Browser Feature Usage on the Modern Web
Summary

- Analysis of how frequently JavaScript features are used
  - “Feature” defined as browser capability accessed through JavaScript function or property.
- Considers only sites in Alexa top 10k
  - Represent ⅓ of total web page visits
- Over 50% of features are not used by sites in the Alexa 10k.

Affected by ad & tracking blocking

- Around 10% of browser features are used by websites but blocked by these extensions at least 90% of the time
- With blockers present, 83% of features are run on less than 1% of websites
Web Features

Browsers support different sets of features & standards

Data obtained from W3C documents
Feature Proliferation

- Browser makers are incentivized to keep adding new features in order to stay competitive.
- No motivation to remove old, unused features.
- Based on analysis of Firefox 46.0.1 WebIDL definitions, there are 1,392 total methods and properties.
Survey Methodology

● Visited each top 10k website 10 times
  ○ Used Firefox browser only.
  ○ 5 with unmodified browser.
  ○ 5 with popular tracking and ad-blocking extensions.
    ■ AdBlock Plus and Ghostery

● Recorded browser features that were used
  ○ Used a custom Firefox browser extension to record each usage.

● Ran automated crawl through sites using “monkey testing”
  ○ Interacted with random elements on page
  ○ Validation shows that after 5 rounds no new standards were discovered

<table>
<thead>
<tr>
<th>Domains measured</th>
<th>9,733</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total website interaction time</td>
<td>480 days</td>
</tr>
<tr>
<td>Web pages visited</td>
<td>2,240,484</td>
</tr>
<tr>
<td>Feature invocations recorded</td>
<td>21,511,926,733</td>
</tr>
</tbody>
</table>
Results: Browser Standards

- **Standard**: Set of related browser features
  - Charted instead of features for simplicity

- **Standard popularity distribution**
  - 6 of 75 standards used on over 90% of websites
  - 28 standards used on 1% or fewer
  - 11 not used at all

Figure 3: Cumulative distribution of standard popularity within the Alexa 10k.
Standard Popularity versus Site Popularity

- Some standards are used by fewer, but more popular sites
- Trend is mostly linear

Figure 5: Comparison of percentage of sites using a standard versus percentage of web traffic using a standard.
Old standards tend to be either very popular or very unpopular (AJAX vs HTML: Plugins)

New standards see a lot more variance, with some being highly popular and many more being unpopular.
Ad and Tracking Blocking

- Standards that are blocked by ad blocking extensions are more likely to be blocked by tracking blocking extensions.
Browser Vulnerabilities

- Many standards have known vulnerabilities (up to 15)
  - Popular standards like HTML: Canvas, HTML 5, and XMLHttpRequest are used on over 70% of sites but have 15, 10, and 8 vulnerabilities respectively.
- Just because a site is using a vulnerable standard doesn’t mean that it is using vulnerable features
Figure 8: Probability density function of number of standards used by sites in the Alexa 10k.