



Assessment Guidance (Including Portfolio and Project Report)

FOR SYSTEMS ENGINEER DEGREE APPRENTICESHIP (ST0107,
V2)

AUTHOR MICHAEL HENSHAW, ON BEHALF OF INCOSE UK

© INCOSE UK Ltd., 2020

The copyright of this document is owned by INCOSE UK Ltd.
You are encouraged to use and distribute this information freely. It may be
reproduced in whole or in part and adapted to your purpose, provided that
the INCOSE UK Ltd copyright notice is always included on every page.
You MAY NOT use this document for commercial gain.

Contents

| | |
|---|-----------|
| This Guide | 2 |
| Purpose of this document..... | 2 |
| Audience | 2 |
| Overview of assessment and preparation | 3 |
| Apprenticeship Timeline | 3 |
| Interpreting the Assessment Plan..... | 7 |
| Origin of assessment criteria | 7 |
| Assessment Products | 7 |
| Guidance on Evidence and Expectations | 8 |
| The distinction between supervised practitioner and practitioner..... | 8 |
| Timeliness of evidence..... | 9 |
| Satisfying the Criteria (Evidence)..... | 9 |
| “Can describe...” | 9 |
| “Can identify...” | 10 |
| “Can explain...” | 10 |
| “Can Evidence...” | 11 |
| “Can Justify...” | 11 |
| “Can List...” | 11 |
| “Can Show...” | 11 |
| “Has...” | 12 |
| Glossary..... | 12 |
| Reference Documents to Support Portfolio Development..... | 13 |
| Assessment 1: Report, Presentation, and Questions | 14 |
| Purpose | 14 |
| KSBs covered by Assessment 1 | 14 |
| Marking | 14 |
| Report | 14 |
| Choice of Project(s)..... | 14 |
| Preparation and Structure | 14 |
| Submission of the report | 15 |
| Presentation..... | 15 |
| Presentation format..... | 16 |
| Timekeeping..... | 16 |
| Assessment 2: The Portfolio and Professional Interview | 17 |
| Purpose of the portfolio..... | 17 |
| KSBs covered by Assessment 2 | 17 |
| Characteristics of the portfolio | 17 |
| Items of evidence..... | 17 |
| Portfolio structure..... | 18 |
| Submission Format | 19 |
| Submission date | 19 |
| Activities through which evidence is assembled | 19 |
| EPA Assessment Day | 20 |
| Preparation for assessment | 20 |
| Result | 20 |

This Guide

This guidance is applicable only to Version 2 of the Systems Engineer Degree Apprenticeship Standard (ST0107/AP04. V2, 2019).

Purpose of this document

The purpose of this document is to provide guidance on the assessment items that all apprentices on the Systems Engineer Degree Apprenticeship Standard (ST0107/AP04. V2, 2019) must provide for End Point Assessment (EPA).

The assessment comprises the following elements:

- A project report, presentation and questions on up to 3 projects to demonstrate acquisition of a defined set of knowledge, skills, and behaviours
- A Portfolio and professional interview to demonstrate acquisition of a defined set of knowledge, skills, and behaviours

This guidance covers preparation of materials for the End Point Assessment and recommends working practices throughout the apprenticeship to ensure that the Apprentice is fully prepared for the End Point Assessment period and the subsequent assessment event.

Audience

This document is intended for

- Apprentices
- Industry Mentors
- Academic Tutors
- EPA Assessors

The reader should be familiar with the Standard [ref. 1] and the Assessment Plan [ref. 2], accessible from the Inst. for Apprenticeships & Technical Education website.

It must be clearly understood that this document provides guidance, it is not a specification and does not constitute a standard.

Overview of assessment and preparation

Apprenticeship Timeline

The apprenticeship is a marathon rather than a sprint; it requires continuous, paced development and recording of information throughout the programme so that when the Apprentice reaches the End Point Assessment everything is in place.

Figure 1 shows the timeline for the apprenticeship; the stages are as follows:

- **Pre-Programme.** Before beginning the apprenticeship, the following activities are required
 - **Initial Needs Assessment (INA)** – the Apprentice identifies their current level of competence in all the KSBs listed in the apprenticeship standard. If any KSBs (or sets of KSBs) are already achieved at the desired level (i.e. supervised practitioner or practitioner level), then module exemption may be possible, as levy funding cannot be used for already acquired learning.
 - A **Training Plan** must be created and agreed with the industrial mentor and academic tutor that will deliver a target profile of KSBs if all learning is completed satisfactorily. This plan will lead to choices of elective modules. It will also indicate how each KSB will be acquired through academic provision, industry practice, and other training sources.
 - **Commitment Statement** – this is a formal agreement between Apprentice, Employer and the Training Provider (University) that includes essential elements of the INA and training plan, details of the commitment of each entity throughout the apprenticeship, and may include expectations in terms of how Off-the Job training will be delivered. This document may be adjusted during the apprenticeship to reflect changes according to progress and other circumstances. This is a key document in terms of delivery of the apprenticeship at the individual level.
 - Evidence of **Level 2 English and Mathematics** qualification is a requirement of achieving the apprenticeship. If candidates cannot provide the evidence (certificates), then such evidence should be generated within the first 12 months of the apprenticeship¹.
- **Years 1 & 2 on-programme:** Generally, this will be the taught part of the programme, but it is essential that the apprentices collect evidence as they go along.
 - **Regular tri-partite reviews** between an employer representative (usually a mentor), a training provider representative (usually a tutor), and the Apprentice². These reviews will cover progress in the training, ensuring the 20% Off-the-Job training hours are being completed, and reviewing the Apprentice’s activities to ensure that all needed KSBs will be in place by the gateway.
 - Usually, the Apprentice will aim to complete the **taught element** of the MSc. during years 1 and 2; it is usually possible, but inadvisable, for this to extend into year 3 if required.

¹ Strictly, the Level 2 English and Mathematics is only required at the gateway, but sector advice from EPAOs and UVAC is that this should be completed within 12 months. Some universities have made the acquisition of level 2 functional skills within the first 12 months mandatory.

² Tri-partite reviews are a requirement of the apprenticeship scheme, although no frequency is specified. UVAC has indicated that the majority of apprenticeships work on a termly basis (three per year) although some work on a quarterly basis. A very small proportion hold tri-partite meetings on a monthly or six-weekly basis. [Rhodes, R., “A Practical Guide to Apprentice Assessment and Review”, UVAC, 2017]

- **KSBs should be exercised** on projects in the workplace. The tripartite meetings should advise the employer of experience requirements and identify any risks to achievement of the KSBs in time for rectifying action to be taken.
- It is essential that **apprentices collect evidence** items that demonstrate their acquisition of KSBs with sufficient information to ensure that they can make a selection of their best evidence for the portfolio and the project report prior to the gateway.
- **Year 3 on-programme:** this is usually devoted to the main, dissertation project, but taught modules could be included.
 - **Regular tri-partite reviews** continue between employer representative (usually a mentor), a training provider representative (usually a tutor), and the Apprentice. As with years 1 and 2, will cover progress in the training, ensuring the 20% Off-the-Job training hours are being completed, and reviewing the Apprentice's activities to ensure that all needed KSBs will be in place by the gateway.
 - **Substantial project** that will be written up as a MSc. dissertation will be carried out by the Apprentice. The precise nature of execution and supervision may vary across the various programmes on offer.
 - **KSBs continue to be exercised** on projects in the workplace and the apprentices continue to collect evidence, as in years 1 and 2.
- **Pre-EPA period on-programme:** typically, this period might last up to 8 months and comprises the acquisition of KSB evidence prior to gateway
 - **Regular tri-partite reviews** continue between employer representative (usually a mentor), a training provider representative (usually a tutor), and the Apprentice.
 - The Apprentice continues to **exercise KSBs** on projects
 - The Apprentice continues to **collect evidence** items
 - **Note** that the period of 8 months is based on the typical apprenticeship programme length of 48 months. But in fact, this period could vary in length and may not even be required. The period length is determined by when the Apprentice has assembled all the evidence needed for the EPA.
- **Gateway (event):** the gateway is a decision point. At this point the employer notifies the EPAO that the Apprentice is ready to enter the EPA period that ends with the assessment event.
 - **Company Approval:** the employer decides that the Apprentice is ready for EPA; this is likely to be in consultation with the training provider and the Apprentice. The following conditions must be satisfied:
 - **All credits attained for the MSc.:** this means that the Apprentice has passed all the assessments for the MSc. and the university's Exam Board has approved the award of the degree. However, there is frequently a gap between approval of the award and graduation. Therefore, it is not necessary that the Apprentice should have actually graduated.
 - **Has suitable project(s) for presentation:** assessment 1 requires a report to be generated (see Assessment 1, pg. 14) of between 1 and 3 projects conducted by the Apprentice. The report evidences the demonstration of acquired KSBs in the project(s). A presentation will also be required.
 - **Portfolio evidence for relevant KSBs assembled:** the evidence to be used in the portfolio must have been collected. This must be provided to the EPAO at the Gateway point, even though the portfolio may not have been fully compiled. **The ten portfolio items of evidence are submitted to the EPAO at the Gateway. The full portfolio (with commentary, tables, etc. and evidence) is submitted seven days before the EPA event (assessment day).**
 - There are circumstances in which the submission of evidence items outside the employer organisation may be unfeasible; the employer and EPAO should agree what evidence or assurances are acceptable, such

that the EPAO has confidence that the portfolio will be complete. Evidence of confirmation from a suitable authority (e.g. Chief Engineer) may be agreed where restrictions (e.g. security classification) precludes release.

- **L2 English and Mathematics qualification:** it is a requirement of ESFA that all apprentices have attained L2 English and Mathematics in order to receive their certificate of apprenticeship. Evidence of qualification (certificate) must be provided to the EPAO at the gateway point. Note that this should have been checked by the Training Provider at the start of the programme and the evidence secured within the first twelve months of the apprenticeship.
- **End of requirement for 20% Off-the-Job Training:** approval at gateway for the Apprentice to enter the EPA period signals the end of the requirement for employers to provide the Apprentice with 20% Off-the-Job training. The Apprentice still has preparatory work to do during the EPA period for which the Apprentice and employer must agree a plan to ensure completion of the apprenticeship.
- **EPA Period:** this is a four-month period during which the apprentice must prepare for the assessment. The items to prepare are described in more detail below.
 - **Assessment 1:** a report and presentation on 1-3 projects. The report **must** be prepared during the EPA period, it is not permitted to write it before the gateway. A presentation must also be prepared. The time allocated to the report is 3 months, after which it must be submitted to the EPAO. The presentation does not need to be submitted in advance of the EPA event.
 - **Assessment 2:** the portfolio is the basis for a professional interview. It is important to understand that the portfolio is not marked. It provides evidence to the Assessor upon which the questions in the professional interview will be formulated. The portfolio must be submitted to the EPAO seven days before the assessment day.
- **EPA (event), or Assessment Day:** this is a single day during which the two assessment activities will be conducted.
 - Results are not presented on the assessment day but are due five days afterwards.

The EPAO will provide an online platform to which the report and portfolio may be uploaded.

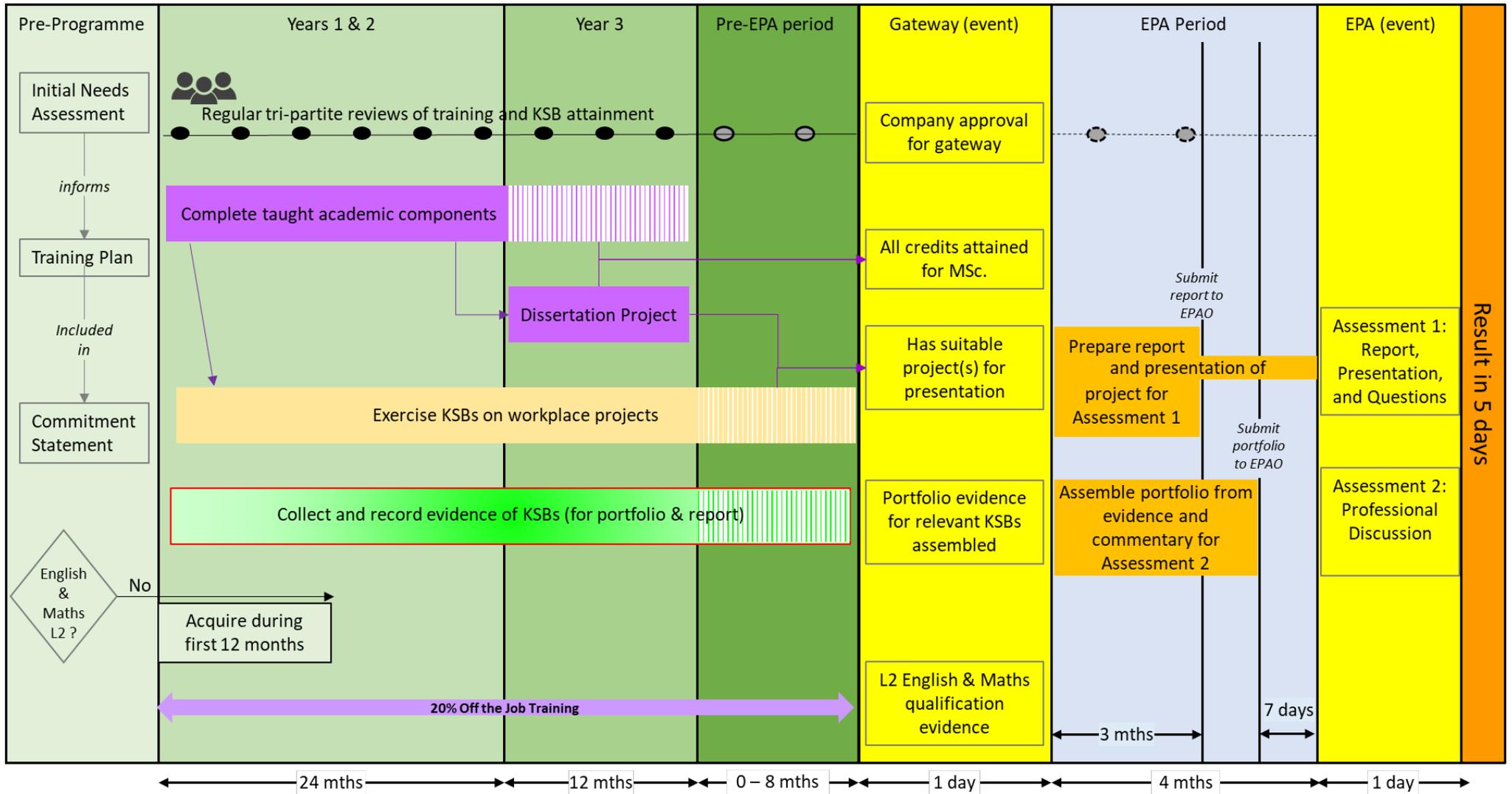


Figure 1: Timeline for Systems Engineering Degree Apprenticeship (v2)

Interpreting the Assessment Plan

Origin of assessment criteria

There are three major stakeholders in the criteria for the Systems Engineering Apprenticeship (Figure 2). The Institute for Apprenticeships and Technical Education is the main governing stakeholder for the criteria, because this body approves and owns the standard. INCOSE UK endorses the INCOSE Systems Engineering Competency Framework as a subject-specific means of assessment. Accreditation of the academic component (MSc.) by the UK Engineering Council is dependent on the meeting the learning outcomes defined in ref [6]; these are fairly high-level and describe what an Engineering MSc. graduate should know and be able to do. The Assessment Plan incorporates all three elements.

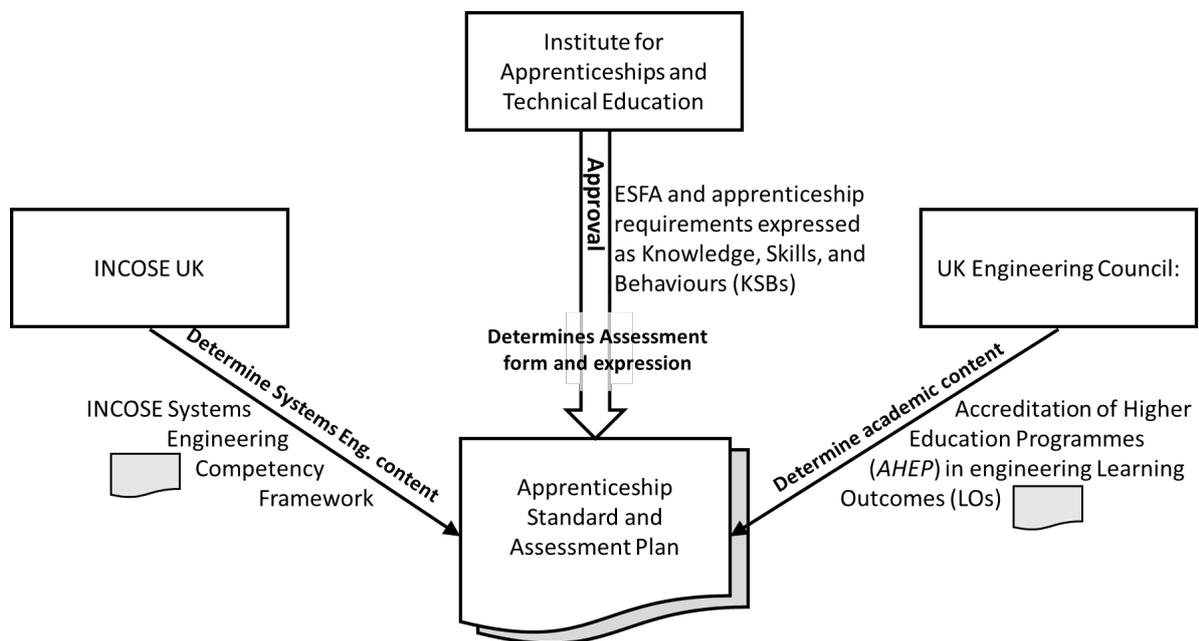


Figure 2: Stakeholders in assessment criteria

Assessment Products

There are three assessment products:

- Report on a project(s) used in Assessment 1 and marked
- Presentation on a project(s) used in Assessment 1 and marked
- Portfolio used to support Assessment 2 (Professional Interview), but not marked.

The two assessments are complementary: each tests a different set of KSBs, as summarised in Figure 3 and discussed in detail below.

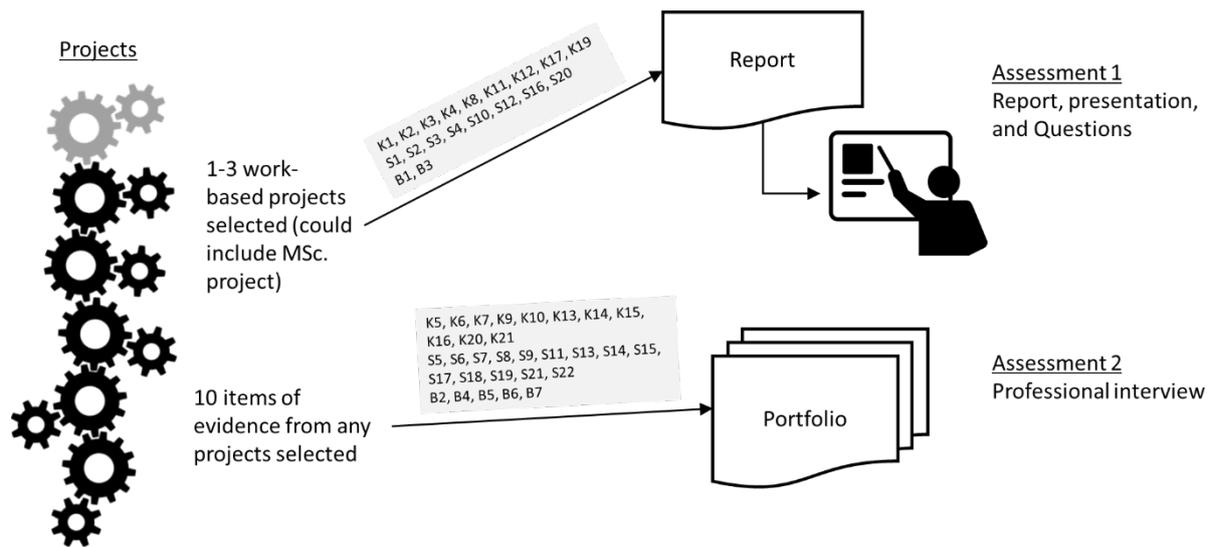


Figure 3: Assessment products

Clearly, the term “project” is open to interpretation. For the purposes of the apprenticeship, it should be considered to be a coherent set of activities in which the Apprentice plays a substantial role in the execution of the Systems Engineering. The project scope is defined in the products for assessment.

For assessment 1, the Apprentice can choose up to three projects (including the MSc. dissertation project) for the report.

For assessment 2, ten items of evidence are selected from any work-based project for the portfolio. An “item of evidence” may include several related articles about which a commentary can be written to provide a coherent demonstration of KSBs at the required level.

Guidance on Evidence and Expectations

The blend of awareness, supervised practitioner, and practitioner levels for the KSBs is an individual choice that is derived from the requirements in Table 6 of the Assessment Plan [ref. 2]. All KSBs must be achieved at least at awareness level and so all will be listed in either the Report or the Portfolio. It is recommended that Apprentices collect evidence as they proceed through the programme, but select that which they use in the assessments towards the end of the programme (prior to gateway), so that the most suitable evidence can be presented to the Assessor.

The distinction between supervised practitioner and practitioner

All Apprentices would be expected to work generally under supervision, but for the purposes of the assessment, the expectation is that at practitioner level the Apprentice completes the work item in question without direct supervision. The distinction between these levels is explained in the INCOSE Systems Engineering Competency Framework and can be summarised as:

- A Supervised Practitioner works under the direction of a Practitioner. The Supervised Practitioner does the work but the Practitioner usually decides what needs to be done, to what level of quality and what level of risk is acceptable.
- A Practitioner is able to justify why a particular approach was taken, what alternatives were available, why (at the time) the approach taken was adopted and what they would do differently in hindsight. They will be able to justify the assumptions made and explain why they were appropriate for the task.

A question may arise as to how many times an Apprentice must demonstrate activity at either Supervised Practitioner or Practitioner level. Evidence of one instance is required for the purposes of assessment. It is likely that evidence may be provided that shows the Apprentice’s development from awareness, to Supervised Practitioner, to Practitioner (if required) through the on-programme period.

Timeliness of evidence

The evidence used in assessment must have been generated on-programme (i.e. during the time of the apprenticeship), even if the KSBs have been informed by prior learning.

Satisfying the Criteria (Evidence)

The Assessment Plan has criteria for achieving the correct level for each KSB; these are variously defined as “Can describe...”, “Can identify...”, “Can explain...”, “Can evidence...”, “Can justify...”, “Can List...”, “Can show...”, “Has...” the evidence that may be provided in the portfolio are described in the following section.

In all cases, this guidance is non-exclusive and other types of evidence could also be considered.

“Can describe...”

In general, “can describe...” implies a written description of a concept, process, technology, or other relevant matter, but it could be a verbal description during the professional interview or presentation.

| | |
|-------------------------------|--|
| Awareness level | <p>Extract from academic or industry document in which Apprentice describes the subject of the criterion</p> <p>An original description of the subject of the criterion specifically written for the report or portfolio</p> <p>Evidence of passing an assessment in which the described subject of the criterion has been addressed</p> |
| Supervised practitioner level | <p>Commentary on an item(s) of evidence in which the subject of the criterion is described</p> <p>An item of evidence in which the subject of the criterion is described</p> <p>The item of evidence could be generated in an industry project or in a substantial academic project relevant to industry. The Apprentice must be a contributor to the item of evidence</p> |
| Practitioner level | <p>“Can describe...” is only used a few times at this level, where it is competence can be validated through the commentary on an item(s) of evidence in which the subject of the criterion is described or to which the description is relevant.</p> <p>The item of evidence could be generated in an industry project or in a substantial academic project relevant to industry. The Apprentice must be a major contributor to the item(s) of evidence, and the unsupervised contributor to the specific subject of the criterion.</p> <p>In this case, the commentary should be detailed and must demonstrate a deep understanding of the subject of the criterion.</p> |

“Can identify...”

“Can identify...” always refers to written identification in evidence or commentary.

| | |
|-------------------------------|--|
| Awareness level | Only relevant to S14 and K20 This will generally be shown in the commentary as a retrospective identification of the subject of the criterion as applied to project(s) used in the portfolio, or examples from academic assignments/projects. |
| Supervised practitioner level | The commentary should identify evidence items for the subject of the criterion that show the Apprentice has identified the relevant matters or could retrospectively identify matters that were missed (to indicate development of the skill or knowledge). The evidence should be from industry projects or a substantial academic project relevant to industry. The Apprentice must demonstrate that under supervision, they were able to identify the matter of concern. |
| Practitioner level | The commentary should identify evidence items for the subject of the criterion that show the Apprentice has identified the relevant matters or could retrospectively identify matters that were missed (i.e. to indicate development of the skill or knowledge). The evidence should be from industry projects. The Apprentice must demonstrate that they were able to identify the matter of concern independently of supervision. |

“Can explain...”

In general, “Can explain...” implies that a verbal explanation during the assessments will be appropriate, however, portfolio evidence may still be provided and is also needed for a context in which the subject of concern is explained.

| | |
|-------------------------------|--|
| Awareness level | The commentary should direct the Assessor to examples of explanation in reports, presentations, academic assignments, etc., or to a relevant example that the Apprentice may explain during the professional interview. |
| Supervised practitioner level | The commentary should explain the subject of the criterion with reference to a specific project on which the Apprentice worked under supervision. This could be either where the explanation was understood at the time, or where it has been subsequently understood. The explanation in the commentary is likely to be a reflection on the work undertaken. |
| Practitioner level | The commentary should explain the subject of the criterion with reference to a specific project on which the Apprentice worked independently of supervision. This could be either where the explanation was understood at the time, or where it has been subsequently understood. The explanation in the commentary is likely to be a reflection on the work undertaken. |

“Can Evidence...”

“Can evidence...” refers to specific items of evidence within the portfolio, but the evidence should be referenced in the commentary and may require elaboration during professional discussion.

| | |
|-------------------------------|---|
| Awareness level | Not used for awareness category. |
| Supervised practitioner level | This definition of a criterion refers to either behaviours or a skill. “Can evidence...” requires specific examples of the behaviour or skill being exercised in the workplace or more generally in the Apprentice’s professional life. |
| Practitioner level | The evidence is artefacts that have been created, examples of behaviours that are validated by others through some means: such as professional assessments, activities that have been led or to which the Apprentice has contributed, attendance at relevant experiential events, awards, etc. Distinction between supervised practitioner level and practitioner level reflects simply the level of independence in which the skill was discharged, or the behaviour exhibited. The commentary should identify the examples with a justification of how they provide evidence of the skill or behaviour. |

“Can Justify...”

“Can justify...” can be assessed from documents and verbally.

| | |
|--------------------|--|
| Practitioner level | This definition of a criterion only occurs at Practitioner level and is expressed in the context of decisions that the Apprentice will have made in the prosecution of their technical duties. Evidence should include a record of relevant decisions made: the justification may be included in the evidence item, in which case the commentary will provide direction to the relevant item, or it may be justified post hoc within the commentary, but with reference to the decision. |
|--------------------|--|

“Can List...”

“Can list...” is usually assessed from written evidence, but for short lists may be assessed verbally.

| | |
|-----------------|--|
| Awareness level | This definition of a criterion only occurs once, at Awareness level. “Can list activities and work products required for transition” Evidence is a list that may be included in the commentary or a separately generated document that provides a list for a real or typical project. |
|-----------------|--|

“Can Show...”

“Can show...” may be assessed through documentation or verbally.

| | |
|--------------------|--|
| Practitioner level | This definition of a criterion only occurs once at the Practitioner level. “Can show traceability between verification requirements and system requirements” This will be evidenced through an example of the traceability for a project in which the Apprentice worked independently of supervision. |
|--------------------|--|

“Has...”

“Has...” can be assessed in a variety of ways, as explained in the table below.

| | |
|-------------------------------|---|
| Awareness level | Occurs only once at this level as a knowledge item: “Has knowledge of core principles of science and engineering” This may be evidenced through academic qualifications. |
| Supervised practitioner level | “Has” always refers to a skill in these levels and the evidence should be reports or artefacts that show demonstration of the skill in an industry project in which the Apprentice works under supervision, or a substantial industry-relevant academic project. The commentary should direct the Assessor to the evidence items. |
| Practitioner level | “Has” always refers to a skill in these levels and the evidence should be reports or artefacts that show demonstration of the skill in an industry project. The commentary should direct the Assessor to the evidence items. |

Glossary of Relevant Acronyms and Terms

| | |
|--------------|---|
| EPA | End Point Assessment – the assessment associated with the apprenticeship qualification |
| EPAO | End Point Assessment Organisation – independent organisation that manages the process of assessment |
| EQA | External Quality Assurance (EQA) |
| ESFA | Education and Skills Funding Agency – an agency of the Department for Education, responsible for funding education and skills for children, young people, and adults. It regulates education and training providers to provide assurance that public funds achieve value for money. |
| Gateway | Decision made by Apprentice’s employer that Apprentice is ready for EPA. Following decision, employer notifies EPAO and four-month period of preparation for EPA begins, during which report and presentation are prepared for assessment method 1 and portfolio is finalised for assessment method 2 |
| IfATE | The Institute for Apprenticeships and Technical Education is an employer led crown Non-Departmental Public Body. Originally called the Institute for Apprenticeships (IfA) |
| KSB | Knowledge, Skills, and Behaviours (as defined in the standard) |
| Levy Funding | Funding drawn down from the national levy to fund apprenticeship learning in accordance with the allocation to the Apprentices employer |
| Logbook | A personal, professional record of project learning and results. |
| Mentor | Industry Mentor assigned to the Apprentice |
| Portfolio | Synoptic record of professional development |
| Tutor | Academic Tutor assigned to the Apprentice |
| UVAC | University Vocational Awards Council |

Reference Documents to Support Portfolio Development

1. Institute for Apprenticeships & Technical Education, Systems Engineer Standard, ST0107, Version 2, 09/04/2019, Available at:
<https://www.instituteforapprenticeships.org/apprenticeship-standards/systems-engineer/>
2. Institute for Apprenticeships & Technical Education, Systems Engineer Assessment plan, ST0107/AP04, 09/04/2019, Downloadable from:
<https://www.instituteforapprenticeships.org/apprenticeship-standards/systems-engineer/>
3. INCOSE Systems Engineering Competency Framework, INCOSE-TP-2018-002-01.0, 2018, Available free of charge from: <https://www.incose.org/products-and-publications/competency-framework>
4. INCOSE. 2015. Systems Engineering Handbook: A Guide for System Life Cycle Processes and Activities, version 4.0. Hoboken, NJ, USA: John Wiley and Sons, Inc, ISBN: 978-1-118-99940-0SEBoK
5. SEBoK Editorial Board. 2019. The Guide to the Systems Engineering Body of Knowledge (SEBoK), v. 2.1, R.J. Cloutier (Editor in Chief). Hoboken, NJ: The Trustees of the Stevens Institute of Technology. Accessed [02/02/2020]. www.sebokwiki.org. BKCASE is managed and maintained by the Stevens Institute of Technology Systems Engineering Research Center, the International Council on Systems Engineering, and the Institute of Electrical and Electronics Engineers Computer Society.
6. Engineering Council, UK Standard for Professional Engineering Competence (UK-SPEC), third edition, 2013, available at:
[https://www.engc.org.uk/engcdocuments/internet/Website/UK-SPEC%20third%20edition%20\(1\).pdf](https://www.engc.org.uk/engcdocuments/internet/Website/UK-SPEC%20third%20edition%20(1).pdf)
 - Note that this standard is in revision (in 2020)

Assessment 1: Report, Presentation, and Questions

The requirements for Assessment 1 are given in detail in the Assessment Plan [ref. 2].

Purpose

The purpose of the report is to write a reflection on the conduct of a project to demonstrate an understanding of the Systems Engineering that was used. The purpose of the presentation is to demonstrate the Apprentice's ability to convey Systems Engineering verbally. The purpose of questions is to enable the Assessor to probe the understanding in more depth.

The KSBs tested in Assessment 1 are typical for all projects.

KSBs covered by Assessment 1

K1, K2, K3, K4, K8, K11, K12, K17, K19

S1, S2, S3, S4, S10, S12, S16, S20

B1, B3

See ref [1] for definitions and ref [2] for assessment criteria.

Marking

Both the report and the presentations/questions are marked.

Report

Choice of Project(s)

It is expected that a single project will be chosen that should illustrate all KSBs required, however, up to two more projects may be used if these are needed to cover the full range of required KSBs. Typically, the selected project(s) would have required a total of at least 500 person-hours effort by the Apprentice.

Apprentices should pay attention to whether the evidence in the project will establish the required grade (Awareness, Supervised Practitioner, Practitioner).

Clearly, the Apprentice must have been responsible for Systems Engineering practice at the level claimed in the project(s) selected.

The Apprentice's work on the projects selected must have taken place during the on-programme period (i.e. time registered as an Apprentice).

It is permitted to use the MSc. dissertation project provided it is relevant to the Apprentice's work domain.

It is usual for Systems Engineers to be working in a team; the Apprentice should make their contribution to the work clear and unambiguous in the report.

Preparation and Structure

Evidence should be collected during the on-programme time (years 1,2,3 and pre-EPA).

The report must be written during the EPA period (Figure 4). It is separate from regular project reporting and the dissertation and is written only for the purposes of assessment.

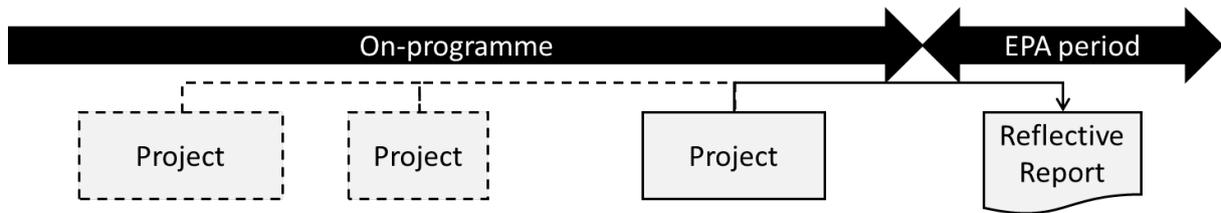


Figure 4: The reflective report covers 1-3 projects carried out on-programme: the selected project(s) can be from any period during the programme

If a dissertation project is used, apprentices should be aware that the reflective report is a separate entity and that only this forms the basis for the assessment; i.e. a distinction in the MSc project does not guarantee a high grade in the apprenticeship assessment.

The report may be up to 7,500 words (maximum) excluding references, diagrams, and attachments; a typical structure is shown in Figure 5.

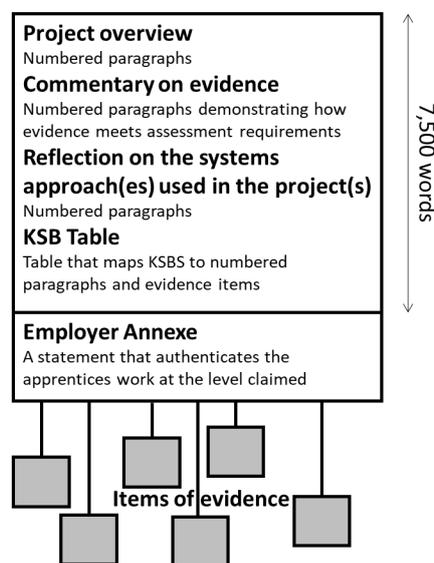


Figure 5: Report Structure

Apprentices are strongly advised to read the Assessment Plan [ref. 13] carefully to ensure that their report is fully compliant.

Submission of the report

The report must be submitted to the EPAO three months from the start of the EPA period.

Presentation

A presentation must be prepared for Assessment 1 that is consistent with the report; it **does not** have to be submitted in advance. The presentation in the assessment will last 30 minutes and must cover the following:

- Project scope,
- Outcomes/achievements,
- Any difficulties faced or lessons learnt and,
- Recommendations

The presentation will be followed by 30 minutes of questions (at least five) to substantiate that the KSBs have been achieved.

Presentation format

Any format is permissible, but apprentices should note that the EPAO should be notified of non-standard formats in advance (note that for the purposes of this assessment non-standard means not MS PowerPoint).

Timekeeping

The Assessor may allow up to 10% extra time (3 minutes) for the presentation and up to 20% extra time (6 minutes) for the questions, to allow completion of presentation and/or questions respectively.

Assessment 2: The Portfolio and Professional Interview

Purpose of the portfolio

The portfolio constitutes evidence that End Point Assessors may use as the basis for assessment. It is not an assessed item in its own right, but it is the basis for questions during the professional interview. Important note: strictly the portfolio supports assessment method 2 (professional interview), but may be used to map all KSBs, which may prove useful for future professional endeavours, e.g. evidence for chartership requirements.

The acquisition of knowledge, skills, and behaviours is monitored by the Apprentice, Industry Mentor, and Academic Tutor as formative evidence of Systems Engineering performance. The arrangement of evidence into the portfolio is a summative record of Systems Engineering performance.

KSBs covered by Assessment 2

K5, K6, K7, K9, K10, K13, K14, K15, K16, K20, K21

S5, S6, S7, S8, S9, S11, S13, S14, S15, S17, S18, S19, S21, S22

B2, B4, B5, B6, B7

See ref [1] for definitions and ref [2] for assessment criteria.

Characteristics of the portfolio

The portfolio provides a synopsis of experience and competence; it is not a logbook (in which everything is recorded), but the logbook is an essential input to the portfolio. Similarly, it summarises projects, it does not provide every last detail.

The portfolio should highlight the acquisition of the KSBs required by the standard in a way that will be clear to others – especially the Assessor.

It contains evidence (items generated by the Apprentice's on-programme work) to support the Apprentice's claims of competence. It also contains their reflections on their performance, experiences, and assessment of their KSBs.

Items of evidence

A maximum of 10 items of evidence is permitted.

An item of evidence supports one or (usually more) KSBs. It should be considered to comprise a coherent set of related articles that constitute a phase or activity in a project; i.e. ten items of evidence can be interpreted as ten pieces of work.

Evidence sources may include:

- management and technical reports
- documents
- presentations
- journal/logbook entries
- systems engineering artefacts
- published articles
- annotated photographs
- media associated with a developed system

- webpages (in general, webpages are discouraged unless there is a very specific Systems Engineering aspect to it)

This list is not a definitive, other evidence sources are allowable.

Items of evidence cannot include any methods of self-assessment or witness testimonies, but evidence of confirmation (e.g. from a Chief Engineer) is permitted. Evidence of confirmation is a statement that the Apprentice carried out certain work to a particular standard: it may be helpful in the case of materials with a security classification.

Because one item of evidence may service several KSBs, the commentary should distinguish between principal evidence and less important evidence for each KSB.

Portfolio structure

Figure 6 shows a basic structure for the portfolio, the components are described below.

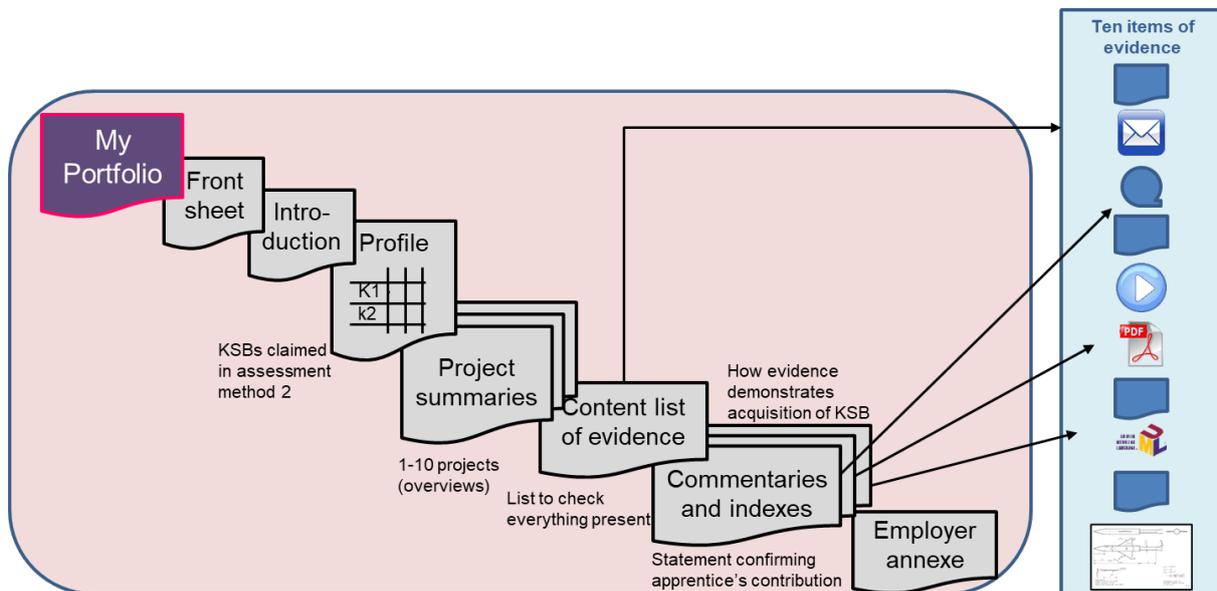


Figure 6: Portfolio structure

1. **Front sheet** – name, employer, university, date apprenticeship commenced
2. **Introduction** (~½ page) – mainly identifies projects that contribute to portfolio and provides context about Apprentice’s role(s) during the period of the apprenticeship (if possible, these should be related to the duties listed in the standard) and an indication of systems engineering development during the period. Identifier code should be defined.
3. **Profile:** Claimed Systems Engineering profile – tabular form. All KSBs listed with indication of whether “Awareness”, “Supervised Practitioner”, or “Practitioner” level is being claimed.
4. **Project summaries** and indexing – a description of each project being used in the portfolio, the KSBs being claimed for the project, and the identifiers for locating the evidence.

The STAR format for the summaries is recommended:

- Situation – i.e. project context, role of Apprentice, team, life cycle stage, etc.
- Task (set) – specific activities that the Apprentice should undertake in the project
- Approach taken – focused on the systems engineering tailored lifecycle and methods
- Result – describes the project outcome, focused mainly on the result of using the systems engineering approach described above

Typically, a project summary should not be more than about five pages long.

5. **Content list of evidence items** – essentially so that the Assessor can easily check they have all the articles expected

6. **Commentaries and Indexes** – This should be a detailed index of, and commentary on the KSB evidence for each KSB and level being claimed, with the identifiers for locating evidence. A short description of how the evidence supports the claim.

It is likely that the evidence for a specific K, S, or B will be distributed in several evidence items; the summary should argue the case that this collective evidence addresses the criteria for achieving the level claimed. It would be expected that the criteria from the assessment plan are specifically referenced. It assists Assessors if the words from the assessment plan are played back in the commentary.

Identifiers should be a code that identifies the evidence item and, if appropriate, the location within the item (e.g. page or paragraph for a document, time start and end for a video, etc. hyperlinks can be used for appropriate media submissions). The purpose is to make it as clear as possible to the Assessor where the evidence to be checked will be found quickly. The indexing code should be defined by the Apprentice in a way most suitable for their portfolio, and example might be:

ID000-T-Pg000, where ID000 is item number, T is type of evidence, and Pg000 is page number

7. **Employer annexe:** a statement that authenticates the Apprentice's work at the level claimed

Submission Format

The entire portfolio should be submitted in electronic format, unless there are reasons (e.g. security) for all or parts of it to be in hardcopy only.

| | |
|--------------|---|
| Introduction | pdf |
| Indexes | pdf, with hyperlinks if possible |
| Evidence | documents (pdf), emails (as pdf), images (in standard formats, e.g. jpg), videos (standard formats, e.g. AVI), designs and architectures (check with EPAO regarding preferred formats), letters (pdf scans), presentations (ppt, pdf) |

In general, the use of hyperlinks outside of the submitted document set must be avoided.

Submission date

The portfolio must be submitted to the EPAO no later than seven days before the assessment day.

Activities through which evidence is assembled

It is essential to keep a good record throughout your apprenticeship; that means retaining material for use as evidence and indexing it competently for locating efficiently at a later date. The record should be reviewed at the tri-partite meetings and more frequently by the Apprentice.

1. Essential: keep a logbook. A good description of a logbook (used by IET) is provided by the University of Idaho:

https://www.webpages.uidaho.edu/mindworks/Capstone%20Design/Project%20Guides/Logbook_Handout.pdf

2. Reference project artefacts and maintain a good description of their significance (in your logbook, for instance)
3. Keep minutes of all meetings
4. Retain preparatory material and reports of design reviews in which you participate
5. Retain emails and other communications that reflect on your competence (e.g. technical decision making)

EPA Assessment Day

Both assessments take place on the same day. Details about the venue and roles during assessment are provided in the Assessment Plan [ref. 2].

Briefly the following participate in the assessments of the Apprentice:

| | |
|-------------------------|---|
| Independent Assessor | Drawn from industry and with no relationship to the Apprentice's employer or the EPAO Judges whether the Apprentice has achieved the required level (only decision maker) |
| Employer Representative | Provides technical input in relation to the Apprentice's workplace policy and procedures and confirm authenticity of their Apprentice's work. May not ask questions or influence the Apprentice during the assessments |

Preparation for assessment

The Apprentice should familiarise themselves with the evidence they have provided (bearing in mind that some may have been collected up to three years before the assessment).

The Apprentice should bring their own copy of report and portfolio to the assessments. They should arrange for the presentation to be available to the EPAO at the start of the assessment day.

Result

The result of the assessment will be available five days after the EPA event. Award of the certificate by ESFA should follow shortly after notification of a pass.