

Submission by the Design Council to The Lambert Review of Business-University Collaboration

Summary points

This submission:

- **Best practice examples:** Shows how design plays a key role in creating innovative new products and services and needs to be understood by business and universities.
- **Strengthening business-university relationships:** Demonstrates how design could help the technology transfer process.
- **Developing skills:** Identifies the need to introduce design awareness and skills in science, technology and business HE programmes. Such activity would enhance employability and ensure that the next generation of scientists, engineers and managers can use design effectively to develop the products, services and businesses that the market needs and wants.
- **New policy directions:** Points to new policy directions, some of which are currently under development at the Design Council, that have the potential to significantly enhance the benefits of business-university collaboration to the UK economy. Following this submission the Design Council would welcome the opportunity to discuss in greater detail with the Lambert Review the potential of these emerging policies.

About the Design Council

The Design Council is an NDPB that works to make sure people in business, education and government know how effective design can transform what they do - and it gives those people knowledge to turn design from an inspiring idea into something they can use. We are increasing awareness of design's role through events, publications, research, resources for students and case studies highlighting examples of design and innovation in action.

The Design Council is also developing new in-depth projects that are demonstrating how design adds value and boosts productivity in business as well as improving the way public services are planned and delivered. Our work is often done in co-operation with like-minded partners such as business organisations, government departments and agencies and also educational bodies. The Design Council is primarily funded through a grant from the Department of Trade and Industry.

What is design? Design is a structured process for identifying problems and developing, testing and evaluating user focused solutions. When placed at the heart of the innovation process it ensures that all thinking is focused around the end user – the customer. This makes certain that the final output, a product, service, environment, communication or indeed a process, resonates with the desires of that customer. Creative design linked to true innovation can make all the difference by defining the competitive edge and resulting in greater, sustainable success.

What's the link between design and business-university collaboration? The role of design in delivering creativity and enabling innovation is increasingly recognised by business, and used to bring successful products and services to market. Collaborating with universities is also used by many innovative companies to develop their ideas and their businesses. The UK needs more innovative companies to ensure future prosperity, but to achieve this, we need more collaboration and a better understanding and more effective use of design. Design therefore has a key part to play and considerable potential in delivering the goals of this review, namely how the long-term links between business and universities can be strengthened to the benefit of the UK's economy.

Examples of collaboration Many types of business-university collaboration involve new product development (NPD) whether it is commissioned or sponsored research, student placements, Teaching Company Scheme or technology transfer activity. Design is an integral part of NPD, from the early stages of idea generation and user research through the visualisation and prototyping stages to user testing and production. There are examples of several different types of collaboration, demonstrating the role of design, in appendix A and in the attached booklet 'Meeting of Minds'. (Design Council publication, 2001)

Delivering successful technology transfer Technology transfer, the process by which a technology developed during the course of scientific research is commercialised, has been recognised as a key source of economic growth and wealth for the UK by the government. The challenge for UK plc is to successfully connect technology – be it from an emerging technology company or a university laboratory - with current and future market opportunities. However, when dealing with disruptive technologies where there is considerable uncertainty as to what will create market acceptance for an innovation, how can a businessman, scientist, engineer or investor know what is the true potential of their innovation? This is where design can make the difference.

Design can be used for exploring business opportunities where the end user has little knowledge, experience or familiarity with the type of product being considered. Many young emerging technology businesses make the leap from science to commercialisation without recognising how design can help them at the critical 'invention' stage. When design is brought into the development process early it can have dramatic results for a business in various ways by:

- Identifying and bringing to life possible applications for an emerging technology.
- Connecting applications closely to the needs and values of end-users both in existing and future markets.
- Demonstrating the credibility of the new technology for investors, customers, suppliers, and manufacturers.
- Anticipating future market opportunities and trends.
- Injecting new thought processes and a fully realised vision into often exclusively science-based teams.

**Design Council's work on
technology transfer**

In recent years, many UK universities have set up offices to promote technology transfer and capitalise on the Intellectual Property Rights (IPR) that currently reside unexploited in their laboratories. Their challenge is to bridge the rather insulated world of the academic researcher with the harsher and more commercial world of business.

The Design Council has recently run a pilot project with UCL Ventures to investigate the technology transfer environment within a university and specifically how design could add value to technologies that are at a very early stage of development, prior to being licensed to larger businesses or being spun out.

The study found that there were considerable benefits to be gained by both the academics and the technology transfer officers involved in using design to help exploit the technologies.

The benefits and impacts that were reported by UCLV team were that their interaction with the designers and the project:

- Helped to speed up the process of commercialisation (one reached a development milestone 6 months early).
- Helped to describe the concept, communicate the vision and story of the technology to non-technical people in a way that excites them (one research team presented their technology to a potential client as

conceptualised by the design team. Having previously been unenthusiastic, their audience now understood the technology and as a result the negotiations moved forward).

- Allowed them to communicate credibility – to potential investors or partners.
- Brought a new perspective - that of the user and market place, which UCLV could simply not do on their own.
- Allowed them to see that using design could help shape the future direction of the Intellectual Property (IP) being developed in the laboratories by putting it in context of the market place and most importantly the end user. They also saw that this could effect the direction of the research itself.
- Worked better for UCLV than that of other management consultants they have worked with. Even though the designers asked difficult questions, it was a more collaborative process and about coming up with suggestions and possible solutions together, rather than just providing the answers.
- Before the project started, UCLV and the academics thought 90% of it would be about ways of expressing the ideas they already had and the remaining 10% would be about creating products. In fact, the reality was that it was about 50:50 and much more about the thinking process to create new ideas than they expected.

The academics recognised a number of benefits from participating in the project:

- Using design at an early stage allows them to visualise future applications of the product and so retain a higher degree of IP and financial autonomy (normally they would have to share IP with partners in order to fund the development of product ideas). This can increase the risk of their IP being copied or stolen by others, as well as diluting the revenue from future products.
- Improved their commercial acumen.
- The specific skills that were different from those within UCL, for example the designers' knowledge of large-scale software development.

Working with designers raised the academics' awareness of future uses and applications of their technologies and made them appreciate what has to happen for it to be commercialised. It also allowed them to seek better advice from external consultants (e.g. marketing) and focus future efforts.

Delivering a culture of innovation through design

The culture within a business or a university is a vital factor in the innovation equation. Creativity, risk taking and an entrepreneurial spirit - grounded in a commercial awareness - are prerequisites of successful innovation. In the 21st Century economy we will be relying heavily on the successful exploitation of ideas by scientists, managers and engineers to achieve this but few would count all of the abilities above within their skill set.

Bringing a designer into an organisation, be it a university or a business, is a fast and effective way of encouraging creativity. The design process engenders creativity both at the individual and organisational level, it enables an organisation to better understand and manage risk, and provides a fuller appreciation of the route map for an innovation to market. It enables organisations to move faster, be more flexible, more creative and more open-minded.

However, it is important to note that the other key players in the innovation process (scientists, managers, investors and engineers, etc) should also have a good understanding of design. This can most effectively be achieved at the Higher Education level through the continued investment in our internationally renowned design colleges – and their cross fertilisation with other college courses - and the inclusion of design teaching and learning within the MBA and science and engineering degrees.

Benefits of design learning in science and engineering courses

Design is one of the most popular choices of subject to study by students considering FE and HE. Numbers on design courses have increased over the last decade at a higher rate than the average increase in students going on to colleges and universities across all subjects. Design courses are particular in their substantial links with industry which include the use of professional practitioners as lecturers, live projects and student placements. Many UK design graduates go on to become first class designers, working in consultancies and businesses across the world. Their contribution to the growth of the creative industries is substantial, with many designers starting new enterprises.

There is a growing awareness that some understanding of design is important in other areas of education. Business and management courses, in some schools and universities, include elements of design management education and some engineering courses are reshaping their curricula with a greater emphasis on design.

The Design Council has supported the development of teaching and learning material for tutors and students in design schools and in business

schools. These include a 'Design in Business' text book which explains how design can be used strategically, including examples of design, innovation and creativity as well as teaching case studies on design in business and resources on issues such as inclusive design and designing out the opportunity for crime from products and services.

The Design Council is currently looking at the possibility of extending this work to support the development of resources for a wider range of science and technology courses, enabling students, tutors and researchers to better understand how design can be used to help develop new products and services. By integrating an awareness of design and innovation into science and technology courses as well as business courses, students would develop the capability to exploit their ideas in an innovative, creative and more commercial way and would be better prepared to participate in university knowledge transfer activities and any future business ventures. The inclusion of design into these courses has the potential to encourage and support greater connections between universities and business, influence course development and enhance graduate employability.

The Design Council is in the process of mapping out university activities such as innovation units, technology transfer, industry links and entrepreneurship and enterprise teaching along with identifying the science and technology HE courses where design might be a relevant component in order to develop this work.

Case study 1

The Silicon Gyroscope – BAE SYSTEMS and Nottingham University

This collaboration created a brilliant new technology that is saving thousands of lives. The collaboration became a model for BAE's Virtual University.

The Silicon Gyroscope is a transport technology breakthrough. Up until its invention, it had been impossible to make the reliable, durable, miniature gyroscopes needed for advanced vehicle safety systems as well as new navigation technology. Large corporations were locked in battle to generate the first miniature gyroscope, the leading contender using quartz technology. But it was the team at British Aerospace's development laboratories in Plymouth, Devon, in co-operation with Nottingham University, that made the surprise breakthrough which effectively put a

gyroscope onto a silicon chip.

BAE SYSTEMS's Colin Fancourt explains how a silicon gyroscope works: "This explanation will probably horrify the scientists, but imagine for a moment a round rubber band lying on a table. If you push the two opposite sides in with your finger, the top and bottom bulge out, giving you four related movements; up, down, left and right. The silicon gyroscope is just such a ring, in miniature, which will 'distort' in a similar manner when stimulated by electricity. That distortion, or vibration, changes as the ring is turned, so you can work out the ring's orientation in space as it turns." In short, the silicon gyroscope can tell where it is and how much it has been turned.

Three million silicon gyroscopes have been put into cars over the last few years, to improve their advanced braking systems. The gyroscope can detect in a tiny fraction of a second whether the car is moving as the driver wants. If it detects there is a difference between the way the steering wheel has been turned and the direction the car is turning, i.e. it realises the car is about to enter a skid, the system causes brakes to be applied to the individual wheels to bring the car back under control. This makes the car safer and feel much more stable.

Collaboration begins

The development team at BAE realised that in order to get this product to market, they would need expert help in micro-machining – etching away tiny amounts of material on the gyroscope to improve its temperature stability and overall performance. They sought out the leading expert in the field and found Colin Fox at Nottingham University. They began a dialogue that grew into a collaborative partnership. By 1997 BAE was funding a PhD student to find solutions to the etching problem.

Chris Fell is the Senior Consultant Engineer at BAE SYSTEMS, running the micro-electro-mechanical systems (MEMS) for applied research - micro-machining, in other words. "The collaboration built up over the years from a specific contract with Nottingham University. It's certainly built up to be very successful. We are looking to find ways of improving the performance and design with Nottingham. And we are certainly making progress."

BAE's Virtual University

Because BAE SYSTEMS takes collaboration so seriously, they have come up with a system to ensure it works well within their corporation. It's called

the Virtual University.

Colin Fell: "The Virtual University brings together various research projects under one set of administration. It organises university liaison throughout the company. As you can imagine, with a company the size of ours, there are a lot of different sites and it's inevitable that people in one site might not know what others in another site are doing. It might turn out they are doing similar research but sponsoring different universities. The Virtual University is internal bridge to help everyone be aware of what's going on so they can effectively pool funding. The aim is to concentrate the research funding at particular centres of excellence – like Nottingham, for example.
Model Collaboration

The BAE SYSTEMS/Nottingham model is put forward by the Virtual University as a best practice example. The company sponsors a supervised 'research group' at Nottingham, currently consisting of three PhD students and one 'Postdoc'. The PhD student projects are investigating both theoretical and experimental aspects of MEMS inertial sensors, which will enable design enhancements in future products. This form of partnership also provides the opportunity for BAE to recruit high quality graduates with directly relevant training & experience.

Benefits for the University

The benefits to the company for this collaboration are pretty clear – they've created a mass market technology that is already highly successful and for which the applications are legion. But what does the university gain?

Colin Fox heads up the mechanical Engineering Department at Nottingham: "The rules under which universities are judged require them to carry out research of leading international quality. To do that, we need funding, and, in this case, we are getting funding from BAE SYSTEMS. This allows us to meet objectives set, for example, by the Research Assessment Exercise. It also allows us to carry out innovative research. The research is fascinating and stimulating in its own right. There is a limit to what you can do in engineering research without industry contact.

"The collaboration provides us with a good stream of funding so we can appoint research students and post-doctorate research fellows to help us carry out the work. It helps us provide a good stream of people who have been educated and trained to an advanced level in areas of technology which are appropriate to the needs of industry."

The university also benefits from patents and Intellectual Property Rights

(IPR). Colin Fox: “We are not disinterested in the financial side – especially given the current economic climate in Higher Education. That’s why we have IPR agreements. These agreements help the creativity of the collaboration itself, because, with IPR arrangements in place, we can all be more open, and that helps to move things along.”

BAE’s Chris Fell: “The IPR deal is roughly like this. If Nottingham come up with patentable ideas, and they do, we’ll sort out the patent for them. Mine and Colin’s name are on a number of patents. We then agree to pay some reasonable royalty on the ideas we implement.

What’s so special about collaboration?

Colin Fox: “It’s hard to see how an arrangement like this could work between two commercial companies. This is because we have fundamentally different ways of working from BAE SYSTEMS and we don’t have competing interests. In fact we have complimentary interests. That’s why it works. And because we work on a longer timescale, and with a strong theoretical background, we can help develop solutions not immediately obvious to industry. We’re not just doing short-term problem-solving for today’s market. We’re really concentrating on the next generation or the one after that. It’s what we would rightly regard as research rather than development work.”

Future Collaboration

20,000 people die in the USA each year from car rollover accidents (when a car rolls over and over following a skid), partly because the sensors activating the air-bags can’t detect rollover motion. BAE and Nottingham have created three separate sensors that detect rotation in three planes – up and down, side-to-side and forward and backward. These are going to be used to activate the air bags and may even initiate braking systems that prevent the roll-over. Nottingham is also working on combining the three sensors in to just one, making the system more cost-effective.

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A pathfinding collaboration with a design school that's helping a large hospital react quickly to major incidents.

Anthony Bleetman is the emergency planning officer for the Birmingham Heartlands Hospital Trust, as well as being a consultant in accident and emergency medicine. Part of his job is to generate the action plan for the hospital to use in the event of a major incident, like a terrorist bomb, a major crash, or an airliner going down at Birmingham airport.

Until Anthony set up a collaboration with Coventry University's school of design, this had been a paper exercise. "The hospital had created a big book of instructions that would satisfy authorities we had made contingency plans, but had practical limitations. The last thing you want in an emergency is staff running about looking for dusty, out-of-date copies of such books on shelves."

So he started examining ways of making this action plan more interactive and easier to access. "We wanted to make the writing clearer, perhaps by using action cards. But the printed options were limiting. It was impractical to produce 5000 copies for 5000 members of staff. We figured there had to be a better way. We decided we would create the plan on our intranet. And it was then we realised we needed some expert design help."

So he turned to Coventry University, acknowledged experts in information design. The school runs a module called *Communication, Authoring and Design*, which had received some publicity. "We knew that Coventry were doing work in usability. And when we presented several project ideas to them, it was the Major Incident Plan that caught their imagination."

The brief was, in effect, to design a system for the hospital that would communicate a lot of information at a moment of high stress. It had to be intuitive and fast, and very easy to navigate.

The students generated 20 or so different designs for an intranet help menu, and their work was a tremendous help in making the hospital's system more meaningful, direct, and easy to use.

Anthony Bleetman: "This, to me, was one of the major advantages of the Coventry University collaboration. We got access to the creative, trained skills of 20 designers. It was really valuable. We conducted a usability trial. This involved getting hospital staff members to find a specific piece of information on the student's systems and monitoring how quickly they were

able to find it. We found this exercise very useful, and so did the students.

“We chose the best three designs and awarded cash prizes, securing publicity for the design school.” Publicity is often a useful by-product in such collaborations, attracting the notice of potential students as well as businesses and services needing the expertise provided by the given university.

University perspective

Kollette Super is the Graphic Design programme manager at Coventry: “The hospital came to us because their Major Incident Plan consisted in the main of a number of box files kept on a dusty shelf. Our brief was to put it into some sort of format that was easily accessible. The students took information supplied by the hospital and worked with hospital staff to understand the needs and rewrite the material into two formats. The print format was a hefty book covering such subjects as bomb alert policy, chemical incident plans, etc. That information was taken and integrated into the hospital’s intranet site (the second format) to allow it to be continually updated.

“Working with Heartlands Hospital has given us real live projects to work on. A lot of the projects that students do in university are, by their very nature, simulated and smoothed out. This project is alive – that makes a big difference. The brief, for example, is subject to change because of outside circumstances. It’s like working with a real client. There are issues of budget constraint, sudden deadlines, liaison...

“The client was very open. The hospital was very clear about what they needed, and they gave us an excellent brief. We also had a very willing group of students. The work wasn’t beyond them and they were extremely well prepared, and very professional. They were all employed straight away – we even employed one of them ourselves to work with us on future collaborations. And there was excellent liaison between staff and hospital and students and hospital.”

Current and future collaboration

Because the collaboration went so well, Coventry students find themselves involved in the updating process of the original project as well as new projects within the university. Kollette Super: “The work of the students in the first year of collaboration on the Major Incident Plan has been refined by the second group. This is good training in itself. Often students start a project from scratch –but in real life there’s usually something already

there that needs to be refined. So we continue to look at how the information presentation can be updated and improved.

“We’re on the third year of the contact with Heartlands – students are looking at it again, and updating it. Some of that work has enabled us to look at other parts of the hospital. Currently we have a deaf student working in medical illustration, and other students looking at other information design projects.

Anthony Bleetman confirms this view: “The relationship continues with Coventry. They still come back with suggested improvements to the intranet, and we incorporate the best. It contributes to the continual updating of the Major Incident Plan. It’s an ongoing thing - the challenge has always been how to keep staff up-to-date and how to get new staff up to speed and ready to cope with a major crisis.

“For us, the days of the dusty tome on some forgotten bookshelf are long gone. Though, of course, we do still have a paper copy of a concise version of the plan, and the training manual and the intranet system are all cross-referring. Coventry University’s input has been invaluable.”

Commercial benefits

Commercial reward has not been a main driver in this particular collaboration. But Coventry’s Kollette Super thinks that commercial benefits could spin out of this work: “We’ve been approached by the Home Office to test their reporting software for incidences of aggression and violence in the NHS. We’re setting up a lab to answer this brief. It may well be that our skills in information usability develop into revenue streams for the university.”

The university has also been looking at ways of introducing the system to other hospitals. For the Heartlands Hospital Trust, the exercise is proving to be a highly cost-effective way of getting a continually improving, fast-access Major Incident Plan.

Case study 3

Edinburgh crystal and Wolverhampton University and the Edinburgh College of Art

A collaboration between a crystal giftware company and two design schools that generated innovative new designs

Edinburgh Crystal had a bit of a problem. They had a solid, conservative clientele, and business was steady. But they knew they needed to appeal to a younger audience in order to ensure long-term survival. They needed fresh, new designs, but weren't sure how they were going to do it, and do it well.

In another part of the UK, the answer to their problem was just emerging from a career in glass and crystal making. Andrew Brewerton was Head of Design and Development and, later, the Marketing Manager at the famous Dartington Crystal company. But he left all that behind and plumped for academia, joining School of Art & Design at Wolverhampton University as Head of Glass.

"I wanted to develop industry links at the department," says Andrew, "and the Edinburgh Crystal Glass Company was the company that really showed an interest. We first met at the Frankfurt Ambiente giftware show in 1994. I proposed a number of models of collaboration to their managing director and manufacturing director, expecting them to be interested in a short-term project, perhaps as a trial.

"But instead they preferred the idea of sponsoring a student on a one-year MA placement up at the factory. They asked if we were happy to include Edinburgh College of Art in the arrangement, and that seemed fine to me. I knew Ray Flavell at Edinburgh College from our work on the RSA's Dartington-sponsored Student Design Awards Glassware panel."

Andrew's key point of liaison became Tony Hoskins, the Operations

Director at Edinburgh Crystal: “The Edinburgh Crystal Masters Design Scholarship was conceived originally through discussions with Andrew Brewerton at Wolverhampton University and later with Ray Flavell at Edinburgh College of Art. The common objective was to build a programme that would benefit the student and company alike whilst forging new links between industry and academia.”

The company was seeking access to high quality graduate designers to help them develop their product offerings and production possibilities on site. In the true spirit of collaboration, they decided together that the scheme would alternate between the glass department in Wolverhampton and Edinburgh College of Art with each programme lasting 12 to 15 months.

Tony Hoskins from Edinburgh Glass: “We were particularly looking to advance our glass design, and get a younger, more contemporary feel to it, in a market that, in the early 1990s, was still very traditional. We felt that the programme could impact positively on the way our design department operated, while also stimulating the product development process within the factory environment.

Design impact

Tony Hoskins has been very impressed by the results: “All the projects have really pushed the boundaries of glass design each year. They've influenced directly the way we've approached design within our products and have been very motivating within the factory, with plenty of support given to the students from our craftsmen.

“One of our early frustrations had been that whilst the collaboration has been very good for the process, we hadn't seen anything selected for our standard product ranges. That changed just over two years ago, when we introduced our brand *The Edge*. This brand provided a vehicle to introduce much more contemporary and challenging product styles into the range - without confusing our slightly more traditional clientele.”

The first *Edge* range was designed by Daniel Whittard who was a Masters Degree student from Edinburgh College of Art. Daniel stayed at Edinburgh Crystal as a full time designer for a number of years and created the initial collection. Additions to the Edge will come from previous scholarship work or from new designs by our designers Nicky Schellander and Jessamy Kelly, both previous Masters students.

How the collaboration works

The students work full time within the company. They are employed by the university, but Edinburgh Crystal pays a sum to the university to cover bursary funding for the student and costs of the academic supervision.

Tony Hoskins: "The student is always based in our design department but will go to the university weekly if it's in Edinburgh or less frequently if he or she is from Wolverhampton, to have tutorials with their academic supervisor. Every three months there's a review meeting with their industrial supervisor and with their academic supervisor. At the end of the programme there is an external examination after which the Masters Degree is awarded. All the students to date have successfully gained this qualification with a number recommended for a distinction."

"The advantage for us is that this continual stream of students encourages us to push the design and production possibilities, keeping us highly competitive. It generates ideas we can build into future product development."

Patent issues

There is no Intellectual Property Right (IPR) agreement between the collaborators, so the property rights from the completed design work belong to Edinburgh Crystal. This does not bother Andrew Brewerton from Wolverhampton University: "IPR is not an issue for us. The company has a number of IPR arrangements – they pay royalties to freelancers, or they purchase designs from creatives on a one-off basis. Or they employ designers on a salaried basis, so there is no royalty arrangement. In the case of Nicky Schellander and Joanne Mitchell, the company has committed to the latter arrangement. Our students are developing as in-house salaried people."

Benefits for the university

Andrew Brewerton is full of praise for the collaboration, and for him the primary benefits are those it brings to the students: "The benefits to us at Wolverhampton are clear. It's almost impossible for an academic programme to simulate a commercial creative environment, with all the urgency of the industry sector: the process of design to prototype, deadlines, internal and external liaison, and the compromises that designers need to learn to make in the professional world. The collaboration helps them learn the importance of self-evaluation and design conviction."

“The students end up with a more developed idea of what design is. In academia, it is very difficult for students to get to feel the process of design as a complete continuum, from the twinkle in someone’s eye to the point at which an idea reaches the end of its product lifecycle. They cannot easily see the way in which the whole design process threads its way throughout that continuum. But in such collaborations they get exposed to all kinds of market realities, and that’s really interesting. They learn retail issues, point-of-sale, marketing issues, and negotiating skills in a client context. They learn how these negotiating skills are necessary for survival in a factory context – that’s often very challenging. They quickly mature as designers.”

How do you make a collaboration work?

Andrew Brewerton thinks that the collaboration is going this well because both parties are open-minded: “The key to the success of this collaboration is openness. We agree the brief with the company for individual students, within which there is plenty of room for creative development. It’s about teamwork, and about not being too fixated and too precious about a 'privatised' design agenda, but responding through design to opportunities as they arise.

“To me, successful collaboration is helped by the company involved having a medium to long-term ambition beyond the brief and this year’s student placement. That’s vital. It enables understanding to develop over a period of time. The relationship matures. And now, some years down the line, we have an intimate understanding of what Edinburgh Crystal’s brand is trying to do. That can’t be rushed. The 'quick fix' is never a real basis for an enduring relationship.”

Edinburgh Crystal’s Tony Hoskins: “We intend to continue the collaboration with the Universities, although we have taken a year's break from the scheme. We haven't at this stage committed to the reintroduction of the scheme for next year (2004) and will make this decision during the summer months. But the scheme is excellent in all respect which is why we have renewed it most years.”

Case study 4 Primal Pictures and University College London

This collaboration gave birth to a world-beating business and continues to grow successfully through intelligent use of grant funding systems

Primal Pictures makes animated anatomy graphics for medical students. This means the students can learn about the way body parts move, function and are structured without always having to dissect corpses. So, if you want to become a knee surgeon, buy the Primal Pictures *Interactive Knee* CD ROM, and take a guided audio-visual tour of the knee's anatomy in action.

Primal Pictures was set up by two men, Laurie Wiseman, a former reporter at the UK's first national breakfast station, TV-am, and his friend Chris Briscoe. They saw a piece in *Broadcast* magazine about EC grants being available for computer educational tools and applied for it to create a

mass-market coffee-table book full of 3D graphics of the human body.

But their business took a different turn when they met Dr Alf Linney from University College London (UCL). UCL contains a world-famous teaching hospital, and Alf Linney is an expert in creating 3D graphics used to plan facial surgery. His office is full of startling before-and-after-the-dreadful-accident photography, in which people who have sustained horrific head wounds through trauma or disease, are literally rebuilt along plans laid out in 3D graphics.

Apart from being an expert in creating these images and securing anatomical data, Dr Alf Linney is also very good at securing grants. With his help, Primal Pictures received a range of government funding including, initially, an Engineering and Physical Sciences Research Council (EPSRC) grant for collaborative research into ways of modelling soft tissues and bones. It was at this point that Laurie Wiseman began to realise their principal market was not going to be the mass market – it was going to be surgeons and students:

“UCL and Alf Linney were fantastic. They helped us find what we wanted to do, helped us secure the funding, and then we went and did it.” And what they did was create their first CD ROM, the *Interactive Hand*. It was quite a revolution. Suddenly, here was an anatomy guide in full colour, and fully animated. You could watch the hand’s layers of skin, muscle, veins and arteries, and nerves, all slowly stripped back to the bone, and then be replaced, all in 3D, all viewable from any angle. You could watch its articulation and movement at all stages. Now medical students had a means of gaining an intimate understanding of the human hand. The knee followed. Then the ankle.

European Funding

But the vision now is even more ambitious. Dr Alf Linney: “Currently, we’re trying to raise some money for a complex dynamic model of the entire human body. A fair amount already has been achieved. Muscles and skeleton – we’ve already done some. But we want to extend that to the entire body, an entire model of the way joints work, including the stresses and strains under various activities.”

Primal Pictures and UCL are looking at pan-European funds. The European Commission’s latest research funding programme is known as Framework Programme 6, announced in December 2003. Under that there are a various headings which include funding for projects like multi-media and anatomy. Says Dr Alf Linney: “The trick is to look down that list and

see where you might fit. Then you assemble a team that has necessary components for a successful application. For example, in a separate venture, there are a number of groups collaborating on a physiology project called the Physiome – a collaboration between a number of centres to generate an overall model of the way the body’s physiology works. [Physiology studies the way in which organisms and organs function.] It’s like a network of expertise that will concentrate all the knowledge they have in a single model. We would like to do the same in anatomy. But we would like it to be a dynamic anatomy.”

Primal Pictures is now looking for partners from across Europe. “We’ve put out a search for partners on an internet notice-board, where people pin up their interests. At the moment a group in Spain said they might be interested in this. And we’ve identified some people in Switzerland we’d like to work with.”

Nature of the collaboration

The collaboration between the university and the company began in the early 1990s and goes from strength to strength. Dr Alf Linney: “Currently, our input to Primal Pictures consists of images of one sort of another – anatomical images. Primal Pictures is way beyond us now in terms of visualisation technology. Their images have a finesse than we don’t need. But we still contribute anatomical material and knowledge as well as some visual stuff. We can tell them the medical significance of a bone and its muscles, the function, how they are affected by injuries, etc.

“We have regular meetings. Nominally I am chairman of their research committee which looks at how we can move things forward. This involves research into what’s going on around the world, to see how we fit in. One objective is to search for funding. The other is to define what we are doing, what there is around, and what’s possible but doesn’t yet exist; what products are needed. To ask: ‘Is it possible to make one of some of the things that are missing?’ I then do the basic research to find out whether it is feasible to build them. It has been a very successful collaboration winning many prizes over many years, from the BMA to the DTI.”

Primal Pictures and UCL also use the DTI-funded Teaching Company Scheme (TCS), which works as a cross-university/business training programme. Dr Alf Linney: “We are overwhelmed by applicants for this. We advertise a position in, say, the *Media Guardian*, and we get 250 applicants for one position. It’s popular because successful applicants get the chance of training that no company could hope to teach you without

university help.”

Laurie Wiseman explains how it works: “The students are employed by UCL (with a contribution from us) but they work here [at Primal Pictures], going to UCL for some academic work. We give them the practical skills at Primal Pictures and UCL gives them the academic background. It makes for a highly-trained, highly employable person, which is good. It’s not entirely without problems – for example, the staff tend to move on after they have trained with us. But it’s worth it – they are with us for two years, and we gain the benefit of their growing expertise.”

Primal Pictures is not only employing medical expertise from UCL: “In the case of our second TCS, we went for a trainee in the marketing side, because we needed to develop our marketing power. We advertised for the trainee and brought the candidate into the TCS via UCL’s business management school. UCL is not just a teaching hospital! It was a very successful move, and really helped us develop our marketing side.”

University Benefits

Dr Alf Linney is very impressed by the way the collaboration has worked: “We get two benefits. The most important thing for me is that I get teaching material, which I would never have got if we hadn’t collaborated. It simply wasn’t on the market. I had always thought it should be, so when I met Laurie and Chris I realised this was an opportunity to create what I thought should have already been produced.

“We also get a useful amount of money through IPR – we get royalties on the products they sell.”

And the student benefit? “They get hands-on development of multimedia, with academic background. The rich mix of academic and business skills makes them highly employable.

Business benefits for the collaboration

Laurie Wiseman from Primal Pictures: “UCL has been very good at bringing money into the company at critical times. Historically the value of that cannot be underestimated. The collaboration has also helped us gain credibility. When a small company gets associated with a university it can be of immense value. We still quote our collaboration with UCL as part of our badge of honour, our credentials.”

UCL also keeps Primal Pictures aware of new 3D imaging technologies

and new 3D displays. Says Laurie Wiseman: “They give us access to new technologies, help us become aware of them.”

But for Laurie it’s the creative vision of UCL that is invaluable: “In a commercial environment you can lose sight of what blue skies could be – the possibilities of Research and Development ((R&D). But universities are not tied to commercial imperatives. So it makes sense for companies to try to collaborate with universities. In our case such collaboration give us an R&D vision and edge which is not usual in a small company. SMEs generally don’t have the resources to invest in such research. Now, as the collaboration develops, UCL helps us hang on to that vision and they instil new vision. They help us ask: ‘What more possibilities could there be?’

“Sometimes the chief value can be the fact that we have access to minds that are thinking in different ways to our own. That access can produce ideas simply through discussion. Academics are always trying to push the envelope beyond commercial reality.

“The collaboration works well mainly because the people involved get on. We recognise and respect each other’s strengths – without that no collaboration will work. They recognise that they have skills they can’t be exploited commercially. They recognise we can. It’s a real blending of talents and skills.

“UCL is helping us stay on track to create our most ambitious product, the Interactive Simulated Patient. Medically, you will be able to do anything to it, like you can with a live patient. That vision is part of where the medical physics department at UCL also wanted to be.”

Laurie Wiseman identifies other benefits peculiar to his particular product-line: “A large part of our market is medical students. UCL is a large medical school, so we have access to market knowledge as well. It’s like having a good market sample right on our doorstep. They’ve also given us access to staff – anatomists and medical physics experts. Our collaboration with UCL effectively means we can dip in and sample their skills. That’s part of the great personal relationship we have.”

Laurie Wiseman cannot praise UCL enough for their contribution: “UCL’s input has been immense. We simply wouldn’t have happened without them. Those products would not have been made without the support through grants and the UCL collaboration that stood behind those grants.

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“Their vision is crucial, their people are crucial, and the money they bring through their knowledge of the grant system is superb. We collaborate on grant-hunts. And their name lends us credibility in that hunt. The collaboration has produced truly world-beating products.”

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