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TUI or GUI—It's a Matter of Somatics

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Over the past 20 years—from the inception of the multimedia research community until now—we've concentrated more and more on digital video and imaging and less on other media types. In fact, somehow we've managed to completely ignore the most common type—namely paper!

It's fair to say that the traditional print/paper media type has become "disconnected" from the rest of the gang of electronic imaging, digital video, and online data. For example, if we try to include printed material in a cross-media information search retrieval, it must be scanned into another form, namely an image or character stream via optical character recognition (OCR). In this article, I intend to make a case for a more inclusive view in our field—for using touch user interface (TUI) technology as a unifying concept.

We shouldn't forget that paper continues to be the favorite medium for the literate. Many of us print our emails, particularly the lengthy ones, and read them off the paper version. The fact that commercial newspapers and magazines haven't significantly decreased in subscription is another indicator that the digital age hasn't been able to weaken the position of print, which has its origins in the hieroglyphs and cuneiforms of several thousands of years ago.

However, our success in the multimedia field (and IT in general) has created a disconnect—that is, a clear separation of printed information from digital information along the methodology, business, and usability dimensions. Have you noticed that those of us who have the option usually pick up timely, small-grain information (say, sports scores or stock prices) from the online sources and rely on paper-based sources for more detailed analyses? Well, now there's a way of connecting these seemingly disparate media types, by the simple concept of a TUI. TUI is just like a graphical user interface (GUI), except that it doesn't make a distinction on the physical medium, which can just as easily be paper.

Within the multimedia community, haptics have been increasingly more important in a variety of applications—a fact that was demonstrated in a special issue of *IEEE MultiMedia* earlier this year.[1] TUI offers the ability to touch the surface of the book you're reading to select such actions as loading an Internet page, activating an audio device, or sending a signal, among many others.

You might ask, Why would I want to do that? Well, just ask the advertisers who still sink an enormous amount of money into print ads, and yet rely on providing the bulk of the necessary product information online. TUI will enable that connection—a connection that doesn't exist today—unless you actually read the URL and type it into the address box of the browser. Imagine the gain for advertisers and the new business models that such a new mechanism will enable. Suddenly, we breathe a whole new life into print media, and paper reduction finds a completely new meaning.

My real interest in TUI, however, is from the point of view of education—particularly the education of persons with disabilities. A properly developed TUI will provide a hyperlink of sorts for the book. Neat, huh? Well, add to this the ability to remotely connect to other sources, maybe a CD/DVD, a database, or page on Wikipedia. Now the learner has the ability to query and cross-reference printed matter and digital information.[2]

Such a capability is significantly more important for persons with disabilities. Those with visual impairment have used the touch technology routinely for information acquisition, and a TUI will only enhance their connectivity and retrieval power. For those who use an assistive device for communication, the TUI concept provides that essential bridge between print and the digital world, which has been identified as a major barrier for universal access. Not convinced? Think about the relief to a person with a disability for not having to use the keyboard!

(continued on p. 103)

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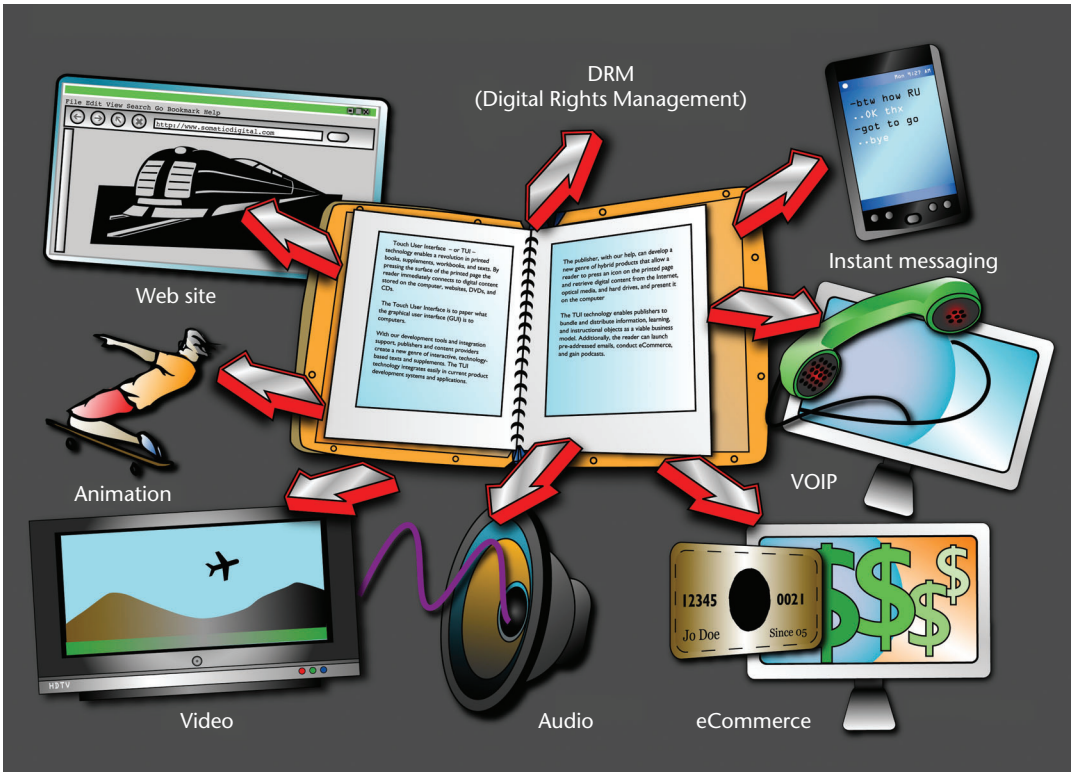

Figure 1. Content and protocol connection diagram. (VOIP stands for Voice over Internet Protocol.)

(continued from p. 104)

From a technology standpoint, all the essential elements are already in place (see Figure 1). Thus, the issue is an engineering one and one of finding the right business model to make TUI the user interface of choice. Several companies are active in this area and prototypes are ready to impress the awaiting users. However, several barriers must be removed for the cost factor to go from around $1,000 per unit to around $10 to $15. One of the barriers is a lack of standards. A TUI standard will specify a paper-based GUI that will enable users to gain additional functionality from printed materials. My hope is that the first standards will be in the area of learning and education, and will

- definitively embrace the existing standards in the disability services area;
- provide consistent and cross-cultural platforms for the authors to connect their readers to a vast array of interrelated material; and
- allow learners to experience and interact with information in multiple formats.

This is bound to ensure more versatility in learning styles. **MM**

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