



# Richmond College

Advanced Education



## Qualification Specification for :

### Level 7 Extended Diploma in Computing Technologies

#### Pathways:

Level 7 Extended Diploma in Computing Technologies (General Route) 603/7702/1

Level 7 Extended Diploma in Computing Technologies (Software Engineering) 603/7704/5

Level 7 Extended Diploma in Computing Technologies (Application Development) 603/7705/7

Level 7 Extended Diploma in Computing Technologies (Data Analytics) 603/7706/9

Level 7 Extended Diploma in Computing Technologies (Networking) 603/7707/0

Level 7 Extended Diploma in Computing Technologies (Artificial Intelligence) 603/7709/4



+ 44 7476 268672



[www.richmondcollege.co.uk](http://www.richmondcollege.co.uk)



[admissions@richmondcollege.co.uk](mailto:admissions@richmondcollege.co.uk)



England: 124 City Road, London, EC1V 2NX

Canada: 7030 Woodbine Avenue, Markham, ON, Canada L3R 6G2

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## Qualification Structures

### Rules of Combination

Each qualification has agreed rules of combination which indicate the number of credits to be achieved, the units that are mandatory and the choice of optional units. The rules of combination for the Level 7 Extended Diploma in Computing Technology qualifications are given below.

### ATHE Level 7 Extended Diploma in Computing Technologies

#### Rules of combination

Learners selecting this qualification must complete all mandatory units (100 credits) and select a further 2 units from the optional units listed below, totalling 120 credits.

**The Total Qualification Time is 1200 Hours**

**The Total Guided Learning Hours is 600**

**The Total Credit value is 120 credits**

Unit Codes	Unit No	Unit Title	Credit	GLH
<b>Mandatory Units</b>				
D/618/7843	1	Managing Innovation and Change in Computing	20	100
H/618/7844	2	Systems Development and User Experience (UX)	20	100
K/618/7845	3	Implementing and Managing Cyber Security	20	100
F/618/7852	4	Business Intelligence Systems	20	100
J/618/7853	5	Independent Project	20	100
<b>Optional Units - 2 of the following</b>				
L/618/7854	6	Agile Transformation	10	50
R/618/7855	7	Enterprise Resource Planning Systems	10	50
Y/618/7856	8	Mobile Application Development	10	50
D/618/7857	9	Data analytics and Big Data	10	50
H/618/7858	10	Networking and Infrastructure Development	10	50
K/618/7859	11	Internet of Things (IoT)	10	50
D/618/7860	12	Artificial Intelligence	10	50
H/618/7861	13	Computer-based Research Methods	10	50
<b>Total for ATHE Level 7 Extended Diploma in Computing Technologies</b>			<b>120</b>	<b>600</b>

## Pathways

### Level 7 Extended Diploma in Computing Technologies (Application Development)

#### Rules of combination

Learners taking the Application Development Pathway take the five mandatory units and the two units from the Application Development Pathway.

The Total Qualification Time is 1200 Hours

The Total Guided Learning Hours is 600

The Total Credit value is 120 credits

Unit Code	Unit No.	Core Units	Credit	GLH
D/618/7843	1	Managing Innovation and Change in Computing	20	100
H/618/7844	2	Systems Development and User Experience (UX)	20	100
K/618/7845	3	Implementing and Managing Cyber Security	20	100
F/618/7852	4	Business Intelligence Systems	20	100
J/618/7853	5	Independent Project	20	100
<b>Pathway Units</b>				
Y/618/7856	8	Mobile Application Development	10	50
D/618/7860	12	Artificial Intelligence	10	50
<b>Total for ATHE Level 7 Extended Diploma in Computing Technologies with Application Development</b>			<b>120</b>	<b>600</b>

### Level 7 Extended Diploma in Computing Technologies (Software Engineering)

#### Rules of combination

Learners taking the Software Engineering Pathway take the five mandatory units and two units from the Software Engineering Pathway.

The Total Qualification Time is 1200 Hours

The Total Guided Learning Hours is 600

The Total Credit value is 120 credits

Unit Code	Unit No.	Core Units	Credit	GLH
D/618/7843	1	Managing Innovation and Change in Computing	20	100
H/618/7844	2	Systems Development and User Experience (UX)	20	100
K/618/7845	3	Implementing and Managing Cyber Security	20	100
F/618/7852	4	Business Intelligence Systems	20	100
J/618/7853	5	Independent Project	20	100
<b>Pathway Units</b>				
L/618/7854	6	Agile Transformation	10	50
R/618/7855	7	Enterprise Resource Planning Systems	10	50
<b>Total for ATHE Level 7 Extended Diploma in Computing Technologies with Software Engineering</b>			<b>120</b>	<b>600</b>

## Level 7 Extended Diploma in Computing Technologies (Data Analytics)

### Rules of combination

Learners taking the Data Analytics Pathway take the five mandatory units and two units from the Data Analytics Pathway.

The Total Qualification Time is 1200 Hours

The Total Guided Learning Hours is 600

The Total Credit value is 120 credits

Unit Code	Unit No.	Core Units	Credit	GLH
D/618/7843	1	Managing Innovation and Change in Computing	20	100
H/618/7844	2	Systems Development and User Experience (UX)	20	100
K/618/7845	3	Implementing and Managing Cyber Security	20	100
F/618/7852	4	Business Intelligence Systems	20	100
J/618/7853	5	Independent Project	20	100
<b>Pathway Units</b>				
D/618/7857	9	Data analytics and Big Data	10	50
H/618/7861	13	Computer-based Research Methods	10	50
<b>Total for ATHE Level 7 Extended Diploma in Computing Technologies with Data Analytics</b>			<b>120</b>	<b>600</b>

## Level 7 Extended Diploma in Computing Technologies (Networking)

### Rules of combination

Learners taking the Networking Pathway take the five mandatory units and two units from the Networking Pathway.

The Total Qualification Time is 1200 Hours

The Total Guided Learning Hours is 600

The Total Credit value is 120 credits

Unit Code	Unit No.	Core Units	Credit	GLH
D/618/7843	1	Managing Innovation and Change in Computing	20	100
H/618/7844	2	Systems Development and User Experience (UX)	20	100
K/618/7845	3	Implementing and Managing Cyber Security	20	100
F/618/7852	4	Business Intelligence Systems	20	100
J/618/7853	5	Independent Project	20	100
<b>Pathway Units</b>				
H/618/7858	10	Networking and Infrastructure Development	10	50
K/618/7859	11	Internet of Things (IoT)	10	50
<b>Total for ATHE Level 7 Extended Diploma in Computing Technologies with Networking</b>			<b>120</b>	<b>600</b>

## Level 7 Extended Diploma in Computing Technologies (Artificial intelligence)

### Rules of combination

Learners taking the Artificial intelligence Pathway take the five mandatory units and two units from the Artificial intelligence Pathway.

The Total Qualification Time is 1200 Hours

The Total Guided Learning Hours is 600

The Total Credit value is 120 credits

Unit Code	Unit No.	Core Units	Credit	GLH
D/618/7843	1	Managing Innovation and Change in Computing	20	100
H/618/7844	2	Systems Development and User Experience (UX)	20	100
K/618/7845	3	Implementing and Managing Cyber Security	20	100
F/618/7852	4	Business Intelligence Systems	20	100
J/618/7853	5	Independent Project	20	100
<b>Pathway Units</b>				
D/618/7860	12	Artificial Intelligence	10	50
H/618/7861	13	Computer-based Research Methods	10	50
<b>Total for ATHE Level 7 Extended Diploma in Computing Technologies with Artificial Intelligence</b>			<b>120</b>	<b>600</b>

### Guidance on Assessment and Grading

#### Assessment

There is no external assessment (i.e. external written examination) attached to any unit. For all of these pathways, assessment is completed through the submission of internally assessed learner work. Each learner is required to create a portfolio of evidence which demonstrates achievement of the learning outcomes, at the standards provided by the assessment criteria associated with each unit. This means that learning outcomes and assessment criteria specify what each candidate has to achieve.

To achieve a pass for a unit, a learner must have successfully achieved the learning outcomes at the pass standard set by the assessment criteria for that unit. To achieve merit or distinction, the learner must demonstrate that they have achieved the criteria set for these grades. The criteria for merit or distinction will mean the standards extend the learning at the level of the qualification. There will generally be fewer criteria for merit and distinction in order to manage the volume of work and assessment for learners and tutors but sufficient to ensure that higher grades can be accurately determined.

Learners cannot omit completing work to meet the pass standard and simply work to the higher grades, as this would put a pass for the unit in jeopardy. Similarly, learners cannot complete work to meet the criteria for distinction in the anticipation that this will also meet the criteria for merit. However, where work for the pass standard is marginal, assessors can consider any extension work completed as this may support achievement of the pass standard.

ATHE will provide a sample assignment for each unit which can be used as the assessment vehicle for the unit. These assignments have extension activities, which enable the learners to provide additional evidence to show that the criteria for the higher grades have been met. The assessor therefore must judge the grade for the work submitted on the basis of whether the LO has been met at the standards, specified for the pass, merit or distinction grade for that LO. In making their judgements assessors will continue to check whether the command verbs stated in the AC have been delivered.

There is no requirement for learners to produce the additional work required for the higher grades and the tutor may advise the learner to work to the pass standard only, where this is appropriate. The assessor should record their judgements on the ATHE template, stating what grade the learner has achieved and providing evidence for the judgements. The internal verifier can also use the ATHE IV template but the feedback to the assessor must show whether the assessor has made valid judgements for all the learner work, including any extension activities which have been completed. Assessment judgements always require care to ensure that they are reliable and that there is sufficient and specific feedback to the learner to show whether he or she has demonstrated achievement of the LO at the specified standard. The additional grades mean that assessors must take even greater care to assure the validity of their judgements. They must provide specific feedback to learners, on whether the additional evidence provided has or has not met the standard for merit and distinction grades. Assessment is therefore more complex.

We would encourage our centres to develop their own assessment strategies so you have the opportunity to put assignments in a context that is appropriate for your learners and business organisations. Any assignments that you devise will need to be submitted to ATHE for approval before delivery of the programme. Centres can submit assignments for approval using the 'Centre-Devised Assignment' template documentation available on the ATHE website. An assignment can job related. It can be based on a single unit or an integrated assignment, incorporating more than one unit. An integrated assignment must show which learning outcomes and assessment criteria from which units are being covered.

### **Recording Assessment Judgements**

Assessors are required to record assessment judgements for each learner by unit. ATHE has provided a template for centres to use to record their judgements and this form should be used. The form enables the centre to record any adjustments due to special considerations or reasonable adjustments. Any repeat work and adjustments following appeals should also be recorded. These records must be retained as they will be checked at external moderation visits. More detailed information is available in our Delivering ATHE Qualifications Handbook. All learner work must be retained for a minimum of 4 years after certification has taken place.

### **Putting an Assessment Strategy in Place**

You will need to demonstrate to your External Quality Assurer that you have a clear assessment strategy supported by robust quality assurance, in order to meet the ATHE requirements for registering learners for a qualification. In devising your assessment strategy, you will need to ensure:

- Any internally devised assessments are clearly mapped to the unit learning outcomes and assessment criteria they have been designed to meet. In addition the internally devised assignment has been submitted to ATHE for verification
- That the command verbs used in the assignment are appropriate for the level of the qualification, e.g. analyse, evaluate.
- That the assessment gives the learner sufficient opportunity to meet the assessment criteria at the right level, through the work they are asked to complete. The RQF level descriptors will be helpful to you in determining the level of content of the assessment.
- Learners are well-briefed on the requirements of the unit and what they have to do to meet them.
- Assessors are well trained and familiar with the content of the unit/s they are assessing.
- There is an internal quality assurance process in place to ensure consistency and standardisation of assessment across the qualification.
- Assessment decisions are clearly explained and justified through the provision of feedback to the learner.
- That work submitted can be authenticated as the learner's own work and that there is clear guidance on the centre's Malpractice Policy.
- That there is an assessment plan in place identifying dates for summative assessment of each unit and indicating when external verification will be needed.

- Sufficient time is included in the assessment planning to allow the learners time for any necessary remedial work that may be needed prior to certification.

ATHE encourages the use of a range of assessment vehicles that will engage learners and give them an opportunity to both demonstrate their knowledge and understanding of a topic and to evaluate how they might apply that knowledge in a given context. We would avoid essay writing and utilise more varied types of assessment. This might include assessment through:

- a research activity resulting in the compilation of a report
- an academic paper or article for publication
- the compilation of a case study
- a critical review and evaluation of a chosen company's policies, procedures and systems
- a set practical project. This may be completed for an employer (also known as an 'employer-engagement' activity) or based on a vocational related activity in an assignment to address a business need

This list is by no means exhaustive but gives examples of some creative assessment methods that could be adopted.

## **Grading**

### **Grading system**

The grading algorithms and overall grade thresholds published in any ATHE specification may be subject to change, where this is necessary to maintain standards.

This qualification involves assessment using judgements against 'Pass', 'Merit' and 'Distinction' Assessment Criteria to make a decision about whether a learner has met the required standard. Our grading system is straightforward and we do not currently envisage the need to change this. However, should a change become necessary, the change would be published in an updated version of the specification with a clearly revised version number and a new 'valid from' date on the front cover. We will write to all centres in good time to inform them of this change so that plans for any changes can be made to your programme delivery, internal assessment and quality assurance arrangements.

The ATHE grading system where a qualification result can be either Pass, Merit, Distinction or Fail is as currently follows and we plan to maintain this system for the foreseeable future:

- Learner meets all Learning Outcomes at Pass standards stated in the assessment criteria in a unit > Learner gains a Pass for the unit
- Learner meets all Learning Outcomes at Pass standards, and where available also at Merit standards stated in the assessment criteria in a unit > Learner gains a Merit for the unit
- Learner meets all Learning Outcomes at Pass standards, and where available also at Merit and Distinction standards stated in the assessment criteria in a unit > Learner gains a Distinction for the unit
- Learner does not meet all Learning Outcomes at Pass standards stated in the assessment criteria in a unit > Learner gains a Fail for the unit
- Learner meets the rules of combination in a qualification and points for achieving units are added up > points are converted to an overall qualification grade > learner meets minimum number of points required > learner achieves a Pass, Merit or Distinction for the qualification
- Learner does not meet the rules of combination in a qualification and/or points for achieving units are added up > points are converted to an overall qualification grade
- Learner does not meet rules of combination or minimum number of points required > learner achieves a Fail for the qualification but may receive unit credit certification for those units achieving a Pass.

## Qualification Grading Structure

### Determining the Overall Qualification Grade

Each unit is graded pass, merit or distinction. As well as receiving a grade for each individual unit learners will receive an overall grade for the qualification. In order to achieve the overall grade the learner must have attempted the valid combination of units.

The calculation of the overall qualification grade is based on the student's performance in all units and the points gained from all credits. The assigned points per credit are as follows:

Grade	Points
Pass	3
Merit	4
Distinction	5

The learner must achieve enough points to reach the point threshold for the overall grade

Grade	Points
Pass	360-431
Merit	432-539
Distinction	540+

#### Example 1

Learner A has achieved the following

Unit	Credits	Grade	Points
Unit 1	20	Pass	60
Unit 2	20	Pass	60
Unit 3	20	Merit	80
Unit 4	20	Merit	80
Unit 5	20	Pass	60
Unit 6	10	Pass	30
Unit 7	10	Pass	30

This learner has a total of 400 points giving them an overall qualification grade - Pass.

#### Example 2

Unit	Credits	Grade	Points
Unit 1	20	Merit	80
Unit 2	20	Distinction	100
Unit 3	20	Pass	60
Unit 4	20	Merit	80
Unit 5	20	Pass	60
Unit 6	10	Distinction	50
Unit 7	10	Distinction	50

This Learner has a total of 480 points giving them an overall qualification grade - Merit.

## Quality Assurance of Centres

Centres delivering ATHE RQF qualifications must be committed to ensuring the quality of the units and qualifications they deliver, by monitoring processes such as observation of classroom practice, gathering and acting on feedback from learners, regularly reviewing programme delivery using data on learner achievement and retention. There must also be effective standardisation of assessors and verification of assessor decisions. ATHE will rigorously monitor the application of quality assurance processes in centres.

ATHE's quality assurance processes will include:

- Centre approval for those centres who are not already recognised to deliver ATHE qualifications
- Approval to offer the ATHE Level 7 Extended Diploma in Computing Technologies
- Monitoring the quality of work in the centre leading to a report, which provides evidenced judgements and normally leads to the identification of strengths and actions for improvement. Before issue to centres this report will be checked at ATHE to ensure the validity of judgements.

Centres will be required to undertake training and standardisation activities as agreed with ATHE. Details of ATHE's quality assurance processes are provided in the ATHE Guide: "Delivering ATHE Qualifications" which is available on our website.

## Malpractice

Centres must have a robust Malpractice Policy in place, with a clear procedure for implementation. Centres must ensure that any work submitted for verification can be authenticated as the learner's own.

Centres should refer to the ATHE Malpractice and Maladministration Policy on the ATHE website and the Guide for the Review of Centre Malpractice Policies, which includes useful information on a range of topics.

## Guidance for Teaching and Learning

This qualification is designed to ensure learners are actively involved and engaged in the learning process. Your approach to delivery must give the learners sufficient structure and information on which to build without you doing the work for them. In achieving the right balance you will need to produce well-planned sessions that follow a logical sequence. This sequence may combine elements or learning outcomes from different units, as required so that learning is holistic.

Centres can deliver this qualification in any mode of delivery, in order to meet learner needs. This will include:

- full time
- part time
- distance
- blended learning.

Learners should build on their previous experience. They must engage in practical activities, as part of their learning in this qualification. This will enable them to apply knowledge and understanding and develop the skills necessary to deliver classes and engage and motivate students. Please see the section on Assessment which explains some specific learning requirements for individual units.

The delivery of the units in the qualification needs to be planned, so there is a logical sequence supporting development of knowledge and understanding. They can be delivered as independent

single units or delivered in a more integrated way. They do not need to be delivered in the order they appear in this specification.

## **Unit Specifications**

### Unit Format

Each unit in ATHE's suite of qualifications is presented in a standard format. This format provides guidance on the requirements of the unit for learners, tutors, assessors and external quality assurers.

Each unit has the following sections:

### Unit Title

The unit title reflects the content of the unit. The title of each unit completed and achieved will appear on a learner's statement of results.

### Unit Aims

The unit aims section summarises the purpose of the learning.

### Unit Code

Each unit is assigned an RQF unit code that appears with the unit title on the Register of Regulated Qualifications.

### RQF Level

All units and qualifications in the RQF have a level assigned to them which represents the level of achievement. The level of each unit is informed by the RQF level descriptors. The RQF level descriptors are included in this specification and are available on the ATHE website.

### Credit Value

The credit value is the number of credits that may be awarded to a learner for the successful achievement of the learning outcomes of a unit.

### Guided Learning Hours (GLH)

Guided learning hours are an estimate of the amount of time, on average, that a tutor, trainer, workshop facilitator etc., will work with a learner, to enable the learner to complete the learning outcomes of a unit to the appropriate standard.

### Learning Outcomes

The learning outcomes set out what a learner is expected to know, understand or be able to do as the result of the learning process.

### Assessment Criteria

The assessment criteria describe the requirements a learner is expected to meet in order to demonstrate that the learning outcome has been achieved. Command verbs reflect the level of the qualification e.g. at Level 7 there are verbs such as analyse, assess, examine and evaluate. At Distinction grades some assessment criteria relate to more than one learning outcome.

## Units

<b>Unit 1 Managing Innovation and Change in Computing</b>			
<b>Unit aims</b>	This unit aims to provide learners with the necessary knowledge and understanding in order to manage innovation and change in computing environments. Learners will explore that change is constant and the importance of understanding and applying a process for managing change within an organisation. There will be a focus on innovation and changes that are common across the computing industry.		
<b>Unit level</b>	7		
<b>Unit code</b>	D/618/7843		
<b>GLH</b>	100		
<b>Credit value</b>	20		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b>	<b>Assessment criteria</b>		
<b>The learner will:</b>	<b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand innovation and change management in computing	1.1 Explore the difference between innovation and change management 1.2 Evaluate the organisational benefits of utilising innovation and change 1.3 Investigate the types of computing changes that can occur in an organisation 1.4 Analyse the potential risks of innovation and change 1.5 Evaluate the possible impacts of change to organisations	1M1 Analyse how to create an innovative culture in an organisation	

	1.6 Assess how innovation is crucial to business success		
2. Understand how to manage change	<p>2.1 Analyse the importance of managing change effectively and the consequences of poor management of innovation and change</p> <p>2.2 Analyse effective change management techniques, processes and methodologies used</p> <p>2.3 Explain how to measure the impact of change</p>	<p>2M1</p> <p>Analyse the importance of ensuring stakeholder buy in to proposed changes</p>	
3. Understand how to explore innovative computing ideas	<p>3.1 Understand the importance of developing innovative computing systems</p> <p>3.2 Explore innovations that are common across the computing industry</p> <p>3.3 Evaluate new and emerging areas of computing</p> <p>3.4 Benchmark computing systems with other organisations</p> <p>3.5 Explore the costs associated with introducing computing changes</p>		<p>LO3 and LO4 D1</p> <p>Prepare a presentation recommending an innovative computing idea and calculating a return on investment from the innovative change</p>
4. Be able to recommend innovative computing solutions	<p>4.1 Analyse how to keep up to date with new computing solutions</p> <p>4.2 Create a business proposal for an innovative change in computing</p>		

<p>5. Understand the wider business context of the proposed computing changes</p>	<p>5.1 Analyse the changes needed to organisational processes from introducing a new solution</p> <p>5.2 Evaluate the changes to business strategy based on introducing a new change</p> <p>5.3 Analyse the importance of linking innovation and change to an organisation's ICT strategy</p>		
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## Indicative Content

### 1. Understand innovation and change management in computing

- Innovation: something new or different being introduced
- Change: a difference in current processes
- Benefits
  - increased competitiveness – higher efficiency, potential lower costs, higher quality products, efficient use of all resources, improved staff retention
  - new ideas are crucial to a business being able to improve its processes
- Types of computing changes
  - Upgraded ICT infrastructure
  - Transition from on premise solutions to cloud-based solutions
  - New software system being implemented
  - The creation of a mobile application
  - Upgraded to hardware devices such as laptops and mobile devices
- Potential risks
  - Operational: quality, cost or scheduling requirements
  - Commercial: failing to obtain customers
  - Financial: investing in unsuccessful projects (over budget spend)
- impact change has to an organisation
  - Improved product quality
  - Increased efficiency and productivity across teams
  - Decreased costs for the organisation
  - Potential reduction in waste
  - Increased employee satisfaction

- Increase in teamwork across the organisation
- Increased customer satisfaction

## 2. Understand how to manage change

- managing change appropriately
  - Successful implementation
  - Communication
  - Using change methodology
  - Planning
  - Feedback and review
- consequences of poorly managing innovation and change
  - Decreased staff morale
  - Breakdown in communication
  - Conflict between departments and staff
  - Resistance from staff
  - Inconsistent messages
  - Reduced productivity
  - Reduced efficiency
  - Damage to reputation and ultimately finances
- change management techniques, including:
  - 7 Rs of change management:
    - REASON behind the change
    - RISKS involved in the change
    - RESOURCES required to deliver the change
    - Who RAISED the change request
    - RETURN required from the change
    - Who is RESPONSIBLE for creating, testing, and implementing the change
  - Four principles of change management
    - Understand change
    - Plan change.
    - Implement change.
    - Communicate change
- change management process and methodologies
  - Lewin's change management model
  - The McKinsey 7-S model
  - Kotter's theory
  - Nudge theory
  - ADKAR

- Bridges' transition model
- Kübler-Ross' change curve
- measure the impact of change
  - KPI's
  - Goals
  - Aims and objectives
  - Regular reviews
  - Ask questions
  - Focus groups

### **3. Understand how to explore innovative computing ideas**

- importance
  - Business continuity
  - Focus on modernisation
  - Competitiveness
- innovations that are common across the computing industry
  - Growth of:
  - Online e-commerce platforms
  - Cloud based technologies
  - Server migration to cloud
  - Fully cloud based software's instead of on premise
- Benchmark
  - Planning
  - Analysis
  - Integration
  - Action
- Costs
  - Hardware
  - Software
  - Consultation
  - Training and support
- Return on investment
  - High ROI
  - Low ROI
  - ROI Calculation

### **4. Be able to recommend innovative computing solutions**

- keep up to date
  - Online

- Offline
- Methods
- Benefits
- business proposal
  - Reason for change
  - Resources required
  - Estimated costs
  - Benefits
  - Return on investment
  - Scope
  - Risks

## **5. Understand the wider business context of computing changes**

- Changes to be made to organisational processes
  - Operational processes
  - ICT processes
  - Human resource processes
  - Health and safety processes
- changes to business strategy
  - Aims
  - Objective
  - Scope
  - Goals
  - Products/services
- linking innovation and change to an organisation's ICT strategy
  - Future planning
  - Business continuity
  - Business aims and objectives
  - Collaboration
  - Modern workforce

<b>Unit 2 Systems Development and User Experience (UX)</b>			
<b>Unit aims</b>	This unit aims to provide learners with knowledge and understanding of the development of systems and how this is achieved using a range of systems development life cycle models (SDLC). Learners will focus on how to establish the user and technical requirements of the system and the considerations to make when developing a user interface.		
<b>Unit level</b>	7		
<b>Unit code</b>	H/618/7844		
<b>GLH</b>	100		
<b>Credit value</b>	20		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the development lifecycle of a system	1.1 Analyse systems development lifecycle models 1.2 Examine the problems that can occur from not using a lifecycle model 1.3 Evaluate the benefits of using a lifecycle model for systems development	1M1 Create a user and system requirements document	1D1 Evaluate the impact change requests can have on a systems development project
2. Understand software and data system construction	2.1 Analyse software development methodologies 2.2 Evaluate software programming languages used 2.3 Explain how information flows between a user and a product or service		2D1 Construct a business case for a software development project
3. Understand system design, implementation and testing	3.1 Analyse the importance of system implementation and testing 3.2 Explain the importance of evaluating a system 3.3 Assess the use of version control for software releases 3.4 Evaluate the importance of software support and maintenance		

	3.5 Analyse relevant laws and regulations that affect the design of a system		
4. Understand how to create a positive user experience	4.1 Explore the principles of positive user experience 4.2 Identify positive and negative aspects of interface layouts 4.3 Explore how user interfaces have an impact on processes 4.4 Explain how to address the differing needs of target audiences 4.5 Create a user interface wireframe (UX) 4.6 Examine the documentation and processes for training end users		
5. Be able to develop and test prototypes	5.1 Develop a user interface prototype 5.2 Carry out testing with end users. 5.3 Evaluate the success of the products usability	5M1 Create a test plan for testing a software development	

## Indicative Content

### 1. Understand the development lifecycle of a system

- Systems development lifecycle models (SDLC)
  - Waterfall model
  - Iterative model
  - Spiral model
  - V-shaped model
  - Agile model
- Problems that can occur from not using a lifecycle model
  - User requirements not met
  - Failed project
  - Lack of communication
- Benefits
  - Provides a view of the entire system, resources, timeline, and goals.
  - Enhanced controls over large projects
  - Involves comprehensive and specified explicit steps
  - Provides a successful model/approach to use
- User requirements: specific to the user action

- System requirements: specific to the system requirements and technical requirements in order to perform the user requirements
- Change requests
  - Assist with roadmap planning
  - Requirement for extra resource

## 2. Understand software and data system construction

- Software development methodologies
  - Agile
  - DevOps
  - Waterfall
  - Rapid
- Software programming languages
  - Procedural programming language
  - Functional programming language
  - Object-oriented programming language
    - Java
    - JavaScript
    - Python
  - Scripting programming language
  - Logic programming language
  - C++ language
  - C language
- Information flows
  - Flow diagrams
  - Flow charts
  - Identifying information flows
- Business case
  - Summary
  - Introduction
  - Problem description
  - Analysis
  - Possible options
  - Recommendation
  - Chosen option
  - Conclusion

## 3. Understand system design, implementation and testing

- System implementation and testing
  - Ensure requirements have been met
  - Ensure system is fit for purpose
  - Identifying changes required
- Evaluating a system
  - Establishing the value of the system
  - Meeting user requirements
  - Increasing productivity
  - Measure the success and impact
- Version control

- Author
- Last updated date
- Review date
- Version number
- Storage
- Software support and maintenance
  - Purpose
  - Structure
  - Services provided
  - Value to organisation
  - Value to users
- Laws and regulations
  - Privacy policy
  - Cookie management
  - GDPR
  - Health and Safety
  - Terms and Conditions
  - Copyright Design and Patents Act
  - DSE
  - Equality Act

#### **4. Understand how to create a positive user experience**

- Principles
  - 3 click rule
  - Content prioritisation
  - Appropriate colours
  - Accessibility considerations
  - Easy to use
  - Touchscreen functions
  - Provide user control
  - Legible content
  - Consistency across device and screen size
  - Interface clearly visible
  - Minimise data input
- Positive aspects: easy to navigate, use of icons, colours which are easy to read, informative content, mix of content type such as video, imagery and text, zoom functionality
- Negative aspects: large amounts of text, no user interaction, large page content, no accessibility options, no icons, difficult to read text, inconsistent pages
- Measure success and impact:
  - Utilisation rates
  - Interactions
  - Bounce rate
  - User flow
  - Page view time
  - Number of registered users
  - Daily views
  - Trends
  - Link to sales and profits
  - Number of sales completed using application vs. other methods
  - Return on investment (ROI)

- Customer feedback including surveys
- Address the differing needs of target audiences
  - Audience types
  - Audience needs
  - Delivery methods
  - Learning styles
  - Accessibility
- User interface wireframe (UX) should include:
  - Icons
  - Navigation
  - App layout
  - Flow between screens
- Documentation and processes for training end users
  - Training plan
  - Handbook/user guide
  - Knowledge base
  - Super users
  - Support processes

## 5. Be able to develop and test prototypes

- User interface prototype
  - Interactive design
  - Navigation
  - Icons
  - Colours
  - Screens
  - Imagery
  - Content areas
- Evaluate the success of the products usability
  - Feedback
  - Change requests
  - Outcomes
  - Functionality
- Test plan
  - test coverage
  - test methods
  - test responsibilities

Learner should be aware of the contents with a test plan and how a test plan is directly referenced to user and technical requirements. A test plan should include:

- Test description
- Test reference number
- Scope
- Resources
- Expected outcome
- Actual outcomes
- Test passed or failed
- Suggested resolution

<b>Unit 3 Implementing and Managing Cyber Security</b>			
<b>Unit aims</b>	This unit aims to provide learners with the necessary knowledge and understanding of securing computing systems and how to implement and manage cyber security in an enterprise environment. The unit will focus on the core principles to consider in order to secure systems appropriately. Learners will develop the knowledge and skills relating to security, detection, information and attack management in order to protect an organisation in the event of a cyber security attack.		
<b>Unit level</b>	7		
<b>Unit code</b>	K/618/7845		
<b>GLH</b>	100		
<b>Credit value</b>	20		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the principles of cyber security	1.1 Explore the types of cyber-attacks that exist 1.2 Analyse the implications to an organisation of having a cyber attack 1.3 Explain the organisational policies and procedures which need to be in place to protect against cyber security attacks 1.4 Explore the benefit of monitoring users, devices and activity on a network	1M1 Examine the process of creating a cyber security culture in an organisation	1D1 Analyse how home working can increase the risks of a cyber security attack
2. Understand the importance of user awareness	2.1 Analyse the importance of training staff on cyber security 2.2 Examine methods and content needed for training staff on cyber awareness 2.3 Evaluate the processes used to keep up to date with emerging cyber trends	2M1 Analyse how users contribute to cyber security risks	2D1 Create a sample user information document on the current threats and protection methods to organisations

<p>3. Understand cyber security protection methods</p>	<p>3.1 Analyse the purpose of implementing cyber security measures across an organisation</p> <p>3.2 Evaluate the methods used to protect systems</p> <p>3.3 Analyse how to deploy security protection methods</p> <p>3.4 Analyse how to configure system settings to increase security</p> <p>3.5 Analyse the considerations to make when recommending cyber security protection methods</p>		
<p>4. Understand cyber security testing</p>	<p>4.1 Evaluate the importance of completing vulnerability testing on a network</p> <p>4.2 Evaluate the importance of scheduling simulated attacks on a network</p> <p>4.3 Explain how to configure and test application and network security</p>	<p>4M1 Analyse the impact cyber security testing has on an organisation's cyber security rating</p>	
<p>5. Understand how to manage a cyber-attack</p>	<p>5.1 Analyse the steps to take when there are indicators of a cyber attack</p> <p>5.2 Explain the communication methods used to inform stakeholders of a potential or actual cyber attack</p> <p>5.3 Examine the process of completing a root cause analysis</p> <p>5.4 Evaluate changes in cyber security working practices as a result of findings</p>		

6. Be able to manage cyber security in an organisation	6.1 Install protection methods on end point devices 6.2 Setup and configure group policies on software 6.3 Setup and configure monitoring software on a network		6D1 Create a documented plan on how to manage a cyber-attack in an enterprise environment
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## Indicative Content

### 1. Understand the principles of cyber security

- Learners should be aware of the range of cyber-attacks that exist and the differences and characteristics of each.

Types of cyber-attacks include, but not limited to:

- Denial of Service Attack (Dos)
- Brute force attack
- Credential surfing
- Social engineering
- Hacking
- Malware
- Phishing
- Spoofing
- Ransomware
- Spamming
- Implications:
  - Financial
  - Economic
  - Reputational
  - Legal
- Organisational policies and procedures:
  - Acceptable Use of ICT Policy
  - Email Policy
  - Mobile Device Policy
  - Bring Your Own Device Policy
  - Data Protection Policy
  - Information Security Policy
  - Induction Process
  - Training Process
  - Cyber Security Policy
- Benefit of monitoring users, devices and activity on a network
  - Identify trends
  - Identify unknown devices
  - Manage missing patches
  - Manage data access
  - Manage user access rights
  - Deploy group policies

- Cyber security culture: Learners should understand the importance of an organisation in developing a cyber security culture where by staff are not afraid to admit when they have made a mistake and that they highlight any concerns relating to cyber security such as a suspicious email.
- Home working risks
  - Non-compliance
  - Unauthorised access
  - Using workarounds
  - Using personal devices
  - Wi-Fi security and access

## **2. Understand the importance of user awareness**

- Staff Training
  - Content to be covered to include overview of cyber security
  - Include types of cyber security attacks
  - Include what to do in the event of spotting an attack
  - Content to be regularly updated
  - Test knowledge of those completing the training
  - Opportunity for staff to highlight concerns
  - Regular scheduled refresher training
- Impact
  - Increase knowledge on cyber security
  - Reduced likelihood of a cyber attack
  - Allows staff to identify a potential attack
  - Creates a cyber security culture
  - Ensure CPD for staff
- Importance
  - Vital to ensure organisation is prepared as users are your main protection method
  - Staff need to be trained on how to identify a cyber-attack and what to do in the event of spotting one
- Keeping up to date
  - Blogs
  - Articles
  - Websites
  - Social networks
  - Supplier information
  - Newsletters
  - White papers
  - Networking with others
  - Events

## **3. Understand cyber security protection methods**

- Purpose: To ensure an organisation is fully protected and has a range of measures in place in the event of a cyber security attack or potential attack. To protect hardware, software, networks and user's activity.
- Methods
  - Firewalls

- End point protection software
- Two factor authentication
- Antivirus and Malware protection
- VPN
- Policies
- Training
- Deploy methods:
  - Remotely including
  - Face to face
  - Patch management
  - Image deployment
- Configure system settings
  - User access
  - Exceptions
  - Alerts
  - Reports
  - Dashboards
- Recommending cyber security protection methods:
  - Cost
  - Health and safety
  - Implementation requirements
  - Staff and other resources required
  - Device compatibility
  - Supplier due diligence
  - Risks including Data Protection

#### **4. Understand cyber security testing**

- Vulnerability testing:
  - To highlight critical risks
  - To provides areas for improvement
  - To identify any security weaknesses or back doors
- Scheduling simulated attacks:
  - To test user's awareness and knowledge
  - To prepare the organisation in the event of a real attack
  - To allow an organisation to gage cyber secure assurance level
- Configure and test application and network security:
  - Identify suitable test software and methods to use
  - Configure solutions to ensure all business technology is covered i.e. servers, cloud base interfaces, emails, domains, end point devices etc.
  - Run scheduled simulated attacks
  - Run vulnerability and penetration testing
  - Setup analytics and reporting mechanisms for all solutions
  - Regularly check any concerns highlighted
- Cyber security rating:

- Cyber security testing will prepare an organisation and allow them to introduce appropriate secure protection methods. These will protect the organisation when being provided with a cyber security rating.

## 5. Understand how to manage a cyber-attack

- Steps to take
  - Identify
  - Protect
  - Detect
  - Respond
  - Recover
- Communication methods
  - Email including mass email
  - Intranet
  - Face to face
  - Telephone
  - SMS
  - Video conferencing software
- Root cause analysis
  - Define the problem
  - Collect data
  - Identify possible causal factors
  - Identify the root cause/s
  - Recommend and implement solutions
- Changes in cyber security working practices as a result of findings
  - Policies
  - Procedures
  - Protection methods
  - Training requirements

## 6. Be able to manage cyber security in an organisation

- Install protection methods on end point devices
  - Create installation file with associated policy
  - Deploy software on a range of end points including laptops, desktops and mobile devices
  - Deployment via software or on each individual device
  - Verifying successful deployment
- Setup and configure group policies on software
  - Identify users to apply policy to
  - Configure policy settings for example exceptions
  - Active policy
  - Deploy or push policy to devices
  - Verifying deployment
- Setup and configure monitoring software on a network
  - Ensure software is suitable for network installation
  - Licence considerations
  - Software functionality and reviews
  - Firewall configuration
  - Administrative access

- Installation using install file
- Connecting data flows and devices

<b>Unit 4 Business Intelligence Systems</b>			
<b>Unit aims</b>	<p>This unit aims to help learners develop an understanding of business intelligence systems and the benefits of using such systems from an organisational point of view.</p> <p>Learners will focus on the key areas within business intelligence systems and develop an understanding of why business intelligence plays a fundamental role in organisational strategic planning.</p>		
<b>Unit level</b>	7		
<b>Unit code</b>	F/618/7852		
<b>GLH</b>	100		
<b>Credit value</b>	20		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes The learner will:</b>	<b>Assessment criteria The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the characteristics of business intelligence systems	1.1 Examine the features of business intelligence systems 1.2 Analyse the difference and inter relationships between: <ul style="list-style-type: none"> <li>• data</li> <li>• information</li> <li>• knowledge</li> </ul> 1.3 Evaluate hosting and storing methods for business intelligence systems 1.4 Explore common problems that can occur when handling data	1M1 Evaluate the benefits of using a cloud-based Business Intelligence System	1D1 Analyse how technologies, processes, and applications are used for business intelligence
2. Understand organisational need for business intelligence systems	2.1 Analyse the use of business intelligence information in organisations 2.2 Evaluate the purpose of business intelligence systems for organisations. 2.3 Assess the benefits of using business	2M1 Evaluate security considerations in relation to business intelligence systems.	

	intelligence software for organisations 2.4 Explore the range of business intelligence solutions available		
3. Understand how business intelligence systems play a key strategic role in organisations	3.1 Explain the processes involved with implementing a business intelligence system 3.2 Evaluate how business intelligence systems facilitate better business planning 3.3 Analyse how Business Intelligence systems support strategic and operational business decision making		3D1 Evaluate the importance for a business to strategically plan the implementation of a business intelligence system
4. Be able to use business intelligence software	4.1 Use modelling tools to document intelligence data 4.2 Develop search criteria for reviewing data 4.3 Create a bespoke business report from data sets 4.4 Develop dashboards to display business data visualisations 4.5 Prepare and clean data from a business intelligence system		

## Indicative Content

### 1. Understand the characteristics of Business Intelligence systems

- Features
  - reporting, analytical processing, analytics, dashboard, data mining, process mining, event processing, performance management, predictive analytics, and prescriptive analytics
- Data: facts that have meaning
- Information: a set of data in context with relevance to one or more people at a point in time
- Knowledge: information that has been retained with an understanding about the significance of that information
- hosting and storing methods
  - on premise

- cloud based
  - platform as a service (PaaS)
  - software as a service (SaaS)
  - infrastructure as a service (IaaS)
- hybrid
- common problems
  - Data entry errors
  - Human errors
  - Bugs and security breaches
  - Data breach

## 2. Understand organisational need for Business Intelligence systems

- Business Intelligence information in organisations
  - support and facilitate better business decision
  - provide analytical analysis on data sets
  - establish trends
  - increase productivity and efficiencies
  - increased visibility of data, process and information
- Purpose
  - reduce costs
  - identify new business opportunities
  - identify inefficient business processes for re-engineering
  - centralise data information
- Benefits
  - faster reporting, analysis or planning
  - accurate reporting, analysis or planning
  - ability to make business decisions.
  - improved data quality
  - improved efficiencies
  - increased competitive advantage
  - ability to make quick business decisions
- Solutions could include:
  - SAP
  - Power BI
  - Oracle
  - Crystal Repots
  - Jasper Reports

## 3. Understand how Business Intelligence systems play a key strategic role in organisations

- Implementation process:
  - Planning
  - Process Design
  - Solution Design
  - Configuration and Customisation
  - Integration
  - Reporting
  - Training & Testing
  - Support
- Business planning:

- Quicker decisions
- Real time information
- Ability to identify trends in data
- Business decision making
  - Financial
  - Operational
  - Resource

#### 4. **Be able to use Business Intelligence software**

- modelling tools could include:
  - Oracle SQL Developer Data Modeler
  - PowerDesigner
- search criteria
  - define and write down your question
  - identify, and keep a record of key words
  - identify keyword synonyms
  - determine a timeframe from your research
- bespoke business report
  - Learners should include a bespoke business report which uses a data set. The report should include a range of data from within the report in order to provide sufficient analysis
- Dashboards: Learners should develop a dashboard to display business data visualisations. The dashboard should include a range of visualisations such as pie chart and bar chart visualisations and use and underlying data set to provide live real-time data functionality.
- Prepare and clean data
  - Retention period
  - Backups
  - Deletion
  - Data classification

<b>Unit 5 Independent Project</b>			
<b>Unit aims</b>	This unit aims to provide learners with the opportunity to undertake an independent project. In the unit learners can utilise the knowledge and understanding gained in previous units and from other areas of learning and experience to independently manage and complete a practical project. Learners will showcase the skills learned and their understanding of technologies whilst following formal project management techniques.		
<b>Unit level</b>	7		
<b>Unit code</b>	J/618/7853		
<b>GLH</b>	100		
<b>Credit value</b>	20		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the considerations to make when planning an ICT project	1.1 Identify a problem which an ICT system can solve 1.2 Evaluate the legal, moral and ethical issues relating to ICT projects 1.3 Analyse the principles, theories and practices for planning ICT solutions 1.4 Explore the implications of common problems that can occur when planning an ICT project 1.5 Explore the methods used in defining and assessing criteria of a systems project	1M1 Evaluate the benefits and role of computer-based systems within an organisation.	1D1 Research and evaluate a potential solution for an additional problem which is more complex
2. Be able to plan an independent ICT project	2.1 Analyse the key steps required for executing a project 2.2 Apply project management principles to a project 2.3 Create a formal project plan 2.4 Evaluate the different roles within a project team 2.5 Use project management software 2.6 Create timelines and charts to display the project plan and associated information		

3. Be able to manage and complete an ICT project	3.1 Deploy best practice development processes 3.2 Communicate technical information to project stakeholders 3.3 Use tools for the planning and implementation of the project 3.4 Successfully develop a solution for an ICT problem 3.5 Communicate findings to project stakeholders		3D1 Create a business case for the suggested development
4. Be able to test your development	4.1 Create a test plan based on initial user requirements 4.2 Successfully test your solution 4.3 Implement changes from user testing process	4M1 Create end user documentation for an ICT development	
5. Be able to evaluate your development	5.1 Complete a post project evaluation		

## Indicative Content

### 1. Understand the considerations to make when planning an ICT project

- Problems
  - Process driven
  - Procedural driven
  - Bottle necks occurring
  - Expensive resources
  - No visibility of data
  - Large amount of data entry required
  - Data duplication
- legal, moral and ethical issues
  - Invasion of personal privacy
  - Breach of Data Protection/GDPR
  - Collection of unauthorised data for example cookies
  - Automated decision making
  - Intellectual property rights
  - Copyright restraints
- Principles:
  - Determine position
  - Prioritise objectives
  - Develop a plan
  - Execute and manage the plan
  - Review and revise the plan
- Theories

- Project Management Book of Knowledge (PMBOK)
- PRINCE 2
- Practices
  - Document requirements
  - Use a project brief
  - Establish a clear project plan
  - Clarify roles and responsibilities
  - Communicate early and often
  - Monitor task progress
- Implications
  - Project failure
  - Project overdue
  - Missed deadline
  - Increased cost
  - Missed deliverables
  - Unsuccessful project
- Defining and assessing criteria
  - Requirements gathering from stakeholders
  - Documented conversations and meetings with stakeholders
  - Fact finding / investigation
  - Feasibility
  - Confirm all points with stakeholders to ensure clear understanding of need
- Computer based systems within an organisation:
  - Benefits: Increased efficiency, increased productivity, reduced costs, provides additional functionality, increases data security
  - Role: To provide an interconnected solution for a business problem, the system should be scalable and use friendly
- Complex problems are problems which
  - Provide additional advanced functionality
  - Use additional resources such as linked databases
  - Required additional development above and beyond standard functionality
  - Use of API's or other systems within the project

## **2. Be able to plan an independent ICT project**

- Key steps for executing a project
  - Create a vision for the project
  - Define a focused strategy
  - Obtain stakeholder buy in
  - Align the objectives of principals
  - Manage priorities
  - Provide team support and training
  - Assign and arrange actions
  - Apply project management principles to a project
  - Create a formal project plan
  - Use project management tools
  - Create timelines and visual charts to display project updates
- Project management principles
  - Formal project management structure

- Invested and engaged project sponsor
- Clear and objective goals and outcomes
- Documented roles and responsibilities
- Strong change management
- Risk management
- Mature value delivery capabilities
- Performance management baseline
- Project plan
  - Defines how a project is going to be managed
  - Scope, goals, budget, timeline and deliverables of a project
  - Essential for keeping a project on target and on time
- Project team roles
  - Project manager
  - Project team member
  - Project sponsor
  - Executive sponsor
  - Business analyst
- Project management software:
  - Microsoft Project
  - Monday.com
  - Trello

### **3. Be able to manage and complete an ICT project**

- Best practice development processes
  - Simple code
  - Ongoing testing
  - Consistency
  - Peer review
  - Estimates realistically
- Communicating technical information
  - Appropriate language according to stakeholder understanding/needs
  - Suitable communication method
  - Correct amount of information depending on needs
- Project Planning Tools
  - Gantt chart
  - Logic Network
  - PERT chart
  - Product Breakdown Structure
  - Work Breakdown Structure
- Business case
  - Background and scope of the project
  - Link to business aims and objectives
  - Expected business benefits
  - The different options considered (including rejected option and rationale)
  - Expected costs
  - Risk analysis

### **4. Be able to test your development**

Learner should be aware of the contents with a test plan and how a test plan is directly referenced to user and technical requirements.

- Test plan
  - test coverage
  - test methods
  - test responsibilities
- Testing should include:
  - Test description
  - Test reference number
  - Scope
  - Resources
  - Expected outcome
  - Actual outcomes
  - Test passed or failed
  - Suggested resolution
- End user documentation
  - Consideration of disability, accessibility and different learning style in training materials and delivery
  - Easy to follow instructions
  - Update cycle in line with software development (document management)

## **5. Be able to evaluate your development**

- Post project evaluation
  - Summary of project outcomes
  - Budget vs. actual in relation to costs
  - Planned vs. actual in terms of outcomes
  - Analysing the actual, as against the projected estimates in relation to
    - time
    - cost
    - quality
  - Benefits gained from the development

<b>Unit 6 Agile Transformation</b>			
<b>Unit aims</b>	This unit aims to provide learners with the knowledge and uses of agile development within business environments. Learners will have the opportunity to explore the fundamental process of agile development including the methodologies used. Learners will develop the skills and knowledge to be able to embed and use agile approaches in a working environment.		
<b>Unit level</b>	7		
<b>Unit code</b>	L/618/7854		
<b>GLH</b>	50		
<b>Credit value</b>	10		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the features of agile working	1.1 Explain the role of agile working in business. 1.2 Evaluate agile methodologies used in a business environment 1.3 Analyse the deliverables from agile methodologies 1.4 Evaluate the benefits of using agile working for an organisation 1.5 Examine the considerations to make when using an agile working environment 1.6 Analyse roles in an agile environment		
2. Understand agile transformation in a business environment	2.1 Analyse the difference between agile adoption and agile transformation 2.2 Evaluate the characteristics of agile working and development 2.3 Examine the key stages of agile transformation 2.4 Analyse the processes needed to embed agile working within an organisation	2M1 Evaluate how agile working is used in computing projects and technology developments	

	<p>2.5 Explore the agile practices to use when transforming a business environment</p> <p>2.6 Evaluate methods of applying agile practices</p>		
3. Understand the use of an agile transformation strategy	<p>3.1 Analyse the importance of having an agile transformation strategy</p> <p>3.2 Evaluate the impact of using an agile transformation strategy</p> <p>3.3 Describe the components of an agile transformation strategy</p> <p>3.4 Explain how to ensure a strategy is embedded and monitored in an organisation</p>		3D1 Create an organisational agile transformation roadmap
4. Understand the importance of continuous change and improvement	<p>4.1 Assess the benefits of continuous change and improvement for an organisation</p> <p>4.2 Evaluate the methods used to ensure continuous improvement</p> <p>4.3 Analyse how agile working contributes to continuous improvement</p> <p>4.4 Evaluate how to manage resistance to change</p>	4M1 Evaluate how agile approaches are used to manage change in an organisation	4D1 Determine and justify how to measure the impact of improvements from agile working on an organisation

## Indicative Content

### 1. Understand the features of agile working

- Agile methodologies
  - Kanban
  - Scrum.
  - Extreme Programming (XP)
  - Crystal
  - Lean Development
- Agile deliverables
  - Initiation
  - Planning and Execution
  - Implementation
  - Retrospectives

- Release Management
- Artifacts
  - Product backlog
  - Sprint backlog
  - Product increment
- Benefits of using agile working for an organisation
  - High quality product
  - Increased customer satisfaction
  - Greater controls
  - Improved project predictability (outcome)
  - Reduced risks (risk management)
  - Increased flexibility
  - Collaboration
  - Constant focus on business value/value to business
  - Appropriate level of quality and standards
- Considerations
  - Staff knowledge and experience
  - Processes
  - Tools and resources
  - Adoption and implementation
  - Staff buy in
  - Change management
- Roles
  - Product owner
  - Team lead/scrum master
  - Development members
  - Stakeholders
  - Additional roles as needed

## **2. Understand agile transformation in a business environment**

- Agile adoption: requires changing the way a team does their work
- Agile transformation: changes the way an organisation gets work done
- Characteristics
  - Development releases and iterations
  - Working tested software delivered
  - Continuous planning and improvement
  - Relative estimation
  - Continuous testing throughout
  - Excellent levels of communication
- Agile transformation key stages
  - Situation reporting
  - Transformation goals
  - Agile champions
  - Systems alignment
  - Agile practices
  - Rollout strategy
  - Agile training
  - Transformation artifacts
  - Team coaches

- Measure and adapt
- Embed agile working
  - Communication
  - Planning
  - Implementing
  - Reviewing
- Agile practices when transforming
  - Define agile structures
  - Build an agile organisation culture
  - Ensuring excellent internal communication
  - Align with strategic vision
  - Communicating the benefits
- Methods of applying agile practices
  - Backlogs
  - Sprints
  - Cross functional teams
  - Scrum meetings
  - Iterative and incremental development
  - Use case

### **3. Understand the use of an agile transformation strategy**

- Agile transformation strategy
  - creates a vision and direction
  - establishes clear goals
  - ensures accountability
  - ensure alignment to company vision
- Impact
  - better performance
  - clear focus and planning
  - more efficient workforce
  - maximises the output
  - better utilisation
- Components
  - Vision
  - Mission statement
  - Core values
  - Link to corporate strategy
  - SWOT analysis.
  - Goals
  - Aims and objectives
  - Actions
  - Roles and responsibilities
- Embedding and monitoring
  - Communication
  - Transparency
  - Accountability
  - Autonomy
  - Planning and implementing (Project plan and implementation plan)

- Post project evaluations
- Regular reviews
- Roadmap should include:
  - major steps or milestones
  - the input of stakeholders
  - visual representatives

#### **4. Understand the importance of continuous change and improvement**

- Benefits
  - Improved product quality
  - Increased efficiency and productivity across teams
  - Decreased costs for the organisation
  - Potential reduction in waste
  - Increased employee satisfaction
  - Increase in teamwork across the organisation
  - Increased customer satisfaction
- Methods
  - W5 (Who, What, Where, When and Why)
  - PDCA (Plan, Do, Check, Act)
  - Benchmarking
  - Cause and effect
  - Focus groups and forums
  - 360 feedback
  - Field analysis
  - Flowcharts
- Resistance to change
  - Engage and communicate
  - Implement in stages
  - Ask for feedback
  - Transparent communication
  - Communicate changes effectively
  - Involve a range of staff
  - Ask questions
- Manage change
  - Change management and change requests
  - Better results
  - Incremental changes
  - Promotes collaboration and interaction
- Measure impact
  - Stakeholder satisfaction
  - Monitor outcomes
  - Establish and monitor KPI's
  - Impact metrics

<b>Unit 7 Enterprise Resources Planning Systems (ERP Systems)</b>			
<b>Unit aims</b>	This unit provides learners with the knowledge and understanding of Enterprise Resource Planning (ERP) Systems. Learners will learn system principles, their use and the benefits they can bring to an organisation. Learners will also focus on the cost, planning and training associated with implementing and running these systems in an organisation. This unit will cover professional practice and the role of ethics and codes of conduct in relation to computing systems.		
<b>Unit level</b>	7		
<b>Unit code</b>	R/618/7855		
<b>GLH</b>	50		
<b>Credit value</b>	10		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the characteristics of Enterprise Resource Planning (ERP) systems	1.1 Analyse the purpose of using ERP systems 1.2 Evaluate the principles of an ERP system 1.3 Explore the features within an ERP system 1.4 Analyse the difference between ERP and management information systems (MIS)		1D1 Analyse how ERP systems are used to increase productivity and efficiencies within manufacturing environments
2. Understand organisational benefits of Enterprise Resource Planning (ERP) systems	2.1 Analyse the management uses of ERP systems in organisations 2.2 Assess the benefits to organisations of using ERP systems 2.3 Explore the range of ERP software available to organisations 2.4 Evaluate the costs associated with implementing ERP systems	2M1 Create a user requirements document for an ERP system	

<p>3. Be able to plan the implementation of Enterprise Resource Planning (ERP) systems</p>	<p>3.1 Use tools to scope a system design and requirements</p> <p>3.2 Analyse quality assurance techniques used when implementing ERP systems</p> <p>3.3 Evaluate the risks associated with implementing ERP systems</p> <p>3.4 Assess the techniques used to manage associated risks</p> <p>3.5 Test the functionality of an ERP system</p> <p>3.6 Analyse training and support requirements for ERP systems</p>	<p>3M1 Create a test plan for an ERP system</p>	<p>3D1 Evaluate the importance of strategically planning the implementation of an ERP system in an organisation.</p>
<p>4. Understand ethics and codes of conduct in Computing Systems</p>	<p>4.1 Analyse the difference between ethics, ethical behaviour and ethical decision making</p> <p>4.2 Evaluate the considerations to make when working with third party providers</p> <p>4.3 Analyse the roles and responsibilities of IT professionals in organisations</p> <p>4.4 Evaluate the legislative and regulatory obligations for ICT environments</p>		

## Indicative Content

### 1. Understand the characteristics of Enterprise Resource Planning (ERP) systems

- Purpose
  - Increase organisational efficiency
  - Manage business functions in a centralised system
  - Commonly used by organisations in the supply chain for manufacturing and distribution
- Principles of an ERP system
  - Centralised process
  - Collect data into one centralised database
  - Accessible by all teams in the organisation
- Features

- Financial management
- Business intelligence
- Customer Relationship Management
- Human Resources
- Supply Chain Management
- ERP and management information systems (MIS)
  - MIS is used for general management and use of information, helps to store and organise data from various sources and runs reports.
  - ERP is used to plan and automate business processes. Can be used to predict certain outcomes and take appropriate action/decision
- Manufacturing environments
  - Cost reduction
  - Proactively manage operations
  - Predict requirements
  - Prevents disruptions
  - Helps make decisions quicker

## **2. Understand organisational benefits of Enterprise Resource Planning (ERP) systems**

- Management use
  - Decision making
  - Report building
  - Trend analysis
  - Stock management
  - Cost control
  - Budget control
- Benefits
  - Real time information
  - Increased data security
  - Business continuity
  - Increase visibility of information
  - Use of dashboards and reporting
  - Ability to drill down into information
- ERP software
  - Microsoft Dynamics
  - SAGE
  - SAP
  - Oracle
- Costs
  - Initial implementation/development
  - Bespoke requirements
  - Change requests
  - Testing
  - User licenses
  - User training
  - Ongoing support/external supplier helpdesk
- User requirements document
  - Include a range of users representing all departments of a business
  - Role of stakeholders
  - Detailed specific and measurable requirements with an expected outcome

- The rating of the requirement i.e. must have, nice to have

### **3. Be able to plan the implementation of Enterprise Resource Planning (ERP) systems**

Tools to scope a system design and requirements

Quality assurance techniques

- Risks
  - Data protection
  - Reputation of appointed supplier
  - Value for money
  - Requirements being achieved
  - Deliverables as expected
  - Time including deadlines
  - Cost / budget over spend
- Manage risks
  - Identify risk
  - Assess risk
  - Control risk
  - Review controls
- Test functionality
  - User testing
  - Beta testing
  - User experience testing
  - Unit testing
  - Integration testing
  - User acceptance
  - Usability testing
- Training and support requirements
  - Training plan and contents
  - Training requests
  - Training needs analysis
  - User competency testing
  - Refresher training
  - Support agreement/contract
  - Service level agreements
  - Suppliers
  - Supplier/contract management
- Test plan
  - test coverage
  - test methods
  - test responsibilities
- Testing should include:
  - Test description
  - Test reference number
  - Scope
  - Resources
  - Expected outcome
  - Actual outcomes
  - Test passed or failed
  - Suggested resolution

- Strategic plan
  - System should be aligned with business plan and corporate plan
  - Decisions should be made according to the strategic vision of the business
  - System should have a roadmap and clear development cycles embedded with the company vision

#### 4. Understand ethics and codes of conduct in Computing Systems

- Ethics
  - Privacy
  - Permission and consent
  - Digital theft and violations
- Ethical behaviour examples
  - Monitoring emails
  - Watching user activity
  - Accessing users accounts
  - Seeking appropriate permission
- Ethical decision-making steps
  - Assessment
  - Alternatives
  - Analysis
  - Application
  - Action
- Working with third party providers
  - Reputation
  - Risks
  - Reliance
  - Due diligence
  - Expectations
  - Communications
  - KPI's
  - Service level agreements
  - Deadlines
- Roles include, but not limited to:
  - Head of IT
  - Head of Cyber Security
  - IT Manager
  - IT Support Assistant
  - Software Developers
  - Cyber Security Analyst
  - Application Developer
- Legislative and regulatory obligations
  - Data Protection Act/ GDPR Regulations
    - Data subject
    - Data processor
    - Data controller
    - Data breach
  - Copyright Designs and Patents Act
  - Computer Misuse Act
  - Fraud Act
  - Network and Information Systems Regulations
  - Payment Card Industry Data Security Standard

- Health and Safety at Work
- Cyber security obligations
- Cyber attacks

<b>Unit 8 Mobile Application Development</b>			
<b>Unit aims</b>	This unit aims to provide learners with an advanced understanding of the processes involved with developing and launching a mobile application to meet user requirements. Learners will have the opportunity to plan, develop and launch a mobile application of their choice to solve a problem. This unit will also focus on testing across all stages of the lifecycle.		
<b>Unit level</b>	7		
<b>Unit code</b>	Y/618/7856		
<b>GLH</b>	50		
<b>Credit value</b>	10		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand mobile application development	1.1 Evaluate the benefits of mobile applications for personal and business use 1.2 Analyse how mobile applications solve problems 1.3 Evaluate Software Development Lifecycles (SDLC) appropriate to mobile application development 1.4 Evaluate device capability and performance considerations 1.5 Create functional user and technical specifications 1.6 Assess network communication methods and considerations 1.7 Investigate data persistence methods	1M1 Evaluate the developments of mobile applications in recent years	1D1 Evaluate the difference between application operating systems development environments

2. Be able to design a mobile application	2.1 Create a wireframe design for an application user interface (UX) 2.2 Evaluate the techniques used to maximise user interaction 2.3 Assess the development environments used in mobile application development		2D1 Evaluate accessibility considerations for a mobile application
3. Be able to use mobile applications development environments to create a mobile application	3.1 Use a development environment and associated tools 3.2 Create a user interface with navigation 3.3 Use object oriented programming to create a mobile application 3.4 Use libraries to develop user functions in a mobile application 3.5 Create Basic Views, Picker Views, List Views, and Image Views 3.6 Create an integration with external services		
4. Be able to test a mobile application	4.1 Investigate the methods used in mobile application testing 4.2 Evaluate how to measure the success and impact of a mobile application 4.3 Test a mobile application and make improvements where necessary	4M1 Create a test plan for a mobile application	

## Indicative Content

### 1. Understand mobile application development

- Learners should be aware of the benefits mobile applications bring to both personal and business use in terms of functionality, efficiency, productivity and creativity. These could include:
  - Personal
    - Provides access to information quickly
    - Provides additional functionality
    - Networking opportunities
    - Learn about new products/services
    - Products an easier process often replacing paper i.e. event registration
  - Business

- Added value to existing service
- Alternative methods of sales and/or promotion
- Direct method to connect better with customers
- Build a stronger brand
- Increased profits
- Reach out to other demographics
- Understand user behaviour
- Learners should be aware how mobile applications are primarily used to solve every day problems and how these problems are eliminated from the use of a mobile application. Learners should also understand the rationale for a business to use an application to solve a problem and the process used to decide this.  
Problems could include:
  - Employees working remotely not able to clock in as they are not on site
    - This could be solved by the use of a mobile application
  - Finance manager is unable to access the company accounts when on the move
    - This could be solved by the use of a mobile application
- Software Development Lifecycles (SDLC)  
Learners should be aware of the range of SDLC's used for mobile application development and the characteristics associated with each model including the stages of each. Learners should also be aware the differences including constraints associated between different model types.  
Models include:
  - Waterfall
  - Agile
  - Iterative
  - Spiral
  - V-model
  - Incremental
  - Scrum
  - Kanban
- Device capability and performance considerations:
  - Physical storage
  - Cloud storage
  - Database access
  - Processor speed
  - Operating system version
  - Accessibility
  - Battery life
- Functional user and technical specifications to include:
  - Specific user requirements
  - Each requirement referenced
  - Resources included
  - Expected functionality
  - Network or data flow design
- network communication methods and considerations:
  - Internet connection methods such as 3G, 4G and 5G or Wi-Fi
  - Network connection methods such as Bluetooth, NFC, RFC
  - Working offline if no internet connection is available
  - Cost of running a network solution
  - Database connection methods

- Security and administrative access
- Data persistence methods
  - Variables
  - Constants
- Developments of mobile applications: learners should be aware of the mobile app stores started and how they have developed today, this should include when the platforms launched, the number of initial applications available vs. the number of applications available today. The increase of smart phone devices being made, supply vs. demand.
- Learners should be aware of the main development environments used to develop a mobile application and the considerations to make in selecting a development environment of if a Hybrid application would be more appropriate
  - IDE Development environments:
    - Apple X Code
    - Android Studio

## 2. Be able to design a mobile application

- Learners should be aware of how to design a mobile application and the various stages within the design of a mobile application. Learners should be aware of the importance of this stage in development and how planning is key the applications success.
- Wireframe design for an application user interface (UX) should include:
  - Icons
  - Navigation
  - App layout
  - Flow between screens

Learners should be aware that a wireframe does not include fonts, colours or other 3 dimensional elements.

- Maximise user interaction:
  - Easy navigation across the applications
  - Search functionality
  - Easy to understand and learn
  - Minimal instructions required
  - Quick loading times
  - No error message or bad links
- Development environments used: Learners should be aware of the features and functionality within the following development environments. This should include libraries and simulators.
  - IDE Development environments:
    - Apple X Code
    - Android Studio
- Accessibility considerations for a mobile application:
  - Fonts
  - Colours
  - Zoom
  - Readability
  - Scalability
  - Text to voice
  - Disability and/or health conditions
  - Learning styles

### 3. Be able to use mobile applications development environments to create a mobile application

- Development environment and associated tools
- User interface with navigation, to include:
  - Colours
  - Fonts
  - Image locations
  - Graphics
  - Navigation
- Object oriented programming:
  - Data types should include:
    - String (or str or text)
    - Character (or char)
    - Integer (or int)
    - Float (or Real)
    - Boolean (or bool)
  - Variables: To label and store data in memory to be used throughout the programme. Learners should be able to understand the difference between variables and constants.
  - Keywords: Learners should know the importance of understanding that some keywords cannot be used and are 'reserved keywords' which will vary between programming language, for example 'PRINT, INPUT'.
  - Logical and Arithmetical Operators: arithmetical operators work with numbers (e.g., integers, floats) while logical operators work with Boolean values (true, false)
  - Conditions in programming (conditional statements):
    - If statement
    - If-Else statement
    - Nested If-else statement
    - Switch statement
  - Explain the use of loops in programming:
    - Entry controlled loop
    - Exit controlled loop
    - While
    - Do while
    - For
  - Numbers, Characters and Arrays:
    - Int
    - Char
    - Double
    - Declaring array and assigning values
    - Print
  - Functions and methods:
    - Set method
    - Get method
    - Print
    - Main
  - Input and Output Operations:
    - Single character input and output
    - String input and output
- Libraries: Learners should be aware that libraries exist within the IDE and the benefits associated with using pre-defined libraries for development work
- Integration with external services, this could include:

- Database
- Map service
- Other mobile application
- Website
- Social media
- Analytical software

#### 4. Be able to test a mobile application

- Mobile application testing methods:
  - System testing
  - Unit testing
  - Integration testing
  - Functionality vs non-functional testing
  - Acceptance testing
  - Usability testing
  - Security testing
  - White box testing
- Measure success and impact:
  - Utilisation rates
  - Interactions
  - Bounce rate
  - User flow
  - Page view time
  - Number of registered users
  - Daily views
  - Trends
  - Link to sales and profits
  - Number of sales completed using application vs. other methods
  - Return on investment (ROI)
  - Customer feedback including surveys
- Test plan
  - test coverage
  - test methods
  - test responsibilities

Learner should be aware of the contents with a test plan and how a test plan is directly referenced to user and technical requirements. A test plan should include:

- Test description
- Test reference number
- Scope
- Resources
- Expected outcome
- Actual outcomes
- Test passed or failed
- Suggested resolution

<b>Unit 9 Data Analysis and Big Data</b>			
<b>Unit aims</b>	This unit will focus on the importance and uses of big data in today's world. This will include how data analysis and big data can be used to provide greater knowledge in certain areas, for example with crime detection and police systems. Learners will also focus on the considerations that need to be made in relation to storing, searching and reporting on big data sets.		
<b>Unit level</b>	7		
<b>Unit code</b>	D/618/7857		
<b>GLH</b>	50		
<b>Credit value</b>	10		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> The learner will:	<b>Assessment criteria</b> The learner can:		
	Pass	Merit	Distinction
1. Understand the fundamentals of big data	1.1 Analyse the purpose of big data 1.2 Analyse the sources of big data 1.3 Evaluate the benefits of using big data sets 1.4 Analyse the different uses of big data sets 1.5 Analyse the problems associated with using big data 1.6 Analyse the ethical concerns associated with using big data for decision making 1.7 Define the terms: <ul style="list-style-type: none"> <li>• volume</li> <li>• variety,</li> <li>• velocity</li> <li>• veracity of data</li> </ul>	1M1 Evaluate how big data impacts on personal life and decision making	
2. Understand the structure, size and security of big data	2.1 Differentiate structured and unstructured data 2.2 Evaluate data storage methods and their characteristics 2.3 Analyse the problems associated with using and storing big data	2M1 Evaluate the importance of cyber security in relation to big data	2D1 Evaluate the laws and regulations that apply to data processing and storage

	<p>2.4 Investigate the concepts of distributed computing with big data</p> <p>2.5 Analyse the risks associated with big data</p>		
<p>3. Understand the characteristics of data analysis</p>	<p>3.1 Analyse the importance of analysing data</p> <p>3.2 Evaluate how to establish data trends in big data sets</p> <p>3.3 Produce analytical and statistical representations of data</p>		<p>3D1</p> <p>Evaluate the importance of exception reporting when analysing big data</p>
<p>4. Be able to present information from large data sets</p>	<p>4.1 Analyse methods used for presenting large data sets</p> <p>4.2 Explain target audience requirements</p> <p>4.3 Prepare and present a summary presentation of information from large data sets</p> <p>4.4 Identify areas for improvement based on data analysis</p>		

## Indicative Content

### 1. Understand the fundamentals of big data

- purpose
  - to analyse data
  - systematically extract information from data sets that are too large to be dealt with by traditional data-processing methods
  - used to address problems you wouldn't have been able to tackle before
- sources
  - Transactional data
  - Crowdsourced data
  - Social data
  - Search data
  - Machine data
- benefits
  - Optimise costs
  - Improve efficiencies
  - Innovation
  - Greater sales insights
  - Time reductions
- uses
  - Decision making

- Analysis
- Fraud detection
- Advertising
- Sales offering
- Location tracking
- Precision medicine
- problems
  - Accuracy
  - Consent and permissions
  - Relevancy
  - Validity
  - Lack of understanding
  - Compliance
  - Data complexity
  - Running costs
  - Complex systems
- ethical concerns
  - Ownership
  - Openness
  - Transparency
  - Consent
  - Privacy
  - Currency

## 2. Understand the structure, size and security of big data

- structured data: clearly defined and searchable
- unstructured data: usually stored in its native format
- data storage methods
  - Cloud storage
  - Warehouse storage (Data farm)
  - Local storage (on device including servers)
- problems
  - Infrastructure
  - Cost
  - Security
  - Corruption
  - Accessibility
  - Compatibility
  - Backup
- distributed computing
  - availability
  - consistency
  - durability
  - idempotency
  - persistence
- risks
  - Security
  - Unorganised data
  - Data storage

- Retention
- Privacy
- Destruction / deletion

### **3. Understand the characteristics of data analysis**

- importance of analysing data
  - to understand organisational problems
  - to explore data
  - to establish trends
  - to predict future data
  - to organise, interpret and present
  - to provide context to data
- establish data trends
  - Trend lines
  - Up, down and sideways
- analytical and statistical representations of data
  - Reports and plans
  - Data summary using tables and keys
  - Visualisation including line graphs, histograms, pie charts and bar charts

### **4. Be able to present information**

- methods
  - Presentation
  - Video
  - Infographic
  - Report
- target audience
  - Age
  - Gender
  - Education
  - Industry
  - Interests
  - Influence
  - Marital Status.
- areas for improvement based on data analysis
  - Improvement based on factual information obtained from data analysis

<b>Unit 10 Networking and Infrastructure Development</b>			
<b>Unit aims</b>	This unit aims to provide learners with the knowledge and understanding of networks used within computing environments and the importance of ensuring a network is designed appropriately, is scalable and fit for purpose. Learners will also learn the considerations that must be made when designing an infrastructure environment including the hardware, software and communication elements within the structure.		
<b>Unit level</b>	7		
<b>Unit code</b>	H/618/7858		
<b>GLH</b>	50		
<b>Credit value</b>	10		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the features of network infrastructures	1.1 Analyse the importance of having a robust network infrastructure 1.2 Evaluate network infrastructure design and design plans 1.3 Evaluate types of network infrastructures 1.4 Analyse the hardware used within a network infrastructure 1.5 Explain the types of software used within a network infrastructure 1.6 Evaluate network communications elements 1.7 Describe cabling types used within a network solution	1M1 Evaluate the importance of ensuring a network is appropriate, scalable and fit for purpose	1D1 Create a draft network infrastructure design plan for a corporate environment

<p>2. Understand network infrastructure security</p>	<p>2.1 Analyse the security considerations associated with networking and infrastructure</p> <p>2.2 Evaluate the use of anti-virus and firewalls in enterprise networks</p> <p>2.3 Investigate the use of surveillance and monitoring systems to protect network environments</p>	<p>2M1 Evaluate the importance of controlling end point devices in a network infrastructure</p>	
<p>3. Understand wireless network infrastructures</p>	<p>3.1 Describe the use of wireless networks in enterprise environments</p> <p>3.2 Explain the risks associated with using wireless networks</p> <p>3.3 Evaluate wireless network protection methods</p> <p>3.4 Analyse how to design a modern hybrid working environment</p>		
<p>4. Understand how to support and maintain a network infrastructure</p>	<p>4.1 Evaluate the use of external network suppliers</p> <p>4.2 Assess methods used for installing, supporting and maintaining a network</p> <p>4.3 Explain how to support a network using remote access methods</p>		<p>4D1 Evaluate methods and techniques used to support external providers to achieve results</p>

## Indicative Content

### 1. Understand the features of network infrastructures

- Importance of having a robust network infrastructure:
  - Enable service delivery
  - Minimal disruption to service
  - Ensure network uptime
  - Business continuity plans
  - Scalability
- Network infrastructure design and design plans
  - Structure and layout of the network

- Hardware elements identified such as servers, drives, routers, switches, cabling and ports
- Clear documentation with visual diagrams
- Network security architecture
- IP addressing structure
- Types of networks:
  - Personal Area Network (PAN)
  - Local Area Network (LAN)
  - Wireless Local Area Network (WLAN)
  - Campus Area Network (CAN)
  - Metropolitan Area Network (MAN)
  - Wide Area Network (WAN)
  - Storage-Area Network (SAN)
  - System-Area Network (also known as SAN)
  - Passive Optical Local Area Network (POLAN)
  - Enterprise Private Network (EPN)
  - Virtual Private Network (VPN)
  - Hybrid
- Hardware
  - Hub
  - Switch
  - Router
  - Bridge
  - Gateway
  - Modem
  - Repeater
  - Access Point
  - Cabling
  - Network interface cards
  - Server
- Software
  - Firewall
  - End point protection
  - Network monitoring software
  - Antivirus and malware protection
  - Hyper-V
  - Remote desktop connection
  - Server / network operating system
  - Application software
- Network communications elements
  - TCP/IP model
  - Protocols
    - Transmission Control Protocol (TCP)
    - Internet Protocol (IP)
    - User Datagram Protocol (UDP)
    - Post office Protocol (POP)
    - Simple mail transport Protocol (SMTP)
    - File Transfer Protocol (FTP)

- Hyper Text Transfer Protocol (HTTP)
- Hyper Text Transfer Protocol Secure (HTTPS)
- Cables
  - Unshielded Twisted Pair (UTP) Cable
  - Shielded Twisted Pair (STP) Cable
  - Coaxial Cable
  - Fibre Optic Cable
  - Wireless LANs
  - Unshielded Twisted Pair (UTP) Cable
  - Category 5 Cable (Cat 5)
  - Category 6 Cable (Cat 6)

## 2. Understand network infrastructure security

- Security considerations
  - Encryption
  - Backup
  - Network access
  - Password security
  - Router settings
  - Security devices
  - Data security
  - Risk mitigation
- Anti-virus and firewalls
  - Purpose
  - Installation
  - Configuration
  - Exceptions
  - Investigations
  - Profiles
  - Definitions
  - Management, administration and monitoring
  - End point devices including mobiles
- Surveillance and monitoring systems
  - Device monitoring
  - Component monitoring
  - Attack monitoring
  - Artificial Intelligence
  - Tracking traffic, bandwidth utilisation, and uptime
  - Highlighting and blocking any areas of concern (back door access)

## 3. Understand wireless network infrastructures

- Wireless networks
  - WLANS: Wireless Local Area Networks
  - WPANS: Wireless Personal Area Networks
  - WMANS: Wireless Metropolitan Area Networks
  - WWANS: Wireless Wide Area Networks
  - Wireless Mesh
  - Transmission

- Data rate
  - Throughput
  - Frequency
  - Range
  - Channels
- Risks
  - Unauthorised access
  - Theft
  - Wireless sniffing
  - Security
  - Installation problems
  - Coverage
  - Transmission speed
  - Network blackspots
- Protection methods
  - Encryption of data on the network
  - Secure logins
  - Change device default passwords
  - Restrict access using profiles
  - Protect your Service Set Identifier (SSID)
  - Configured firewall
  - Anti-virus software
  - End point protection software
  - Patch management software
  - Restrict file sharing possibilities
  - Ensure device firmware is updated
- Modern hybrid working environment
  - Cloud software
  - On premise software
  - VPN Connections
  - Mobile devices
  - Network access
  - Infrastructure as a service (IaaS)
  - Collaboration software
  - Video conferencing software
  - Connectivity across all corporate devices
  - Data accessibility
  - Two factor authentication
  - Single sign on
  - Hybrid Architecture
  - VOIP

#### **4. Understand how to support and maintain a network infrastructure**

- External network suppliers
  - Managing expectation
  - Contract
  - Service level agreements
  - KPI's
  - Due diligence

- Uptime and downtime
  - Benefits and risks of using external suppliers
- Installing, supporting and maintaining of a network
  - Face to face
  - Email
  - Telephone
  - Online chat
  - Remote control software
  - Push deployment
  - Email
- Remote access methods
  - Remote desktop connection
  - Remote control software
- Support external providers to achieve results
  - Availability
  - Reliability
  - Communication
  - Expectations
  - Agreed deliverables
  - Managing outcomes

<b>Unit 11 Internet of Things (IoT)</b>			
<b>Unit aims</b>	This unit aims to provide learners with core knowledge and understanding of Internet of Things (IoT) technologies. The unit also explores how IoT is used today to increase productivity and efficiency across personal and business life, identifying its use in the future. Learners will explore the underlying technologies that make functionary possible.		
<b>Unit level</b>	7		
<b>Unit code</b>	K/618/7859		
<b>GLH</b>	50		
<b>Credit value</b>	10		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand Internet of Things (IoT) technologies	1.1 Explain the purpose of IoT 1.2 Analyse the history and development of IoT 1.3 Analyse the components used in IoT technologies 1.4 Evaluate the personal and professional uses of IoT technologies 1.5 Analyse the technology and business drivers for IoT technologies 1.6 Explore IoT applications and trends	1M1 Evaluate the impact IoT has on productivity	1D1 Analyse how IoT solutions can assist with automation
2. Understand Internet of Things (IoT) security considerations	2.1 Analyse how to address security issues with IoT technologies 2.2 Evaluate the considerations needed when implementing IoT solutions 2.3 Evaluate the security measures to consider when implementing IoT technologies 2.4 Investigate IoT connectivity protocols		

<p>3. Understand the benefits of Internet of Things (IoT) technologies</p>	<p>3.1 Evaluate the benefits of using IoT technologies in</p> <ul style="list-style-type: none"> <li>○ Healthcare</li> <li>○ Automobile</li> <li>○ Education</li> <li>○ Business</li> <li>○ Finance</li> </ul> <p>3.2 Analyse emerging software-defined networks and virtualisation</p> <p>3.3 Analyse the analytical benefits of using IoT technology</p> <p>3.4 Analyse the potential future use of IoT technology</p>		<p>3D1 Analyse the benefits of obtaining real time data for an application</p>
<p>4. Understand the requirements of Internet of Things (IoT) technologies</p>	<p>4.1 Evaluate the dependence of paid subscriptions for solutions</p> <p>4.2 Evaluate connectivity and network requirements for Internet IoT devices</p> <p>4.3 Assess sustainability measures for Internet of IoT technologies</p>	<p>4M1 Evaluate the cost for using IoT solutions for personal and professional use</p>	

## Indicative Content

### 1. Understand Internet of Things (IoT) technologies

- Learners should be aware of the purposes of IoT technologies and how these technologies have an impact on both business and personal life
- Learners should be aware of IoT technologies have been developed over the past number of years and the key stages within this development cycle such as 4G/5G, mobile devices and analytics. Learners should also focus on the speed of developments that have occurred such as automated driving, smart homes and smart speakers.
- Learners should be aware of the components used in IoT technologies, their purpose and setup considerations, components could include:
  - Sensors and sensor nodes
  - Sensing components and devices
  - Connectivity
  - Analytics
  - User interfaces
  - Mobile, desktop and other devices
- Personal uses of IoT technologies
  - Connected appliances
  - Smart home

- Smart cities
- Smart security systems
- Wearable devices and health monitors
- Professional use of IoT technologies
  - Ultra-fast internet
  - Security
  - Biometric security
  - Vehicle tracking
  - Big Data
- Technology Drivers
  - Connectivity including mobile data signal / speed
  - Device specifications, accessibility and performance
  - Capacity such as storage and bandwidth
  - Networks including cloud
- Business Drivers
  - Governance
  - Security
  - Management
  - Efficiency
  - Cost
- IoT applications
  - Wearables
  - Fleet
  - Traffic monitoring
  - Hospitality
  - Water supply
  - Analytics and applications
  - Signal processing, real-time and local analytics
  - Databases, cloud analytics and applications
- Trends
  - Big data and analytics
  - Personal healthcare
  - Machine learning
  - Smart machines
  - Smart security
  - Software as a service

## 2. Understand Internet of Things (IoT) security considerations

- Security issues with IoT technologies
  - Access rights
  - Password and login issues
  - Data breaches
  - Server failure
  - Connectivity issues
- considerations to make when implementing IoT solutions
  - 4G, 5G, Wi-Fi availability
  - Initial costs including implementation, hardware and training/ongoing support
  - Mobile sim card dependence
  - (passive and active) sensors, actuators, the physical communications layer, communications

- protocols, programming frameworks, and an understanding of energy and bandwidth constraints
- Security measures
  - Access levels
  - Firewalls and Anti-Virus
  - End point device protection
  - Two factor authentication
  - API security
  - Encryption
  - Secure VPN
  - Password management
  - Patch management
- IoT connectivity protocols
  - Bluetooth and BLE
  - Cellular 3G, 4G and 5G
  - NFC/RFID
  - Wi-Fi
  - IPv6
  - LPWANs
  - Mesh protocols

### 3. Understand the benefits of Internet of Things (IoT) technologies

- Benefits of using IoT technologies:
  - Healthcare: diagnostics, patient monitoring, remote care, remote patient monitoring, detections, automatic alerts
  - Automobile: automatic driving, detection systems, smart cards, electric cars, digital radios
  - Education: remote learning possibilities, smart home solutions, smart classrooms
  - Business: automated processes, big data, automatic ordering, security and detection systems
  - Finance: improved processes, automatic transaction matching, tracking, bank reconciliations, automatic invoice processing, integrated systems
- Software-defined networks and virtualisation
  - Virtual servers
  - Datacentres
  - VOIP
  - Cloud based storage and solutions
- Analytical benefits
  - Real time data
  - Increased accuracy
  - Ability to predict future trends
  - Comparisons
- Future use of IoT technology:
  - Interconnected systems
  - Increased use of Big Data
  - Greater use of automation and detection systems
  - Increase in security options for home and business
  - Increased use of Artificial intelligence

#### 4. Understand the requirements of Internet of Things (IoT) technologies

- Paid subscriptions
  - Mobile data plans
  - Software with user interface
  - Device or other hardware rental
  - Percentage commission cost (for EPOS or other transaction based processes)
- Connectivity and network requirements
  - Wireless technologies for the IoT
  - Edge connectivity and protocols
  - Wireless sensor networks
- Sustainability measures
  - Economy
  - Society
  - Environment

<b>Unit 12 Artificial Intelligence</b>			
<b>Unit aims</b>	This unit aims to provide learners with an introduction to the features of artificial intelligence including the philosophical foundations of artificial intelligence. This will include intelligence machines, artificial thinking and working like humans for example, speech recognition, problem-solving and learning.		
<b>Unit level</b>	7		
<b>Unit code</b>	D/618/7860		
<b>GLH</b>	50		
<b>Credit value</b>	10		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the features of artificial intelligence	1.1 Investigate the history and foundations of artificial intelligence. 1.2 Evaluate the uses of artificial intelligence in business, social and science environments 1.3 Evaluate the benefits, challenges and risks of using artificial intelligence 1.4 Explain the limitations of artificial intelligence		1D1 Evaluate how artificial intelligence has been used to increase productivity and efficiency and solve complex problems in business
2. Understand functions of artificial intelligence	2.1 Analyse how artificial intelligence is used for problem solving and searching 2.2 Analyse how artificial intelligence is used for cyber security 2.3 Evaluate how natural language processing is used in artificial intelligence 2.4 Evaluate how machine learning is used to solve problems 2.5 Evaluate the types of environments and		

	<p>agents used in artificial intelligence</p> <p>2.6 Examine the use of artificial intelligence in decision taking</p> <p>2.7 Analyse the properties of intelligent agents</p> <ul style="list-style-type: none"> <li>- Performance</li> <li>- Environment</li> <li>- Actuators</li> <li>- Sensors</li> </ul>		
3. Understand concerns relating to the use of artificial intelligence	<p>3.1 Assess possible concerns and perceptions in relation to the use of artificial intelligence</p> <p>3.2 Examine the ethical considerations to make in relation to artificial intelligence</p>	3M1 Evaluate how to change people's perceptions in relation to artificial intelligence	
4. Understand the future of artificial intelligence	<p>4.1 Analyse how to keep up to date with artificial Intelligence technological enhancements</p> <p>4.2 Evaluate how artificial intelligence contributes to collaborative working between humans and technology</p>	4M1 Investigate how artificial intelligence could be used for future technologies	

## Indicative Content

### 1. Understand the features of artificial intelligence

- History and foundations of artificial intelligence
  - Key developments
  - Timeframes
- Uses of artificial intelligence
  - business
  - social
  - science environments
- Benefits
  - Reduces time to complete a task by using automation
  - Increases productivity
  - Makes business decisions faster
  - Operates 24/7 with no interruption
  - Uses insight to make predictions

- Increases business revenue by identifying sales opportunities
- Provides analytical information
- Consistency
- Challenges
  - Trust
  - Buy in
  - Data security and privacy
  - Perception
  - Knowledge
  - Automated decision making
  - Ethical, moral and legal difficulties
  - Impact on traditional skills
- Risks of using artificial intelligence
  - Violations of privacy
  - Inequality
  - Incorrect algorithms
  - High cost
  - Cyber security
- Limitations
  - Access to data
  - Cost and budget constraints
  - Internal knowledge
  - Requires resource
  - No creative element
  - The same solution does not work for all organisations

## **2. Understand functions of artificial intelligence**

- Problem solving and searching
  - Algorithms
  - Heuristics
  - Root cause analysis
- Cyber security
  - Able to learn user behaviour and take appropriate action
  - Able to identify suspicious abnormal behaviour in relation to internet and email activity
  - Continues to learn the user behaviour and tailor action according to the risks identified
- Natural language processing
  - To understand text and take actions such as translation, grammar checking
  - Makes it possible for humans to talk to machines
  - Enables ability for devices to understand, interpret and manipulate human speak
- Machine learning
  - Supervised learning
  - Unsupervised learning
  - Semi-supervised learning
  - Reinforced learning
- Environments
  - Complete vs. Incomplete
  - Fully Observable vs. Partially Observable
  - Competitive vs. Collaborative

- Static vs. Dynamic
- Discrete vs. Continuous
- Deterministic vs. Stochastic
- Agents
  - Simple Reflex agent
  - Model-based reflex agent
  - Goal-based agents
  - Utility-based agent
  - Learning agent
- Artificial intelligence to make decisions
  - Provides reliable information to users for different business functions
  - Enables automation such as campaign management in marketing
  - Can trigger quick actions when certain criteria have been met
  - Decisions are based on the understanding of how actions lead to outcomes
- Intelligent agent's properties
  - rationality
  - autonomy
  - adaptivity
  - reactivity
- Artificial intelligence techniques
  - machine learning
  - NLP
  - automation and robotics
  - machine vision

### **3. Understand concerns relating to the use of artificial intelligence**

- Concerns and perceptions
  - informed consent
  - voluntary participation
  - confidentiality
  - anonymity
  - privacy and surveillance
  - bias and discrimination
- Ethical considerations
  - will artificial intelligence replace human worker's
  - is artificial intelligence always watching
  - is artificial intelligence transparent
- Change people's perceptions
  - perceiver
  - the target
  - the situation
  - allow questions to be asked
  - explain the benefits
  - remote the benefits
  - eliminate concerns
  - provide reassurance
  - have open conversations
  - building ethical artificial intelligence and trust

#### **4. Understand the future of artificial intelligence**

- Keeping up to date
  - Research
  - monitor technology trends
  - Online resources including blogs and websites
  - Newsletters
  - Social networks
  - Podcasts
  - Discussion groups
- Collaborative working between humans and technology
  - human+machine instead of human vs. machine
  - creations of new roles and opportunities
  - Flexibility
  - Speed
  - Decision making
  - Personalisation
- Future technologies
  - ability to converse and interact with each other in the native language of choice
  - reduced risk of having to worry about miscommunicating
  - Machine learning able to understand context and nuance

<b>Unit 13 Computer-based Research Methods</b>			
<b>Unit aims</b>	This unit aims to provide learners with an understanding of different computer-based research methods. Learners will plan their own research using associated techniques. Learners will also carry out a research project based on an area of interest within the computing technologies field, for example future/emerging technologies, cloud-based technologies.		
<b>Unit level</b>	7		
<b>Unit code</b>	H/618/7861		
<b>GLH</b>	50		
<b>Credit value</b>	10		
<b>Unit grading structure</b>	Pass, Merit and Distinction		
<b>Assessment guidance</b>	In order to achieve this unit, learners must produce work which demonstrates achievement of the learning outcomes at the standards provided by the assessment criteria and the completion of assignments in accordance with awarding organisation guidance.		
<b>Learning outcomes</b> <b>The learner will:</b>	<b>Assessment criteria</b> <b>The learner can:</b>		
	Pass	Merit	Distinction
1. Understand the use of computer-based research methods	1.1 Evaluate the types of computer-based research methods used 1.2 Explain the importance of research projects 1.3 Compare and contrast primary and secondary data used in computer-based research 1.4 Compare and contrast qualitative and quantitative research methods 1.5 Assess the considerations needed when carrying out computer-based research	1M1 Discuss how research is used in technology innovation projects	
2. Understand the components of research	2.1 Analyse the stages in conducting research 2.2 Explain the regulatory, legal and ethical considerations required when carrying out research 2.3 Evaluate the use of research for decision making	2M1 Evaluate the impact inconsistent outcomes or results can have on research projects	

<p>3. Be able to prepare for a computer-based research project</p>	<p>3.1 Formulate and construct research questions  3.2 Prepare research aims and objectives  3.3 Carry out a digital literature review based on the proposed questions and aims  3.4 Analyse how to measure the success of a research project</p>		<p>3D1  Evaluate the importance and impact of planning to organisations when conducting a technology based research project</p>
<p>4. Be able to carry out an independent computer-based research project</p>	<p>4.1 Research a technological area of interest  4.2 Use appropriate research tools and techniques to gather evidence  4.3 Critique research findings  4.4 Present research findings in a professional format</p>		<p>4D1  Gather and analyse feedback from a technology research project</p>

## Indicative Content

### 1. Understand the use of computer-based research methods

- computer-based research methods
  - literature study
  - case study
  - structured surveys
  - interviews
  - online focus groups
  - participatory approaches
  - narrative analysis
  - scenario methodology
  - technology foresight
- importance of research projects
  - discovering new technologies and solutions
  - build knowledge and facilitate learning
  - understand and increase awareness
  - highlights issues
- primary and secondary data
  - Primary: interviews, surveys, focus groups, observations, lab experiments
  - Secondary: government statistics, trade publications, company websites, market research reports
- qualitative and quantitative research

- Qualitative: holistic, non-quantifiable, case specific, subjective
- Quantitative: objective, specific, predictive
- considerations
  - relevance of information
  - validity of information gathered
  - sources of information
  - citing sources
  - date of information gathering
  - methods used
  - sample size

## 2. Understand the components of research

- stages in conducting research
  - identify problem
  - review literature
  - set research questions, objectives and hypotheses
  - choose the study design
  - decide on the sample design
  - collect data
  - process and analyse data
  - write the report
- regulatory and legal considerations
  - Data Protection
  - GDPR
  - Privacy (including privacy policy)
  - Copyright
- ethical considerations
  - consent
  - autonomy
  - confidentiality
  - protection of data
  - right to be forgotten
  - legitimate interest
  - code of conduct
- research for decision making
  - the impact of the decision
  - the benefits of the decision
  - the outcome of the decision

## 3. Be able to prepare for a computer-based research project

Learners should construct open and closed questions which the answers will provide sufficient amounts of information for this project. The research project should have clear aims and objectives and allow for a critique of the evidence gathered.

The success of a research project can be measured by:

- The outcomes of the project
- Knowledge gained from the project
- If the project met the aims and objectives
- The time taken to complete the project
- The satisfaction of stakeholders

#### **4. Be able to carry out an independent computer-based research project**

Learners must complete an independent computer based research project providing evidence of the knowledge gained from this unit across all learning outcomes.