Changeable Context of the New Technology Artefact and the Changeable Research Outcomes

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Abstract

Computer Aided Drawing (vector based) and painting (raster based) packages, allow the mock-up of designs in virtual space. Whilst this is beneficial for visualising the end product, both methods of drawing have been applied to new and existing machining technologies so that some aspect of the product is derived from a computer file. Today, the applied artist now has an abundance of CAD/CAM (Computer Aided Drawing / Computer Aided Manufacturing) technologies awaiting them. So much so, that in the past fifteen years, many makers have embarked upon practice-led research to find out what a particular technology can do with regard to their design interests. Within such research, the object is the manifestation of what has been discovered through the research activity. This paper considers the relationship between the content of the research object and the context for the object's reception. This is examined with regard to the author's research with new technologies for the applied arts. Examples will highlight how the characteristics of artefacts that arise from the research can help determine who the audience for the work is, and how the technology might be used by different kinds of craft practitioners. References will also be made to the work of other designer-makers working with and researching similar technologies. Evidence from practical examples will also be supported by a more theoretical discussion. The implications of supplying, or not supplying, background information for an audience within a variety of settings on the perceived content/context of the object, and the communication of the research, will also be discussed. It is concluded that when developing new processes, keeping the work open to a number of audiences can maximise the outcomes and increase the chances of the process being integrated within practice. The discussion also highlights a trend of positioning the consumer/viewer at the forefront of the research, and a need to evaluate their experiences.

Background

The motivation for this paper is the inherent awareness that there are several audiences for the process-led research being personally carried out. These audiences are both heavily material dependant and vary in the degree to which they use production. The technology under personal investigation is laser forming, an emerging rapid prototyping (RP) technique whereby the laser induces compressive stresses which causes the material to bend. Laser forming belongs under the umbrella of CAD/CAM technologies. In simple terms, a metal sample is moved about underneath a laser beam by some form of computer controlled x-y table. Using software, a computer drawing is converted into machine code, and it is the path that the laser takes which determines the resulting form. On a macro scale, the process has perceived applications in the aerospace and automotive industries for producing body panels, whilst on a micro scale, it is used in the production of CD-players for the alignment of the laser diode that reads the CD. (Geiger, 2002). The author's research has shown that laser forming is capable of creating sophisticated surfaces and is a suitable method for producing designed objects. (Silve and Zhao, 2004).

The Research Question and the Contribution of Research to the Knowledge Base

Using our understanding of our particular design field and how it fits into the wider knowledge base, we can begin to determine the research question. We are often aware of what could form a satisfactory argument and outcome, and this helps us to select an appropriate methodology. The research object is the manifestation of what has been explored or discovered in the course of the research activity. Biggs (2004:10) asserts more strongly that "the focus of the research, that is the end rather than the means, is experiential content". In other words, the objects are presenting answers to the research question, and this positions them and the context for dissemination, at the forefront of the research investigation. Expanding on this, Biggs (2004:7) uncovers a fundamental problem, which is "the communication of the experiential content".

The problem with communicating content can lead to the consideration of arguments relevant to the accumulated knowledge base of the discipline, museum practice, and wider material culture. A crucial concept of museum theory is that of collecting and selection, which relates to the concepts of Duchamp's readymades. According to Pearce (1992:5), "selection occurs according to contemporary principles" and in view of new technologies, this can be seen as the maker selecting a new method that is appropriate to the progression of their practice, which is typically anchored within the state of the discipline at that time. In its selection, the museum piece goes through a detachment from its natural context. (Pearce, 1992:5). This can be similarly evident with the learning of new techniques, whereby the research may evolve experimentally before reconnecting with the issues of object making. It may also be the case that the maker is taking a technique out of its original context or discipline. There is a subsequent debate as to the relationship of what has been developed with what has gone before, in and around the context of the discipline, so that some conclusions can be drawn as to how practice has been extended. Likewise, the museum artefact is presented and interpreted within the framework of existing material. The experiential factor in both scenarios is the viewing of the object, which requires contextualisation for the interpretation by others. It is this dissemination that enables the object/research to become part of the knowledge base. Harvey (1998:147) similarly describes the relationship between technology and culture as being one of a "liberal rationalist thought which posits culture as a way of life and technology as innovation and improvement. In this model there is a casual and developmental relationship between technology and culture". With a link made between research activity and museum practice, this paper will later discuss approaches for communicating meaning.

A Quest for the New, Prototype Theory and Extending the Boundaries

The requirement of doctoral research to involve a contribution to knowledge, fits well with the desire of designers to create original and innovative objects. Consequently, there is a preoccupation that artefacts made using new techniques must be unachievable by other means. This quest has been noted by arts historian Tanya Harrod (2002) and jeweller Rebecca Strzelec (2004:4) who believes "it is the duty of the technologically driven artist to create work that exceeds the novelty of their process."

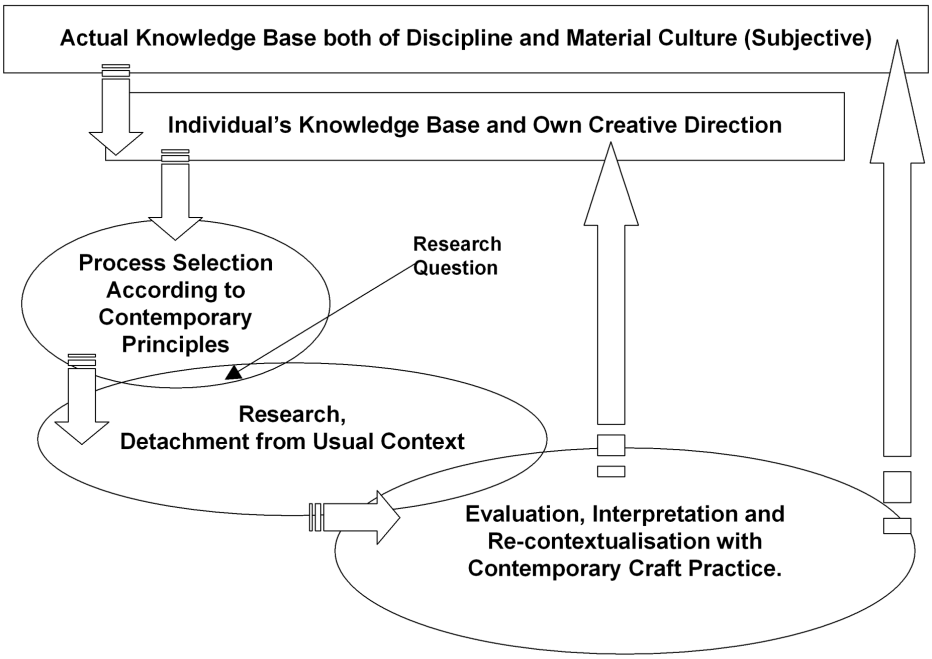

Figure 1: The ascension of the research contribution into the larger ethereal knowledge base as a comparison with museum practice.

'Prototype Theory' is a system that involves placing things in categories by using a comparison to a 'norm' that is based upon the average or common characteristics of the category members. Applied to design, new objects joining the category will subsequently affect the norm of the category against which further objects will be judged, and it is through this continued process that the norm slowly evolves. At the 1998 Design Research Society's conference, Shackleton and Sugiyama further stated that products which subscribe to the middle of the category norm may be considered to be boring, dull and conservative by consumers. They point out that "designers consistently seek the distinctiveness and diversity around the boundaries of the category" and that they are "trying to maximise originality and minimise typicality, without moving outside the criteria or boundaries of the product type as perceived by the target consumer group". (Shackleton and Sugiyama, 1999:157). This evokes a visualisation such as that shown in Figure 2. They also believe that "prototype theory not only accommodates stylistic evolution but also predicts it." (Shackleton and Sugiyama, 1999:157).

So we are looking to generate both research and objects that extends the boundaries of practice and 'prototype' categories respectively. This is a tall order. Although in his lifetime the 'artist' may seek to make an ultimate statement or piece of work, in the author's research project, it is accepted that there is no such definitive work and therefore, the outcomes of the project may be expressed by a number of objects.

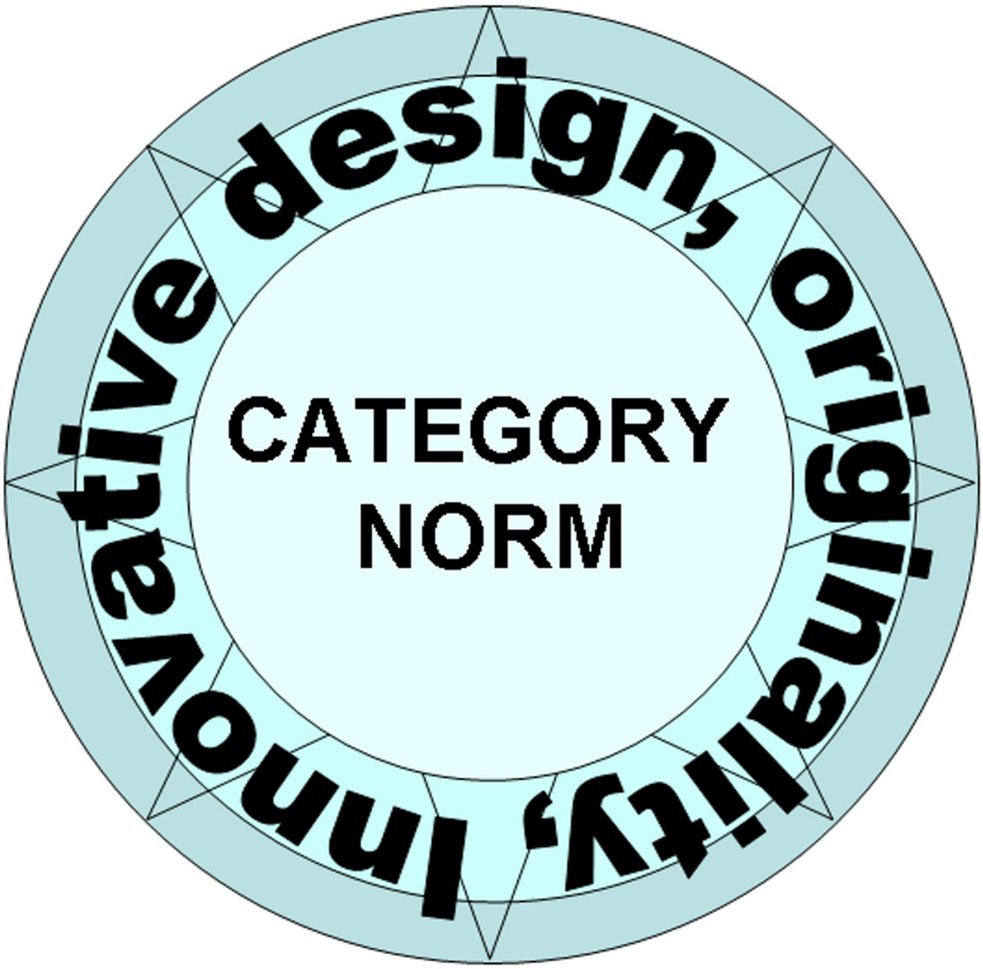

Figure 2: Prototype theory, with designers seeking the innovation and originality on the boundaries of the category norm.

Characteristics of the Artefact and the Motives of the Producer/Consumer

The laser forming project considers the use of the process for 'producing designed objects', these three words are loosely coined, and loaded with meaning. Biggs puts forward that the "researcher is normally a suitable consumer of the research", which makes sense because they are usually the instigator of the enquiry. (Biggs 2004:16). With a background in silversmithing and jewellery, it follows that the objects and interest for the research would lie in that area. Whilst this is evident, laser forming can use a range of precious and non-precious metals, and so the prospective audience actually includes any applied artist or 3D designer working in metal.

A situation can arise where an object represents something to an audience in terms of function, aesthetics and value, yet when the material is changed, these qualities are also changed. A loose example is the use of modern cutting techniques, e.g.: water and laser, which have found niche markets within textiles, jewellery and ceramics. Here, as the material is changed, so are the potential products and audiences. The material used is often perceived as determining the craft discipline to which the object

ascribes. This may have some validity with ceramics and textiles which are material bound disciplines. Metal, plastic and wood however, are widely used across a range of applied arts, spanning furniture, jewellery/silversmithing and extending to 3D/product design (See Figure 3). It is therefore arguable that with process-led design research, that the specialist area of the audience can be transient even if the researcher comes, more or less, from a fixed perspective. It could also then be reasoned that it depends on whether the motivations or contexts for using the said new technology are relevant to the identity of these wider crafts disciplines, as to whether the transition could be successful. The actual transition relies upon the successful communication of a relevant meaning to the target groups. This view is supported by Niedderer (2004:2) who writes that, "dependant on the context, an object can be understood to have a different purpose and therefore it will be interpreted differently. Indeed, it seems that the farther the interpretations move away from the physical reality, the more knowledge is created dependant on the context of the object and its interpretation".

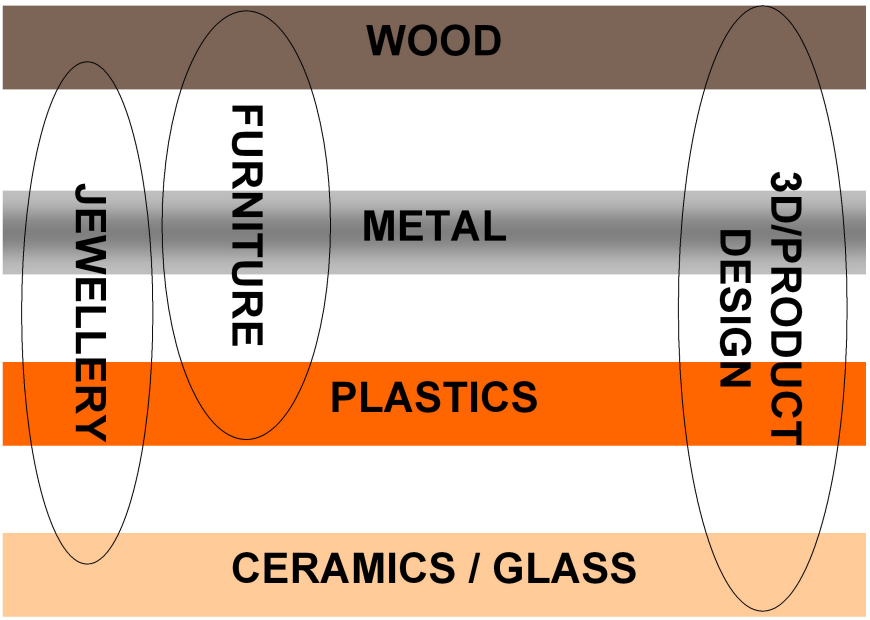

Figure 3: Metal is used within many applied art disciplines

The visual qualities of new technology artefacts are often referenced against conventional techniques e.g.: that laser formed bowl looks as though it could have been made using a press tool. This is partly because some new technologies are seen as replicating or replacing existing techniques, however this referencing also takes place because when as skilled makers we are confronted with a new object, we often take it apart visually to see how it has been made. It is this activity of the viewer that the design researcher with their quest for the new, can look to interrupt. This is a mechanism to be aware of in the communication of the research outcomes through objects. In keeping the work open to a number of design fields, it may be the case that incompatibility arises between the referenced techniques of the background discipline and the speculative transitional discipline, eg: the new technology object that resembles a pressing does not communicate this to someone who does not know what a pressing is.

Within the project phrase ‘producing designed objects’, the term ‘producing’ has several inferences, implying production rather than making, which itself has the connotation of making by hand. With ‘production’, how many objects legitimise the use of the word, and furthermore, who is doing the producing? Components made by laser forming are repeatable, and automation means that it could be used not only for one-offs and prototypes, but also for batch production and larger scale manufacture. Subsequently, the research has a wide audience in terms of their output volume, ranging from the individual designer-makers to larger manufacturing companies.

Whilst the designer-maker seeks to make something unachievable by other methods, enterprise is also on the lookout for the new, but more so than designer-makers, they may be interested in using the technology to solve a pinpointed problem, or because it offers advantages for production e.g.: reduced time and cost. These two strands of enquiry have been significant in the experimental research, and collaboration seems the natural route to demonstrate how a technology can provide solutions, be developed for a specific application in a relevant discipline, or be exploited creatively by designer-makers. Within the process-led research, the audience can be seen as being two-fold; firstly the target audience for the research consists of makers and companies in a range of disciplines who may wish to use the technology; secondly there are end-consumers of the objects, or indeed end-consumers of the objects which might be made by future practitioners.

Other rapid prototyping techniques possess this changeability with regard to audience and context. These are primarily layered object manufacturing (LOM) techniques, which include stereolithography (SLA), Fused Deposition Modelling (FDM), and Selective Laser Sintering (SLS). Most of these techniques involve drawing a three-dimensional CAD model which is sliced into layers for the building of the part. The slicing occurs within the modelling software by exporting the drawing in a STL file format to the system that will build the object layer by layer. Typically, to build each layer, the object being generated is lowered by the thickness of the layer to accommodate the new material, after which some process for binding the layers takes place. LOM models may be produced in a number of materials e.g.: resin, wax, plastic and nylon, with selective laser sintering being the only process to directly produce metal parts. The expense of LOM technologies means they are not suitable replacements for conventional CNC (computer numeric controlled) machining, which is much cheaper and capable of directly machining metal. Layered manufacturing is only really viable for objects that have undercuts or contain internal structures.

The CALM (Creating Art with Layer Manufacture) project ran from 1997-8 funded by the Higher Education Funding Council for England (HEFCE). The project provided artists and designers working within higher education, the opportunity to produce an artefact using rapid prototyping techniques by utilising equipment housed in the engineering departments of other institutions. Designers from several fields joined the project, and aside from their creative motivations, two common thoughts emerged. Sculptor Keith Brown and ceramicist Brian Adams, took onboard the quest to make something not possible by other means, particularly when considering the relative expense of using RP technologies. Secondly, in several proposals, the output model was not to be the end product. In producing a sculpture, Brown envisaged a single bronze casting, whilst Adams could see himself using RP in conjunction with the traditional moulding and casting methods of ceramics to produce larger objects

through repeated units. So it can be seen that because the output of the process is not usually the end result, and some post-processing typically takes place, that the technology can be extended to a number of materials and disciplines, which also vary in the extent to which they use production.

In 2004, the impact of stereolithography and other LOM techniques on the applied arts, was widely reported at the Challenging Craft conference. Jeweller, Hazel White, also used stereolithography to produce models for casting. White believes that using RP in conjunction with traditional techniques can impart a sense of the hand-made, for instance, as the model is used in the processes of mould making, wax injecting and casting, it becomes less perfect, picking up random flaws, such as shrinkage, loss of definition and porosity, and that this gives some life back to the utterly soulless machine model. (White 2004:4).

With the widespread use of computers, rapid-prototyping can have a sense of the Do-It-Yourself about it. Mitchell and McGravie believe this will reframe the 'consumer-object-designer' relationship, inevitably leading designers to focus on the pro-active consumer and offer a higher level of mass-customisation. As a testament to this idea, Mitchell and McGravie (2004) conducted case studies which enabled 'typical' consumers to design products using software which sent output to 3D printing machines; they demonstrated that some consumers were interested in and capable of designing their own products.

Of his 'Future Factories' project, Paul Atkinson writes that "it is an exploration of the possibilities for flexibility in the manufacture of artefacts inherent in digitally driven production techniques. In essence the project proposes an inversion of the mass production paradigm to one of mass-customisation." (Atkinson, 2004:1). The project considers computer generated forms whose features such as scale, proportion and surface texture, morph over a parameter envelope. The proposition is that each individual frame of the morph has the potential to be an artefact using rapid prototyping. This link between animation and RP methods was also exposed by Ron Arad (2000) in his collection 'Not made by hand, not made in China' which featured a series of bouncing vases that were SLA models based on the concept of a spring in motion. Atkinson (2004:4) goes on to discuss the potential ways in which this system could be fitted within our consumer culture. He postulates that this method of production would ideally be exhibited online using real-time networks; the consumer has a playful interaction when viewing the animation and clicks for which frame they want, pays for the item, and the prototype is then made and delivered to their door. Within this, he argues that there is the possibility to build value into the item by adding exclusivity as to the number of times the model of each frame may be produced, and offering the possibility for a client to commission their own morphing design, which will in itself be unique as well as the designs contained within it. Atkinson feels that placing the consumer at the forefront of this method of working might raise issues for designers, such as who is the designer of these artefacts, and the seeming detachment of the author from the outcome. (Atkinson, 2004:5)

This section has shown that with some new technologies, a change in the material can also change the audience for the research. Evidence has also demonstrated that there can be several types of consumer and producer for this work. These range from designers in the same or different fields looking to produce one-offs or multiples, to

companies looking for mass production, and finally to a position where the end consumer is actually in the driving seat for the bespoke selection of the object. With so many contexts for the reception of the work, it seems sensible that the researcher looking to establish a new technology or new method of working digitally, should not try to constrain themselves overwhelmingly to the original discipline of their craft, but remain open to other perspectives. Within the constraints of academic research, the potential contexts can be backed up with evidence from a literature survey. With enough reflection as to the possible contexts for reception, the outcomes of the research can be maximised. Such an approach is likely to be of interest to research councils since it widens the dissemination to other areas, and increases the chances of extending the boundaries of craft disciplines.

Context of Viewing

There has been widespread debate as to the necessity of a thesis in what is commonly termed 'practice–led' research. Many believe that a text is vital for the correct interpretation of the research, which in turn enables the advancement of knowledge – a viewpoint the author also shares. The relationship between research objects and text is equally as important within the framework of an exhibition; as Atha points out (2004:5) "language is our first tool of interpretation and reception", so it makes sense for the researcher to illustrate and contextualise exhibits so they have some control over the interpretation, and the viewer is guided through what they are looking at. Atha (2004: 5) further states that "the context in which we find objects is clearly important to our understanding or relationship to them, this is a form of literacy"; it is clear that the context of the viewing can attract different audiences.

Niedderer (2004) comments that within the object, we see a complex reality that comprises of and operates on different levels, whilst text can only deal with one issue at a time. Inversely, it can be the case within 'practice-based' design research, that a series of objects arise from the research, and that each object deals with different outcomes of the research.

Sometimes we hear someone saying that 'their work/object speaks for itself', Cochrane (2004:3) points out that "objects only speak for themselves to people who know the language they are speaking". When an object is seen in an exhibition setting, it is detached from its original or conceived context and function, despite the fact that we select objects because of their narrative. Its form and design alludes to a function that can be utilised in another setting, but without text, the object is unlikely to express its research component unless something novel about its construction or content suggests new knowledge. The object is being read against a backdrop of objects that exist, and is read within discourse of the discipline. If we relate this back to the prototype theory discussed earlier, then it can be imagined that research objects exhibited without supporting information are being compared within the category norm, and are less likely to extend the boundaries and convey new knowledge.

On discussing Expo '92 Harvey (1998: pp.147-151) describes three relationships between the technology and culture on display: 1) invisible techniques of assistance for the expression of beauty, 2) techniques of innovation and improvement for culture as a way of life, 3) technology as cultural artefact, providing sensational evidence of

its own enterprise, e.g.: laser shows and video montages. Cummings (1993:23) also mentions invisibility saying that with regard to function “perfect use renders the object invisible”. If we look to use technologies in this way, then it suggests that we make them analogous with techniques which are already accepted as being fit for the purpose. This could reduce the degree to which new technologies are used creatively to extend the boundaries of design and craft.

Let us consider the transparency of the recently established laser welding technology in jewellery. Used in jewellery repair, the technology is invisible even though it may enable items to be repaired which were previously beyond repair, using other methods. When using the laser to construct a new piece however, the jeweller may choose to exploit the advantages offered by the technology and may consciously make these visible in the fabrication and aesthetics of the object. It is then their choice as to whether they make their use of the laser known. Tom Rucker is affectionately known as ‘Mr Laser’, such is the transparency of his use of the laser welder. (Brittain, 2002). He is critically acclaimed for his innovative designs using the laser; his trademark pieces are created in platinum wire which is randomly wound over a wooden bead and the joints welded. The bead is then burnt away leaving an intricate 3D hollow web of precious metal.

Together CAD platforms, digital imaging, web design, and electronic communications such as internet and email, present not only new ways of making, but also new ways of viewing, disseminating and selling. This has been exemplified by Atkinson’s ‘Future Factories’ project. On a more conventional level, Nooten-Boom II (2005) remarks that modelling software enables you to present clients with catalogues of items that you haven’t yet made, so that you can test the market. He says that this allows the jeweller to concentrate on designs that the market wants, whilst the rejected designs can remain on file until the market’s taste changes. This approach is becoming popular with mainstream jewellers, with companies such as Advanced Jewel-Craft, embracing the advantages of CAD and electronic communication to create mock-ups of bespoke pieces for clients. This is a model which is likely to be pertinent to many design fields. In this context, the consumer brings to the viewing their understanding of the context and product norm, and the CAD/CAM product is not usually explained in respect of conventional techniques.

Whilst these are mainstream examples and not explicitly connected to research, they highlight an avenue of viewing in which the technology used is openly presented and inextricably connected to viewing, as they create an experiential representation of the object as a substitute for viewing the item itself. Outside of the virtual gallery, two of the most common formats for viewing research objects are seminars or stand-alone gallery style exhibitions. Seminars usually involve the researcher explaining their research through a multimedia presentation, and often there is also the possibility to present the actual research artefacts e.g.: samples and objects. This process exposes the researcher to external scrutiny from the audience who share a context with the researcher. Whist the experience can be scary, the opportunity to connect directly with the consumer is a valuable one for assessing the accuracy of the communication, the relevance of the research to the audience, and receiving their response to it, all of which can inform further research and dissemination activity.

In the stand-alone exhibition, the researcher is absent; in their choice to explain their research, they must carefully choose appropriate media to convey the message. This we hope, will enable the viewer to reach a deeper understanding which, in the case of video, often entails an attempt to bring them closer to the experience of the process at the heart of the research. Cochrane (2004) believes that through this, we seek to share a language with new audiences, but that audiences are pragmatic and resistant to jargon, and they like to see things which make a connection with what they already know. As cited by Jones (1995:260), Ivan Karp states that "audiences do not bring to exhibitions the full range of cultural resources necessary for comprehending them; otherwise there would be no point in exhibiting. Audiences are left with two choices, either they define their experience of the exhibition to fit their existing categories of knowledge, or they reorganise their categories to fit better with their experience. Ideally, it is non-recognition which urges them to choose the latter". When the communication is at its finest, the elements of the exhibition make a connection with the individual's experiences, and Kaplan (1995) believes they cross a threshold between the personal and cultural experience; this enables the viewer to become an active participant rather than a passive observer, they encounter a unique experience which is a combination of learning and extending perceptions. As with the move towards mass-customisation, we are confronted with the need to place the consumer at the forefront of the experiential activity to optimise the dissemination.

By taking a more curatorial approach, we may be better equipped to engage our viewer. Macdonald (1998) advices us that we should set ourselves aims and objectives for our exhibitions. Taking on board the pragmatic approach of some viewers, she suggests that we pitch our information in varying levels of complexity, and probe our audience with questions to which the answers lie elsewhere in the text. Macdonald says that use of questions has the effect of changing the visitor from a passive viewer to an active participant.

In the exhibition setting, there can be the difficult task of trying to convey the finer aspects of the work within the objects themselves. Within the framework of the laser forming project, staging more than one of an object or displaying an object made from multiples, demonstrates that components can be massed produced. The same items may also be produced in a number of sizes to show the scalability of the process and the suitability for making product ranges. As previously mentioned, the use of different materials can open the process to different design disciplines. With the development of thin precious and non-precious sheet metal components into designed objects using traditional silversmithing techniques, the work connects more easily with silversmiths, jewellers and 3D product designers in the exhibition setting. In order to connect with other makers in other disciplines such as furniture, perhaps the potential use of the process to that end could be made explicit by a combination of accompanying contextual material and metal samples, rather than evidence by way of a piece of furniture, of which the author does not have the required skills to produce. Sculptural surface qualities are common throughout the applied arts; this gives the disciplines a commonality with each other but also with sculpture. It is also these kinds of qualities that bring makers from other areas in touch with new technologies. As mentioned previously, this relies on the viewer making a connection of what they see with their own experience. Paper artist Damian Cruikshank, creates large installations of forms constructed from sophisticated geometrical folds. He is interested in laser forming because not only could it present new geometric

possibilities, but also that it could free him from the constraints of repeatability, whilst allowing him to work on a range of scales in a more durable material. In this context, Damian becomes the consumer of the technology, but the audience for his work with the process will not conceive of how it has been made because that is not the content of his work; they are there to encounter his geometrical conceptions.

The Need for Evaluation

Our experience is unique to us, we do not experience how others experience, and as researchers, we do not know what the viewer experiences when encountering the outcomes of our research. This is recognised by Biggs (2004:9) who states that "while they remain private experiences they cannot reasonably be regarded as research because they do not meet the criterion that research should be disseminated. But the problems of identifying and communicating the first person experiences to the second or third person are notoriously difficult."

So here we are left in a precarious position where it is necessary to evaluate the effectiveness of our communication and the learning that has taken place, and to then consider how the imparted knowledge might affect practice, and ultimately feed all this information back into our research. With evaluation, we can estimate the appropriateness of the technology, particularly with regard to transitional contexts.

It is a personal opinion however, that too much language and explanation in an exhibition setting can lessen the opportunity for the viewer to become an active participant and draw their own conclusions. Hein (1995:191) ties this in with the problems of evaluation "We cannot predict what meaning learners will make of the experiences we provide for them. The more we construct a situation that allows and encourages learning, the more likely we are to construct something that is open and ambiguous, and able to be manipulated in a variety of ways by the learner and the less we can predict what is learned". In continuing to read around the subject of exhibition evaluation in museums, there did not seem to be any accurate, adequate or appropriate method to fully explore the meaning making that takes place. Evaluation and feedback questionnaires are widely used in teaching and exhibition scenarios; this is incredibly useful in attracting the active viewer and potential user of the research, but this method can a double-edged sword in that the questions posited can seek to give further explanation, and frame what an appropriate response could be.

Finally, with all of this reflection and evaluation, seating of the experiential content (the objects), and the consumer (of the experience of the object, of the research, and of the object as product) at the forefront of the research, then it would seem that we are taking a more sociological perspective of the integration of our research with practice, and that the projects more over, could be perceived as having a shift in methodology as to be including case studies and collaborations. This may enhance our research experience as we can begin to envisage looking as a spectator.

Conclusion

When researching a new technology that is not yet an established process, the route often favoured is not to discount or close any avenue of reception. This means keeping the work open to a number of audiences, which can in turn maximise the outputs and outcomes of the research, which is likely to be of interest to funding bodies. Working in this way, the researcher's aspirations of personal research are combined with an outlook of economics and process development. Examples in this paper have shown that the context for the creative use of a new technology can vary according to the associated disciplines and capabilities of the material, the potential user's motives, the level of production, and the possibilities for post-processing e.g.: incorporating the process within established practices, such as casting. Truly 'new' technologies, once established as technically and economically viable, are quickly taken up by the wider industries, whoever they might be. With interest and speculation from many sectors, the content and context of artefacts that arise from the research become increasingly important, since they signify the research outcome. Changing the content or context of the object can therefore, change the audience of its reception. The researcher is responsible for activating and deactivating content within the selection of their objects and accompanying explanatory materials for the context of viewing. The activation of the content however, is equally, if not more so, dependant on the reception of the artefact by the viewer and the connections that they make between it and their own practice. Pearce (1992:217) similarly states that "the meanings of an object lie both in the object itself, with all the historical and structuralist/functionalist ways in which meaning is constituted, and equally in the process which the viewer carries out in relation to the object." The transfer of knowledge to other design areas by other practitioners then diversifies the former experimental practice. Furthermore, in the new instances of use and possible changes in the context of experiential viewing, the underlying technical knowledge is not necessary and can be muted, so that the artistic content is central.

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