Knowing the User's Every Move – User Activity Tracking for Website Usability Evaluation and Implicit Interaction

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• Detailed Logging of User Actions on Web Pages
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Detailed Logging of User Actions on Web Pages

Requirements:

- Make website usability tests cheaper, automate more of the process
- Detailed logging of mouse movements, key presses, scrolling, window resizing etc.
- Unchanged user experience: Invisible tracking, user can take part from usual work/home environment
- Allow tracking of a user's actions on multiple sites which we do not control
- Without reconfiguring anything at the client side, allow tracking the user's actions on a site we control
Detailed Logging of User Actions on Web Pages

Problems:

• With AJAX, more code runs in the browser
• No server log entry for many user actions in an AJAX application
• People are reluctant to download and install software on their computers
• Many different browsers/OS in use

How can we monitor user interaction with standard web technologies?
Approaches for User Activity Logging

- **Client-based**: Installation of special logging software on the client machine
  ...but this will not work for analysing the behaviour of arbitrary visitors of a site

- **Server-based**: Analysis of all HTTP requests made by the client
  ...but this will not work with many AJAX applications, where a click might not necessarily result in an HTTP request

- **Proxy-based**: All HTTP traffic passes through an HTTP proxy
  ...but how can we observe e.g. the user's mouse movements on the proxy?
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UsaProxy: A Web 2.0 Approach to Proxy-based Logging

- The proxy modifies "text/html" responses before passing them on to the client.
- The modification causes the proxy's logging JavaScript code to be loaded by the browser.
- The JavaScript code is executed on the client to log user behaviour.
- HTTP requests and responses are recorded by the proxy.
JavaScript-based Logging of User Actions

```html
<html>
<head>
<script src='http://lo.lo/proxyscript.js' type='text/javascript'>
<title>Title</title>
...
</script>
</head>
</html>
```

- The logging JavaScript code executes on the browser and registers global event handlers for `onkeypress`, `onmousemove`, `onmouseover`, `onfocus`, `onblur`, `onresize`.

- Log data is aggregated and passed back to the proxy at regular intervals by making HTTP requests to `http://lo.lo/img.jpg?string-to-be-logged`.

- `http://lo.lo/` is treated specially by the proxy code.
Typical Log Output

- Unprecedented level of detail for a solution without installation of client-side software
- Can determine which parts of the page were viewed
- Info about click/hover coordinates and the involved DOM element – also works for dynamically generated elements
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Case Study: A User Test

- UsaProxy ran on one machine, another machine's browser was reconfigured to use it
- 12 test participants were given tasks:
  - Find information in Wikipedia (navigation, search form usage, scrolling)
  - Use the AJAX calendar application on kiko.com
- Extraction of usage data proved to be easy and efficient
- UsaProxy worked well for both scenarios

Mouse trail combined with screenshot
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Application Areas for Our Technology

- **Web usability tests**
  - No expensive test lab, people can participate easily from their own desktop
  - Can invite arbitrary site visitors from the Internet to take part in a test (our solution can be adapted not to require browser reconfiguration)
  - Int'l test users can take part from anywhere

- **User profiling/usage analysis for marketing and business process improvements**

- **Implicit interaction, self-adapting sites**

- **Developing and debugging web applications**
Conclusion

● Detailed tracking of user interaction without client-side software installation

● Fully automatic, no manual preparation of websites for a user test

● Due to UsaProxy's flexibility, a large number of possible fields of use exists

● This work raises privacy concerns – users could be monitored without their knowledge
Questions?

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http://atterer.net/uni.html
http://fnuked.de/usaproxy/
Related Work

- HTTP proxy for tracking: *WebQuilt* (Hong, Heer, Waterson, Landay)

- JavaScript for tracking mouse movements etc: *WebVCR* (Anupam, Freire, Kumar, Lieuwen) *Cheese* (Müller, Lockerd)

- Client-side logging with eye tracking: *WebLogger/WebEyeMapper* (Reeder, Pirolli, Card)

- Correlation between eye and mouse movements (Chen, Anderson, Sohn)

- Making users move the mouse to where they look: *Enhanced Restricted Focus Viewer* (Tarasewich, Fillion), *Poor Man's Eyetracker of ActiveMath* (Ullrich, Melis)