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Project Information			
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Interim Reporting Template

Project Name: *Course Tools, University of Cambridge*

Report compiled by: *Amyas Phillips*

With contributions from: *Laura James*

Reporting period: *May - October 2010*

Section One: Summary

The last interim report included a staffing plan and updated outline project plan, implementing a renewed focus on curriculum innovation. The programme management team's feedback was received with thanks and circulated amongst the project team and Steering Committee. The feedback's opening lines were: "The project although having achieved a great deal in terms of carefully securing strategic buy-in, has much ground to make up in terms of realistically achieving its objectives." The feedback also said "There is a sense that the project is responding to a series of operational imperatives without a clear strategic direction."

In this reporting period the project has developed and responded to these points by refreshing its aims and objectives, retaining alignment with the original statements but recasting them to compass a project which is now best understood in terms of institutional innovation infrastructure, and also to be immediately accessible to project stakeholders by invoking 'universal truths' and a number of specifically identified problems.

Significant progress has been made on the three fronts identified in the previous report - technology to assist with complex scheduling issues for teaching, shared information about courses, and systems and processes for working with this and managing curriculum change. Efforts to increase the level of engagement of key stakeholders, both individuals and committees, have advanced in parallel.

In summary the project has moved from understanding the motivations and impediments attaching to curriculum design and innovation at Cambridge to pursuing a 'joined up' suite of interventions designed to achieve change in an institution with unusually independent faculty.

Section Two: Activities and Progress

Objectives for this reporting period

The focus for the project over this reporting period was to focus in from general to specific interventions. Part of this effort involved a review of project aims and objectives to reflect the project team's better understanding of what needs to be and can be done and to support enhanced institutional engagement.

Restatement of Aims and Objectives

We have restated the primary aims of Course Tools as follows:

1. Enable complex and interdisciplinary courses through IT-based support infrastructure. In the specific case of Cambridge, this will include making it possible for new courses or new teaching patterns within the Natural Sciences Tripos, and optionally supporting the creation of the new Social Sciences Tripos.

2. Reduce administrative burdens (and thereby costs) through sharing information about courses, whilst maintaining or improving the quality of course information

These are an expansion of the original primary aim. What were listed as secondary and tertiary aims in the original project document are subsumed in these new aims, but still contribute outputs.

We have also revised our project objectives to directly align with specific issues. These objectives are fewer than in the original project document because they are focussed on ends rather than means. They represent a restatement, not a change of direction.

1. Show that the present apparently insoluble problem with NST 1A, that students cannot take both Computer Science and Biology of Cells (which breaks the Cambridge philosophy that all combinations of NST course should be possible), can be solved using technology

2. Enable the efficient and timely development and introduction of the new NST part III course "Structure and Determination", which would be the first major interdepartmental course at that level

3. Optionally, enable the merger of several humanities and social science triposes into a new cross-departmental Social Sciences Tripos, whilst avoiding creating a monolith (like current NST) which blocks future curriculum innovation and change. This will be effected with IT support tools, information and process support.

4. Report to the UK HE community on the value and applicability of the Kuali Student curriculum management data model and software, including comparison to other related data models such as TEN competence and XCRI

5. Reduce the administrative burdens of finding, maintaining and using course information, by collecting and presenting it in a consistent, accessible and accurate form

6. Embed project outputs within Cambridge (by empowering staff within a sustainable community of practice, sharing learning with senior staff, demonstrating fit with related initiatives, and so on)

A note on success

If we can achieve, say, 2 out of the first three objectives, this will be success for the project within Cambridge, demonstrating that curriculum innovation is possible in even in tricky cross-departmental areas. Of course, the objectives must be met in such a way as to leave a sustainable legacy of processes and systems across the campus, such that our methods can be reapplied to similar problems in other Triposes – this is encapsulated in objective 6. Solving the NST problems (objectives 1 and 2) would have a major impact on campus and would be highly valued.

Success within Cambridge would illustrate that complex cross-departmental curriculum design, and reduction of administrative load and costs through effective course information sharing, is possible even within universities with highly decentralised departments, each with very different operational styles and processes. This demonstration will be of value to the HE sector at large, and therefore represents success for JISC. There is further detail on how the various stakeholders will benefit from our project below.

How the objectives relate to the project strands

Three project strands support the overall aim of supporting curriculum flexibility by making it less work and less risky to change things:

- shared information about courses, and systems and processes to work with this
- technology to assist with complex scheduling issues for teaching
- process support for managing curriculum change

Each of the objectives may be addressed by one or more types of solution, and many potential solutions overlap and connect together; for example, to create a new cross-departmental course not possible today might require an answer to a complex scheduling question, shared course information

across the campus, and also change management support. An example of the interlinking of these areas is that the shared course data will be required to inform the scheduling effort. As such, each of the goals may be addressed by one or more of the strands of work listed above.

Project Management

The project plan was rewritten at some length to focus on reaching a final phase of curriculum experimentation and evaluation. Instead of organising by work packages described the original bid the new plan is structured around a coherent sequence of project stages, which in collapsed form allow a ready overview of project position.

Constructing a project plan from individually identified, sized and assigned activities is a more realistic exercise now than at the beginning of the project, nevertheless an irreducible level of uncertainty remains associated with those elements dependent on internal stakeholders, who are independent actors. This style of project management may be better suited to institutional and socio-technical change projects underwritten by a senior authority.

A plan which needs regular updating is nevertheless useful, and the exercise, though difficult to maintain at its finest level of granularity, provides useful management information, including some statistics which may be of interest to the programme management team. Allocation of resources by project activity breaks down as follows: curriculum flexibility 70% of total planned expenditure, planning and management 15%, general dissemination: 15%. The expected division of resource between the three project strands is approximately 25% course information, 25% scheduling support, process support 50%, although the infrastructural nature of the tasks involved means that many of them overlap all three strands and this division should be understood with this in mind.

Project Team

The project has drawn on CARET staff time as needed throughout this reporting period and has additionally had a student partner over the long vacation. Project Director John Norman has increased his participation in setting project priorities. Laura James, CARET senior manager has also joined the project at 1-2 days/week to engage senior University stakeholders, advise on project management, and mobilise resources.

As recommended by the Steering Committee, a ‘change manager/evaluator’ person specification was drawn up and remains available for reference in any future CARET ‘pool’ recruitment. During this reporting period we have become more aware of the significant difference between research and evaluation roles.

Project Meetings

The Steering Committee received monthly reports following the last interim report, May - August. It continues to meet once termly, receiving ‘midpoint’ reports.

Management and project team meetings now take place on alternate weeks, providing an opportunity to co-ordinate the lager team and with other CARET projects. Steering Committee members are welcome to attend these meetings, as our critical friend Prof. Stephen Brown already has.

Workpackages

The work packages set out in the original project document do not map well to the three project strands and no longer serve well as a division of project activity. We therefore present an update by project strand first, followed by shorter notes on the original work packages.

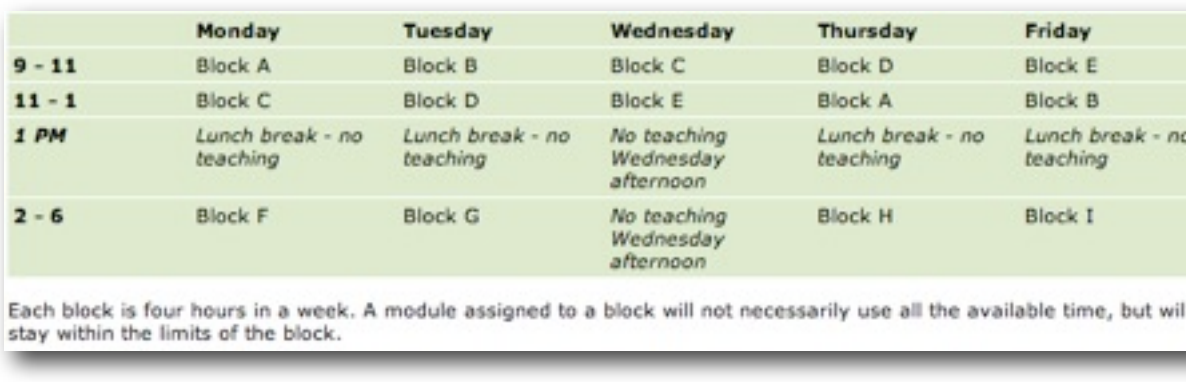
Support for scheduling complex interdisciplinary courses

Continuing from part IA of teh Natual Sciences Tripos (NST), all timetableable events in NST parts IB and II and the majority of Part III have been catalogued in a spreadsheet, linked to information on

allowed combinations. This work represents a considerable effort of collating and reconciling data from many sources, in many styles and formats. This will be used to support NST IA reform and also NST part III interdisciplinary modules.

Work began on entering this information into Purdue's UniTime software, preceded by exploratory work with Scientia's Syllabus Plus, and EventMap's OpTme. This task was preceded by the definition of common institution-wide conventions such as working hours and weeks and mapping of the software's terminology to that which Cambridge uses to describe curricula. This was complicated by the University's Thursday week-starts, the lack of a definitive course catalogue and coding system, departmental variation in curriculum terminology and structure, and the need to map these structures into the software's concept model such that they remain recognisable to staff and students.

In beginning this process a number of requirements for effective timetabling have become clearer. Firstly, and perhaps rather obviously, we have created unique identifiers for all key resources including people, rooms, Departments and courses, none being initially available. Secondly, a common hierarchy of course elements, using common terminology is necessary if a system is to have any chance of rendering cross-departmental timetabling problems tractable. In similar vein, a common 'grid' of teaching timeslots and meeting patterns is, if not absolutely necessary, a very powerful tool in enabling cross-departmental timetabling, especially where clash-free timetabling is wanted, because it reduces the problem to a single variable: which time slot to use. UCL and Purdue both provide useful examples.



	Monday	Tuesday	Wednesday	Thursday	Friday
9 - 11	Block A	Block B	Block C	Block D	Block E
11 - 1	Block C	Block D	Block E	Block A	Block B
1 PM	*Lunch break - no teaching*	*Lunch break - no teaching*	*No teaching Wednesday afternoon*	*Lunch break - no teaching*	*Lunch break - no teaching*
2 - 6	Block F	Block G	*No teaching Wednesday afternoon*	Block H	Block I

Each block is four hours in a week. A module assigned to a block will not necessarily use all the available time, but wil
stay within the limits of the block.

UCL common timetable grid

The current situation in NST IA represents a combination of historical practice and piecemeal incremental change such that it is not any longer tractable to accommodate any significant change - requiring conformance to some form of grid (lectures in the morning and practicals in the afternoon, at the least) would be a first step to correcting this. Identifying a 'top 10' specific impediments to flexible timetabling is something that is hitherto only possible for experts or those with hands-on experience of attempting change, but EventMap are are exploring heuristics with the aim of determining this algorithmically, at least to a greater extent than at present. Such an ability would support the effective management of complex curricula such as the NST in which several departments compete for access to a common pool of timetable resource.

Eventmap's are further developing their software to address the specific NST IA problem of constructing a schedule in which students are able to attend all lectures of an option and at least one instance of each practical class for an option, given their and everyone else's other option choices. This is a complex optimisation problem, different in kind to the co-ordination problems which are the bread and butter of most timetabling software and of which the proposed NST part III module introduction is an example.

As part of a strategy of establishing credibility with and learning from a initially small timetabling problems Course Tools is pressing ahead with Purdues' UniTime, at least for the mean time.

Liaison with the current NST IA process for allocating students to practical classes has been one source of important practical experiences. First, we were able to identify very specifically the severest constraints on overall NST recruitment and on the flexibility of the NST timetable and hence curriculum. Second, although it has worked to date the current system does not offer any guarantee of success. Thirdly, the current system depends on a 'pool' of flexibility provided in the form of excess lab capacity - the less one department contributes, the more is demanded of others. It is quite possible that a requirement by, say, Physics for even lab numbers could cause highly uneven lab numbers in Materials; or that a student not taking chemistry might be unable to be accommodated in their preferred options because of Chemistry's full labs. We have been able to tabulate data to evidentiate this and support our discussions with management committee members.

At a presentation to the NST Management Committee at the end of Easter term this year the PM presented a tabular and constraint-based models of the NST IA timetable, validated the list of timetable-driven curriculum problems now forming our objectives, proposed that timetable change should be a special case of curriculum reform and that process support would make it faster and more reliable, asked for intelligence on 'waiting in the wings' course innovations, and asked committee members to consider the relative importance of a set of constraints, or rules, identified as having been applied to the IA timetable. The committee was supportive on all points excepting process support which it reserved comment on, and directed the project to prioritise investigation of how the move of Materials Science practical classes to a new, more distant building in 2012 might be enabled.

Subsequent discussion with the head of practical classes in Materials Science revealed that he had already documented a plan for accommodating this move, proposing to modify the provision of practical classes to Materials Science students from 2x2hr/wk to 1x3hr/wk, running these longer labs in the afternoons so that travel time is part of lunch hour. This change has a general effect of increasing flexibility in the NST IA timetable, by removing practical classes from the mornings where they clash with some lecture slots. Until project staff met with Materials Science and discovered he was able to change his teaching requirement in a way that was an improvement in terms of both pedagogy and timetabling flexibility, we were unable to find a solution within the current timetabling constraints. The solution proposed is only possible because the change is fundamentally a simplification of the scheduling constraints - other departments may not be able to benefit from this approach, especially if they are contemplating changes which due to resource constraints require many presentations. This illustrates both the importance of enabling discussion and collaboration in such changes and the larger significance of our plan to demonstrate alternative solutions by relaxing one or more timetable constraints and applying scheduling algorithms, showing that curriculum change is possible in general.

The tabular view of NST IA has subsequently proved popular as a tool for staff looking at timetable problems. The fact such a artefact was not previously circulated is illustrative of the purposefully light touch central direction usual in the University, and also of the rarity of change in the scheduling of this part of the curriculum. The fact that it has proved popular indicates demand fortools which can support change.

2010-11	Mon	Tue	Wed	Thu	Fri	Sat
9	G X [B1]	Z Y	G [X B2]	Z Y	G X [B3]	Z Y
10	D L (M) [!B1 C1]	A (M) [B2]	D L (M) [!B2 C2]	A (M) [B3]	D L (M) [!B3 C1]	A (M) [B1]
11	B (M) [C1 D A']	E (M) [C2 A']	B (M) [C2 D A']	E (M) [C1 A']	B (M) [C1 D A']	E (M) [W]
12	C (M) (CS) [B2 E' D A']	F (M) [C2 E' A']	C (M) (CS) [B3 F' D A']	F (M) [C1 A']	C (M) (CS) [B1 F' D A']	F
1	[E' D A']	[E' A']	[F' D A']	[A' (CST)]	[F' D A']	

2010-11	Mon	Tue	Wed	Thu	Fri	Sat
2	[C2 E' D G' A']	[E' G' A']	[C2 F' D A']	[Y L G' A' (CS)]	[C1 F' D G' A']	
3	[C2 E' D G' A']	[E' G' A']	[C2 F' D A']	[Y L G' A' (CS)]	[C1 F' D G' A']	
4	[E' G' A']	[E' G' A']	(M) [F' A']	[Y L G' A' (CS)]	(M) [F' G' A']	
5	[G']	[G']	[W]	Y [G' (CS)]	[G']	

KEY: Letters represent NST IA options, parenthesised letters indicate events in overlapping triposes. Square brackets [ ] enclose practical classes, prime (') indicates those which students attend on alternate weeks, enumeration is used to distinguish classes where students take more than one a week, and ! is used to indicate where one instance of a practical follows on directly from a preceding one.

A second, immediate scheduling problem Course Tools was asked to investigate solutions for was the scheduling of a new short course in Scientific Computing, for first delivery this year. Course Tools identified a range of options for the NST using a combination of expert knowledge, EventMap software, and existing CARET technology to explore solutions. Given the current distribution of lectures and practical classes, even modern scheduling algorithms were unable to discover solutions such that all students would be able to attend weekday morning presentations of this new class with no more than two presentations of the course lectures, again demonstrating the intractability of the current timetable.

Ultimately, rather than accept marginal evening and weekend time slots which might adversely affect attendance, the course organisers chose a 'least bad' solution which includes weekday morning lectures for the majority of students (one lecture presented twice a week) but requires special workarounds for a small number of students taking a rare course combination. Although this solution was identified manually, the problem of such an approach in a very complex timetable was found to be to follow the chain of consequences and verify the feasibility not only of the time slots but of their impact on other student course choices, which determine how the cohort is split between the two Scientific Computing lecture presentations.

More flexibility was available in return for relaxing one or more constraints on the timetable, e.g. by allowing lectures in the afternoons, but this was too big a change so close to term time. The NST has, in effect already adopted a constraint relaxation so that future years will not require a workaround for those few students, in the form of the revised Materials Science practical provision.

Overall, we observe that flexible timetabling is a product of infrastructure as well as of software tools and expert analysis. Infrastructure in this context includes a standard hierarchy of 'learning units', delivery patterns and patterns of time slots, all things which are to a large degree open to definition during programme design, as is currently the case for the University's forming Social Sciences Tripos. There is a basic tension between the desire to have degree of choice for students and a high degree of independence for lecturers in how to structure and deliver their material.

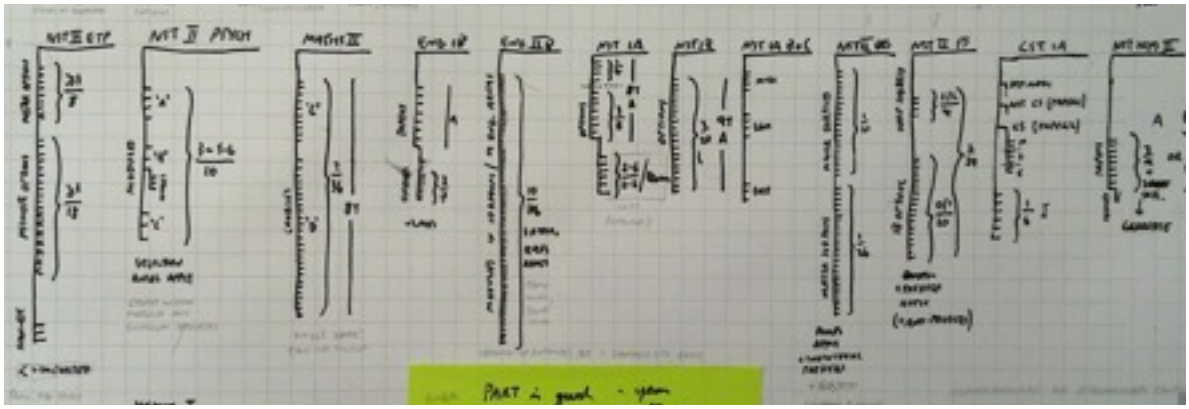
We will document the characteristics of flexible but complex curricula as "n steps to happiness", with emphasis on implementable changes, for circulation to University stakeholders prior to circulation to the NST and SST Committees and the wider HE community.

Course Information

NST administrators reviewed the project's existing course database in May, and made a number of recommendations, including a) that the curriculum hierarchy should be complete for the whole University, b) that course information should initially be limited to links to existing sources, thus requiring no additional maintenance.

Encountering increasing variation and confusion in beliefs about curriculum structure at Cambridge, Course Tools diagrammed a sample of course structures across the University in order to visualise the curriculum structure independent of terminology. We observed that there is, in fact, a three-level system in place: **Tripos**, **Part** and **Module**. Modules, a.k.a. courses, papers, lecture courses, options

and units, are typically characterised by occupying between one half and one tenth of a student's study in a year and by being at the level at which students are offered any choice of study directions, so that there are often rules about allowed combinations, minimum and core modules. It is important to distinguish the rules about allowed combinations from the Parts and Modules themselves, in order to avoid confusion: module selection rules form an element of the Part specification. Modules are composed of timetabled events and private study, and sometimes extended coursework. Many Parts include some smaller, special-purpose Modules, e.g. Scientific Computing, which are often not examinable.



Sample of course hierarchies at Cambridge

Occasionally it may be appear useful to subdivide a Module further in to Units, for instance the several sections of NST IA Physiology of Organisms, because they are delivered by different departments and somewhat distinct from one another, or of NST II Psychology, because they are both lectured and timetabled separately. Although these cases seem reasonable as reflecting the curriculum structure, reflective of practice in the current Lecture List, and generally of assistance to students and staff, Units do not usually have separate entries in course handbooks, merely being distinguished by title and timetable information, and not all modules have them; Maths and History modules, for instance, do not.

A few subjects in the current Lecture List go even further and specify individual lectures, but a line needs to be drawn somewhere. Consistently drawing it at Module level in a three-level system, with Units specified in the synopsis text, would be consistent and applicable across the University, enabling mapping onto other common IT platforms such as the VLE CamTools, the student information system CamSIS and, potentially, library and timetabling systems. This would not, however, be particularly supportive of automatic generation of Lecture List-style information. How to meet this need in a way which enables consistent treatment of curricula across the University remains an open question which we continue to engage stakeholders with.

Interestingly, all three timetabling software tools and Sakai Open Academic Environment (as Sakai 3 is now known) assume a three-layer curriculum hierarchy. Kuali Student has adopted a more complex approach, defining Courses and Programmes as first class entities, and providing for several layers of Programme definition.

A three-layer system might mean ignoring Units (and Lectures beyond them) means it is not possible to match the functionality of the current Lecture List. Making Units 'first class citizens' of curriculum structure would mean that Modules which are not so subdivided will have to have a single Unit, increasing indirection in the curriculum structure. If Modules were demoted to being a kind of selection rule which specifies a set of Units to be taken together, we would be ignoring the fact that handbook information is typically only published at Module level. The solution we are presenting to stakeholders is to separate the problems: make it optional to define Units (and Lectures), and where they are defined require them to be attached to events timetabled at Module level.

Creating and maintaining a curriculum hierarchy to Module level is a necessary first step in building an innovation-enabling curriculum infrastructure, and we intend to remodel our current course information tool along these lines. It is a small enough data set that it can be maintained in a few person-days a year.

Once the conventions of the representation are established, it will probably be possible to construct the entire data model entirely within spreadsheet format importable to timetabling software. This does not require much Departmental input or process change and is sufficient to give a software representation of current practice, enabling interstitial room bookings, lecture theatre timetables, online course timetables (to Module level), scenario planning and easier problem solving and troubleshooting. It is not sufficient to conduct significant timetable reform in order to respond to staff or student needs, which requires much more staff involvement, specifying preferences and negotiating clash resolutions, and an ability to auto-generate whole or part-timetables. To this end, having created the course information model, we plan on attaching further course information to its nodes, including empty fields which we will make 'adoptable' by lecturers opting in to the system.

Capturing the bare course hierarchy is not however devoid of curriculum benefits. Mapping of the course hierarchy into CamSIS or another system (e.g. Purdue's UniTime) could enable students to indicate course preferences before they start them, making it possible for the first time to adjust teaching provision in response to student needs. 'Enrolment' is not at present a familiar concept at Cambridge, where students register for examinations (in CamSIS in November) but are mostly free to try things out and study what they choose. Advance enrolment need not prevent students from doing this - in fact it would make it easier. Some courses already require students to enrol, for instance Physics, in order to manage lab and lecture provision, and the entire NST IA, for the same reasons. Departments could use an enrolment system if they needed it, and perhaps in future formalise it so that in November the enrolments are frozen and passed to CamSIS.

Unusually for a student information system, CamSIS at present does not know about Modules, only examination papers, which do not have a one-to-one relationship with Modules. By making use of an approved course hierarchy CamSIS would be able to provide more meaningful transcripts, as recommended for HEAR. This would be especially true if CamSIS could also include with transcripts an approved record of Modules' synopses and learning objectives. Attaching this information to an academic database of curriculum hierarchy would not be trivial: lecturers and course organisers would have to transfer it from course handbooks and websites, and Departmental heads or teaching offices or teaching committees would have to 'sign off' annually. However, as well as providing HEAR transcripts this information would then form the basis for searchable, browsable, **re-usable** information about courses at Cambridge, helping students, lecturers and course designers, potentially replacing the Guide to Courses, and allowing pre-population of CamTools course sites.

In summary, a basic course information infrastructure is essential to solving both 'co-ordination' and 'finding time' timetabling problems, which currently have the strongest traction with internal stakeholders. Having constructed this we propose to integrate facilities for academic managers to claim curriculum they are responsible for and, if they choose, populate course information in this common, deliberately designed, and re-usable form.

To this end, and complementing a previous survey of course information available at Cambridge, project staff have conducted a survey of course information resources available at peer institutions, particularly at Module level, and with particular regard to the type and granularity of information presented, with the aim of constructing a canonical form of information which could be used here. The requirements were that the fields of such a form should be clearly defined and discrete to promote consistency and so re-usability, sufficient to capture the full variety information staff may wish to include and which users may wish to access, designed to support pedagogic best practice, and easy to use. A review of the course information standards TEN-Competence and XCRI was included in this work, which is presently ~70% complete. It is intended that this should lead to both University-internal and JISC programme outputs.

Process Support

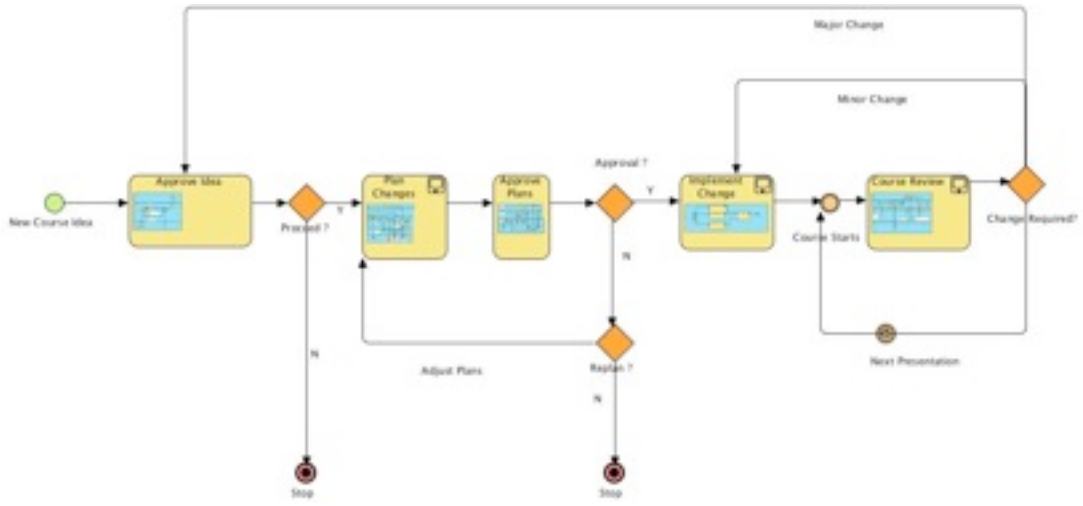
Kuali Student Curriculum Managelent (KS CM) was initially perceived as an element of a revolutionary new approach to building a Student Information System, claimed to be able to model curriculum situations other SISes could not, thus rendering tractable previously impossible problems. This claim that the information model itself was Kuali's value was something Course Tools intended to test, by comparing the utility of KS in these circumstances with that of commercial software. As our understanding of KS has advanced however we have come to view it as a tool for supporting and facilitating change processes.

Following the last steering committee meeting project staff sought to identify and engage teaching staff with curriculum proposals ‘waiting in the wings’, or who had recently undertaken such changes. Changes of any scale and type were considered, for generality, and because most curriculum change at Cambridge is mostly in the form on incremental improvements and updating of existing courses, rather than new Modules or Tripos. We surveyed staff via CamTools, contacted key people directly, and asked the NST Management Committee at their second meeting of Easter term. We found a number of staff willing to talk to us about changes they had made, and a few anticipating future changes:

- Materials Science and Mineralogy - move to West Cambridge site and shared Part III
- NST 1B Ecology - changes in 2010-11 due to retirement
- 1A German - consolidation of three courses in to one
- Chemistry - significant changes across whole programme.
- Transferable skills programme - change of delivery format
- English - assembly of a Resources for Research course from pre-existing units
- Psychiatry (Clinical Medicine) - improving placements with more systematic feedback
- Part I Veterinary and Medical Science - updates to accommodate changes in accreditation requirements
- NST IA Neuroscience - networked laboratory equipment used to enhance pre and post-lab work
- Public Health and Primary care - updates to curriculum in line with “Tomorrow's Doctors” programme

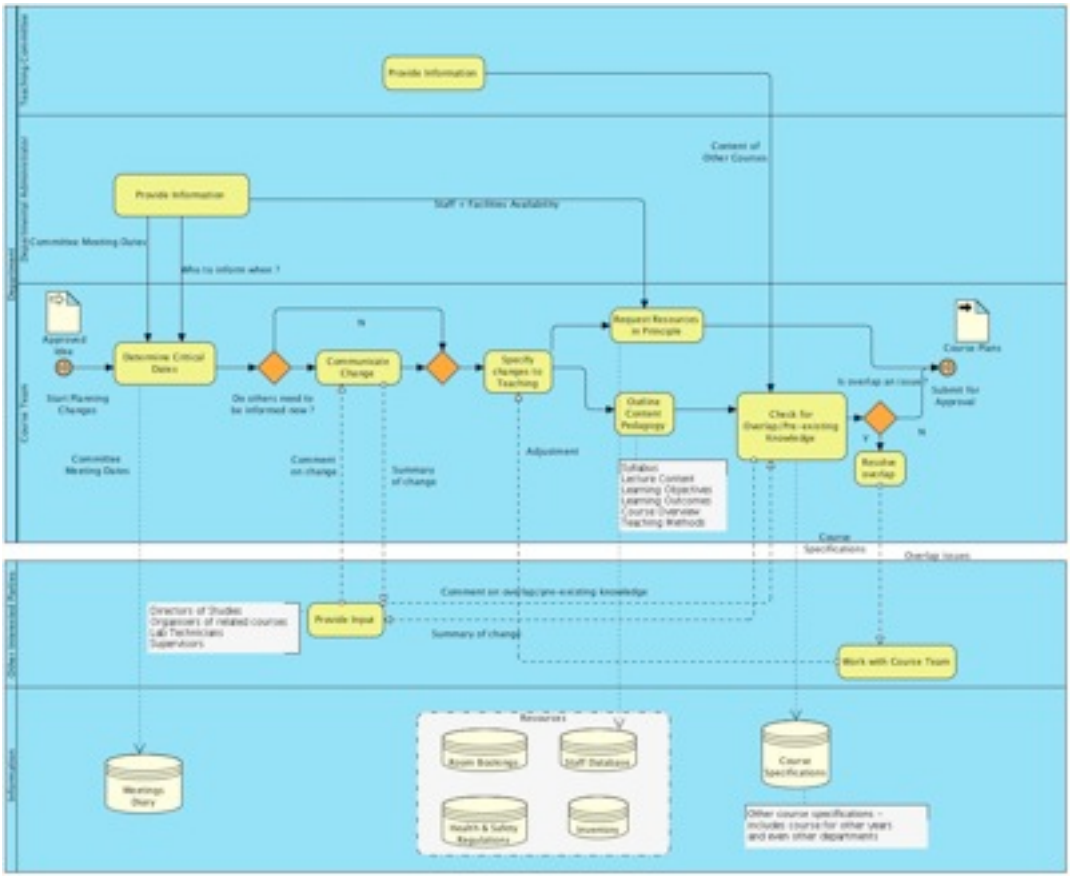
Case studies of a sample of recent changes were constructed on the basis of interview data, with issues initially being organised using a mindmap. Finding a marked degree of similarity between quite different change cases, we combined the maps and from them derived a ‘common change process’, in the form of a business process model (BPM). Although different departments divide up responsibility differently, different kinds of changes involve different people, and different scales of change involve different people, at a one-step-abstracted level we find all changes follow this process.

The aim of this process modelling was to derive BPMs of common change cases for implementation and subsequent support in Kuali Student, and to identify where pedagogic considerations are introduced and so where design support could most usefully be offered. In doing the work we found that pedagogic concerns are either main motivations for change, or else are considered at the planning stage once initial approval is obtained. Most change is managed relatively informally, and so requires relatively informal support tools - the downside of this is that change involving other Departments is often very difficult. Also, all changes follow a similar path, but with different people involved and sometimes skipping sections.



Unified change process: overview

Accordingly, we believe the most effective process support tool would be an informal one, to which initiators can invite collaborators from their own and other Departments, perhaps in multiple roles. The tool might aim to produce as output a revised module specification of the type discussed above, but its chief purpose would be to support cross-departmental collaboration and promote (and archive) design reasoning. It would benefit from being linked from the Education Section or Learning and Teaching Support pages, and relevant external resources.



Unified change process: expansion of the planning stage

It is our intention to use this model to create a process support tool. We will also test it with out cluster, with the intention of generalising it and making a cluster-level output.

Kuali Student R7 was successfully deployed shortly after the last CTSC meeting by CARET chief technical officer Ian Boston, and R8 has recently been released, R9 has passed code-freeze and is due for release as public release 1.1 at the end of November, incorporating significant increases in functionality. It is apparent that the project is now beginning to become more open and strides are being made with documentation, for release with R1.1.

We have determined that significant customisation of Kuali Student requires significant investment in familiarisation with its code. The University of British Colombia, which plans a proof test before fully deploying it, estimates that customising it, converting data from existing systems and providing extra functionality will require 3 Java developers for 3 months. Our best strategy is to use the default configuration as far as possible, keeping customisation to a minimum.

Using Kuali Student requires that one have a course hierarchy, an organisation chart, and process definitions whose stages are mapped to roles in the organisation chart. While this infrastructure is reasonable and indeed desirable when shared with Kuali Financial Services, for instance, it may be insufficiently flexible for an 'informal' process support tool. Our present intention is to push our evaluation a bit further and write up a full report as a project output before Christmas, and then review Kuali Student in the light of findings from the Kuali Days conference and R1.1.

Original Work packages

WP1: Project set-up, governance and initial stakeholder engagement (complete)

Although conceived as an up front task of establishing need and agreeing interventions, prior to executing and evaluating them with fully engaged institutional partners, in the project plan this has divided in to two components. One, similar to the original concept, comprised initial engagement and baselining. Second is an ongoing dialogue to discover what can and what needs to be done amongst the various stakeholders, respond to emerging opportunities to further project aims,

WP2: Review of current processes and practice (complete)

WP3: Understanding the initial issues and identifying changes desired by the end of the project (complete)

WP4: Initial design: planning innovations in in curriculum design process (complete)

WP5: Piloting curriculum design support tool with a range of programmes and modules

This work is ongoing on the three fronts described above. As well as engaging with specific examples of curriculum design the project is working to create and embed an institutional infrastructure for curriculum innovation.

WP6: Evaluation of new processes

The project's interventions have benefited from repeated rounds of feedback and reformulation such that desired outputs and outcomes all lie within the scope of what can be achieved with the engagement of our teaching and administrative stakeholders.

WP7: Embedding of new processes

Design for sustainability is a continuing feature of the project. Although some influential teaching stakeholders are currently of the opinion that establishment of tools and processes for occasional modelling change before its implementation is preferable to emplacing permanent infrastructure, this may in practice be an impactful and sustainable model.

WP8: Engagement with Phoebe and/or LPP / LDSE

This work package is about supporting an awareness of pedagogical best practice in course and programme design. Course Tools expects to to offer a course development workflow tool in which support for pedagogic practice can be embedded.

WP9: Engagement with Kuali Student project

Please see Process Support above.

WP10: Oracle evaluation and comparative analysis

We plan to call in our commitment from Oracle when we have reported on Kuali, when we have placed ourselves in a position to make testable assertions about the relative merits of the Oracle and Kuali systems for curriculum management, which Oracle have said they will test and respond to.

WP11: Engagement with synthesis project, programme and JISC community

Our cluster held one CAMEL event, at which we began work on a mind map illustrating the 'wicked' nature of institutional change around curriculum design processes.

We have studied both XCRI and TEN-Competence in the this period and intend to write up our findings for the benefit of the community and those projects.

Project members spoke by invitation on the interrelation of scheduling and curriculum at the bi-annual Practice and Theory of Advanced Timetabling (PATAT) conference held at Queens University Belfast.

Section Three: Risks, Issues and Opportunities

A current SWOT analysis is given below.

Strengths	Weaknesses	Opportunities	Threats
We understand and can describe consistently Cambridge's tacit data models and processes.	Engaging and keeping in touch with teaching staff contacts.	CUSU Education Officer Maria Helmling supports advances in course information	Path for opt-in model of adoption university-wide is slow.
We are able to plot the sequences of steps needed to achieve change.	Writing up research into project outputs for the University and wider community.	University cost-saving committee may be interested in streamlining course information or otherwise achieving administrative efficiencies	The scale of the timetabling task is large: first to obtain a software representation, then to support change.
We have identified and socialised a set of specific curriculum design problems.	Having key committees and staff agree with our problem statements and engage with us to address them.	Computing service has published Google Calendars of main central committees, made Google Calendar available to all University members	NST committee bumped us from their latest meeting. New chairman may wish to engage on different terms.

Strengths	Weaknesses	Opportunities	Threats
		Members of the NST committee, motivated by marginal viability of present IA timetable, are attempting a manual redesign.	

We have used this to identify project priorities for the next 2-3 months:

- Project output: Kuali Student report to coincide with 1.1 public release
- Project output (interim): Timetabling report including "n Steps to Happiness"
- Project output: Cambridge Course Information Model, including notes on suitability of XCRI, Kuali Student, TEN-Competence, relational databases.
- Activity: Load all NST data into OpTime / UniTime and work with individual NST Committee members to model changes
- Activity: Build 'informal' process support tool
- Engagement: Ask LTS or ES to support process support tool, work with staff engaging in change
- Engagement: Present complete representation to next NST meeting, identify chief constraining factors, propose possible reforms
- Engagement: seek meeting with PVC (Education) Prof. John Rallisson to pitch potential efficiency benefits of common course information

The following risk factors have changed or been newly recognised.

Risk	Probability (1-5)	Severity (1-5)	Score (PxS)	Action to Prevent/Manage Risk
Kuali student LUM not suitable for use at Cambridge	4	2	8	**Changed risk:** Although we are confident it is possible to represent our course structures and management flows in Kuali Student, we are less confident we can do so as part of a sustainable solution for course information and design process support. However, as we have come to understand Cambridge's CD challenges in socio-political infrastructural terms, we no longer believe KS LUM is the only possible solution.
Late delivery of Kuali Student Curriculum Management Module	5	1	5	**Unchanged - now built in to project plan.** Originally expected to be available to the project late 2009, difficulties with KS have delayed its '1.0' release until April 2010 and its '1.1' release (including documentation and much functionality) until November 2010. This is accepted in the project plan and should have no further impact.
Design workflow and flexible scheduling tools have insufficient project time window for application to real cases	3	4	12	We have identified further problems and proposals, both large and small, in the early stages of being addressed. The socio-technical nature of the curriculum design problem space means that as well as specific problems, we have identified 'innovation infrastructure', or the potential of change, as a further important impact area.

Risk	Probability (1-5)	Severity (1-5)	Score (PxS)	Action to Prevent/Manage Risk
Conflict between top down (meeting the requirements of key senior stakeholders) and bottom up (faculty/student engagement) methods each demanding different decisions at a more detailed level of the project	3	3	9	**Reduced risk**: With a wide variety of stakeholders it is likely that requirements may conflict at some point. All the key users of the tools must be happy with them for the project to be successful. However, internal stakeholders are now aware of and willing to align JISC's programme aims.
Departure of key project staff causes loss of project expertise or gap in staffing	3	3	9	**Mitigated risk:** A number of experienced staff have become involved or been assigned part-time to Course Tools from within CARET. The project director has also had an increased role in this reporting period. Increased team and management meeting frequency helps maintain momentum and connection for this more distributed team, and reduces the impact of any further staff changes.
Engagement of key staff and committees remains arms-length	3	3	9	**New risk:** moving our academic partners from discussion to action requires their full support, in terms of accepting the problem to be addressed and the solution to be implemented. The project has previously attempted to drum up momentum for change, but was rebuffed because of concerns about sustainability and need for proposed changes. Because of our dependence on individual champions, circumspection has been necessary to avoid expending credibility on prototypical proposals. The project now has definite and achievable steps, each thought through, joined up and justifiable to relevant stakeholders in its own right. We will proceed to 'bang the drum' and intensively engage a small number of important people able to promote, influence or pioneer change.

Section Four: Outputs and Deliverables

A common data structure will be used to store information about courses, capable of supporting applications aimed at promoting curriculum flexibility and innovation, and providing a common integration point VLE, SIS, enrolment and library systems. An 'informal' process support tool will support a variety of course developments, surfacing their common requirements and the sequences of actions employed to achieve them. Timetabling software will enable curriculum innovation and flexibility in complex interdisciplinary programmes, through a combination of social-led change to adopt flexibility-promoting practices and academic-owned scheduling algorithms. Further technical outputs are expected to include course management templates for the developing Sakai 3 VLE.

Type of output (see indicative list below)	**Details e.g. theme, topic, number (of this type), size/scope**	**Proposed audience (internal or external) and who will use this output and why?**
Blog posts	Regular posts, approximately once every two to three weeks, reflecting both on what the project has been doing, and on wider issues of relevance to the project.	Both internal and external; used by both to review the progress of the project, and to learn lessons for future projects at an early stage.
Conference presentations	Workshops and conferences on Kuali Student and curriculum management systems more broadly.	UK and European HE institutions interested in Kuali Student
Dissemination materials	A series of articles appearing in University newsletters	Internal, particularly aimed at those with a strong interest in learning and teaching
Dissemination materials	A series of termly project newsletters, reporting the progress of the project.	Predominantly aimed at internal stakeholders, although also available externally
Dissemination materials	Videos from stakeholders detailing their experiences over the duration of the project	Predominantly aimed at internal stakeholders, although also available externally
Guidance Materials	Recommendations of how the requirements for new learning and teaching projects at Cambridge assure quality and well designed outcomes and might be used in other universities to guide similar projects there.	PVCs and those with responsibility for institutional IT support for learning and teaching
Guidance Materials	Open licensed documentation for Kuali Student Curriculum Management, supplementing existing project documentation and providing an orientation and evaluation on the value and applicability of the Kuali Student curriculum management data model and software, including comparison to other related tools and data models, for technical, managerial and academic staff at UK (and EU) HEIs.	UK and European HE institutions interested in Kuali Student. The Kuali Student project documentation effort.
Case studies	Pre and post-intervention case studies	Available both internally and externally
Evaluation report	Evaluation report highlighting the impact of innovations in curriculum design processes on departments' ability to address strategic aims; evaluation of changes that have occurred as a result of project innovations and of lessons learnt through carrying out the project. This will be written to support the full range of roles involved in these processes including course designers, technical staff, institutional/faculty managers/heads, registrars, teaching committees	Available to all stakeholders internally: actively circulated to Education Committee of the General Board and Pro Vice Chancellor for Learning and Teaching; available externally for other HE institutions interested in learning the lessons of the Course Tools project
Review	Review of technical and pedagogical links between pedagogical planning and curriculum design, including “n steps to happiness” for flexibility in complex multidepartmental programmes. Possible integration with support tool, e.g. under the aegis of Learning and Teaching Support initiative. This will be written to support those with responsibility for QE activities	Available to all stakeholders internally: actively circulated internally via the Education Section and to Quality Assurance contacts. Available externally to all, but may be specifically promoted externally via the HEA Teaching and Learning Experts group and QAE SIG
Technical documentation	Technical documentation (which may be in a range of forms, e.g. video, text, presentations) to support both the users and the administrators of software developed specifically for the project	Available to all users of the software, internally and externally

Type of output (see indicative list below)	Details e.g. theme, topic, number (of this type), size/scope	Proposed audience (internal or external) and who will use this output and why?
Evaluation Plan	Detailed evaluation plan	Key stakeholder groups within the University; other JISC Curriculum Design groups
Evaluation Report	Reflections on the evaluation and research methodologies used, issues encountered, lessons learnt and recommendations for future projects, including reflection in the General Board's Criteria for Learning and Teaching projects.	Both internal and external; used by both to review the progress of the project, and to learn lessons for future projects.
Tools and Guidance Materials	Curriculum innovation infrastructure for the University, including a course information model and tool, informal process support tool, and scheduling support tool, demonstrated within the context of specific challenges of the NST.	Cambridge staff, and potentially/ indirectly students. Process support tool/methodology likely to be useful for other HEIs having highly independent departments.

Section Five: Evaluation

During this period it has become clear that in a socio-technical institutional change project such as this, demonstrating the 'popularity' of an idea is rarely sufficient to engage key stakeholders. Far more important is to understand their particular concerns personally and as office holders. Having particular vantage points, they may not have the same priorities as staff and students generally. In a big institution with many stakeholders, the number of people with a small stake may be large, but the number of people with an overview of the problem, or a significant part of it, and the power to address it, may be quite small. Evaluation measures and success criteria must be designed to engage them, and preferably with their input, or risk irrelevance.

Baselining interventions which are still in development is best done by focussing on the broadest aims of the project, its ends rather than its means, creating a rich picture which stands a better chance of capturing impact of any implementation.

Quantitative data on effort and scheduling/process obstacles to course creation and revision has proved difficult to acquire, because of a low response rate to our initial survey to uncover the types and frequency of curriculum revision, which was designed to inform subsequent question design. We have instead followed some of the responses with interviews to obtain rich data including causation.

Rationale / Purpose for activity	Planned method	Participants	Timing
Baselining current practice	Survey followed up with interviews of staff on externally and self-imposed scheduling constraints preventing them from implementing changes	Staff involved in timetabling in a range of Faculties, particularly the NST	May - August 2010
Baselining existing practice	Development of example workflows for a variety of kinds and scales of curriculum change tasks; abstraction to a common form	Staff involved in timetabling in a range of Faculties, particularly the NST	May - August 2010

Rationale / Purpose for activity	Planned method	Participants	Timing
Investigation of extent to which lecturers feel the inflexible timetable and restricted room choice constrains pedagogy	Online survey - mainly quantitative	Lecturers and Course Organisers in the Natural Science Tripos; Lecturers and Course Organisers in other Depts - attempt to compare the responses from those who have previously taught at other Universities with those who have only taught at Cam	insufficient response - deferred
Baselining current experience of the process of creating / revising courses	Request for statistics from Education Statistics regarding current numbers of courses created / revised, time taken to create a course, time taken to implement a course, and (if available) number of times material was re-presented to the same committee.	Education Section	Continued from Dec 2009 onwards

Activities for the next 6 month period:

Rationale / Purpose for activity	Planned method	Participants	Timing
Explore functions and benefits of proposed course information	Lunchtime focus groups with staff and students to collect feedback on storyboard and lo-fi prototype.	Undergraduates in all years, lecturers and academic managers. in all Schools.	Dec 2010
Explore functions and benefits of proposed course information	Collect responses from staff in roles likely to be able to benefit from systems integration using this information.	IT and admin staff in management information systems, board of examinations, University library, Education Section	Dec 2010
Value benefits and validate designed functions of proposed process support tool	Storyboard, user-oriented process map, and paper prototypes	New-in-post academic teaching staff and staff with recent or impending experience of curriculum design projects	Dec 2010
Value timetable models/ representations as enabler of change projects	Interviews	NST administrative and teaching staff attempting reforms who have been given to opportunity to use the models	Dec 2010
Initial assessment of impact of Kuali Student report on UK HE Community	Usage stats	UK HEIs interested in Kuali Student	April 2011

Section Six: Outcomes and Lessons Learned

In timetable-constrained curricula, even with software there is likely to be a need for a professional / experienced timetabler to identify pinch points and appropriate strategies. Otherwise there is a tendency to make incremental adjustments until a 'local minimum' is reached where any further

adjustment makes things worse, but where more radical adjustments could make things significantly better. We believe NST IA may be a living example of this.

In cross-disciplinary curricula, this role will be most effective if created in support of a strategic management role, which may be an individual or small committee. A large committee benefits from including representatives of all interested departments, but suffers from the effect this has of encouraging a 'silo' mentality. If departmental concerns are not to dominate, it is important that this management role combines a specific remit to look to the common good with authority to make or propose changes, aligning risks and rewards.

Curriculum design in a teaching institution which is a community of academics first and an institution second is naturally burdened with relatively few formal procedures. The University's central administration has deliberately, by the common desire of its members, kept itself as clear of curriculum matters as it may. Avoiding stultifying bureaucracy is understood be a good thing, avoiding wasted time and allowing room for brilliance. But the relative lack of formal structure, especially institution-wide, is increasingly itself the prime cause of wasted time and blocked innovation.

The good will and professionalism of teaching staff can not be questioned, but foregoing a higher degree of consistency across the University creates considerable opportunities for reinvention of wheels, unnecessary heterogeneity, and avoidable oversights. There are fewer opportunities to pool effort, or to share and benefit from the expertise and knowledge of other branches of the University. Bilateral connections between departments must start from scratch each time, and multilateral co-ordination between departments is made less tractable, so that multidisciplinary curricula are prone to ossification. The information systems and administrative functions which do exist are prevented from integrating by their lack of knowledge about teaching, which being half the business of the university should be a natural integration point, leading to wasted effort and missed opportunities.

The Course Tools project team has come to understand that freeing up curriculum innovation at Cambridge, and indeed at any HEI with strongly federal and co-operation-based structure, requires a systems approach in which the 'innovation infrastructure' is attended to piece by piece, each stage being sustainable and positive in its own right, or at least creating potential for change. An infrastructure problem requires a multi-stranded solution, but is not necessarily undefinable or something stakeholders can not agree on.

Simply by attempting to address the problems around course information and resource allocation the project is setting the terms of debate, such that NST Management Committee members are aware of the issues, are able to weigh constraints and benefits and take decisions which address or change the nature of the problem, for instance by deciding not to support unpopular combinations, or requiring earlier enrolment. Illustrating this, senior academics have recruited project members in attempted manual redesign of the NST IA timetable based on expert knowledge.

This is perhaps an example of the value of envisioning an ultimate goal, even if apparently unachievable. The change needed to implement the vision may be too great to win institutional commitment, but once the goal of change is established it forms a framework for consideration of future IT solutions to emergent problems, such that the overall objectives are incrementally realised in a series of achievable steps. Deliberately seeking an impact in such terms, helping stakeholders solve their own problems rather than seeking to create change directly, may be a valid and effective strategy.

Section Seven: Communication and Dissemination Activities

The project panager presented a talk on the link between curriculum and timetabling at the bi-annual PATAT conference on advanced scheduling problems, held this year at Queens University Ulster.

Course Tools continues to maintain a blog, twitter feed and web site. We intended to present a printed newsletter again this term for key contacts, and a 'flyer' for use in awareness-building of our interest in curriculum innovation.

Project staff have found, not unexpectedly, that functional demonstrations elicit far more concrete feedback and engagement - positive or negative - than conceptual discussions. We have an excellent understanding of the institutional cultural and informational context, as well as of its specific challenges, far better than at the beginning of the project. We have also succeeded in beginning to set the terms of debate. If we are not merely to build a better buggy[1], we have concluded that having minimised risks now is the moment to press ahead with implementation of tools and infrastructure, even without specific instructions from internal stakeholders.

Another strategy is adopted from previous work with stakeholder-led research at CARET and involves simply presenting problems to academic stakeholders, highlighting degrees of freedom but avoiding any immediate recommendations or detailed discussion of technical measures. This preserves stakeholders' freedom of action so that they are able take ownership of a solution, rather than being asked merely to endorse it.

Section Eight: Collaboration and Support

Briefly summarise contact with the programme manager, critical friends and support team, formal or informal links with other projects, programme-related activities, and ways in which you have been able to influence the development of the programme.

Prof. Stephen Brown, project Critical Friend has attended one meeting of the project steering committee and one project team meeting during this reporting period, where he represents informally JISC's interest and is able to provide points of comparison with other projects.

The feedback of the programme team has as always been of great value.

Do you have any specific needs, requests or suggestions for support?

None at this time.

How have you found the process of working with your critical friend and Cluster? Please highlight what has worked well and what hasn't worked as well, and any recommendations for how to improve the process.

Cluster B continues to be a source of ideas and support as described in the previous interim report and we would like to thank the programme team for arranging to continue support for this activity.

Section Nine: Financial Statement

The directly incurred costs of the project (staff salaries, on costs, expenses and subcontracts) are £16,940 below the project budget to end September 2010 calculated on a pro-rata basis, and £3,009 below the expenditure anticipated in the project plan.

[redacted]

1 Henry Ford's description of what would have been the outcome had he asked his customers what they wanted

	Total over entire project period		Total to end Sep10		
	Allocated funds (original budget)	Allocated funds (revised budget)	Pro-rata (26/46 of revised budget)	Expected to spend (project plan)	Actual expenditure / income
Total Directly Incurred Staff (A)	[redacted]				
Non-Staff					
Travel and expenses	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Equipment	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dissemination	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Conferences	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Subcontracts	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Directly Incurred Non-Staff (B)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Directly Incurred (A+B=C)	[redacted]				
Directly Allocated					
University Staff	[redacted]				
Estates	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Directly Allocated Total (D)	[redacted]				
Indirect Costs (E)	[redacted]				
Total project Cost (C+D+E)	[redacted]				
Amount of grant from JISC	[redacted]				
Institutional Contributions	[redacted]				