

Some Musings On Building and Showing Future UI Prototypes

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Introduction

For better or worse, I have spent a great deal of time demonstrating prototypes of “future UI” systems to people of all kinds. In this paper I would like to lay out some observations I have made regarding people’s reactions to these demo systems. These are very all preliminary thoughts, half-cocked, naïve or even obvious, but I think they can at least serve as interesting talking points.

People are wowed by the darndest things.

Now that large flat panel displays and projectors are relatively commonplace, it is refreshing to give a demo where people don’t make comments on how stunning your display is. Even so, people will often completely miss the point of your demo, and will be completely snowed by the overall whiz-bang nature of it. At one level it is a lot of fun to show systems that deeply impress people, but at another level it is frustrating that in the process they can miss the point of your little innovation.

One common phenomenon is the absolutely robust fascination with *action at a distance*. That is, people tend to be impressed by almost any form of action initiated by some control that is removed from the site of action. This effect is strongest when the mechanism is hidden. Of course, most people are not impressed by the lights coming on by flipping a switch on the wall. A key component then must be the level of surprise, or degree to which expectations are violated when they move a knob here and something changes there. People’s expectations are by and large cast by their experience with personal computers—the most amazing thing they will ever see is the optical mouse.

Magicians are probably operating on many of the same principles. There are probably some things we can learn from magicians, though magicians may be more intent on redirecting attention. Presumably we are less interested in that?

People love the Minority Report interface.

Most people’s conception of future UI is tightly bound to how they are portrayed in sci-fi movies. Sci-fi movie interfaces are a great source of imagination for everyone, but they do not always give a balanced view of what’s really possible or even desirable. There’s a great variety of demos before and after the movie *Minority Report* that are gesture-based, and use interesting sensing in ways that trigger people’s memories of the movie. Interestingly, more than half of the people that I demo to can cite the movie but cannot remember its name (really)—that at least speaks to the power of the particular scene.

Most people don’t fully grasp some of the problems with such an interface. Fatigue is significant problem with these kinds of interactive systems. It is interesting to note, for

example, that before the mouse there was the light pen (a proto-Minority Report interface?), and that one of the draws of the mouse was that you didn't have to hold your hand up for long periods. John Atherton uses the transparent display so that the director can get nice shots of his expensive actor (and it's cool, besides). I believe there *are* real advantages of these kinds of interfaces, but what are they exactly? "I'm too busy having fun moving this thing around the screen."

People expect one-size-fits-all computing.

As mentioned above, people carry a lot baggage when it comes to how they expect computers should behave, i.e. the WIMP interface. Unfortunately, these expectations have an adverse effect in proposing a UI that behaves radically differently. It is shocking how many people will seriously ask whether they can read their email or surf web pages on just about any device you can imagine.

The future-UI designer is thus faced with a difficult choice in how to present their work: try to get full-up Windows running on their device or show their device on some whacky new barely-working application framework. The approach of emulating Windows input is limited by the fact that it usually emulates the mouse very poorly and therefore provides a pretty miserable experience. Inventing a completely new UI suffers from the fact that the UI is probably not very well developed and very narrow, and maybe even doesn't do anything useful at all.

One way to talk around these issues is to sketch the vision of *ubiquitous computing*. For the present purposes this vision predicts that the future is populated with *many* interfaces, each perhaps specialized to a given application or style of interaction. For example, it's not reasonable to expect to code up a C++ program while driving your car. Living room media PCs probably shouldn't present dense fields of text and widget, and kitchen computers are probably fine with coarse levels of input. Thus the future is not about one-size-fits-all computing, but rather smart *specialization*, where some interfaces are free to employ modes of interaction that make sense for a given range of applications. It will be playground of interactive techniques in which its perfectly okay if the wall computer doesn't provide fantastic mouse emulation.

The challenge then is how to design a variety of interactions, without falling back to the WIMP interface, forcing it onto devices where it can't take advantage of a device's special advantages. How will users learn and understand such a variety of interfaces? Are there primitives of interaction more basic than WIMP that we should be using?

Kids have far fewer preconceptions.

It is interesting to watch young children use an interactive table system and compare their usage pattern with that of typical adults. Kids will use possibly both hands, putting their whole (small) hands on the surface, while most adults will form a proper extended index finger and fully expect a cursor-based interaction. This is probably due to the fact that most kids have never used an ATM touch screen and have minimal experience with PC computing, and so do not have many preconceptions about computing interfaces. In

many ways, they expect the direct manipulation interface and are not surprised by it in the least, while adults are quite the opposite.

The differences don't stop there. Kids tend to move much faster than adults, which can be a problem for many prototypes. Kids seem to be *a lot* harder to impress than adults. Perhaps this is due in part to increasingly early experience with video games or the relative technical sophistication of today's toys.

It will be interesting to see how today's generation of children will question today's interfaces and re-invent them. Instead of waiting until they are out of college (at least) to have access to computers powerful enough to build interesting prototypes, they will be able pursue their wildest dreams right away.

Building prototypes is fun. Evaluating them is hard.

Many of us have been having *a lot* of fun building interesting prototype systems that demo well. However, evaluating these prototypes to show that users can understand them, or showing scientifically that they improve some aspect compared to more conventional approaches, can be very difficult.

Chief among the difficulties is that because the systems tend not to be incremental improvements on what we already have but more a reinvention of the interface, typical users are wowed by the novelty. Most will say they like it or enjoy it but when you press for specifics you find they like it just because it is new and interesting. Subjective evaluations that include questions such as "Did you like it?" are therefore not helpful. Comments solicited during brief demonstration-length encounters are interesting and can be valuable feedback, but they tend to miss important considerations such as whether users could really live with such an interface day in, day out. Longitudinal studies are expensive and usually require a fairly refined (robust) prototype.

Even when the user study is truly informative and well executed, the effort put in the study is usually a fraction of the effort spent to get the system working in the first place, and once the paper is done, we're onto the next thing. Most of us are engineers and inventors at heart after all. It is therefore difficult to find answers to some of the deeper questions raised by these new interfaces. *Tangible computing*, for example, satisfies an intuition that input and output should be embodied in the real world, yet this very powerful intuition is supported by very few scientific studies. Does tangible computing scale? In order to make it real must we spoil it with layers of modal interactions?

One can argue that the field (whatever it is) is very young and we are still in an exploratory mode, where we are at once picking the low-hanging fruit and exploring the outer boundaries of what is even possible.

Traditional HCI evaluation metrics capture only a part of what's going on.

When it comes to the application of traditional HCI evaluation metrics such as time to task completion, reaction time, Fitts index of difficulty and so on, as applied to future UI

concepts, one is reminded of the adage of the drunk looking for his keys under the lamp-post because that is where there is good light. Traditional HCI metrics seem ill-suited to address many aspects of future UI prototypes that generate a lot of excitement, such as the interface's *novelty*, the sheer *pleasure* in using a device, and the quality of "flow" experience [2] enabled by the interface. Don Norman [3] argues that there are a variety of dimensions along which a device or interface can be evaluated, some of which have nothing to do with *performance per se*, such as the *reflective* qualities that relate to the user's self image and satisfaction in using the device. Norman further argues that in order for a device to be a success it must be successful on multiple levels. It is interesting to note how this dove-tails nicely with the observation that the future will lead to a larger variety of interactions—not everything must be built to do word processing.

The novelty of a UI prototype presents an interesting dilemma. On the one hand, scientists studying usability often spend a great deal of effort to remove novelty effects (longitudinal studies being the most relevant method). On the other hand, novelty is a quality that can drive users to initially engage in a device in the first place, and can provide some much needed variety in one's life. In some sense, as consumers we crave novelty and actively seek it out. The question of whether novelty is a "good" or "bad" thing has probably more to do with its staying power and whether it gets in the way of performing the main task. Unfortunately there are few good ways to talk about the impact of novelty. The quality of pleasure in using the device, and the abstract quality of "flow" have similar stories.

Video games provide a wide variety of user interfaces (at least, in comparison with most other computing), but very little is known or written about what specifically makes a game fun or engaging. The new field of study that considers the design of games may provide some directions on non-traditional ways to evaluate user interface prototypes [1].

Conclusion

This short paper presents a number of thoughts related to how prototypes of future UIs are shown and how they are positioned within the HCI field. While many of the comments are of a critical nature, they should also be viewed as opportunities for areas of future work. Many of these problems are very difficult, and it is probably unreasonable to expect clean solutions for any one, particularly in light of the overall arc of *interface diversity* presented: the *future* of the future UI is likely to be messy but full of interesting worthwhile diversions.

References

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