

# 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
- UsaProxy: A Web 2.0 Approach to Proxy-based Logging
- Case Study: A User Test
- Application Areas for Our Technology
- Conclusion

# 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?*

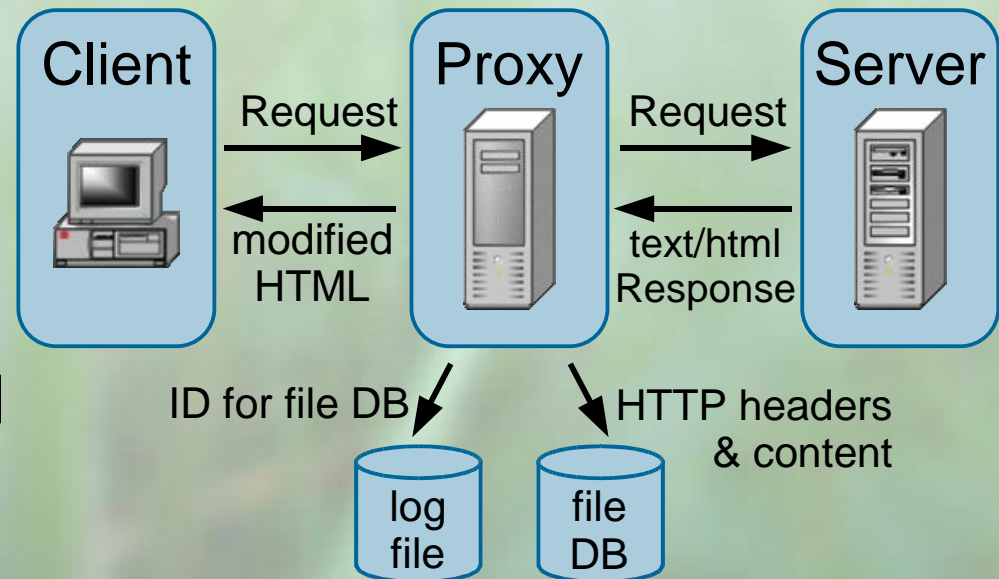
# Approaches for User Activity Logging

- **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



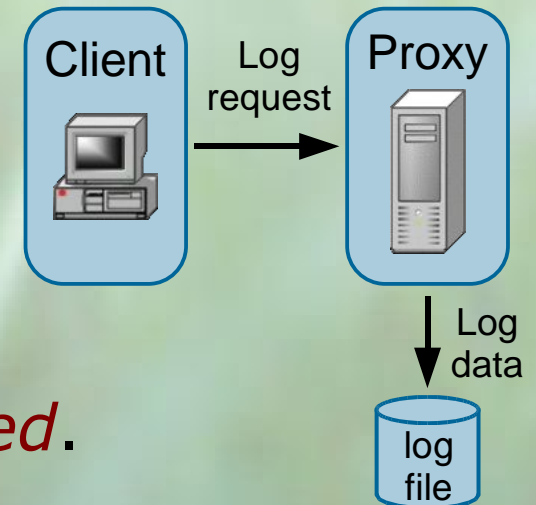
# JavaScript-based Logging of User Actions

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

*original server response*

*content inserted by the proxy*

- 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
- 

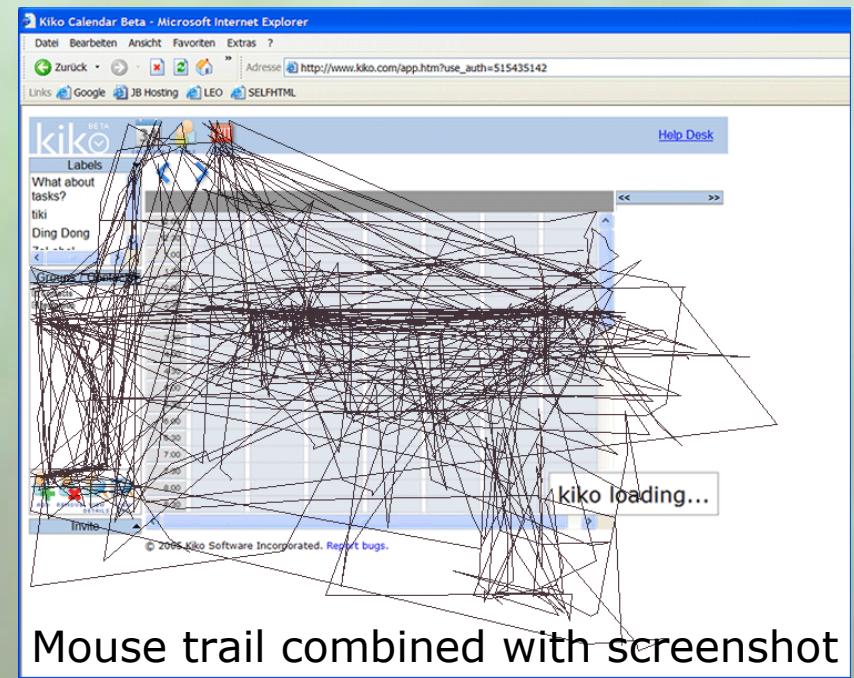
```
141.84.8.77 2005-10-25,11:5:57 http://www.kiko.com/ serverdata 12
141.84.8.77 2005-10-25,11:5:58 http://www.kiko.com/ load width=1280;height=867
141.84.8.77 2005-10-25,11:6:2 http://www.kiko.com/ mousemove x=672;y=7
141.84.8.77 2005-10-25,11:6:2 http://www.kiko.com/ mouseover x=731;y=457
    target=link:http://www.kiko.com/ contact.htm+linktext:Contact
141.84.8.77 2005-10-25,11:6:6 http://www.kiko.com/ click x=815;y=231 target=id:SPAN16
141.84.8.77 2005-10-25,11:6:37 http://www.kiko.com/app.htm?use auth=678397351 mousemove
    x=849;y=352
141.84.8.77 2005-10-25,11:6:37 http://www.kiko.com/app.htm?use auth=678397351 mouseover x=472;y=296
    target=id:DIV144
141.84.8.77 2005-10-25,11:6:37 http://www.kiko.com/app.htm?use auth=678397351 mouseover x=161;y=229
    target=id:left bar
141.84.8.77 2005-10-25,11:6:38 http://www.kiko.com/app.htm?use auth=678397351 click x=147;y=183
    target=unknown:scrollbar
141.84.8.77 2005-10-25,11:6:50 http://www.kiko.com/app.htm?use auth=678397351 focus
141.84.8.77 2005-10-25,11:6:56 http://www.kiko.com/app.htm?use auth=678397351 keypress key=T
141.84.8.77 2005-10-25,11:47:45 http://de.wikipedia.org/wiki/Hauptseite scrolledTo y=399
```

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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)