully defined.	☐	Initial technical requirements for the trial outlined	☐	Infrastructure and network requirements for HE
☐	Trial programme and resource requirements created	☐	Features and boundaries of solution proposed	☐	On-road trials – further site criteria considerations
☐	Does the now frozen concept still align to HE vision & strategy?	☐	A business case in place for innovation	☐	Customer & performance impact review
☐	Initial safety risk assessment to step 4 complete – appropriate reviews convened for the trial?	☐	Have the benefits been reviewed against cost?	☐	Expected benefits review with further detail
☐	Has the consultation plan been enacted	☐	Have the benefits been reviewed against cost?	☐	Expected benefits review with further detail
☐	Have stakeholders agreed to the concept design?	☐	Evaluation plan in place for assessment.	☐	Initial safety risk assessment has been reviewed
☐	Have clear assessable success criteria been made?	☐	Have lessons learnt from past trials been sought to inform this work?	☐	Future development pathway - how could this be standardised
☐	Have legal and ethical issues been reviewed?				
☐	Partners, contractual requirements and IPR reviewed				



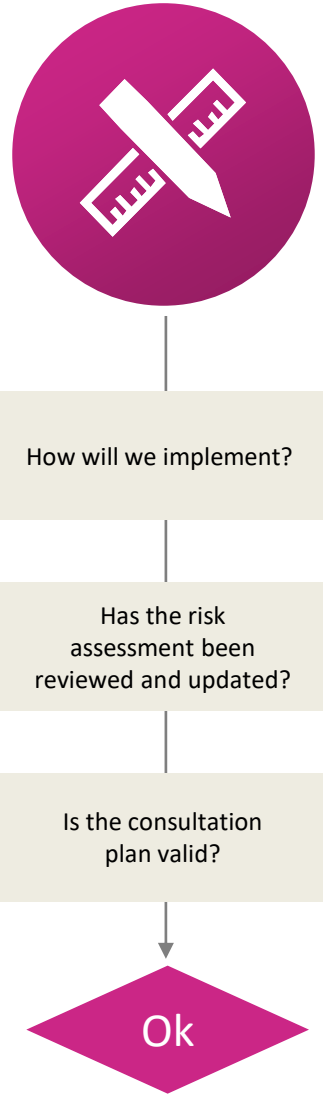
Detailed design

The initial trial design will now need to be developed so that by the end of Stage 3 the trial is ready to be implemented. Through this stage you should mainly be building on your Stage 2 submission where your concept design was frozen and initial stakeholder support was agreed.

By the end of Stage 3 typical outputs expected to prepare the trial before implementation include:

- **Updated detailed trial programme – covering all key activities and showing inter-dependencies**
- **Refined methodology from Stage 2, with resources known and identified**
- **An evaluation / assessment framework which allows for verification of the experimental hypothesis**
- **A clear set of deliverables matched with resources and internal / external skills and roles**
- **How you will install / create, operate and decommission the trial**
- **An updated stakeholder consultation plan with recorded changes and actions**
- **An updated safety risk management plan to reflect you detailed methodology and trial design**

Stage 3 submissions for implementation funding will also be expected to demonstrate evidence for project management, governance and procurement. This section outlines features more closely associated with trials and pilots, it is expected all projects will be delivered/managed in line with industry best practice and Highways England's requirements.



Detailed design

Is there a clear innovation methodology and a set of deliverables?

Through this step you will need to develop the trial methodology and resource requirements in accordance with the design requirements specified in Stage 2. It is essential that you clearly set out and finalise your aims and objectives before determining the methodology.

Research questions and hypotheses

The research questions specific to a project can only be identified once the overall aims and objectives have been established. Research questions should be defined using scenarios that have been derived systematically from use cases. Defining and prioritising the research questions at an early stage will ensure they stay at the focus of the trial. Once the research questions have been defined, the assessment methodology and hypotheses can be developed.

Performance indicators

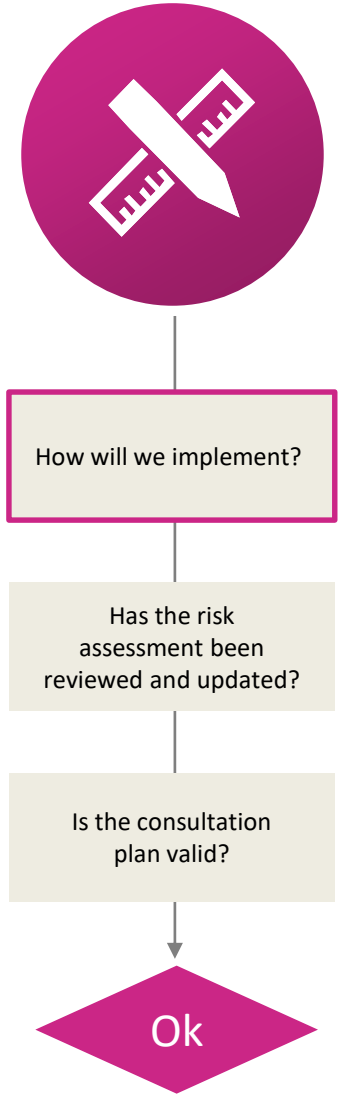
While developing hypotheses, it is important to choose appropriate Performance Indicators (PIs) that will allow answering the hypotheses and will also be obtainable within the budget and other limitations of the project. PIs are quantitative or qualitative indicators used to evaluate the success of a project, derived from one or several measures. PIs can be expressed as a rate, index, percentage or other value which is monitored at intervals and can be compared to one or more criteria.

Data collection and analysis

Having determined the range of PIs, consideration must be given to how they are quantified and measured. This will inform the data to be collected. You will need to detail what data collection equipment is required, how the data will be stored and data ownership.

An important aspect to consider is to ensure that sufficient represenative 'before data' is collected to reflect the 'before' trial situation or baseline. Whilst data collected cannot commence until the trial has been progressed to Stage 4, it is strongly recommended that preparation for data collection and potential sources are checked and started at the earliest opportunity. This will also inform your SRA to define a safety baseline and objective.

The analysis methodology should be defined so that it enables the independent assessment of the innovation. To avoid bias, depending on the trial an independent party may be needed to carry out the assessment or validate. Stakeholders and suppliers should be involved through this stream to review and refine the assessment requirements.



DRIVES – Behavioural change Trial support (HE internal only)

Analytical Assurance (HE internal only)

Detailed design

Are we ready to implement?

Before Stage 4, it is essential that you plan how your trial will be set-up, installed, certified, commissioned, operated and decommissioned. This includes all relevant details regarding certification, installation monitoring, operational monitoring and planning how you will record this information.

Site location

The criteria and definition of the trial location must be clearly defined and confirmed in this stage. For on-road trials this would could consider variables such as; traffic, geometry, environmental impacts or seasonal effects. Off-road trials should also be assessed, as these are not always fully controlled environments.

Accessibility and availability must be confirmed in principal, and required methodologies incorporated into scope i.e. Traffic management, road space booking, timescales or planned works which may impact.

To confirm location, site visits and assessments maybe required at Stage 3, if so all key parties should be aware and involved in site selection. The site assessment may also include risk and environmental impact analysis as deemed appropriate. All category C trials would be expected to undergo impact analysis.

Installation

The implementation and construction of trials on the operational network will require significant planning to ensure the impacts on road users and others is minimised. An implementation plan should be developed and progress against this plan during implementation should be regularly monitored.

During installation the impact of the trial on the travelling public is likely to be highest. This will be particularly apparent through any disruption caused through the construction period. A proactive communication plan should be adopted, particularly for larger trials, to publicise significant milestones and include suitable activities to maintain positive end user stakeholder involvement within the trial, such as press releases.

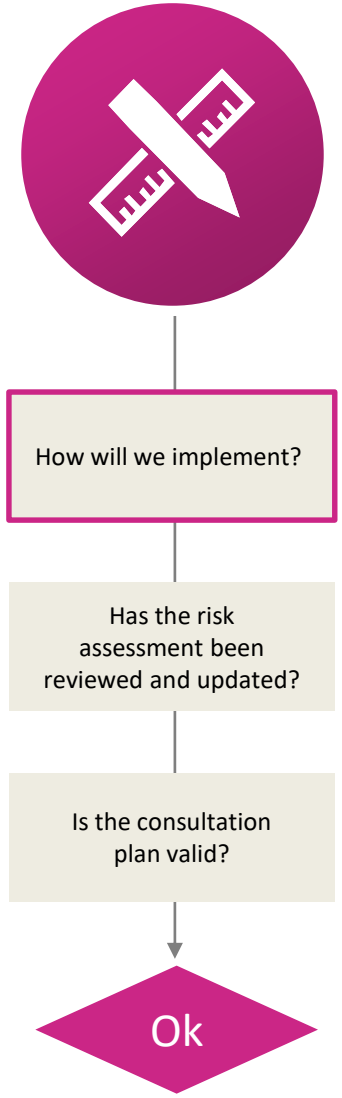
Even off-road trials can require significant planning in Stage 3 and should not be overlooked.

Operation

Close liaison between the implementation team and the operational and assessment team is very important to ensure the successful transition. Roles and responsibilities for all teams involved should be clearly defined and accepted by all parties.

The innovation may require calibration and fine tuning to ensure that the optimum performance on site can be attained. This is particularly true for trials involving new systems. This may take some considerable time before it is suitable to undergo overall assessment in accordance with a pre-defined framework.

During operation, the initial focus will be monitoring any untoward adverse effects, in order that these can be correct without delay, or if this is not possible, consideration can be given to abandoning the trial.



Detailed design

Are we ready to implement?

The hypothesis, performance indicators, data collection and site have now been confirmed. Before stage 4 the trial design must detail how the expected outcomes are to be quantified, what they might be, and any additional costs, resources or considerations.

Assessment

Consideration must be given to how trial impacts are to be quantified and measured. It is possible at this stage that the likely impact of some indicators will be minimal particularly in comparison to the size of the trial being undertaken. Judgement will be required to assess the risk of eliminating the quantification of some of these potential indicators. Consideration should also be given here to the potential of combining the measurement of two or more indicators. It is essential at this stage that all the assumptions made in the assessment are recorded. These will prove particularly useful should the completion of the pilot lead to the development and adoption of new standards.

In stage 3 a document outlining the methodology to be adopted to quantify the impacts must be produced – this should be updated if new indicators or assessment methods are introduced.

During the trial a monitoring and evaluation report must be prepared summarising the various results from the assessment and drawing conclusions from the trial. Several formats for the final report may be required to ensure that stakeholders receive the appropriate summary information. Reports should be tailored to provide information to assess trial impacts at three levels of timescale:

- Reporting to enable rapid changes to be made to counteract any unforeseen, dangerous or other adverse outcomes
- Short term impacts to be identified early in the life of the trial for potential changes
- Medium to longer term, wider, impacts

Expected Benefits

Having developed the overall methodology the anticipated impacts of the system should be quantified. This will consider the impacts, positive and negative, of the pilot in isolation and also the impact of the implementation of the innovation across the broader HE network following a successful roll-out. This may build-on or reuse work completed in earlier Stages.

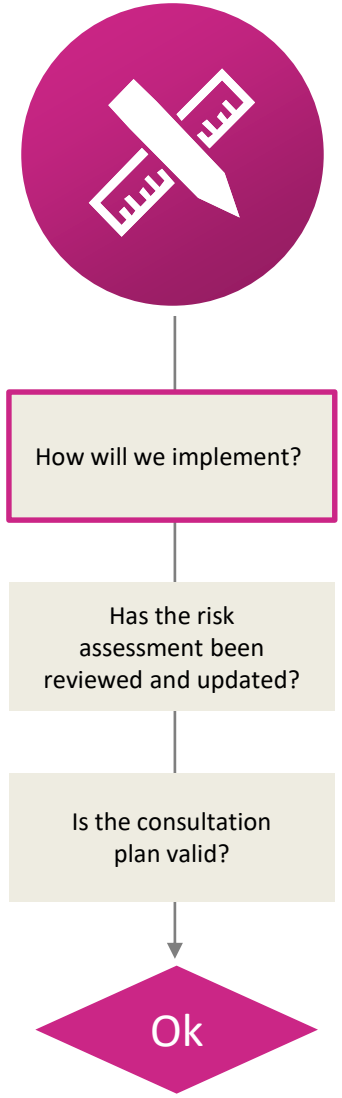
This estimation of the impacts can be used to justify the trial during the Stage 3 review process or to inform a wider business case or Value for Money assessment.

Other cost and considerations

A later step is the determination of estimated costs for the outlined assessment methodology. This again will feed into the Stage 3 review process and potentially wider business cases for more mature innovations.

This should include all costs associated with trial assessment and operation such as; equipment purchase, data collection resources, data or computing fees and subsequent analysis costs.

During this stream of work it maybe necessary to revisit your methodology if more cost-effective assessment is possible or required due to limitations.



Detailed design

Have we updated the safety risk assessment and trial classification?

Safety risk assessments (GG 104) are live documents that should be reviewed and updated throughout the life of the trial. If anything changes that affects the trial, a review to check how this could impact your safety risk assessment should be completed, this does not invalidate your previous work.

Having updated your methodology, the anticipated impacts of the trial should be re-quantified. You should consider both positive and negative impacts of the trial in isolation, in addition to the impact of the implementation of the innovation across the broader Highways England network following a successful roll-out. This can be recorded against your trial classification criteria or any benefits management documentation being maintained during the trial.

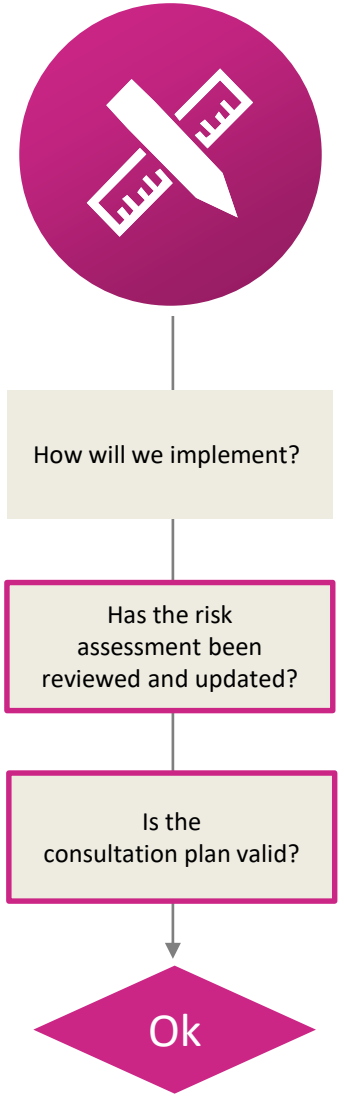
Safety risk assessment (GG104)

Specific SRA actions at this stage would align to steps 5 -8 of GG104. Steps would include: definition of the safety baseline and objective, defining monitoring regimes, updating the SRA iteratively based on any changes or a review of operation, hazard identification risk analysis, assessment and evaluation against the baseline and specifying any handover arrangements and action owners.

Is the consultation plan valid?

Stakeholder management is crucial, and your consultation plan needs to be complete and valid prior to implementing your trial. Your plan should address the following:

- Ensure full buy-in by all stakeholders for the finalised detailed design – record comments
- Define the status of all stakeholders and their requirements during implementation phase (Stage 4)
- Ensure stakeholder roles are clear at all levels to permit other sub-groups to pursue their objectives without delay
- To agree scope of participation of stakeholders during the implementation phase
- To ensure full co-ordination of strategy with other parties (potentially external to Highways England)
- Define the communication management plan for the trial – this includes new stakeholders for Stage 4, and user comms if required.



Ensure you have updated the safety risk assessment GG104 to reflect you final trial design. Ensure your previous trial category is still correct (Annex B)

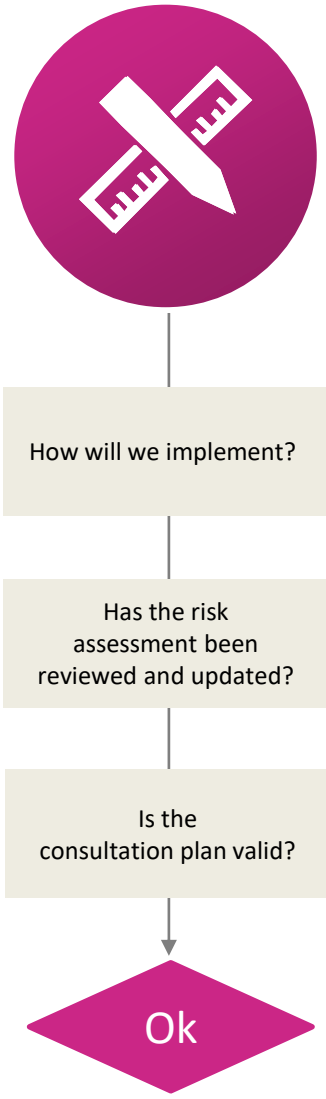
Do not move to Conducting the Pilot (Stage 4) before completing your detailed design and reviewing the SG3 checklist at the end of this section.

Detailed design – Checklist

Considerations which should be known or assessed prior to moving to the next stage of development and submission by the project sponsor or responsible SRO. At this stage you trial design should be complete with buy-in from stakeholders to the trial methodology. The design should have a defined objective, performance indicators, assessment method and implementation plan.

In Stage 3 the checklist is scaled to the selected trial category – this checklist should build on work completed in Stage 2

SG3	For all categories of trials (A,B,C)	SG3	In addition for Category B and C consider:	SG3	In addition for Category C consider:
☐	Does the design include a well considered innovation description?	☐	Is there a reviewed updated business case for the project?	☐	Has a cost benefit analysis or similar technique been considered as needed?
☐	Clear deliverables established, design is fully defined?	☐	Has the project team considered other options or solutions during design?	☐	Is a detailed communications plan for stakeholders in place?
☐	An evaluation and assessment methodology is in place	☐	Have any specific location requirements been considered and reviewed?	☐	Has the innovation undergone a feasibility review by a HE Subject Matter Expert (SME)?
☐	Safety risk assessment has been updated & agreed to reflect final design	☐	Has an a appropriate site or location been selected for the trial?	☐	Has any maintenance or site access planning occurred?
☐	Performance indicators which allow verification are agreed	☐	Does the design include detailed methodology for the trial's operation	☐	Are any required impact assessments prepared?
☐	Has the consultation plan been enacted and support gained?	☐	Are the trial reporting mechanisms known? To enable rapid changes?		
☐	Contractual, legal and ethical review remains ok?	☐	Are all stakeholders aware of their roles and duties for this trial?		
☐	Project costs and programme cover all key activities				



Conducting the trial – setup

Your progress to this Stage is dependent on securing approval (and possible subsequent funding) for your detailed trial design. This Stage involves the implementation of your trial following your design. You should conduct both trials and pilots with bespoke project management stage gates and Key Performance Indicators based on the most appropriate management process. You should also use such processes to assess early termination of the trial.

Trial setup

Data collection should be started as soon as practicably possible, in order to enable a *before scenario* to be quantified and subsequently assessed. Providing evidence of trial success against agreed objectives is an important step towards the next phase of development.

Installation and validation During the installation process, it is critical to follow the programme and strategies set out in Stage 3. A test schedule for this is essential. It is important to pay early attention to commissioning tasks (particularly for on-road trials) as they are a key source of programme delay. These may include site acceptance tests, approvals, and certification. Training may need to be provided to operational and assessment teams.

Guidance specific to simulator or modelling trials
The experimental plan created in Stage 3 may require access to specific simulation facilities or modelling software. It is critical to ensure this access is now secured for your pilot.

You may also need to start experiment activities such as evidence reviews, stakeholder engagement, questionnaire design, participant recruitment, and scenario design.

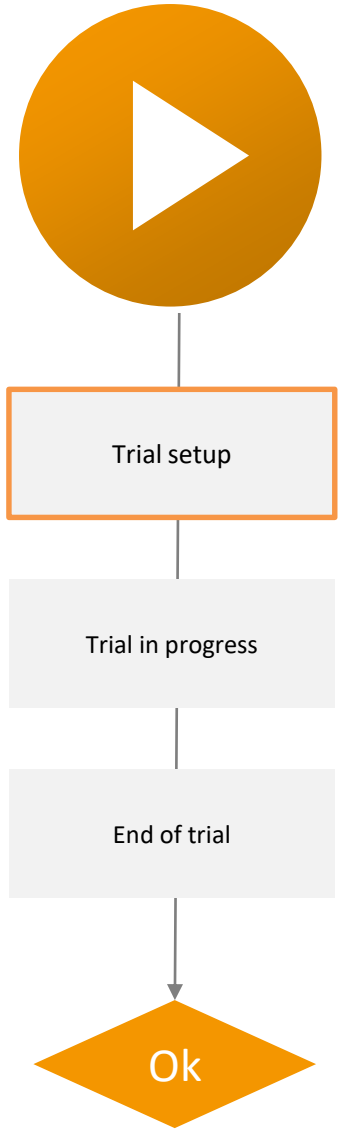
Guidance specific to off-road trials/pilots
An immediate task is to secure access to the site during the proposed trial time. It is also prudent to revise the risk assessment and method statement for the trial, considering fresh information such as site conditions, and outlining new actions to mitigate all potential risks. The risk assessment and method statement will also need to be signed-off by appropriate persons.

Guidance specific to on-road trials/pilots
You should be aware of specific aspects of an on-road pilots that require detailed consideration and management actions to be developed. These include:

- Safety risk for both road users and road workers. This must be documented in accordance with legislation and Highways England's procedures for managing safety risk. It may also be appropriate to include a Road Safety Audit (RSA) to identify safety concerns.
- Road user and environmental impact.

You should also consider these further activities in order to ensure a smooth implementation of your trial design:

- Implement your communications plan and be proactive in end user and stakeholder interaction.
- Processes such as road space booking and traffic management arrangement can take time to complete.
- All personnel need to be appropriately trained and hold relevant certifications (such as Construction Skills Certification Cards).



Conducting the trial - implementation

Considerations which should be known or assessed prior to progressing the trial to an active stage and during the activity:

Trial in progress

Testing
The innovation may require calibration and fine tuning to ensure that the optimum performance on site can be attained. This is particularly relevant for trials involving the consideration of technology or communications solutions.

Monitoring and optimisation
Follow existing guidance and use Key Performance Indicators to monitor and assess the impact of the trial. This includes:

- The immediate effects to enable rapid changes to be made to counteract any unforeseen, dangerous or other adverse outcomes.
- Short term impacts to be identified early in the life of the scheme at reasonable cost
- Medium to longer term, wider, impacts.

It is essential to capture evidence of such monitoring through reporting and change management processes aligned with your quality management system and GG104 SRA.

Maintenance
Highways England has legal duties with respect to the maintenance and operation of the network. Cyclical and repair/reactive maintenance is carried out to prolong asset life, deliver sustained performance and keep assets safe for customers.
The innovation may require maintenance during the trial and for any future deployment on the network.
Early engagement with team(s) responsible for the maintenance policy/standards and general principles will help to reduce ambiguities in the requirements, minimise the change of the requirement specification and provide a more resilient understanding of the time and cost for the design and implementation.
This is an important step to ensure suitable handover of the innovation at the end of the trial to the relevant business, product or service owner (if previously agreed).

End of trial

Ending the trial early
There are many valid reasons to end a pilot early, and this should be viewed positively as good research practice. This is important to deliver value for money, and may help to secure the next phase or a repeat of the pilot if you can demonstrate objectivity.

Ending the trial at the planned time
The trial does not end until the decommissioning tasks have been completed. These may be very minimal for simulator or modelling tasks, but can be quite comprehensive for on-road pilots. For instance, it is not acceptable to leave equipment on site without a plan in place to handover responsibility to another team.

End of trial reporting
The reporting requirements for the trial should have been set out in Stage 3 (for example: IMDF case study report). You should ensure that the team produce all agreed deliverables or document reasons why they may not be produced or they are delayed.
It is particularly important to ensure reporting is completed when a trial is ended early. It is good research practice to capture and share learning in such circumstances, and will help to support future decision making in regards to follow-on phases or repeat trials.

Not all trials and pilots are successful or should be expected to achieve all their outcomes. Taking a considered, evidenced approach to the best point at which to halt testing is important, with relevant lessons reported back in Stage 5.

Conducting the pilot - Checklist

Considerations which should be known or assessed prior to moving to the next stage of development by the project sponsor or responsible SRO.

SG4	Trial setup
☐	Review and update Safety Risk Assessment as required
☐	Has the trial setup followed the plan outlined in Stage 3, or have changes been recorded appropriately?
☐	Were commissioning tasks required and have they been documented?
☐	Can the innovation and assessment systems be implemented, and can the requirements be assessed for impact and be proved?
☐	For simulator or modelling trials, has access to suitable facilities or software been secured?
☐	For off-road trials, has the Risk Assessment Method Statement (RAMS) been signed off?
☐	For on-road trials, has safety risk for both road users and road workers been assessed and are processes in place to manage the risk?
☐	For on-road pilots, has a road user or environmental impact assessment been completed?
☐	Have trial personnel been trained appropriately?

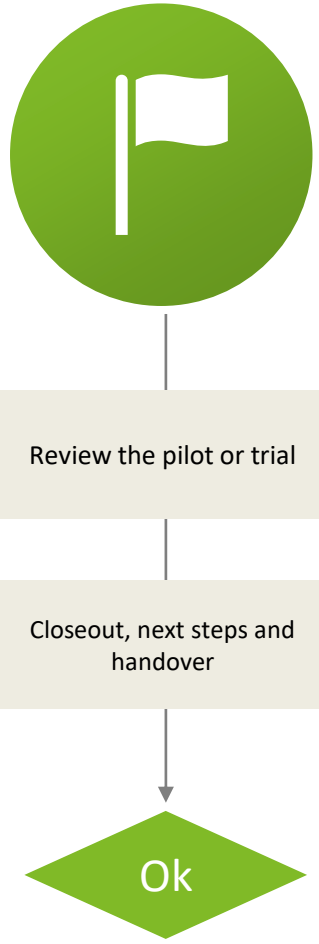
SG4	Trial in progress
☐	Has the trial team engaged with the appropriate team in Highways England responsible for future maintenance?
☐	Has the trial setup been optimised and is this documented?
☐	Has the trial followed the correct guidance to monitor and assess the impact of the trial or pilot?

SG4	End of trial
☐	Has the trial terminated early, or are you satisfied that it should not have terminated early?
☐	Have all trial deliverables been completed, (or are you satisfied that action is taking place to complete)?
☐	Have all non-essential services or resources been decommissioned or redeployed?
☐	Has any immediate lessons learnt and notification of trial completion been sent. For example the Designated Funds Case Study Report.

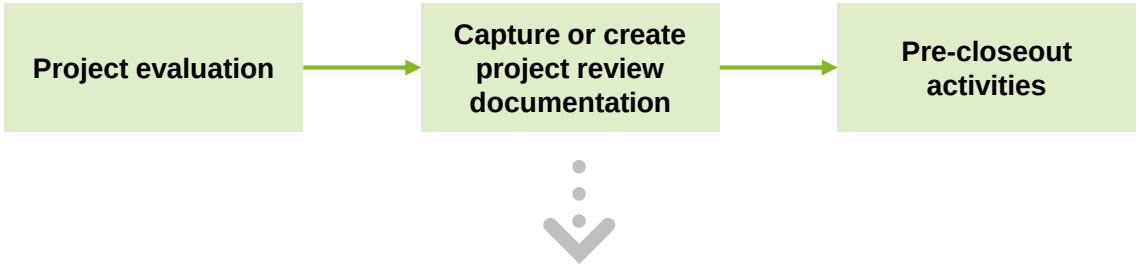
Closeout and review

Closeout and review can occur once the trial has been completed in accordance to the agreed framework from Stage 3. The post-trial period of the project includes two primary sections:

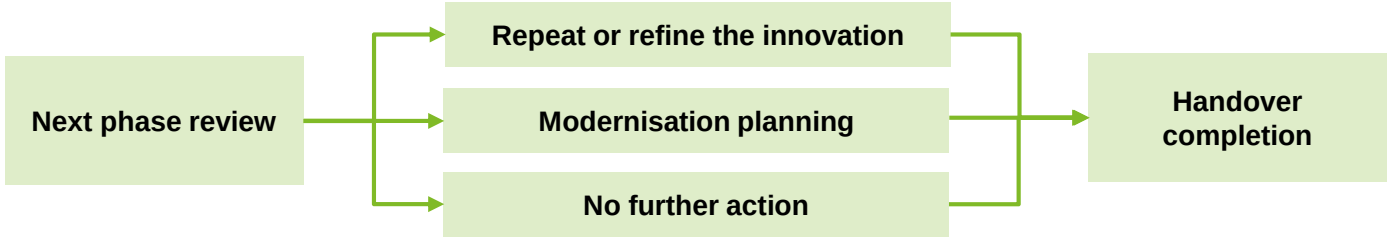
- Part A evaluates the performance of the project against the Stage 3 plan, creates important project review documentation, and disseminates information to relevant parties. Documentation must be prepared which summaries the various results from the assessment and draws conclusions from the trial, additionally further pre-closeout activities maybe needed.
- Part B identifies the next phase for the project. This may include repeating or refining the project for further trials or pilots, graduating the trial or pilot towards business ownership or best practice, or closing the project with no further actions. During this part you should identify if the project needs to be handed over to another group for further development.



Part A: Reviewing the project



Part B: Next phase, final closeout and handover



Ensure you have started and completed Stage 5 of the Designated Funds Project Summary Form (PSF) if required.

Closeout and review

Part A: Reviewing the project

In Part A you must completed the evaluation of the trial against your execution plan from Stage 3, all projects are expected to produce an initial decommissioning documentation confirming the end of the trial and a final report. This documentation must be tailored so relevant stakeholders receive appropriate information, each trial will require different closeout pathways so we recommend a communication plan is agreed and enacted.

Review the pilot or trial

Closeout, next steps and handover

Ok

Project evaluation

- Update project deliverables (if required)
- Evaluate performance against Stage 3 plan & SRA
- Trial or pilot decommissioned report
- Supply chain sustainability evaluation

Capture or create project review documentation

- Capture lessons learnt
- Create communications plan
- Create maintenance plan
- Gather calibration certificates

Pre-closeout activities

- Input to Standards
- Publicise outputs (Communications team – HE internal only)
- Innovation SharePoint (HE internal only)
- HE Innovation SharePoint updated
- Disseminate final reports to stakeholders
- Update asset register
- Lessons learnt passed to similar trials or pilots

Part B: You are satisfied with the pilot review and that information has been disseminated appropriately

Closeout and review

Part B: Next phase, final closeout and handover

Review the pilot or trial

Closeout, next steps and handover

Ok

Next phase

Using the project review documentation from part A and advice from key stakeholders where possible, the project sponsor and project team will identify the next phase for the project. It is particularly critical that appropriate actions are completed if there is no further development or implementation.

Repeat or refine
You can demonstrate good research practice by implementing your innovation through phases. You may want to repeat or refine your trial or pilot because the maturity level is low, or you need more time, a new location or larger scale to gather appropriate evidence, or a new detailed design is required to assess the original objectives.
This is a good way to demonstrate proportionate investment.

→ Return to Stage 1

Modernisation planning
You may decide the trial or pilot has proved its value for wider roll out (commission), or the development should be passed to business ownership (handover), or the output should be incorporated into best practice via updated standards.

→ Operations Directorate (HE internal only)

→ SES Directorate

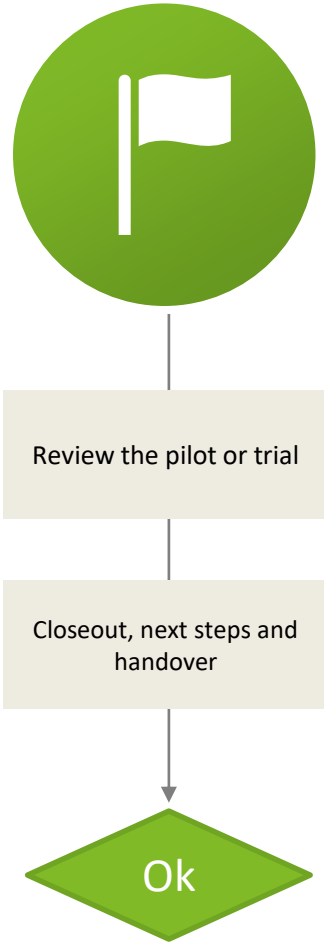
No further actions
This is a valid decision and you should give it serious consideration. Ensure any outputs and learning are recorded.

Successful handover completed and project should be closed (refer to closeout & review checklist plus any funding pathway requirements)

Closeout and review - Checklist

Considerations which should be known or assessed prior to closeout by the project sponsor or responsible SRO. All Part A and B sections must be completed prior to further trials being conducted and funded.

SG5	Part A: Reviewing the project	SG5	Part B: Next phase, final closeout and handover
☐	Has the project been evaluated against the plan and objectives outlined in Stage 3 (Detailed Design) and Safety Risk Assessment objective?	☐	Has a decision been made on the next direction for the project (refine, modernise, no further action)?
☐	Have lessons learnt been captured and saved?	☐	If a creating new phase or graduating the innovation has the new pathway and actions been agreed?
☐	Has a communications plan been created or key stakeholders or a wider audience?	☐	Has the project been successfully handed over? Do the right partners have the correct information.
☐	Has a maintenance plan been created if required? Plus records, certificates etc.	☐	Have Highways England skills been extended through this trial?
☐	Have the project technical reports been saved and filed?	☐	Has the project been closed and Final Closeout Report been submitted and agreed?
☐	Have Highways England fed in the lessons learnt to other similar pilots?	☐	Have you submitted the project information and technical report locations to the Innovation Groups SharePoint site?
☐	Has the project information been disseminated to the appropriate parties?		



Contact

For further information please visit:

w: www.highwaysengland.co.uk/innovation-hub

Contact us via:

e: innovation@highwaysengland.co.uk

t: 0300 123 5000 (Highways England general enquires)

Also see our internal resources hosted via:

Highways England Innovation SharePoint (HE internal only)

Annex A: Innovation Maturity Levels

See the table below for Highways England's Innovation Maturity Levels which explain the five levels of maturity and the typical activities you would associate with each level. The list is not exhaustive but aims to provide a guide to where an innovation project may sit on our development pathway.

Level		Description	Typical activities to be supported in this phase of maturity	Technology Readiness Level equivalent*
1	Initial Research	Understanding the problem and exploring possible solutions	Initial industry & market research, Problem investigation and analysis, Gathering stakeholder requirements to create the value proposition, Early optioneering of solutions, Technology concept/application formulation, Risk/opportunity analysis and research	TRL 1-2
2	Concept & feasibility	Developing or testing a concept, designing the solution and testing feasibility of solutions	Innovation concept selection and early design, Testing/proving a concept, Development of the initial prototype, Defining the approach to enable further detailed testing, Assessing the fundamental feasibility of solution(s) within controlled environments.	TRL 2-4
3	Development and verification	Developing the preferred solution, verifying the design through prototype demonstration in a real world (or near real world) environment	On or off road trials of the solution in a near real or real-world environment, Design risk analysis, including Failure Modes Effects Analysis (FMEA) for future operation, Approach to departures (how can we deploy the solution), Testing against operational requirements	TRL 3-6
4	Validation and optimisation	Scaling up the solution for roll-out or commercialisation	Identifying practical routes to market, Development of training or education requirements , Large scale or late stage testing (pilots), Fine-tuning to proven operational concepts, Benefits evaluation, Departures review for approval and deployment, Standards or specification development for the innovation.	TRL 6-8
5	Deployment and post launch	Implementing or rolling out the solution and assessing its impact	Roll-out and implementation, Standard/specification finalisation and publication, User training or education, Benefits testing and evaluation, Continuous improvement & lessons learnt for future development.	TRL 8-9

For further information please visit:

w: www.highwaysengland.co.uk/innovation-hub

Highways England staff can access our Innovation Site on SharePoint

* What do we mean by a TRL?, please click here.

Annex B: Categorisation of project scale

Each pilot or trial project (or phase) such be categorised so the project sponsor, innovator and wider Highways England understand the likely support requirements and investment the project may require at an early stage. Categories don't not inform whether projects should be supported (or not). The checklists in this guidance are tiered to reflect categories from Stage 2 to Stage 5 with certain advised areas removed for lower categorised projects.

The categories

Category A (Low) – Minor project with minimal impact on SRN operations and business targets, usually a trial or research trial in a laboratory or simulator, or off-road. Level of detail required for pilot and trial requirements is reduced at this scale, although more detailed analysis may be required dependent for specific projects.

Category B (Mid) – Medium projects which will not impact on SRN operations and business targets but will require increased co-ordination across directorates. This category would usually be an off-road trial but or could become an on-road trial or a pilot in a later phase. Pilot and trial requirements might be reduced at this scale, however any features assigned as a category C should be considered in more detail.

Category C (High) – More significant projects with higher sensitivity, wider interest, operational resource requirements or impact on business targets. This category would be an on-road trial or pilot or significant off-road activity with later impactful phases. Pilot and trial requirements should be detailed and fully understood.

The features

Feature	Indicator	Suggested category
Impact on organisation - Effect on current processes, procedures, responsibilities & policy. In addition to contractual arrangements.	No impact on current activity, procedures and responsibilities.	**A**
	The **project** can **lead to** permanent minor changes to any of these	**B**
	The **project can change** core roles and responsibilities	**C**
Stakeholder interest and impact – The quantity of and impact on stakeholders. Complexity & resulting ability to influence the activity.	Projects where stakeholders interest and influence is limited and well known	**A**
	Projects with a few stakeholders who can influence and are directly impacted	**B**
	Project with large numbers of stakeholders, complex interactions and impacts	**C**
Cost and resource requirements – Level of capital outlay or other resource requirements to undertake the full activity.	Capital outlay and resource requirements are low (less than £100K)	**A**
	Capital outlay or resource requirements are considered to be medium in scale	**B**
	Capital outlay and resource requirements for project are substantial (over £500K)	**C**
Innovation maturity level – Level of development and maturity of solutions under consideration – *See annex A*	Innovation is classified as at level 1 to 2	**A**
	Innovation is classified at level 3	**B**
	Innovation is classified at level 4 to 5	**C**

Final classification

Result	Category comment
All type A	**A** – All project feature are classed as A
All type B	**B** – All project feature are classed as B
All type C	**C** – All project feature are classed as C
3+ marked as one lower category	Where three or more features are categorised as A or B but the remaining features are a combination of B or C, the project is categorised as the lower scale but the features categorised as B or C require greater rigour of analysis, assessment and consideration.
3 in type C	Where three or more features are categorised as C then the entire project is category C.
Mixed across features	If equally distributed between two category types the decision on the overall project categorisation is governed by the importance of each feature relative to the project. Higher features should receive greater rigour of analysis, assessment and consideration.