

Next Generation Higher National Unit Specification

Emerging Technologies and Experiences (SCQF level 7)

Unit code: J691 47

SCQF level: 7 (8 SCQF credit points)

Valid from: session 2022–23

Prototype unit specification for use in pilot delivery only (version 1.0) May 2022

This unit specification provides detailed information about the unit to ensure consistent and transparent assessment year on year.

This unit specification is for teachers and lecturers and contains all the mandatory information required to deliver and assess the unit.

The information in this unit specification may be reproduced in support of SQA qualifications only on a non-commercial basis. If it is reproduced, SQA must be clearly acknowledged as the source. If it is to be reproduced for any other purpose, written permission must be obtained from permissions@sqa.org.uk.

This edition: May 2022 (version 1)

© Scottish Qualifications Authority 2022

Unit purpose

This unit introduces learners to new or emerging digital technologies in the public domain. It also covers the associated experiences made possible by these technologies.

It is suitable for a wide range of learners who want to gain an appreciation of recently developed digital technologies, such as big data and virtual reality, along with the types of digital technology set to emerge in the near future, such as machine learning.

This unit explores long-term technological trends and the reasons for them; how these trends are manifesting themselves in current and future technologies; and how these technologies can be used vocationally, educationally and socially. It also considers the personal, societal and business applications and implications of these technologies.

This non-specialist unit is suitable for all learners who are doing programmes of study at this level. It is appropriate for inclusion in a wide range of learning programmes and can be customised to match learners' personal and vocational interests.

On completion of this unit, learners understand technological trends, current and near-future technologies, how these technologies can be used, and their personal, economic and societal implications.

Learners can progress to:

- ◆ Big Data at SCQF levels 7 and 8
- ◆ Artificial Intelligence at SCQF levels 7 and 8
- ◆ Machine Learning at SCQF levels 7 and 8

Unit outcomes

Learners who complete this unit can:

- 1 explain trends in digital technologies
- 2 describe the potential uses of emerging digital technologies
- 3 evaluate an emerging digital technology for vocational or educational use

Evidence requirements

Learners must provide evidence to demonstrate their knowledge and skills across all outcomes.

Evidence is normally required for all of the knowledge and skills in every outcome. However, sampling may be used in a specific circumstance (for outcomes 1 and 2, when the evidence is produced through testing).

The evidence requirements for this unit take the form of knowledge evidence only. This may be written or oral or a combination of the two. It can be captured, stored and presented in a range of media (including audio and video) and formats (analogue and digital). The amount of evidence should be the minimum consistent with the stated knowledge and skills.

For outcome 1, learners need only learn about the major milestones, but they must explain:

- ◆ hardware and software developments
- ◆ at least two current trends
- ◆ at least two potential future developments

The personal, economic and societal implications must include personal privacy and cyber security. These implications can be related to these trends or described generically.

For outcome 2, learners must describe at least three potential uses of emerging digital technologies, and their associated benefits and risks, in relation to one of each of the following:

- ◆ education
- ◆ business
- ◆ society

The evidence for the ethical and legal implications of emerging digital technology can be related to these potential uses or described generically.

The evidence for outcome 3 must relate to at least one vocational or educational application of emerging digital technology, which in turn should relate to learners' own vocational or educational interests. The evidence for research methods and skills, evaluation methods, critical thinking and computational thinking should be implicit in the evaluation and need not be evidenced separately.

The evaluation must include:

- ◆ a description of the technology (generic description)
- ◆ how the technology works (generic explanation)
- ◆ features of the technology (specific to this use)
- ◆ adoption of the technology (specific to this use)
- ◆ barriers to adoption (specific to this use)
- ◆ effectiveness of the technology (specific to this use)
- ◆ benefits of the technology (generic explanation)
- ◆ risks of the technology (generic explanation)
- ◆ likelihood of success for the technology (specific to this use)

For all outcomes, the evidence can be wholly or partly produced under controlled conditions. When evidence is produced in uncontrolled or lightly controlled conditions, it must be authenticated. You can find further advice on authentication methods in the [Guide to Assessment](#).

Learners can produce evidence at any time during the life of the unit. There are no time limits and learners can use reference materials, except if using a test for assessment.

Sampling is allowed for outcomes 1 and 2 when the evidence is produced through testing. The test can take any form (including oral) but must be supervised, unseen and timed. The test contents must sample broadly and proportionately from the contents of outcomes 1 and 2, with approximately equal weighting for each outcome. Learners should not have access to reference material during this type of assessment.

All evidence must be consistent with the level of this unit. The following SCQF level 7 descriptors are particularly relevant to this unit and can be applied to the evidence when appropriate:

- ◆ Knowledge is embedded in theories, concepts and principles.
- ◆ Exercise initiative and independence in carrying out defined activities.
- ◆ Use a range of numerical and graphical techniques skills in combination.
- ◆ Present and evaluate arguments, information and ideas that are routine to computing.

You can find specific examples of assessment in the 'Approaches to assessment' section.

Knowledge and skills

The following table shows the knowledge and skills covered by the unit outcomes:

Knowledge	Skills
<p>Learners should understand the:</p> <ul style="list-style-type: none">◆ characteristics of digital technologies◆ milestones in the development of digital technologies◆ changes in capacity, speed and computing power over time◆ current trends in digital technologies and the reasons for these trends◆ potential future developments in digital technologies◆ personal, economic and societal implications of current trends in digital technologies◆ emerging digital technologies◆ potential experiences in education, business and society made possible by emerging digital technologies◆ potential benefits of emerging digital technologies◆ potential risks of emerging digital technologies◆ ethical and legal implications of emerging digital technologies	<p>Learners can demonstrate:</p> <ul style="list-style-type: none">◆ use of an emerging digital technology in specific vocational and educational fields◆ research methods and skills◆ evaluation methods◆ critical thinking◆ computational thinking

Meta-skills

Throughout the unit, learners develop meta-skills to enhance their employability in the computing sector.

Self-management

This meta-skill includes:

- ◆ integrity: ethics
- ◆ adapting: openness, adaptability

Social intelligence

This meta-skill includes:

- ◆ feeling: social conscience

Innovation

This meta-skill includes:

- ◆ curiosity: questioning, problem recognition
- ◆ sense-making: holistic thinking, synthesis, analysis
- ◆ critical thinking: logical thinking, judgement, computational thinking

Literacies

Communication

Learners develop communication skills throughout the unit, and particularly when they produce the research report in which they evaluate an emerging digital technology.

Digital

Learners develop digital skills and computer literacy by researching and exploring the vocational or educational use of an emerging digital technology.

Delivery of unit

We recommend teaching this unit sequentially, so that learners gain the underpinning knowledge by studying and completing outcome 1, before moving onto outcome 2. Outcome 2 is a mixture of taught knowledge and research, and you should teach this before attempting outcome 3, where it is down to learners to research and report their findings.

While the exact time allocated to this unit is at your discretion, the notional design length is 40 hours. One possible approach is to distribute the available time as follows:

Outcome 1 — Explain trends in digital technologies
(15 hours)

Outcome 2 — Describe the potential uses of emerging digital technologies
(15 hours)

Outcome 3 — Evaluate an emerging digital technology for vocational or educational use
(10 hours)

You should provide learners with hands-on experience with emerging digital technologies. You could let them try out virtual reality headsets like Oculus Rift, or a cheaper alternative such as Google Cardboard. We also encourage day trips to technology companies and science centres, where learners can experiment with the latest digital technology.

Access to this unit is at your centre's discretion. However, learners should have a reasonable level of knowledge of computing terminology and computing technology.

If you deliver this unit as part of a group award, we recommend that you teach and assess it within the subject area of the group award to which it contributes.

Where evidence for outcomes is assessed on a sample basis, you should teach the whole of the content listed in the 'Knowledge and skills' section and make it available for assessment. Learners should not know in advance the items they are being assessed on, and different items should be sampled on each assessment occasion.

Additional guidance

The guidance in this section is not mandatory.

Content and context for this unit

This unit is intended to provide learners with an insight into new and emerging digital technologies and experiences in the public domain.

It is suitable for a wide range of learners, studying a wide range of learning programmes.

Emerging technologies include:

- ◆ mobile technology
- ◆ cyber security
- ◆ cloud computing
- ◆ speech recognition
- ◆ virtual worlds
- ◆ robotics
- ◆ big data
- ◆ Internet of Things (IoT)
- ◆ real-time language translation
- ◆ augmented reality
- ◆ virtual reality
- ◆ driverless cars
- ◆ natural language processing
- ◆ machine learning
- ◆ artificial intelligence

This unit explores long-term technological trends, the reasons for them and how these trends are manifesting themselves in current and future technologies. Part of this involves looking backwards at key milestones in the development of computing and other digital technologies. Learners gain knowledge of how capacity, speed and computing power are measured, and how the power of computing devices has increased over time.

Learners gain an insight into how new digital technologies can be used vocationally, educationally and socially. They also consider the personal, societal, business and socio-economic implications of these developments.

In addition, they examine recently developed digital technologies and the types of technologies that are about to emerge, and consider how these could be applied in a personal, business and societal context.

The precise content of this unit is likely to change over time as technologies emerge.

For outcome 1, learners should learn about the following topics:

- ◆ Characteristics of digital technologies:
 - differences between analogue and digital technology
- ◆ Milestones in the development of digital technologies (hardware and software):
 - key developments in computing and other digital technologies over the years
 - evolution of software running on digital devices over the years
- ◆ Changes in capacity, speed and computing power over time:
 - methods for measuring capacity, speed and throughput of computers
 - relationship between true computing power and measurements of speed or frequency of CPUs (Central Processing Units):
 - other factors apart from CPU speed that affect computing power
 - the increase in capacity, speed and power of computers over the years
 - Moore’s Law and its relevance today
- ◆ Current trends in digital technologies (hardware and software):
 - trends in current digital hardware technologies
 - trends in software in relation to current digital technologies
 - the adoption cycle
- ◆ Reasons for current trends in digital technologies:
 - the factors driving the current trends in digital technologies
- ◆ Potential future developments in digital technologies:
 - near-future developments in digital technologies
 - likelihood of the success of these technologies
- ◆ Personal, economic and societal implications of current trends in digital technologies:
 - personal, economic and societal implications of current trends
 - personal privacy and cyber security in relation to current trends

In outcome 2, you should teach learners about a variety of emerging technologies and the potential experiences they make possible. They should study the potential benefits and misuses of these technologies.

In outcome 3, learners should research, critically analyse, and evaluate an emerging digital technology. In preparation for this, they should study basic evaluation and research methods. You should work with learners on their critical analysis and computational thinking skills. We recommend that you provide learners with hands-on experience with the emerging technology they are evaluating.

Approaches to assessment

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

A traditional approach to assessment would involve a test for outcomes 1 and 2, and a research activity for outcome 3.

NextGen: HN published prototype unit specification for use in pilot delivery only (version 1.0)
May 2022

The test would sample the knowledge and understanding in outcomes 1 and 2 and could take one of various forms, including multiple-choice and short-answer extended-response. If you use a multiple-choice or short-answer test, then you should use scenario-type questions. The test would take place under controlled conditions, be time-limited, and have an appropriate pass mark that reflects the type of test used.

The research activity would involve learners exploring a vocational or educational use of an emerging digital technology. For example, this could involve:

- ◆ a business education learner exploring the commercial uses of big data
- ◆ someone studying care exploring the rehabilitation uses of virtual reality
- ◆ an automotive engineering student exploring the uses of driverless cars

Learners could present their findings in a written report or a presentation. If they choose to produce a report, it should contain a title page, table of contents, conclusions and a bibliography.

For a more contemporary approach to assessment, learners could use a web log (blog) to record their learning throughout the life of the unit, daily or weekly. If they take this approach, sampling would not be appropriate. The blog would contain evidence for all knowledge and skills statements using a variety of media and links to external resources.

Assessors should be sure of the authenticity of the evidence. Authentication can take various forms including, but not limited to, oral questioning and plagiarism checks. Some forms of evidence generation (such as video recordings) have intrinsic authentication and would require no further means of verification.

Equality and inclusion

This unit is designed to be as fair and as accessible as possible with no unnecessary barriers to learning or assessment.

You should take into account the needs of individual learners when planning learning experiences, selecting assessment methods or considering alternative evidence.

Guidance on assessment arrangements for disabled learners and/or those with additional support needs is available on the assessment arrangements web page:

www.sqa.org.uk/assessmentarrangements.

Information for learners

Emerging Technologies and Experiences (SCQF level 7)

This section explains:

- ◆ what the unit is about
- ◆ what you should know or be able to do before you start
- ◆ what you need to do during the unit
- ◆ opportunities for further learning and employment

Unit information

This unit introduces you to new or emerging digital technologies and experiences in the public domain. It gives you an opportunity to learn about, and use, some of the latest digital technology available for personal or business use.

The types of technologies covered include:

- ◆ mobile technology
- ◆ cloud computing
- ◆ big data
- ◆ Internet of Things (IoT)
- ◆ speech recognition
- ◆ augmented reality
- ◆ virtual reality
- ◆ cyber security
- ◆ robotics
- ◆ driverless cars
- ◆ language translation
- ◆ natural language processing
- ◆ machine learning
- ◆ artificial intelligence

This unit explores long-term technological trends, and the reasons for them; how these trends are manifesting themselves in current and future technologies; and how these new digital technologies can be used in employment and also for learning. It also considers the personal, societal, business and socio-economic applications and implications of these developments, including the implications for your privacy and for business security.

Assessment is straightforward and does not take much time. It might comprise a short test and a research activity or require you to maintain a log of your learning.

NextGen: HN published prototype unit specification for use in pilot delivery only (version 1.0)
May 2022

When you complete this unit you understand long-term technological trends, current and near-future emerging technologies, how these technologies can be used, and their personal, economic and societal implications. You also gain experience of using some of these technologies and understand how they are likely to develop in the future.

This unit also provides opportunities for you to enhance your meta-skills in self-management, social intelligence and innovation.

You may progress to:

- ◆ Big Data at SCQF levels 7 and 8
- ◆ Artificial Intelligence at SCQF levels 7 and 8
- ◆ Machine Learning units at SCQF levels 7 and 8

Administrative information

Published: May 2022 (version 1.0)

Superclass: CB

History of changes

Version	Description of change	Date

Note: please check [SQA's website](#) to ensure you are using the most up-to-date version of this document.