Looking back: a very brief history of HCI

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In the early 1960s, at a time where computers were scarce, expensive, bulky and formal-scheduled machines used for automatic calculations, Douglas Engelbart saw their potential as personal interactive tools. He initiated a research program aimed at developing computing hardware and software to *augment the human intellect*, to increase a person's capabilities to approach a complex situation, to gain comprehension to suit his or her particular needs, and to derive solutions to problems [1]. At the Stanford Research Institute, he and his colleagues created the first system realizing this vision. Their oN-Line System (NLS) was not only designed to augment the capabilities of its users, but also to foster their collaboration. Among other firsts, its 1968 demonstration featured the introduction of document processing, hypermedia, shared files, messaging, real-time distant collaboration, multiple windows and the computer mouse. NLS was way ahead of its time. It impressed and inspired many people. Few realized the vision behind it, however. Due to complex hierarchies of modes and commands, it was also difficult to use and required substantial training. This difficulty with initial use and its reliance on networked time-shared computers were fatal to the system, and Engelbart's vision of personal computing as an augmentation tool somewhat faded away.

Important developments of personal-computer technologies followed at the Xerox Palo Alto Research Center (PARC) in the 1970s. At PARC, past collaborators of Engelbart and other researchers devoted several work-years discussing and evolving a conceptual model for an office automation system. They created the hardware and software required to provide untrained non-computer professionals with adequate support for typical office procedures. Doing so, they pioneered many of the mouse-based interactions we know today, WYSIWYG and direct manipulation interfaces, modeless interaction and the desktop metaphor. But although they influenced later developments, their Alto was never a commercial product and their Star was a commercial failure. The late 1970s and early 1980s instead saw the advent of smaller, less expensive microcomputers boosted by interactive but text-based productivity software. By allowing to interactively explore the consequences of decisions on pre-specified computations, for example, VisiCalc transformed the computer into a powerful forecasting tool, propelling it into the business world [2, p. 228-231]. Professionals started developing a taste for actively using computers for their own purposes, instead of simply serving as operators for externally-defined ones.

As personal computers became more pervasive, the need for people-oriented systems matching the demands and capabilities of their users became an important concern. The ACM Special Interest Group on Computer-Human Interaction (SIGCHI) was founded in 1982 to emphasize research directed towards the users, with strong ties to both academia (e.g. UCSD, CMU, U. of Michigan, Virginia Tech) and industry (e.g. Xerox, IBM, Bell Labs, DEC, Apple). More than 1000 people attended its first CHI conference in 1983[1]. Within a few years, regular meetings and seminal publications such as [3, 4, 5] established HCI as a discipline borrowing from Computer Science, Human Factors & Ergonomics and Cognitive Psychology but with its own theories, models, frameworks and goals: a science of design seeking to understand and support people interacting with and through technology [6].

Starting from the mid 1980s, the Apple Macintosh and Microsoft Windows brought the desktop metaphor and WIMP interfaces to the masses. A strong emphasis was put on the development of walk-up and use interfaces for novice users of these systems. Guidelines and toolkits made it easier to develop graphical interfaces with consistent look and feel, which lowered the learning curve. Combined with performance improvements, cost reduction and system support for multimedia and multitasking, this allowed the emergence of a wide range of interactive applications. By the early 1990s, graphical interfaces were used not only for work-imposed tasks but also at home, for discretionary ones. Yet despite commercial successes, the daily experience of using computers remained "far too often fraught with difficulty, pain, and barriers for most people" [2, pp. 2-9]. Practitioners started realizing that interactive software design is much more than graphic design and basic programming. Some researchers saw in Artificial Intelligence a potential

[1] SIGCHI remains the premier international society for professionals and academics interested in HCI. It was the largest ACM SIG in 2012. 3442 people from 54 countries attended its CHI conference in 2013, in Paris. SIGCHI also sponsors various specialized conferences (CSCW, UIST, DIS, GROUP, C&C, ICMI, MobileHCI, TEI, RecSys, ITS, EICS) and co-sponsors many others.

solution to the problems and started investigating "intelligent user interfaces". But the focus of many HCI people instead shifted away from computers and graphical interfaces to usability evaluation, interaction design and user experience. Formal cognitive experiments were complemented with alternative evaluation methods more applicable to real world problems. Participatory techniques gained in popularity as a means to more actively involve users in the design process. Theoretical frameworks such as situated action, distributed cognition and activity theory also gained in popularity for better taking into account the social and contextual aspects of HCI.

In 1991, at PARC, Mark Weiser envisioned a future in which computing services would not be channeled through a single and prominent machine but supported by ubiquitous devices seamlessly integrated into the world, allowing people "to use them without thinking and so to focus beyond them on new goals" [7]. The commercialization of the Internet and the development of the World Wide Web in the mid 1990s allowed the creation of a wide range of networked services. From an interaction perspective, the original Web was actually a step backward, a return to forms and menu-based interfaces. But with miniaturization and advances in power management and wireless networking technologies, it was instrumental in the advent of mobile computing and smart devices (laptops, PDAs, phones, tablets; connected gaming consoles, TV sets, cars; etc.). The new devices brought forward many interaction challenges related to their form factors and coordinated use. And the ability to access services and communicate with people anywhere and at any time vastly expanded the uses of computing technologies in the 2000s.

Over the recent years, the increasing number and diversity of interactive computing applications have renewed interest in many aspects of HCI. The rise of user-generated content, social networking services, multiplayer online gaming and other forms of social computing has reinvigorated the Computer Supported Cooperative Work (CSCW) community. The big data and open data movements have helped publicize the works of the Information Visualization (InfoVis) community. Novel interfaces and interaction techniques better suited to mobile and discretionary uses have been introduced to complement the ones originally designed for the personal computer and office information workers. Commercial products now commonly feature sensors of various kinds (microphones, light and image sensors, touch and proximity sensors, accelerometers, magnetometers, gyroscopes, etc.) supporting speech and gesture recognition, or augmented reality. These are typical examples of the interfaces and techniques pioneered by the User Interface Software and Technology (UIST) community since the late 1980s, which perfectly illustrates the "long nose of innovation" [8]: in HCI like in many other fields, an idea may start with an invention, but the bulk of the work and creativity is in its augmentation and refinement. This process takes time and requires knowledge about people, computers and the interactive phenomena between them. HCI research is not about tomorrow's interfaces or applications but about the original ideas, fundamental knowledge and practical tools that will inspire, inform and support the design of human-computer interactions in the next decades.

For a more detailed account of the evolution of HCI, see Jonathan Grudin's, for example [9].

References

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