

End-point assessment plan for Operational Research Specialist apprenticeship standard

Apprenticeship standard number	Apprenticeship standard level	Integrated end-point assessment
ST0884	7	No

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Introduction and overview

This document sets out the requirements for end-point assessment (EPA) for the Operational Research Specialist apprenticeship standard. It explains how EPA for this apprenticeship must operate.

This document provides the EPA design requirements for end-point assessment organisations (EPAOs) for this apprenticeship standard. It will also be useful for apprentices undertaking this apprenticeship, their employers and training providers.

EPA must be conducted by an EPAO approved to deliver EPA for this apprenticeship standard. Each employer should select an approved EPAO from the Education & Skills Funding Agency's Register of end-point assessment organisations (RoEPAO).

Full-time apprentices will typically spend 24 months on-programme (before the gateway) working towards this occupational standard. All apprentices must spend a minimum of 12 months on-programme. All apprentices must spend a minimum of 20% of on-programme time undertaking off-the-job training.

Before starting EPA, an apprentice must meet the gateway requirements. For this apprenticeship they are:

- the employer must be content that the apprentice is working at or above the occupational standard
- the apprentice must have submitted a portfolio of evidence
- apprentices must have achieved all qualifications mandated in the Operational Research Specialist occupational standard. The qualifications required are:
 - apprentices must have achieved English and mathematics at Level 2¹.

The EPAO must confirm that all required gateway evidence has been provided and accepted as meeting the gateway requirements. The EPAO is responsible for confirming gateway eligibility. Once this has been confirmed, the EPA period starts.

This EPA should then be completed within an EPA period lasting typically for 6 months.

This EPA consists of 3 discrete assessment methods.

It will be possible to achieve the following grades in each end-point assessment method:

Assessment method 1: Work-based project report with presentation

- Fail
- Pass
- Distinction

¹ For those with an education, health and care plan or a legacy statement, the apprenticeship's English and Mathematics minimum requirement is Entry Level 3. British Sign Language (BSL) qualifications are an alternative to English qualifications for those who have BSL as their primary language

Assessment method 2: Professional discussion underpinned by a portfolio of evidence

- Fail
- Pass
- Distinction

Assessment method 3: Test

- Fail
- Pass
- Distinction

Performance in the EPA will determine the overall apprenticeship standard grade of:

- Fail
- Pass
- Merit
- Distinction

EPA summary table

<p>On-programme (typically 24 months)</p>	<p>Training to develop the knowledge, skills and behaviours (KSBs) of the occupational standard.</p> <p>Training towards English and mathematics Level 2, if required.</p> <p>Compiling a portfolio of evidence.</p>
<p>End-point assessment gateway</p>	<p>The employer must be content that the apprentice is working at or above the level of the occupational standard.</p> <p>Apprentices must have achieved all qualifications mandated in the Operational Research Specialist occupational standard. The qualifications required are:</p> <ul style="list-style-type: none"> • Apprentices must have achieved English and mathematics at Level 2. <p>The apprentice has completed tasks relevant to the assessment methods:</p> <ul style="list-style-type: none"> • work practice on which the work-based project report with presentation will be undertaken; • portfolio of evidence. <p>The work-based project report with presentation proposal (including scope and title) is agreed with the EPAO.</p>
<p>End-point assessment (typically 6 months)</p>	<p>Assessment method 1: Work-based project report with presentation</p> <p>With the following grades:</p> <ul style="list-style-type: none"> • Fail • Pass • Distinction <p>Assessment method 2: Professional discussion underpinned by a portfolio of evidence</p> <p>With the following grades:</p> <ul style="list-style-type: none"> • Fail • Pass • Distinction

	Assessment method 3: Test With the following grades: <ul style="list-style-type: none"> · Fail · Pass · Distinction
Professional recognition	Aligns with recognition by: <ul style="list-style-type: none"> • N/A

Length of EPA period

The EPA will be completed within an EPA period lasting typically for 6 months, starting when the EPAO has confirmed that all gateway requirements have been met.

Order of end-point assessment methods

The assessment methods can be delivered in any order.

The result of one assessment method does not need to be known before starting the next.

Gateway

The apprentice should only enter the gateway once the employer is content that the apprentice is working at or above the occupational standard. In making this decision, the employer may take advice from the apprentice's training provider(s), but the decision must ultimately be made solely by the employer.

The EPAO determines when all gateway requirements have been met, and the EPA period will only start once the EPAO has confirmed this.

In addition to the employer's confirmation that the apprentice is working at or above the level of the occupational standard, the apprentice must have completed the following gateway requirements prior to starting EPA:

- achieved English and mathematics at Level 2.
For those with an education, health and care plan or a legacy statement, the apprenticeship's English and mathematics minimum requirement is Entry Level 3. British Sign Language (BSL) qualifications are an alternative to English qualifications for those who have BSL as their primary language.

For the work-based project report with presentation the following will be required:

- the employer must be satisfied that the apprentice's on-programme practice is sufficient for the requirements set out in this EPA plan;
- the apprentice must have completed the work practice on which the project will be undertaken;
- the employer and the apprentice must have set the project scope and title;
- the apprentice must have created the project report proposal (including scope and title)
- the EPAO must have approved the project report proposal (including scope and title).

For the professional discussion underpinned by a portfolio of evidence, the apprentice will be required to submit:

- a portfolio which they have developed during their on-programme training period i.e. pre-gateway. It must be submitted at the gateway, in electronic form.

For the test the apprentice will be required to submit:

- N/A

Portfolio of evidence requirements:

- apprentices must compile a portfolio of evidence during the on-programme period of the apprenticeship
- it must contain evidence related to the KSBs that will be assessed by the professional discussion
- the portfolio should include an example of coding (by programming, scripting, coding or using spreadsheet) constructed by the apprentice
- the portfolio of evidence will typically contain 20 discrete pieces of evidence
- evidence must be mapped against the KSBs
- evidence may be used to demonstrate more than one KSB; a qualitative as opposed to quantitative approach is suggested
- evidence sources may include:
 - workplace documentation/records, for example workplace policies/procedures, records
 - witness statements
 - annotated photographs
 - video clips (maximum total duration 15 minutes); the apprentice must be in view and identifiable

This is not a definitive list; other evidence sources are possible.

- it should not include reflective accounts or any methods of self-assessment
- any employer contributions should focus on direct observation of performance (for example witness statements) rather than opinions
- the evidence provided must be valid and attributable to the apprentice; the portfolio of evidence must contain a statement from the employer and apprentice confirming this
- the portfolio of evidence must be submitted to the EPAO at the gateway

The portfolio of evidence is not directly assessed. It underpins the professional discussion and therefore should not be marked by the EPAO. EPAOs should review the portfolio of evidence in preparation for the professional discussion but are not required to provide feedback after this review of the portfolio.

End-point assessment methods

The apprentice will be assessed against the KSBs assigned to the assessment methods outlined below, as shown in the mapping section of this EPA plan.

End-point assessment method 1: Work-based project report with presentation

Overview

A project involves the apprentice completing a significant and defined piece of work that has a real business benefit. Due to the complexity of Operational Research projects, the work-based project is undertaken before the apprentice has gone through the gateway, but both components for this assessment method are completed during the EPA period.

The project should be designed to ensure that the apprentice's work meets the needs of the business, is relevant to their role and allows the relevant KSBs to be assessed for the EPA. The employer will ensure it has a real business application and the EPAO will ensure it meets the requirements of the EPA, including suitable coverage of the KSBs assigned to this assessment method as shown in the mapping of assessment methods.

This assessment method includes two components:

- an outcome component - a project report
- a presentation component - to ensure the apprentice is given the opportunity to focus or elaborate on particular aspects of their work-based project report

The rationale for this assessment method is:

- An operational research intervention can take several months; typically 6 months to one year; not all projects go through a full life cycle or have a predictable outcome; sometimes they are terminated, delayed or extended for business reasons outside of the control of the apprentice. Therefore, the practice on which the project is undertaken cannot invariably be designed or delayed to fit into the EPA timescale or the specification of the EPAO.
- The project is designed to demonstrate the application of knowledge, skills and behaviours that is mapped to this assessment method as they would be in occupational practice. Producing a report reflects normal practice in the workplace so this assessment method is appropriate.
- It is a significant and complex piece of work that thoroughly tests both higher and lower order knowledge and skills.
- Note that it is essential that the project articulates the apprentice's own work practice rather than the activities performed by the team of which they were part.
- Note that it is the post-gateway project (the report) and presentation that are graded as parts of one composite assessment method, rather than the work practice on which it is based.

The evidence from the project report and responses to questions will be assessed holistically.

Component 1 – Work-based project report

Delivery

Apprentices must create the work-based project report and presentation post-gateway during the EPA period.

The EPAO must provide detailed specifications for a range of projects on which qualifying work-based project reports could be written.

Employers must ensure that apprentices undertake a range of projects (i.e. work-based practice) on-programme, having regard to the EPAO's detailed specifications.

The apprentice will draft a proposal for the work-based project report at the gateway. This proposal will include the scope and title of the work-based project report and must include a summary of the work practice covered by the project, and an overview of the apprentice's tasks and responsibilities.

The work-based project proposal, scope and title must be signed off at the gateway by the EPAO. This ensures adequate controls are in place to meet the requirement that the report and presentation are produced by the apprentice post-gateway.

Apprentices will then develop post-gateway a project report in written format - paper based or electronic based.

The project report may be based on any of the following type of projects that the apprentice was directly involved in pre-gateway:

- a specific problem impacting the operational function of an organisation
- a recurring issue impacting the operational function of an organisation
- an idea/opportunity to improve operational delivery/efficiency of an organisation

The work-based project report content should include (but need not be limited to) the following topics:

- Description of the operational research issue(s) and its context.
- Objectives of the work practice on which the project is based.
- Chosen methods, methodology(ies) and rationale.
- Summary of the tasks and responsibilities undertaken by the apprentice.
- Discussion of challenges and barriers experienced or observed, and actions taken by the apprentice.
- Evaluation of how far the project objectives were met.
- Summary of the tasks and responsibilities undertaken by the apprentice.

The employer should ensure the apprentice has sufficient time and the necessary resources, within this period, to plan and undertake the project.

A typical work-based project report is organised in the following way:

- Executive summary. (This is no more than one side - which summarises the content of the report. It must be comprehensible to someone who has not read the rest of the report.)
- Introduction. (The scope or hypothesis of the project and terms of reference, setting the scene for the remainder of the report.)
- Background. (A review chapter, describing the background work or research undertaken at the beginning of the project period.)
- Work undertaken: Several chapters describing the work that has been undertaken.
- Outputs. A chapter describing the outputs, deliverables or artefacts that have been produced as a result of the project.
- Further work. (A chapter describing possible ways in which the work could be continued or developed.)
- Conclusions. (A statement of conclusions relating to the work done, and outputs produced to the initial hypothesis and terms of reference.) The project report has a word count of 8,000 words. A tolerance of plus or minus 10% is allowed. Appendices, annexes, references, diagrams etc. will not be included in this total.

The project must map, in an appendix, how it evidences the relevant KSBs for this assessment method.

The project report will be conducted as follows:

- The apprentice must be given 3 weeks to complete and submit the work-based project report following the EPAO's approval of the report scope and title.
- Employers must allow apprentices up to eight working days of time (within this 3 week period) to do so.

The apprentice should complete their project report and presentation unaided. When the report is submitted, the apprentice and their employer must verify that the submitted project report and presentation is the apprentice's own work, and that the project report and presentation were completed during the EPA period.

The independent assessor will review and assess the project report holistically together with the other components of this assessment method.

The independent assessor will make all grading decisions.

Component 2 – Presentation

Delivery

The presentation will focus on the project report. The presentation should not be formulaic; given the wide and varying nature of operational research related issues, it will be for the apprentice to decide the nature and focus of their presentation. As a guideline, two or more of the following may be of greater relevance dependent on the nature of the project.

- description of the context and issue(s) they addressed and why it is appropriate to use operational research to address the issue(s)
- how they chose their analytical methods and the reasons for their choice
- the tasks and responsibilities the apprentice undertook, how they scheduled and managed this project
- the challenges and obstacles they faced during the course of the project and how they addressed them
- how they communicated, and the impact of, their findings and results
- how they quality assured their work
- reflections on the project (methods and process) including how it informs their practice

The presentation content will be completed and submitted to the EPAO no later than 3 weeks after the project report submission and will be presented to an independent assessor, either face-to-face or by video conferencing at a later date.

The EPAO must provide the presentation content to the independent assessor at least 2 weeks before the presentation to allow the independent assessor sufficient time to review it and prepare appropriate questions.

The EPAO must provide the apprentice with a minimum of 2 weeks notice prior to the presentation being delivered.

The presentation will last for 60 minutes. The presentation stage typically lasts for 15 minutes, and the questioning stage typically lasts 45 minutes. The independent assessor has the discretion to increase both the time of the presentation and the questioning by up to 10% to allow the apprentice to complete their last point.

The independent assessor will ask a minimum of 6 questions at the end of the presentation. The independent assessor may ask any number of follow-up questions within the overall time permitted.

The purpose of the questions will be:

- for clarification
- to assess the depth and breadth of understanding

The independent assessor will use the questions from a question bank supplied by the EPAO as a guide to tailor their own questions based on the presentation. They will use them to confirm their understanding of the presentation and how it demonstrates the relevant KSBs.

To deliver the presentation, the apprentice will have access to:

- audio visual presentation equipment
- flip chart and writing and drawing materials
- computer.

The independent assessor will review and assess the presentation holistically together with the other components of this assessment method.

The independent assessor will make all grading decisions.

Assessment location

EPAOs must ensure that the presentation and questioning elements are conducted in a suitable controlled environment in any of the following:

- employer's premises
- other suitable venue selected by the EPAO (for example a training provider).

The venue should be a quiet room, free from distraction and external influence. Video conferencing can also be used to conduct the presentation but the EPAO must have processes in place to verify the identity of the apprentice and ensure the apprentice is not being aided.

Only the independent assessor will observe the presentation. (A representative from the EPAO may be present when necessary for moderation purposes).

Question and resource development

Questions must be written by EPAOs and must be relevant to the occupation and employer settings. It is recommended that this be done in consultation with employers of this occupation. EPAOs should maintain the security and confidentiality of their questions when consulting employers. EPAOs must develop question banks of sufficient size to prevent predictability and review them regularly (and at least once a year) to ensure they, and the questions they contain, are fit for purpose. The questions relating to underpinning KSBs, must be varied, yet allow assessment of the relevant KSBs.

EPAOs must ensure that apprentices have a different set of questions in the case of re-sits/re-takes.

EPAOs will produce the following material to support this assessment method:

- question bank
- assessment specifications
- marking materials
- examples of work-based project report proposals, including titles, scopes, and subjects.

End-point assessment method 2: Professional discussion underpinned by a portfolio of evidence

Overview

This assessment method has 1 component.

A professional discussion is a two-way discussion which involves both the independent assessor and the apprentice actively listening and participating in a formal conversation. It gives the apprentice the opportunity to make detailed and proactive contributions to confirm their competency across the KSBs mapped to this method.

The rationale for this assessment method is:

- This method was judged to be the most appropriate way for the knowledge, skills and behaviours (KSBs) to be assessed. It allows a range of examples to be brought forward during the discussion to show the full range of duties can be undertaken, ensuring that competence can be evidenced in a robust and consistent, yet flexible manner.
- It covers a disparate set of KSBs that may not reliably occur in the project.
- Provision of the portfolio to the independent assessor ahead of the professional discussion ensures the independent assessor can target, select and generate their questions effectively.

Delivery

This assessment will take the form of a professional discussion which must be appropriately structured to draw out the best of the apprentice's competence and cover the KSBs assigned to this assessment method. It will involve questions that will focus on the apprentice's occupational competence and whether they have met the KSBs, using the portfolio to underpin this. The independent assessor will seek to gain assurance of the apprentice's competency via discussion and questioning. The purpose of the questions will be:

- To assess the KSBs assigned to this assessment method. The apprentice may use their portfolio to support their responses.

The independent assessor will conduct and assess the professional discussion.

The EPAO will provide the apprentice with 2 weeks' notice prior to the discussion. The EPAO will provide the independent assessor with 2 weeks to review the portfolio prior to the discussion. The professional discussion must last for 90 minutes. The independent assessor has the discretion to increase the time of the professional discussion by up to 10% to allow the apprentice to complete their last answer.

The topics and themes that must be covered are:

- The history of operational research & the relevance to current practice
- Understanding and application of coding to operational research problems

- How business & organisational landscapes influence operational research
- The importance of professional practice, ethics and resilience
- Continuous professional development of self & others
- How to communicate with clients in a clear and unbiased manner

The professional discussion will be conducted as follows:

- The professional discussion is a structured one-to-one discussion between the apprentice and an independent assessor.
- Independent assessors must be developed and trained by their EPAO in the conduct of professional discussions and in reaching consistent judgements.
- The independent assessor will conduct and assess the professional discussion.
- The professional discussion must be appropriately structured to draw out the best of the apprentice's competence and excellence.
- Independent assessors must select six opening questions (one per theme) from their bank of competency-based questions provided by the EPAO. This approach ensures that all aspects of the portfolio can be probed and ensures that all the KSBs mapped to this method are appropriately covered.
- The independent assessor will use follow-up questions throughout the professional discussion to allow the apprentice the best opportunity to evidence their competence. These follow up questions will be in addition to the requirement for six opening questions
- The apprentice and the independent assessor will have access to their own copies of the portfolio throughout the discussion and both can refer to it as needed.
- The independent assessor will make notes of evidence / answers provided on the EPAO data capture form.
- The independent assessor must use the assessment tools and procedures that are set by the EPAO to record the professional discussion. Recording documentation for the professional discussion must be developed by the EPAOs.
- The professional discussion should be graded fail, pass or distinction. Independent assessors must allocate grades using the grading criteria.
- The portfolio underpins the professional discussion and will not be assessed or graded during the end-point assessment.

KSBs met and answers to questions, must be recorded by the independent assessor.

The independent assessor will make all grading decisions.

Assessment location

The professional discussion should take place in a quiet room, free from distractions and influence. Video conferencing can also be used to conduct the interview but the EPAO must have processes in place to verify the identity of the apprentice and ensure the apprentice is not being aided.

The professional discussion can take place in any of the following:

- employer's premises
- other suitable venue selected by the EPAO (for example a training provider).

Question and resource development

Independent assessors are responsible for generating suitable questions in line with the EPAO's training and standardisation process. A question bank must be developed by EPAOs. Independent assessors must use the question bank as a source for questioning and are expected to use their professional judgement to tailor those questions appropriately. The question bank must be of sufficient size to prevent predictability and the EPAO must review it regularly (at least once a year) to ensure that it, and its content, are fit for purpose. The questions relating to the underpinning KSBs, must be varied yet allow assessment of the relevant KSBs.

EPAOs must ensure that apprentices have a different set of questions in the case of re-sits/re-takes.

EPAOs will produce the following material to support this assessment method:

- question bank
- structured specification
- EPAO data capture form
- marking materials

End-point assessment method 3: Test

Overview

This assessment method has one component.

A test is a controlled assessment which consists of a series of questions in which apprentices are asked to provide a response.

The rationale for this assessment method is:

- An operational research specialist must draw upon their wide range of technical knowledge when assessing a complex piece of work. In doing so, they must select from different approaches and different techniques.
- A test is a suitable and efficient way of establishing apprentice competency in this area, by demonstrating their ability to both recall knowledge and through their applied thinking.
- A test complements the other chosen assessment methods. Whereas a project report and presentation will test the apprentice's skill and ability via a bespoke piece of work, the underlying knowledge required in the occupation is far broader than can be covered in one project.

Delivery

Test format

The test can be:

- computer based
- paper based

It will consist of 30 questions.

These questions will consist of multiple-choice questions. The multiple-choice questions will have four options of which one will be correct. The questions must be varied to avoid the test becoming too predictable yet allow assessment of the relevant KSBs.

Test administration

Apprentices will be given a minimum of 2 weeks notice from the EPAO to prepare for the test.

Apprentices must have 180 minutes to complete the test.

The test is closed which means that the apprentice cannot refer to reference books or materials outside the list of permitted equipment below.

The following equipment is permitted during the test (to be defined by EPAO):

- list of appropriate formulae
- scientific calculator
- blank notepad
- pen/pencil.

This assessment method will be carried out as follows:

- The test questions will consist of closed questions covering both problem structuring, data sourcing and analytical methods used by occupational research specialists.
- The 30 test questions should include a variety of question types including 10 fact-based questions, 10 analysis of data questions, and 10 interpretation of occupational research solutions questions. This will allow the apprentice to demonstrate their knowledge recall and applied thinking.
- The test will determine whether the apprentice has sufficient awareness, understanding and knowledge of the problem structuring approaches, data sourcing and analytical methods of operational research as set out in this EPA plan.
- With 1 mark available for each of the 30 questions, the maximum available marks is 30.

Assessment

Tests must be marked by independent assessors or markers employed by the EPAO following a marking guide produced by the EPAO. Alternatively, marking by computer is permissible where questions types allow this.

A correct response will be assigned one mark.

Any incorrect or missing answers must be assigned zero marks.

Assessment location

Apprentices must take the test in a suitably controlled environment that is a quiet space, free from distractions and influence, in the presence of an invigilator. The invigilator may be the independent assessor, or another external person employed by the EPAO or specialised proctor software if the test is computer based.

The EPAO is required to have an invigilation policy that will set out how the test is to be carried out. This will include specifying the most appropriate ratio of apprentices to invigilators to best take into account the setting and security required in administering the test.

The EPAO is responsible for ensuring the security of any tests they administer to ensure the test remains valid and reliable (this includes any arrangements made using online tools).

The EPAO is responsible for verifying the identity of the person taking the test. The EPAO must also verify the suitability of the venue for test-taking.

Question and resource development

Questions must be written by EPAOs, must be relevant to the occupation and assess KSBs mapped to this assessment method. It is recommended that this be done in consultation with employers of this occupation. EPAOs should maintain the security and confidentiality of their questions when consulting employers.

Each EPAO must develop a test specification. They must also develop a question bank of sufficient size to prevent predictability and review it regularly (and at least once a year) to ensure it, and the questions it contain, are fit for purpose.

The test questions must be varied yet assess the relevant KSBs.

EPAOs must ensure that apprentices have a different set of questions in the case of re-sits/re-takes.

EPAOs will produce the following material to support this assessment method:

- a question bank
- a test specification
- sample tests and mark schemes
- live tests and mark schemes
- analysis reports which show areas of weakness for completed tests and an invigilation policy
- assessment recording documentation
- list of permitted equipment and formulae

Reasonable adjustments

The EPAO must have in place clear and fair arrangements for making reasonable adjustments to the assessment methods for the EPA for this apprenticeship standard. This should include how an apprentice qualifies for reasonable adjustment and what reasonable adjustments will be made. The adjustments must maintain the validity, reliability and integrity of the assessment methods outlined in this EPA plan.

Overall EPA grading

All assessment methods are weighted equally in their contribution to the overall EPA grade. Performance in the EPA will determine the apprenticeship grade of fail, pass, merit or distinction.

Independent assessors must individually grade each assessment method, according to the requirements set out in this plan.

EPAOs must combine the individual assessment method grades to determine the overall EPA grade.

Apprentices who fail one or more assessment method will be awarded an overall EPA 'fail'.

In order to gain an overall EPA 'pass', apprentices must achieve a pass in all the assessment methods.

In order to achieve an overall EPA 'merit', apprentices must achieve a combination of a pass in one assessment method and a distinction in two assessment methods. The only way of attaining an overall 'distinction' is by apprentices achieving a distinction in all 3 assessment methods. Grades from individual assessment methods should be combined in the following way to determine the grade of the EPA as a whole:

Assessment method 1 Work Based Project report and presentation	Assessment method 2 Professional Discussion	Assessment method 3 Test	Overall grading
Fail	Any grade	Any grade	Fail
Any grade	Fail	Any grade	Fail
Any grade	Any grade	Fail	Fail
Pass	Pass	Pass	Pass
Distinction	Pass	Pass	Pass
Pass	Distinction	Pass	Pass
Pass	Pass	Distinction	Pass
Distinction	Distinction	Pass	Merit
Distinction	Pass	Distinction	Merit
Pass	Distinction	Distinction	Merit
Distinction	Distinction	Distinction	Distinction

Any grade = fail, pass, merit or distinction

Re-sits and re-takes

Apprentices who fail one or more assessment method/s will be offered the opportunity to take a re-sit or a re-take at the employer's discretion. The apprentice's employer will need to agree that either a re-sit or re-take is an appropriate course of action.

A re-sit does not require further learning, whereas a re-take does.

Apprentices should have a supportive action plan to prepare for a re-sit or a re-take.

The timescales for a re-sit/re-take is agreed between the employer and EPAO. A re-sit is typically taken within 3 months of the EPA outcome notification. The timescale for a re-take is dependent on how much re-training is required and is typically taken within 4 months of the EPA outcome notification.

All assessment methods must be taken within a 10 month period, otherwise the entire EPA will need to be re-sat/re-taken. (i.e. 6 months typical EPA period plus 3 or 4 months for re-sit/re-take = 10 month total period).

Re-sits and re-takes are not offered to apprentices wishing to move from pass to a higher grade.

Where any assessment method has to be re-sat or re-taken, the apprentice will be awarded a maximum EPA grade of pass, unless the EPAO determines there are exceptional circumstances requiring a re-sit or re-take.

Roles and responsibilities

Role	Responsibility
Apprentice	<p>As a minimum, apprentices should:</p> <ul style="list-style-type: none"> • participate in and complete on-programme training to meet the KSBs as outlined in the occupational standard for a minimum of 12 months • undertake 20% off-the-job training as arranged by the employer and training provider • understand the purpose and importance of EPA • undertake the EPA including meeting all gateway requirements
Employer	<p>As a minimum, employers should:</p> <ul style="list-style-type: none"> • select the EPAO and training provider • work with the training provider (where applicable) to support the apprentice in the workplace and to provide the opportunities for the apprentice to develop the KSBs • arrange and support a minimum of 20% off-the-job training to be undertaken by the apprentice • decide when the apprentice is working at or above the occupational standard and so is ready for EPA • ensure that all supporting evidence required at the gateway is submitted in accordance with this EPA plan • remain independent from the delivery of the EPA • confirm arrangements with the EPAO for the EPA (who, when, where) in a timely manner (including providing access to any employer-specific documentation as required, for example company policies) • ensure that the EPA is scheduled with the EPAO for a date and time which allow appropriate opportunity for the KSBs to be met • ensure the apprentice is well prepared for the EPA • ensure the apprentice is given sufficient time away from regular duties to prepare for and complete all post-gateway elements of the EPA, and that any required supervision during this time (as stated within this EPA plan) is in place

	<ul style="list-style-type: none"> • where the apprentice is assessed in the workplace, ensure that the apprentice has access to the resources used on a daily basis • pass the certificate to the apprentice
EPAO	<p>As a minimum, EPAOs should:</p> <ul style="list-style-type: none"> • conform to the requirements of this EPA plan and deliver its requirements in a timely manner • conform to the requirements of the Register of End-Point Assessment Organisations (RoEPAO) • conform to the requirements of the external quality assurance provider (EQAP) for this apprenticeship standard • understand the occupational standard • make all necessary contractual arrangements, including agreeing the price of the EPA • develop and produce assessment materials including specifications and marking materials (for example mark schemes, practice materials, training material) • appoint suitably qualified and competent independent assessors • appoint administrators (and invigilators where required) to administer the EPA as appropriate • provide training for independent assessors in terms of good assessment practice, operating the assessment tools and grading • provide adequate information, advice and guidance documentation to enable apprentices, employers and training providers to prepare for the EPA • arrange for the EPA to take place, in consultation with the employer • where the apprentice is not assessed in the workplace, ensure that the apprentice has access to the required resources and liaise with the employer to agree this if necessary • develop and provide appropriate assessment recording documentation to ensure a clear and auditable process is in place for providing assessment decisions and feedback to all relevant stakeholders • have no direct connection with the apprentice, their employer or training provider. In all instances, including when the EPAO is the training provider (i.e. HEI), there must be no conflict of interest

	<ul style="list-style-type: none"> • have policies and procedures for internal quality assurance (IQA), and maintain records of regular and robust IQA activity and moderation for external quality assurance (EQA) purposes • deliver induction training for independent assessors, and for invigilators and/or markers (where used) • undertake standardisation activity on this apprenticeship standard for all independent assessors before they conduct an EPA for the first time, if the EPA is updated and periodically as appropriate (a minimum of annually) • manage invigilation of apprentices in order to maintain security of the assessment in line with the EPAO's malpractice policy • verify the identity of the apprentice being assessed • use language in the development and delivery of the EPA that is appropriate to the level of the occupational standard • provide details of the independent assessor's name and contact details to the employer • have and apply appropriately an EPA appeals process • request certification via the Apprenticeship Service upon successful achievement of the EPA
Independent assessor	<p>As a minimum, independent assessors should:</p> <ul style="list-style-type: none"> • attend the required number of EPAOs standardisation and training events per year (as defined in the IQA section) • have the competence to assess the apprentice at this level and hold any required qualifications and experience in line with the requirements of the independent assessor as detailed in the IQA section of this EPA plan • understand the occupational standard and the requirements of this EPA • have, maintain and be able to evidence up-to-date knowledge and expertise of the subject matter • deliver the end-point assessment in-line with the EPA plan • comply with the IQA requirements of the EPAO • have no direct connection or conflict of interest with the apprentice, their employer or training provider; in all instances, including when the EPAO is the training provider (i.e. HEI) • attend induction training • attend standardisation events when they begin working for the EPAO, before they conduct an EPA for the first time

	<p>and a minimum of annually on this apprenticeship standard</p> <ul style="list-style-type: none"> • assess each assessment method, as determined by the EPA plan, and without extending the EPA unnecessarily • assess against the KSBs assigned to each assessment method, as shown in the mapping of assessment methods and as determined by the EPAO, and without extending the EPA unnecessarily • make all grading decisions • record and report all assessment outcome decisions, for each apprentice, following instructions and using assessment recording documentation provided by the EPAO, in a timely manner • use language in the development and delivery of the EPA that is appropriate to the level of the occupational standard • mark open (constructed) test answers accurately according to the EPAO's mark scheme and procedures
Training provider	<p>As a minimum, training providers should:</p> <ul style="list-style-type: none"> • work with the employer and support the apprentice during the off-the-job training to provide the opportunities to develop the knowledge, skills and behaviours as listed in the occupational standard • conduct training covering any knowledge, skill or behaviour requirement agreed as part of the Commitment Statement (often known as the Individual Learning Plan). • monitor the apprentice's progress during any training provider led on-programme learning • advise the employer, upon request, on the apprentice's readiness for EPA • remain independent from delivery of the EPA. Where the training provider is the EPA (i.e. a HEI) there must be procedures in place to mitigate against any conflict of interest
Marker	<p>As a minimum, markers should:</p> <ul style="list-style-type: none"> • attend induction training • have no direct connection or conflict of interest with the apprentice, their employer or training provider in all instances including when the EPAO is the training provider (i.e. HEI)

	<ul style="list-style-type: none"> mark multiple-choice test answers accurately according to the EPAO's mark scheme and procedures
Invigilator	<p>As a minimum, invigilators should:</p> <ul style="list-style-type: none"> attend induction training as directed by the EPAO have no direct connection or conflict of interest with the apprentice, their employer or training provider; in all instances, including when the EPAO is the training provider (i.e. HEI) invigilate and supervise apprentices during tests and in breaks during assessment methods to prevent malpractice in accordance with the EPAO's invigilation procedures

Internal Quality Assurance (IQA)

Internal quality assurance refers to the strategies, policies and procedures that EPAOs must have in place to ensure valid, consistent and reliable end-point assessment decisions. EPAOs for this EPA must adhere to all requirements within the Roles and Responsibilities section and:

- have effective and rigorous quality assurance systems and procedures that ensure fair, reliable and consistent assessment across employers, places, times and independent assessors
- appoint independent assessors who are competent to deliver the end-point assessment and who meet the following minimum requirements:
 - are Fellows of the Operational Research Society
 - have recent relevant experience of the occupation/sector gained in the last two years or significant experience of the occupation/sector
 - have achieved a relevant qualification at a level equivalent to or higher than the apprenticeship standard being assessed
 - are up to date with current operational research practice
 - hold or are working towards an independent assessor qualification e.g. A1 or equivalent
- operate induction training for independent assessors, markers and invigilators
- provide training for independent assessors in terms of good assessment practice, operating the assessment tools and grading
- where appropriate:
 - provide ongoing training for markers
 - provide ongoing training for invigilators
- undertake standardisation activity on this apprenticeship standard for all independent assessors:
 - before they conduct an EPA for the first time
 - if the EPA is updated
 - periodically as appropriate (a minimum of annually)
- conduct effective moderation of assessment decisions and grades
- conduct appeals where required, according to the EPAO's appeals procedure, reviewing and making final decisions on assessment decisions and grades

Value for money

Affordability of the EPA will be aided by using at least some of the following practices:

- Use of technology – the project report and portfolio content.
- Location – use of employer premises
- Test – allowing computer marking for efficiency
- Possibility of scheduling multiple assessment methods on the same day

Professional body recognition

Professional body recognition is not relevant to this occupational apprenticeship.

Mapping of knowledge, skills and behaviours (KSBs)

Assessment method 1: Work-based project report and presentation

Knowledge
K17: The techniques for managing client relationships from project initiation to closure.
K18: Project management principles and techniques; including people, risk, financial controls and budgets.
K19: How to translate information, insights and recommendations into client focused reports and presentations.
K23: The concepts of team dynamics and its relevancy to solving Operational Research problems. How to use this to create, lead and manage high performing and collaborative teams.
K24: The principles and techniques of quality assurance. This includes model structure and clarity, validation & verification, recording data sources, assumptions and documentation.
K25: How to balance actions and benefits that meet client needs with policy, legal, codes of practice and funding requirements.

Skills
S1: Structure a client's problem using a relevant informal or formal methodology.
S2: Conceptualise complex client problems into tractable operational research questions.
S3: Critically evaluate and synthesise data relevant to the client problem (including data provenance, scope and limitations).
S4: Manipulates, interrogate and manage raw data, using relevant methodology.
S5: Undertake exploratory data analysis. This includes identifying relationships, robustness and quality, covering both model generated data and external information sources.
S6: Exercise judgement by selecting the appropriate technique to design an approach to a client's problem.
S7: Use relevant software solutions to support the analysis of a client's problem.
S12: Source and use relevant internal/external technical expertise necessary to address the client's problem.

S13: Use appropriate methodologies to manage complex client relationships.
S14: Strategically manage all variables necessary to deliver timebound Operational Research recommendations. This includes, but is not limited to, people, risk, financial controls and budgets.
S16: Translate complex landscapes into client focused communications that balance rationale for recommendations with project limitations & compliance.
S19: Use concepts of team dynamics to create, lead and manage high performing and collaborative teams.
S20: Operate autonomously within the limits of own authority and responsibility.
S21: Design and implement strategic approaches that motivates team members to achieve objectives.
S23: Validate quality by application of relevant quality assurance methodology.

Behaviours

B1: Adapts approach to meet client needs, whilst avoiding over-attachment to pre-determined or expected outcomes.
B2: Actively utilises diverse networks to enhance Operational research outcomes.
B4: Delivers client centric outcomes.
B6: Adopts an analytical mindset to the client's problem.
B7: Seeks out proportionate and pragmatic response to client issues

Assessment method 2: Professional discussion underpinned by a portfolio of evidence

Knowledge

K9: How to create spreadsheets and code in at least one programming language to develop models and carry out analysis.
K10: The role of the Operational Research team within their own organisation.
K11: The wider political, business and social context and how these external factors might affect their clients and analysis.
K12: The principles of Organisation theory. This includes how organisations work, change and behave. And how this impacts Operational Research practice, modelling and the uptake of findings.

K13: Ethical principles and processes that relate to Operational Research and how to ensure compliance
K14: How regulatory frameworks, commercial and contract management collectively impact the practice of Operational Research.
K15: How Data Protection legislation is implemented across own and client organisation
K16: The importance and value of using expertise from your own internal/external networks when considering an Operational Research question.
K20: How Operational Research has evolved and its impact on society
K21: Techniques for managing and appraising your own personal and professional development.
K22: Techniques for supporting colleagues in their professional development through provision of feedback.

Skills

S8: Creates a model to analyse a problem; applies an appropriate approach including programming, scripting, coding or using spreadsheets.
S9: Critically analyse the internal and external factors relevant to an Operational Research problem to determine a holistic approach. These factors include organisational structures, the political, business and social context.
S10: Apply holistic approaches to an Operational Research problem, taking into consideration internal and external factors.
S11: Recommend compliant solutions that address the client's problem.
S15: Exercise judgement to deliver persuasive arguments that are objective and unbiased.
S17: Critically evaluate & address own developmental needs.
S18: Apply judgement to provide relevant and timely feedback when supporting colleagues' development.
S22: Exercise judgement in managing and using data in accordance with relevant legislation, organisational principles and governance.

Behaviours
B3: Overcomes challenges and perseveres in order to deliver on time.
B5: Seeks out the latest Operational Research techniques in order to address client problems effectively.
B8: Acts ethically and challenges unethical evidence/practice.

Assessment method 3: Test

Knowledge
K1: How to select and apply, a range of problem structuring methods to understand complex problems.
K2: How to establish and scope client requirements into clear analytical questions.
K3: The comparative strengths and weaknesses of informal and formal methods used to structure problems.
K4: The approaches used to identify and obtain potentially useful data (including their provenance, scope and limitations).
K5: How to manipulate, interrogate and manage raw data.
K6: How to conduct exploratory data analysis. This includes identifying relationships, robustness and quality, covering both model generated data and external information sources.
K7: The range of potential Operational Research techniques & methods, their strengths and weaknesses and how they are used in practice. This includes, optimisation, machine learning, scheduling, forecasting, simulation, decision analysis, inventory models, Markov models, dynamic programming, performance measurement (such as KPIs, metrics and benefits), heuristics and statistical methods.
K8: Operational Research software solutions (packaged and “in-house” developed) and their comparative strengths and weaknesses in analysing client operational research problems.

Grading Descriptors

End-point assessment method 1: Work-based project report and presentation

To achieve a distinction in this assessment method, the apprentice must pass all pass level criteria, plus achieve a minimum seven out of ten distinction level criteria.

KSB	Fail	Pass	Distinction
K18 S14 B1	Does not meet the pass criteria	Identifies and uses relevant project management principles and techniques. Manages the range of variables impacting a problem in order to conclude the project. These variables include people, risk, financial controls and budgets. Demonstrates how they have adapted their approach to the project throughout the project lifecycle.	Adapts and blends from a range of recognised approaches, balancing their strengths and weaknesses for that particular situation.
K19 K25 S16 B4		Creates evidence-based client reports that offer compliant recommendations to client problems, and balances proposed actions and benefits with cost. Demonstrates adapting to clients' requirements when adopting their communication style.	Seeks feedback on their style of communication during the project and reflects on how they can improve Demonstrates they have met the client's needs by varying or going beyond the original statement of work
K23 S12 S19 S20 S21 B2		Manages and leads by identifying and utilising the dynamics within the team and motivates team members in order to collaborate to achieve project outcomes. Operates autonomously, within limits of own authority and responsibility.	Transfers and synthesises learning between teams and reconciles conflicts in teams.

	Actively draws on both internal and external sources of expertise to inform their results.	Demonstrates how the learning they have generated could be used to inform future projects
S1 S2	Identifies and structures the client problem by applying either a relevant formal or relevant informal methodology. Turns this into relevant and defined operational research questions.	Uses multiple approaches in parallel or combination and reconciles their inconsistencies to deliver practical results.
S3 S4 S5 B6	Actively identifies the provenance, scope and limitations of all key data relevant to a client problem Sources required raw data. Manipulates, interrogates and manages this raw data, selecting a relevant methodology. Critically analyses available data and compares modelled data with external data. Weighs the relationships, robustness and quality of data to form appropriate data sets.	Critically appraises the data sources and their treatment and makes suggestions for improvements should the analysis be repeated.
S6 S7	Evaluates why their chosen analytical method is appropriate to the client's problem including its theoretical underpinning. Demonstrates the use of relevant software solutions and compares with bespoke modelling when designing the approach to a client's problem.	Demonstrates how they have drawn on research and expertise to improve the robustness of their analytical approach
K17 S13	Manages client relationships from project initiation to closure, by selecting from a range of approaches to identify clients' views, surface and challenge client assumptions, handle	Reflects on how their approach to client management added benefits to addressing the client's needs efficiently and effectively and is able to articulate what else they might have done.

		conflict and resistance, and balance a variety of interests	
K24 S23		Demonstrates validation and verification of analysis by application of relevant quality assurance methodology. Explains how they select and apply suitable assurance methods for their analysis and for the work of others.	Critically evaluates their assurance methods with respect to their adequacy, time demands and ability to provide appropriate assurance
B7		Evaluates how they considered the practical implications of their analysis and recommendations.	

Assessment method 2: Professional discussion underpinned by a portfolio of evidence

To achieve a distinction on this assessment method, the apprentice must pass all pass level criteria, plus achieve a minimum six out of eight distinction level criteria.

KSB	Fail	Pass	Distinction
K9 S8	Does not meet the pass criteria	Evaluates how they have selected appropriate approaches to effectively use a programming language to develop models and carry out analysis of a problem.	Evaluates the suitability of alternative methods to achieve improved outcomes.
K10 K11 K12 S9 S10		<p>Analyses how operational research fits into the context of their organisation</p> <p>Evaluates how organisational theory and behaviour theory each relates to Operational Research practice, modelling and the uptake of findings.</p> <p>Critically analyses how they have considered the organisational structures, the political, business and social context impacting a client's problem. Explains how they utilised this in their holistic approach to the problem.</p> <p>Evaluates the context of their, or their client's, organisation using a standard organisational theory</p>	Critically analyses the effectiveness of the application of organisational theory
K13 K14 K15 S11 B8		<p>Explains how they use both data protection legislation, together with the expectations of the client and their own organisation, when handing or creating data and is able to recommend a compliant solution.</p> <p>Evaluates when they have identified the relevant commercial,</p>	

	<p>contractual, regulatory and ethical factors that impacted their work and how they ensured compliance.</p> <p>Justifies how they act ethically and how they challenge unethical evidence or practice to meet client needs.</p>	
K16	<p>Analyses how using expertise from both internal and external networks contributes to the quality of advice provided to clients.</p>	<p>Evaluates how internal and external networks can be used to advance shared learning.</p>
K20	<p>Explains the origins of operational research in the UK including its migration from military to civil use. Evaluates how the range of operational research applications have had impact on society.</p>	<p>Critically evaluates how the history and development of operational research in the UK influences its current practice.</p>
K21 K22 S17 S18 B5	<p>Articulate when they sought out and identified their own operational research developmental need, and the technique they used to proactively plan and appraise their development.</p> <p>Analyses when they identified a colleague with a development need and how they ensured their feedback was relevant and supportive.</p>	<p>Explains how they have used a recognised learning loop methodology to reflect on practice and explains the impact of this reflection on their current practice.</p>
S15	<p>Explains when they adapted their communication style in order to convey a complex and objective message in ways that will help their audience to understand. Justifies how this was persuasive and the impact this had on their audience.</p>	<p>Critically evaluates a communication style that they discounted and their rationale for this.</p>

S22		Evaluates the steps they take that ensures they use and share data compliantly throughout an operational research issue.	Critically evaluates their own experiences of data management and how these could be used to improve assurance processes in future.
B3		Analyses a time when they encountered obstacles that were blocking a project and explains the tactics they deployed to overcome these to deliver the project on time.	Evaluates how these experiences overcoming obstacles will inform their future practice.

Assessment method 3: Test

KSBs	Fail	Pass	Distinction
K1 K2 K3 K4 K5 K6 K7 K8	0-14 marks	15-22 marks	23-30 marks