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**The Electronic Law School - Development of the
Intranet College Information System (iCiS)**

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Introduction

This is a paper on the design and development of a prototype intranet for administration, teaching and research at Queen's University of Belfast Law School.

The Queen's University of Belfast Law School was the first UK law school to have a World Wide Web server on the internet back in 1993. Since then we have all seen the explosion of information provision though the 'net. The ease with which on-line information can be created and viewed on the internet has been the primary reason for its rapid development and acceptance. This then raised the question: Why not use this technology to facilitate the internal information needs of a law school?

This paper is partly an account of the difficulties and challenges of re-designing internal systems, the problems of managing change, finding technology champions and retaining a clear view of the objectives. The paper also indicates the varying degrees of success encountered.

Importantly, since Queen's Law School has now developed considerable expertise in the use of intranets in legal teaching and administration the next steps in our continuing development of IT in the Law School and beyond will be examined here.



How iCiS began

The iCiS system development began in 1997. Primarily iCiS was intended to replace manual timetabling activities, assist with student/staff appointment scheduling, deliver on-line course materials and provide an electronically assisted examination board meeting at the end of the year.

The system was intensively developed throughout the academic year 97/98 by Chris Martin with assistance from Brian Childs - who as a past Assistant Dean had a wealth of administrative experience within the School and who proved to be an invaluable academic technology champion.

Much of the early development of iCiS involved analysing what was currently being done in the Law School and more importantly why it was being done that way. The question we began asking was WHY ?

Why wait for students to be enrolled and then attempt to start timetabling a week before term starts ?

Why distribute internal information on paper at all ?

Why communicate with students via a one-way notice board ?

Why expect students to return time and again to knock on office doors when all they had to do was view an electronic calendar and confirm appointments via e-mail ?

Why produce piles of colour-coded paper and backup documentation and manually calculated results for an examination board meeting and then end up shredding it all ?

Invariably these kinds of questions were answered with the phrase "we always did it that way !"

If this was the only justification then it was realised at a very early stage that the intranet could make a significant difference. A few founding principles were established to allow the development to proceed:

1. Data ownership to be clearly defined.
2. All data must be entered/amended at source.
3. All systems must be closed-loop
4. Data security and user authentication to be fundamental to the design.
5. Rapid Application Development techniques to be used throughout.
6. Establish a committed user base for testing and feedback.
7. Minimise cost and risk wherever possible.
8. Minimise the need for user training.

Importantly, it had to be realised that conditions were not ideal for the design and implementation of such a system - even with relatively modest goals. Resources were short, there was only the network manager (i.e. me) to actually do the software design, programming and implementation. Some measure of credibility had been established in the preceding two years with a standalone student records database and a new network installation. However, maintaining this credibility was to make the difference between success and failure. There were only a few weeks before term started and we had no timetable - the timetabler had taken sick. There was no choice now, no alternative - iCiS had to start.

Timetabling - at the core of iCiS

It was quickly realised that timetabling could no longer be done the traditional way. There were just too many permutations to deal with when you had already enrolled the student cohort onto modules without any regard to their timetabling. The key here was to think about the modularisation of degree courses and how this had been done. It was soon obvious that modularisation had not been fully implemented - the University was trying to operate a modular course structure using traditional, non-modular administration procedures. Of course, the fundamentals of modularisation state that a student can do any combination of courses, provided those choices satisfy the requirements for a degree and secondly, their module choices can be facilitated by timetabling constraints. It was the timetabling constraints that were missing - iCiS had to fill this gap.

Advance timetabling was the way forward. A fixed timetable had to be created, this had to be offered to students who could then choose not only which course; but when and where the course would take place. The students needed to make these choices at enrolment. This meant that the fixed timetable would have to be created almost a year in advance. However, on reflection this was not so radical, all first year students always had been enrolled into a fixed timetable - this just had to be extended for all returning students too.

It was now apparent that the timetabling system had introduced the need for further systems to be put

in place. Firstly, the timetable could not be created without a staff work allocation and confirmation of which courses were actually going to be offered in the coming year - new data capture systems would have to be devised for this. Secondly, software would have to be written to assist with the timetable creation and eliminate clashes. However, this was now eased because only course, staff and room clashes could occur - the students having been taken out of the equation at this point. Thirdly, software was required to put the students back into the equation i.e. to allow them to enrol themselves into the fixed timetable.

STAFF

UNIVERSITY PATHWAY/COURSE

CO-ORDINATION

WORK ALLOCATION CONFIRMED PATHWAYS/COURSES

SYSTEM

TIMETABLING SYSTEM CENTRAL ROOM BOOKING

SELF-ENROLMENT SYSTEM

STUDENTS

The timetabling system has been included here as a very typical example of the iCiS development process. Timetabling is not the sole preserve of the educational community, rather it should be seen in terms of advance planning and resource scheduling - the result of which is the timetable. This is what airlines and train operators have done for years. Their customers expect to be able to plan and book a journey, likewise the student should be able to plan their academic journey in a similar way. It illustrates how the analysis of one problem - that of producing a timetable - has resulted in the design of several systems which together produce a coherent, closed loop system. It has been proven time and again during the iCiS project that this kind of analysis is absolutely essential to provide a robust and reliable solution. It also produces spin-off effects and realisations that previously were clouded in the cumbersome, over-specific, manual processes. A global view is very important and can be difficult to maintain when dealing with the detail design. The global view tends to highlight inconsistencies and the most difficult problems to overcome have been encountered here.

Limitations in the iCiS design have always been accepted when the designer has been unable to directly influence factors outside the control of the Law School. This element of realism has compromised iCiS to some extent, but has allowed development to proceed - albeit with some delays and frustrations. These kind of systems modifications are undesirable but at least allow the program to continue to operate in this environment. Problems which have compromised the design include:

1. Interacting with a centralised University "top-down" systems approach.

This has meant some duplication of data entry and some difficulties in data transfer.

2. Co-operation both vertically and laterally.

For example, joint degrees require that the timetables of other departments are known in advance so that they can be applied to the Law School timetabling system - this is still problematic. Modifications to degree pathways and courses must conform to the traditional timescales - these do not now correspond with the iCiS system which is out of "sync" with these schedules.

3. Lack of a coherent information systems strategy.

There is currently no corporate strategy for information systems here. This is the biggest obstacle for iCiS and often makes its legitimacy difficult to justify and additional resourcing nearly impossible to find. It is also difficult to accept above average expenditure on hardware with a disproportionate investment in software development. Seems to me to be little point in buying hardware if there is nothing for it to do. However, the system is now making a significant impact for the University to accept its existence.

4. Lack of acceptance of some of the fundamental principles of iCiS.

iCiS allows students to amend certain data themselves, they can enrol themselves on-line and print a timetable a year in advance. Students can go and get information on a course web site, they can create discussion threads on-line, they can plan meetings with staff using on-line calendars and e-mail. Importantly, iCiS devolves control to its users and makes for a culture of "self-administration" for both staff and students. iCiS empowers its users to make choice - staff and students can plan their time on-line sometimes years in advance. iCiS allows for administration to be largely reactive and handled by the system itself - this is very much evident in the information recording, analysis and archiving functions. It also uses event-handling procedures to alert staff and managers to matters requiring decision taking. iCiS frees staff time - time traditionally used for mundane administration and record keeping can be used for pastoral activities and research. Likewise, students are effectively no longer full-time - they often have jobs and family commitments - iCiS allows students to organise their studies around these activities. These are all fairly radical changes which seem to threaten the centralised, control ethos of traditional University administration. It is unfortunate that so much development time has been lost because of this continual battle for acceptance. There is plenty of work for everyone - the difference is that iCiS has the potential to make that work more productive and interesting for all concerned.

iCiS to date

iCiS has operated in the Law School throughout the 97/98 academic year. It handled all activities from enrolment through to graduation. The system has been largely programmed and designed "on the hoof". It has relied on the commitment and patience of its users for testing and evaluation. In these less than favourable conditions a system now exists that holds the following data on undergraduates in law:

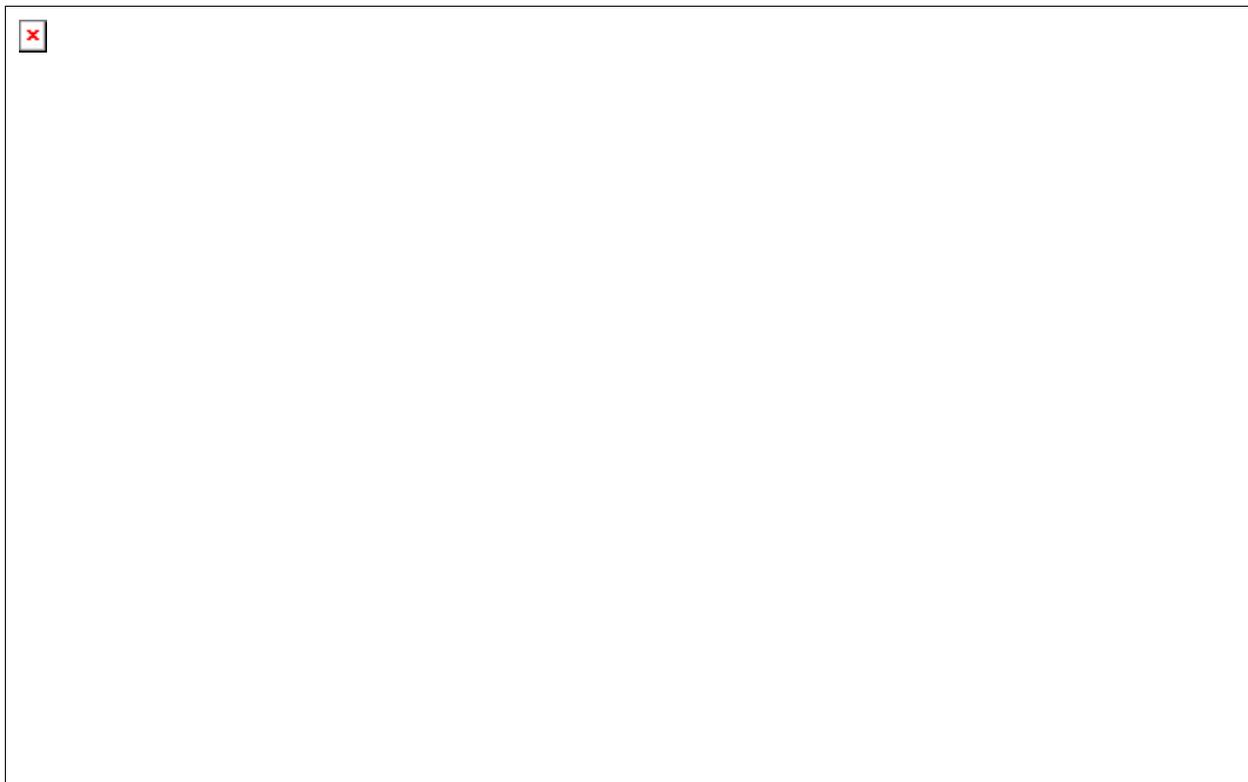
1. A central store of core student data - e.g. name, address, Email address, student number, photo,

username, password, etc.

2. A central store of core staff data - e.g., name, room, phone number, Email address, web page, photo, username, password, etc
3. A set of related course and enrolment data - e.g., current degrees and courses, which staff members are teaching which course, where and when. Which students are enrolled on which courses. Class lists and Email distribution lists are derived automatically from this data.
4. A set of teaching materials - added by staff themselves - relating to each course and available on-line, restricted to students enrolled on that course.
5. A discussion forum for each course whose participation is restricted to those students enrolled on the course and the staff member(s) who are teaching it.
6. A set of examination results for each term.
7. Activity log of student accesses to iCiS
8. Statistical analysis of examination results by course and by student.
9. An archive of data for current students including past exam papers, syllabi, exam marks, etc.
10. An archive of alumni

RAE Data

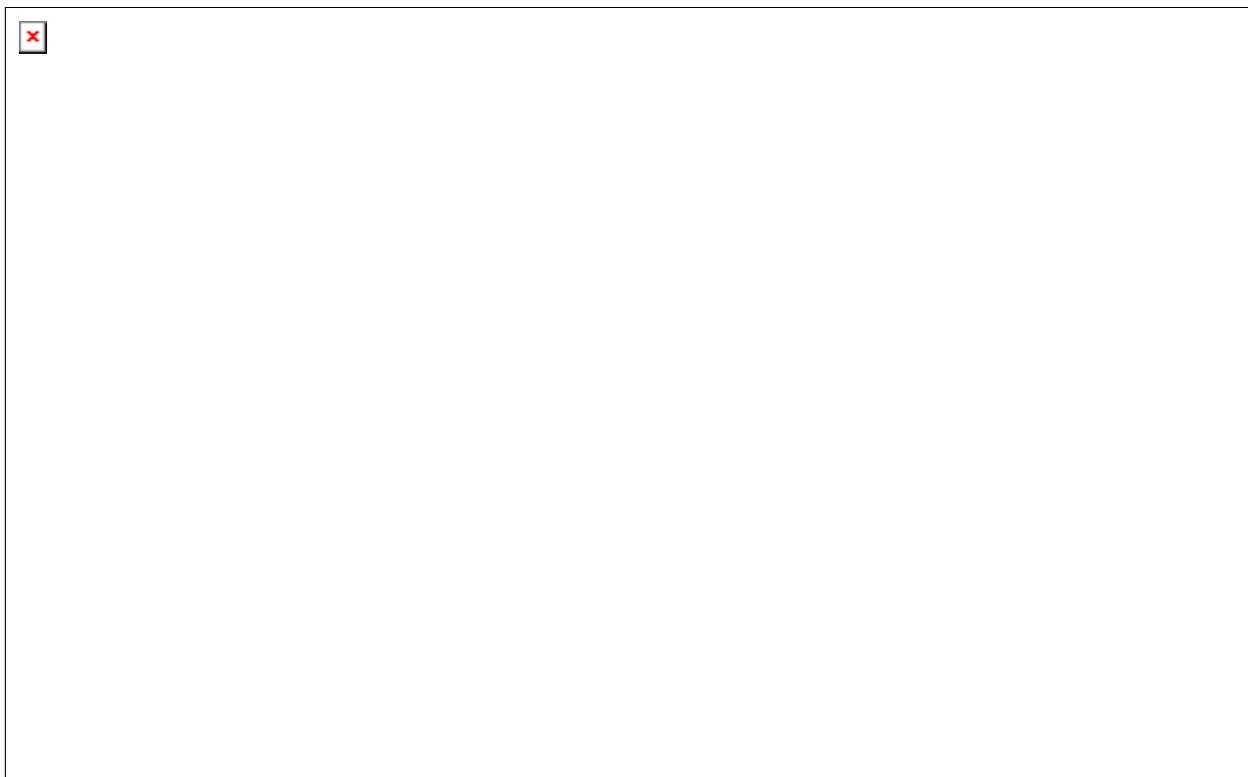
iCiS also includes an RAE on-line database with the facilities for updating by each member of staff, central collation and analysis. This module is currently being prepared for a campus-wide release.



iCiS work in progress

iCiS is currently being developed to include the following modules:

1. Postgraduate system - similar to the features available in the current undergraduate system.
2. QAA system - a module providing further event handlers, analysis and recording appropriate to the TQA exercise.
3. Complete network integration - this module will use the existing iCiS user authentication model and extend this to provide access to application programs (Word-processing, spreadsheets, Lexis, etc.) file store, printing and CD-ROM access - all from one interface. This allows registered users - both staff and students - to use iCiS from any location, either through direct network connection or over modem. This builds upon the overriding principle that iCiS can be run with the absolute minimum of hardware at the client-side i.e. only a web browser or thin client connection will ever be needed to access the entire system from anywhere.



Example iCiS Integrated Applications Desktop

iCiS future directions

It is now apparent that some 80-90% of university administration could be handled by this kind of web-enabled technology. For this reason alone the iCiS development project will continue - there is still much to be done. The software is robust and scaleable. This has been proven over one whole academic cycle.

The future of the iCiS approach seems to be assured because of two important indicators, one is the ever increasing PC ownership and internet usage, the second is the falling price of the PC. It is now not uncommon to see students carrying notebook computers around campus. According to the latest Durlacher report, <http://www.durlacher.com>, the UK ISP (Internet Service Provider) dial-up market in September 1995 consisted of 0.27 million users with 80 ISPs, by June 1997 it had risen to 1.1

million dial-up accounts spread between 190 ISPs, and now it stands at over **2 million** users with 300 ISPs. This represents a seven fold increase in three years.

It is also useful to note that the main reason cited for using the internet is for information gathering. Furthermore, internet usage for education and research is far more common than internet usage for e-commerce and on-line shopping.

How long will it be before cheap on-line devices are as common on your campus as the pen ?



What planning has been done to facilitate this change to the emerging electronic self-service education market ?

Perhaps iCiS can, in some small way, contribute to the greater acceptance of these developments. Above all the iCiS model is non-threatening. It has been accepted by its own small user base and its incremental development has allowed for continual evaluation of usage and both its perceived and real benefits.

Conclusion

There have been several milestones along this two year journey of development. The first of these occurred within the first three months of iCiS existence when returning students self-enrolled into the fixed timetable for the first time. This had never been tested due to time constraints and there were concerns over whether the system would handle the load. The system actually worked - there were problems when a student access centre went down and there were problems with some printers. However, about 85% of students successfully enrolled, some did this from home or from local libraries. Students were seen to be choosing courses not only by content but by when the lectures and tutorials were scheduled. Students could see how quickly popular courses were filled and here was an added incentive for them to "book" early. Staff could see their own courses filling on-line and could produce class lists for the next year as enrolment happened. School management could use all this advance data to decide on further resourcing i.e. extra staff or extra rooms for the year ahead. Staff research time and research leave could now be planned a year in advance.

It was disappointing when the captured data had to be manually re-keyed into the central University system. No amount of negotiation could have changed this !

It has also proved difficult to actually prevent some students from changing their enrolment off-line. Some staff remain unconvinced of the importance of the fixed timetable which implies fixed enrolment. If students change their mind after on-line enrolment has closed there can be a situation where a student can actually do an examination in a course for which they were never enrolled. This subverts the entire system. It is unfair to students who "waited their turn" at enrolment time and it negates the closed-loop concept and poses significant extra administrative burdens to locate these events that occur outside the loop.

Throughout the first year certain groups of staff were identified who would pilot the on-line course materials and discussion forums. The discussion forums were initially anonymous - students could

add comments to forums without any authorisation. This led to serious problems with possibly libellous remarks appearing in discussion forums. The forums had to be temporarily withdrawn. Upon resumption they have proven to be very successful - students and staff were still discussing topics over the Christmas holiday period prior to first term examinations.

Further problems were encountered when it proved impossible to accurately download the central University enrolment data that had been manually entered. This data included substantive changes and additional students who had transferred from other courses or other universities. Further changes had been made to the central data from students who enrolled late or who had been co-opted on modules by default or who had been permitted to change their options.

Additional time and resources had to be used to bring the systems back into sync. This was highly undesirable and was a fairly bleak time in the development process.

However, there had been wide acceptance of the on-line course materials. This has been slightly dampened by a central university policy of print charging. However, there is now an active student self-service culture. Handouts are no longer hand delivered - the emphasis is now on "go get it" rather than wait and be served.

A major milestone was reached at the end of the 97/98 academic year when the entire examination board meetings were presented in a "paperless" format. This was a resounding success and was proof that the year had been completed using iCiS. The examination boards were finished within a few hours and results signed-off. This was very satisfying given staff unease about this process even at a "dry run" only days before the actual board meetings.

The current academic year 98/99 has started well for iCiS - there is now a commitment to provide direct data transfer from the central university system. There is a much better recognition of the importance of the fixed timetabling system. There is also some likelihood that the university examinations process will more closely follow the iCiS model. Some work is still needed in convincing a central computer service of the benefits of distributed computing ! It is still proving difficult to influence opinion on the matter of student responsibility as well as their rights. This is essential in promoting the self-service notion.

One very important spin-off from iCiS has been the underlying record keeping - all course discussions, materials and e-mail communications between staff and students are automatically recorded along with logs of student accesses. This is true reactive administration and bodes well for the TQA system. If staff time can be saved here then it is all time gained for research.

With a reasonably successful first two years I am more optimistic about the future of iCiS. An additional programmer has been secured for the next 6 months to work on further enhancements to the system (mainly the TQA module).

In the year ahead it is hoped to widen the user base for some of the iCiS modules and a downloadable test version is long overdue !