

Dead-Until-Touched: How Digital Icons Can Transform the Way We Interact with Information

Isabel Cristina G. Fróes

IT University of Copenhagen, Copenhagen, Denmark
icgf@itu.dk

Abstract. This paper challenges the way we currently use and interact with information through digital icons and static metaphors. The latest computer and mobile devices' graphical user interfaces need to be reevaluated in order to support the paradigm shift from static and local to mobile and cloud-based interactions. Furthermore this paper questions the lingering of static icons used in computers, mobile and tablet interfaces. The paper also presents concrete suggestions on how expanding the functionality of digital icons can better afford how users interact with information.

Keywords: GUI, UI, Icons, Metaphors, Interaction Design.

1 Introduction

Notwithstanding the vast literature on graphical user interfaces (GUI), including research and usability methods to test them from within and outside applications [5], [8], [12], [13], [15], [20], [21], little has been done to the core of the system in relation to the metaphors, iconography and their functionality. This paper approaches user interfaces by looking at icons, metaphors and their current use on computers and mobile devices, in order re-approach GUIs by discussing how to challenge the user interface metaphor, and how iconography can serve as an information hub instead of a static representation of an object. This topic is currently pertinent given the current diffusion of cloud based-computing, tablets and touch-based smartphones, as well as the number of applications being developed for such devices. Digital interfaces need to be re-examined in order to fulfill the various uses of technology and data, and augment the way information is consumed and manipulated.

The launch of graphical user interfaces (GUI) in 1973 at Xerox PARC has undoubtedly revolutionized the way we interact with digital devices [6], [11]. The shift from a command-line digital interface to digital icon metaphors represented a key point in facilitating a relationship between machine and user [18], [23]. Digital user interfaces predated 1973, but they became popularly known after the introduction of the personal computer and its graphical user interface [8]. GUI's history has been covered in the HCI field [14], [20], [24], with more recent authors concentrating their research efforts on specific points of user interface (UI) [22-25].

The UI as a tangible artifact [14] and its application in design of personal computers was, among other things, due to the fact that GUI followed direct and overly literal metaphors from a known working environment: the office desktop [6], [18], [23], [27]. The clear recognition of the objects and devices from the users' workspace provided a direct understanding of the icons and their functionalities on the digital domain.

The user interface presents itself on a computer screen with desktop icons, which directly correlates to the desktop context as its metaphor [1-3], [11], [16-19], [23], [25]. The icons are graphical representation of existing physical objects, such as file folders. However, the icons can carry other objects within them, leading to a literal metaphor with mismatched functionality [6], [23] as not all objects have the same kind of functionality in the physical world. File folders in physical cabinets do not often store videos, documents or music in one folder, for example. Despite this distinction between the physical objects and their digital equivalent icon properties, such metaphors also perpetuate some of the limitations of the physical world [6], [23] about layout and interaction. For example, Hudson [11] presents the case of the Lotus organizer program for the Windows platform, which was an exact digital copy of its physical counterpart, with all its physical limitations translated to the digital format. The digital versions of such objects did not necessarily add to their physical functionality, but the physical resemblance was presented as a positive aspect allowing an intuitive interaction. However, such literal designs also limited the amount of other physical world possibilities to be used, such as the action of clearing the desktop with a hand swipe, which was possible in the physical world, but not transcoded to the digital desktop [23].

Despite its initial innovative approach, GUI design for desktops and laptops has to some extent stagnated over time, not following the growth curve in hardware developments. Attempts to challenge the basic levels of GUI and the windows, icons, menus, pointer (WIMP) and Post-WIMP interface standards [12], [22-23], [27], [29], which are represented by the desktop/folder/files structure, did not succeed in becoming mainstream; and very little has been implemented to update iconography and its functionality on computers. The idea of a blank canvas/space as presented by the desktop – either filled with icons of various types, or empty, containing just one or two icons such as the recycle bin, does not address current use of the device, nor does it facilitates an initial overview of the recently accessed files and programs.

1.1 The Interface at the Work, Social and Personal Setting

As computers became ubiquitous in the work space, computer users became more heterogeneous and more dependent on their computer tools. These same tools migrated into homes to fulfill some of the same tasks of the work environment, such as home budgets and personal communication (both offline as well as online with the advent of the Internet).

Upon entering the home environment, the computer also became an entertainment platform, and games and leisure activities attracted younger users. Furthermore, the computers were no longer only for work purposes, but with the advent of the Internet,

they became a major communication platform, allowing their users to chat, write and talk to other computer users. Their role in the households and workplaces evolved along with the Internet's growth.

However, despite this dislocation from work to home, little happened to the interface metaphor. This metaphor continued to limit the ways the information was accessed through the desktop structure, despite the varied styles of communication and interactions taking place. Some of these limitations were identified and challenged by a number of authors, such as Raskin [22], who discussed why current GUIs are flawed and dives into a variety of interface aspects that needed to be taken into consideration for the success of later developments.

The home computer initially was the personal device, family-owned and used. This was followed by each family member owning their own desktop device, and later on with portable laptop computers becoming more competitive in the market price and replacing the desktop computers. Yet, very little modification occurred on computers digital interface metaphors; even with the advent of these rarely shared personal computers, with social and communication roles beyond the work.

1.2 The Interface Everywhere

The growth of the portable laptop computer market for personal and professional use brought a clear distinction from a fixed to a flexible location. In the late 1990's, laptops became also customizable in a variety of ways. Such settings as hardware case colors (e.g., first generation of iMacs), backgrounds, accounts, programs and shortcuts were used as personal identity statements, allowing users to customize their digital environment even further. With the spread of the Internet, the computer became an indispensable tool of communication, obliging a large number of the population to own at least one device for basic communication, such as emails [9]. Despite computers becoming ubiquitous machines, the interfaces they carried (and still carry) did not accommodate a larger revision, even as the single-user-per-device paradigm continued to grow. These machines were now being used everywhere and on the go by students, doctors, businessmen, musicians, to cite a few. Furthermore, the spaces where people interact with these machines have also become flexible due to software and hardware developments.

The paradigm shift started with home and portable computers was followed by a number of mobile devices and the cloud. The mobile phone interface continued the use of the metaphor approach, with different icons illustrating distinct programs or functions. Mobile phones became the most ubiquitous communication device with a global penetration of 86% as by the end of 2011[15]. The growth in numbers of regular phones into screen-based interaction with the advent of smartphones and, more recently, tablets, has brought the GUI metaphor to a different direction, however, not one that is necessarily innovative. With the dissemination of portable devices iconography functionality could have been challenged further. Still this did not happen widely and icons and workspace metaphors, such as folders, lingered and maintained their static role on the mobile platforms.

2 Beyond Icons

This ubiquitous presence of digital devices and the growth in information accessibility brings opportunities to evolve and transform interfaces. It is time we started advancing our designs for the interaction with information or the “interformation” [28]. The growth in research and developments of data visualization [4] with designs trying to illustrate and inform beyond a set of static data is one example in this direction. Data visualization augments one’s capacity to understand and interact with such data by making the data malleable through visuals and allowing a tangible feel despite its digital content.

The digital interfaces of the majority of current smartphones differ very little from their predecessors (earlier phones or first generations of the Palm, beeper and digital agendas) in the sense of only having icons with button functionalities (or digital switches) that could only be tapped. The PalmPilot’s interface, for example, was button-based, both in the physical and the digital sense, the user needed to press one of their physical buttons or tap a button on the screen in order to open/launch an application. These digital buttons did not provide much information, since, as in the physical world, they were not more than switches to “turn on” an application. Despite the button-orientation of the early mobile digital interface, other behaviors, such as swiping or pinching, have become an integrated part of current operating systems, though these additional behaviors are often accessible only from within applications (e.g., browsing music albums or looking at pictures and maps) or at the first layer of interaction (e.g., browsing apps).

2.1 Dead-Until-Touched

The Dead-Until-Touched paradigm refers to the static behavior typical to icons, which behave only as on-off buttons, and this paradigm needs to gain a larger focus in interface developments assessment.

The icons with static symbolic representation, without any additional information being displayed on them linger on current platforms. This brings two main questions:

- Why are users now still subjected to static icons (buttons) and folder interfaces, which have so little information on the “tip of the eye”?
- How digital icons can expand their functionality, gaining a larger role in user interface experience?

The weather icon that do not show current forecast on OS5 is an example of a Dead-Until-Touched icon. Despite the fact that Weather applications and others, as well as different operating systems such as Android and Windows, have tackled this issue, other applications’ icons still carry the IOS5 weather example.



Fig. 1. Widgets informing visually the weather conditions on Windows and Android platforms. Next to them, on top right, the calendar appointment detail as it is currently available on Windows phones; and on bottom right, a mock-up illustration of another use of the same tile.

To better illustrate my point about how an icon could inform beyond a static button, the calendar icon on the Windows phone (left image, Fig. 1) could show, besides the next appointment in line (calendar detail, top right Fig. 1), maybe the next two appointments or even chosen appointments, small details that could be customized by the user (bottom right of Fig. 1).

The interface should support icons that inform instead of just being a static symbol; this could be defined as *infography* or *iconformation*. Icons would work more as live avatars, always informing instead of just representing an unanimated object. They would need to be renamed as *licons* (live icons) or *iconars* (icon avatars) in order to distinguish themselves from their current static counterparts or from the gadgets, widgets or tiles, which have their own meanings and would not necessarily best describe this new type of icon functionality.

The latest Windows and Android devices have most certainly progressed with some of the considerations raised here. The Windows 8 platform has customized live tiles, although with limitations as illustrated in the previously mentioned calendar case. The live tiles on Windows 8 desktop platforms, as well as the gadgets of Windows 7, or the dashboard widgets on Apple computers, have similar functionalities to the mobile widgets and live tiles – extra programs or information areas one can attach to the computer desktop. However, none of the widgets or gadgets has extended its concept towards the larger scope of the digital interfaces, such as folders or files, which remain giving little or no information about their contents and remain “dead until touched” icons. Why should users be required to interact with information in a “dead icon conceptual model”, while its digital nature, with its vast graphical possibilities could be explored to deliver a lot more?

2.2 Clouded Files

In the existing networked and cloud-based environments, “dead icons” become a greater issue. With the growth of cloud-based services, devices could regain their multi-user aspect, allowing user accounts to be linked to their equivalent cloud-based items, with devices themselves being only temporary hosts of a file. The cloud paradigm brings further considerations of interfaces, as cloud-based files afford distinct possibilities, such as easier co-sharing, which implies multi-user accessibility in distinct spaces and time zones. As files stored in the cloud are also detached from specific devices, detailed levels of information are particularly important. The context expectation, for example, the location where the file has been last accessed, by whom and even from which platform, can help users interact with files and devices in distinctive ways. Besides, with files stored remotely, they do not depend on the local device hardware to keep updating themselves. This facilitates the *live* information display, as it can be argued that some programs need to be constantly running in the background in order to keep updating their *licons*.

As a scenario, imagine users not carrying laptops, but logging on in distinct platforms to access their data from anywhere. As a user opens his/her cloud interface, its *licons* inform from which platform the document has been last accessed and, in the case of shared documents, who last accessed it or even if it had been simultaneously accessed (Fig. 3). Distinct and valuable information would be visible even before the document is clicked or opened. As an illustration, avatars could be linked to specific devices and/or locations, allowing the user to identify where it was last accessed. Furthermore the avatars shape, round or square in the examples given below, could inform if the file is shared or not (Fig. 2 and 3). The time stamp when the file was last saved could also be part of the *licon* with even a distinct color to differentiate itself visually from earlier versions (Fig. 2).

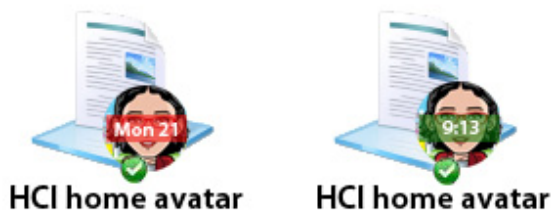


Fig. 2. Image on the left: A file with user’s home avatar and time stamp indicating the last day file was saved; the red color on the time stamp also helps visualize that it is an older version of the file; the round shape of the avatar indicates the file is not shared. Image on the right: Its round home avatar shape indicates file is not shared, and the green color of the time stamp indicates it is the last saved version.

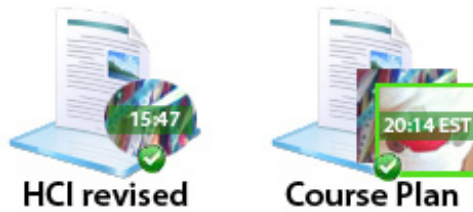


Fig. 3. Image on the left: Round shape of the avatar indicates the file is not shared and the time when the file was last saved. However the user’s avatar is the one from the work place. Image on the right: Shows squared avatar indicating it is a shared file. It also indicates through the order of the avatars, which user has last accessed and saved the file with a time stamp. Also, the green border indicates the file being in use by the other user at that moment.

This kind of intervention is a way forward to facilitating the interaction with the file’s information that is relevant for the user. These examples could also apply for any file type as well as folders. These considerations about Dead-Until-Touched icons and cloud-based interfaces could help inform and define some of the future scenarios towards more distinguishable and optimized graphical user interfaces.

3 Conclusion

Current digital interfaces, their icons and metaphors were discussed with the intent to reconsider some of the designed functionality attributed to them. This paper contribution lies on providing a distinguished view on user interfaces and helping elaborate on future iconography design and its role on UI developments.

The cloud-based paradigm and the growth in numbers of computers and portable devices bring a shift in how information is consumed. Consequently the approach of Dead-Until-Touched icons on digital interfaces should also come to an end soon. Data accessibility is gaining a distinct value as users of digital devices interact with different types of information, and it is time interfaces have addressed that with more care.

As when interacting with physical spaces, and despite all the direct metaphors used in graphical user interfaces, cues from the physical world are not yet reaching the same level of visual attributes on digital devices. This does not lie necessarily in lack of processing power, but due to a lingering concept from previously known interfaces. Questions such as “why do most computers and mobile devices have to host the same GUI for different age groups and uses?” and “why do static icons have to continue?” become appropriate.

As computers and portable devices change from a “lasting” good to something obsolete in few years, and as they need constant updates and upgrades, the UI design could fit different purposes and their different uses. From schools to work and personal environments, GUIs could comply with the diverse contexts of their uses in a

single device, by, for example, recognizing the device location, and changing the configuration accordingly.

Other questions for consideration involve the growing number of files being stored on cloud-based services and how GUIs can better inform users about them. Physical spaces are constantly challenged, objects are moved around, and whole areas are redesigned and reorganized. This very tangible physical human behavior has not spread itself into GUIs yet. Mobility has gained new meanings as well as our relationship to technology and information. Therefore such changes need to be taken in consideration by interface designers in order to apply more creative and innovative approaches towards graphical user interface environments. And consequently *Interformation* should gain the center stage in UI by adding visual accessibility to digital communication through *licons*; and, by augmenting user experiences through challenging the current Dead-Until-Touched paradigm.

Acknowledgments. I would like to thank all my previous and current students, who have been asked to challenge current interfaces and who have answered this challenge with various creative approaches. I would also like to thank Nalini Kotamraju and Rilla Khaled, who read and provided helpful comments on previous versions of this document.

References

1. Agarawala, A., Balakrishnan, R.: Keepin' it real: pushing the desktop metaphor with physics, piles and the pen. In: CHI 2006, SIGCHI Conference on Human Factors in Computing Systems, pp. 1283–1292. ACM Press, New York (2006)
2. Kay, A.: User interface: A personal view. In: Laurel, B. (ed.) *The Art of Human-Computer Interface Design*. Addison-Wesley Publishing Company, New York (1990)
3. Barr, P.: *User-Interface Metaphors in Theory and Practice*. MSc. New Zealand, http://www.pippinbarr.com/academic/Pippin_Barr_MSc_Thesis.pdf
4. Baudisch, P., Good, N., Stewart, P.: Focus plus context screens: Combining display technology with visualization techniques. In: *Proc. UIST 2001 ACM Symposium on User Interface Software and Technology*, CHI Letters, vol. 3(2), pp. 31–40. ACM Press, New York (2001)
5. Benbasat, I., Todd, P.: An Experimental Investigation of Interface Design Alternatives: Icon vs. Text and Direct Manipulation vs. Menus. *International Journal of Man-Machine Studies* 38(3), 369–402 (1993)
6. Brouckerhoff, R.: *User Interface Metaphors* (2000), <http://203.130.231.110/pub/books/Cultural-HCI/Cultural-HCI/User-Interface-Metaphor.pdf>
7. Buxton, B.: *Sketching User Experience: Getting the Design Right and the Right Design*. Morgan Kaufmann, San Francisco (2007)
8. Grudin, J.: The computer reaches out: the historical continuity of interface design. In: *Proc. CHI 1990, SIGCHI Conference on Human Factors in Computing Systems*, pp. 261–268. ACM Press, New York (1990)
9. <http://www.itu.int/ITU-D/ict/statistics/>

10. Holz, C., Baudisch, P.: Understanding touch. In: Proc. CHI 2011, SIGCHI Conference on Human Factors in Computing Systems, pp. 2501–2510. ACM Press, New York (2011)
11. Hudson, W.: Metaphor in User Interface Design: A view from the trenches, <http://www.syntagm.co.uk/design/articles/muid01.pdf> (retrieved June 2012)
12. Jacob, R.: What is the next generation of human-computer interaction? In: Proc. CHI 2006, Extended Abstracts on Human Factors in Computing Systems, pp. 1707–1710. ACM Press, New York (2006)
13. Jørgensen, A.K.: Taking stock of user interface history. In: NordiCHI 2008, Proc. of the 5th Nordic Conference on Human-Computer Interaction: Building Bridges, pp. 479–482. ACM Press, New York (2008)
14. Jørgensen, A.K., Myers, B.A.: User Interface History. In: Proc. CHI 2008, Extended Abstracts on Human Factors in Computing Systems, pp. 2415–2418. ACM Press, New York (2008)
15. Key statistical highlights: ITU data release (June 2012), http://www.itu.int/ITU-D/ict/statistics/material/pdf/2011%20Statistical%20highlights_June_2012.pdf
16. Krug, S.: Don't make me think. New Riders Press, Berkeley (2005)
17. Lanquetin, N.: Evaluation & Use of Metaphor in Advanced Interface Design (2007), http://psbase.com/studies/uad/wdd/ca1034a_report/ca1034a_report.pdf
18. Marcus, A.: Metaphor design in user interfaces: how to manage expectation, surprise, comprehension, and delight effectively. In: Proc. CHI EA 1997 Extended Abstracts on Human Factors in Computing Systems, pp. 172–173. ACM Press, New York (1997)
19. Marcus, A.: Metaphor design for user interfaces. In: Proc. CHI 1998 Conference Summary on Human Factors in Computing Systems, pp. 129–130. ACM Press, New York (1998)
20. Moggridge, B.: Designing Interactions. MIT Press (2007)
21. Nielsen, J., Molich, R.: Heuristic evaluation of user interfaces. In: Proc. CHI 1990 SIGCHI Conference on Human Factors in Computing Systems, pp. 249–256. ACM Press, New York (1990)
22. Raskin, J.: The Humane Interface: New Directions for Designing Interactive Systems. Addison-Wesley, Reading (2000)
23. Saffer, D.: The Role of Metaphor in Interaction Design. Master Thesis, http://www.odannyboy.com/portfolio/thesis/saffer_thesis_paper.pdf
24. Smith, D.C., Kimball, R., Harslem, E.: The Star User Interface: An Overview. In: Proc. of the AFIPS 1982 National Computer Conference, pp. 515–528. ACM Press, New York (1982)
25. Thomas, D.: Erickson. Working with interface metaphors. In: Laurel, B. (ed.) The Art of Human-Computer Interface Design, pp. 65–73. Addison-Wesley Publishing Company (1990)
26. Wiklund, M.: Usability in practice: How companies develop user-friendly products. Academic Press, Boston (1994)
27. Zigelbaum, et al.: Reality-based interaction: a framework for post-WIMP interfaces. In: CHI 2008, Proc. of the Twenty-Sixth Annual SIGCHI Conference on Human Factors in Computing Systems, pp. 201–210. ACM Press, New York (2008)
28. Froes, I.: New Perspectives on Interaction Design Lecture. Second Interaction South America (IXDA South America) Curitiba, PR, Brazil (2010)
29. Saffer, D.: Designing for Interaction: Creating Smart Applications and Clever Devices, pp. 238–240. New Riders, Berkeley (2009)