Providing End-Users with a Visual Editor to Make their Electronic Documents Active

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Outline of the talk

- In this brief talk I will:
  - Introduce the rationales for and core concepts of WOAD.
  - Tell you a (very) short story on how we came to visual languages.
  - Outline the results of a usability user study.
  - No end line: we are still in our way to make end-users autonomous in developing their own tools.
Motivations behind the talk

- In organizational (paper-based) settings, users are usually in control of developing and continuously refining their own artifacts (templates, forms, records, charts, documents...).
- These artifacts are used according to informal and local conventions that change over time.
- Changes are fast & cheap.
Motivations behind the talk

- When these settings get “digital” and records get “electronic”, these conventions are often “lost in translation”.
- Artifacts are substituted by clean masks to and views from The Information System.
- Changes are usually contrasted by vendors, painful for users and mediated by IT staff (if any).
  - Anyway, they cost time and money
Our proposal

- We conceived a design framework and service platform to deploy document-based information systems.

- An artifact-centered architecture vs. MVC:
  - Core concept: Hyperlinked Active Document
  - No rational, unified Model,
  - Rule-based control,
  - Presentation in control of end-users.

- So, a Web of Active Documents
  - WOAD
Our proposal

- In WOAD end-users build their own templates.
  - So much alike users of FileMaker, yes.
  - The idea is to build ISs by the recursive accumulation of small elements (datoms)
- We developed a Template Editor (WTE)
  - By which users assemble “datoms” (sets of fields) into templates
  - and configure the resulting didgets (document widgets).
- Based on Oryx.
Our proposal

- We also developed a Mechanism Editor (WME).
- Mechanisms are what make documents active (WOAD)
  - A mechanism is a “simple” rule that associates any condition on a documents’ content to specific actions on the whole WoADs.
  - We focus on actions that “promote collaboration awareness”, i.e., the display of Awareness Promoting Information (read it uh-pi).
    - Like highlighting, colored fonts, particular affordances...
Our proposal

- In other words: a mechanism expresses a local contingent document convention in computation terms.

- This poses a precise requirement:
  - Mechanisms must be easy to conceive and execute.
  - No need for IT staff/vendor involvement.
  - Drawing a mechanism must be as easy as...
Research Question

- Can WOAD make end-users become the developers/maintainers of their own digital artifacts?
  - That is make them able to build their own templates from scratch...
  - ...and embue them with their conventional “logic”?
The Woad Mechanism Editor

- To answer this, we also developed a Mechanism Editor (WME).
  - A **mechanism** is a simple rule that associates any condition on a documents’ content to specific actions on the whole WoADs.
- We first adopted a form-based, wizard-like approach.
The Woad Mechanism Editor

- We also developed a Mechanism Editor (WME).
  - A **mechanism** is a simple rule that associates any condition on a documents’ content to specific actions on the whole WoADs.
- We first adopted a form-based, wizard-like approach.
  - It came out to be a **dead end**...
The current WME

- We adapted and integrated in WOAD a visual editor based on the MIT OpenBlocks (now Google Blockly)
  - which adopts the building block metaphor.
  - and was conceived to teach kids (<12 y) how to program.
User Study

- Research Hypothesis:
  - Can the WME can be used with no particular training as proficiently as with a specific training?

- Method:
  - Sample of 30 proxy users [Friedman & Wyatt, 2006]
  - Two groups: trained (U1) vs not trained (U2)
  - Three tasks with an increasing complexity
  - Compare the Mean Time To Performance (MTTP) of the two groups

- Null hypothesis: $H_0: \mu_{T_{U1}} = \mu_{T_{U2}}$
Example of ward convention:

“The nurse usually underscores in the newborn sheet (the vital parameter section) any APGAR score that is lower than 4 five minutes after the delivery so that any other colleague is aware of this critical condition.”
User Study

- Corresponding task:
  - “Write a mechanism that applies a “Criticality API” to the APGAR score field in the Newborn Sheet, if its value is lower than 4 after 5 minutes since delivery”
User Study

The intended result:
User Study

- The video of the task execution
User Study

Results 1:

U1: training;
U2: no training
User Study

Results 2:

- t-Test for equality of means
- Acceptance threshold: $\alpha = 0.05$

<table>
<thead>
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<th></th>
<th>Groups</th>
<th>N</th>
<th>Mean (seconds)</th>
<th>Standard Deviation</th>
<th>P-value</th>
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<td>304</td>
<td>164</td>
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<td>Task 2</td>
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</tr>
</tbody>
</table>

- In general, not trained users perform better (bad training?)
- In any case, $H_0$ cannot be rejected.
A small step forward

- We got results that are unlikely if $H_0$ were not true, if the visual approach were not easy to grasp.
- So can we say that the WME is sufficiently intuitive and really empowers end-users?
- Maybe.

- We need evidence from real settings!
Conclusions

- We are proposing the WME in a clinical setting,
- The paper reports the findings from a series of exploratory / evaluation focus groups where
  - We extracted some safety-related conventions that nurses apply (almost unaware) in their documental artifacts NOW.
  - we showed the WME prototype as a tool to express these conventions in computational terms.
- Further reports from these FGs are in progress for publication.
Thank you!

(and sorry for the hurry, my train is leaving!)