

Appendix E

The University of Bolton Case Study: Part 1

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**IPR in International e-Learning Programmes
Case Study from The University of Bolton**

Part 1. The Case Study

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INTRODUCTION

Part 1 of this case study examines the relevant IPR arrangements and experiences from four e-learning programmes, all of which have been concerned with teaching microelectronics at postgraduate level in an international context.

Part 2 examines the debate for and against "open courseware" in higher education.

Part 3 considers the issues associated with attempting to protect IP of courseware in an international e-learning programme and draws conclusions. The Bolton approach is put forward as an example of a practical and rational response. Finally an attempt is made at defining a generalised practical approach to protection where both web content and a thin client facility are involved.

The four Bolton programmes considered in part 1 are:

Joint International e-Learning Programme: AMI. 1997 - 2002

Partnered by the University of Northumbria, Bolton Institute was one of the first HEIs in the UK to develop a fully e-learning accredited postgraduate degree programme, *Advanced Microelectronics for Industrialists* (AMI), and make it available internationally. To date students have enrolled on this programme from Canada, Malaysia, USA, Ecuador, Hong Kong and Singapore as well as European countries. Interest is also strong from Pakistan, India, Nigeria and many other countries in Africa. Students from abroad have already graduated without ever travelling to the UK or being visited by a tutor.

Joint International e-Learning Programme: MIND 1998 - 2002

The Department of Electronics and Computing Technology at Bolton led a European programme (Leonardo) to develop e-learning courseware in *Microelectronics for Industry* (MIND). Partners were based in Germany, Italy and the UK. (Ref. 1)

Joint International e-Learning Programme: CEESI 2000 - 2006

Since 2000 the Department has led another collaborative programme involving e-learning for microelectronics and involving ten UK university partners: *Continuing Education for Electronics Systems Integration* (CEESI). The management board for this programme took the decision not to attempt to share IPR, but instead to share the academic credits assigned to a student on completion of a module. In other words, the collaboration is at a higher level, at the level of module outputs instead of module contents. The CEESI project represents a successful model of collaboration that is proven and avoids concerns over IPR. The CEESI partners are: The University of Bolton, University of Bradford, Institute for System Level Integration (representing the universities of Glasgow, Heriot-Watt, Edinburgh and Strathclyde), University of Manchester, Northumbria University, University of Southampton, University of Surrey, the National Microelectronics Institute. (Ref. 2)

Online Postgraduate Courses for the Electronics Industry 2003 onwards

The CEESI agreement has superseded the partnership agreement between Bolton Institute and Northumbria University. Bolton now runs three MSc programmes taught entirely by e-learning:

- MSc Advanced Microelectronics
- MSc Electronic Design Realisation
- MSc Microelectronic Realisation

Modules are also marketed individually to attract delegates from industry who are primarily interested in Continuing Professional Development (CPD). It is quite common for such delegates to study further modules and eventually gain a qualification. (Ref. 3)

1. METHODOLOGY

Relevant documents were collected from the four programmes and information extracted on the key topics of this study. The evolution of the IPR arrangements and issues that have arisen are described. Structured interviews were conducted with key stakeholders.

1.1 Sources of information

The following documents were examined:

- proposal documents
- memorandum of agreements
- minutes of course committee meetings
- regular reports to the course committees
- external examiner reports

Agreement	Description
Administrative and Financial Memorandum of Agreement	Agreement between Bolton Institute and University of Northumbria at Newcastle, 1997 - 2002. Appendix A
Partner contract, Leonardo international MIND programme	Agreement between six international partners, Leonardo MIND programme. Appendix B
Memorandum of Agreement Masters Training Packages	Agreement between 10 universities, CEESI project. Appendix D
Agreements with employees and external contractors	Internal developments, Appendix G

Table 1: List of contracts and agreements, and details of their purpose

Structured interviews were conducted with key stakeholders including authors representing three different circumstances:

- a) authors where somebody else has subsequently taken over their work.
- b) authors who have retained control of their material
- c) authors who have taken over somebody else's work

1.2 Analysis of information

The information collected was categorised into the key topics, as follows:

- Motivation and objectives
- Rewards and business models
- Licences, agreements and contracts
- Rights of use/exploitation
- Jurisdiction
- Enforcement
- Geographical considerations
- Risks

The information in each of the above categories has been analysed, looking for common themes and trends relating to the international aspects of IPR.

2. MOTIVATION AND OBJECTIVES, REWARDS AND BUSINESS MODELS

2.1 What the programmes set out to achieve, and why

The initial programme considered by this case study was developed and managed by an internal "enterprise" department known as the *Technology Development Unit*. The motivation was to fulfil industrial customer demands for distance learning, in particular for remote teaching of electrical computer aided design (ECAD) design software used in industry. This fully e-learning course in microelectronics was jointly validated by Bolton Institute and the University of Northumbria in 1997.

Conscious of the public money being invested by EPSRC, the management committee made it a requirement that the IP be jointly owned. Reaching agreement on this took a long time but the memorandum (Appendix A) was eventually signed with the following wording (paragraph 6):

The partners agree that each institution has joint ownership of the intellectual property rights associated with the course materials developed for the joint programme. It is also agreed that permission is granted in perpetuity, by each institution to the other, for use of all such course materials as are developed during the contract period. In all cases, the names of the two institutions and the names of the author or authors shall be retained on all such materials.

The course has attracted many overseas applicants but was initially restricted to people in the UK while the systems were fully proven. For the past four years it has been available to overseas students. The wording of the agreement has withstood the test of time and the expiry of the agreement. Both parties have redeployed material developed by the other party, including on occasion running a commercial short course

Responsibility for the postgraduate programmes in microelectronics is now with the Department of Computing and Electronic Technology and student enrolments are of major importance. Consequently marketing is much more important than it was.

Motivated by the need to obtain additional funding for developing courseware, a European programme under the Leonardo scheme was proposed and led by Bolton Institute involving six partners in Germany, Britain and Italy between 1998 and 2001.

In the last few years the agreement between Bolton Institute and the University of Northumbria has been superseded by a wider agreement between ten universities known as CEESI (reference 2). The formation of the CEESI partnership was motivated by an industry trade association, the *National Microelectronics Institute* on behalf of its members. It recognises that individual universities can no longer deliver the breadth and depth required in a modern fast-changing technology so the only way forward is to pool resources and collaborate.

2.2 Influence of IPR on business and reward models

Bolton Experience No. 1

The contract between the Leonardo Office and Bolton Institute (the contractor) left it to the partners to come to an arrangement over IP. Article 8 (Rights of Ownership) states:

8.1.1 the knowledge resulting from the work undertaken under this contract shall belong to the partners, including the contractor, which developed the project.

8.1.2 The contractor and the partners in the project shall jointly define as from the design stage, ownership of the copyright covering the knowledge and results obtained from the project.

During the first meeting the partners agreed that each partner would retain the IP for the material contributed and that it would all be made publicly available so the other partners could link to it. This strategy also served as a cost effective means of fulfilling the requirement for "dissemination". Regrettably, after reporting back to management following the meeting, one of the commercial partner in the group then pulled out of the project because they were unwilling to allow others to reference material they had developed. An example of a partner contract is included as Appendix B.

Bolton Experience No. 2

The CEESI collaborative model was based on an earlier Integrated Graduate Development Scheme (IGDS), *Advanced Silicon Processing and Manufacturing Technologies* which involves ten universities and is still running today. (ref. 4) The section of the memorandum of agreement between partners dealing with IPR is 4.15, reproduced in Appendix C. The first two clauses of 4.15 are:

- (i) Each of the parties to this agreement acknowledges that nothing herein shall alter the ownership or control of any Intellectual Property.
- (ii) Each institution hereby confirms that it will grant a non-exclusive, royalty-free non-transferable license to the other members of the consortium to use the intellectual property they own and contribute in connection with the Programme, for the duration of the programme and any successor thereto.

Paragraph (ii) is unusually supportive of collaboration and encourages referencing from one module to another. It was acceptable to the Silicon IGDS partners because all the material had to be developed from scratch since no such MSc existed already and the work and remuneration was shared out fairly. Each partner institution individually validated the same programme. Students graduate from the organisation in which they complete the MSc project.

The CEESI partners were starting from a different position because each partner already ran a validated postgraduate degree in one or other speciality of microelectronics. The partners rejected the need for an additional validation process, and consequently ruled out paragraph (ii) It was replaced with the clause below.

- (ii) In the event that an Institution, which has received funding from CEESI to develop new modules wishing to withdraw from CEESI then the developed module(s) (including all material therein) will be transferred at no charge to a substitute CEESI Institution so that the module can continue to be delivered within CEESI.

In most other respects the memoranda of agreements are identical.

2.3 Effect of funding source on IP strategy

There is an argument that where the development of e-learning courseware has been funded by an agency of central government, the resulting courseware should not be restricted to one institution but should be made available to every UK university. The industrial membership of the CEESI management board strongly supports this view but to date has not persuaded the majority of academic representatives.

With an extension to the programme recently approved, the CEESI Board will be considering changes to the memorandum of agreement. It has been suggested that an agreement to license courseware between partners may be a condition of development funding. i.e. it is possible that the earlier wording of paragraph (ii) described above may be reinstated.

Bolton Experience No. 3

One of the driving forces for the development of e-learning material has been and still is the funding provided by various programmes of the EU. A key requirement for all such programmes is that the outcomes should be "disseminated", the ideal being that the funding should bring wider benefits to the EU than just the immediate partners.

The international group producing e-learning material for electronics funded under the Leonardo MIND project (ref. 1) agreed that all material produced under the scheme would be published openly and would therefore be available for reference by each member of the consortium (as well as anyone else). This approach had a spin-off benefit in that it saved the cost of arranging events to publicise the outcomes of the project. Promoting the website to search engines was accepted by the scrutineers of the Leonardo Office as an appropriate way of disseminating the outcomes.

Note that at the time of the Leonardo project the consortium members did not foresee the future modification and re-use of the material by other partners and consequently the partner contracts made no provision for such a development. The goal at the time was simply to help create a critical mass of high level online content that could be referenced by partners. All the material published is clearly marked as being copyright to the partner concerned.

2.4 Effect of marketing internationally on IP strategy

Marketing to the UK is relatively straightforward: advertising in journals that are known to be read by the target market is affordable and effective. When the market is extended globally, however, advertising in printed media becomes an impossibility.

The only medium with global readership is the internet. Readers are attracted to sites mainly by the search engines, which means promotion to the search engines is a vital part of the marketing strategy. One of the ways of achieving a high ranking with search engines is to host useful content which is readily accessible and is updated fairly regularly. "Promotion by largesse" is mentioned in Part 3 of the report as the normal way of attracting business on the internet.

Bolton Experience No. 4

The established arrangement with the electronics programmes at Bolton is to make the first three units of each module open access (roughly one third of the module). The free courseware represents a substantial benefit to the casual reader who is likely to return to the site later thereby pushing up the search engine rankings. Having tested a fair sample of the teaching, prospective students have sufficient confidence to complete the online application form. About 70% of applicants quote the internet as the source of enquiry. (Caution: this is not a reliable statistic because many will have been directed to the internet by advertising or some other primary source of information).

2.5 Business case for pursuing infringements of IPR

It is argued in Part 3 of this report that whilst there is a business case for monitoring usage and pursuing infringements in the UK, it is impractical for educational institutions to do so in the international context without assistance from a central department set up for the purpose.

A more positive approach would be to regard a detected infringement of copyright as a business opportunity and target that geographic area with local marketing that points out the benefits of enrolling on "the real thing" and perhaps warns of the shortcomings of imitation courses.

3. THE DEVELOPMENT PROCESS

3.1 Background information

The departmental distance learning team in microelectronics at Bolton includes ten academic authors, two web developers, two IT specialists plus administrative staff and additional student effort at times of peak demand. In addition, the Learning Support and Development unit hosts the e-learning laboratory (eLab) and the Centre for Educational Technology Interoperability Standards (CETIS), with input from Professor of e-learning, Oleg Liber.

Because the department started teaching over the internet early, it had developed much of the functionality of a virtual learning environment before the term was invented.

When a proprietary virtual learning environment (VLE) was purchased, a set of new modules was loaded with the expectation of moving the others later. Sadly it soon became apparent that whilst the VLE was good at supplementing classroom based tuition (blended learning), it was too restrictive to benefit a programme conducted entirely by e-learning. This is expanded upon in Bolton Experience No. 5, below.

Bolton Experience No. 5

Protection of e-learning material using a virtual learning environment

Approximately five years after the introduction of the distance learning MSc course Bolton Institute decided to introduce a virtual learning environment that had several attractive features. Students and tutors could communicate via e-mail within the environment, notice boards, bulletin boards and quizzes etc. The package could take care of all the day to day administrative tasks and allowed student activities to be tracked. It was decided to use the package as a platform for a new MSc course developed in collaboration with an external organisation.

Protection was built into the package and our ability to allow access to material was constrained. In particular students and tutors were only allowed access to the module they were involved with. Authors of new modules were particularly affected - they could not easily access other modules without being given very high levels of administrative authority.

The result of introducing the package was that we gained some attractive, but not unique, features and lost the flexibility we had become accustomed to when granting permissions to students, tutors, authors and special groups. In particular we lost the integrated learning environment we had painstakingly developed over several years.

The introduction of the package did not affect delivery of the established MSc which continued to be delivered in our integrated learning environment. After reviewing the virtual learning environment we decided to abandon it and transfer the newly introduced course into our integrated learning environment.

The development process

The development process for distance learning courses in microelectronics at The University of Bolton is outlined below:

1. internal approval
2. validation documentation specifies the course
3. authors take the syllabus of individual modules and start writing teaching material and assessments in accordance with the specification.
4. rights clearance for all external resources
5. development of interactive elements
6. conversion to web presentation
7. peer review
8. proof reading
9. testing
10. pilot delivery with individual tutors
11. review
12. modify
13. continual maintenance and periodic upgrades

Value and IP is added progressively at each stage of the above process.

The accepted position, at Bolton (the local culture) regarding IPR is as follows:

- **The University** owns any intellectual property that is created by members of its academic staff and/or its paid agents in the course of their employment. Academic staff who author e-learning material are given an allowance in their teaching/administration hours to cover the time spent in authorship. Where consultants are engaged to write e-learning material, they are paid on the understanding that the intellectual property resides with the client. Normally the name of each author is stated on each piece of work alongside a notice stating that copyright is with Bolton.
- **Software companies** own the software used by students and staff. The terms of an educational licensing agreement may place restrictions on how the software can be accessed and used.
- **Students** own the knowledge and any notes they make or acquire while studying. Students are therefore free to pass on the knowledge they gain when studying a course to family or colleagues within their place of work without restriction. However, any intellectual property arising from project work belongs to the university. (This is in line with the situation for the academic member of staff supervising the project). Where the topic for an MSc project has been proposed by the student's employer, an IPR agreement assigning IP to the employer is signed in advance.

3.2 Ownership of IP

The legal situation for employees is described in Appendix E. Paragraph 8.5 makes it clear that e-learning courseware developed by employees belongs to the university unless agreement is reached to the contrary (paragraph 8.6).

The situation for paid agents (contractors) is less clear. It has been confirmed in interviews that all concerned do indeed believe that the university owns the IPR. However, in the absence of a signed transfer of rights, this may not be the legal position. We have resolved that in future a transfer of rights agreement will be required in advance. (Bolton Experience No. 7, below suggests using the IEE form as a starting point for wording the agreement in a fair and acceptable manner).

Bolton Experience No. 6

A coordinator at a CEESI partner university reported difficulty convincing colleagues that the IPR for courseware developed with CEESI funding would reside with the institution, not the individual. Agreement was only reached after threat of losing the funding. The institution concerned was a long-established university and the contracts for academic staff will not have been as clear as those at Bolton. It is likely therefore that the authors do in fact have rights to the IPR despite their agreement to the contrary under duress.

Bolton Experience No. 7 Contract author requests rights to re-use material

One of the consultants engaged to write a module is a self employed design engineer and also a visiting professor at two universities. He pointed out that he might in future want to use parts of the material he had developed for Bolton in different teaching circumstances such as delivering a short course at a different university. He pointed us to paragraph 6 of the Institution of Electrical Engineers' (IEE) publication agreement and assignment of copyright. (See reference 5 or Appendix F) which states that the author can reuse material without requesting permission as long as there is an acknowledgement to the IEE and no implication of an endorsement by the IEE.

The request detailed above is similar in spirit to the flexibility intended in the contract of employment for academic staff at Bolton (Appendix E). It was therefore readily agreed. At the time the agreement was verbal.

Now knowing more about the subject we propose in future to require consultants to sign an agreement assigning copyright and will include something along the lines of the wording used by the IEE to allowing re-use in circumstances that could not give rise to direct competition.

3.3 Policy on rights clearance

Where there is no alternative but to seek to use copyright material requiring clearance, permission is sought and a record kept of all correspondence. Only in one instance has permission been refused.

It is often possible to find a suitable image to illustrate a technical point in a manufacturer's website where there is a stated policy allowing educational re-use as long as an acknowledgement is provided. In cases where there is an educational benefit, a link may be provided to the manufacturer's site.

In general though, our policy has been to avoid the need for rights clearance as far as possible by creating new material in house or by using sources where clearance is unnecessary. Examples of this approach are:

- commission our own staff or external experts to write new courseware
- take new photographs (or video) wherever possible
- create our own animations
- re-draw any line drawings using a vector package intended for the web. (this creates new IP and has advantages in terms of presentation and maintenance, the ability to make changes later).

Not infrequently attempts to gain clearance are unresolved - perhaps the company concerned no longer exists or has been taken over and nobody is interested in taking responsibility. When this happens our practice is to go ahead and use the material (usually it is simply an image) with an acknowledgement of the source. We have in place a "take-down" policy and would remove the material if requested. However, we accept that there is a small risk that communications could go astray and a take-down request could be overlooked, leading to litigation. Since this is known to have happened elsewhere, the risk is accepted as being genuine.

3.4 Take-down policy

It is understood that unintentional infringement of copyright is a risk that can lead to a request for immediate removal of the material from server. The policy at Bolton is to take down the material on request. Although sudden removal could be detrimental to students studying the module but delay could invite litigation.

A "Bolton Experience" case study on this topic may be found in section 5.

4. PERMITTED USES AND CONSTRAINTS

4.1 Levels of access to learning content

The rationale behind the approach taken at Bolton is discussed in Part 3 of the report. Section 4.1 of Part 3 explains there are four levels of protection and includes a diagram. The access arrangements to the four levels are briefly described here:

Open access

Anyone can access this material - it is not necessary to have an account or to provide any details to gain access. Roughly one third of all teaching courseware is open access. The debate whether to make all the courseware open (but not the assessment) is described in Part 2 of this report and expanded upon in Part 3.

Restricted access

Any student enrolled at Bolton (on any course) has access to this material. In addition, a guest password can be issued to interested parties. Students who complete a postgraduate award are given the guest password so they can continue to refer to the teaching material in future and benefit from any subsequent updates.

Protected access

The communications tools (email distribution lists) are only accessible to students currently enrolled on a module, and tutors. Such a higher level of protection is necessary to comply with the Data Protection Act.

Remote access to specialist application software

Access to software that is licensed for a relatively low number of concurrent users and for educational use only has to be carefully controlled. Most of the software is American in origin and the licence forbids use within certain countries listed by the USA Export Compliance Office. These technical and commercial constraints are expanded upon in sections 4.2, 4.3 and 4.4

Influence of pedagogy on access

Authors are encouraged to refer students to content in other modules and to other websites and to grant access when similar requests are received. Such cross-referencing is vital for providing an appropriate rich learning experience.

Requests for use elsewhere

We receive many requests for free access to the restricted parts of teaching material, mostly from impoverished students in third world countries. At the moment these requests are answered with an invitation to apply in the normal way while politely pointing out that there are no arrangements for reducing fees.

Every couple of months a request is received from a lecturer in another academic institution. Each case is treated on its merits but the normal practice is first to verify that the request is genuine and then to approach the author of the module concerned. In every case to date the author has welcomed the interest shown by a colleague and therefore a guest password has been issued. Partly because our policy is to cross reference between modules extensively, the guest password provides access to all modules. We ask that the moral right of an author to be associated with their work be respected.

There have been many enquiries about the possibility of a franchise arrangement (Sweden, India, Germany, Malaysia, China [Hong Kong]) but so far all of them have floundered, mainly because of the high investment required in hardware and software and technical expertise required to replicate remote access to the design software. Until student numbers rise there is little point in franchising something that is already available

worldwide. Negotiations at present focus on establishing local agents to assist with admissions and student support.

4.2 Technical constraint on thin client remote access system

The apparent performance of software accessed remotely is compromised if the delay across the transmission path becomes too long. We consider that the threshold for acceptable usage is that the latency (the delay) of the connection should be no more than 300 milliseconds. Students based outside the UK are instructed to test the latency of the connection to the servers at Bolton at times when they are likely to be studying and report their findings. If the latency is more than 300 milliseconds they are advised to try an alternative internet service provider.

To avoid possible confusion, it should be pointed out that latency is not to be confused with bandwidth. Latency refers to the time taken for data sent from Bolton to arrive at the student premises, and vice versa. Bandwidth refers to the volume of data that can be channelled per second through the narrowest part of the transmission path, normally the local connection at the student's premises. An ordinary telephone connection in Malaysia having a bandwidth of 56 kbps or less may give a latency to Bolton of 230mS and will be adequate for remote access.

The internet is sufficiently developed now that it should be possible to arrange a suitable connection anywhere in the world. However, there are a few countries where a longer latency is apparent in standard connections and we can only guess the reasons behind this. Saudi Arabia shows the problem consistently. China has shown the problem in the past but it is not consistent.

Where a student proposes to use equipment based at work for studying the course, it is frequently necessary to contact the network administrator because traffic from Bolton's remote access servers will be blocked by the company's firewall. It can take a week or more for this to be resolved but it has never proved insurmountable.

An enrolment is not accepted until the student certifies that they have a connection where the latency is less than 300mS.

4.3 Commercial constraint on use of proprietary software

Software licensed for educational use may not be used for commercial designs. The software that can be accessed remotely from Bolton is from many vendors, notably Microsoft and Cadence.

The educational agreement for Cadence is marked confidential but is publicly available for download as a 6-page pdf document from the Europractice end user agreement page. See reference 6. The two most relevant paragraphs are provided below and are sufficiently clear to need no further comment other than that the "End User" is The University of Bolton, not the student.

1. Grant of Licence

Cadence Design Systems in consideration of the licence fee, hereby grants a non-exclusive, non-transferable licence to use and display this copy of the software program (hereinafter the "Software") on the computer network installed in their organisation. Cadence Design Systems reserves all rights not expressly granted to the End User.

This licence is restricted to a non-commercial, educational use at the location of the End User and excludes the right of sublicensing. Educational use means the use of the Software by the End User only for undergraduate teaching, postgraduate research purposes and other educational purposes provided always that any such use by the End User, its employees, undergraduates, postgraduates or others hereby authorised to use the Software shall not include its or their use of the Software directly or indirectly for any commercial purpose or purposes (including any joint venture for the design or validation of commercial products). Use of the Software for other purposes may not be made without the written consent of Cadence Design Systems.

(paragraph omitted)

The End user shall allow Cadence Design Systems access at all reasonable times and with twenty four (24) hours notice to its premises (including without limitation a right of access to the Site) to make such inspection and interview such persons on the premises that Cadence Design Systems reasonably requires to satisfy itself that the use of the Software does not breach any of the End User's obligations under this Agreement. The End User shall comply fully with any such inspection.

An alternative and broader treatment of this topic is provided in reference 10.

4.4 Government constraints

Software and development kits originating from the USA are subject to US export controls. An example of licence conditions is to be found in Appendix G. References 7a, b and c point to the relevant US documentation.

It would be impossible to complete the electronics programmes without using American software or kits. To comply with the licence conditions it appears we should decline applications from students who are nationals or residents of any of the following countries:

- Iran
- Iraq
- Libya
- Serbia
- Sudan
- North Korea
- Cuba
- Syria

In practice the admissions staff have avoided enrolling anyone based in these countries but have not thought to check nationality when applicants have provided a UK address. (Nationality and sometimes evidence of right of stay in the UK are of course still required on enrolment because the administrators have to assemble statistical returns to HESA and account for funding received from HEFCE).

UK and European export control legislation is based on awareness and control of end use, the intention being to prevent substantive information becoming available to proliferators and procurers of either weapons of mass destruction or conventional weapons. The legislation is therefore only relevant to e-learning if the subject matter could be useful in that context. Ref. 8a,b,c

The terms of the *Export of Goods, Transfer of Technology and Provision of Technical Assistance (Control) Order 2003* extend to information in such forms as skills and training, so could be a concern to an e-learning programme teaching microelectronics. However, the regulations do not apply to information which is in the public domain. Whilst it is conceivable that a postgraduate course in other subject areas could cover information that is not in the public domain, it is not at all likely in the area of microelectronics so these regulations can be disregarded as far as this course from Bolton is concerned. Ref.8b

5. ANALYSIS

5.1 Licences, agreements and contracts

Please refer to section 3.1 for a description of the informal and unwritten agreements or assumptions followed in section 3.2 by the legal position. Examples of documents are in the appendices.

In addition, note that the CEESI memorandum of agreement specifically avoids issues of IPR while still allowing collaboration to take place. A description forms Case Study 2 within section 2.2. The agreement represents a workable solution to an aspect that at one stage threatened the entire project

Part 2 of this report examines the debate for and against "open courseware" in higher education.

5.2 Jurisdiction

Third party contributors are reassured that the e-learning programmes from Bolton are non-commercial by these two facts:

- a) The programmes are "accredited", i.e. they are designed to lead to a degree qualification and this fact is accepted by the Higher Education Funding Council.
Note that even if a student studies a module in isolation for CPD, their study is still accredited.
- b) VAT is not levied on the fees.

Much of the software used remotely originates from the USA and the terms of the licence conditions state the jurisdiction to be used in any dispute. An example is given in Appendix G, paragraph 7.

5.3 Enforcement

Part 3 of this report puts the case that

- enforcement world-wide is an unrealistic approach for UK HEIs
- the opportunity cost of lost sales where an infringement takes place is not high
- the value of e-learning courseware without added value elements is significantly less than many people imagine

Part 3 then proposes that the limited resources available to HEIs are better spent on identifying other aspects that add value but cannot easily be copied. The proposed "practical approach to IP protection" involves concentrating on technological means of protecting those aspects. Usage through the "thin-client" model can be readily be monitored and the log files provide irrefutable evidence of any misdemeanour.

5.4 Geographical considerations

Please refer to sections 4.2 and 4.4. An alternative treatment is provided in reference 10.

5.5 Risk

The arrangement at Bolton to date has been that the responsibility for obtaining rights clearance rests with the author rather than the web development team. The risk is that the author is not interested in such routine work, so may not approach it properly and fail to pass on proper records. Paradoxically the risk that authors will fail to appreciate the need for proper rights clearance and documentation may have been increased by the growth in use of first generation virtual learning environments. Such environments exclude access to all but the students currently enrolled on the module so it is less likely that any infringement of copyright would be detected by the copyright owner.

Proposed policy to guard against inadvertent infringement of copyright

In order to avoid inadvertent infringements and protect ourselves against the possible consequences of detection our current procedures could be updated as follows:

- Require authors to provide evidence that the use of any external material has been approved in writing by the owners of the material.
- Remind authors that any external material used should be acknowledged appropriately.
- Ask authors always to supply *original* versions of material (e.g. images, line drawings etc). so they are available as evidence of ownership if it were ever challenged in the future. It is frequently helpful to go back to the originals before making changes when the site is updated.
- Ensure source materials are stored systematically.
- Ensure that when an infringement claim is received, it is responded to in timely fashion.
- Once the claimed infringement has been checked and proven the page should be removed immediately. (the existing take-down procedure)
- If withdrawal of the material has a serious impact on module delivery students studying it should be informed and measures taken to remedy the omission. This may mean suspending the module at no cost to the students. It may also affect the authoring process- it could be argued that external material should not be critical for a site to function effectively.
- Be sure that existing insurance covers litigation against accidental and innocent infringement. With a proper procedure documented and in operation, insurance would carry a low risk.

Although the above procedure is simple in principle, getting it accepted and adopted by everyone may pose something of a challenge.

Bolton Experience No. 8 Example of risk leading to unknown obligation.

Third party IP unwittingly being transferred without appropriate clearance.

A few years ago a lecturer asked the opinion of colleagues at another university and became convinced that he had obtained clearance from the copyright owners to publish a well-known psychometric test. On his instruction the web development team published the test in a publicly accessible part of the site and wrote code to mark it automatically.

Two years later the publishers of a book containing the psychometric test contacted us pointing out that we had infringed their copyright. In the correspondence that followed they requested that the page either be removed or that we should purchase a copy of the book for each student. We chose to remove the site.

Subsequently two or three lecturers from other HEIs contacted us requesting that the site be re-instated because (unknown to us) they had referenced it in their teaching and found the automatic marking feature particularly helpful. It is interesting to speculate what might have happened if we had agreed to the publishers' request to purchase a book for each enrolled student and had not been careful to restrict the obligation to students enrolled at Bolton.

Bolton Experience No. 9 Archive site retains the history

At least one site is now compiling regular archives of the internet for posterity. See Reference 9. Unknown to us, the site reference 9 has been taking a copy of the public pages of the e-learning course regularly since 1998. Within the archive there are no less than six copies of the offending page described in Bolton Experience 8, all publicly accessible.

On discovering the archive we were at first concerned about the implications of it hosting material that had been taken down from our site. On reflection, however, we now realise that the site is not our responsibility and indeed it proves that we acted appropriately.

Bolton Experience No. 10 Importance of holding records centrally

Correspondence relating to the take-down of material described in Bolton Experience 8 is held by the CET Web Development Resource unit and is available for inspection, should any issue re-surface. In contrast, the lecturer concerned moved to a different university about a year after the incident occurred, and has since moved again. With no further interest in the courseware at Bolton, it is most unlikely that the lecturer would have retained any record. This illustrates the importance of holding records on rights clearance and any take-down actions centrally.

6. ADDITIONAL FINDINGS

6.1 Example of a practical approach to protecting IP

Please refer to parts 2 and 3 of this case study and especially the Key Points within Part 3 as they have influenced the Bolton approach. The aim has been to develop a stimulating and flexible learning environment with the minimum of restrictions to students while at the same time protecting the most valuable elements against theft.

Part 3 of this report stresses the importance of identifying the added value in an e-learning course and giving priority to protecting those elements over the courseware itself. Enrolled students of the postgraduate electronics courses gain added value in the following ways:

- **Remote access to industry standard software**
Students gain authentic experience of advanced design techniques, such as simulation and Computer Aided Design, with full tutor support. This can enhance their career prospects and widen their career opportunities.
- **Transferable credits**
On successful completion of a module students are awarded a number of transferable credits, typically between 10 and 20.
- **A recognised qualification**
On successful completion students are awarded a postgraduate degree which is recognised qualification worldwide.
- **Tutor support**
Students are in contact with the module tutor for help and guidance for the duration of the module.

7. CONCLUSIONS

7.1 Flow of Thinking

With regard to IPR we perceive the following differences when operating in an international context as compared to just the UK.

- the website becomes the main mechanism for marketing so there is an argument for greater exposure of intellectual property
- it is unrealistic to attempt to monitor infringements of IPR on a global basis and a legal defence of IPR is unworkable; hence a new approach is called for
- there is much more competition
- cultural differences have unexpected implications

A realisation of the practical limitations to defending IPR in an international context and a wider appreciation of the costs of protection have encouraged partners to adopt a different approach. Each course has certain elements that are key to the learning or assessment, or very expensive to develop. By focusing on just these elements the burden of protecting IP is greatly reduced. Equally, the dual danger of compromising the learning experience with excessive protection and having an "empty shop window" that turns away potential customers is avoided. By a bit of lateral thinking it is possible that this approach could be adopted in any discipline. This is the subject of Part 3 of the report.

We recognise that material published on the web is likely to be copied. Rather than put a lot of effort into anti-copying devices, all of which can impact negatively on learning, we have taken the approach of finding ways of adding value that can remain firmly under our control. The primary example is, of course, the qualification. A degree from a UK HEI is highly regarded worldwide and there are robust systems in place to ensure that certificates are only issued to bone fide graduates. Assessment is another example, and remote access to specialist services or additional material is another.

7.2 Solutions / Advice

The model that has emerged as being most workable and successful in an international context has four different levels of protection: open access, restricted access, protected access and "special". These categories were first described in section 4.1 and are re-stated here in the way they could apply more generally.

Open access

A substantial amount of e-learning material is open access. This is our "shop window" to the world; the pages are actively promoted to the search engines and, because there is substantial useful content, are widely linked from other sites, thereby creating goodwill and gaining referrals and enquiries. The e-learning material itself has become a vital component to the marketing strategy, approximately one third of the courseware being open access.

Restricted access

The remaining two thirds is restricted but readily available to all enrolled students and staff at Bolton and also to people allocated a guest account, such as alumni, training officers and the External Examiner. On a few occasions a guest account has been allocated to a serious enquirer who wanted to know more about the coverage of a

module before making a decision. Although all the material is marked as copyright to Bolton and the name of the author is identified, in practice it is accepted that on the international stage there will always be countries where copyright agreements will not be enforced and copying for commercial gain may take place.

Protected access

"Protected" indicates a much higher level of security, where access is restricted to students enrolled on the course, and their tutors. The communications tools and student progress chart are in this category because they disclose a small amount of personal information. Anything that could come within the scope of the data Protection Act should be in this category and checked carefully against the terms of the agreement with the student on enrolment.

Special access

The "special" category is a higher level of protection that guards a few core aspects of service, presentation, delivery or assessment. In the Bolton example it involves allowing remote access to specialist software through a thin client model. Only authentic student accounts can use the facility. In our view such "special" service aspects are likely to be the main differentiators between e-learning providers in future.

We choose to call this model "a practical approach to intellectual property protection".

8. REFERENCES

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<http://www.bolton.ac.uk/mind/>
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<http://www.ceesi.ac.uk>
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<http://www.ami.ac.uk>
4. Website for the modular part time MSc programme, *Advanced Silicon Processing and Manufacturing Technology*
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<http://www.iee.org/Events/ConfExh/copyright.pdf>
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- 7a. U.S. Department of Commerce Bureau of Industry and Security
<http://www.bxa.doc.gov>
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- 7c. U.S. Export Administration Regulations (EAR) Database
http://www.access.gpo.gov/bis/ear/ear_data.html
Parts 734, 740 and 772 are referred to in Appendix G of this report.
- 8a. Export Control Organisation (DTI)
<http://www.dti.gov.uk/export.control/publications.htm>
- 8b. Supplementary guidance note on the export of dual-use technology and software
<http://www.dti.gov.uk/export.control/publications/bizguide/xtec.htm>
- 8c. Introduction to Export Controls; The EC Regulation
<http://www.tradeprism.com/library/help/faq/exportcontrols/intro/06.shtm>
9. Internet Archive
<http://www.archive.org>
Note: prior to October 2001 the URL for the postgraduate provision from Bolton, was www.ami.bolton.ac.uk. Searching with this URL will return archived pages back to December 1998 whereas a search for www.ami.ac.uk only finds pages from 2001 onwards.
10. Chest Agreements: Types of User Access
www.eduserv.org.uk/chest/user-access.html

9. Appendices

For further details about the items in appendices please contact the authors of this case study.

- Appendix A Administrative and Financial Memorandum of Agreement between Bolton Institute and the University of Northumbria at Newcastle, MSc *Advanced Microelectronics for Industrialists* (AMI) 1997 - 2002
- Appendix B Partner contract for EU Leonardo project developing e-learning content in electronics *Microelectronics for Industry* (MIND) 1998 - 2000
- Appendix C Extracts from Memorandum of Agreement for Integrated Graduate Development Scheme (IGDS) *Advanced Silicon Processing and Manufacturing Technologies* 1999 onwards
- Appendix D Memorandum of Agreement for Masters Training Package (MTP) *Continuing Education for Electronics Systems Integration* (CEESI) involving ten UK universities. 2002 onwards
- Appendix E The University of Bolton Contract of Employment for Academic Staff (extract)
- Appendix F Institution of Electrical Engineers publication agreement and assignment of copyright (extract)
- Appendix G Example of clauses by commercial suppliers governing educational use and controlling re-export