Sustaining the paper metaphor with Dynamic-HTML

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ABSTRACT
We describe prototypes that sustain the paper metaphor in two new on-line scenarios: (1) reading annotated works of foreign literature, and (2) paperless medical reporting [Brelstaff & Chessa, "D-HTML paper metaphors", submitted to *Demo's at HCI'98]*.

KEYWORDS
Paper metaphor, D-HTML, Open distance learning, CALL, Electronic patient record.

INTRODUCTION
The goal of the paperless office remains somewhat elusive - as the leading printer manufacturers can testify. PC applications, in particular, seem to be designed to produce new printed documents, rather than eliminate them. However, a new impetus away from paper is now being led by the technology of the Internet/Intranet. It not only provides new channels to exchange purely digital documents, but its vast readership, re-motivates the quest to extend the paper metaphor whilst enabling new methods with the advent of dual-browser dynamic-HTML (D-HTML) [Mudry 1998].

The metaphor of the user interface (UI) as paper page has endured up to today's homepages on the web - due, in part, to its universal familiarity. New users rapidly orient themselves -already knowing how pages should behave or respond. As long as their UI obeys key expected behaviours they happily accept extension of functionality [Collins 1995]. Examples have included: the DEL key – enabling correction without snowpake; VisiCalc, an early spreadsheet - computing totals on the page; spell-checkers red-underscoring misspellings; text entry into blank form fields; and the Mac's cartoon context-sensitive help. A factor common to these successful extensions is their minimal invasion of the user's visual search capacities: action occurs at, or near where visual attention is already fixed - so normal reading patterns (Yarbus 1976) are not disrupted by external saccades. It is becoming clear that transsaccadic memory is not a good cache of detailed information [Blackmore et al 1995]. Ignoring this fact can lead to disorientating UIs: pop-up assistants (Office95); digital footnotes at the foot of the page; hypertext links that obliterate the reader's current page; and *Next* buttons out of the natural reading flow. Below we outline prototypes that leverage D-HTML to extend the paper metaphor in two on-line scenarios: (1) reading annotated works of foreign literature, and (2) paperless medical reporting.

READING ANNOTATED WORKS OF FOREIGN LITERATURE
Original texts of great works are often inaccessible to foreign literature undergrad's until they complete a year of preparatory language training. Our prototype confronts them with original text from the word go, providing inline annotation designed by tutors to resolve predicted language difficulties as well as to instill literary appreciation and interpretation. The interface design is simple:

1. The original text is always visible as black on a light-grey background, except when the cursor moves over a word - where the coherent phrase or sentence containing it becomes highlit by a white background.
2. Parts of that phrase containing annotation are signaled in a distinguishable coloured font, and respond to a mouse click by replacing, in-line, the original text with that of the annotation while reversing the font/background colours.
3. Successive clicks replace that annotation with another, or return to step 2; while moving the cursor off the phrase undoes any annotation or highlighting.

Here we dynamically manipulate CSS-2 style-sheets using client-side JavaScript (CSJS). Text and annotations are imported from CSJS files as series of call to a function. Minimal eye movement is needed by the reader, and colour highlights hold rather than distract attention. So a basic grasp of a language may afford an on-line opportunity to appreciate and learn from classics with less resort to reference books.

PAPERLESS MEDICAL REPORTING

Medics happily fill-in paper reports or forms, sign them and file a copy before dispatching them. They are used to being able to see what they wrote when they need to. An electronic form is different: once submitted transparency is immediately lost – medics neither know where the data has gone nor whether it got manipulated during the process to misrepresent them. Gaining medics' trust remains a barrier to the widespread introduction of the multi-media, electronic patient record (EPR). Our prototype uses CSJS to freeze each form at the moment of submission into a document with identical HTML layout but with all data field fixed as permanent text. A medic can then digitally sign and email (S/MIME) this document to a secure newsgroup [Brelstaff, "Leveraging Internet-98 Technology for Computer Healthcare Networks", submitted to *IEEE Transactions on Information Technology in Biomedicine*]. Thus a paper-like, electronic archive remains always visible to the medic and authorised colleagues. A newsgroup is maintained for each patient, each hosting a pre-specified set of *threads* that map onto distinct parts of the patient record (e.g. anagraph, clinical plan, diagnoses, vital signs, exams). Each thread is initialized with a custom blank document. As the patient progresses though the ward medics successively update the latest version of relevant forms. For this purpose a "Reactivate Form" link is included in each frozen form. When clicked it re-launches that form with the previously filled data fields. In fact, it requests the appropriate blank form from a companion secure web server (running SSL) as an URL with a "search string" specifying the existing data. CSJS parses that data and fills in the blanks. Remarkably, no SQL databases is involved – and no text processing occurs on the server.

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