EXPERT GROUP REPORT

FOR

AWARDS SEEKING ADMISSION TO

THE UCAS TARIFF

OCR LEVEL 3 CERTIFICATE AND DIPLOMA FOR IT PROFESSIONALS (iPRO)

October 2006

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THE CONDUCT OF THE COMPARABILITY STUDY

In order to ensure a robust and transparent procedure for allocating UCAS Tariff Points to qualifications seeking admission to the framework, UCAS approached the University of Oxford, Department of Educational Studies for assistance in developing an appropriate methodology.

Acknowledging the problematic nature of comparability studies, and recognising that a mechanical procedure would not work, the Department proposed a procedure based on the premise that such comparisons can only be achieved through the exercise of collaborative judgement by an Expert Group.

Guidelines were drawn up for the composition of the Expert Group, the evidence that would need to be collected and examined and the choice of a benchmark qualification.

Procedures were developed for the conduct of the work of the Expert Group, including detailed sets of questions to be addressed at different stages in the process. Questions appropriate to the awards under consideration are selected and are used to guide, not constrain, the work of the Expert Group.

The judgements made by the Expert Group in this report are presented as suggested allocations of UCAS points which take account of the size and demand of the award seeking admission to the Tariff, and a candidate's level of attainment within that award. The guidelines also provide for an automatic review process to be conducted at a later stage in the light of further evidence. This latter point acknowledges the fact that both benchmark qualifications and those seeking admission to the Tariff may still be relatively new. Consequently there may only be a relatively small amount of evidence (particularly candidate evidence) available at the time of the work of the Expert Group. There is, therefore, a need to review the decisions of the Group when more evidence becomes available and when HE admissions tutors have gained more experience of using the awards as entry qualifications.

The work of the Expert Group is subject to a quality assurance procedure by an independent auditor from Higher Education.

SUMMARY AND RECOMMENDATIONS

This report contains a detailed examination by an Expert Group of the OCR iPRO Certificate and Diploma against a selected benchmark qualification, the AQA GCE A level in Applied IT.

Section 1 of the report sets out the composition of the Expert Group. Sections 2 and 3 provide an overview of each qualification. Section 4 indicates the procedures followed by the Expert Group and reflects, in its structure, the sets of questions which were addressed and the Group's decision making processes.

As a result of its deliberations, the Expert Group agreed that:

- The aims of the two sets of qualifications are different: the GCE Applied A level specifically prepares candidates for HE; the iPRO is designed more for entry into the world of work. Nonetheless, the iPRO was seen to have utility for supporting progression to Higher Education.

- The iPRO Certificate is broadly equivalent to the GCE Applied A level in terms of guided learning/study time; the iPRO Diploma is bigger.

- However, in terms of content, there is considerable difference between the GCE Applied A level and the iPRO Certificate/Diploma. To begin with, there is variability in the size of the iPRO Units which makes the comparison with the GCE Applied A level Units difficult. There is also variability between OCR devised iPRO units and the vendor units within the iPRO: vendor units are more technology specific and slightly narrower than A level units in terms of their utility in supporting progression into HE. OCR-devised iPRO Units seem to be more similar to the Applied A level units in terms of their utility in supporting progression to HE. In addition, the range of choice of units that is available would seem to indicate that candidates applying for HE may hold a Certificate/Diploma that could vary considerably in size depending upon the exact Units combined within the overall qualification.

- The modes of assessment between the two qualifications place very different demands on the students. This is not only demonstrated between the AQA GCE Applied A level and the iPRO, but also across the range of Units achievable within the iPRO qualifications.

    - The iPRO Certificate and Diploma are overarching qualifications which can be built up in different ways, dependent on the three differing pathways. The iPRO assessment is based on a mastery model within which, depending on which pathway and which combination of units are chosen, the candidate may be presented with different types of assessment: internally set, assessed and externally moderated case studies; externally assessed and examined case studies

using a checklist to record qualitative judgements; online objective tests devised either by OCR or by vendors (with a 70% pass mark).

- The grade for the Applied AS and A level is achieved by adding unit marks, scored on the Unified Mark Scale, together to get an overall mark and grade and re-scaling for percentage. All units have equal weighting. There is greater emphasis on evaluation, understanding and application, and the GCE A level goes further than the knowledge requirements of the iPRO, as demonstrated by the assessment objectives (AOs): AO1 – practical capability, AO2 – knowledge and understanding, AO3 – application, AO4 – evaluation. In an A level (AS and A2), to access higher grades, you would need to achieve well against all four assessment objectives.

It was suggested that iPRO candidates would undoubtedly have met AO1, AO2 and AO3, but not necessarily AO4. An additional issue is the difference in nature between the varying iPRO units. The vendor units have no evaluation aspect.

- The usual practice followed for Expert Group meetings of examining candidate materials from the different qualifications to align grading could not be undertaken because there were no Applied A level materials to make a comparison.

Recommendations

1 After considerable discussion, it was accepted that 80 UCAS Tariff points for the iPRO Level 3 Certificate would be appropriate for the following reasons:

- the technical knowledge being assessed through the iPRO vendor units was considerable and had value in terms of progression to HE, and that the 70% pass mark was evidence of considerable achievement.

- OCR-devised units seem to be broadly comparable to A level units in terms of size and assessment demand with the exception of AO4.

- Applicants would be accepted with this qualification only if it formed part of a wider basket of attainment.

- Such an allocation can be further justified on two grounds. First, it indicated that the OCR Certificate was a qualification of intermediate volume between the AS and the A level (Single) Award, even though the OCR Certificate is nominally a six unit qualification with similar guided learning hours to the six unit Single A level award. Thus it takes account, at least to some extent, of the perceived narrowness of the vendor units. Second, it recognised that candidates taking the OCR Certificate could not achieve attainments comparable to those of Grade A and B in the GCE A level because they were, on the basis of the evidence reviewed, not able to demonstrate evaluation skills. Thus, the allocation of 80

UCAS Tariff points recognised both the smaller size and lower demand of the OCR Certificate compared to the GCE A level, as judged on its utility to support progression into Higher Education.

2 It was accepted that the iPRO Level 3 Diploma merits more points than the Certificate as it requires two more Units. The usual approach would be to divide 80 Tariff points by six (Number of units) and add two sixths to the 80 points to come to a value for the Diploma, i.e. 106 UCAS Tariff Points. However, there is a need to take account of the differences between OCR and vendor units and the fact that the two additional units for the Diploma may well be vendor units. A paper considering all of these issues was circulated to all members of the Expert Group. On the basis of the recommendation made in that paper, it was accepted by all members of the Expert Group that a pass in the iPRO Diploma should, for the time being, attract 100 UCAS Tariff Points.

3 Both of these decisions were taken on the understanding that there will be a review in September 2007 when candidate evidence will be available from the AQA GCE Applied A Level for direct comparison. It was confirmed that the following evidence would be required for the review:

- Applied A level AS and A2 candidate evidence to reflect the A/B, E/U boundaries, and Grade C students.

- iPRO candidate evidence for Pass candidates.

SECTION 1: THE COMPOSITION OF THE EXPERT GROUP

The following individuals with expert knowledge and experience of the qualifications under consideration in this study were selected to form the Expert Group:

Glen Millberry, OCR Chief Examiner, iPRO Systems Support, Level 2,3 and 4.
Barbara Wilson, AQA Chair of examiners for ICT and Applied ICT GCE
Robin Oldham, Higher Education Representative, Staffordshire University
Dr Andrew Naftel, Higher Education Representative, University of Manchester

In addition, Mara Bogdanovic attended the meeting as an OCR Observer.

Penny Faust acted as the facilitator for the work of the Group, ensuring that the Group worked systematically through the procedures.

Helen Wakefield, Tariff and Support Officer at UCAS, guided and supported the work, as well as acting as secretary to the meeting.

The whole process was overseen and quality assured by Dr Geoff Hayward, an independent Higher Education based consultant.

SECTION 2: OVERVIEW OF THE BENCHMARK AWARD - GCE A LEVEL IN APPLIED INFORMATION AND COMMUNICATION TECHNOLOGY

The AQA Chair of Examiners for GCE IT gave an overview of the GCE Applied A level in ICT.

1. Aims and purpose of the qualification

- Based on the GCE General and Subject Specific Criteria produced by QCA
- Broad-based vocational qualification designed to allow students flexible progression routes, moving on to higher education or further training/employment
- Provide knowledge and understanding of the vocational area
- Ideal for students who want a broad background in ICT
- Delivered through full-time or part-time education courses

2. History of the qualification

This is a new qualification and was first available for teaching in the academic year 2005/06. AQA anticipateS 6,500 – 10,000 candidates in 2007.

3. Entry requirements for the qualification (including literacy standards)

This lies at the discretion of the providing institution. The specification states that no prior level of attainment is required for these qualifications. However, a typical candidate would start with a reasonable level of GCSE attainment (four or more GCSEs at A*-C).

4. Age of candidates

Typically candidates will be 16 years of age when they start this qualification..

5. Guided Learning Hours

The specified guided learning hours are 60 hours per unit giving:

- Single AS – 3 units - 180 hours
- Double AS – 6 units - 360 hours
- Single A level – 6 units - 360 hours
- Double A level – 12 units - 720 hours

In addition, the assignment required for each unit will typically take an additional 15 hours, so the total for each unit is 75 hours, i.e. the same as the iPRO units.

6. Content and structure of the qualification

An important distinction made in the specification is between users and practitioners of Information Technology, and this distinction underpins the overall design of the content of the award. A user is defined as someone who uses ICT, typically desktop applications, in the work place. A practitioner is defined as someone who has an ICT role in an organisation.

Students can take

- AS Award
- AS Double Award (practitioner)
- A Level Single Award
- A Level Double Award (practitioner)

Students who achieve the double AS but then decide to study only three A2 units to complete the qualification are only accredited with the A Level Single Award. The majority of students take the Single Award. The Double Award would be relevant only to those going on to practitioner work.

The following AS user units are compulsory for every single award:

- Unit 1: ICT & Society
- Unit 2: ICT & Organisations
- Unit 3: Data Handling

The AS double award consists of Units 1-3 above and

- Unit 4: ICT Solutions

Plus any two of:

- Unit 5: Fundamentals of Programming
- Unit 6: Computer Artwork
- Unit 7: Creating a Website

The A2 user units taken to complete the A Level Single Award are:

- Unit 8: Project Management
- Unit 10: Advanced Spreadsheet Design

Plus one of:

- Unit 12: Publishing
- Unit 14: Interactive Multimedia

The A Level Double Award therefore has the following structure:

AS User units	**AS Practitioner units**
Unit 1: ICT & Society Unit 2: ICT & Organisations Unit 3: Data Handling	Unit 4: ICT Solutions *Plus any two of:* Unit 5: Fundamentals of Programming Unit 6: Computer Artwork Unit 7: Creating a Website
A2 User units	**A2 Practitioner units**
Unit 8: Project Management Unit 10: Advanced Spreadsheet Design *Plus one of:* Unit 12: Publishing Unit 14: Interactive Multimedia	Unit 9 Software Development *Plus any two of:* Unit 11: Communications and Networks Unit 13: Systems Analysis Unit 15: Supporting ICT Users

In terms of double award units – unit 15 (Supporting ICT users) is the most popular of the optional units. There appears to be no particular pattern of unit uptake at present – it probably depends on the staff and facilities available.

7. Assessment – procedures, methods and levels

The philosophy underpinning the assessment of this qualification reflects the intention to judge not just whether a candidate has achieved against a particular assessment criterion, but also how well they have undertaken a task, and that they understand what they have done and why across a range of criteria within each assessment objective. This is intended to encourage independence of learning. Consequently, reflection and evaluation are important parts of the assessment process and are taught in every unit, specific to the topic rather than generically. For example, in AS Unit 2 ICT and Organisations, candidates are required to evaluate a solution they have created for a particular brief and their own performance in creating the solution. Through this process, AQA seeks to encourage students to understand that they do need to assess their own performance if they are to do well in the qualification.

Units 1, 9 and 10 are externally assessed; the remainder are centre assessed and externally moderated. All units are assessed against four assessment objectives (AOs) with the objectives and approximate weightings for each one being set by QCA:

- AO1- **ICT Capability**: practical capability in applying ICT
- AO2- **Knowledge and Understanding**: knowledge and understanding of ICT systems and their roles in organisations and society
- AO3 – **ICT Problem Solving**: candidates apply knowledge and understanding to produce solutions to ICT problems
- AO4 – **Evaluation**: candidates evaluate ICT solutions and own performance

There is a difference in the weighting of AOs between the AS and A2 units: typically, in the A2 units, greater weight will be placed upon the application of knowledge and evaluation, i.e. AO3 and AO4, and less on AO2 knowledge and understanding.
In addition, weighting of the AOs is different for different compulsory units, but the percentage weighting for each assessment objective is the same for optional units at AS and A2 levels.

A maximum of 70 marks is set for **all** units and these are then distributed across the different AOs.

In Unit 1, for example:

- AO1 *Practical capability in applying ICT*, which is concerned with the **appropriate** use of the functionality of the software used and of the **appropriate** use of ICT for research and documentation, attracts 18 marks.

- AO2 *Knowledge and understanding of ICT systems and their roles in organisations and society* has the highest weighting for this unit (**24 marks**) and requires candidates to demonstrate that they know and understand the material relevant to the particular unit.
- AO3 *Apply knowledge, skills and understanding to produce solutions to ICT problems* requires the application of the knowledge and understanding that candidates have gained to a particular situation and to use it to design solutions to problems that can be solved using the practical skills that they have acquired. Candidates have to be able to explain why functions of the software that are used are **appropriate** for the given **audience** and **context.** This AO attracts 14 marks.
- AO4 *Evaluate ICT solutions and own performance* requires candidates to demonstrate that they are able to formulate criteria that will allow them to test and assess how well their solution meets the client's needs. They will also have to design any tests that will be necessary to provide evidence of whether assessment criteria have been met and hence whether the solution meets the client's needs. This requires candidates to assess how well they have met the criteria they set themselves for suitability and how well they worked whilst completing the task. This AO also attracts 14 marks.

There is an element of synoptic assessment at A2 achieved through both internally and externally assessed units. For example, in Unit 8, Project Management (a compulsory A2 unit), candidates work on a large or complex project requiring the use of many different ICT skills and areas of knowledge to be applied in different ways.

The AQA assessment instruments are summarised below

AS Units		**A2 Units**	
Unit 1	Externally assessed AQA set assignment completed under controlled conditions	Unit 8	Portfolio of work
Unit 2	Portfolio of work	Unit 9	Externally assessed AQA set assignment completed under controlled conditions
Unit 3	Portfolio of work	Unit 10	Externally assessed AQA set assignment completed under controlled conditions
Unit 4	Portfolio of work	Unit 11	Portfolio of work
Unit 5	Portfolio of work	Unit 12	Portfolio of work
Unit 6	Portfolio of work	Unit 13	Portfolio of work
Unit 7	Portfolio of work	Unit 14	Portfolio of work
		Unit 15	Portfolio of work

With the exception of units 1, 9 and 10 the assessment instrument is a portfolio product with detailed marking schemes provided for each unit. However, there are separate investigations/tasks for each unit which take place under controlled conditions: 15 hours for the AS, and 20 hours for the A2 units.

8. Grading

Attainment in each unit is graded A-E and the marks on each unit are combined, using a Unified Marking Scale, to produce an overall A-E Grade for the qualification. Candidates failing to achieve a pass grade are classified as U. Awarding involves studying samples of work with different marks and matching these to the Performance descriptors as defined by QCA for the grade boundaries A/B and E/D This process, combined with evidence from the Principal Examiner for each unit and statistical evidence about candidate achievement in previous examination sessions, is used to set the final mark for the grade. Grade boundaries are therefore not fixed, but are set at awarding. This allows for changes in tasks/mark schemes and therefore level of difficulty from one examination session/year to the next.

9. QA systems and code of practice

AQA works within QCA's Code of Practice and adheres to the Common Criteria contained in QCA's document *'A Guide to the Arrangements for the Statutory Regulations of External Qualifications in England, Wales and Northern Ireland'*.
All aspects of the examination process are therefore subject to QCA codes of practice. Detailed advice and guidance about setting work for centre assessed units, applying the portfolio assessment criteria, assessing group work, and supervision and authentication of student work are provided in the specification. Centres are required to standardise their assessment across different teaching groups and teachers, within and across units, to ensure that all work at the centre has been judged against the same standards. Centre assessed work is subject to external moderation.

SECTION 3: OVERVIEW OF THE AWARDS SEEKING ADMISSION TO THE UCAS TARIFF - OCR LEVEL 3 CERTIFICATE AND DIPLOMA FOR IT PROFESSIONALS (iPRO)

It is worth stating at the outset that the iPRO Certificate and Diploma are overarching qualifications, which can be built up in different ways, dependent on which of the three different pathways is followed.

1. Aims and purpose of the qualification

These qualifications are intended to develop the following underlying knowledge, understanding and skills:

- Recognition of the importance of customer liaison and communication
- Awareness of the requirements for documenting work and actions
- Capacity for individual thinking
- Review of own actions
- Ability to review and analyse data
- Ability to plan own time and schedule work
- Ability to research from a variety of sources – publications, journals, internet
- Awareness of up-to-date developments
- Practical hands-on skills

2. History of the qualification

The current qualification is an adaptation of a previous OCR IT qualification and was accredited as a Level 3 qualification by the QCA in 2006. The current last entry date for the qualification is 31/08/2009 with the date of last certification set at 31/08/2012.

3. Entry requirements for the qualification (including literacy standards)

There are no formal entry requirements for the qualification, but the specification suggests that the qualification is suitable for those who already possess basic knowledge and understanding of ICT, perhaps gained as part of a level 2 ICT qualification.

4. Age of candidates

A typical candidate would be a 17 year old student taking the iPRO as an alternative to a vocational A level. The qualification is also taken by mature students either because of a change in career or in recognition of job requirements. Professionals – tend to be customer support staff, technicians – would take the iPRO as a part-time course. The iPRO is also attractive to those returning to the world of work, e.g. after a period looking after their children.

5. Guided Learning Hours

The iPRO normally takes over two years to complete and candidates are usually fulltime, taking the qualification alongside other qualifications, such as A Levels. The recommendation in the specification is for 75 Guided Learning Hours per unit, including

personal study time. This gives a total of 600 Guided Learning Hours for the Diploma (8 units) and 450 Guided Learning Hours for the Certificate (6 units).

6. Content and structure of the qualification

Three distinct pathways are available through the iPRO qualifications – a General Pathway and two endorsed user-selected pathways of either Software Development or ICT Systems Support. The pathways are constructed from a choice of 45 different units, some of which are mandatory for a specific pathway, while others are optional. Some of these units are OCR devised, others are vendor units. Appendix 4 provides a complete list of units, their status, and their mode of assessment.

- OCR Level 3 Certificate for IT Professionals – to achieve this qualification, candidates must complete 3 mandatory units (1, 3, 29) and 3 optional units
- OCR Level 3 Certificate for IT Professionals (ICT Systems Support) - to achieve this qualification, candidates must complete 3 mandatory units (1, 3, and 8) and 3 optional units from Units 2 - 28
- OCR Level 3 Certificate for IT Professionals (Software Development) - to achieve this qualification, candidates must complete 2 mandatory units (1, 29) and any 4 optional units from Units 30 - 45
- OCR Level 3 Diploma for IT Professionals - to achieve this qualification, candidates must complete 3 mandatory units (1, 3, 29) and 5 optional units
- OCR Level 3 Diploma for IT Professionals (ICT Systems Support) - to achieve this qualification, candidates must complete 2 mandatory units (1, 29) and any 4 optional units from Units 30 - 45
- OCR Level 3 Diploma for IT Professionals (Software Development) - to achieve this qualification, candidates must complete 2 mandatory units (1, 3 and 8) and any 5 optional units from Units 2 - 28

The ICT Systems Support pathway is more popular than the Software Development pathway. Entries are mostly for units 1-18, with Unit 10 (Repair Centre Procedures) being the most popular. The lack of popularity of the software development pathway may be due to the fact that the qualification is primarily college based; professionals already have equivalent qualifications and the iPRO therefore seems less appealing.

The optional units include a wide range of vendor units from, CISCO, CompTIA, Microsoft and ORACLE. To decide which vendor units to include within the qualification, and ensure that they were at the right level, OCR looked at the vendor units that were available and the skill level required. They were advised by the vendors and worked with them to see how their units fitted into the overall programme with respect to assessment objectives, depth of coverage and so on. However, the OCR iPRO qualifications have been constructed so that they can be achieved either with or without vendor units. CISCO vendor units are the most popular and nearly every CISCO academy offers the iPRO.

7. Assessment – procedures, methods and levels

The model of assessment depends on the pathway chosen within the iPRO and the units selected.

- Units 1 and 29 are assessed by an OCR-assessed external assignment that is supplied and marked on demand. One of these units must be taken, whichever pathway is chosen.
- Unit 31 is e-assessed with an OCR administered objective test consisting of 25 questions with a pass mark of 70%.
- Units 2-10, 30, 32 and 33 are examined by a locally assessed practical activity, subject to OCR moderation. This assessment is more akin to that undertaken by an NVQ candidate. The candidate has to complete OCR supplied evidence checklists where tasks are ticked off as being completed or the appropriate information supplied. These are then checked by the tutor against a portfolio of evidence to ensure that all activities have been completed to a standard that would be acceptable in the workplace. Candidates are required to complete tasks that address all of the assessment objectives for these units, and evidence must be available that shows where and how the assessment objectives have been achieved. Tutors may set specific assessment tasks. Alternatively, candidates may use naturally occurring evidence from their workplace.
- Units 11-28 and 34-46 (the vendor units) are tested by vendor devised e-assessments, online objective tests with a pass mark of 70%.

Attainment is graded pass/fail for each unit.

Centres have to be approved as test centres otherwise arrangements have to be made for candidates to visit the nearest approved local centre to take the vendor qualifications. This has considerable cost implications.

If a candidate fails a unit, they can retake it using the next set of assessments when they are released. There is no limit to the number of resits, other than time restrictions. Externally set and marked OCR developed units can only be taken twice a year; a candidate would then need to wait 6 months if they wanted to resit.

Centres mark locally assessed practical activities which are ALL (not just samples) sent to OCR for moderation. For centre-assessed units, candidates are required to demonstrate that they can meet all of the assessment objectives as stated in the specification. Assessment activities take the form of practical activities, typically based on a case study approach. To help centres with the task of devising appropriate assessment instruments, OCR provides specific assessment requirements for each unit. Upon completion, the assignment is assessed by the centre assessor who must:

- judge candidate work against the standard identified in the OCR provided Assessment Guidance
- identify valid and sufficient evidence
- identify gaps in evidence
- give feedback to candidates

- liaise with other assessors in the centre to ensure standards (internal moderation)
- verify candidates' achievements by completing and signing OCR documentation
- maintain records of candidates' achievements

While assignments are not time constrained, an iPRO case study typically requires 20-25 hours input from candidates. The work is not undertaken under controlled conditions so the result is more like a portfolio assessment. All tasks within the case study have to be undertaken and there is no choice. A centre's assessment decisions are externally moderated through systematic sampling (a 25% sample) of the decisions of each assessor in a centre. If the centre assessment is judged inaccurate, then the necessary amendments to candidates' achievements are made and certification will reflect these amendments.

OCR-set-on-demand assignments are used to assess units 1 and 29. Unit 31 is externally assessed by OCR in the form of a timetabled electronic test. All units are graded pass/fail. Considering possible assessment profiles, an iPRO candidate could potentially complete the qualification without ever having undertaken assessment under controlled conditions if they undertake all OCR devised Units (Unit 31 is optional). There may also be some group work within the assignments without any assessment compensation for that.

Electronic feedback is sent to centres for candidates who have failed. The report is detailed in terms of what has gone wrong. A moderator will retain a centre for a minimum of two years and therefore has copies of reports and knows what the centre has done over time. Centres have resources that show how to construct the case study assignments. However, if a teacher gets the assignment design wrong, all candidates in that centre would potentially fail.

8. Grading

Candidates are graded as passing the qualification on the basis of passing six (certificate) or eight (Diploma) units, i.e. no compensation is allowed.

9. QA systems and code of practice

The OCR works within QCA's Code of Practice and adheres to the Common Criteria contained in QCA's document *'A Guide to the Arrangements for the Statutory Regulations of External Qualifications in England, Wales and Northern Ireland'*.

SECTION 4: THE WORK OF THE EXPERT GROUP

The Expert Group met for one day on 13th July 2006. This section contains an account of the deliberations that took place at that meeting.

4.1 Preliminary work

As usual, the Expert Group facilitator undertook an extensive mapping exercise to compare and contrast the content of the two qualifications under consideration against the benchmark qualification. This was sent to members of the Expert Group, together with a number of tasks to be completed before the Expert Group meeting. The following challenges presented by the iPRO were identified during this planning phase:

- In its assessment methodology and flexibility the iPRO most closely resembles an NVQ with different aims and objectives to the Applied A level. In particular, it is designed primarily for progression into work, not into Higher Education. However, in the specification, access to Higher Education is identified as a progression opportunity for the OCR iPRO.
- There are no qualifications currently in the Tariff that provide a match to the vendor units in the qualification. Consequently, it was decided to use the OCR devised Units in the preliminary mapping exercise against the Applied A level[1].

4.2 Comparison of aims

The aims of each qualification are set out in Table 1 below. A comparison of these aims by the Expert Group confirmed that this was a difficult comparison. The Applied A level is clearer in its aims and objectives in terms of forming a progression route to Higher Education than the iPRO. The Expert Group saw this qualification as offering a more flexible opportunity, geared to enabling individuals to build a qualification for progression into a range of jobs within the ICT sector. This was reflected in the greater customer focus in the aims of the iPRO, which were echoed in the explicit linkage of some of the iPRO Units to NVQs at Levels 4 and 5 in Customer Service. Nonetheless, areas of comparability in the aims were identified and the Expert Group saw some utility in the qualification for supporting progression to Higher Education.

[1] This initial mapping was subsequently amended and developed by Andrew Naftel, one of the HE representatives on the Expert Group and used at the Expert Group meeting. It is attached as Appendix 3.

Table 1 A comparison of the aims of the OCR Certificate and Diploma with the GCE A level in Applied Information Technology.

GCE A Level	OCR iPRO
The specification aims to develop: • an understanding of the impact of information and communication technology on society and organisations • an awareness of the economic, social and ethical implications of the use of information and communication technology • the ability to analyse critically the use of information technology systems • the ability to analyse problems that could be solved or tasks that could be completed with the use of information and communication technology, and to identify how information and communication technology can be used to solve these problems • problem solving skills through the practical application of information and communication technology • interpersonal skills necessary for communicating and working with others • the ability to reflect critically on the effectiveness of solutions created and personal performance • the ability to adopt standard ways of working • the ability to work independently.	This qualification aims to: • develop understanding of the ICT industry and its environment • develop understanding of the process of software creation from the point of investigation of customer requirements through to the testing of the completed product • develop understanding of the process of system support from the point of investigation of customer requirements through to the testing of the completed product • develop practical skills in creating and testing software • develop the skills needed to manage an ICT system and network • develop practical skills in installation, maintenance and testing of ICT systems • develop generic, non-technical skills that will support personal effectiveness in the workplace • encourage progression by assisting in the development of skills and knowledge which learners will need to undertake further study • provide candidates with the knowledge, expertise and practical skills for the IT workplace • develop candidates' broad understanding of the issues and importance surrounding customer support procedures and its symbiotic relationship for IT Professionals • develop the professional competence of candidates for the maintenance, management, support and development of systems or databases/web and server applications

4.3 Determining size – comparison of guided learning hours (glh)
Using the respective specifications, the following comparison can be made.

Applied A level	iPRO
Per unit: 60 glh AS (Single): 180 glh AS (Double): 360 glh A Level (Single): 360 glh A Level (Double): 720 glh + 2 hours per week, 35-40 hours week for assignment work. If we add the assessment component this would provide 75 glh per unit comparable to the iPRO.	Per unit: 75 glh Certificate (6 units): 450 glh Diploma (8 units): 600 glh

At face value, this comparison suggested that the iPRO Certificate was larger in size than the Double AS or a single A level; the iPRO Diploma is bigger still. However, the 75 Guided Learning hours for each iPRO unit included time for assessment and assignment work. If this were added to the time for the Applied A level Units (estimated at about 15 hours per unit) then there would appear to be no difference in the size of iPRO and Applied A Level Units. Using this metric, then, the iPRO Certificate would be comparable in size to an A level, and the Diploma somewhere between a single and a double A level.

On the basis of using this metric alone, the maximum UCAS Tariff points that could be allocated to the OCR qualifications would be:

Certificate – 120 UCAS Tariff Points
Diploma **–** 160 UCAS Tariff points

However, these initial estimates did not take account of the comparative breadth and depth of content coverage. This was considered next.
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4.4 Determining size – breadth and depth of content coverage
In the initial mapping (see Appendix 3) which had focused on the OCR devised Units in the iPRO (see Appendix 4), the focus was on the iPRO certificate compared to the GCE A level. It was agreed that the overlap in the content between these two qualifications, judged on the basis of this mapping, was not large. The vendor units presented particular problems, both for the benchmarking activity and in terms of their utility in supporting progression to Higher Education. The OCR devised iPRO units were considered less contentious, but even they were considered as being possibly unacceptable to some Higher Education institutions because they appeared to contain less academic content and skills compared to the A level, i.e. they were seen as being more akin to NVQ unit specifications. A general discussion around these issues ensued.

The Higher Education representatives reported that most Higher Education ICT departments find the work of their A grade VCE applicants (now GCE A level in Applied Subjects) indistinguishable from that of their GCE A level candidates. However, departments vary in their requirements, depending on whether the course is Computer Science or IT. Candidates from the iPRO, it was argued, would have a fairly good match in terms of knowledge and skills with what may be required for an IT degree, but Computer Science would require more maths and physics. The judgement being made at this stage was that the iPRO Certificate could satisfactorily support progression into HE in conjunction with other qualifications, but it would be worth no more than 1 A level in terms of UCAS Tariff Points.

It was suggested by the HE representatives that the two qualifications may be aimed at very different types of student. The discrete units within the iPRO mean that there is no general approach to the overall qualification, as is the case with the GCE A level. Furthermore, the iPRO's practical, task based approach to internal assessment might be very mechanistic, rather than encouraging the development of academic skills, such as the application of knowledge and evaluation. However, the iPRO specification does make it clear that while there was no requirement for a centre to deliver the programme in any pre-specified way, or the units in any particular order, centres are required to consider the candidates' complete learning experience when designing learning programmes. Furthermore, the OCR specification states that:

"In order for candidates to be able to effectively progress towards meeting the requirements of each assessment objective, tutors must make sure that the supporting knowledge, understanding and skills requirements for each objective are addressed." (p. 15)

Nonetheless, the iPRO does provide a very practical course. Candidates could pick a route which would match some of the academic rigour of the A level, depending upon the units chosen, or a much more practical route, although this made comparison of the two qualifications, in terms of their utility for supporting progression to Higher Education, problematic. However, the Expert Group agreed that the three Certificate and Diploma pathways provide a logical route through the units, the contents of which supported each other in terms of the overall learning being undertaken, i.e. this was not a programme where a student could link together an eclectic choice of units.

In summary, it appeared that the iPRO had some value in terms of supporting progression to Higher Education, but there was a real issue in terms of how to determine its value. There is a wide variety in the number and range of the iPRO units which would be hidden from Higher Education admissions who would only see a learner applying with a whole iPRO Certificate or Diploma and not its component parts. It was agreed that this variation in the units had to be taken into account when allocating UCAS Tariff points using what was termed the principle of due caution.

Furthermore, concern was expressed that the standard benchmarking would not work particularly well because of the different nature of the qualifications. The judgement

about the allocation of UCAS Tariff points might, therefore, need to be formed more subjectively than usual, but nonetheless supported by an argument and a valid audit trail.

In an attempt to get to grips with the content in each qualification, a unit-by-unit comparative analysis was undertaken between the Applied A level and iPRO units. Both iPRO devised and vendor units were selected for this comparison under the guidance of the Higher Education representatives on the Expert Group. They pointed out, drawing upon their more expert knowledge of the content domain, that if consideration was given to the iPRO vendor units, which were deemed beyond scope for the original mapping exercise, comparisons with the Applied A level units could be found.

Networking units

The first comparison was made between Applied A level Unit 11: *Communications and Networks* (an optional unit for those undertaking the A Level Double Award for practitioners having already taken the compulsory Unit 4: *ICT Solutions,* which is mandatory) and iPRO Unit 14: *Network Fundamentals* (an optional CISCO vendor unit which is likely to be taken in the iPRO).

In many ways the same words could be identified and matched across the two units – using networks, hardware issues, cables, and so on – and thus they appeared to be very similar in content. However, the Expert Group thought that there might be a higher level of academic content in the Applied A level unit with its emphasis on evaluation. In the Applied A level unit though there was no indication of the depth of understanding of practical application required. In response, the AQA Chief Examiner confirmed that the Applied A level does require practical work; candidates would be required to know the content of iPRO Unit 14. Nonetheless, it was suggested that the iPRO had more technical depth, while the Applied A level had more breadth and application.

On the basis of this observation, and looking at the number of glh per unit, a reasonable hypothesis might be that the two units are roughly comparable, given that they were of a similar size, and that there seemed to be a reasonable amount of overlap in content. There was some agreement with this, but the assessment processes for the two units, it was argued, militated against this conclusion. Even though the language being used to describe the content may be very similar, the assessment does make a difference: as a Higher Education representative pointed out, even if someone has taken and passed the objective test required for the vendor unit, that does not necessarily mean that they will have developed academic skills such as analysis and evaluation, so valued in Higher Education, and which are explicitly assessed in the A level. If Higher Education is looking for an ability to generalise knowledge, a candidate would not necessarily achieve that capability by passing a vendor unit.

The assessment of iPRO Unit 14 and the GCE A level Unit 11 was then compared to see what light this might shed on the issues of breadth and depth of content. The assessment of the two is very different. In iPRO Unit 14, assessment is by an objective test and requires that the candidate demonstrates knowledge of 'can you do and can you prove you can do?' The candidate could be asked to demonstrate their competence against all

the assessment objectives in Unit 14 and, if achieved, would show that they could do everything in the Unit. Given that the pass mark for the test is 70%, this is akin to a mastery model of assessment However, in the Applied A level, if candidates achieve a good Unit grade, this is evidence that they can do most things, but not necessarily everything from the assessment objectives for the unit, i.e. a more compensatory assessment model is being used.

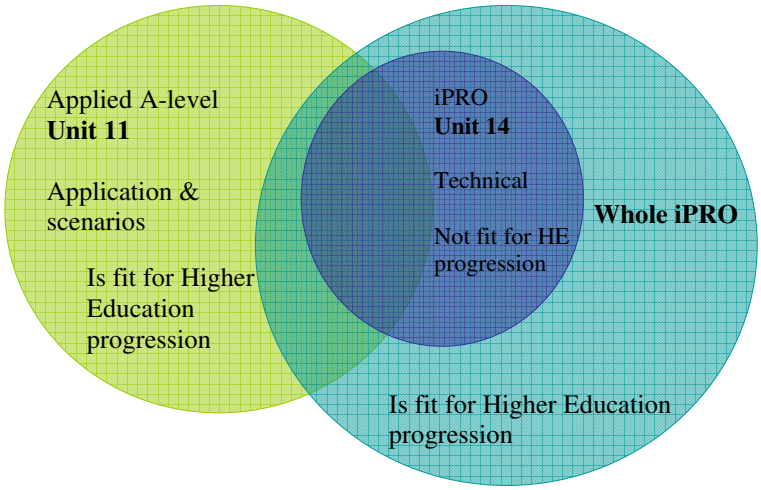
On the basis of this exercise, it also appeared that the Applied A level is putting a much more functional slant on the knowledge being learnt. For example, candidates were required to look at the function(s) of a component within a network and relate that to the function(s) of other components within a network. There was much less focus on what is going on within the component within the A level unit; the iPRO (CISCO) Unit required this deeper level of technical knowledge. Thus, the Applied A level Unit required candidates to know how a component, treated as a black box, can be used and how it fitted into the network. The iPRO required knowledge of what goes on inside the black box. There was therefore a difference in knowledge requirements, which was emphasised by the methods used to assess that knowledge. Put crudely, this amounted to more breadth in the Applied A level Unit, but more depth in the iPRO Unit. However, it was pointed out again, that the assessment model for the iPRO unit was not making an explicit assessment of evaluation and analysis skills, as was the case with the A level Unit. This suggested greater depth in the A level unit as these were academic skills, as opposed to technical skills, valued by Higher Education.

It was then suggested that a more holistic approach should be taken to judging breadth and depth of content. Independently, Units 11(Applied A level) and 14 (iPRO) do not match each other in terms of academic skills. But taken in the context of the whole iPRO qualification, a candidate would have achieved the additional skills (evaluation and analysis) sought by Higher Education because, it was argued, if iPRO Unit 14 was taken in the context of the whole qualification, the candidate would have demonstrated, via the different assessment model for the OCR-devised units, the necessary supporting skills of evaluation and analysis. If this was the case, then the two qualifications could be considered to have broad comparability. The hypothesis being advanced was, then, that if one candidate achieved the Applied A level including unit 11, and another achieved the iPRO with Unit 14, there would be comparability in terms of skill development, but that this cannot be established by a comparison across the two individual units alone. In addition, by adopting a more holistic approach, it was argued that completing both qualifications would provide a level of networking knowledge and understanding that would be largely comparable across the two qualifications.

The counter argument was that the iPRO candidate would have detailed but rather compartmentalised technical knowledge, but without the ability to deal with the whole construct of ICT, a clear aim of the Applied A level. Thus, while the iPRO had some utility in terms of progression to Higher Education, it was not as appropriate a base to build on for Higher Education courses as the Applied A level. Consequently, two candidates, one coming through the Applied A level and the other through the iPRO,

would be seeking entry into Higher Education with very different types of knowledge and skills which should be reflected in the allocation of UCAS Tariff points.

Diagrammatically, this can be summarised as follows. The Applied A-level and the iPRO unit share some common content, but the iPRO unit is understandably more focused on developing technical knowledge and work-place competence that is not intended for Higher Education progression. Embedding the iPRO unit within the whole of the iPRO qualification does provide something which was fit for supporting progression to Higher Education. However, the Applied A level unit, with its focus on application of knowledge and scenarios, was in itself designed for progression to Higher Education.



Thus, on the basis of the comparison of these two units, at a unit level it looked as if the Applied A Level unit was larger than the iPRO unit, in terms of its utility for supporting progression to Higher Education. But that conclusion did not necessarily apply to the whole qualification.

Systems Analysis

The next comparison involved the use of a mapping exercise undertaken in the preparatory work (Appendix 3) between the OCR-devised iPRO Unit 29: *Investigate Requirements for Software Solutions* (a mandatory unit in the software development pathway that is assessed by an externally set and marked assignment) and the Applied A level A2 Unit 13: *Systems Analysis* (an optional unit for the double award, internally assessed and externally moderated by AQA). Both units are about analysing the requirements needed for software construction. The content of the Applied A level unit seemed to match quite well with iPRO Unit 29, although the latter was less explicit in terms of the link between content and assessment objectives (AO). For example, in the A2 Unit, the content and criteria used to judge attainment against AO1 ICT Capability are covered explicitly in iPRO Unit 29.

But this comparability, between an A level and an OCR devised unit, was largely a function of the way the assessment objectives were specified for the two awards: at the

award level for the Applied A level to maintain coherence and on a Unit by Unit basis for the iPRO to maintain flexibility. Thus, the assessment objectives for the vendor units differed, to some extent, from those of the OCR devised units. On the basis of this observation, it was suggested that OCR iPRO units are likely to look like Applied A level units, whereas vendor units are more narrowly specified. The vendor units, therefore, have lower utility for the purpose of supporting progression to higher education because they are more focused on developing specific work-related knowledge and skills. It was pointed out that this tentative conclusion on the basis of the comparison being made here was unsurprising given that the same person had written Unit 29 (iPRO) and Unit 13 (Applied A level).

To summarise, so far it had been suggested that:

- comparing guided learning hours tended to suggest that, at Unit level, the Units in the two qualifications seemed to be of similar size
- comparing content, the vendor units, in terms of their utility in supporting progression to Higher Education, were smaller than the Applied A level units (the vendor unit hypothesis)
- OCR-devised iPRO units seemed to be more similar to the Applied A level units in terms of their utility in supporting progression to Higher Education (the OCR-devised unit hypothesis).

Customer Support
The OCR-devised Unit hypothesis was tested through a comparison between iPRO Unit 1: *Customer Support Provision* (a mandatory unit whichever pathway is chosen) and the Applied A level Unit 15: *Supporting ICT Users* (an optional unit).

It was suggested that the focus of the iPRO unit was much more on the user support desk rather than the Applied A level's whole organisation perspective. The identification of ICT faults, for example, which was part of the A level unit, was covered in another iPRO unit. Nonetheless, there was agreement that there was similarity in size between these two units, which tended to support the view that the OCR devised units were of a similar size to the Applied A level units.

Programming
The vendor unit hypothesis was tested using iPRO Oracle Vendor Unit 44: *Introduction to JAVA* and the Applied AS Unit 5: *Fundamentals of Programming* and A2 Unit 9: *Software Development*.

The iPRO unit appeared to be very focused on the acquisition of programming skills, and testing whether the candidate knew JAVA and could put it together to construct something. This knowledge was specific and deep. The AS and A2 units were found to be much wider in scope, but the candidate would not have developed better programming skills than the iPRO candidate. The comparison was not straightforward: on the one hand, the iPRO candidate would have developed a much deeper knowledge of JAVA than the Applied A level candidate, who, on the other hand, would have a much wider

knowledge of programming in general. Compared to the networking comparison, made above, this was, therefore, not a good match.

However, these differences, it was argued, would not make a significant difference in terms of progression to higher education. The student just needed to have had experience of programming; the additional accompanying knowledge that the iPRO applicant would have of JAVA was viewed as being good, but not essential. Since degree courses started teaching programming from scratch, they do not build upon any existing skills. However, the broadness in scope of the A2 unit did provide additionality for the purposes of progression to higher education.

Consequently, it seemed that the second generalisation made above also holds: vendor units, within the iPRO, are more specific and slightly narrower than A level units in terms of their utility in supporting progression into Higher Education.

Creating software

As a final test of the OCR-devised Unit hypothesis, the Expert Group compared OCR-devised iPRO Units 30: *Create Designs for Software*; 31: *Create Software Components – Generic*; 32: *Create Software – Programming Constructs*; and 33: *Test Software Solutions* against AS Unit 5: *Fundamentals of Programming* and A2 Unit 9: *Software Development*. OCR Unit 31 is externally assessed by means of an objective test: candidates would create software components in the course of learning, but not through assessment. It was commented that Multiple Choice Questions are a strange assessment method for Unit 31. The rationale given was that QCA wanted some external assessment and this is what OCR devised. The other iPRO units were assessed through locally set assignments, all of which were subject to external moderation.

There was thought to be considerable overlap between the OCR units in terms of knowledge, the difference being in how that knowledge was applied. All four Units would together cover the topic of programming. Overlap was also noted in the content of the AS and A2 units; a candidate could do Unit 9 without Unit 5 because of the overlap. It was argued that the difference between Unit 5 and Unit 9 was that Unit 5 involved working on specific aspects of programming, while Unit 9 was more whole task based.

Nonetheless, it appeared that 4 OCR-devised iPRO units seemed to map, in terms of their content, to two Applied A level units. This would refute the first generalisation made earlier that the OCR-devised iPRO units are similar in size to the A level units. Rather, this evidence suggested that there was another size of OCR-devised iPRO unit which is half the size of an Applied A level Unit.

Conclusion

At a unit level, then, there appeared to be considerable variation in the size of OCR iPRO units in terms of their utility in supporting progression to Higher Education. When combined with the range of choice of units that was available within the OCR iPRO, the outcome could be candidates applying for Higher Education who have a qualification that varied considerably in size. This was not seen as being so important in terms of

progression into employment where the development of specific knowledge and skill sets seemed to be the key issue. It did, however, present a problem for the UCAS Tariff, which was looking to establish as clear a signal as possible about the size of a qualification in relation to supporting progression into Higher Education.

Given this variation, it was agreed that there would need to be a more holistic judgement, i.e. at the level of the whole qualification, made about the value of the iPRO in terms of progression to Higher Education. On the basis of the evidence reviewed so far, it was suggested that the iPRO Certificate, in terms of its volume of learning, lay somewhere between an A level and AS, maybe more toward an AS. QCA currently gave 280 points to the Applied A level and 262.5 to the iPRO Certificate, which would support this intermediate position. If accepted by the Expert Group, this argument suggested that a possible allocation of UCAS Tariff Points to the iPRO Certificate would fall somewhere between 80 and 110 UCAS Tariff points without taking account of the relative demand of the two qualifications. This issue was addressed next.

4.5 Estimating relative demand - comparing Assessment Models

The Expert Group was reminded that the iPRO Certificate and Diploma are overarching qualifications which can be built up in different ways, depending which of the three pathways through the qualifications was chosen. That iPRO assessment was based on a mastery model within which, depending on the pathway and so the combination of units, the candidate would be presented with different types of assessment: centre set and assessed case studies externally moderated; externally set and assessed case studies using a checklist to record qualitative judgements; objective e-tests set either by OCR or by vendors (with a 70% pass mark).

In terms of allocating UCAS Tariff points to a qualification, the Expert Group agreed that it was necessary to decide on values for the iPRO Certificate and one for the Diploma, which did not send false messages to Higher Education. The assessment model, for example pass/fail rather than grading, and the different assessment methods being employed in the different units, in addition to the variation in the size of the units and the various ways in which units of different size can be combined, presented additional challenges to reaching this outcome.

The Expert Group then looked at the different modes of assessment within the iPRO and compared these to the GCE A level. Consideration of the mark scheme and assessment material for iPRO Unit 1, assessed via an externally set assignment, indicated that candidates were presented with a scenario in the form of a case study, which was then used to complete four tasks. Each of these tasks was made up of a number of sub-tasks (a total of 20) each one commencing with one of the following verbs:

- Identify (6 occurrences)
- Research and identify (2 occurrences)
- Develop (1 occurrence)
- Select (1 occurrence)
- Describe (4 occurrences)

- Produce (4 occurrences)
- Use (1 occurrence)
- Identify and justify (1 occurrence)

Combining these verbs with the remainder of the sub-task suggested that the majority of the assessment for this unit was focused on knowledge and application of IT. While there was some evidence of analysis and evaluation skills being required to answer some of the questions, this was not as great as with the A level assessment. The assignment avoided atomisation by making the case study tell a story. By contrast, in the GCE A level, the externally set tasks were very broad, not specific case studies. Nonetheless, in both qualifications the set activities provide some stimulus material and then specify in different ways a range of tasks that a candidate has to undertake. Both ask students to 'research, develop, find out, describe'.

In terms of the centre devised assessments, a list of assessment items had to be checked off. If one was missed or was deemed to be of insufficient quality, the candidate failed the unit. This, it was argued, was a very mechanical form of assessment and one through which evaluation and analysis skills could not really be demonstrated, though knowledge and application could be assessed.

The objective tests could not be examined for reasons of confidentiality over the question bank. Given the pass mark of 70% required for the objective tests used to assess the vendor units and OCR-devised unit 31, the HE representatives argued that passing the iPRO overall would require a candidate to demonstrate a good level of performance.

It was noted that the overall Pass grade for the OCR qualification could only be obtained by passing all units. This, it was suggested, indicated that a passing OCR iPRO candidate would have achieved a good mastery of technical knowledge and would possess considerable technical skills. The grade for the Applied AS and A level was achieved by adding module marks, scored on the Unified Mark Scale, together to get an overall mark and grade by re-scaling for percentage marks achieved on each unit assessment. This allowed for some compensation between Units and the assessment scheme suggested that lower grades were associated with weaker knowledge and understanding in addition to a lower level of evaluation and analysis.

For the Expert Group, it was clear what the different assessment requirements were within the Applied A level and it was clear that the GCE was assessing different things from the iPRO. There was a greater emphasis, for example, on evaluation, understanding, application – high level academic skills – in A level. The GVCE A level, it was concluded, goes further than the knowledge requirements of the iPRO, as evidenced by the assessment objectives:

- AO1 – practical capability
- AO2 – knowledge and understanding
- AO3 – application
- AO4 – evaluation

In an A level (AS and A2), it was argued, a candidate accessing higher grades would need to achieve well against all these four assessment objectives. However, it was pointed out, on the basis of examining the assessment material, that the OCR iPRO candidate did not seem to have the opportunity to demonstrate achievement of the higher order skills of evaluation and analysis (which of course did not mean that they could not do so if given the chance). In particular, it was noted that the checklist approach to assessment in the centre devised assessments, where candidates were asked to produce evidence to demonstrate their competence, was not really amenable to assessing such skills. Nonetheless, given the mastery model of assessment and the pass mark of 70% required for the objective tests being used to assess the vendor units and OCR-devised unit 31, Higher Education admission tutors, it was agreed, should have confidence in the standard being achieved by an iPRO candidate in terms of technical knowledge and skill. However, the emphasis in the iPRO seemed to be on the first three assessment objectives listed for the A level. If this is the case, then this would reduce the demand of the iPRO viz-a-viz the A level. To test this hypothesis, the Expert Group next examined candidate evidence.

4.6 Estimating relative demand - Comparison of candidate evidence

The usual practice followed for Expert Group meetings of examining candidate materials from the different qualifications to align grades could not be undertaken because the Applied A level was a new qualification and currently no candidate 'scripts' were available. Furthermore, given the newness of the current iPRO specification, there was also no candidate evidence available for this qualification. However**, s**everal iPRO assignments, taken from the previous iPRO awards, were available for inspection. It was suggested, on the basis of inspecting this material, that an internally assessed assignment for the Applied A level portfolio would look similar to the iPRO assignments available for inspection, but would consist of more encompassing tasks, with the candidate required to undertake two or three tasks for the whole portfolio.

There was some evidence that iPRO candidates meet the Applied A level assessment objective AO1 –candidates demonstrated an ability to use their initiative to develop, enhance and extend their range of ICT skills and techniques as required. For example, a Unit 29: Software Development case study showed that the candidate was finding the most appropriate method of implementation. In the Unit 1: Customer Support Provision case studies, iPRO students were having to find out how and what to analyse to complete the assignment. This required the use of initiative and the possible development of new skills in order to achieve the assessment objectives.

However, Applied A level candidates achieving high grades will know not just how things are done, but can demonstrate knowing why they are done a particular way. The emphasis is on understanding and on evaluating. All of their work, from all units from AS upwards, would need to demonstrate this if they were to achieve the higher grades in the A level. The assessment, it was argued, is therefore more synoptic. Thus, while iPRO candidates could have a high level of knowledge, Applied A level candidates showed understanding as well. The candidate had to have done well in all the assessment

objectives to achieve higher grades, and AO3 and AO4 are particularly important in achieving higher A level grades, compared to AS grades, given the weighting attached to them in the A2 scheme of assessment.

It was argued that iPRO candidates would have met AO1, AO2 and AO3, but not necessarily AO4 from the GCE AS/A level specification. An additional issue was the difference in nature between the varying iPRO units; the vendor units had no evaluation aspect, so an iPRO candidate following a programme containing several of these units would have even less opportunity to develop such skills.

4.7 Recommendations for Awarding UCAS Tariff Points

The Chair summarised the evidence reviewed to date. This suggested that the iPRO was, on average, somewhere between the size of an AS and an A level. The evidence further suggested that because of the variation in the size of the iPRO units noted earlier, learners applying to Higher Education with iPRO Certificates could have completed a qualification consisting of 6 OCR-devised units of similar size to an Applied A level unit or, at the other end of the scale, 2 OCR-devised and 4 vendor units – a potentially much smaller qualification. Given that there is as yet no available information as to what a typical profile for an iPRO candidate looks like, either of these possibilities could be equally likely to occur. This suggested that an iPRO Certificate applicant might apply to Higher Education with a qualification ranging from 20 (AS Grade E) to 120 (A level Grade A) UCAS Tariff points. Given the lack of grading and the lack of distinction between different types of unit in the iPRO qualifications, this range had to be compressed to a single value for the purposes of this exercise. It was argued that, at this stage, the Expert Group should err on the side of caution, but not excessive caution: if too many points are allocated, the wrong signals would be given to Higher Education; if too few, the candidates would not receive enough credit.

At this point, it was suggested by the Chair that the group had three options:

1. On the basis of the available evidence, it could decide that it was not possible to allocate UCAS Tariff points to the iPRO Certificate. This option was rejected as it was felt that there was consensus that the award was relevant for supporting progression to higher education.
2. The Expert Group could agree that it was possible to award Tariff Points but that more evidence was needed in the form of candidate assessment materials.
3. The Expert Group, while accepting that there was a degree of uncertainty, could nonetheless award UCAS Tariff points to the iPRO Certificate, but that this should be a provisional allocation subject to an early review once additional candidate evidence became available in the autumn of 2007.

There was an objection to allocating Tariff points until samples of candidate evidence became available, specifically A/B boundaries and E/U fails for the GCE A level, along with Pass/Fail boundary scripts for the OCR qualifications. Concern was expressed that without seeing portfolio work from both qualifications the value of the Applied A level could be diminished. (In some ways, vendor units, it was suggested, are less contentious,

as long as it was made clear to admissions staff that objective testing was involved in their assessment).

It was then suggested from one Higher Education representative that 80 UCAS Tariff points would be appropriate for the iPRO Certificate for the following reasons:

- the technical knowledge being assessed through the vendor units was considerable and had value in terms of progression to HE, and that the 70% pass mark on the objective tests represented evidence of considerable achievement.
- OCR-devised units seemed to be broadly `comparable to A level units in terms of size and assessment demand, with the exception of AO4.
- Applicants would not be accepted with this qualification on its own but only as part of a wider basket of qualifications.

The other Higher Education representative agreed with this proposal providing that no more than 80 UCAS Tariff points were allocated to the iPRO Level 3 Certificate.

There was some disagreement from the AQA A level Chief Examiner, who argued that in particular, 80 UCAS Tariff points was too high for a qualification with mechanistic assessment, pre-defined assignments and checklist marking, and that teaching to such an assessment scheme is very much easier than teaching to the GCE A level assessment scheme. The Higher Education representatives were asked to arbitrate and agreed that 80 points should be awarded to a Pass for the iPRO Certificate at this stage to equate to grade C at A level. However, it was agreed that this must be reviewed once candidate evidence becomes available.

On the basis of this discussion, and given the decision rule embodied in the UCAS protocol that Higher Education representatives should be allowed the final decision, the Chair concluded that 80 UCAS Tariff points should provisionally be allocated to the iPRO Level 3 Certificate Pass. This would be reviewed in September 2007 when candidate evidence would be available from the first Applied A level A2 candidates and from those taking the new OCR iPRO. The Chair asked the Higher Education representatives to offer reassurance that the decision would not harm an Applied A level applicant. They agreed that such a student with a C grade alongside two other A levels would be just as acceptable as a student with a Pass in the iPRO Certificate alongside two other A levels. In addition, it was pointed out that those taking the iPRO could not access the higher level of Tariff Points available for those achieving Grades A and B at A level.

It was also pointed out that the iPRO Level 3 Diploma required more points as it contained two more Units. It was agreed that an additional paper should be prepared by Dr Geoff Hayward and circulated to the Expert Group, with a recommendation on this matter. It was confirmed that the following evidence would be required for the review in September 2007:

- Applied A level AS and A2 candidate evidence to reflect the A/B, E/U boundaries, and Grade C students.

- iPRO candidate evidence for Pass candidates.

Units would be specified later.

Allocating UCAS Tariff Points to the OCR Diploma for IT Professionals
The following argument, providing a suggested rationale for the allocation of UCAS Tariff Points to the Diploma, was circulated to members of the Expert Group after the meeting for their consideration as part of the draft of the Expert Group report. It is expanded slightly here to ensure clarity in the argument.

Given that it has been agreed that the OCR Certificate is provisionally allocated 80 UCAS Tariff Points, then one approach to allocating UCAS Tariff points to the Diploma would be through a process of proportional reasoning: multiply 80 UCAS Tariff Points by one-third (i.e. the value of two extra units) giving a value for the Diploma of 106 UCAS Tariff Points. However, there is a need in making an allocation of UCAS Tariff points to the Diploma to take account of the differences between OCR-devised and vendor units, and the fact that the two additional units for the Diploma may well be thin vendor units. The following is therefore suggested, taking account of the principle of due caution outlined above: A pass in the iPRO Diploma should, for the time being, attract 100 UCAS Tariff Points.

This proposal was subsequently accepted by the Expert Group, albeit with some concern being expressed. Barbara Wilson, the AQA Chief Examiner, commented, "Basically I think the suggestion for the diploma is reasonable." Andy Naftel, one of the Higher Education Representatives, responded: "In [the] absence of candidates' work and typical iPRO unit profile information, reluctantly I have to accept this mechanistic scaling process." Robin Oldham, the other Higher Education representative also accepted, albeit reluctantly, the proposal for the Diploma: "Having read through the draft report I support what is there. The only issue I have is the 8 unit award which on one hand has to have a proportional increase in value, but it could be increased by 2 extra 'smaller' units rather than the more hefty ones, but this was briefly discussed on the day and this is the most logical outcome."

Coda
The unease with which the final recommendations for this exercise were accepted indicates the importance of treating the current allocation of UCAS Tariff Points to this award as being provisional. It is worth rehearsing the reasons for this here.

The variability in the volume of learning judged suitable for supporting progression to Higher Education within the Units of the OCR qualification presented a huge problem. On the basis of the evidence available, the Expert Group could not create a benchmark relationship in terms of learning volume for each type of Unit in the OCR award - OCR devised and vendor - because there was no easily recognised, universally applicable benchmark for either type of OCR unit in the Applied A level. If the process had proceeded by just benchmarking the demand of the OCR devised units, then a fair judgement of the demand of the vendor units would not have been formed. Thus the

Expert Group, having accepted that the OCR qualifications did have utility for supporting progression into Higher Education, had to adopt a more holistic and subjective approach to accommodating the OCR qualifications. Bearing in mind the preliminary agreement that in terms of volume of learning, the iPRO certificate lay somewhere between an AS and an A level; and given the mastery model of assessment being employed; and the sheer amount of Technical content being covered, then the best judgement of the Tariff value for the OCR Certificate would lie somewhere between 20 (Grade E at AS) and 120 (Grade A at A level) UCAS Tariff points.

Such an allocation can be further justified on two grounds. First it indicated that the OCR Certificate was a qualification of intermediate volume between the AS and the A level (Single) Award even though the OCR Certificate is nominally a six unit qualification with similar guided learning hours to the six unit Single A level award. Thus it takes account, at least to some extent, of the perceived narrowness of the vendor units. Second, it recognised that candidates taking the OCR Certificate could not achieve attainments comparable to those of Grade A and B in the GCE A level because they were, on the basis of the evidence reviewed, not able to demonstrate evaluation skills. Thus, the allocation of 80 UCAS Tariff points recognised both the smaller size and lower demand of the OCR Certificate compared to the GCE A level, as judged on its utility to support progression into Higher Education.

The Expert Group was offered the opportunity to decline or postpone making an allocation of UCAS Tariff Points to the OCR qualification because of the uncertainties experienced during the course of the meeting. However, **both** Higher Education representatives on the expert group believed that an allocation of UCAS Tariff points should be made to the iPRO at this stage because it did have utility for supporting progression to Higher Education. Bearing in mind the consideration of due caution, it was suggested by **both** Higher Education representatives that 80 UCAS Tariff points, i.e. a position between the AS and A level, but closer to the AS, would be a reasonable allocation at this stage for the OCR Certificate. This would take account of both judgements of (a) the smaller size of the OCR Certificate, though it is nominally a six unit qualification like the GCE A level (Single award) and (b) its lower demand because of a reduced emphasis on evaluation as an assessment objective.

Further work was undertaken after the meeting to ascertain the value that should be allocated to the Diploma. This is clearly larger than the Certificate and using proportional reasoning, the Tariff allocation would be 106 UCAS Tariff points. However, in the absence of candidate evidence, the principle of due caution was again applied and a suggested allocation of 100 UCAS Tariff points was recommended. This recommendation, with the supporting argument, was circulated to all members of the expert group and agreed.

This is not an ideal situation. The qualification is therefore being reviewed in September 2007 when candidate evidence will be available for both qualifications, and the typical profile of OCR candidates will have begun to emerge.

APPENDIX 1

THE CURRICULUM VITAE OF THE MEMBERS OF THE EXPERT GROUP

Glen Millberry	OCR	Chief Examiner, iPRO Systems Support, Levels 2, 3 & 4
Barbara Wilson	AQA	Chair of Examiners for ICT and Applied ICT
Andrew Naftel	University of Manchester	Lecturer in Informatics
Robin Oldham	Staffordshire University	Principal Lecturer & Student Recruitment Manager, Faculty of Computing, Engineering & Technlogy

CURRICULA VITAE

GLEN MILLBERY

EMPLOYMENT HISTORY

Teaching

2003 – Present	Sutton Valence School	Director of ICT
2002 – 2003	Sutton Valence School	Head of ICT
1997 – 2001	Highworth Grammar School for Girls	Head of ICT, ICT Co-Ordinator, Network Manager, Curriculum Manager
1995 – 1997	Highsted Grammar School for Girls	ICT Teacher, Teacher Governor, Chair of ICT Cross Curricular Group
1994 - 1995	West Buckland School	ICT Teacher

Business

2001 – Present	Director, Resources for Teaching Ltd
1993 – 1995	Devon County Council

Examining/Moderating

2004 - Present	Chief Examiner, iPRO Systems Support, Level 2,3 and 4.
2002 - Present	Specification Development: Applied A Level, General A Level, CIE Skills Awards and IAS/IA2, iPRO Levels 1,2,3 and 4
2002 - Present	Principle Examiner, VCE ICT (7342: Investigating Communications and Networks)
2001 - Present	Team Leader GCSE ICT Moderation OCR (Moderator since 1997)
2000 - Present	Principle Examiner, AS ICT OCR (2512)
1998 - Present	Team Leader GCSE ICT Exams OCR (Examiner since 1997)
1997 - 2000	Assistant Moderator and Examiner A Level Computing AQA

EDUCATION

1982–1987	Brentwood School
1987–1989	West Buckland School
1989 – 1992	Saint David's University College, University of Wales BA(Hons) II(i) Philosophical Studies and Informatics
1994 – 1995	Keele University PGCE Secondary, ICT, History (RE)

Resume for **BARBARA WILSON** (BSc, PGCE(dist))

Currently Chair of examiners for ICT and Applied ICT GCE for AQA, having previously been an assistant principal moderator, principal examiner and chief examiner. Also Chair of Examiners for the National Computing Centres International Diploma.

Employment includes:
Transport planning
Teaching and head of department roles in schools, FE, HE, and most recently sixth form college. Courses taught primarily to 16+ age group including adult work on A levels and vocational courses including the National Computing Centres Threshold scheme.

Self employed since 1991, contracts having included:

Consultancy work for City and Guilds International

Consultancy work for the National Computing Centre

Training organiser - Deva Horticultural Training Group

Trainer and consultant to Agricultural Training Board

Freelance Training and consultancy in ICT primarily for smaller businesses and sole traders

Author of several text books

Consultancy and training services to teachers and schools both locally and nationally

Work for WIT (Women into Technology)

Founder member of NAITFHE (National Association for IT in Further and Higher Education)
Member of Association of Educational Assessors

ANDREW NAFTEL

Personal Information

Full Name Dr Andrew James Naftel BSc PhD ILTM MBCS CITP MIEEE

Date of birth 27/04/63

Dates	***Education***
1985-1989	University of Bradford – PhD (Photogrammetric Engineering)
1981-1985	University of Bradford – BSc (Hons) Mathematics with Industrial Experience

Qualifications

2005	Chartered IT Practitioner
2002	Member of British Computer Society
2001	Member of the Institute for Learning and Teaching in HE
1989	PhD Photogrammetric Engineering, University of Bradford
1985	BSc (Hons) Mathematics, Upper Second Class, University of Bradford

Employment History

2004 – present	Lecturer in Informatics, School of Informatics, University of Manchester. Teaching duties: object oriented programming, Web technologies, BSc and MSc project supervision. Supervised four PhD students in computer vision. Research interests: computer vision and image understanding.
2002 – 2004	Lecturer in Computation, Department of Computation, University of Manchester Institute of Science and Technology.
2000 - 2001	Lecturer in Computing, Department of Computing**,** University of Bradford**.** Teaching duties: software development (Java), UML, graphics and image processing, BSc and MSc project supervision. Supervised two PhD students in computer vision.
1991 – 1999	Lecturer in Mathematics and Computing, Department of Mathematics and Statistics, University of Central Lancashire. Teaching duties: numerical analysis, programming, mathematical methods
1988 – 1990	Postdoctoral Research Assistant**,** Department of Civil Engineering, University of Bradford.

Selected recent publications

Naftel, A. and Trenouth, M.J. Stereo-assisted landmark detection for the analysis of changes in 3-D facial shape, *Medical Informatics and the Internet in Medicine*, 2004, 29(2), 137-155.

Khalid, S. and Naftel, A., Evaluation of matching metrics for trajectory-based indexing and retrieval of video clips, *Proc. 7th IEEE Workshop on Applications of Computer Vision* (*WACV/MOTION'05*), Colorado, USA, 5-7 January 2005, pp. 242-249.

Khalid, S. and Naftel, A., Motion trajectory clustering for video retrieval using spatio-temporal approximations, *Proc. 8th International Conference on Visual Information Systems* (*VISUAL'05*), Amsterdam, Holland, 4-5 July 2005, pp. 60-70

Naftel, A. and Khalid, S., Classification and prediction of motion trajectories using spatiotemporal approximations, *Proc. International Workshop on Human Activity Recognition and Modelling* (*HAREM 2005*), Oxford, UK, 9 September 2005, pp. 17-26.
Khalid, S. and Naftel, A., Classifying spatio-temporal object trajectories using unsupervised learning of basis function coefficients, *Proc. 3rd ACM International Workshop on Video Surveillance & Sensor Networks* (*VSSN 2005*), Singapore, 11 November 2005, pp. 45-52.
Melo, J., Naftel, A., Bernardino, A. and Santos-Victor, J., Detection and classification of highway lanes using vehicle motion trajectories, *IEEE Trans. Intelligent. Transport. Syst.*, 2006, 7(2), 188-200.

MR ROBIN OLDHAM
Principal Lecturer
Faculty of Computing, Engineering & Technology
Student Recruitment Manager

Qualifications

1998	BSc(Hons) Media Technology (2:i) Staffordshire University

Experience

2002 – Current	Principal Lecturer with responsibility for Student Recruitment for Computing, Engineering and Technology awards Staffordshire University
2000 – 2002	Senior Lecturer Entertainment Technology Staffordshire University Award Tutor Media Technology
1989 – 1999	Lecturer Staffordshire University
1986 – 1987	Dixons Stores Group Multimedia PC Trainer
1993 – 1994	Chinese State Circus

Teaching Specialisation/Areas of Academic Interest

- Media & Internet Technology
- Interactive Multimedia

University/School Responsibility

- FCET Student Recruitment Manager
- FCET Quality Development Team
- University Student Recruitment Forum
- International Practitioners Group

Consultancies

- UCAS IT Advanced Apprenticeships Experts Group

Internal Examinerships

- Asia Pacific Institute of Information Technology (Kuala Lumpur) internal member of the validation panel 2006

APPENDIX 2
EVIDENCE EXAMINED

THE OCR iPROs

1. OCR Specifications for the OCR Level 3 Certificate And Diploma For IT Professionals (iPRO).

These included:

- The combinations of units for each award
- Unit content
- Assessment guidelines
- Grading criteria for each unit

2. OCR Unit 1 Customer Support Provision Assignment, mark scheme and 2 candidate scripts

3. OCR Unit 29 Investigate Requirements for Software Solutions Assignment, mark scheme and 2 candidate scripts

4. Chief Examiner Reports

THE AQA APPLIED A LEVEL

1. AQA Specifications for the GCE A Level in Applied Information and Communication Technology

These included:

- The combinations of units for each award
- Unit content
- Assessment guidelines
- Grading criteria for each unit

2. GCE specimen assessment materials

APPENDIX 3
MAPPING DOCUMENT

Mapping the OCR iPRO Level 3 Certificate/Diploma for IT Professionals to the Practitioner Units of the AQA GCE Applied Information and Communication Technology (Single and Double Award)

Please note: The original mapping document was amended by HE Representative, Dr Andrew Naftel. This is his version of the ***exercise***

1 Four units of the OCR iPRO Certificate/Diploma are mandatory: Units 1, 3, 8 and 29
2 Units 1, 29 and 31 are externally assessed by OCR
3 Where possible the AQA Units are matched for over lap against all of the above Units.

AQA	**OCR**
There are 8 Practitioner Units in the AQA Award used in this mapping exercise: only Units 4, 5, 9, 13, 15 were found to overlap. The Practitioner Units are only available to those completing the Advanced Subsidiary and Advanced level double awards. The content of the Units is written against a number of subheadings which have been included together with an indication of the main content areas. ***Content not matched against OCR Units is in bold italics***	There are a total of 45 iPRO Certificate/Diploma Units but this mapping exercise is concerned only with all the mandatory units, some of which are externally assessed by OCR, and 1 optional unit which is externally assessed by OCR. The content of the Units is written against a number of learning outcomes which have been included together with an indication of the main KSU areas. *Learning outcomes not matched against AQA Units are in italics*

Externally assessed unit titles are in upper case	Externally assessed unit titles are in upper case

AQA	OCR
A2 Unit 15 Supporting ICT Users • understand how to set up and run a support service for ICT users • recognise when you can solve users' problems yourself and when you need to refer their problems to others • understand the need for maintaining accurate documentation • understand the need for user guides • understand the importance of safe working practices when providing user support. **Content** Systems for providing user support services Operating systems and user interface Software installation, configuration and support Hardware faults Evaluation Evidence of written communication Standard ways of working Working safely Keeping information secure Managing your work	**UNIT 1: CUSTOMER SUPPORT PROVISION K/101/9538** **Relevant Learning outcomes** • Understand the importance of and the techniques which can be used in providing technical support to customers. • Understand how to identify trends which may occur and how to improve support by the analyses of trends • Understand how problems can be resolved including the use of other sources of support and advice. **KSU** Identify types of users Use other sources of support Effective recording Effective communication Selection of technical information Analysis and evaluation

AQA	OCR
AS Unit 4: ICT Solutions **Partial overlap** • acquire an understanding of ICT system components and their purpose • select and evaluate hardware and software components for a stand-alone ICT system • install, configure and test an ICT system for use by a specified user • install, configure and test new software • understand the basics of software development • understand the principles of ergonomics • ***understand and implement safety and security procedures, including user rights, backup, file permissions and management issues.***	**Unit 3: Hardware/equipment and systems installation H/101/9537** **OCR Unit has much wider scope and makes more sense within a work-based context** **Relevant Learning outcomes** • Prepare for, assemble and integrate hardware/equipment and systems products, including - Identify configuration options, and their effects, for different hardware systems - Integrate different systems, demonstrate an understanding of the criteria to be used, the expected outcomes, the types of problem that could occur and the actions to be taken for different types of problem - Install system software to upgrade systems, understand the procedures for maintaining data integrity, and carry out checks to ensure that software meets operating specifications - Understand the principles of configuration management and change control - Document strategies for resolving problems and identify methods for ensuring that all interested parties are informed of actions undertaken • Understand the principles of configuring the components of an ICT infrastructure

AQA	OCR
Content Hardware Software Ergonomics Basic principles of software development Security, backup, user rights file permissions and management issues Evidence of written communication Standard ways of working Working safely Keeping information secure Managing your work	• Customise ICT systems and services, demonstrate an understanding of the criteria to be used when reviewing customisations, the expected outcomes, the types of problem that could occur and how to deal with these • *Understand the principles and importance of quality assurance, and how to apply quality assurance procedures* **KSU** Hardware Software Ergonomics Analysis and evaluation Producing reports Maintaining documentation *Principles of qa and implementation methods*
A2 Unit 13 Systems Analysis • understand the principles of systems analysis • investigate problems identified by a client by: - interviewing the client - analysing the results of completed questionnaires - observing systems used by the client - examining documents used by the client • apply the principles of systems analysis to propose solutions to meet the client needs • use structured analysis methods to define data needs and processing requirements for the client • create feasibility study reports and systems specifications. **Content**	**UNIT 29: INVESTIGATE REQUIREMENTS FOR SOFTWARE SOLUTIONS F/101/9562** **Relevant learning outcomes** • Gather and analyse appropriate and relevant information to meet the defined needs of the customer • Produce a report defining the customer requirements **KSU**

AQA	OCR
systems analysis methods feasibility studies investigation methods structured analysis tools system specifications dataflow diagrams entity-relationship modelling cost-benefit analysis creating conclusions standard ways of working **A2 UNIT 9 SOFTWARE DEVELOPMENT** **Partial overlap in content on design** • explore in depth the design, development and testing of a software system to meet the needs of a client • devise evaluation criteria for the solution and your own performance • explore and use appropriate standard design methods • create customised software to meet a given specification • incorporate programmed routines into the software solution using a recognised programming language • fully test the solution • understand the effects of the solution on the end users of the system • evaluate the solution and your performance against the agreed criteria • ***understand the implications of current legislation on the installation and use of the software solution.*** **Content**	investigation methods approaches to system development, feasibility studies alternative solutions identification of customer requirements production of reports **Relevant Learning outcomes** • Produce a physical design specification • Identify Implementation & maintenance procedures. **KSU**

AQA	OCR
production of software specifications evaluation criteria standard design methods modular implementation testing and evaluation evidence of quality of written communication **AS Unit 5: Fundamentals of Programming** • explore the use of algorithms and programming languages to create and customise software • learn and apply the principles of program design • design, implement and test a program to meet a given specification • produce technical documentation • develop good practice in your use of ICT **Content** hardware and software (languages) that are necessary how it may be broken down into manageable procedures how data will be processed data and variables that need to be used how information will be input and validated processing required (how you need to reshape or develop the information) how information will be output, e.g. screen, printed copy or electronic file program structures, e.g. sequence, repetition, selection how pre-written standard/library routines can be included the events and user interaction that occur while the program is being used	Physical design and software specification Testing programmes Technical documentation **Relevant learning outcome** • Construct logical data models from information system descriptions **KSU** Logical data modelling

AQA	OCR
the layout and structure of the program. **AS Unit 5: Fundamentals of Programming** • explore the use of algorithms and programming languages to create and customise software • learn and apply the principles of program design • design, implement and test a program to meet a given specification • produce technical documentation • develop good practice in your use of ICT **Content** hardware and software (languages) that are necessary how it may be broken down into manageable procedures how data will be processed data and variables that need to be used how information will be input and validated processing required (how you need to reshape or develop the information) how information will be output, e.g. screen, printed copy or electronic file program structures, e.g. sequence, repetition, selection how pre-written standard/library routines can be included the events and user interaction that occur while the program is being used	**UNIT 31: CREATE SOFTWARE COMPONENTS – GENERIC L/101/9564** **Relevant learning outcomes** • Create and assemble software components • Select and use tools, techniques and programming language appropriate to the software being created • Use good coding practice in creating software components • Select the appropriate pre-defined functions • Be proficient in the use of a current programming language, and familiar with the features of commonly available types of other programming languages **KSU** The identification of appropriate software components The selection of tools and programming languages Good coding practice Pre-defined functions At least three programming languages and when to use them

AQA	OCR
the layout and structure of the program. **A2 UNIT 9 SOFTWARE DEVELOPMENT** **Partial overlap in content related to use of design methods, testing software and software component interfacing** • explore in depth the design, development and testing of a software system to meet the needs of a client • devise evaluation criteria for the solution and your own performance • explore and use appropriate standard design methods • create customised software to meet a given specification • incorporate programmed routines into the software solution using a recognised programming language • fully test the solution • understand the effects of the solution on the end users of the system • evaluate the solution and your performance against the agreed criteria • ***understand the implications of current legislation on the installation and use of the software solution.*** **Content** production of software specifications evaluation criteria standard design methods modular implementation testing and evaluation evidence of quality of written communication	**Relevant learning outcomes** Understand the principles of configuration management and change control • Test software, apply appropriate types of test and understand the factors affecting the suitability of test types • Understand the principles of software component interfacing and integration. **KSU** Testing components and software Principles of change control How to integrate and interface software

APPENDIX 4
OCR iPRO UNITS

Unit Title	Status	Assessment
1. Customer Support Provision	OCR Devised Unit	Externally set assignment, externally assessed
2. Service Delivery, Planning & Control	OCR Devised Unit	Centre assessed, externally moderated
3. Hardware/Equipment and Systems Installation	OCR Devised Unit	Centre assessed, externally moderated
4. Principles of Planning Telecoms Services	OCR Devised Unit	Centre assessed, externally moderated
5. Software Installation	OCR Devised Unit	Centre assessed, externally moderated
6. System Testing	OCR Devised Unit	Centre assessed, externally moderated
7. Systems and Network Management	OCR Devised Unit	Centre assessed, externally moderated
8. Maintain Equipment and Systems	OCR Devised Unit	Centre assessed, externally moderated
9. Support ICT Acquisition	OCR Devised Unit	Centre assessed, externally moderated
10. Repair Centre Procedures	OCR Devised Unit	Centre assessed, externally moderated
11. Installing, Configuring and Administering Microsoft Windows 2000 Professional	Microsoft Vendor Unit	Vendor Test
12. Installing, Configuring and Administering Microsoft 2000 Server	Microsoft	Vendor

	Vendor Unit	Test
13. IT Essentials	CISCO Vendor Unit	Vendor Test
14. Network Fundamentals	CISCO Vendor Unit	Vendor Test
15. Router and Routing Basics	CISCO Vendor Unit	Vendor Test
16. Switching	CISCO Vendor Unit	Vendor Test
17. Wide Area Network Technologies	CISCO Vendor Unit	Vendor Test
18. Network+	CompTIA Vendor Unit	Vendor Test
19. Managing and Maintaining a Microsoft Windows Server 2003 Environment (70-290)	Microsoft Vendor Unit	Vendor Test
20. Implementing, Managing and Maintaining a Microsoft Windows Server 2003 network infrastructure (70-291)	Microsoft Vendor Unit	Vendor Test
21. Installing, Configuring and Administering Microsoft Windows XP Professional (70-270)	Microsoft Vendor Unit	Vendor Test
22. Server+	CompTIA Vendor Unit	Vendor Test
23. Security+	CompTIA Vendor Unit	Vendor Test
24. Linux+	CompTIA Vendor Unit	Vendor Test
25. Wireless LANs	CISCO Vendor Unit	Vendor Test
26. HTI+	CompTIA Vendor Unit	Vendor Test
27. Planning and Maintaining a Microsoft Windows Server 2003 Network Infrastructure	Microsoft Vendor Unit	Vendor Test
28. Planning, Implementing and Maintaining a Microsoft Windows Server 2003 Active Directory Infrastructure	Microsoft Vendor Unit	Vendor Test
29. Investigate Requirements for Software Solutions	OCR Devised Unit	Externally set assignment, externally assessed
30. Create Designs for Software	OCR Devised Unit	Centre assessed, externally moderated
31. Create Software Components – Generic	OCR Devised Unit	Externally (OCR) set objective test
32. Create Software – Programming Constructs	OCR Devised Unit	Centre assessed, externally

		moderated
33. Test Software Systems	OCR Devised Unit	Centre assessed, externally moderated
34. Creating Software Components – Fundamentals of Java	CISCO Vendor Unit	Vendor Test
35. Creating Software Components – Fundamentals of Unix	CISCO Vendor Unit	Vendor Test
36. Developing and Implementing Web Applications with Microsoft Visual Basic .NET and Microsoft Visual Studio .NET	Microsoft Vendor Unit	Vendor Test
37. Developing XML Web Services and Server Components with Microsoft Visual Basic .NET and the Microsoft .NET Framework	Microsoft Vendor Unit	Vendor Test
38. Developing and Implementing Windows-based Applications with Microsoft Visual Basic .NET and Microsoft Visual Studio .NET (70-306)	Microsoft Vendor Unit	Vendor Test
39. Developing and Implementing Web Applications with Microsoft Visual C#.NET and Microsoft Visual Studio .NET (70-315)	Microsoft Vendor Unit	Vendor Test
40. Developing and Implementing Windows-based Applications with Microsoft Visual C# .NET and Microsoft Visual Studio .NET (70-316)	Microsoft Vendor Unit	Vendor Test
41. Designing and Implementing Databases with Microsoft SQL Server 2000 Enterprise Edition (70-229)	Microsoft Vendor Unit	Vendor Test
42. Data Modelling and Relational Database Design	Oracle Vendor Unit	Vendor Test
43. SQL Programming	Oracle Vendor Unit	Vendor Test
44. Introduction to Java	Oracle Vendor Unit	Vendor Test
45. Java Programming	Oracle Vendor Unit	Vendor Test