

BCS Certificate in Requirements Engineering Syllabus

Version 2.0

August 2011

Effective: 1 September 2011

Change History

Version Number	Changes Made
Version 2.0 August 2011	<p>Updated ISEB to BCS logos and strapline. Added table of contents, levels of knowledge, levels of skill and responsibility, format of the examination, change history and definition of terminology.</p> <p>Technical Changes: Linkage of requirements to the business context and business case emphasised</p> <p>Lifecycle for business change and benefits confirmation removed.</p> <p>Framework for Requirements Engineering clarified. Changes to elicitation techniques – Ethnographic Studies removed, Focus Groups added</p> <p>Documentation styles added. Requirements Validation and Management reworded and clarified. Minor rewording and clarification of other syllabus points</p> <p>Swimlane diagrams removed.</p>

BCS Certificate in Requirements Engineering

Contents

Change History	1
Introduction	5
Objectives	5
Eligibility for the Examination.....	5
Format of the Examination	6
Accreditation Guidelines for Examination Providers	6
Syllabus	7
1. Introduction to Requirements Engineering (5%)	7
1.1 Framework for Requirements Engineering	7
▪ Requirements Engineering activities – Elicitation, Analysis, Validation, Documentation, Management	7
▪ Rationale for Requirements Engineering and the problems with requirements	7
▪ The importance of requirements planning and estimating	7
1.2 The business rationale and inputs	7
▪ The business case	7
▪ Terms of Reference / Project Initiation Document (PID)	7
2. Hierarchy of requirements (10%).....	7
2.1 Building the hierarchy	7
2.2 Categories of requirements within the hierarchy	7
▪ General business requirements, including legal and business policy	7
▪ Technical policy requirements	7
▪ Functional requirements	7
▪ Non-functional requirements, including performance, usability, access, security, archiving, back up and recovery, availability, robustness	7
3. Stakeholders in the requirements process (5%)	7
3.1 Project Stakeholders	7
▪ Project Manager	7
▪ Business Analysis	7
▪ Developer	7
3.2 Business Stakeholders	7
▪ Project Sponsor	7
▪ Subject matter expert	7
▪ End users and managers	7
3.3 External stakeholders	7
▪ Customers	7
▪ Regulators	7
▪ Suppliers - products and services	7

4.	Requirements Elicitation (20%)	8
4.1	Knowledge types – tacit and non-tacit	8
4.2	Elicitation techniques	8
▪	Interviews	8
▪	Workshops	8
▪	Observation:	8
○	Formal/informal	8
○	Shadowing	8
▪	Focus groups	8
▪	Prototyping	8
▪	Scenarios	8
▪	Document Analysis	8
▪	Special purpose records	8
▪	Questionnaires	8
4.3	Understanding the applicability of techniques	8
5.	Use of models in Requirements Engineering (10%)	8
5.1	The purpose of modelling requirements	8
▪	Generating questions	8
▪	Cross-checking for consistency and completeness	8
▪	Defining business rules	8
5.2	Modelling the business context for the system	8
5.3	Developing a model to represent the system processing requirements	8
5.4	Interpreting a data model	8
6.	Requirements Documentation (15%)	8
6.1	Documentation styles and levels of definition	8
6.2	Requirements Catalogue	8
▪	Identifier	8
▪	Name	8
▪	Description	8
▪	Acceptance criteria	8
▪	Source/Owner	8
▪	Rationale/Benefits	8
▪	Non-functional requirements	8
▪	Priority	8
▪	Related requirements/documents	8
▪	Author	8
▪	Version control/status	8
▪	Change history	8
7.	Requirements Analysis (20%)	9
7.1	Prioritising and packaging requirements for delivery	9
7.2	Organising requirements	9
7.3	Ensuring well-formed requirements	9
7.4	Prototyping requirements	9
7.5	Verifying requirements	9
8.	Requirements Validation (5%)	9
8.1	Agreeing the requirements document	9
8.2	Types of reviews	9
Stakeholders		9

8.3	and their areas of concern	9
9.	Requirements Management (10%).....	9
9.1	Dealing with changing requirements	9
9.2	The importance of traceability	9
▪	Vertical traceability (to business objectives)	9
▪	Horizontal traceability (from origin to deliver)	9
9.3	Traceability and ownership	9
9.4	Requirements Engineering support tools	9
	Levels of Knowledge	10
	Levels of Skill and Responsibility (SFIA Levels)	11
	Format of the Examination	13
	Recommended Reading List	14
	Definition of Terminology.....	16

Introduction

This certificate is concerned with one of the major areas of business analysis work, producing a well-organised and clearly-defined set of requirements.

The syllabus is structured around a five part framework for Requirements Engineering which is applied to a project initiated by an approved business case. The five elements of the framework are Requirements Elicitation, Requirements Analysis, Requirements Validation, Requirements Documentation and Requirements Management.

The syllabus requires that the candidate should be able to describe the objectives and techniques within each element of the framework.

Organisations can submit their own approaches for accreditation, provided that they show how all aspects of the syllabus are handled in their proposed approach.

Candidates may be expected to apply any of the techniques defined in the syllabus in the examination for this certificate.

Objectives

Holders of the BCS Certificate in Requirements Engineering should be able to:

- Explain the importance of linking requirements to the Business Case
- Describe the roles and responsibilities of key stakeholders in the requirements engineering process
- Explain the use of a range of requirements elicitation techniques and the relevance of the techniques to business situations
- Analyse, prioritise and organise elicited requirements
- Document requirements
- Identify problems with requirements and explain how requirements documentation may be improved
- Create a model of the features required from a system
- Interpret a model of the data requirements for an information system
- Describe the principles of Requirements Management and explain the importance of managing requirements
- Describe the use of tools to support Requirements Engineering
- Explain the process and stakeholders involved in Requirements Validation

Eligibility for the Examination

There are no specific pre-requisites for entry to the examination; however candidates should possess the appropriate level of knowledge to fulfil the objective shown above.

Format of the Examination

The format for the examination is a one hour written (open book) examination based on a business scenario with 15 minutes reading time.

Candidates who are awarded a pass for the examination are awarded the BCS Certificate in Requirements Engineering.

Accreditation Guidelines for Examination Providers

This certification is subject to the accreditation guidelines applied to all BCS Certifications. It is the view of BCS that, for full coverage to be achieved, training courses leading to the certificate should normally run for 21 hours.

Syllabus

1. Introduction to Requirements Engineering (5%)

- 1.1** Framework for Requirements Engineering
 - Requirements Engineering activities – Elicitation, Analysis, Validation, Documentation, Management
 - Rationale for Requirements Engineering and the problems with requirements
 - The importance of requirements planning and estimating
- 1.2** The business rationale and inputs
 - The business case
 - Terms of Reference / Project Initiation Document (PID)

2. Hierarchy of requirements (10%)

- 2.1** Building the hierarchy
- 2.2** Categories of requirements within the hierarchy
 - General business requirements, including legal and business policy
 - Technical policy requirements
 - Functional requirements
 - Non-functional requirements, including performance, usability, access, security, archiving, back up and recovery, availability, robustness

3. Stakeholders in the requirements process (5%)

- 3.1** Project Stakeholders
 - Project Manager
 - Business Analysis
 - Developer
- 3.2** Business Stakeholders
 - Project Sponsor
 - Subject matter expert
 - End users and managers
- 3.3** External stakeholders
 - Customers
 - Regulators
 - Suppliers - products and services

4. Requirements Elicitation (20%)

4.1 Knowledge types – tacit and non-tacit

4.2 Elicitation techniques

- Interviews
- Workshops
- Observation:
 - Formal/informal
 - Shadowing
- Focus groups
- Prototyping
- Scenarios
- Document Analysis
- Special purpose records
- Questionnaires

4.3 Understanding the applicability of techniques

5. Use of models in Requirements Engineering (10%)

5.1 The purpose of modelling requirements

- Generating questions
- Cross-checking for consistency and completeness
- Defining business rules

5.2 Modelling the business context for the system

5.3 Developing a model to represent the system processing requirements

5.4 Interpreting a data model

6. Requirements Documentation (15%)

6.1 Documentation styles and levels of definition

- User stories
- Use cases
- Requirements Catalogue

6.2 Requirements Catalogue

- Identifier
- Name
- Description
- Acceptance criteria
- Source/Owner
- Rationale/Benefits
- Non-functional requirements
- Priority
- Related requirements/documents
- Author
- Version control/status
- Change history

7. Requirements Analysis (20%)

- 7.1 Prioritising and packaging requirements for delivery
- 7.2 Organising requirements
- 7.3 Ensuring well-formed requirements
 - Removing overlapping requirements
 - Identifying and negotiating conflicts between requirements
 - Removing ambiguity
 - Ensuring feasibility
 - Ensuring testability
- 7.4 Prototyping requirements
- 7.5 Verifying requirements

8. Requirements Validation (5%)

- 8.1 Agreeing the requirements document
- 8.2 Types of reviews
- 8.3 Stakeholders and their areas of concern

9. Requirements Management (10%)

- 9.1 Dealing with changing requirements
- 9.2 The importance of traceability
 - Vertical traceability (to business objectives)
 - Horizontal traceability (from origin to deliver)
- 9.3 Traceability and ownership
- 9.4 Requirements Engineering support tools

Levels of Knowledge

This course will provide candidates with the levels of difficulty / knowledge highlighted within the following table, enabling them to develop the skills to operate at the levels of responsibility indicated.

The levels of knowledge are explained in the following text. Note that each K level subsumes lower levels. For example, a K4 level topic is one for which a candidate must be able to analyse a situation and extract relevant information. A question on a K4 topic could be at any level up to and including K4. As an example, a scenario requiring a candidate to analyse a scenario and select the best risk identification method would be at K4, but questions could also be asked about this topic at K3 and a question at K3 for this topic might require a candidate to apply one of the risk identification methods to a situation.

Level 1: Remember (K1)

The candidate should be able to recognise, remember and recall a term or concept but not necessarily be able to use or explain. Typical questions would use: define, duplicate, list, memorise, recall, repeat, reproduce, state.

Level 2: Understand (K2)

The candidate should be able to explain a topic or classify information or make comparisons. The candidate should be able to explain ideas or concepts. Typical questions would use: classify, describe, discuss, explain, identify, locate, recognise, report, select, translate, paraphrase.

Level 3: Apply (K3)

The candidate should be able apply a topic in a practical setting. The candidate should be able to use the information in a new way. Typical questions would use: choose, demonstrate, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write.

Level 4: Analyse (K4)

The candidate should be able to distinguish/separate information related to a concept or technique into its constituent parts for better understanding, and can distinguish between facts and inferences. Typical questions would use: appraise, compare, contrast, criticise, differentiate, discriminate, distinguish, examiner, question, test.

Level 5: Synthesise (K5)

The candidate should be able to justify a decision and can identify and build patterns in facts and information related to a concept or technique, they can create new meaning or structure from parts of a concept. Typical questions would use: appraise, argue, defend, judge, select, support, value, evaluate.

Level 6: Evaluate (K6)

The candidate should be able to provide a new point of view and can judge the value of information and decide on its applicability in a given situation. Typical questions would use: assemble, contract, create, design, develop, formulate, write.

Levels of Skill and Responsibility (SFIA Levels)

The levels of knowledge above will enable candidates to develop the following levels of skill to be able to operate at the following levels of responsibility (as defined within the SFIA framework) within their workplace:

Level 1: Follow

Work under close supervision to perform routine activities in a structured environment. They will require assistance in resolving unexpected problems, but will be able to demonstrate an organised approach to work and learn new skills and applies newly acquired knowledge.

Level 2: Assist

Works under routine supervision and uses minor discretion in resolving problems or enquiries. Works without frequent reference to others and may have influence within their own domain. They are able to perform a range of varied work activities in a variety of structured environments and can identify and negotiate their own development opportunities. They can also monitor their own work within short time horizons and absorb technical information when it is presented systematically and apply it effectively.

Level 3: Apply

Works under general supervision and uses discretion in identifying and resolving complex problems and assignments. They usually require specific instructions with their work being reviewed at frequent milestones, but can determine when issues should be escalated to a higher level. Interacts with and influences department/project team members. In a predictable and structured environment they may supervise others. They can perform a broad range of work, sometimes complex and non-routine, in a variety of environments. They understand and use appropriate methods, tools and applications and can demonstrate an analytical and systematic approach to problem solving. They can take the initiative in identifying and negotiating appropriate development opportunities and demonstrate effective communication skills, sometimes planning, scheduling and monitoring their own work. They can absorb and apply technical information, works to required standards and understand and uses appropriate methods, tools and applications.

Level 4: Enable

Works under general direction within clear framework of accountability and can exercise substantial personal responsibility and autonomy. They can plan their own work to meet given objectives and processes and can influence their team and specialist peers internally. They can have some responsibility for the work of others and for the allocation of resources. They can make decisions which influence the success of projects and team objectives and perform a broad range of complex technical or professional work activities, in a variety of contexts. They are capable of selecting appropriately from applicable standards, methods, tools and applications and demonstrate an analytical and systematic approach to problem solving, communicating fluently orally and in writing, and can present complex technical information to both technical and non-technical audiences. They plan, schedule and monitor their work to meet time and quality targets and in accordance with relevant legislation and procedures, rapidly absorbing new technical information and applying it effectively. They have a good appreciation of the wider field of information systems, their use in relevant employment areas and how they relate to the business activities of the employer or client.

Level 5: Ensure and advise

Works under broad direction, being fully accountable for their own technical work and/or project/supervisory responsibilities, receiving assignments in the form of objectives. Their work is often self-initiated and they can establish their own milestones, team objectives, and delegates responsibilities. They have significant responsibility for the work of others and for the allocation of resources, making decisions which impact on the success of assigned projects i.e. results, deadlines and budget. They can also develop business relationships with customers, perform a challenging range and variety of complex technical or professional work activities and undertake work which requires the application of fundamental principles in a wide and often unpredictable range of contexts. They can advise on the available standards, methods, tools and applications relevant to own specialism and can make correct choices from alternatives. They can also analyse, diagnose, design, plan, execute and evaluate work to time, cost and quality targets, communicating effectively, formally and informally, with colleagues, subordinates and customers. They can demonstrate leadership, mentor more junior colleagues and take the initiative in keeping their skills up to date. Takes customer requirements into account and demonstrates creativity and innovation in applying solutions for the benefit of the customer.

Level 6: Initiate and influence

Have a defined authority and responsibility for a significant area of work, including technical, financial and quality aspects. They can establish organisational objectives and delegates responsibilities, being accountable for actions and decisions taken by them self and their subordinates. They can influence policy formation within their own specialism to business objectives, influencing a significant part of their own organisation and customers/suppliers and the industry at senior management level. They make decisions which impact the work of employing organisations, achievement of organisational objectives and financial performance, developing high-level relationships with customers, suppliers and industry leaders. They can perform highly complex work activities covering technical, financial and quality aspects. They contribute to the formulation of IT strategy, creatively applying a wide range of technical and/or management principles. They absorb complex technical information and communicate effectively at all levels to both technical and non-technical audiences, assesses and evaluates risk and understand the implications of new technologies. They demonstrate clear leadership and the ability to influence and persuade others, with a broad understanding of all aspects of IT and deep understanding of their own specialism(s). They take the initiative in keeping both their own and subordinates' skills up to date and to maintain an awareness of developments in the IT industry.

Level 7: Set strategy, inspire and mobilise

Have the authority and responsibility for all aspects of a significant area of work, including policy formation and application. They are fully accountable for actions taken and decisions made, by both them self and their subordinates. They make decisions critical to organisational success and influence developments within the IT industry at the highest levels, advancing the knowledge and/or exploitation of IT within one or more organisations. They develop long-term strategic relationships with customers and industry leaders, leading on the formulation and application of strategy. They apply the highest level of management and leadership skills, having a deep understanding of the IT industry and the implications of emerging technologies for the wider business environment. They have a full range of strategic management and leadership skills and can understand, explain and present complex technical ideas to both technical and non-technical audiences at all levels up to the

highest in a persuasive and convincing manner. They have a broad and deep IT knowledge coupled with equivalent knowledge of the activities of those businesses and other organisations that use and exploit IT. Communicates the potential impact of emerging technologies on organisations and individuals and analyses the risks of using or not using such technologies. They also assess the impact of legislation, and actively promote compliance.

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

Format of the Examination

This syllabus has an accompanying examination at which the candidate must achieve a pass score to gain the BCS Certificate in Requirements Engineering.

Type	Written examination based on a business scenario
Duration	1 Hour preceded by 15 minutes reading time
Pre-requisites	None
Supervised / Invigilated	Yes
Open Book	Yes
Pass Mark	50%
Distinction Mark	None
Delivery	Paper based examination

Recommended Reading List

Title: Business Analysis (2nd Edition)
Author: Debra Paul, Donald Yeates and James Cadle
Publisher: BCS
Publication Date: 2010
ISBN: 9781906124618
URL: <http://shop.bcs.org>

Title: Mastering the Requirements Process
Author: Suzanne Robertson and James Robertson
Publisher: Addison Wesley
Publication Date: 1999
ISBN: 978-0201360462

Title: Writing Effective Use Cases
Author: Alistair Cockburn
Publisher: Addison-Wesley
Publication Date: October 2000
ISBN: 0201702258

Title: User Stories Applied: For Agile Software Development
Author: Mike Cohn
Publisher: Addison Wesley
Publication Date: March 2004
ISBN: 9780321205681

Title: Requirements Engineering: Processes and Techniques
Author: Gerald Kotonya and Ian Sommerville
Publisher: John Wiley & Sons
Publication Date: April 1998
ISBN: 0471972088

Title: Use Case Modeling
Author: Kirt Bittner and Ian Spence
Publisher: Addison Wesley
Publication Date: August 2002
ISBN: 9780201709131

Title: Business Analysis Techniques: 72 Essential Tools for Success
Author: James Cadle, Debbie Paul and Paul Turner
Publisher: BCS
Publication Date: February 2010
ISBN: 9781906124236
URL: <http://shop.bcs.org>

Title: Writing Better Requirements
Author: Ian F Alexander and Richard Stevens
Publisher: Addison-Wesley
Publication Date: 2002
ISBN: 0321131630

Title: Scenarios, Stories and Use Cases
Author: Ian Alexander and Neil Maiden
Publisher: John Wiley and Sons
Publication Date: 2004
ISBN: 0470861940

Title: Requirements by Collaboration
Author: Ellen Gottesdiener
Publisher: Addison Wesley
Publication Date: April 2002
ISBN: 9780201786064

Definition of Terminology

Term	Writing the Question
Describe	The word describe can be used on its own or qualified in many ways e.g. describe how, describe when etc.
Explain	Very similar to describe but the emphasis here is to elicit specific points raised.
Discuss	This usually requires a candidates to provide a balanced view of a topic. This may include, where appropriate, the benefits and drawbacks of a particular idea.
Compare	Need to describe those areas where the two processes are similar in objectives, techniques etc.
Compare and Contrast	Need to cover both similarities and differences – see the separate terms for examples of each.
Define	Here a precise definition is required. A full and descriptive definition which shows the marker that a candidate fully understands the term is necessary to be awarded full marks.
Contrast	Need to describe those areas where the two processes are different, i.e. in scale, impact and timescales
Justify	Candidates will need to set out the reasoning behind a particular view. This would normally include a description of benefits that may result, the likely scenario if the action is not taken and the positive financial implications.
List	A simple numbered or bullet point list is needed.
List and Describe	More is needed here than a simple list. Each point will need to be expanded upon to include details of exactly what will be achieved, how this will come about and any other relevant details.
Outline	Similar to 'describe' but in overview form. This term is also often used where the markers know that a very full answer could be given if there were no time constraints, but where a high level – broad answer is sought in the limited time available. It can be better to cover a wide area in less detail than just a very narrow point or two in great depth.
Identify the benefits	The positive outcomes of a particular activity. For example to an individual or an organisation.
Problems	Problems are best broken down into cause and effect. Care should be exercised to identify which problems are being sought. Problems for implementing a process differ from problems of creating a process.