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## Toward an undergraduate programme in Interdisciplinary Design

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# Toward an Undergraduate Programme in Interdisciplinary Design

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## Abstract

This technical report describes an experimental syllabus proposal that was developed for the Cambridge Computer Science Tripos (the standard undergraduate degree programme in Computer Science at Cambridge). The motivation for the proposal was to create an innovative research-oriented taught course that would be compatible with the broader policy goals of the Crucible network for research in interdisciplinary design. As the course is not proceeding, the syllabus is published here for use by educators and educational researchers with interests in design teaching.

## Status

There are *no plans* at present to offer this syllabus to Computer Science students in Cambridge.

Although a course along these lines was advertised in the Cambridge prospectus for 2008, students who might have wished to take that option will instead be offered the Part I social psychology paper, “Society, Interaction and the Individual”.

After review of the original proposal described in this report, some elements may be adapted for inclusion in experimental interdisciplinary teaching initiatives elsewhere in Cambridge.

The proposed syllabus is published here in the form of a technical report, in response to interest and enquiries from other institutions that are currently developing research, policy initiatives and teaching materials in related areas. Many researchers affiliated with the Crucible network are involved in similar initiatives, and welcome contact and discussion. Please contact the author with any enquiries, observations, and especially notification of any plans to adapt or apply any element of this syllabus in actual course teaching.

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## **Design, Theory and Society**

Syllabus proposal developed for Cambridge Computer Science Tripos  
Intended audience: Part 1a (first year undergraduate / freshman year)

### **Educational Objectives**

The goal of this syllabus proposal was to develop computer scientists who are technically proficient and confident, highly articulate, and have broad analytic perspectives. The manner in which these objectives would be achieved is derived from first year design courses in architecture and engineering rather than traditional computer science. However the syllabus usually associated with such teaching would be replaced with material specifically focused on computer science. This was intended to deliver education with both professional and scientific relevance. In professional terms, the main theme is of the “reflective practitioner” (from Donald Schon), competent not only in technical skill, but able to reflect on the purpose and context of his or her work. In scientific terms, the objective was to develop a “critical technical practice” of computer science research (from Phil Agre), in which scientific themes do not lose relevance by isolation from critical perspectives.

### **Timetable and Teaching Resources**

The course timetable would be designed as an optional replacement for first year Physics, which involves a total of 60 lecture-hours (on Monday, Wednesday and Friday mornings) and 40 formal practical hours. Other work to be completed in students’ own time would consist of essays and further practical work, with overall workload equivalent to that in Physics (nominally 2.5 hours per week beyond the formal timetable, 50 hours in total). Practical hours would be taught in a “studio” style, with students working on practical design assignments in a shared space with dedicated tutors. “Lecture” hours would be taught in seminar style rather than formal lectures. College supervisors in computer science would not be expected to supervise topics in critical theory, although students would benefit from the opportunity to compare their developing perspectives to those of their peers in social science, arts or humanities. Occasional supervision sessions in a mixed-discipline group, supervised by a senior member of the college from a non-technical discipline, would be stimulating for all involved. The course organiser would propose a list of suitable topics and disciplines that colleges may use for this purpose.

### **Prerequisites and Advanced Courses**

To gain entry to the Computer Science Tripos, strong high school mathematics is essential, typically two A-levels. Similar mathematical qualifications would be assumed for those taking this option. A-level Physics is *not* a prerequisite of this course. Students would benefit from either prior arts, humanities or social science education to A-level, and from significant essay-writing experience. Prior experience of practical software construction would also be a significant advantage, although this need not have been acquired in a formal education context (indeed, the UK secondary school syllabus offers almost no such opportunities). The Design, Theory and Society course would provide students with valuable background for later parts of the Tripos including (Part 1b) Group Project, Software Engineering, Economics and Law, and Introduction to Security; and (Part 2) Business Studies, Human-Computer Interaction, Natural Language Processing, Security, E-Commerce and the (capstone) individual project. It would also be complementary to other Part 1a courses such as Programming in Java, Software Design, Computer Perspectives and Professional Practice and Ethics.

## Studio-taught Practical Component

The objectives of studio teaching, as practiced in other design disciplines, are as follows:

- Students work together in a shared space for significant periods of time, with an emphasis on shared experience and learning from each other (sometimes drawing on the prior professional experiences of some students).
- Students use tools that are as close as possible to those that would be encountered in professional practice. The acquisition of skill in using these tools is considered to be a valuable educational experience in itself, leading to mature understanding of the capabilities and weaknesses of different tools.
- Many of the practical assignments start from a design brief, rather than being academic technical exercises. The design briefs typically become increasingly relevant to actual professional problems toward the end of the course.
- Students are encouraged to sketch and discuss design concepts, rather than become immersed in technical details from the outset of a task. Tools for sketching are a valuable component of the skill set.
- Studio tutors often include guest practitioners who are currently active in professional practice, and who visit the studio to advise on design practice, tool use, and other professional issues.
- Students display their work to each other for open discussion and critique, both of work in progress and finished products. Guest tutors often lead or participate in such discussion, and the final stage of the course may include an invited "jury" of outside practitioners for open comparison of finished work.

In the analogy from architectural and product design teaching to software design, there would be some adaptation of the concepts of "product", "tool" and "sketch". A typical path of technical development might include the use of simple Web technologies (HTML and JavaScript) so that students can develop functional products before they have completed much coursework in programming. Simple database and presentation tools could be used with scripting facilities to create interactive graphics and web services. More sophisticated products can be built using programming techniques such as AJAX, PHP or Ruby on Rails, with many available from open source repositories.

All of these are typical of products that are used everyday by software professionals, but do not have the clean design of the teaching languages preferred for the Computer Science Tripos. Students would undoubtedly find them flawed, but would be encouraged to take a critical perspective toward their design and capabilities, reviewing these aspects in the light of their increasing knowledge of formal computer science. We expect that a significant number of students would arrive in Cambridge with prior experience of these tools, such that they were able to assist less experienced students. Studio tutors would also have experience of the possibilities and potential pitfalls offered by current tools. Overall, the emphasis would be on a toolset that is timely and contemporary, rather than elegant. As a result, it would be necessary to be careful in managing the risk that students might find tools confusing, unusable or unreliable.

The studio space would have been a dedicated area within one of the existing computer science workstation rooms. This would be slightly modified to create spaces for drawing, physical construction, discussion, and display of work products. The preferred location (for convenience of students travelling from other lectures in Central Cambridge) would have been Cockcroft 4.

Six or seven studio assignments would be selected from among the following, each exercise lasting 1-4 weeks.

## **First term studios**

Exercise 1: Visual design concept exploration of Site, Context, Society. Development of drawing skills, from lines showing screen presentation, to simple still-life with digital appliances in context, and scenarios of people: using, meeting, living and living with digital products.

Exercise 2: Information architecture: Retail / e-Government, using simple web technologies. Design intervention to investigate information architecture of familiar sites: UCam, CL, Darwin. Taking account of current design trends: other sites, mood boards, design magazines. Paper prototyping. Using scanned drawings animated with HTML & CSS. Evaluation of prototype or actual sites.

Exercise 3: Digital business models, with simple programmed interaction, investigating innovative mixed online / physical business models. Draw on case studies such as iPod, TiVo, Amazon, Google. Produce both interactive site based on current development tools (e.g. JavaScript, Ruby, AJAX) and accompanying business plan.

## **Second and third term studio options (selection from these topics)**

Exercise 4: Open source community work: contribute to an open source development community, but without programming. Opportunities might include testing, documentation writing, management / coordination activity. Inspired by Andy Dearden's Case Studies in Software Design.

Exercise 5: Narrative of Digital Space: 3D and 4D modelling, using foam, card and clay, followed by Storyboards, implementation using VR / gaming environments World generation tools Plot: Narrative and character. Guest tutors: (game developer, recommendation from Francois Penz) and Maureen Thomas.

Exercise 6: Augmented appliances. Home automation or museum / science exhibits: Experiments with simple sensors (phidgets) and actuators, mechanical design and assembly using robot kit parts, if necessary Lego. Support for personalisation and individual appropriation. Inspired by Mark Gross and Ellen Do's work at the University of Washington Design Machine Group.

Exercise 7: Evidence, estimation and inference. Practical use of techniques supporting Bayesian inference as a critical perspective in technology: distribution, tolerances, Monte Carlo simulation and experimental analysis. May include web metrics, search and spiders, "wisdom of crowds" recommender or forecasting applications. Guest tutor: David Mackay

Exercise 8: Creative interactivity: Musical instrument, programmed control of dynamic processes, using tools such as LabView or Max/MSP. Inspired by Bill Verplank's Stanford University course "Designing Controllers." Guest tutors: Julio d'Escrivan & Richard Hoadley (Anglia Ruskin University) with graduate students from Centre for Music and Science.

Exercise 9: Sustainability focus. Develop applications / appliances suitable for users on incomes of under \$2 a day. May include rural mobile applications, neo-sneakernet USB device protocols etc. Guest tutor from local companies such as Aptivate or Ndiyo.

Exercise 10: Optional joint project / jury exchange with the design studio course taught in the Cambridge Manufacturing Engineering Tripos (may be added as further component of either the augmented appliances or sustainability exercises). Similar exchange possibilities exist with Structural Engineering design studio, or Interdisciplinary Design for the Built Environment.

## **Seminar-taught Theory Component**

The theoretical component of the course would involve a series of in-depth investigations, of specific topics in design, applied social science and critical theory. Most topics would require

a significant amount of private reading and research in preparation for seminar sessions, to an extent unusual in computer science courses, and probably more typical of college supervision teaching in arts and humanities subjects.

The first term would involve a relatively fixed syllabus, giving an opportunity for students to become accustomed to the teaching and study style, and (in the first year pilot) would have been an opportunity to calibrate the workload relative to other first-year courses. The second and third terms would draw from a range of alternatives, providing flexibility to accommodate the developing interest of students, and to use specialist guest speakers. These would be linked to design exercises where possible, for example by providing an analytical starting point for design, or evaluative perspectives for critical assessment.

Each topic would be addressed by students first reading assigned texts, then carrying out their own further research and analysis in response to design-related reading questions. Each topic would have at least three seminar sessions devoted to it, one of which would be an introduction to the design issues from a course leader, one a discussion of student's own research, and one session with an invited specialist speaker. Topics that warrant more attention (whether due to complexity, intellectual challenge or practical significance) would extend over more than three sessions. Students would be required to submit at least three formal essays over the course of the year, in which they relate one of these topics to one of the design exercises.

Note that the following list includes suggestions for preparatory reading that would be extended or reduced as necessary. Many of the readings are individual chapters or short articles that can be copied and distributed to students in advance. Most of the named guest speakers agreed in principle to present a single seminar, if the course had been introduced in 2007/08. Topic selections in terms two and three would be determined in part by availability of speakers.

### First term seminars

Topic	Assigned Reading	Guest Speaker
Study methods for critical technical practice	Donald Schon, "Educating the Reflective Practitioner", Philip Agre "Computation and Human Experience", Herbert Simon "Sciences of the Artificial"	Alan Blackwell
Theory bases for social science research	Nelson Goodman "Ways of World Making"	Lee Wilson (CRASSH)
Social science research methods in design	Robson "Real World Research" (vs) Laurel "Design Research" (vs) Francis Bacon "Novum Organum"	David Good (SPS)
Knowledge and language	Wittgenstein "Philosophical Investigations", Eco "In search of the perfect language"	Richard Harper (Microsoft Research Cambridge)
Visual form and communication	Eco "A theory of semiotics"? Baudrillard "The system of objects"?	Nathan Crilly (Engineering Design Centre)

**Second and third term seminar options (selection from these topics)**

<b>Topic</b>	<b>Assigned Reading</b>	<b>Guest Lecturer</b>
Developmental, clinical and social cognition, from perspective of autism spectrum	Dawn Prince-Hughes "Aquamarine Blue" (2002)	Elisabeth Hill (Goldsmiths College University of London)
Machine reasoning and human action	Philip Agre Computation and Human Experience, Chapter 8, Collins & Kusch "The Shape of Actions: What Humans and Machines Can Do" (1998)	Martin Kusch (History and Philosophy of Science)
Domestic economy as development of classical stoicism vs. epicureans	Ruth Cowan Schwartz "More Work for Mother", Janice Radway "The Institutional Matrix of Romance", Richard Coyne "Cornucopia Ltd", Ch.1	Mia Gray (Geography), Melissa Lane (History)
Politics of technology and data	Andrew Barry "Political Machines" (2001), Chapter 7	Andrew Barry (Oxford)
Representations in design	Malcolm McCullough "Abstracting Craft" (1996)	Claudia Eckert (Engineering Design Centre)
Ethnographic method, social context and object worlds of technology	Louis Bucciarelli "Designing Engineers"	Robin Boast (Arch. & Anth)
New journalism, social software and contemporary public policy	Charles Leadbeater "We Think"	Bill Thompson (BBC) John Knell / John Naughton (Open University)?
Gender studies	Eve Kosofsky Sedgwick "Epistemology of the Closet"	Jackie Scott (SPS), Melissa Lane (History), Mia Gray (Geography)
Global economics / development / social sustainability	Mark Warschauer "Rethinking the Digital Divide"	Heather Cruickshank (Sustainability Centre)
Conversation and communication		David Good (SPS)
Designed spaces		Francois Penz (Architecture)
Narrative in interaction, games and digital media		Maureen Thomas (Film Studies)
Innovation in the technology business	Petre "Disciplines of Innovation", Shapiro and Varian "Waging a Standards War", de Rond on Strategic alliances	Mark de Rond (Judge)
Epistemology, ontology and philosophy of mind	Simon Blackburn "Think", Chapters 1&2	Tim Lewens (History and Philosophy of Science)?
Contemporary digital arts	Dunne "Hertzian Tales"	Dawn Giles (Arts Council of England) or Simon Biggs

		(Edinburgh School of Art)?
Literary critical challenges	Borges/Blanchot, Barthes “Criticism and Truth”, Sokal & Bricmont “Intellectual Impostures”	Drew Milne (English)?, Mary Jacobus (CRASSH)? (unconfirmed)
Design inclusion		John Clarkson (Engineering Design Centre)
Social perspectives on intellectual property	Raymond “the Cathedral and the Bazaar”	James Leach (Anthropology)
Music as a technical / cognitive system	Adorno “Philosophy and new music”	Ian Cross (music) Ben Etherington? (unconfirmed)
Typography, graphic design, composition	Kress & van Leeuwen “Reading Images”, McCloud “Understanding Comics”, Resnick “Design for Communication”	Alan Blackwell
Physical product design		James Moultrie (Manufacturing Engineering)
Ethnography in design	Squires & Byrne (2002) “Creating breakthrough ideas: anthropologists and designers in product development”, Randall Harper & Rouncefield (2004) Fieldwork for design, Salvador Bell & Anderson (1999) “Design Ethnography”	Alex Taylor (Microsoft Research Cambridge)
Design practice and process	Dorst “Understanding Design”, Lidwell “Universal Principles of Design”	Sally Fincher (University of Kent), Marian Petre (Open University)
Representation	Goodman “Languages of Art”, MacEachren “How Maps Work” Eco, Baudrillard	Alan Blackwell
Digital/network economy	Shapiro & Varian “Information Rules”	John Knell (Intelligence Agency) Cambridge Entrepreneurship Centre?
Workplace studies	Luff, Hindmarsh and Heath (2000) “Workplace Studies” Plowman, Rogers & Ramage (1995) What are workplace studies for?	Matthew Jones (Judge Business School)
Psycho-political	Foucault “Discipline & Punish” Ch.1, (vs) Suler “Cyber- psychology”	Drew Milne (English)? Mark Blythe (University of York)? (unconfirmed)

## **Appendix: Proposed MPhil in Digital Product Design**

This appendix contains the text of an earlier proposal for a Cambridge graduate programme in interdisciplinary design. Several iterations of this proposal were submitted for funding consideration by the Cambridge-MIT Institute (CMI) in 2001 and 2002. CMI did proceed with a number of other Master's programmes as described below, although Digital Product Design was not included among the offered options. The "Software Engineering and Design" module was developed, and is currently offered to postgraduate Diploma students in Cambridge.

It was Gillian Crampton-Smith who helpfully suggested, during a visit to Cambridge in February 2006 (sponsored by Microsoft Research), that this kind of material might form the basis for a first-year undergraduate rather than a post-graduate syllabus, leading to the syllabus described in the body of this document.

### **Overview**

This proposal describes a one year MPhil degree for inclusion in the CMI modular professional practice programme (PPP). It would naturally incorporate a range of the existing PPP modules. It will draw on existing course material from the current postgraduate Diploma in Computer Science. It will include at least one major new component – a design project and dissertation taught in a supervised studio. It will also include up to three new taught modules, potentially introduced after the degree is initially offered.

### **Market Opportunity**

Contemporary technology design practice, especially research and development for novel digital products, increasingly demands a human perspective in order to identify and analyse user needs. Major corporations such as Microsoft, Intel, Hewlett Packard, Xerox and BT have created "User Experience" research groups, typically staffed by anthropologists and cognitive psychologists. The practice of these leaders is rapidly being adopted throughout technology industries, but there are at present few educational programmes ready to supply an increased demand for interdisciplinary design professionals.

Current recruitment practice in such companies is to hire either a) graduates with an MSc in Human Computer Interaction, typically computer science graduates given a one year introduction to social science and experimental methods alongside additional technical skills; or b) graduates in a relevant social science discipline, preferably with some incidental post-graduate experience that has made them familiar with technology design issues. The most skilled practitioners generally come via the latter route, but it is increasingly hard to find qualified professionals for whom training relies on accidents of career history.

### **Target Audience**

This postgraduate degree would be aimed at graduates from arts, humanities or social science (AH&SS) backgrounds intending to pursue a career in technology industries. Cambridge AH&SS graduates already find themselves in those industries, but typically in roles where their academic training is not considered to be relevant to product design. Some AH&SS graduates currently take the Diploma in Computer Science in order to move into more active technology roles, but the Diploma does not serve them well – the Diploma was developed for maths or physics graduates who wish to move into computer science research, so students without maths backgrounds often struggle.

Experience at other universities indicates that a course like the one we propose will also attract technology graduates wishing to develop alternative perspectives. Master's courses such as Computer-Related Design at the Royal College of Art, the Design Machines Group at University of Washington, HCI Design at Carnegie Mellon University and the Ivrea Institute for Interaction Design, all recruit a mix of arts, humanities and technology students. The CMI professional practice programme provides an ideal opportunity for Cambridge to emulate and extend the strategic success of such courses. The modular structure of PPP would allow all students to do project work in the mixed interdisciplinary design teams that have proven so successful for these international leaders, while also providing an additional modular selection of academic extension material meeting the needs of diverse individual students.

### **Proposed Modules**

**Design Studio:** This will be the central (required) component of the DPD MPhil. All students will meet together to work on digital product design projects, working in a studio environment for a total of approximately 200 hours. The studio would be supervised by a professionally qualified designer with both technical and evaluative skills. Teaching would follow the conventional practice of studio courses in architecture and other design disciplines, in which the supervisor and the rest of the class engage in group "critiques" of work being done in the studio. Examination would be by dissertation, supported by demonstration and exhibit of the final product. Students would be required to address intellectual property protection, business plan issues, and user analysis perspectives arising from their work, as well as demonstrating technical competence.

**Software Engineering and Design:** This module would place the more detailed technical material of the Computer Science Diploma syllabus into context for students from non-technical backgrounds. It would include an introduction to software problem solving, project management, structured design and other transferable skills in digital product design. It would be designed to complement the Design Methods elective in the current PPP degrees with a specialist software perspective.

**Research Methods in Technology Design:** This module would be derived from the current inter-departmental course in postgraduate research methods for the social sciences. Social science research methods are becoming increasingly widespread in technology applications, and there are several professional consultants based in Cambridge who do this work. They would supplement the basic academically-focused material with case studies and specialist methods for working within the time and budget constraints of technology design projects.

**Applied Humanities and Comparative Media:** This module would adopt critical perspectives from a range of humanities disciplines in the analysis of new technologically based media. The role of technological media in society will be of particular concern, as will perspectives on creative technology exploitation.

**Other PPP Modules:** Modules that are likely to be of special interest to students on the DPD MPhil include: Design Methods, Design Case Studies, Management of Technology and Innovation, Leadership, Negotiation and Consensus, Enterprise and Business Development. Some students might also benefit from technical extension modules (assuming suitable pre-requisite qualifications) such as Control System Design or Nanotechnology.

**Other Diploma Courses:** The Computer Laboratory currently runs a Summer course in Java programming in advance of Michaelmas term, for Diploma students having no previous programming experience. This would be a valuable preparatory course for DPD students. Other suitable courses from the current Diploma syllabus include further Java beyond that taught in the summer, Introduction to Algorithms, Digital Electronics, Computer Design, Operating System

Foundations, Computer Graphics and Image Processing, Digital Communication, Data Structures and Algorithms, Comparative Programming Languages and Compiler Construction.

### **Resources and Timescale**

This course can be developed and introduced in a phased manner. Several previous proposals have been written, so a good deal of background work has been carried out, so far as has been possible with no commitment from any sponsor or host institution.

**Management:** The immediate requirement is to coordinate inputs from the existing supporters of the proposal, prepare detailed costings, liaise with developers of existing courses, identify and equip the teaching studio space, identify and meet with an MIT-side leader, prepare a syllabus and recruitment literature for the course, and meet regularly with the leaders of the other PPP MPhils.

The initial proposal prepared in summer 2001 assumed that these management tasks could be carried out by a particular UTO in addition to his full-time teaching duties, aiming at a Michaelmas 2002 start date. In early 2002, an accelerated programme was discussed, in which a 50% buyout of the UTO would still allow a Michaelmas 2002 start date. At the time of writing in summer 2002, an immediate full-time appointment (if a suitable candidate could be found in time) should allow a Michaelmas 2002 start date for the phased introduction.

**Studio Module:** The Computer Laboratory is prepared to host a trial of the Design Studio module, which would be offered to a selection of the 2002/03 CS Diploma students as an alternative to the current project and dissertation. Diploma students start work on their projects in December, so all equipment would need to be in place by then. Students are required to select projects, meet with supervisors and write detailed proposals earlier in the term, so the studio supervisor would need to be appointed from the start of Michaelmas term.

This is the largest cost component of the proposed MPhil: one full-time teaching officer, a dedicated studio space, computing facilities for all students, observational equipment, workshop equipment, materials, software tools and special electronic components for individual projects.

**Software Engineering and Design Module:** A timetable slot has been reserved to run a trial of this module within the CS Diploma course in Michaelmas term 2002. This course could potentially be developed and taught by the person appointed to cover management activity, thereby allowing an appropriately qualified UTO to devote more effort to overall course development.

Costs of developing this module would be covered by the two appointments for course management and studio supervision.

**Research Methods Module:** A firm proposal is in place to run a trial component on applied ethnographic methods within the postgraduate Social Science research methods course in 2002/03. This is currently being staffed by an external consultant who has agreed to work on a voluntary basis, and a lecturer funded by the Newton Trust to do strategic development in Anthropology. These temporary arrangements have been made while awaiting CMI approval – in the longer term a UTO with appropriate skills would have to take on development and teaching of this module.

Some financial contribution should be made to the pilot course in 2002/03, rather than relying on voluntary work by non-University employees. The fully developed course for 2003/04 would require part-time funding of a teaching post.

**Applied Humanities Module:** This would be adapted from the MIT Comparative Media Studies course. A proposal was prepared in March for collaboration between CMS and Crucible, although

this also included a range of other CMS activities unrelated to the present proposal. The course development would be carried out by MIT-side staff, and it has been proposed that a staff member would travel to Cambridge to teach it initially.

Costs involved would include travel and accommodation, as well as part funding of the MIT post.

### **Advisors and Potential Collaborators**

This proposal has been under consideration for two years, following initial work carried out at the request of CMI sponsors BTextact. BT staff who have advised us, and who could collaborate in developing and promoting the MPhil include Graham Cosier, Jeff Patmore, John Seton, Frank Stone, Ben Anderson, and Chris Fowler.

MIT staff who have advised on the proposal and would be potential collaborators include: Bill Mitchell, Dean of Architecture, who is a pioneer of architectural studio teaching methods in software; Ted Selker who teaches an Industrial Design Intelligence course in the Media Lab; Hiroshi Ishii, who leads a group in the Media Lab designing tangible interactive products; Henry Jenkins (and Edward Barrett?) who run a media workshop course as part of the Master's in Comparative Media Studies; Louis Bucciarelli, who co-led a CMI workshop on best practice in design that is leading to a national conference under the CMI NCN; and Hal Abelson, who is pursuing strategic initiatives in design education across the whole of MIT. However there is no single person yet identified as the senior supporter of this initiative on the MIT side. Identifying such a person would be a top priority for the person appointed to develop the next phase of activity. There is a possibility that the main point of contact with MIT on this project might in fact be based at Media Lab Europe.

Cambridge University staff with relevant skills who have been involved in preparatory work and could contribute to the MPhil include: John Clarkson and Claudia Eckert of the Engineering Design Centre, who organized the CMI workshop on best practice in design with Louis Bucciarelli; Paul Richens, Sebastian Macmillan and Simon Ruffle of the Martin Centre for Architectural Research; who are experienced software product designers and also design researchers; James Leach in Social Anthropology, who is developing new applied components of the social science research methods course with Crucible assistance; François Penz and Maureen Thomas who use studio and seminar teaching techniques in the CUMIS MPhil; and Jem Rashbass and Jonathan Mackenzie of CARET.

These university resources could be supplemented with external experts such as Rachel Jones, a Cambridge-based design consultant now working with Crucible; William Newman and Marge Eldridge, researchers who are now independent after the closure of the Xerox Research Centre; and Quentin Stafford-Fraser, now independent after the closure of the AT&T research laboratory. Further afield, leading academics in digital product design teaching and research who have contributed to this proposal include Bonnie John at Carnegie Mellon; Mark Gross and Ellen Do at University of Washington; Clive Richards, Dean of Art and Design at Coventry; and Bill Gaver of the Computer Related Design course at Royal College of Art.

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