An NCR perspective on User Experience (UX) competency

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Abstract
The authors present an insight into the UX role within a large multinational corporation, place the UX role in an historical perspective and describe recent organisational changes that have resulted in this UX role being placed in a central corporate team. Examples are given of the activities undertaken by this group, and the skills needed to accompany core technical knowledge are outlined. The paper concludes with conclusions on how the UX role could be developed.

Keywords: UX, CX, Self-service technology

Introduction

As usability specialists within a large multinational corporation, the question of what are the core competencies of a user experience (UX) practitioner are of importance, not just in recruiting, training and developing our own team, but also in terms of growing and developing the profession as a whole. In this paper we discuss what the UX role involves in our organisation and place this in the context of what the role has meant in the past within NCR.

NCR Corporation is a global technology company of 125 years standing, and is headquartered in Duluth, Georgia. NCR's assisted- and self-service solutions and comprehensive support services address the needs of retail, financial, travel, healthcare, hospitality, entertainment, gaming and public sector organizations in more than 100 countries. As a leader in ATMs (Automated Teller Machines), point-of-sale and checkout technology, and entertainment and airline kiosks, NCR has focussed on the consumer of these public-facing self-service technologies for many years.

Development towards UX in NCR

During the late 80's and early 90's NCR Corporation underwent a period of growth in the area of what we now know as UX. This was driven by two central organisations within the US, both having a corporate and therefore umbrella cross-business role. Previously, industrial designers and engineers had the primary responsibility for ensuring ease of use, applying traditional ergonomics and addressing user-related matters. The HITC (Human Interface Technologies Centre) and Corporate Industrial Design were established in Atlanta GA and Dayton OH respectively. They created a hub-and-spoke model for UX, with specialists employed in both centres and the operational businesses elsewhere, such as Dundee, UK and Waterloo, Canada. At that time, the 'usability' role and title within NCR was formally defined as that of Cognitive Engineer in accord with the *Zeitgeist*.

HITC also embraced the notion of a research and evaluation remit, with adoption of, the then popular, usability lab mentality. The early and mid-90's saw NCR acquired by the US giant, AT&T. During this period the collaboration with AT&T Bell Labs became a priority for those concerned with user research with many initiatives aiming to enhance collaboration and exploit fully the well-established resources with AT&T.

For the best part of a decade, the roles of Cognitive Engineer and Usability/HF Engineer were, in line with the times, characterised by those with an applied psychology, HCI (Human-Computer Interaction), human factors or ergonomics research background. The expectation was the systematic, empirical evaluation of proposed, prototype, released and competitor products and ('user') interfaces. There was buy-in to the notion of in-house usability labs and they were seen by all as essential to human factors or usability engineering within research and product development. Like many US multinationals, NCR favoured concepts such as task analysis, mental models, ISO 9241-11, and the nirvana of corporate user interface guidelines (Coventry *et al.*, 1996; MacTavish, 1997). During this time most associates in the general UX domain had skills that were tailored towards evaluation, as opposed to design or requirements capture and definition.

The end of the 90's and the dot-com years saw re-organisation, and the subsequent distribution of design, usability and human factors types into the business units. Again, efforts were made to ensure co-ordination, method and knowledge sharing. NCR's creation of the London-based Knowledge Lab (Lynch *et al.*, 1999) represented an innovation initiative that focussed upon research using a customer consortium model within which there emerged *inter alia* a multidisciplinary 'consumer research' team as well as an explicit competency in interaction design.

Further re-organisation and consolidation saw two main teams based in Atlanta and Dundee, with a financial and retail industry scope. This last decade produced the DU+A team (Design, Usability and Accessibility), and a research and technology team with HCI and consumer research as the focus. These changes served to help shape the techniques and approaches taken. Since the late 90's user research areas of study have ranged greatly from, for instance, ethnographic investigation (Cooper *et al.*, 1999; De Angeli *et al.*, 2004) to technology adoption studies (Johnson & Coventry, 2001; Riley *et al.*, 2009).

So, historically NCR, as with many others, has seen a number of changes within those serving to promote the importance of the user or consumer, and witnessed the gamut of job titles, organisational structures and associated role definitions.

The current UX role at NCR

The role of UX specialist itself is that of a subject matter expert, offering input and support throughout the development process from initial scoping of requirements through design, implementation and then rollout, or as a subject matter expert in a professional services (consulting) capability bringing expertise to solve specific customer needs. Another feature of this role is to promote the accessibility of products by gaining in-depth knowledge of relevant accessibility regulations and advising development and product management of these requirements.

Recent changes at NCR have resulted in the UX role being migrated to a central group with a cross-business focus, this group being distributed between Dundee, Dublin and the US. This reorganisation has resulted in a fresh emphasis being placed on UX work. In addition, the remit of this group now includes a major focus on software which has meant that HCI skills are also a key requirement for such a role. After these changes were made there was some confusion over the appropriate terminology used within the organisation, with job titles including "HCI specialist", "human factors engineer", "usability consultant", "cognitive engineer" and "ergonomist". The decision was taken to use the umbrella term "usability specialist" to cover all these roles, as "usability" was a term that had, and still has, general meaning across the organisation.

The group was also renamed from "Design, Usability and Accessibility" to "Consumer Experience" to reflect this broader remit. This multidisciplinary group also includes interaction designers and industrial designers thus enabling UX input to be involved right from the start of any new design work, and allowing for the complementary skill sets from the design discipline to enrich the UX function. A related group within NCR that conducts a similar role as a professional service has also recently been renamed from "Human Factors Engineering" to "Consumer Experience Consulting".

The UX role now covers usability and accessibility issues for hardware and software products and related tools across multiple business units within the company. A particular focus is in the areas of walk-up and use self-service terminals and also many diverse professional and self-service applications delivered through desktop, kiosk, mobile and internet channels. An essential element of such a role is an understanding of the design and usability challenges of complex technologies in the public domain for both able-bodied and disabled user groups across international populations. Typically this involves close team working in a distributed, multidisciplinary project team including graphic designers, industrial designers, product managers, sales personnel and hardware and software engineers.

The UX role in practice
Frequently conducted tasks and some recent project work are described below in order to give a greater insight into what this role involves.

Expert review of hardware consumer usability
An expert review of consumer usability and accessibility is often conducted at a very early stage in the development of a new product or module. This can be at a very coarse level where the model consists of a simple space volume, and some rough ideas about approximate positions for interface elements. A key tool that we have been utilising to conduct this type of review is to take the early concept model from CAD into a human modelling software package, and quickly assessing reach and visibility to the main elements on this proposed product layout (Day *et al.,* 2010a).

As the development matures, an early build of the product enables further reviews to be conducted. This includes working through an in-house checklist containing key usability and accessibility requirements. These include the maximum allowable force and grips accommodated for insertion or removal of media, acceptable height ranges for the interface and sample eye heights to quickly validate visibility for worldwide populations. In addition, this type of review involves walking through consumer tasks (for example making a deposit and withdrawing cash at an ATM). A further portion of this type of expert review includes an assessment of compliance to different accessibility standards. This type of accessibility review is then used as the basis for sign off at two key milestones: the first of these on completion of the product development, and the second on completion of the manufacturing phase of the product.

Expert review of first line maintenance usability
An expert review of usability for replenishment and maintenance users is often conducted at a very early stage in the development of a new product or module. This involves assessing whether visibility and access to all portions of a product or module is possible for a number of first line maintenance tasks (such as jam clearance and replenishment of media). This analysis is then used to formulate the space volume that is therefore needed as a service footprint. Again, we have found the use of human modelling software to be valuable in this, with approximate space volumes for modules in the product quickly being imported and then human models being used to evaluate reach and visibility. In addition, the human models are placed in the postures needed to complete the tasks thus the volume needed is defined by these postures.

This initial analysis is then validated later in the development lifecycle with first line maintenance task walkthroughs being conducted on an early development build to ensure that the service footprint previously identified definitely allows all tasks to be completed.

Usability study of novel device performance
In this type of usability study a particular device is of interest. In one example, the use of biometric fingerprint readers was investigated, with the investigation looking in particular at how the information that is fed back to the user affects their use of the device (Riley *et al*., 2009). In this particular study various different visual and animated representations were considered, and the results were then used to influence the development and adoption of fingerprint readers as an NCR-supported offering.

Usability study of a hardware product
An example of this type of study of a working product was conducted just over a year ago. A new product range had been completed, and therefore a usability study with members of the general public was desired. A particular focus of this study (with 100 participants) was on two main features that had not been previously assessed; namely a biometric fingerprint reader and a bulk cheque deposit module. The findings from the previously mentioned biometrics study were used to develop the lead through used in this study. A representative sample of ages, heights, and genders were recruited. In addition, as it was known that biometric performance degrades with age, the sample included a large number of participants over the age of 65 (22%).

Figure 1: Usability test photos and example of biometric leadthrough

Another example of a larger study like this involved a drive-up ATM product and assessing the reach to different elements in this very constrained environment (Day *et al.*, 2010b).

User interface design and evaluation
When working on software projects we have begun to be much more actively involved in the original design of the user interface. For instance, on a currently ongoing large software project, our engagement began with a period of requirements gathering including field based observations and requirements clarification with potential end-users. Once requirements had been resolved paper prototypes (sketches) were then used to further refine the requirements, and then developed into wireframes. In parallel with this, heuristic reviews of the existing development build of the software were conducted. A visual strategy was defined and brand applied for the overall look and feel of the product, and then the detailed designs were produced (electronically). It is important to note that interaction designers and usability specialists collaborated to produce these designs – reviews and walkthroughs were conducted on a daily and sometimes hourly basis. The final designs are intended to be referenced directly in the code. A plan has also been defined to continue this engagement as a phased iterative approach to future developments, and for a large scale usability test to be conducted with multiple end user groups. In this type of project, the next stage would have changes being submitted formally as requests for change from any such review.

Conceptual work
Some of our engagements occur very early before requirements have been set. Often the skills of the designers in the group are used to produce visual concepts (in the form of sketches or renders). These visual concepts, produced by designers with input from usability specialists, show the design of possible directions for new products and are used to promote discussions and begin an engagement with a customer. Often this early exploratory activity then results in a longer term engagement with the team. The visual appeal and innovative aspects of these concepts is often important in the beginning of this engagement, sometimes more so than the finer detail of the usability benefits of such a concept.

Oft-overlooked skills for UX
Rather than attempt a list of skills needed for UX professionals derived from the Ergonomics, HCI and Psychology disciplines, this section focuses on skills that are often omitted from such lists, but we have

found to be invaluable in our experience within NCR.

In particular, those skills that are required to represent and exert influence within a large organization driven by other priorities are of high importance. We have found a significant amount of time is spent in being an advocate for the UX function, and this ability to encourage other parts of the organization to engage with the UX role is necessary. This is particularly important as our UX role is a small group in a much larger organization. To a great extent the impact of this group is influenced by the credibility that the group has within the organization; to this end presenting summary information of current activity (especially up to the executive level) is also an important function within the group.

Related to this is the role of informing others and raising awareness within the organization, not just as to the merits of UX in the abstract, but the real-world impact that such engagement has had in previous programs. In addition, a solid understanding of other disciplines and well-developed negotiation skills are also called upon in our experience, as is an element of political savvy in dealing with disparate parts of the organization and their different priorities.

The ability to provide effective, visual summaries of complex issues and results is also very valuable, as is producing concise, actionable recommendations. We have found human modeling software and also graphical summaries of information to be useful in this regard (and indeed some of this has then been used in marketing collateral for our products).

Finally the ability to apply theoretical knowledge to novel and unexpected areas is a further useful skill as input is often sought across many diverse application areas.

Conclusions

Our experience suggests that the UX function within a large organisation has to be pragmatic enough to work within the constraints of the larger organisation including cost, schedule and business priorities. One key to this as previously mentioned is to inform other parts of the organisation of UX principles, and to embed UX knowledge in the form of testable requirements. An added benefit of this approach is to reduce the load on the UX team as others in the organisation can then implement and test these requirements.

The degree to which UX can exert its influence over the direction and shape of a specific program of work within research and development is formally determined by those processes which are applied. Without being attached to and grounded in the key processes, the UX role can be frustrating as it will be seen as tangential. The importance of sign-off, contribution to formal approvals and an enforced involvement in the development process is necessary at a basic level. More importantly, however, the appreciation of UX and what it can bring to a product development is typically subject to individual decision-makers, stakeholders and major teams. The perception of UX as an essential role in the development of successful products is critical to full collaboration and engagement with the relevant process elements.

Upon reflection of the development of UX and usability roles within NCR, one clear conclusion that we can draw, is the requirement to move with the times, demonstrating flexibility within a large organisation, and simultaneously with respect to evolving technologies. The latter relates not only to those technologies determining products, service and user experiences, but also the tools with which we carry out the UX function.

Working within and for a large, global organisation also brings with it several challenges that are not unlike those faced when engaging a distributed customer from a consultancy base. The need to articulate value concisely, to achieve rapport with other project members, and to master the art of collaboration are key skills. The question of collaboration is also pertinent to the emerging nature of UX as a discipline. We must look to a future where under the umbrella of the UX title we see specialists with many and

varied core skills, whether in animation, ethnography, applied psychology, prototyping or the variants of contemporary design approaches. The relationship between these diverse skills is a crucial step towards extending and enriching what is meant by the UX role.

Acknowledgements

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