Promoting design in SMEs through user-centred methods

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Abstract
The Centre for Product Design Information (CPDI) was established in late 1999 to assist small and medium enterprises (SMEs) in making more effective use of design in all its forms. A major lesson of the project was that for information to be easily accessible, engaging and clearly presented, a user-centred design approach is critical to meeting user needs.

This has been incorporated in the evolution of a new project, the Centre for High Value Added Products (CHVAP). The project will establish a number of websites that target companies in design-related sectors. CHVAP will provide both design information and promote electronic cross-sector networking, so encouraging companies to exchange best practice.

This paper describes the projects, the lessons learnt and an outline set of methods for user-centred design in an experience design framework.

Introduction
The Centre for Product Design Information (CPDI) was set up in late 1999 with part-funding from the European Regional Development Fund. By developing a website of product design information, its major aim was to help small and medium-sized enterprises (SMEs), in the West Midlands region of the UK, to innovate through product design. The initial stages of the project have been described in detail by Burns et al. (2001). The following summarises the major stages in order to provide a background for the major part of this paper, ie, to describe how user-centred design can help define and meet the design needs of SMEs.

Project development
The CPDI team combined skills and experience in product design, development and management, web design, marketing and engineering. However, it had little knowledge of website usability or user-centred design. In the initial stages, CPDI made a very conscious decision to develop the website using the team's experience and not to consult users until they could be shown a 'product'. Furthermore, the team felt that a blank canvas could be confusing to a user, whereas a working site would generate more constructive discussions.

Based on this approach, the team conducted brainstorming sessions to:
• establish the areas of information needed to aid product design;
• ascertain and characterize the possible user base;
• determine the major features required of the website; and
• outline a first attempt at the site architecture.

The outcome of these discussions was the outline site structure shown in figure 1.

The CPDI team concluded that the information should be targeted at companies involved in the design and manufacture of consumer durables and capital goods. Additional analysis revealed four distinct user sectors:
• product designers, eg, design managers, design consultants;
• fringe product designers, eg, marketing personnel, engineers;
• potential product designers, eg, general public, school students; and
• non-product designers, eg, architects, artists.

Since the majority of SMEs are unlikely to have either in-house designers or use outside consultants, the team pinpointed fringe designers as the most important sector. Its characteristics were a professional interest in, but little knowledge of, product design. Fringe designers needed information about product design, as well as help in using a design consultancy and managing a design-focused project.

Having created content for the website and incorporated navigation features such as a search and browse facilities, the first version of the CPDI website was launched in Jan 2001, see figure 2.

Figure 1: Outline site architecture

Figure 2: The original CPDI home page

Post launch, as the user base grew, a number of issues arose:
• it was not completely clear, from the home page, what the site was about;
• the site's appearance was too dark;
• too many levels had to be clicked through to get to desired information;
• section names were not clear to the uninitiated; and
• the website name did not communicate well to the target market.

As noted above, this first version did not take much consideration of users or the usability of the site. CPDI now took these concerns to the newly formed User-Lab.

Birmingham Institute of Art and Design had established User-Lab in recognition of the increasing number of digital media projects and the need to improve the usability of their product. Comprising a multi-disciplinary team, with expertise in digital media design, human-computer interaction, psychology and software engineering, User-Lab has purpose built testing and design labs, which are equipped with the latest technology for conducting behavioural, physiological and psychological research. It has two functions: to carry out research into the digital experience and, based on the results of this work, to develop an innovative commercial service.

Usability
Usability is defined by ISO 9241-11: Guidance on Usability (1998) as ‘the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use’. ISO 13407: Human-centred design processes for interactive systems (1999) outlines methods to be deployed throughout the development life cycle.
These user-centred design methods are broadly based on the principles identified by Gould and Lewis (1985). The first principle is an 'early focus on users', where designers have direct contact with intended or actual users. Methods such as interviews, surveys, and participatory design enable the designer to understand users’ ‘cognitive, behavioural, attitudinal, and anthropometric characteristics - and the characteristics of the jobs they will be doing’. Secondly, they state that ‘all aspects of usability (eg, user interface, help system, training plan, documentation) should evolve in parallel, rather than be defined sequentially, and should be under one management’. This they call ‘integrated design’. The third principle of ‘early - and continual - user testing’ argues for empirical observation and measurement of user behaviour and evaluation of feedback. The fourth principle, ‘iterative design’ states that a system should be continually modified in response to results of the empirical testing and feedback (Gould and Lewis, 1985, 300)

Information design and structure
As a rule websites provide features for navigating content. These can include search facilities as well as menu structures and links that allow users to find related information as they peruse a site. To be useful, menus need to match the names and associations that users have in the real world. Vora (1998) found that category titles were important in setting up the user’s expectation of section content. Furthermore, an inappropriate title can lead the user to visit several different sections, or even prevent the user from ever finding a sought page. Spool (2001) also found that users only used searches when the categories were poorly designed.

However, subject experts, design teams and even human factors experts can be poor judges of categories and menu names. Lee et al (1984) conducted a study in which experts ranked menus using the criterion of ‘ease of use’. Virtually no correlation was found between the rankings of the experts. However, when a group of users ranked the menus, there was high agreement among them as to which menus would be easier to use. This suggests that organising content in a meaningful and intuitive way has to involve users.

Redesigning the CPDI website
Considering both this work and the concerns of the development team, it was important to establish how CPDI’s users understood the content structure, whether it made sense to them and whether they knew where to find the information they wanted. User-Lab developed an ‘online data collection instrument’ (ODCI) tool (Knight and Jefsioutine, 2002). The tool was based on card sorting techniques in which users are asked to organize and categorize content.

The results revealed that there were confusing categories. Furthermore, some of the menu labels were misunderstood and led users to the wrong content. From these results alternative labels were tested and an optimal menu was designed. For instance, the services section was renamed ‘directory’ to reflect more accurately its content of design consultancies and suppliers while techniques was renamed ‘design methods’, to indicate its content of design management tools and methods.

The outcomes of CPDI’s redesign
The new CPDI site was launched in Sept 2001 and included a radical change in the appearance and design, see figure 3. The much lighter look was easier on the eye and the new menu improved usability. The redesign also gave CPDI the confidence to invest in the promotion and advertising of the site. This resulted in a substantial increase in the user base. The site now had over 400 pages of information; 1,000 registered users; a directory of over 150 consultancies; and a monthly hit rate of 100,000.

As the above indicates, evaluating usability is very useful in the context of redevelopment, since some problems can be addressed in the redesign. However, the usability findings can also indicate fundamental issues that may be very costly to correct. For example, user consultation was still limited and it was not clear that the content of the new site was meeting all the needs of the user or even reaching the right users. Another concern was that the name still did not effectively target West Midlands SMEs and so the project was not helping to improve their knowledge vis-à-vis design perspectives.

The development of the Centre for High Value-added Products project
The CPDI experience clearly showed that user-centred design should be paramount in the development of any web-based project. In tandem, a number of national and regional policies and strategies had been published and new funding streams introduced since the inception of the CPDI project.
The regional bodies of significance in this context are: Government Office for the West Midlands (GOWM), which manages European Funding in the West Midlands, and Advantage West Midlands (AWM), the regional development agency, which looks after national government funding.

The new policies included the West Midlands Single Programming Document Objective 2 2000 – 2006 (Government Office for the West Midlands, 2001), the Regional Innovation Strategy (Advantage West Midlands, 1999b), the West Midlands Economic Strategy (Advantage West Midlands, 1999a), and Agenda for Action (Advantage West Midlands, 2001). Among other factors, all the strategies include the following elements:

- the need for the West Midlands to build a diverse and dynamic business base;
- the importance of innovation through design;
- the need for companies to collaborate and develop joint ventures;
- dissemination of best practice;
- promotion of an innovative culture;
- the need for technology transfer between companies and between companies and higher education institutions; and
- a focus on clusters and cluster development.

The latter is particularly important. A cluster is defined as a ‘geographic concentration of interconnected companies, specialised suppliers, service providers, firms in related industries and associated institutions…..in particular fields that compete but co-operate’ (Porter, 1998, 197).

Connections between companies in the same cluster can be based not only on trading, but also on the fact that they share a common asset base. This includes items such as, technological capabilities in universities, potential suppliers/customers, skills pool and natural resources.

AWM’s ‘Agenda for Action’ defines ten clusters based on key industries in the West Midlands. These clusters provide over a third of the region’s employment and represent a range of activities from established (well developed cluster asset base matured over decades) to embryonic (lacking the critical mass of cluster assets).

In addition, CPDI had made links with a number of regional projects that helped companies in a ‘hands-on’ way for a short period. It was evident that the provision of a work-based follow-up resource would be very helpful.

All of the above provided an ideal opportunity to create a new project that combined the lessons learnt by CPDI and the new elements of the regional strategies. For instance, a major drawback was the Centre for Product Design Information name. CPDI felt that it did not appeal to the target market, ie, SMEs with little or no design.
knowledge, the fringe designers discussed above. The regional emphasis on clusters gave a means of counteracting this drawback. The project could build a number of sector-specific sites of design and related information. The rationale was that users from SMEs would find a site with content relating to their industry more attractive than a site called product design information.

Therefore, the new project, the Centre for High Value-added Products (CHVAP), proposed nine industry sector-specific websites targeting manufacturers and designer-makers of high value-added products in the West Midlands. The sites would cover tableware/ceramics; jewellery; glass; leather goods; furniture; clothing; carpets; (all part of the high value products sector) medical technologies; and engineering design. Additionally, the team would build a general design site covering across-the-board design principles and processes. CHVAP would also create a product showcase site providing a vehicle to promote the region internationally as an area of design and innovation.

As well as providing a range of design and new product development information, the sites would also facilitate networked communities. These would promote business-to-business and academic-to-business collaboration and provide opportunities for intra and inter cluster working. Thus, the project would help companies to become more innovative through design and also assist the various regional bodies build their vision of cluster networking.

The proposed CHVAP project was successful in gaining both ERDF and AWM funding and aims to launch in mid-2003.

**Beyond usability**

CPDI primarily aimed to be an information resource. User-centred methods employed during the second version of the website improved ease of use and information retrieval. The new CHVAP websites aim not only to be information resources but also to facilitate networked communities. This will be achieved through individuals and groups developing relationships through interacting with the websites. While usability is critical in making interaction efficient, in order for these relationships to flourish, the user experience needs to be an engaging and rewarding one.

Jordan (Jordan 2000) has brought methods from product design and market research into usability research in what he has called the ‘new human factors’. He argues that ‘because customers have come to expect products to be easy to use, usability has moved from what marketing people call a “satisfier” to being as “disatisfier”. In other words, people are no longer pleasantly surprised when a product is usable but are unpleasantly surprised by difficulty in use’ (Jordan, 2000, 3).

Furthermore, Jordan argues that ‘having become used to usable products, it seems inevitable that people will soon want something more: products that offer something extra; products that are not merely tools but living objects that people can relate to; products that bring not only functional benefits but also emotional ones (Jordan, 2002, 6).

Like Jordan, others consider products as ‘living objects’ that people experience in use. For example, Overbeeke *et al* (2002, 10) argue ‘the designer needs to create a context for experience, rather than just a product. He offers the user a context in which they may enjoy a film, dinner, cleaning, playing, working…with all their senses’.

The new human factors have consequences for user-centred design methodologies. McDonagh-Philp and Lebbon (2000, 38) state ‘in the design research stages, emphasis is changing from “hard” functionality to “soft” functionality in product design’. This suggests a change from the traditional ‘focus’ on ‘users’, ‘tasks’ and ‘tools’ (Jordan, 2000, 8).

The new human factors shift the focus and scope of design research. This requires the identification of the elements of the user experience. For instance, Rothstein’s (2002) a (x4) model consists of activity, artefacts, atmosphere and actors while Ortony *et al* (1998, 63) present a cognitive model comprising ‘events, agents and objects’. User-Lab considered how these various elements might be integrated into the project.

This has resulted in an experience design framework (EDF) that will inform the design of the CHVAP websites. The framework has undergone some initial evaluation on a group student design project. Further evaluation and refinement to the framework will be undertaken during the CHVAP project.
The CHVAP websites’ development
The first stage of the development has begun with a sample of users with design and industrial experience. The research involved participants describing, in their own words, the elements that supported designing and improving product designs. The researcher then sorted these elements into categories suggested by the participants. Card sorting was used to ascertain users’ attitudes to competitor websites and to identify desirable features and qualities. User-Lab then presented the results to the design team to discuss how the CHVAP websites might support the activities, needs and preferences elicited during the research. Based on this work, the general design site will be developed to prototype stage.

The second stage of the project will investigate the needs of each of the sectors and validate the findings of the first stage. This will include evaluation of the prototype websites and deeper user requirements captured from each of the user groups. The result of this work will inform the design and development of the sector specific sites. The final stage of the project will be a refinement and validation stage. This will involve user testing and replicating the methods of stage two in order to describe a before and after measure of the project’s outcomes.

Conclusions
The CPDI project created an information resource that had much to offer SMEs. However, allying the team’s ongoing learning experience, of the site and its users, with the skills and methodologies of User-Lab, provided a significant step forward in the site’s evolution.

Building on this experience and taking current thinking and methods in user-centred design into account, the new CHVAP project aims to deliver sector specific websites for SMEs in the West Midlands. This will involve user participation in the project and follow user-centred design principles. The research methods will be based on an experience design framework and will inform the design of the websites with the aim of providing an engaging user experience while delivering pertinent knowledge and community networks.

Therefore, by drawing together research and practical experience, CHVAP and User-Lab will deliver a project that will increase innovation and thereby profitability in West Midlands SMEs.
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Bibliographical references
Biographies

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John completed an MSc in User-Interface Design at London Guildhall University in 2000. Since then he has worked on design projects for a range of organisations. These include projects in user-interface design for the British Library and user-centred design in digital media. In addition, he has worked as a visiting lecturer and external examiner (London Guildhall University) on BSc and MSc computing and business courses.

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