

**Under Blue Skies:
The Watershed/HP Labs Partnership
A Case Study**

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WATERSHED

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“As the pace of economic, cultural and social change speeds up, creating value is increasingly dependent on fusing the knowledge capital of diverse partners. Successful collaborations need partners who make things happen rather than find reasons why they can’t. What drives us is a shared instinct for ‘can do’ participation and creative collaboration, allied to mutual trust and respect; a desire to connect and engage with ideas and talent that mirrors and reinforces the radical spirit of the digital age.”

Dick Penny, Managing Director, Watershed

1) Introduction

In the fast moving digital media world, finding new ways of doing things is essential to the development of innovative products and services and maintaining a competitive edge. In the purely commercial realm, strategic alliances between companies are commonplace. The pooling of knowledge, expertise and resources frequently underpins research and development initiatives.

In industry terms, the partnership between Hewlett Packard Labs and Watershed is an exceptional case - not simply because it is an imaginative public/private sector alliance that has been sustained and developed over several years, but also for the open and flexible nature of the relationship.

The Watershed/HP Labs relationship is a major industry success story that deserves to be shared with a wider audience. It has undoubtedly been a success for both organisations in terms of furthering their respective commercial and cultural aims. But beyond that, it is a success story for the Bristol creative industries sector, and for the UK digital media industry as a whole.

2) The Brief for the Case Study

The brief for this case study is to tell the story of the HP Labs/Watershed relationship. Its principal aim is not to evaluate the success of the projects undertaken, but rather to give a flavour of how they were conceived, how they worked and how the nature of the partnership influenced both their design and outcome.

The SE3D animation showcase is the main project explored in the case study, but the other projects in Watershed/HP Labs’ portfolio are included to illustrate how the relationship has developed over the years and continues to evolve today.

The source material for the case study has been background documentation and existing evaluation reports, and a series of hour-long interviews conducted during July 2005 with key individuals who have been involved in some way with the partnership and the projects arising from it. The case study has been part-funded by Arts Council England’s Interdisciplinary Arts Department, which creates and supports events and initiatives that build networks of people interested and involved in the intersection of the arts and other disciplines.

Although the focus of the study has not been on formal evaluation, it is hoped that by examining in some detail how the relationship developed and the lessons learnt, and by disseminating the case study to stakeholders, funders and agencies within the creative industries, this document will provide useful insights that might inform policy and strategy, and a basis for other creative partnerships between public and private sector organisations.

3) Background and Wider Context

Innovation has always been central to the social, cultural and economic achievements of all nations, but 'innovation' as an economic driver in the 21st Century has acquired a new context and meaning through the emergence of a 'global economy' and because of the impact of digital technologies on production, distribution, marketing and communication processes in almost every sphere of human activity.

In public policy terms, innovation is now being defined as 'the successful exploitation of new ideas'. This is a broad definition that goes beyond the traditional understanding of innovation as a process of technical or scientific invention. Innovation is now about the creation and exploitation of knowledge – encompassing both the development of new ideas through research and their application in business and in wider society.

National and regional government strategy increasingly focuses on promoting creativity and innovation in every part of the economy, with the Creative Industries being singled out as a particularly fast-growing and dynamic business sector in which the relationship between innovation, knowledge transfer, productivity and marketplace performance is integral to market success.

To give a typical example, an overall aim for South West Regional Development Agency is *'to put innovation, creativity and technology at the heart of the region's businesses and organisations'*. The regional Innovation Strategy identifies as one of its key objectives *'to create a culture in the region that encourages innovation in all sectors of business, public sector, education, research organisations and the voluntary sector'*. One way the regional body pursues this objective is through seeking to develop a 'technology excellence network' in which new ideas, expertise, and creative and technological advancements can be shared amongst several companies in the region. Collaboration is seen as fundamental to the 'incubation' of new ideas and products, and their 'roll-out' through industry 'clusters'.

Yet it is one thing for government to recognise the importance of innovation to wealth generation, quite another matter for state intervention to actually create the conditions in which innovation and creativity can flourish. For all the investment in and rhetoric around 'sector specific groupings', 'hubs', 'clusters' and 'cross-sectoral partnership', it is questionable how many state engineered collaborations have truly realised their expected potential and acted as a catalyst for innovation and change.

What is clear is that promoting a co-operative approach and forging mutually beneficial relationships either within or between particular industrial sectors is a complex business, and a hard nut to crack at the best of times. There are several factors that can militate against collaboration, including issues around ensuring equity between partners in such relationships, protecting intellectual property and achieving a good return for time and money spent. For some, there is the fear that

sharing ideas and resources, and opening up one's business affairs to another company, might jeopardise a competitive advantage.

Against this background, the Watershed/HP Labs partnership seems all the more remarkable, and certainly there are few examples nationally of a major global corporate and publicly funded cultural organisation collaborating in this way. This study will reveal how the relationship between the two organisations came about and developed through time, and the reasons why it made sense in terms of geography, ideology, cultural vision and shared goals, albeit with different emphases.

4) About Watershed

Established in 1982 as Britain's first 'media centre', Watershed has always played a key role in the development of moving image culture in all its forms, with the organisation acquiring and maintaining a high profile and good reputation at regional, national and international level. As a publicly funded agency, supported by Arts Council England, SW Screen and Bristol City Council, Watershed's role traditionally focused on the development and presentation of high quality arts and media product, and providing an engaging, stimulating and educating experience for audiences and participants. To this day, Watershed remains the regional venue of choice for film festivals, media conferences, seminars and showcase events.

As emergent digital technologies rapidly transformed the worlds of photography and the moving image over a decade ago, Watershed began to shift the locus of its activities and embrace new models of collaborative research and development, enabling artists, designers and programmers to devise new creative applications of available technologies and explore new user interfaces.

This process of change led Watershed into challenging new territory, and the organisation soon discovered that making sense of the complex artistic and cultural milieu surrounding digital creativity demands both a versatile and fleet-of-foot approach, and a willingness to cross boundaries between areas of practice and different professional sectors. Over the last ten years Watershed has progressively developed an effective infrastructure to support various forms of electronic design, production, publishing and presentation, and successfully brokered new working relationships between artists, producers and exhibitors in the subsidised and commercial media world, and with a number of key educational institutions and partners in the creative industries and ICT sector.

As a result of this willingness to embrace change, Watershed today is a flexible, well-run and accessible organisation, with a strongly entrepreneurial creative vision and the ability to function in a multi-disciplinary environment. Watershed has not only learnt how to recognise talent and back new kinds of creative process, but also when to remain an enabler rather than the controlling partner in collaboration and partnership. Such an approach has earned Watershed the respect and trust it needed to become a proactive networker within the 'knowledge-based economy'. It has also given the organisation the ability to bring together and work with diverse (and in some cases unlikely) partners to make things happen that would not otherwise take place.

As a July 2005 report by Peter Boyden Associates, *21st Century Watershed: Building a Different Kind of Creative Organisation*, puts it:

"Watershed understands and harnesses the economic, cultural and social change triggered by digital technology... This is Watershed's natural terrain – the point at

which Hewlett Packard meets the Knowle West Media Centre, the Philharmonia meets Portishead and Electric December meets DreamWorks. Without a public space like Watershed these worlds struggle to inhabit the same universe let alone talk to each other in a common language"

5) About HP Labs

As its corporate website states, Hewlett Packard is a technology company *"fed and fuelled by progress and innovation"*.

HP Labs is the division responsible for delivering breakthrough technologies and technology advancements that enable the parent company to gain a competitive advantage in the marketplace. Since the inception of HP Labs in 1966, these innovations have included thermal inkjet printing, the pocket calculator, light-emitting diodes and the Alta Vista search engine. More recently, HP Labs' success stories have included film-quality Photosmart digital cameras and the 64-bit architecture that is the basis for Intel's Itanium microprocessors.

In line with and contributing to Hewlett Packard's strategy creation, HP Labs' research focuses on several areas, including:

- Next-generation computing - using industry-standard components to develop an adaptive ICT infrastructure that automatically and securely moves, balances, shares and re-uses computing resources as needed.
- Printing and imaging growth - expanding HP technologies into new areas such as commercial printing and photofinishing; developing smarter cameras, video projectors, 3D imaging, enhanced device connectivity and other technologies for innovative imaging applications.
- Industry collaborations - developing solutions for customers in fields undergoing rapid change, including mobile devices and infrastructure, rich digital media, life sciences and education.
- Technologies for services - developing architecture, tools, platforms and software in the areas of adaptive infrastructure and services; creating platforms, services and solutions that provide end-to-end security.
- Consumer systems - creating architectures to make systems and devices work better together; developing and driving open, cross-industry standards.
- Emerging and disruptive technologies -- continuing to push the boundaries of science in areas such as atomic resolution storage, molecular computing and flexible displays; innovating for emerging markets.

HP Labs Bristol is Hewlett Packard's second largest central research laboratory and among the most significant corporate ICT research labs in Europe. Since HP Labs Bristol opened in 1983, it has cultivated leadership and excellence in a wide range of technical fields, with a current emphasis on utilities computing, computer security, the Semantic Web, quantum information processing, digital imaging, media and publishing, mobility and display technologies.

HP Labs Bristol operates as an outward facing research centre, developing important local partnerships with organisations such as the BBC's Natural History Unit and the

University of Bristol, and also international collaborations such as the *Dspace* project with MIT Libraries and several European Union sponsored initiatives including *QUIPROCON*, which coordinates a European Quantum Information Processing and Communications Network of Excellence. HP Labs Bristol also has excellent conference and seminar facilities, and has hosted a number of technical events including the Information Security Conference and the international Eurowearables conference.

6) Watershed/HP Labs: The Story So Far

6.1 Basic Chronology

1999 - Watershed joins a Bristol University Computer Science led R&D consortium, Bristol Creative Technology Network. The object was to experiment with high bandwidth connectivity for the media sector. This provided a dark fibre MAN offering 155MB connections to the consortia members.

1999 to present - Bristol Creative Technology Network holds a series of events at Watershed to disseminate outcomes. Watershed begins to build a relationship with HP Labs. Following the conclusion of the 3 year R&D project Watershed and HP became founding partners in a commercial successor to MAN, Bristol Media Exchange (BME), which currently provides Watershed's broadband connectivity.

June 2003 - *The Painter*, HP Labs commission Bristol-based production company 422 to produce a 3D animated film using a prototype utility rendering service developed by researchers at HP Labs Bristol and run on the Labs' Utility Data Centre. *The Painter* was premiered at Watershed in September 2003.

July to November 2003 - *Schminky*, Mobile Bristol/HP Labs Bristol. A project integrating interactive exhibition systems into the lifestyle experience of a visit to Watershed.

October 2003 - *Jukola*, Mobile Bristol/HP Labs Bristol. Trialled and evaluated in Watershed Café Bar. An interactive Jukebox designed to allow a community of people in a public space to all partake in the choice of music playing.

2003/4 - The 5th Clark Digital Bursary: *The Interactive Building*, with Mobile Bristol/HP Labs Bristol. These bursaries provide opportunities for creative development in digital media through a residency programme which explores the use of the latest wireless technologies to engage audiences in the public spaces inside and outside of Watershed.

November 2004 to September 2005 - *SE3D Animation Showcase*, HP Labs Bristol. Following on from HP Labs commission of *The Painter*, HP Labs and Watershed, with co-sponsor Alias®, launched the SE3D animation showcase, offering access to an experimental Maya® Rendering Service to 12 groups of animators to produce a 3D short.

April to July 2005 - *Active Print*, Mobile Bristol/HP Labs Bristol. Trialled and evaluated in Watershed. Standard printed advertising posters that have special "barcodes" printed on them that are read using a camera phone to link to online content, applications and services.

May 2005 - *Misto Table*, Mobile Bristol/HP Labs Bristol and HP Labs Palo Alto. Developed by researchers in HP Labs Palo Alto, *Misto* is a touch screen table trialled

in Watershed café bar using *dshed* content. The research aim is to explore how *Misto* could be used by people in homes and social settings to view content and communicate.

6.2 Mobile Bristol

An ongoing and fruitful relationship has been developed between Watershed and Mobile Bristol over the last three years, which has resulted in several collaborative projects. The founders of Mobile Bristol are HP Labs, the University of Bristol and The Appliance Studio. Mobile Bristol has received substantial funding from the Department of Trade and Industry to explore the uses of mobile technology in the city.

Mobile Bristol's remit is to investigate *"how mobile devices and pervasive information technology can be used to enhance the ways in which residents and visitors experience and interact with their physical environment and with each other in urban and public spaces"*.

Through real life testing of portable media appliances and the development of new content and applications, Mobile Bristol has created a 'toolkit', which provides a *"digital canvas over the physical landscape onto which digital experiences can be painted and new commercial opportunities can be explored"*. Their approach addresses not only technical issues around the use of mobile technology and wireless access, but also the development of new content authoring tools and software that enables a wide range of users to create and manage multimedia experiences.

Mobile Bristol's research and development work is led by an interest in consumer needs and behaviour and how to respond to them through technology, rather than by enterprise concerns and the drive to create new products for the marketplace. As Project Manager, Jo Reid, puts it:

"For any technological focus, especially in a consumer space, you need to think about content provision and the mechanisms by which content gets created and put into that space"

For Mobile Bristol, user experience is integral to the design of new products and applications. Their research is concentrated around two major questions: what makes a technology experience compelling? How do you design situated technology experiences?

Although some pilot work had been done at HP Labs Bristol, it became clear that simply undertaking studies in a traditional research lab environment was inappropriate for this kind of investigation. Mobile Bristol therefore looked around the city for partners that could provide both a public interface and an infrastructure to support the research programme. For Jo Reid, Watershed was an ideal choice:

"Watershed is an obvious match for us – a partner who can collaborate at a research level and is willing to turn their venue over to being a 'living lab space', somewhere where we can conduct research studies in a real world setting"

Moreover, Watershed and Mobile Bristol shared a mutual interest in how creative technology might be introduced into the highly popular, social space of the Watershed café/bar. From Watershed's point of view, there was the desire to explore

how its digital media work could be extended beyond the confines of the cinemas and gallery/workshop spaces into the more informal public spaces within the building. For Mobile Bristol, Watershed's café/bar provided a context in which researchers could interact with consumers from a wide range of backgrounds who are receptive to technology experiences and willing to try out innovative media appliances and content.

Schminky was the first major collaboration between Mobile Bristol and Watershed. Mobile Bristol had discussed with Watershed the possibility of conducting research into sound art, gaming and the use of portable digital appliances. Watershed identified the digital artist/composer Duncan Speakman, oversaw his commission and mediated the artist's relationship with Mobile Bristol for the duration of the project. As *Schminky* was conceived as a group design project, the artist did not operate in isolation and was fully integrated into the Mobile Bristol creative team, having access to a range of design experience, technical expertise and resources.

The culmination of the project was a week long public trial where visitors to the Watershed could register and use an iPAQ handheld computer and play *Schminky*. Players worked to solve musical puzzles that involved identifying sounds that are missing from an audio prompt. They could play individually or invite other *Schminky* users in the café/bar to join in a group game. The game was specifically designed to promote social interaction and test acceptability of new technologies in social spaces.

The next collaborative project *Jukola* - the interactive Jukebox – allowed people in the café/bar to use wireless iPAQ handheld to view music tracks, find out further information about the tracks and submit their votes. Votes were collated across all the iPAQs to determine the next track, providing a democratic choice over the music played. A touch screen display was used by people in the café/bar to nominate songs for public vote. *Jukola* was also networked to allow access over the web enabling people to submit MP3s remotely or review a history of the music played on a particular day.

Schminky and *Jukola* demonstrated that it was possible to introduce technology-mediated experiences into the heart of a social space without destroying the ambience. The project gave Watershed and Mobile Bristol an incentive to explore further the integration of interactive exhibition systems into the lifestyle experience of a visit to Watershed. The 5th Clark Digital Bursary was deployed as an enabler to engage more artists in the exploration of this territory. The aims of the bursary were:

- To enable artists and multi media producers to develop their creative practice in digital media and specifically to work with next generation mobile technologies
- To explore the integration of interactive exhibition systems into the lifestyle experience of a visit to the Watershed.
- To foster creative collaborations between artists, technologists and Watershed to explore new working practices
- To develop the Mobile Bristol Infrastructure through practice based R&D
- To make digital work and practice available to audiences in the South West through seminar, presentation, exhibition and/or publication
- To support opportunities for exchange of ideas in the wider community

Under the programme title *The Interactive Building* three artists - Stanza, squidsoup and Dane Watkins - were commissioned to develop projects using the latest wireless technologies to engage audiences in public spaces within and outside of Watershed. Although the individual artists made very different creative responses to the brief, all three projects addressed the interplay between appliances, services and infrastructure when placing technology in a consumer space. By focusing on both the experiential aspects of technology and developing audience engagement, the projects provided important real life research data for Mobile Bristol about the relationship between user experience and design.

Meanwhile, Watershed had been exploring new public interfaces in the café/bar area to allow people to browse online creative content. During capital refurbishment of the building, the artist Simon Poulter was commissioned to design and produce two new 'slacker tables' that were sited in a new area of the café. In Spring 2005, this new public area also provided an opportunity to trial one of the latest concepts being developed by Hewlett-Packard in California - *Misto*, the interactive coffee table. HP Labs' aim is to develop a touch screen table that can be used by people in homes and social settings to view content and communicate online. A pilot version of *Misto* was shipped over to Bristol to be roadtested by the public using a selection of content from *www.dShed.net* - Watershed's online showcase of digital creativity.

Established by Mobile Bristol, the *Active Print* project is exploring how printed materials and digital displays can be linked to online content, services and applications in all kinds of urban/suburban/rural situations. In particular, the concerns of the project lie in how this can be done using the mobile phone – the device that many people carry with them everywhere. Current camera phones now have good enough optics, resolution and processing power to be able to read special barcode-like symbols known as 'QR codes' on the printed materials. These symbols encode information such as web addresses, phone numbers and various pieces of meta information. When read and decoded by a camera phone, they can initiate several ways of linking the user to content and services, in particular:

- By initiating a Web (WAP or HTTP) download
- By automatically sending an SMS message to a service

I Can Read You is a game based around QR Codes and mobile phones that was developed in Summer 2005 by Simon Poulter in conjunction with the Watershed and HP Labs. The game consists of a large puzzle board in the shape of a QR code. At the beginning of the game, key segments of the board are removed which reveal additional QR codes underneath. These revealed codes when read by camera phones provide clues to the location of codes hidden around the environment. The players need to find these hidden codes in order to discover where on the board the removed code segments must be placed. When all the code segments have been pieced together it forms a large QR code. This code can then be read by the camera phone to reveal a quote from a famous novel in Glass's pop up text box.

6.3 SE3D – the HP Labs/Watershed Animation Showcase

Utility and grid computing has been one of Hewlett Packard's major success stories within the ICT industry. Animation, and most recently 3D animation using computer generated imagery (CGI) is a success story for Bristol's film and media industry. So it was perhaps inevitable that at some point the respective strengths and needs of the two sectors would bring them together.

HP Labs Bristol played a key role in creating the HP Utility Data Centre, which provides a simple, flexible and low-cost way to quickly mobilise powerful computing resources - servers, networking, storage and applications - and easily reallocate them to meet changing needs. The Bristol team continues to lead research into key systems technologies that will enable HP's wider Utility Computing vision.

In relation to that work, HP Labs Bristol researchers had been developing a rendering service for digital animators which speeds up the process of converting wire-frame models into finished, fleshed-out frames. A key factor behind HP's decision to undertake research in this area was Bristol's particular strengths in 3D animation. When HP Labs wanted to test the prototype version of the rendering service in a real-life production situation, they approached Aardman Animations and invited them to make a short film using the system.

For reasons of capacity, Aardman did not take up the offer, but directed HP Labs to another local production company 422, who created a four-minute film *The Painter* using the system in collaboration with HP researchers. The animation was entirely produced using the experimental Maya® Rendering Service running on an HP Utility Data Centre. *The Painter* was premiered at Watershed in September 2003, before being showcased at various international film and media events to great industry acclaim.

Film animation uses a lot of computer power. To give an idea of the scale of the job, *The Painter* was rendered over 17 days. In total, 18,832 frames were rendered, of which 6,000 were used in the final animation. This four-minute film was composed of 50 different shots, comprising 178 separate rendering jobs. The most complex frame took 97 minutes to render and the average time was 38 minutes. During production 422 used up to 104 computers on the rendering service, generating 36 gigabytes of content. Making an animation using this amount of rendering would have been way beyond the capacity of 422's in-house servers.

What *The Painter* subsequently achieved for Hewlett Packard far exceeded everybody's expectations. As well as helping HP to test and refine their utility computing systems, the quality of *The Painter* as a film made using this rendering process now gave the company serious credibility within the international CGI animation industry. This short film made from Bristol proved to be HP's calling card for a much larger engagement with one of the industry's leading players DreamWorks.

The rendering of a full-length animated film consumes processing time equivalent to more than 10 million hours. Rendering involves combining digital character models, textures, lights and special effects to create finished frames. Each frame goes through the rendering process multiple times on a high-performance processor. HP worked with DreamWorks to create a 1,000-processor dedicated utility data centre at HP's laboratories in Palo Alto to provide a flexible rendering service with enhanced security features.

This was not a simple process of wiring 1,000 processors together. HP's Utility Rendering Service used software from the original utility data centre, including server and storage virtualisation software and allocation resource tools that automatically assigned data centre resources to applications when needed. Connected to DreamWorks via a fibre-optic link with enhanced security capabilities and a gigabit-per-second bandwidth, the data centre rendered more than 1 million frames. About 10 percent of *Shrek 2*'s 10 million rendering hours were processed remotely using

the Utility Rendering Service.

Back in Bristol, HP Labs, Watershed and Aardman were considering which direction next to take the research and development programme. *The Painter* had admirably demonstrated the efficacy of a single-user application of the utility rendering service, but HP needed to research how the system would perform with several users accessing it remotely at the same time. Watershed and Aardman suggested offering the rendering service to emergent filmmakers and small production companies who would not otherwise have access to such expensive technology. A new animation programme was launched for which prospective participants were required to make a real-life 'pitch' to a panel of industry representatives.

Watershed agreed to manage and facilitate the project on behalf of the group, and HP/Watershed jointly appointed a Project Coordinator, Clare Reddington, who divided her time between both companies. This post provided an important point of central contact and mediation for the participating filmmakers. Under a new brand name - SE3D - twelve animators were recruited to the programme, reflecting a range of creative backgrounds and levels of experience within the industry. One of the benefits of working with Watershed was the establishment of SE3D as a strong brand in its own right, distinct from HP's corporate products and services. With additional financial support secured from several UK regional screen agencies and broadcasters, Arts and Business and South West Regional Development Agency, sufficient production funding was finally in place by December 2004 to enable the commissioned films to be made.

As well as being able to access the HP Labs-Maya® Rendering Service via any consumer broadband internet link, the animators were given creative, technical and administrative support throughout the whole filmmaking process. SE3D set up an advisory group that included senior representatives from the BBC, Aardman Animations, DreamWorks and Alias®. This advisory group opened up access to a network of industry 'mentors' who were available to assist individual animators during the script development and storyboarding stages through to production and final edit.

SE3D also wanted to trial a mechanism for managing fluctuating and unpredictable market demand for the rendering service. HP Labs designed and built an 'ebay-style' system whereby each of the animators was given a fixed amount of virtual money with which they could place bids for use of the service, related to their individual requirements and scheduling. The underlying aim was to explore how freelance animators and smaller production companies might access the technology and keep their production costs down by bidding for cheap rendering time in off-peak hours.

The first of the SE3D films were presented in an HP Labs-Alias® showcase at the annual Animated Encounters film festival which took place at Watershed in April 2005, and subsequently at Cannes Film Festival in May as part of HP's presence and sponsorship at that major event. Other screenings were mounted at events in Copenhagen, Amsterdam and Annecy, and Watershed/HP continue to screen and promote the SE3D films.

7) People and Structures in the Watershed/HP Labs Relationship

At the end of the day, the success or failure of any professional collaboration hinges on the calibre of the people involved and how they relate to each other. Pulling together effective teams for particular projects, and then carefully structuring the relationships, roles and responsibilities within them, has been crucial to the success of the Watershed/HP Labs partnership. Serendipity has also played its part, with

several instances of the right people appearing on the scene at the right time and adding an extra dimension to the mix.

Without doubt, the Watershed/HP Labs partnership has benefited from inspired leadership and effective project champions. The 'project champions' in this case have been drawn from that all too rare breed of maverick, creative entrepreneurs who David Sproxtton from Aardman describes as:

"People with professionalism, serious intent and a 'can do' attitude mixed in with enthusiasm, imagination and an openness to new ideas"

On Hewlett Packard's side, there has been John Manley, Director of Utility Computing, with his wider vision for BMEEx and a digital media service provider network drawing together Bristol's various strengths in this area. There has also been Steve Hinde, who led the research team that designed and built the utility computing server architecture that provides the backbone to the rendering service, and who took the prototype system out into the real world environment of CGI 3D animation. And Phil Stenton, who leads Mobile Bristol's pioneering research and manages the Technology and Lifestyle Integration Department at HP Labs.

The catalytic role that Dick Penny, Watershed's Managing Director, played at all stages in the process cannot be underestimated. Aside from passion, energy and a willingness to engage with emerging ideas and practice in some relatively unchartered digital territories, he has shown a keen instinct for new forms of creative collaboration, often with partners that might be perceived to be outside Watershed's traditional frame of reference as a publicly funded cultural organisation. In doing so, he has engendered within Watershed a culture that is inclusive rather than exclusive, open rather than closed and externally focused rather than turned in on itself.

One function of project champions is to strategically draw in other collaborators to extend the range of expertise and resources available for projects. For Watershed/HP Labs this has been very important to realising the full ambition of the projects and creating a wider pool of media industry talent and specialist knowledge that can be called upon when needed. Paul Appleby, BBC Producer, feels that the quality of the people involved in the core advisory group was a key factor in the BBC's support for SE3D.

"Because of their scale and repute, Hewlett Packard were already a big name draw for the BBC and Watershed had a good reputation in the city as a focus for media activities, but when we saw that Aardman Animations, DreamWorks and Alias® were also involved we knew this was serious – these were all industry hard-hitters, people who would get the job done, and done really well"

As well as good strategic leadership, the Watershed/HP Labs partnership has also benefited from effective programme management. SE3D had Peter Toft as its Programme Manager at HP Labs, dealing with issues around technology, resourcing and PR, and Clare Reddington as the SE3D Coordinator tackling a wide range of practical and logistical issues relating to delivery. Most critically, Clare provided ongoing advice, liaison with and support to the twelve commissioned animators. With her diverse background in the arts, media and science she was able to mediate both the production needs of the animators and the technological issues affecting delivery of the utility rendering service.

One of the real strengths of the Watershed/HP Labs partnership has been the close peer-to-peer working relationships developed not only at the top, but all the way

down the project management and delivery chain. For example, with Mobile Bristol/Watershed collaborations there has been a symmetry between Phil Stenton and Dick Penny's roles in leading the programme, between Jo Reid's role as Project Manager and Gill Haworth's role as Watershed's Digital Development Coordinator, and between Stuart Martin's role as Network Engineer for Mobile Bristol and Oliver Humpage's position as Watershed's ICT Coordinator.

Within the two partner organisations and their extended network of industry collaborators, there has been sufficient choice of personnel with the pre-requisite skills and availability to fill all the key roles identified for effective delivery of particular projects. However, it is in the nature of this work that both process and outcomes can be unpredictable. Whereas specific roles and responsibilities have been assigned to people, the individuals involved have understood the need to be flexible and adaptive to changing circumstances and needs.

8) Finance and Resources

Making money – and achieving an immediate return for the investment of time, finance and resources – has not been the underlying basis of the Watershed/HP Labs partnership. Both companies have certainly invested a great deal in the partnership, and there have been significant commercial as well as cultural gains derived from the programme. However, bottom line costs have never been the primary concern for either party.

With twenty people working on the programme during its first year, HP Labs estimate that for SE3D alone they have already directly invested around \$2 million in staff time, lab facilities and technical support. When you add to that the real market cost of thousands of hours of rendering time using the utilities computing system (\$1 million plus), PR and marketing support, the showcasing of the films at international events, and other 'hidden' costs such as legal and contractual work, it is clear that the real costs to the company are substantially higher than HP Labs' baseline estimate.

For Watershed too, staff time, use of workshop and technical facilities, server space, hosting events in the cinemas and conference spaces, administration, marketing and project management has over five years run up a total investment by the company in the order of several hundred thousand pounds.

Partnership programmes have attracted around £160,000 of partnership funding in cash towards specific films, and over £300,000 support in kind from various sources such as the BBC, Aardman Animation, Alias®, Films at 59 and DreamWorks. What is perhaps surprising is the modest level of public sector grants that have been made available to support the projects and programmes initiated by the partnership. Public sector funding has underpinned less than 10% of the direct costs accrued over the five years of the partnership.

Watershed is a cultural organisation driven by public service values. It does not make profits for shareholders as a private company, and indeed if it were to do so that would compromise its core principles and limit public benefit. Nevertheless, Watershed is (and has needed to be) an entrepreneurial organisation that finds new sources of income rather than relying simply on public subsidy as its bedrock. Watershed has always operated with a lower gearing of public funding to earned income than other building-based arts and media organisations in its sector. The ratio (around 1:9) has not changed significantly for two decades. In 2005/6, £310K of core public investment will generate a turnover of around £2.8m.

By way of contrast, Hewlett Packard's activities do have an overriding commercial imperative – that of increasing its competitive advantage and performance in the marketplace. HP Labs is accountable to the parent company, and ultimately, the commercial value of research and development programmes has to be demonstrated.

Nevertheless, for different reasons - which are outlined later - both Watershed and HP Labs see any commercial gain derived from the partnership as part of a longer-term gameplan, in which neither party expects an early payback for their investment.

9) PR and Profile

Achieving and maintaining a high level of public awareness and press and media profile for the programme has been an important objective for both parties. Looked at in its most basic terms, the philosophy has been *'It's a great story, let's put it out there'*. But that belies the highly strategic, coordinated approach that has been adopted by the partners to building good PR and successful external marketing and promotion.

Hewlett Packard is a company proud of its achievements and innovations. The corporate website has links to dozens of company releases and press features, including numerous postings about SE3D, the success of the Utility Rendering Service and news of HP sponsored showcases at international film festivals and media events. It is also telling that because of its significance in helping HP to secure the alliance with DreamWorks, Hewlett Packard's senior executives regularly include a screening of *The Painter* in keynote addresses at industry events.

Both HP Labs PR and Watershed's Communications Department have worked hard on attracting press and media attention for projects, achieving many successes at local and regional level, and also prominent features in *The Independent*, *Guardian* and *Broadcast* and national and international coverage on *Radio 4*, the *BBC World Service* and *Discovery Channel*. Watershed's online showcase of digital creativity www.dshed.net includes individual websites for SE3D and the artist commissions with *Mobile Bristol*, and a selection of SE3D films has been presented in www.electricpavilion.org - Watershed's flagship contribution to *Creative Bristol 2005*.

The relationship to the University of Bristol, via *Mobile Bristol*, has also been important in ensuring that projects like *Schminky* and *The Interactive Building* are featured in academic research journals and publications, and at higher education/industry forums such as the *Second International Conference on Appliance Design*, which took place in May 2004. More recently, SE3D was featured at the *Arts and Humanities Research Council (AHRC) June 2005 conference Up to Speed: The Potential of Broadband as a Space for Research, Development and Production*. The AHRC also used SE3D as a case study within a national report to the *Research and Knowledge Transfer Task Group* entitled *In Search of Innovation: Business Models and Value Chains in the Creative Industries*.

10) Outcomes of the Partnership

Creative

Aside from all the other benefits it brings to Watershed and HP Labs, the partnership has first and foremost been about achieving creative outcomes – whether that be in research terms or the production of exciting new work. The underlying approach and ethos may have been open-ended and exploratory, but it has resulted some excellent

films, new artworks and imaginative artist-devised products and applications of the technology. It has also produced new forms of audience engagement, and revealed new things about how people interact with technology-mediated creative content.

For participating artists and animators, a 'real-life' focus to projects has multiple benefits. Not only have they had access to technologies and technical facilities well beyond their normal means, but also to the expertise and resources of the wide range of industry professionals within the Watershed/HP Labs orbit. For SE3D, prospective animators were initially required to successfully pitch their idea to a panel that included respected people from the BBC, Aardman Animations and DreamWorks. When selected, they were supported with script development, mentoring from experienced producers, access to actors and facilities such as sound dubbing studios, creative feedback during production and post-production and help with the distribution of the finished work.

For some participants, the outside contact with other creatives was of particular benefit to their practice, especially as producing animation is often both a painstakingly slow and isolating process. Jaime Pardo, one of the SE3D animators, rather amusingly commented that *"if it wasn't for SE3D I would still be locked up in the gimp cupboard"*

For artist/composer Jo Hyde, a major benefit of SE3D has been the opportunity to change his practice and go beyond the traditional visualization of sound to explore what it is possible to do with sound data in a three dimensional space. Jo Hyde was specifically commissioned by Watershed as an artist who did not come from an animation background, but whose skills and interests had the potential to add a different dimension to HP's research. Jo explains:

"For me this is the beginning of a journey rather than the end. I'm new to 3D animation, but I've always been interested in how sound is integrated into a multimedia context. Working with the HP Labs' team and their utility rendering service has been a different and much more rigorous approach to that I am used to. I know that the techniques and ways of working I've developed through SE3D will have a wider application to other projects I undertake in the future"

To assist with the 3D animation side of the project, extra finance was secured to bring in three emerging animators from Supernatural Films to work alongside Jo. As a side project to the film, Jo Hyde developed new software which extracts data from sound for use with Maya® rendering tools. Jo is currently exploring with Watershed and its intellectual property lawyers what options exist to commercially exploit this new software, which appears to have many other applications beyond Jo's own more abstract and experimental artwork.

For researchers at HP Labs, a key challenge has been to find creative solutions to the technological problems encountered by artists and other users working on projects. For SE3D, the utility rendering service ran on top of the service utility. To enable several animators to access it remotely via the Net, a technology called Elephant Store had to be deployed. This efficiently stores multiple versions of the animated data coming into the system. Underpinning all of these software components is a technology called SmartFrog developed by HP Labs Bristol that manages both the service utility and rendering service.

On several of the Mobile Bristol/Watershed projects, freely downloadable software tools were specially developed by HP to enable non-programmers – artists, students, researchers, schoolchildren etc. – to use the handheld devices to create their own

soundscapes, games and interactive media artworks. These creative tools helped participants to overcome the fear and technical obstacles that many people experience when using a new technology for the first time.

Bridging the Gap

There has traditionally been a perceived (and perhaps actual) gap between the world of computing, and that of arts and media production. Artists and media producers have tended to view the complex computing operations underlying their practice as 'below the line' services that merely support the 'serious' business of creativity. The creativity and technical ingenuity that goes into such computer systems and their application is all too often overlooked by producers, and consequently undervalued within the industry.

One of the positive outcomes of the Watershed/HP Labs partnership is that this perception has been challenged, and the gap is being closed through the experience of collaborative working. Several of the participating artists have commented on how interested, and interesting, HP Labs' personnel have been in their engagement with the artists' projects. Their creativity often goes way beyond creative problem solving – as an example, one HP researcher is currently looking at how you can build music from genetic algorithms as a result of the technical support that he offered Jo Hyde on his project.

For David Sproxtton, of Aardman, the importance of the computer industry to most forms of creative media production is all too apparent:

"Because of the Digital Revolution, the perception of what companies like HP can do for the creatives is much clearer. Everything we do is in digits, everything is coming out of a box, and the value chain from these guys is beginning to be recognised now"

From HP's point of view, Watershed's role as the networking hub and facilitator of new relationships with the arts and digital media sector has been very important. Inevitably, despite its presence and influence in the city for 23 years, the motives behind Hewlett Packard's desire to collaborate with media producers in Bristol are from time to time questioned by sceptics within the sector. Paul Appleby describes HP Labs Bristol as *"the big corporate player that has lived for years behind hedges on the ring road, yet rarely seemed to show its face in the city"*. Watershed has acted as the honest broker that provided HP both with the public interface and local profile it lacked, and useful introductions to talented artists, media producers and cultural providers in the city and beyond.

Knowledge and capability transfer

Knowledge transfer has always been a core outcome of Watershed/HP Labs' collaborations - whether that be artists and producers learning how to apply the available technology in imaginative ways which could be incorporated into their practice; or Hewlett Packard understanding better how people in the real world will use the products and technological solutions they are developing; or Mobile Bristol building up knowledge of how end users experience technology-mediated content.

For Watershed, the partnership has significantly expanded the organisation's knowledge and capability in the digital media sphere, and also enabled it to understand new things about physical and virtual creativity in relation to building-based and online activity, which in turn has informed the professional infrastructure that is being developed at Watershed to support this activity.

Thus knowledge transfer and capability transfer have gone hand in hand. The collaboration has increased know-how and expertise at many levels, for all parties involved, and it has also enabled the people involved to do things that they would not otherwise have been able to do. Julie Taylor, Creative Industries Manager at the Arts and Humanities Research Council, feels that the Watershed/HP Labs collaboration (particularly in relation to SE3D) is an important national and international model of research-based knowledge transfer within the creative industries. She comments:

“the project embeds many of our current concerns, including networking as a business model, access to new and expansive technologies, new distribution avenues, mobilisation of production funding, changes in core business practice and the ownership of IP in the content that is created by the research process”

For Steve Hinde at HP Labs, widening access to the huge capabilities afforded by new generation computing is the key to revolutionising the industry and supporting emergent talent.

“Utility computing has the potential to shake up the media industry by lowering cost barriers for the animators and others. They can call on a service like ours when they need it, paying only for what they use. We hope projects like SE3D will uncover highly talented people who would otherwise never be able to work in animation”

Intellectual Property

As with all such projects in the creative industries, in addition to the immediate outcomes of individuals' creativity, skill and talents in research and development work, there is the potential for further wealth creation through the exploitation of intellectual property. For that reason, there is always a need to be clear about where intellectual property lies and who owns it, about how best to protect it from theft, and in which context it is permissible to freely share original ideas, content and knowledge – some of which may have taken many years to develop.

Finding new models for Intellectual Property (IP) protection, which are both equitable and workable, has been one of the positive outcomes of the Watershed/HP Labs partnership. Quite unusually, the artists and animators have been able to retain the intellectual property rights on all or most of their productions. The agreement, negotiated by Watershed on their behalf with in-kind legal support from TLT, is a much better deal than most production funding arrangements allow. In typical cases, for example the UK Film Council's production funding schemes, copyright on the films produced is assigned to the agency providing production finance to the maker, either on a fixed term basis or in perpetuity. The retention of IP strengthens the originator's position in terms of using the content created by the research projects to secure future commissions.

Watershed has been in a good position to safeguard the interests of all parties because it has acted as an intermediary agency that has not sought to own the intellectual property derived from the projects. Through developing an effective Intellectual Property Agreement and process over several projects, Watershed has reduced the legal costs and time that might have been spent negotiating individual arrangements. If this responsibility had fallen on Hewlett Packard, as the commercial lead partner, the process could all too easily have become tied up in legal complexity and disputes over what value is accrued at what point, and who benefits from future exploitation of films and artworks produced on collaborative research projects.

Economic impact

The economic impact of the Watershed/HP Labs partnership and collaborative projects can be easily demonstrated, but it is very hard to accurately quantify. Certainly, the commercial outcomes of the relationship go much wider and deeper than those relating to the digital media world, although in that sector alone they have been significant.

In terms of their PR value and contribution to Hewlett Packard's industry profile, *The Painter* and SE3D have yielded a very high return for the company's investment. When you add to that the direct commercial impact of *The Painter* in enabling HP to secure the large contract with DreamWorks, the economic benefits to the company derived from the partnership certainly run into millions of dollars. And it does not stop there.

For John Manley, at HP Labs, an innovation in one domain such as CGI animation can have an immediate impact on Hewlett Packard's business in other sectors:

"How The Painter came about is a story that can be understood by everyone, regardless of which industry they come from. I once told the story to someone from the aerospace industry and showed him the film. The very next day he phoned me to ask whether we could do the same job with crash simulation"

Whilst putting the utility rendering service through its paces, Hewlett Packard is also busy developing and testing in a real life situation various compression and data processing technologies applicable to sectors as diverse as financial services, telecommunications and engineering. The company is concurrently looking at the issue of cost effective broadband distribution and the best system for enabling remote access to its utilities computing services by business users around the world.

For Hewlett Packard, such research-based programmes and outcomes are viewed within the context of how online utilities computing has been developing over the last thirty five years and how it is set to develop in the future. In 1969, the Internet came along as the first utility – one focused around connectivity, in essence a system which allowed Point A to talk to Point B. Twenty five years later the World Wide Web was established as a powerful new utility for standardizing information gathering and sharing using the Internet as its distribution system. Now ten years on we are entering the third utilities phase in which people not only share information, but also have the ability to do computational tasks wherever they are in the world. It is advancements in this territory that are of particular interest to Hewlett Packard. As John Manley explains:

"It's about the disruptive effect technological innovations have on business practices worldwide. Hewlett Packard's ability to realise its commercial ambitions rests on the ability of utilities computing to disrupt established industry structures and ways of working, changes to the way we do business of an order of magnitude even greater than the Web has achieved to date"

Watershed is a not-for-profit organisation, whose work does not have any overriding commercial imperative. Nevertheless, Watershed is a stakeholder in digital innovation with an important role to play in supporting new technology-based practices and their successful adoption by the creative industries – especially in the cultural sectors that relate to Watershed's primary interest in moving image and digital creativity. As Dick Penny explains:

“We want to be at the heart of making new things happen through new collaborations, especially those bringing public and private sector interests together. We can increase the ‘value for money’ payback on investment by drawing new and diverse players into the creative game, especially enlightened commercial players who are committed to innovation, exploring new territories and knowledge exchange. Our fruitful partnership with Hewlett Packard is one example of this approach”

11) Some Reflections and Lessons Learnt

It is clear that there are many factors that have underpinned the success of the Watershed/HP Labs relationship – not least a mutual recognition of the two organisations’ respective strengths and differences, as well as an ethos of collaboration and open-ended investigation of new possibilities. The difference in scale and turnover between the companies has never been a barrier to them working effectively together.

Good ‘casting’ has been essential to the success of the partnership. This starts with ensuring that there are strong project champions on both sides, who share a clear vision for the programme and are able to enthuse and motivate other team members. Getting roles and responsibilities right within each project team is critical, as is engendering a flexible ‘can-do’ culture at all levels. Throughout Watershed and HP Labs’ partnership working, good peer-to-peer relationships have been an important factor in effective delivery.

Being adaptive to changing circumstances has also been vital, adhering to the research maxim that *‘even if you are looking for specific research data, it is the unexpected outcomes that you learn most from’*.

Watershed’s intermediary role – both as a networking hub and catalyst for collaboration – has been crucial. At times, the organisation has also been very hands-on in both co-ordination of and delivery of projects, as well as its important role as a mediator between artists, HP Labs’ personnel, funders and the other industry players involved. This intermediary function includes ensuring that all parties agree terms of engagement in which there is equity and fair exchange.

The local context – and Bristol’s strength and depth in terms of its creative and technological infrastructure the contribution it makes to the digital media industries – has certainly helped. Concentrating activities initially around Bristol, then building out, has made it easier to identify and enlist the support of the right people and companies at the right time, and to build and sustain close working relationships for the lifespan of projects.

Adopting a ‘blue sky’ approach to research and development, in which what is learnt from the processes involved is as important as outcomes, has promoted greater creativity and inventiveness in the way that people have approached collaborative endeavour. It has also encouraged lateral approaches to problem solving and the application of learning outcomes to domains other than the one under investigation. In deliberately pushing the technology to its limits, and giving artists and animators the freedom to experiment with, and perhaps subvert its use, a better understanding is gained of how different technologies work together in real life applications. This in turn enables the identification of technical and design solutions that are best suited to particular user needs.

Such an open-ended approach is often at odds with the demands of public funders, who look for quantifiable outputs and predictive outcomes in advance of any financial

support for initiatives. At times, this tension between open enquiry and working towards fixed outcomes has had an adverse impact on Watershed/HP Labs ability to attract public funding. Paul Hassan, from South West Screen, admitted that:

“In terms of SE3D’s creative drive, the access the scheme gave micro-businesses to capacity they could otherwise only dream of, and HP Labs’ lateral solution to animators’ needs, then funding the programme should have been a no-brainer decision for us. However, convincing the Regional Development Agency that it met their objectives and was something they should support took a very long time, and because of that we were very late coming to the table”

The Watershed/HP Labs experience underlines the need for a new model for public funding that recognises ‘blue sky’ research as integral to creativity and innovation, and one which demands fewer ‘hard’ outputs in the early stages of a project’s development. This implies a move away from conventional notions of public subsidy towards a culture of investing in creativity, and backing innovation and new talent wherever it exists. In the mercurial and unpredictable world of digital creativity, such an approach does not seem unduly radical, but it does demand of the public funding system a greater willingness to take risks and support dynamic new partnerships with the private sector outside its traditional frame of reference.

12) Conclusions and the Way Forward

The Watershed/HP Labs partnership works. It will continue to do so.

There is a good match between the organisations culturally and creatively, and they bring complementary skills and resources to the table that combine well in joint projects and other collaborative ventures. Both organisations are ambitious and entrepreneurial, and operate in flexible environments that balance strategically planned initiatives with the continuing energy of opportunistic intervention. Both organisations have achieved the high professional standing and profile needed to draw in other industry partners, and to extend the network of expertise and resources available for projects.

There are aspects of the relationship that are locally specific, and key individuals who have been important catalysts both in making the partnership happen and ensuring that the projects undertaken realise their full creative potential. That said, the core characteristics of the Watershed/HP Labs’ relationship could be applied to other public/private sector partnerships in the creative industries sector. The partnership may not provide a ready-made blueprint for success, but it does point the way forward to similar forms of collaboration. It provides a good model for networked delivery of research and development projects.

Hewlett Packard is keen to extend the work to another domain, as well as maintaining its presence in the digital media industry. For Watershed, building on the successes of the partnership furthers its ambition to be a 21st Century media organisation responding to emerging creative opportunities and supporting digital creativity across and beyond Bristol.

In John Manley’s view, Watershed is ideally positioned to function as the front-end, collaborative hub within a Digital Media Service Provider ‘eco-system’. His vision is for a strong local network of digital media service providers, greater than the sum of its parts, underpinned by a massively powerful utilities computing infrastructure supporting all forms of rendering, digital media production and post-production,

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content and asset management, transcoding and content distribution technologies. He feels that:

“In the digital media industry the only way to stay competitive is to use the emergent technologies before others adopt them. It’s the pioneers, early adopters and risk-takers that succeed, and because of what’s here in Bristol we’re in a strong position to become a leader on the world stage. But if Bristol doesn’t move soon, and establish a strong technological infrastructure, then somewhere else will get there first”

Whether or not the full extent of this grand vision is realised, Watershed/HP Labs’ partnership has been a shining example to the region and nation, and a fruitful collaboration that has already produced much high quality work and strengthened the UK’s position as a world leader in digital excellence.

Appendix A: Under Blue Skies – Some lessons learnt by Watershed Media Centre

The HP Labs/Watershed relationship provides a rich picture of what can be achieved through collaboration between publicly funded organisations and large companies. This report highlights many of the reasons why these particular projects have been so fruitful, but different lessons can be taken away from what has been learnt. To this end, Watershed wanted to explore some of the key points it, and other creative organisations, may want to consider when embarking on similar collaboration.

How do you collaborate?

- In order for a successful partnership to be achieved, all partners need to be stakeholders in the research undertaken and should be clear about why they are collaborating
- Each partner may have different objectives for getting involved, both individually and with regards to the research. Partners need to be aware of all of the desired outcomes for the collaboration
- These outcomes need to be worked into measurable objectives but room should also be allowed for serendipity and new avenues of creative enquiry
- The nature of collaboration is that the partnership is often greater than the sum of its parts. The research may take on a life and character very different to that of the collaborating partners, and should be given space to do so
- Ideally, relationships need time to develop. Familiarity and experience breed trust and allow greater opportunity for risk-taking and blue-sky exploration
- Be prepared to regularly review and amend plans, especially timetables.

Consider the outcomes:

- Effective research collaboration will involve partners who are willing to invest resource without the need for certain outcomes
- Collaborating partners should be prepared to embrace and exploit unexpected results
- Questions surrounding Intellectual Property Rights should be agreed at the beginning of the partnership
- Each partner will bring different contacts and a different agenda to the collaboration in terms of PR and potential outlets for dissemination
- How to credit the role played by each of the collaborators in the end product should be addressed from the beginning.

What can you offer?

- It is important that all partners are aware of the value they bring to the partnership. The size or financial position of an organisation outside of the collaboration, does not necessarily represent their scale of influence within the partnership
- In a collaboration between multiple partners from different sectors, a 'hub' or intermediary organisation is useful, to act as translator between potential differences in culture, working practice and lexicon
- As above, an intermediary can broker trust between parties, particularly when the collaborators differ in financial and organizational scale
- Knowledge networks and new contacts are as vital to the health of the collaboration as cash funding and a valuable resource for knowledge transfer, promotion and dissemination.

How to manage collaboration?

- Managing expectations of the partnership is key, and another valuable role that can be led by the intermediary. Expectations relating to the potential

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outcomes of the project, the quality of the work produced and the timescale in which results can be achieved may differ between partners. These should be discussed at the outset and continuously re-assessed as the project progresses.

- A collaborative research project includes two distinct disciplines: the research undertaken and the project management of the partnership. Where sufficient trust exists between collaborators these roles may be carved out, allowing the intermediary, who needs to be less bound by administrative/organisational bureaucracy, to manage the project with a degree of flexibility and freedom that will benefit the collaboration.
- For Watershed, collaboration has worked best when personal relationships have been established between the collaborating partners at all levels of the research, from senior management to marketing and administrative support.

Clare Reddington, SE3D project Manager, Watershed Media Centre

Appendix B: Further Information and contact details

Further information on the projects cited in this case study can be found at:

- www.watershed.co.uk - Watershed website
- www.dshed.net - Watershed's online showcase of digital creativity
- www.se3d.co.uk - SE3D website
- www.hpl.hp.com/se3d - HP SE3D website
- www.mobilebristol.com - Mobile Bristol website
- www.hpl.hp.co.uk - HP Labs website
- www.interdisciplinary.org.uk - Interdisciplinary Arts
- www.artscouncil.org.uk - Arts Council England

Appendix C: Acknowledgements and Sources

Interviews conducted with:

Dick Penny, Managing Director, Watershed
Clare Reddington, SE3D Coordinator, Watershed
Steve Hinde, SE3D External Contacts Manager, HP Labs, Bristol
Peter Toft, SE3D Programme Manager, HP Labs Bristol
John Manley, Director of Utility Computing, HP Labs Bristol
Jo Reid, Mobile Bristol, HP Labs Bristol
Paul Hassan, South West Screen
Bronac Ferran, Arts Council England
John Hartley, Arts Council England
Julie Taylor, Arts and Humanities Research Council
Jo Hyde, SE3D artist
David Sproxtton, SE3D Advisory Group, Aardman Animations
Paul Appleby, SE3D Advisory Group, BBC

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21st Century Watershed: Building a Different Kind of Creative Organisation Peter Boyden Associates, July 2005

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Schminky: The Design of a Café Based Digital Experience Josephine Reid, Richard Hull, Tom Melamed 2004

dShed: Initial Feasibility Study David Drake, March 2003