Tracking the Interaction of Users with AJAX Applications for Usability Testing

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How to make usability tests of websites easier and cheaper?

Recruit regular site visitors as test users!

Use AJAX technology to record user actions!

Users do not have to install extra software!

Users only reconfigure browser's proxy setting
Proxy adds JavaScript to all web pages
All mouse and keyboard input is recorded
Privacy & security issues should be considered

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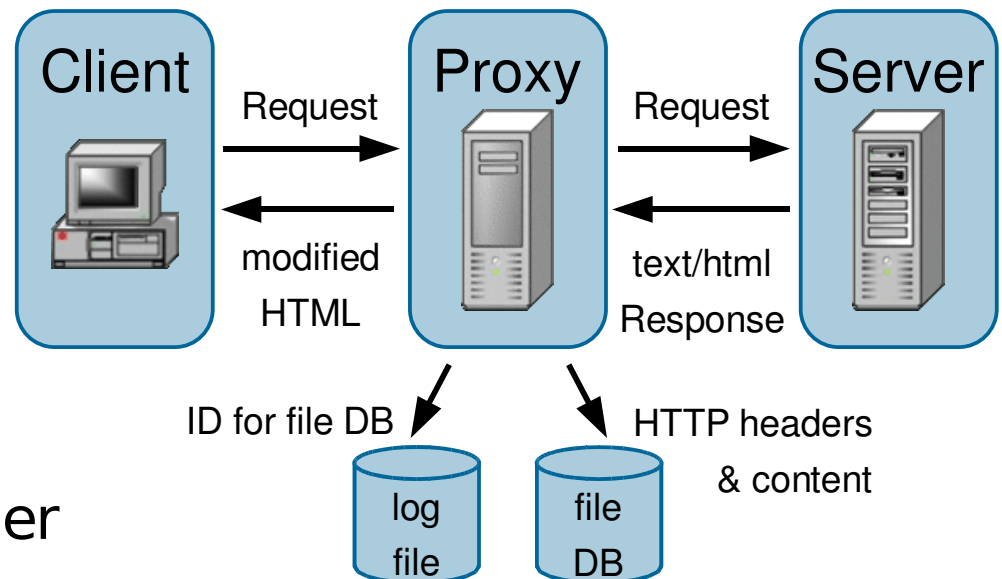B-IT, University of Bonn
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UsaProxy: An AJAX Approach to Remote Website Usability Testing

Make website usability tests cheaper by automating more of the process. Scenario:

- Visitors agree online to take part in a remote test
- An HTTP proxy is inserted transparently between the user and visited website(s)
- User actions are recorded by the proxy with AJAX: Pages visited, mouse/keyboard input etc.
- Easy-to-parse log formats allow automated processing of logs
- Can quickly collect data for a large number of test users, should be combined with in-lab tests

UsaProxy Implementation

- Open-source Java program which can run in different modes:
  - HTTP server: No changes to users' setup, they can be tracked only on our own site
  - HTTP proxy: Users reconfigure browser proxy setting, can be tracked across all sites they visit
- "text/html" responses are modified before being passed on.

- 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.

- All user actions in the browser are recorded by the proxy.

Client — Request → Proxy — Request → Server
Client ← modified HTML — Proxy ← text/html Response — Server

ID for file DB
HTTP headers & content

log file
file DB

Collected Types of Data

- HTTP headers of all browser requests

- For text/html content: Complete server response

- Mouse movements, hovered-over elements, scrolling, clicks, key presses, window size, actions on form controls, cursor focus/blur, selection of text

- DOM elements are identified by ID or position in the DOM tree, so flexible page layouts can be used

- Storage requirements of log data:
  3 kB/min/user for interaction log,
  100 kB/min/user for HTML data

```
141.84.8.45 2006-09-26,14:55:31 httptraffic url=http://www.google.de/ sd=4724
141.84.8.45 2006-09-26,14:52:52 sd=4724 sid=QMv8JThJpnFt event=load size=1272x887
141.84.8.45 2006-09-26,14:52:52 sd=4724 sid=QMv8JThJpnFt event=focus name=q dom=abaecaabb tag=INPUT
141.84.8.45 2006-09-26,14:52:52 sd=4724 sid=QMv8JThJpnFt event=mouseover coord=367,174 name=f dom=abae tag=FORM
141.84.8.45 2006-09-26,14:52:59 sd=4724 sid=QMv8JThJpnFt event=mousemove coord=234,158
141.84.8.45 2006-09-26,14:53:01 sd=4724 sid=QMv8JThJpnFt event=keypress key=c
```

Properties of Our Approach

- No need to find test persons, organize test labs and schedules

- No need to set up equipment (e.g. PC with screen recording), we use AJAX to record user actions

- Test users do not need to install extra software

- No changes to the web application

- HTTP proxy mode: No control over web server necessary

- More automation, so we can perform tests with more users
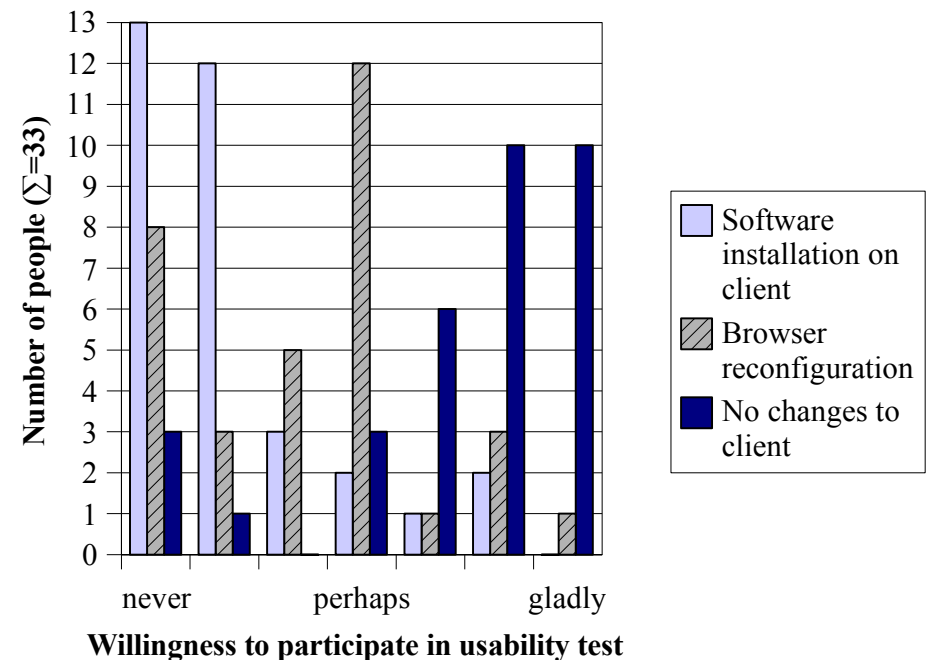
Evaluation – Automated Testing

- Small-scale usability tests were performed to verify that the concept works:

  - Online shopping on Amazon *(no control over server)*
  - Google Mail and Calendar usage *(complex AJAX)*
  - Online map usage *(anonymous tiles in DOM tree)*

- Each of the 7 test participants performed the 3 tasks

- Automatic data analysis using scripts, so our approach would have scaled to far more participants

Evaluation – Can We Recruit Test Participants on the Internet?

- Questionnaire with 33 people
- "Would you take part in a remote usability test...
  - if you would have to install software first?
  - if you had to reconfigure your browser?
 - if no changes to your setup were required?"

Online users are suspicious of downloading and installing software

Non-invasive technology makes a difference!

Number of people ($\sum$=33)

Willingness to participate in usability test

Software installation on client

Browser reconfiguration

No changes to client

Conclusion

- **UsaProxy is an effective tool for remote web-based usability testing**

- **Flexible proxy approach, works with complex AJAX**

- **Potential of abuse for this technology:**
  - Security: Proxy can intercept passwords, session IDs etc.
  - Privacy: Users may be monitored without being aware of it. *We strongly recommend that AJAX-based logging is only employed after users have explicitly agreed!*
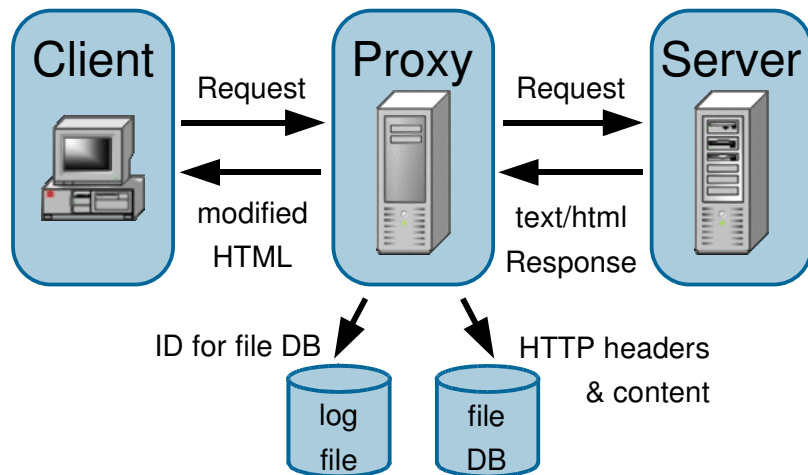
Thank you!
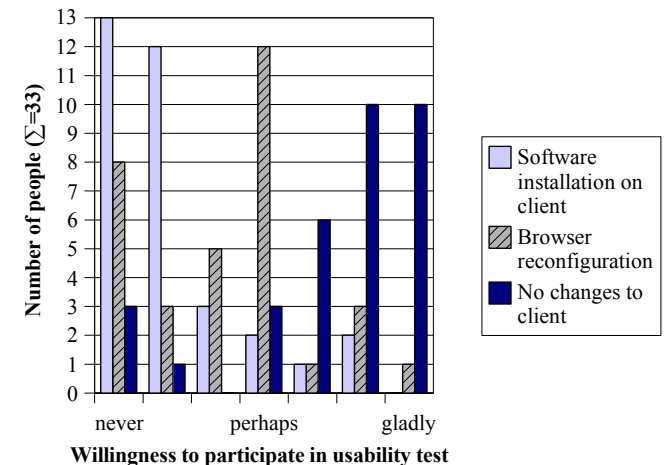
Flexible Deployment

UsaProxy works in different modes depending on the type of usability test:

- *Server mode:* Program acts as a HTTP server, forwards requests to our web server. Users are tracked on our site.
  Users need not change their config, control over server needed

- *Proxy mode:* Program acts as a HTTP proxy, can track users on all pages they visit
  Users need to reconfigure their browser's proxy setting

- *Transparent proxy mode:* Mandatory HTTP proxy for all machines on a LAN.
  Users need not change their config, access to network infrastructure necessary