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CROSSING THE CHASM: DEVELOPING AND UNDERSTANDING SUPPORT TOOLS TO BRIDGE THE RESEARCH DESIGN DIVIDE WITHIN A LEADING PRODUCT DESIGN COMPANY

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1. Introduction

Within design literature, there is a distinct lack of longitudinal studies focussing on the work practice of real world design companies [Lawson, 2002]. This is understandable given the practical problems associated with such a task, as well as the hurdle of gaining access in the first place. With this void in mind, this paper reports on some of the findings of a three year longitudinal study undertaken within the product design innovation company Pankhurst Design Development (PDD), between March 2000 and June 2003. The methodology of this research utilised ethnographically informed techniques such as interviews, observation periods, group discussion and videotape data. Given the relatively limited scope of this paper, the focus will be upon the communication gap that exists between the research group and design group within this company. More specifically, it is concerned with what principles should be considered when developing software and harware solutions intended to bridge this gap.

2. An overview of Pankurst Design Development (PDD)

PDD is one of the leading product design innovation companies in the UK. Formed in 1980 and based in Hamersmith, London, their work has been much lauded in the design community and their methods hailed as "creative" by the media. The company had between 65 and 71 employees during the period of research and clients ranging from Nokia, Panasonic and Phillips to Dunhill, British Airways and Tetley.

The staff at PDD can generally be categorised into five relatively distinct groups. Business, which includes those who work on company strategy, client affairs, marketing and finance. Administration, which includes the reception staff and secretaries. Research, which is made up of five permanent staff and occasional specialist freelance consultants. Workshop, whose role it is to construct prototypes and models. Designers, by far the largest group, who range from industrial and graphic designers to electrical and mechanical engineers, ergonomics specialists and artists. There is a distinct geographical grouping as well, the first three groups being on the upper floor, whilst the last two are on the ground floor.

3. The realities of product design

Famous products are very commonly attributed to be the realisation of one individuals creative dream. This has been the case throughout history, from Michelangelo's Sistine chapel ceiling to Jonathan Ives imac. Common sense tells us that Jonathan Ives did not personally perform every aspect of the imac design process and history tells us that Michelangelo did not paint every stroke of the chapel ceiling.

Product design on an industrial scale is a group activity, from the secretaries who take phone calls, to the accountants who bill the client. PDD is no exception, it has a lot of individuals working towards a common goal, making the company money. Money comes from clients not the end product (although there are notable exceptions where a back end percentage is agreed or the product is an in-house project) but the quality of product, the field evaluation of its creative success, attracts bigger and better clients leading to bigger and better paycheques [Lawson, 2002]. Thus the creative success of projects directly influences economic success for the product design company.

Through the initial investigation, it became increasingly apparent how despite the multitude of tasks and activities undertaken throughout a projects lifetime by a wide variety of differently skilled individuals, each had a place along a path to creative evaluation. Furthermore these apparently disparate activities are at a fundamental level concerned with one of five elements which constitute the project lifecycle. These five elements are the client, the design collective, the research, the innovation and that which binds them all together, the communication.

3.1 Understanding the five elements of a project

The client element is both literal and theoretical. Literal in the standard scenario where a client company approached PDD with an initial design brief, theoretical when that client company was actually an internal group who have identified a design brief. The design brief is informed by the current state of the cultural domain with which the client group is concerned, for example exercise equipment. A design collective is then formed, this collective constitutes members from the client group, the design team and the research team and forms the decision making unit of the system, it identifies the key elements of the brief and initial strategies about how to approach it.

The next element is that of research, which is concerned with examining the current state of the domain (remember there can be no new without an old) and identifying pertinent features, continuing the exercise example, they may examine current workout methods and equipment noting that exercise is often dull. These findings are reported back to the design collective before being passed to the innovation element. This is where novel solutions to the issues identified by the research and design collective are generated. This is the glamour part of the design process where the practitioners are usually the members of the design team, although on occasion one of the research team may be involved.

After brainstorming and initial prototyping the design collective is presented with product concepts. They assess validity, cost and potential, in many ways acting as the societal field will do but on a very localised scale. A determination of which way to proceed is reached and the innovation process continues refining the product concept. Iterations of these last few steps occur until a final working prototype is established and manufacturing technique is finalised. The end product is then presented to the client group, who mass market and distribute. It then enters the full system ready to be evaluated by the field, which may be a specific number of experts or zeitgeist exponents, but could also be the purchasing society as a whole with high sales figures representing a positive evaluation. The final element of communication is present informally whenever two or more individuals interact, and formally when two or more elements interact.

4. Gaps in the System

When examining the realities of work practice and utilising a systems approach to creativity to model that practice, it means that the gaps in the system begin to show [see Mival, 2003, for detailed discussion of the application of a systems model of creativity]. What is clear is how important the design collective is as they mediate the project strategy and high level decisions whilst also acting as the conduit between the other elements. Yet they are a transient group who are not involved as a collective in the day to day decisions and interactions and this can inhibit the flow of information, in particular between the researchers and designers. As product design is a highly iterative process there is the need for a constant flow of information and re-interpretation of findings. Without this flow an information gap appears. Furthermore, the importance of the work undertaken by PDD's research department is not fully appreciated by all facets of the design team. We suggest that this information gap in the system emerges for two key reasons:

4.1 (i) Differing attitudes as to the validity of the research undertaken, and its role in the process of design.

Quote 1

G: You can go into a brainstorming after say downloading on two different things, and one designer will be saying "yes because we've got to consider this and this" and they will be things that came up in research and other designers will sit there and say "well we'll pursue the agenda" which you know they were pursuing before they saw the research…and not in a bad way because, you know, they're convinced…

V: Sometimes in a bad way

G: Yeah, but, yes sometimes in an absolutely appalling way, I'll put it that way. But, y'know, it doesn't arise out of, kind of, malice or anything, but sometimes when they feel so strongly about what a product's going to be.

V: Yeah, and sometimes they don't even believe in the research anyway.

G: Yeah

V: It's just kind of like it's just there to make a bit more money at the frontend and y'know whatever. Y'now, I've been in situations where I've been in a client meeting and we've done some research on this product, and y'know one of the overwhelming findings was that everyone the end user wasn't the buyer but absolutely hated this product. Treated it like shit kicked it around y'know the main issue is it has to be rugged and y'know….and these people spent about two hours arguing whether it should have a straight splitline or a curved splitline, the curved split line y'know adding an extra month or two months onto the work and costing us much more and I was just sat there going hello, hello it so doesn't matter.

V is head of the research department
G is a freelance product design research consultant

4.2 (ii) Access to the research findings

Quote 2

O: How do you show video footage, or how would it be presented to clients, and what if a designer wanted to see the research?

J: If it's a big thing we'll get someone to do a director thing [often PDD bring in outside freelancers as only two people are competent on director] but we mostly just use video. I don't know what designer's do, I guess, ask the researchers I guess, but I don't think they do.

O: Why not?

J: Can't be bothered, no I didn't say that (laughs).

J is head technician
O is the interviewer

The first point, the notion that designers ignore the research findings, can be attributed to several factors. Most commonly, it stems from the mentality and methodological history of the junior designers. These individuals are generally in their early twenties, fresh from university degrees in the mechanisms of product design and are often more concerned with the aesthetics and engineering of a product than the final user experience.Furthermore, these junior designers rarely see the research findings first hand, but rather gain a rudimentary understanding from a condensed appraisal by the project manager. These generally take the form of a bullet pointed list, and while this can be useful in distilling the hours of research into digestible nuggets, lacks the rich contextual elements of watching footage oneself.

This point is intrinsically related to the second factor mentioned above, concerning level of access. While there is an informal level of communication (the fact that the researchers and designers occupy different floors certainly does not help here), the brief chat over a coffee or cigarette, this interaction is in essence the same as the condensed version already received from the project manager. More commonly than not the designers will never see research footage themselves, but rely on second or third hand reportage of its content. As mentioned before, during some brainstorming sessions the researchers will be present to flesh out the findings and functional requirements, but as can be seen from quote 1 above, the level of credence attributed to the research varies from designer to designer. However, when a project is small in scale, the design team has a much closer relationship with the individuals undertaking the research. It is within these scenarios that the designers experience first hand the raw research footage, and indeed often participate in its evaluation and analysis. But does this make for better products?

Quote 3

G: But sometimes you can just see a kind of new generation of a quite a mundane everyday product that and they all look the same and all of a sudden after the research that you've presented somebody will come up with something completely different based on some of the things…and you can very clearly see that that would not have happened without the research.

G is a freelance product design research consultant

The impact of research footage on designer innovation can be clearly seen in the case study of the e-book project. While everyone has an opinion on what makes a book such a special object, it wasn't until the design team poured over the footage of people using and discussing books that a wider appreciation of its tangible qualities became apparent. The key here is that the requirement generation does not enter the designer's consciousness through an abstract context free list, but rather through a collective appreciation and understanding of the rich contextual setting of a product. The 'creative success' of this project can be crudely evaluated on financial terms, the prototype designs have led to second round investment for the client company ZBD after industry excitement from Dow Industries. True this is not a product evaluation on a grand public scale, but it is an evaluation of potential by industry experts who have accepted PDD's work as innovative and of value.

5. Principles for communication and dissemination of research findings

So if rich contextual information generated by research can manifest such a rapid and significant impact on designer mentality and appreciation of a product's end user's needs and desires, yet designers currently do not experience this information, how can we bridge this gap? What factors must be considered in bringing this information to where it is needed, the minds and imaginations of the design team?

5.1 Accessible

Medium to large companies generally all have an intranet system which allows the electronic storage of information which can be accessed from any company workstation. However, several studies have shown that the primary source of information that influence designer's is other people [Phillips, Rahman & Jarvinen, 2001; Allen, 1977]. This assertion has been supported by the observation of the work practice at PDD, where a definite hierarchal system of advice and knowledge dispensement exists. The most junior designer will ask the more experienced junior designers who in turn seek the senior designers who ask the project managers who ask the senior managers. This is as much a case of physical geography and interpersonal interaction as it is a respect for seniority and experience. Of course it is not definite, at times an acknowledged expert may be present who has considerable knowledge on a particular subject such as current mobile phones or videogames due to a particular personal interest or prior project experience. They may well be a junior designer as in the case of T who considered himself a "gadget freak". When anyone had a query concerning a current mobile phone, pda or digital camera they were inevitably sent to quiz T on its features, manufacturer, price and to obtain a review. T occupied a central desk in the middle of the design studio and was rarely further than 5 metres from any of the other designers, therefore little more effort than raising your voice was required to communicate with the information source. The research department and it's practitioner's, the acknowledged experts on user experience, are located in an office on the floor above the design studio, and in a typical day would only be near the designer's because of a break in the work day such as lunch, a cup of coffee or a cigarette. At these times neither designer nor researcher have much interest in discussing a project and more commonly want to talk about non-work related issues. When interviewed many of the designers suggested a distinct "them and us" divide:

Quote 4

P: We work down here, they're up there, it's the same at lunch you'll see them all at the same table, it's not that we don't get on or anything, it's just, y'know, the way it is.

<div align="right">P is a 27 year old junior designer</div>

This physical divide feeds into the "them and us" mentality and leads to designers asking other designers research related questions. For a small query it is simply not deemed worth walking up the stairs to ask someone who may not even be there, even though the quality of the response is likely to be better and more informed. Even typing an email is rare because the response is wanted in real-time conversation not a series of written responses which may not contain the pertinent information and do not allow the rapid information exchange a face to face conversation does. Although a voice conversation over the phone is low in effort and in real time it is very rarely used. When asked why, everyone shrugged their shoulders and said they didn't know. This may be due to a hesitance to potentially interrupt what someone is doing, whilst if they can see someone they are more capable of judging how busy they are. On the occasions when a serendipitous exchange occurs the results seem to highlight the importance of researcher designer communication, as in this case of T's unintentional exchange with the head of the research group. An interesting point to note is that although the conversation was both interesting and useful, the content discussed was lost with geographical dispersal, ie, when she left:

Quote 5

T: I went for a fag, on the terrace outside the lunch bit, and V came out as well, we started talking about the stuff I was doing and stuff. We ended up having a couple because we got quite into it and it started me thinking about ways of y'know looking at it and y'know it was cool. Course I forgot what she said about 5 seconds later (laughs).

<div align="right">T is a 28 year old junior designer</div>

What all this demonstrates is that the information generated by the research and the expert knowledge it leads to needs to be more accessible than it currently is. The ease with which the information can be obtained needs to be on a par with turning around and asking the person next to you, or that is what will happen. For a more detailed query the detail of the response will permit a more time consuming interaction, but again the investment of time needed must be tailored to the quality and detail of the information obtained.

5.2 Level and type of content

Even if the researchers sat side by side with the designers all day long, their expertise would be redundant if every quick question led to a three hour monologue, in design firms as in all business's the concept time is money is taken very seriously. The level of content of the research findings produced for the client goes into too great a depth for the designers to read in any detail, and for this reason are virtually never read at all. However, the bullet pointed list of things to consider lacks the rich contextual information which the research is undertaken to unearth. A compromise is needed. Boff [Boff, 1994] reported that literature reviews and statistics do not interest designers which is true of the designers of PDD, he found that tables, charts and illustrations that summarise data and have practical implications are greater appreciated. Consistently the designers interviewed at PDD mention the mini-documentaries produced by the research team as being interesting but that they would like to see the raw unedited footage as well. This appreciation of video footage is consistent with Boff's findings, but the same issue of level of content exists. The researchers often shoot 50+ hours of footage for a project, of which only 5-10% is of significant value although it is all examined and logged. The researchers also commented on the appeal of video footage to designers:

Quote 7

V: We spend hours and days going through it all then they see a five second clip and go "that's it, why didn't you tell me about that before" which would be happening all the time if they were doing what we do.

<div align="right">V is head of the research team</div>

It is obvious that if those "five second" clips could be seen when desired this would be immensely helpful to the designers fully understanding the issues they are exploring. Of course what constitutes these killer clips is much harder to determine, but if the research team highlight what they feel may be of interest and trim the footage down to manageable nuggets, there is nothing to stop the designer from exploring higher level content (video footage) which is linked to more basic content such as findings summary's and tables and charts. It's not that designers don't want this information it's that they do not want spend time searching it out when they don't really know where to look.

5.3 Standardised format

As discussed above, not knowing where to look and not knowing what you're going to find or having the potential of expending effort for no return is one of the main reasons that the research information does not reach the designers in a successful way. If the designer knows what type of thing they will find when they look somewhere and that it is appropriate to the task at hand, it becomes a much less painful process. For this reason a standardised format means people know what to expect and where to look for what information. Phillips, Rahman and Jarvinen who developed the Knowledge Shelf for Motorola [a software system run on the Motorola intranet to present human factors information to it's engineers and designers: Phillips, Rahman & Jarvinen, 2001] suggest guidelines should be no longer than 3-4 pages and agree that a standardised format is important. The concept of pages is used as they utilise PowerPoint slides to demonstrate the human factor information, the most viable amount for research findings is tricky to say without definitive evaluation but after informal conversations with PDD's designers it seems likely that rather than a slideshow the more effective format would be a page with headlines and snippets allowing for the exploration of deeper content much like a portal website.

5.4 Searchable and surfable

Having high quality information is only useful when related to the task at hand, hence the importance of keyword searches. But more than that, information should be "surfable". One of the most common practices with designers is the surfing of media, from the traditional concept of surfing the web to the perusal of a design or lifestyle magazine. The desired outcome is a serendipitous feeling of anchoring various floating thoughts, ideas and images to a concrete implementable concept:

Quote 8
K: Yeah if I'm bored or can't be arsed, you know, I'll just wander around a bit, have a coffee or something. The number of times something sets me off on a train of thought is like, cos all the time it's, you know reading the paper or whatever, a magazine or something, it's cool cos it means I can read Wallpaper [lifestyle and design magazine] or Stuff [technology magazine] and say it's for work (laughs) but seriously we all do it all the time, they [PDD] buy them [magazines] for just that reason.

K is a 32 year old senior designer

A recurring comment throughout the observational period with PDD was that the designers often felt that the unintentional, unfocused perusal of various media led to the genesis of a design solution or new approach. With this in mind it is obviously crucial to facilitate this activity with research findings as what one person sees as unimportant may be just what sparks the imagination with another.

5.5 Up to date

As already mentioned, time is money in the product design environment. The projects move fast and the information the research team generate needs to be available as rapidly as possible so as to enable the designers to make informed decisions early in the design process. For this reason it makes sense for the research analysis to be updated as and when members on the team work on it. This does not mean old information is useless, far from it, as the history of a project which may well undergo several facets of research, can shed valuable insight on the concept of the product:

K: You have to step back and look at the process as a whole, y'know telling the trees from errr the woods from the trees or whatever, otherwise you can lose sight of what you were thinking at the start, but in the same instance you need to keep your finger on the pulse, need to know where everyone's at and what the plan is.

K is a 32 year old senior designer

5.6 Editable and savable

As mentioned above, one of the desired outcomes of examining information such as video footage is to discover the "killer five second clip" which makes everything about the findings make sense. The more common finding though is the "relatively interesting twenty second clip". As these short clips are found in larger clips of anything up to a few minutes, it would be helpful if a rapid it could be performed. This would leave the original source clip unaltered, but would copy and save the desired section to a separate location. Using this technique a designer may rapidly form their own rapid mini report on the issue that they are investigating at that time. There is no need for any video editing experience, it would need to be utterly straightforward and drag and drop simple. The importance of being able to compile a temporary or even permanent dosier of highly task specific information and examples can counter one of the most common complaints related to information gathering tasks for designers, that of forgetting what was found:

Quote 10
N: Yeah we've all done it, y'know you write something down, you've seen how much bloody paper we get through…….and then when you're in later it's "which bloody pad was it in" and you scrabble about on your desk wasting 20 minutes because you can't be bothered to look it up again.

N is a 33 year old project manager

This then raises the question of authorship as well as what Luff and Heath describe as the movement of information "between the individual and private to the collaborative and public" [Luff and Heath, 1998]. As some of the information may be sensitive or under data-protection there needs to be clear lines as to who can see and do what with any piece of information.

5.7 Mobile

Decision making in the design studio is a rapid and important process. In the usual life of a project there are several major meetings to decide on the direction of progress of the product development. Also important though are the hour to hour micro decisions which are made by individuals related to their current task. During the observational period, it was seen time and time again that the decision making moment occurred at a physical boundary such as a doorway or workspace division. Furthermore, when two or more people are involved in a micro decision they will physically relocate to one of the members work environment. With such decisions being commonly made away from one's work space, the information accessibility must be mobile enough to cater for this. For example, if someone's been working on forming a task specific dosier it would be very useful to access that information at another workstation or indeed remotely either by themselves or another designer. The importance of mobile information and access in a collaborative work environment has been proposed by many researchers [Bardram, 1998; Luff and Heath, 1998; Christensen, 2001; etc]

5.8 Easy to use, implement and pick up

Developing software or hardware support for designers is all well and good, but only if they use it. The common currency of a design firm such as PDD is paper. Designers have conversations using it as the medium of conversation, it is cheap, familiar and easy to use, they all agree that it's not going away anytime soon. The emergence of computer technology such as CAD (computer aided design) systems, illustrating packages such as Adobe Photoshop and Illustrator as well as e-mail, have all found a place in the work environment as they compliment the tasks designers undertake and make them easier. Presentation applications such as Microsoft's PowerPoint are used daily for client and in house presentation's, while Macromedia's Flash is used by those who know how and Macromedia's

Director is utilised but not in house as only two people have a working knowledge of how to develop with it. Several times PDD have brought in technology with the intent to support the design process but have underestimated the factor of ease of use and practicality of implemtation into the work environment. Perhaps the best example of this is the FreeForm system which enables 3D computer sculpting utilising a Phantom forcefeedback interface device. It cost £15'000, requires a dedicated workstation and has no formal training package attached. Everyone's feelings about it are that as a standalone item it serves no practical purpose and no-one knows how to use it properly:

Quote 11
N: It won't be useful until it cost's a grand, everyone knows how to use it and sits on everyone's desk. Until then it looks cool and keeps the client's impressed.

<div align="right">N is a 33 year old project manager</div>

It is plain to see that developing any form of technological support for the communication of research findings to the designers who require it must take into consideration the practical and realistic usability of the end application. It must be easy to use and easy to begin using, otherwise it will be simply another redundant tool sitting on an already crowded bench.

6. Summary

What is more important than identifying the gap between research and design, which some may consider a generic communication issue, is the development and understanding of what principles should be applied to any attempt to bridge this gap within a product design house. Naturally these eight principles will have varying degrees of influence on various potential solutions, however each covers cornerstone issues that emerged throughout our time with PDD. As mentioned before, the limited scope of this paper precludes any real level of in depth reportage, hence the use of anecdotal material and pertinent quotes to support the points being made.

Currently these principles are being used as an evaluatory tool for a system PDD have put in place with the intention of supporting the accessibility of research findings throughout the company with specific attention to the design group. Initial findings have been promising and a full report will follow.

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