SQA Advanced Unit Specification

General information for centres

Unit title: Building Information Modelling (BIM): Principles (SCQF level 7)

Unit code: HR7N 47

Superclass: VF

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Unit purpose

This Unit is designed to develop learners' knowledge of the principles of Building Information Modelling as it applies within the architectural design and construction environment. The Unit will examine the principles and benefits of a BIM project as well as how digital technologies are integrated with the project lifecycle and investigate the history of BIM standards.

The Unit is primarily aimed at learners who wish to work in the architectural design and construction industry, although may be of interest to learners of other disciplines.

Outcomes

On successful completion of the Unit the learner will be able to:

1 Explain the key principles of BIM.
2 Explain the key benefits of BIM.
3 Identify technology used in a BIM project and explain where they sit in reference to a project lifecycle from conception to completion.
4 Identify BIM standards and explain how they developed.

Credit points and level

1 SQA Advanced Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

Recommended entry to the Unit

Entry to this Unit is at the discretion of the centre. However it would be beneficial if learners possess good communication skills. This could be evidenced by the completion of the Core Skill *Communication* at SCQF level 6, Higher English or equivalent.

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes for this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The Assessment Support Pack (ASP) for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from the SQA Advanced subject-specific pages on SQA's website **(www.sqa.org.uk/sqa)**.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

SQA Advanced Unit specification: Statement of standards

Unit title: Building Information Modelling (BIM): Principles (SCQF level 7)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Explain the key principles of BIM.

Knowledge and/or skills

- collaborative working
- responsibilities of individuals and professions involved in a collaborative project
- soft landing
- BIM levels of maturity
- security of digital files

Outcome 2

Explain the key benefits of BIM.

Knowledge and/or skills

- clash detection
- timeline sequencing
- lean construction
- cost control
- project coordination
- BIM analysis

Outcome 3

Identify technology used in a BIM project and explain where they sit in reference to a project lifecycle from conception to completion.

Knowledge and/or skills

- authoring
- collaboration
- analysis
- data collection
- cost analysis
- sequencing
- visualisation
- parametric design

Outcome 4

Identify BIM standards and explain how they developed.

Knowledge and/or skills

- relevant BIM standards
- BIM history

Evidence Requirements for this Unit

Evidence for the knowledge and/or skills in this Unit can be generated on an Outcome by Outcome basis or as part of a combined assessment event, under controlled, supervised, open-book conditions. Learners should be allowed to refer to relevant course material and have access to the internet.

Learners will need to provide written and/or oral recorded evidence to demonstrate their knowledge and/or skills across all Outcomes by showing that they can:

Outcome 1

- explain how different professionals work collaboratively using a BIM project and how that might be a benefit in terms of cost or time to the project
- explain why it is important to define the responsibilities of individuals and professions working on a BIM project before any work commences
- explain the term 'soft landing' and what it is expected to bring to a BIM project
- explain the various BIM levels of maturity
- explain how the security of BIM project files may be threatened

Outcome 2

- explain what clash detection is, when it should be investigated and how it benefits a BIM project
- explain what timeline sequencing is and how it benefits a BIM project
- explain the term lean construction and how a BIM project encourages this
- explain the term cost control and how a BIM project encourages this
- explain the term BIM project coordination
- explain how a building might be analysed in a BIM project

Outcome 3

- identify the various software packages used in a BIM project
- explain where the applications sit in reference to a project lifecycle from conception to completion

Outcome 4

- correctly identify and discuss relevant BIM standards
- explain the history of BIM

SQA Advanced Unit support notes

Unit title: Building Information Modelling (BIM): Principles (SCQF level 7)

Unit support notes are offered as guidance and are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

It is more or less accepted that BIM is a truly global process that will soon be utilised in every country in the world.

This Unit has been written in order to allow learners to develop the fundamental knowledge and essential understanding of the terminology, technology and principles of BIM projects from conception to completion. As this is a theory based Unit, this may be in the form of case studies or simulated projects.

Outcome 1 should provide the learners the opportunity to better their overall understanding of the terminology and overarching principles within a BIM project.

Outcome 2 should provide the learners the opportunity to better their overall understanding of the advantages a BIM project brings to design and construction.

Outcome 3 should provide the learners the opportunity to better their overall understanding of the various digital applications that are used in a BIM project by various professionals across the entire life of the project.

Outcome 4 should provide the learners the opportunity to better their overall understanding of BIM standards and relevant Government Construction Strategies and how they were developed to allow this to happen. At the time of writing this Unit, BS 1192 and PAS 1192 were the up-to-date standards.

Progression to further BIM Units developing learner's practical skills is recommended and should take place after successful completion of this Unit.

This SCQF level 7 Unit is an optional Unit within the SQA Advanced Certificate and SQA Advanced Diploma Computer Aided Architectural Design and Technology Group Awards. However, this does not preclude the use of the Unit in other Group Awards where award designers feel this to be appropriate. The design of this Unit allows for content to be contextualised within topics which allow for a simulation of working practices when preparing a response to a client brief.

Guidance on approaches to delivery of this Unit

It is expected that this Unit be delivered early in the course to allow learners to gain the knowledge and understanding of BIM projects before they work on any practical BIM projects.

The delivery of this Unit should focus on BIM as a collaborative way of working, underpinned by digital technologies which encourage the collection and reuse of project data and three-

dimensional models to reduce the risk of error and cost. For example, it could further discuss the UK's position as a leader in the development of BIM standards and their adoption of BIM in public buildings.

This Unit may be delivered by a combination of lecturing, group work, investigation (using case studies, journals and the internet). Where possible past students now working with BIM projects could be invited to give guest lectures on their projects.

Guidance on approaches to assessment of this Unit

Evidence could be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

All Outcomes could be assessed by means of a series of short answers to structured questions, a formal report or a presentation addressing all components of the knowledge and/or skills.

Use of a case study would allow centres to integrate all Outcomes into a whole or combination of Outcomes.

Assessments should be carried out in supervised, controlled, open-book conditions. Learners should be allowed to refer to relevant course material and have access to the internet. There may be opportunity for investigations to be conducted by groups, however any individual work produced for assessment should be authenticated through turnitin or similar resources.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Opportunities for developing Core and other essential skills

Learners may have opportunities to develop the Core Skills of *Communication* (Written) and *Communication* (Oral) at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components. *Communication* (Written) could be achieved by producing a report covering one or all Outcomes, while *Communication* (Oral) could be achieved if this information was presented orally.

History of changes

Version	Description of change	Date

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced qualifications.

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our Centre Feedback Form.

General information for learners

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This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

It is more or less accepted that BIM is a truly global process that could soon be utilised in every country in the world. This Unit has been written in order to allow you to develop the fundamental knowledge and essential understanding of the terminology, the technology that sits at the heart of a BIM project and the overarching principles from conception to completion.

Outcome 1 should provide you with the opportunity to better your overall understanding of the terminology and overarching principles within a BIM project.

Outcome 2 should provide you with the opportunity to better your overall understanding of the advantages a BIM project brings to design and construction.

Outcome 3 should provide you with the opportunity to better your overall understanding of the various digital applications that are used in a BIM project by various professionals across the entire life of the project.

Outcome 4 should provide you with the opportunity to better your overall understanding of BIM standards and relevant Government Construction Strategies and how they were developed. At the time of writing this Unit, BS 1192 and PAS 1192 were the up-to-date standards.

No prior qualifications are required at the outset of this Unit, other than a strong interest in architectural design. The Unit may be delivered by a balance of lecturing, group work, investigation work and computer simulation.

Assessment may comprise of a combination of written and/or oral recorded work and/or presentations. Please ask your lecturer for more details about the assessments in this Unit.

You will have opportunities in this Unit to develop the Core Skills *Communication* at SCQF level 6, however there is no automatic certification of Core Skills or Core Skill components.