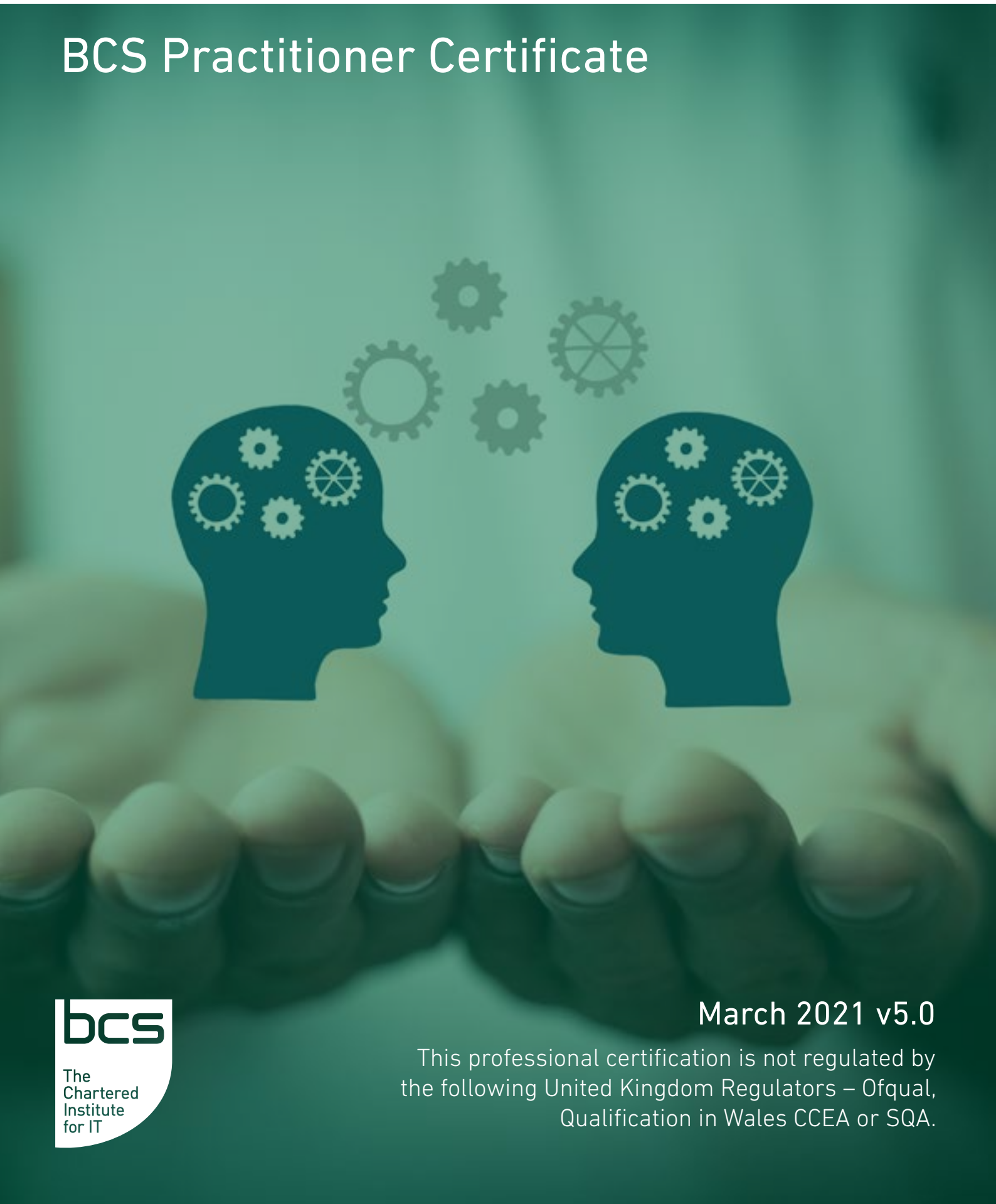
Requirements Engineering

BCS Practitioner Certificate



March 2021 v5.0

This professional certification is not regulated by the following United Kingdom Regulators – Ofqual, Qualification in Wales CCEA or SQA.

bcs
The Chartered Institute for IT

CONTENTS

Introduction

The BCS Practitioner Certificate in Requirements Engineering is for candidates who want to develop or further their skills in the understanding and application of elicitation, analysis and management of requirements. As the traditional Business Analyst role develops and grows into other areas, the need for Requirements Engineering skills has opened up into the wider business and is now necessary in a variety of roles and teams. The learning in this certificate is shaped to place emphasis on valuable business analysis skills rather than the Business Analyst role. Focusing on these skills should ensure alignment with business objectives and a fit-for-purpose solution.

This syllabus provides an outline of the qualification including the learning objectives and assessment. Further guidance on each **learning objective** (the "what", i.e. what you expected to know and be tested on) has been provided within each topic in the syllabus through the inclusion of **indicative content** (the "how", i.e. the main points/concepts to be covered in the learning and assessment) as well as general **guidance** (the "why", i.e. the relevance, context and expectations on how candidates may be tested on a particular learning objective where there is an need to apply or demonstrate their understanding of a topic).

Qualification Suitability and Overview

While there are no mandatory pre-requisites for candidates to be able to undertake this certificate, information within the Foundation Certificate in Business Analysis precedes the knowledge level of this certificate providing candidates with understanding of documenting, managing and validating requirements, which candidates are likely to find valuable. Candidates will also need to possess a good standard of written English.

This certificate will align with the updates made to the BCS Foundation Certificate in Business Analysis (launched Dec 2020) and has been developed with the Requirements Engineering Framework as a guide, with focus also on the Requirements Definition service.

This qualification has been designed to provide valuable learning for those in roles such as business analyst, business architect, business systems analyst, data analyst, enterprise analyst, management consultant, process analyst, product manager, product owner, project manager, and systems analyst. This certificate provides value for candidates in entry-level, associate and management level roles.

Candidates can study for this certificate by attending a training course provided by a BCS accredited training provider or through self-study.

Total Qualification Time

18 hours

Assessment Time

1 hour

Trainer Criteria

It is recommended that to effectively deliver this certification, trainers should possess one or more of the following:

- Hold a relevant qualification in Business Analysis or another, relevant discipline.
- Have a minimum of 2 years' training experience.
- Have a minimum of 3 years' practical experience in the relevant subject area.

SFIA Levels

This award provides candidates with the level of knowledge highlighted within the table, enabling candidates to develop the skills to operate successfully at the levels of responsibility indicated.

Level	Levels of Knowledge	Levels of Skill and Responsibility (SFIA)
K7		Set strategy, inspire and mobilise
K6	Evaluate	Initiate and influence
K5	Synthesise	Ensure and advise
K4	Analyse	Enable
K3	Apply	**Apply**
K2	**Understand**	**Assist**
K1	**Remember**	**Follow**

SFIA Plus

This syllabus has been linked to the SFIA knowledge, skills and behaviours required at level 4 for an individual working in Requirements Definition and Management.

KSB12

Understanding commercial considerations and ensuring alignment with them when making decisions or recommending actions.

KSC04

Applying techniques which help investigating, analysing, modelling and recording a business area or system of interest. Example, but not limited to: business environment analysis and process modelling.

KSC84

Understanding and application of different development approaches e.g. iterative/ incremental methodologies (Agile, XP, TDD, SCRUM) or traditional sequential methodologies (Waterfall or V-Model) and their energy and resource footprints. Irrespective of development methodology a DevOps approach may also be taken where development and operational staff work collaboratively.

KSC04

Identifying gaps in the available information required to understand a problem or situation and devising a means of resolving them.

KSB22

Establishing relationships, contributing to an open culture and maintaining contacts with people from a variety of backgrounds and disciplines. Effective, approachable and sensitive communicator in different communities and cultures. Ability to adapt style and approach to meet the needs of different audiences.

KSC09

Using tools (manual or automated) to record the structure, relationships and use of information within an organisation. Examples, but not limited to class diagram and relational data model.

KSD04

The selection and application of information elicitation methods, tools and techniques which are appropriate to the information required and the sources available. Examples, but not limited to: focus groups and surveys/questionnaires.

Further detail around the SFIA Levels can be found at www.bcs.org/levels.

Learning Outcomes

Upon achievement of the certificate, candidates will be able to demonstrate a practical understanding of how to:

- collaborate with stakeholders to ensure requirements align with business objectives.
- elicit different types of requirements and the associated documentation.
- analyse and validate requirements.
- ensure and manage requirement quality and change.

Syllabus

1. Define Requirements Approach and Project Scope (5%) (K3)

Candidates will be able to:

1.1 Define the term "Requirements".

Indicative content

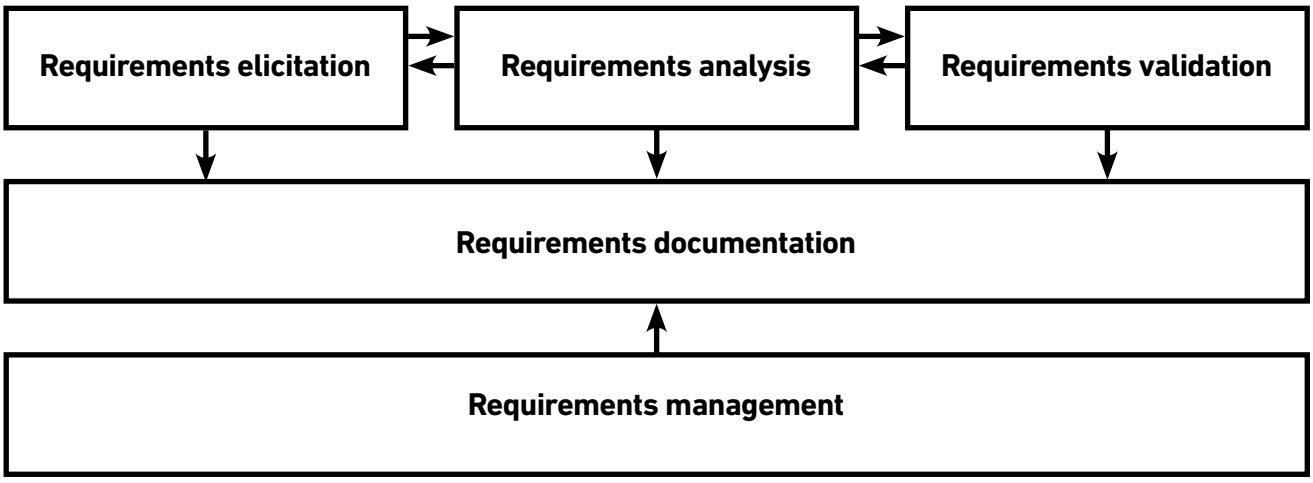
a. "A feature which business staff need a system (business or IT) to provide."

Guidance

Candidates should be able to provide a definition of the term "requirements" as per Business Analysis 4th Edition.

1.2 Describe the Requirements Engineering Framework.

Indicative content



Guidance

The Requirements Engineering Framework, as shown, demonstrates the relationship between the typical stages of the requirements engineering process. The non-linear nature of this framework should be noted, allowing for flexibility in the order of completion of these stages, and repetition as required. Note that stakeholder engagement and consultation is necessary throughout this framework. This is explored further in topic 5.

Candidates will be able to:

1.3 Explain factors to be considered in adapting the approach to requirements engineering.

Indicative content

a. Organisational standards.
b. Project approach.
c. Types of requirement.
d. Nature of the solution.

Guidance

The selected approach will vary, depending on a range of factors – candidates should have an understanding of how to identify and respond to these factors when planning their approach to requirements engineering in a given environment/own context.

1.4 Describe the contents of a project initiation document (PID)/terms of reference (ToR)

Indicative content

a. OSCAR (Objectives, Scope, Constraints, Authority, Resources).
b. Rationale for aligning requirements with a business case and the objectives of the organisation.

Guidance

The contents and use of the PID/ToR should be understood and how it is used to support the approach to requirements engineering, ensuring alignment with project and business objectives.

Note that for the purpose of this syllabus, the terms PID and ToR may be used interchangeably, as per the reference text.

2. Elicit Requirements (15%) (K3)

Candidates will be able to:

2.1 Explain different knowledge types.

Indicative content

a. Tacit/non-tacit (explicit).
b. Individual/Corporate.

Guidance

The ability to categorise and elicit both tacit and explicit knowledge is integral to the requirements engineering process. Elicitation is concerned with purposefully extracting requirements from stakeholders, a process which requires different skills and techniques to simply gathering knowledge. Candidates should consider things such as individual skills, corporate culture and other factors which may not be explicitly communicated through all elicitation techniques.

2.2 Identify a technique to articulate tacit knowledge.

Indicative content

a. Observe: observation, shadowing.
b. Recount: storytelling, scenario analysis.
c. Enact: prototyping, scenario role-play.

Guidance

Certain techniques are more likely to be effective in the successful elicitation of tacit knowledge.

2.3 Explain the use, advantages and disadvantages of the following elicitation techniques:

Indicative content

a. Interviews.
b. Workshops.
c. Observation.
d. Shadowing.
e. Story-telling.
f. Scenario analysis.
g. Scenario role-play.
h. Prototyping.
i. Document analysis.

Guidance

Candidates should understand the benefits and drawbacks of each of these techniques, to be able to evaluate their effectiveness and suitability in a range of circumstances. Consider how these techniques have evolved within different organisational contexts to take account of online working and collaboration. Note that additional techniques exist, but candidates should expect to be tested only on those listed.

2.4 Identify an appropriate technique to elicit requirements.

Indicative content

a. Project approach.
b. Resources (time, documentation, technology).
c. Stakeholder expertise.

Guidance

Appreciating that many factors can impact the effectiveness of an elicitation technique - such as those listed - candidates should be able to select a technique suitable to a particular circumstance.

2.5 Explain the suitability of elicitation techniques for Agile and linear development approaches.

Indicative content

a. Iterative development.
b. linear development.

Guidance

Different elicitation techniques can be considered more useful or suitable to either an agile or linear project approach as detailed in the reference text. Candidates will be asked to interpret a range of circumstances (including the project approach) to consider the (un)suitability of a given elicitation technique.

3. Record Requirements (Documentation) (10%) (K3)

Candidates will be able to:

3.1 Identify and describe the categories of requirement.

Indicative content

a. Business:
   - General requirements.
   - Technical requirements.

b. Solution:
   - Functional requirements.
   - Non-functional requirements.

Guidance

Requirements are categorised depending on whether they are related to a business objective, or the solution/ product. Sub-categories can then be established. This categorisation is useful when prioritising requirements, selecting a documentation approach, ensuring alignment with business strategy etc.

3.2 Explain the importance of documentation.

Indicative content

a. Ensures consistency.
b. Enables communication.
c. Provides a basis for validation.
d. Supports product evelopment.

Guidance

Documentation should be used throughout requirements engineering. This can take many forms, considering the project approach and type of requirement. Documentation can be revisited/referred to at each stage of the process, as illustrated by in the RE framework. Robust documentation will capture the development of requirements from elicitation, to implementation and ongoing management.

3.3 Identify the key documentation styles.

Indicative content

a. Text based.
b. Diagrammatic.

Guidance

Candidates should understand that documentation styles can be categorised as either text based on diagrammatic, including but not limited to a requirements document, business process model, or requirements backlog.The style of documentation used will vary depending on the type of requirement, project approach, organisational norms etc.

3.4 Explain the characteristics documented for requirements in a requirements catalogue.

Indicative content	Guidance
a. Source. b. Owner. c. Name. d. Business Area.	Information gathered that relates to an individual requirement is recorded in the requirements catalogue. This document is useful in providing a level of organisation and structure to the elicited requirements. Many characteristics may be recorded; a full list is available from the Business Analysis 4th Edition text. Candidates should expect to be assessed on any characteristic from the complete list within the reference text.

3.5 Explain the key underlying principles and standard format of a user story.

Indicative content	Guidance
a. Who? What? Why? b. "As a {user role} I want {feature} so that I can {reason}."	Creating user stories is a simple method of identifying the needs of a particular actor, from a system or solution. This is a standard format, easily used by all stakeholders to communicate their needs. For example, "As a cardholder, I want to be able to view my statement on demand, so that I can review my transactions".

4. Build Models and Prototypes to Represent the Requirements (20%) (K3)

Candidates will be able to:

4.1 Explain the rationale for modelling the functional requirements (processing and data) of an information system.

Indicative content	Guidance
a. Conceptualises the solution in its entirety. b. Helps to confirm requirements are in scope. c. Provides clarity.	Being able to visualise the solution using a model can help both the analyst and stakeholders to confirm the functional requirements are as intended, and to identify any errors.

4.2 Describe the purpose of modelling in requirements engineering.

Indicative content

a. Generate questions in order to clarify a requirement and remove ambiguity.
b. Define business rules.
c. Cross-check requirements for consistency and completeness.

Guidance

Modelling is used to provide a visual representation of the intended solution. Candidates should understand that models are used to provide clarity and ensure consistency of requirements, allowing the concept to be easily understood by others.

4.3 Prepare a UML use case diagram.

Indicative content

a. Elements required to create a case diagram:
   - Actors.
   - Use Cases.
   - System Boundary.
   - Associations.

Guidance

Use case diagrams are created to show interactions between system functions and actors. Candidates will be expected to complete diagrams within the assessment using given examples, including filling missing information, rectifying errors, and ensuring correct representation of all elements.

4.4 Prepare a UML Class diagram.

Indicative content

a. Elements used to create a class diagram that represent the data requirements:
   - Classes.
   - Attributes.
   - Associations.
   - Multiplicities.
b. Describe the business rules that are represented.

Guidance

Class diagrams are used to model data and show the associations between "classes" – items of interest – in a system. Candidates will be expected to complete diagrams within the assessment using given examples, including filling missing information, rectifying errors, and ensuring correct representation of all elements.

4.5 Explain the use of a CRUD matrix.

Indicative content

a. Create, Read, Update, Delete.
b. Comparing a Function or Event against data.
c. Benefits to be derived from cross-referencing models.

Guidance

Candidates should be able to explain how a CRUD Matrix can be used in conjunction with the other models explored in this topic, to identify omissions or errors in data and/or models. A CRUD matrix shows which functions in a solution create, read, update or delete data.

4.6 Explain the use of prototyping to elaborate requirements.

Indicative content

a. Visualisation of requirements.
b. Increase stakeholder understanding.
c. Analysis and confirmation of requirements.

Guidance

Prototyping can take many forms such as manual/hand drawn mock-ups, images of screens, genuine software development etc. The useful common feature and purpose of these prototypes is the creation of visual or physical example, with which stakeholders can interact and provide feedback on.

5. Collaborate and Communicate with Stakeholders to Clarify Requirements (7.5%) (K3)

Candidates will be able to:

5.1 Describe the responsibilities of the actors (stakeholder roles) in Requirements Engineering.

Indicative content

a. Actors – "Usually user roles [that] show the individual or group of individuals responsible for carrying out the work or interacting with a system. An actor may also be an IT system or time."
b. Stakeholders – "An individual, group of individuals or organisation with an interest in the change."

Guidance

Multiple stakeholder roles exist as explored in the reference text. Candidates should expect to be tested on roles specifically associated with Requirements Engineering, including the project sponsor, product owner, the SMEs and business stakeholders.

5.2 Describe the purpose of requirements validation.

Indicative content	Guidance
a. Validation process. b. Review and agree requirements.	Candidates should be able to describe the use of requirements validation to ensure that the features and characteristics of the solution are met by the requirements. This process involves a review of the requirements with relevant stakeholders.

5.3 Describe the rationale for various approaches to requirements validation.

Indicative content	Guidance
a. Informal review. b. Formal review.	The approach to validation may vary depending on the project approach and the availability of stakeholders – for example, if a singular stakeholder is unable to attend a formal review, then an informal review may be conducted with that individual.

5.4 Demonstrate how Agile requirements are validated.

Indicative content	Guidance
a. Initiating the backlog. b. Maintaining the backlog. c. Prioritisation. d. Defining acceptance criteria.	Candidates should be able to articulate the less formal validation processes typically associated with an Agile approach. For example, a straightforward outline of a requirement may be accepted as "valid" in order to be added to the backlog, prioritised for development and then elaborated over time.

5.5 Demonstrate how formal requirements are validated.

Indicative content	Guidance
a. Business Requirements Document (BRD). b. Review Group.	Candidates should be able to articulate more formal requirements validation which may align with a more linear methodology and/or organisational governance. This involves forming a review group where different perspectives on the requirements are considered as part of a formal review process.

6. Analyse, Prioritise and Assure the Quality of Requirements (20%) (K3)

Candidates will be able to:

6.1 Explain the purpose of analysing requirements.

Indicative content	Guidance
a. Ensure they are developed clearly. b. Well organised. c. Appropriately documented.	Candidates should be able to explain how requirements analysis is used to ensure the correctness and completeness of the requirements which have been elicited.

6.2 Apply the MoSCoW technique to prioritise requirements.

Indicative content	Guidance
a. Must have, Should have, Could have, Want to have (but won't have this time).	The MoSCoW technique is used to categorise requirements by priority level. Application of this technique ensures features are developed and delivered in an order which supports the priority of the requirements. Candidates should expect to be tested on their ability to apply this technique to given requirements.

6.3 Interpret individual requirements; applying filters and quality criteria.

Indicative content	Guidance
a. INVEST. b. Quality Criteria including; clear, concise, consistent, relevant. c. Filters including; checking for duplication, unravelling multiple requirements, evaluating feasibility.	Requirements should be quality checked to minimise errors such as duplication, multiple requirements or inconsistencies. Candidates should be able to use the filters and quality criteria listed, as listed in the Business Analysis 4th Edition text, to interpret the characteristics and quality of the requirements.

6.4 Identify the purposes of Slicing Requirements (Agile/ Linear).

Indicative content

a. Allowing work to commence and/or progress.
b. Elaborating only as required.
c. Incremental development.
d. Linear development.

Guidance

As the requirements engineering framework is non-linear, there can be the need for elicitation, elaboration etc to be completed over time. Through the use of slicing (focusing on sections of requirements, rather than requirements as a whole) requirements analysis can begin on high priority requirements, while some elicitation work is still ongoing.

6.5 Identify techniques used to analyse Business Rules.

Indicative content

a. Constraints:
   - Action governance.
   - Data constraints.
b. Operational Guidance:
   - Decision conditions.
   - Calculations.
c. Data models.
d. CRUD matrices.
e. Activity diagrams.
f. Business process models.

Guidance

Business rules must be considered to ensure that the requirements – and therefore the solution – align with the business objectives, ways of working and any legal or regulatory conditions which must be adhered to. Candidates should be able to identify a range of techniques used to analyse both operational guidance and constraints.

6.6 Explain the importance of testability.

Indicative content

a. "Has the requirement been delivered as intended?".
b. Functional requirements and related non-functional requirements.

Guidance

The mark of testability is the ability to provide a firm yes or no response to this question. Candidates should be able to articulate the need for testability to ensure that requirements have been delivered as intended.

7. Conduct User analysis and Profiling (7.5%) (K3)

Candidates will be able to:

7.1 Describe techniques used to analyse roles.

Indicative content	Guidance
a. User role analysis. b. Personas.	User analysis helps the analyst to understand how a given party will interact with the solution, which is further supported by the creation of personas. A persona provides a more detailed example of a specific user (to explore particular demographics, needs and wants, limitations, accessibility etc). This helps to further validate/support the need for specific requirements to be met and to help define the workings of the solution.

7.2 Explain the purpose of a Customer Journey Map.

Indicative content	Guidance
a. How to use a Customer Journey Map. b. Elements to be considered in its creation.	Customer Journey Maps should be used to demonstrate the points of contact between a given user and the business/process. They are generally used in conjunction with a persona to fully explore the needs and behaviours of specific users, rather than the generic "user" Following the journey of the persona(s) helps to ensure the requirements are met in the final solution. Candidates should consider elements such as role, persona and touchpoints. A full list is provided within the Business Analysis 4th Edition text.

8. Requirements Management and Traceability (15%) (K3)

Candidates will be able to:

8.1 Explain the rationale and the approach to achieving requirements traceability.

Indicative content	Guidance
a. Establish the origin and ownership of each requirement.	Candidates should be able to articulate why traceability is necessary within a project and within Requirements Engineering. For example, to ensure alignment with business objectives or to track the origins of a feature.

8.2 Explain the rationale for requirements management.

Indicative content	Guidance
a. Business change. b. Traceability. c. Ownership. d. Origins.	The robust management of requirements is necessary to ensure ongoing traceability – this is particularly useful in times of problem solving or business change. Good requirements management will allow the origins and ownership of any requirement to be explored if challenged and can assist with future planning.

8.3 Define the elements of requirements management and the links between them.

Indicative content	Guidance
a. Identification. b. Cross-referencing. c. Origin and ownership. d. Software support. e. Change control. f. Configuration management.	Candidates should explore each element of Requirements Management as listed, and the relationship between these elements. For example, the relationship between cross-referencing and change control, where any change made to a single requirement may impact on other requirements.

8.4 Explain the use of a change control process.

Indicative content	Guidance
a. Document, Analyse, Consult, Decide. b. Implement or reject.	Change control is a vital element of requirements management, the purpose of which is to create a robust audit trail of any changes made to requirements and ensure that any changes made are justified.

8.5 Describe the elements of a version control process.

Indicative content

a. Allocate an identifier.
b. Allocate a version number.
c. Version number updated to reflect changes.

Guidance

Version control ensures that any movement from draft to baselined requirements, and any movement within those, is recorded through the allocation of a unique identifier and the allocation/update of a version number. This ensures that any movement in requirements is clearly recorded and version numbers can be used for comparison and to ensure all parties are working with the correct version.

8.6 Explain the use and advantages of different forms of traceability.

Indicative content

a. Horizontal; forwards and backwards.
b. Vertical.

Guidance

Traceability is the means of being able to track the development of a requirement – either forwards or backwards throughout the development cycle (why does it exist, or what became of it?), or vertically, to confirm alignment with overall business strategy. Candidates should be able to define both forms of traceability including when and why they are required.

Examination Format

This certificate is assessed through completion of an invigilated online exam which candidates will only be able to access at the date and time they are registered to attend.

Type	40 multiple choice and multiple response questions
Duration	60 minutes
Supervised	Yes
Open Book	No (no materials can be taken into the examination room)
Passmark	26/40 (65%)
Delivery	Digital

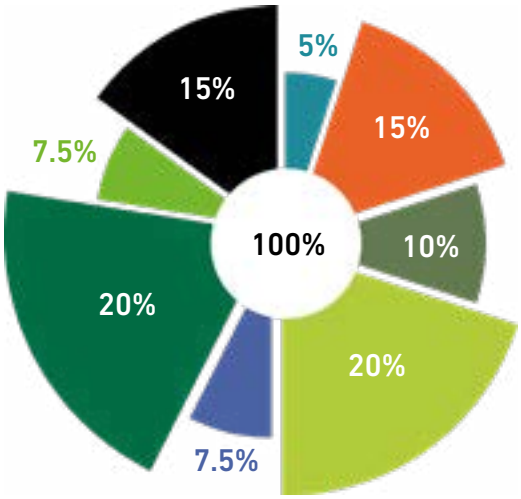
Adjustments and/or additional time can be requested in line with the BCS reasonable adjustments policy for candidates with a disability, or other special considerations including English as a second language.

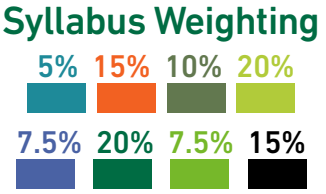
Question Weighting

Each major subject heading in this syllabus is assigned a percentage weighting. The purpose of this is:

1. Guidance on the proportion of content allocated to each topic area of an accredited course.
2. Guidance on the proportion of questions in the exam.

Syllabus Area	Question type	
1. Define Requirements Approach and Project Scope	Multiple choice and multiple response.	**5%**
2. Elicit Requirements	Multiple choice and multiple response.	**15%**
3. Record Requirements	Multiple choice and multiple response.	**10%**
4. Build Models and Prototypes to Represent the Requirements	Multiple choice and multiple response.	**20%**
5. Collaborate and Communicate with Stakeholders to Clarify Requirements	Multiple choice and multiple response.	**7.5%**
6. Analyse, Prioritise and Assure the Quality of Requirements	Multiple choice and multiple response.	**20%**
7. Conduct User Analysis and Profiling	Multiple choice and multiple response.	**7.5%**
8. Requirements Management and Traceability	Multiple choice and multiple response.	**15%**





Recommended Reading

The following titles are suggested reading for anyone undertaking this award. Candidates should be encouraged to explore other available sources.

Title: Business Analysis (4th Edition)
Author: Debra Paul and James Cadle
Publisher: BCS
Publication Date: July 2020
ISBN: 9781780175102

Note: This title is **required reading** for this certification rather than recommended.

Title: Business Analysis Techniques: 99 Essential Tools for Success
Author: James Cadle, Debra Paul and Paul Turner
Publisher: BCS
Publication Date: September 2014
ISBN: 9781780172736

Title: Agile and Business Analysis
Author: Lynda Girvan, Debra Paul
Publisher: BCS
Publication Date: February 2017
ISBN: 9781780173221

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Document Change History

The below summarises any revisions made to this document since first publication.

Version Number	Changes Made
Version 5.0 April 2021	Full review of key topics, learning outcomes and exam structure. Addition of indicative content and guidance for each topic and criteria.
Version 4.1 March 2020	Addition of Trainer Criteria and Classroom Size ratios. Additional wording of clarification to the passmark.
Version 4.0 September2018	Amended to closed book. Pass mark details amended post Angoff review. Required and recommended reading list confirmed.
Version 3.0 July 2017	Change History introduction updated; Standardisation of use of capitals; full stops added to end of every bullet/paragraph; 'Objectives' changed to 'Learning Objectives' throughout and formatting updated to achieve uniformity across the portfolio. Updated learning outcomes. Updated section headings and standard template text to align with other documents in the portfolio. Exam format updated to MCQ and open book.
Version 2.5 May 2017	Centralised exam pass mark clarified.
Version 2.4 December 2016	Strapline regarding regulated statement has been added.
Version 2.3 March 2015	Updated language requirements for extra time and use of dictionaries. Minor updates made to the commentary. Standardised the trainer requirements.
Version 2.2 September 2012	This is the first version of the extended RE syllabus. The version number is unchanged so that it is consistent with the existing RE syllabus. The syllabus has been extended to support the centralised RE examination. The original syllabus is defined in black and the extensions in red. A commentary has been added to aid candidates preparing for the centralised examination.

CONTACT

For any queries relating to this document or the delivery of this award, please contact;

T: 01793 417445

E: bcssales@bcs.uk

If you have any queries relating to the online assessments, please contact;
Service Delivery - eprofessional@bcs.uk

For further information please contact:

BCS
The Chartered Institute for IT
3 Newbridge Square
Swindon
SN1 1BY

T +44 (0)1793 417 445

www.bcs.org

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The Chartered Institute for IT