

# Pushing the boundaries of User Experience Test Automation

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# What we want to achieve



*To automatically detect (some)  
issues that may adversely  
affect the User Experience*

# So what are the business problems?



- Quality-In-Use:
  - UX, Cross-browser & Accessibility issues on live site
- Engineering Productivity:
  - Time taken from feature-complete to live site
- Quality Engineering:
  - Over-reliance on manual testing
  - Existing test-automation under-performing

# And some UX Test Automation problems...

- Minimal existing work in Industry
  - Existing tools tend to test static aspects
- Academic work appears to be unsuitable
- How to automatically measure and test UX *at all!*

# UX = User Experience

- Dynamic, based on *using* the system



- We focus on the Human + Computer Interactions

# Using Heuristics\*



1. When I navigate by tabbing I should return to where I started in a reasonable number of key-presses
2. Flow should be consistent through web-forms
3. Look-alike & work-alike across web browsers
4. I should not be able to bypass the security of the site from links in the UI

*\* Fallible, but useful, guide/approach/practice*

# Equivalence of input paths

## Mouse

- Clicks...

New

Dropdown

Select

Send

4 inputs

## Keyboard

- Keystrokes

Tab

Space

Down-arrow

Enter

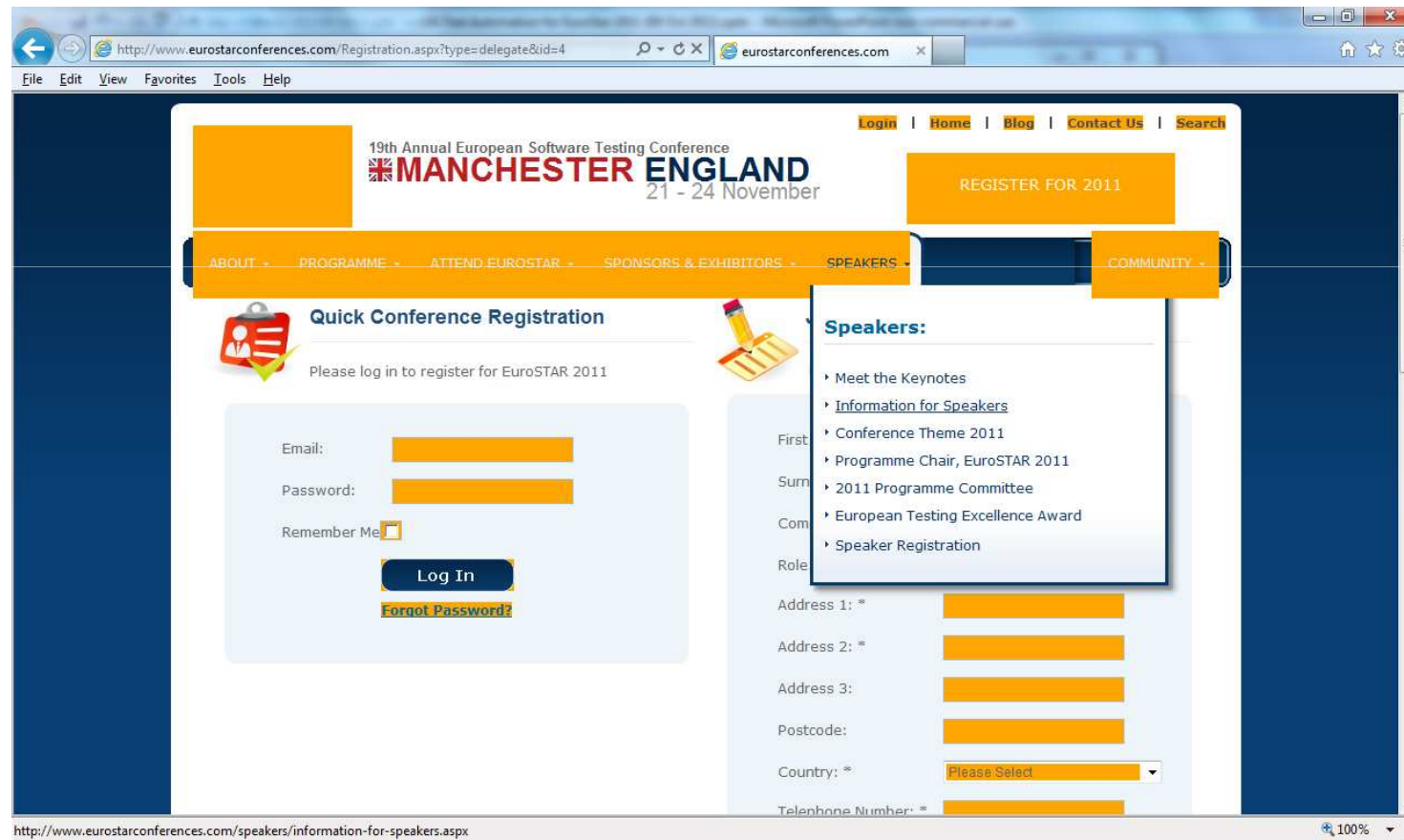
Tab

Enter

10 inputs

# A real example: Information for Speakers

Mouseover; click = **2 steps**      13 Tabs + 22 Tabs = **35 steps**





# Automated exploration and discovery\*



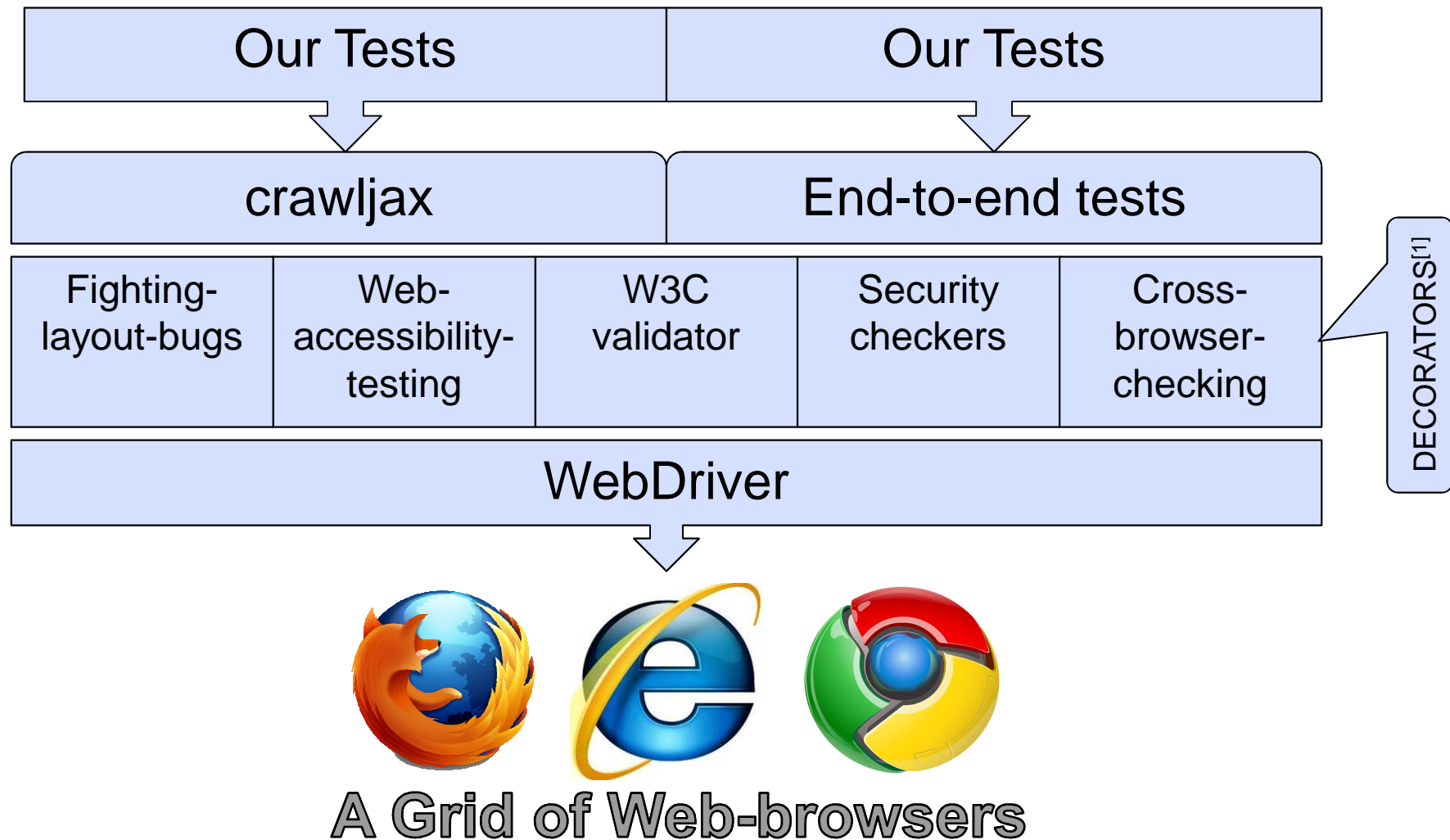
- Automating heuristic tests
  - Web accessibility testing
  - Fighting layout bugs
  - BiDi checker
- Using Crawling tools
  - Crawljax

*\* We're working on complementary work on interactive exploration and discovery*

# Man & Machine

- Fully automated execution, human inspection
- Interactive testing, aided by tools

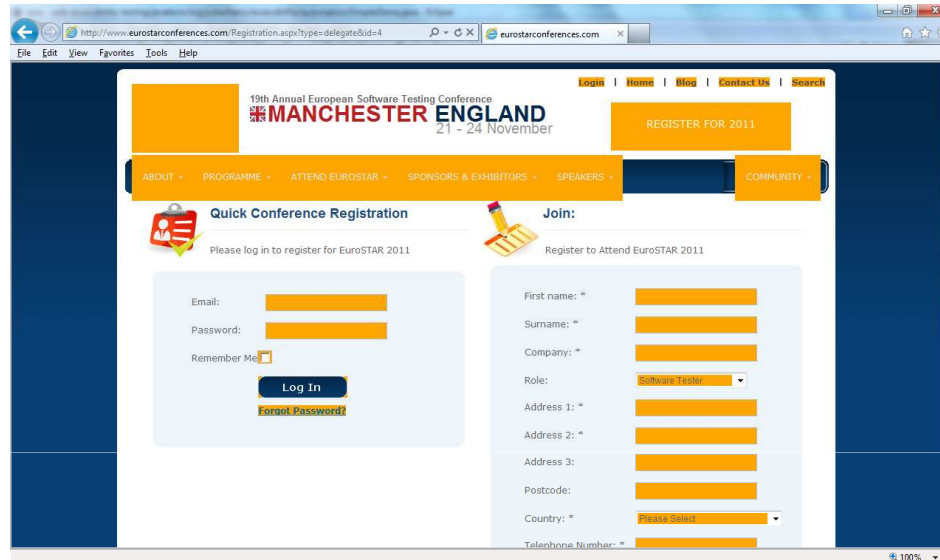
# The moving parts...



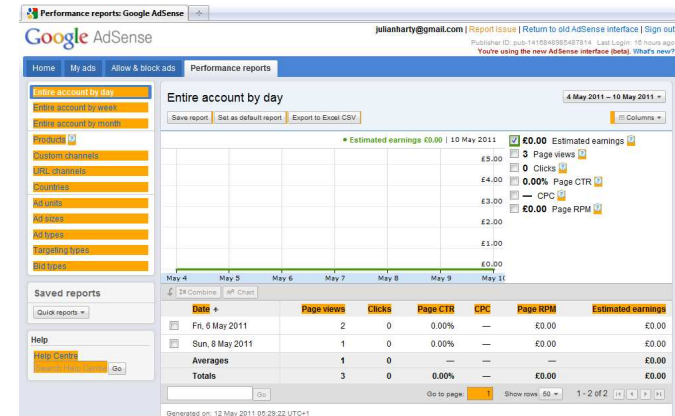


# DEMO

# Sample screenshots



<http://www.eurostarconferences.com/Registration.aspx?type=delegate&id=4>



<http://adsense.google.com>



<http://www.google.co.in>

## And what about Static Analysis?

- Don't overlook the value of static analysis (but don't rely on it either...)
- Find ways to filter the reported results
- We've created automated Accessibility Tests, which check the contents of pages using WCAG guidelines.

# Problems detected:

```
{ "testName": "checkMouseEventHaveKeyboardEvent", "description":  
  "Check that elements that have mouse actions also have keyboard actions.",  
  
  "severity": "error", "elementCode": "<a href=\"#\"  
onclick=\"window.open(' /Content/Terms-and-conditions.aspx',  
'termsAndConditions','width=1000,height=600,resizable=yes,toolbars=0,menubar=no,scrollbars=yes,status=no'); return false;\"> Click here to read terms  
and conditions</a>"}  
}
```

"checkTitleIsNotEmpty" for the entire page

```
"testName": "checkAltTextOnImage", "description":  
  "Check that visible images have alt text",  
  "severity": "error", "elementCode":  
  "<img src=\" /themes/Eurostar/images/ico-linkedin.png\" />"
```



# Now what?



“Sure, Accessibility is important:  
file it with the rest of the things  
we *should* do...”

What *should* be done seldom gets done...



# 3 Improvements for the price of 1

- Accessibility + Testability
  - Both need to interpret the contents in the browser
  - Improving one often improves the other
- Accessibility + SEO\*
  - Both find value in descriptive labels



alt=""



picture

alt="picture"



alt="Mens Black ..."

Mens Black Levi 501 Jeans 32" Waist /32" Leg Excellent Condition

# Happiness



- Improved Accessibility: Users are happier
- Improved Testability: We're happier
- Improved SEO: Business is happier

# Beware of (over-)trusting test automation



- Automation as servant, not master, of our software delivery
  - Inaccurate results
  - “Beware of Automation Bias” by M.L. Cumming<sup>[1]</sup>
- Automated tests and checks miss more than they find
- Make behavior easier to assess
  - Screenshots and contents of DOM to verify after tests ran
  - Automated video recordings

[1] <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.91.2634&rep=rep1&type=pdf>

# What we think we're testing...

The screenshot shows the eBay.co.uk homepage. At the top, a rainbow-colored brushstroke spans the width of the page. The eBay logo is on the left, followed by the user greeting "Hello, (julian1964). (Not you?)". Navigation links include "Buy", "My eBay", "Sell", "Community", "Contact us", and "Help". A search bar is present with a dropdown menu showing "All Categories" and buttons for "Search" and "Advanced".

**Left Sidebar (All Categories):**

- All Categories
- Electronics
- Fashion
- Home & Garden
- Jewellery & Beauty
- Sports & Leisure
- Books, Films & Music
- Collectables
- Motors
- Daily Deals

**Main Banner:** "The new iPhone 4 in white Just out and now on eBay". It features images of the iPhone 4 and a pink circle saying "NOW ON EBAY". A "Shop now >" link is at the bottom right.

**Daily Deals Section:** "DON'T MISS TODAY'S DEALS". It features two deals:

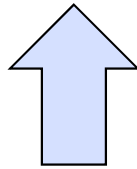
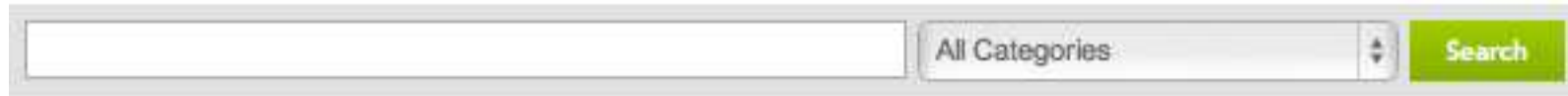
- Bench Men's Overton Jeans:** 60% OFF, £19.99, Free P&P. \*RRP as at 16/12/2010.
- Timberland Men's Shoes:** 55% OFF, £39.99, Free P&P. \*RRP as at 01/04/2011.

A "See more great deals" link is at the bottom right of the Daily Deals section.

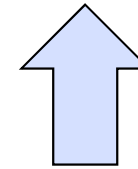
**Bottom Section:**

- Your recent searches:** macbook air, bmw f800, seat arosa automatic, korean towel, korean, plastic insects, plastic insect locust. A "Clear searches" link is at the bottom.
- Shop safely on eBay:** Includes "eBay Buyer Protection" (Shop with confidence), "eBay Top-rated Sellers" (Get great service and fast dispatch from top sellers), and "PayPal" (The safer, easier way to pay online).
- Sign in:** "Sign in now to buy, bid and sell or to manage your account." Includes a "Sign in" button, "Not registered yet?" (Join the millions of people who are already part of the eBay family.), and a "Register" button.
- AdChoice:** "You're in safe hands when you shop on eBay" with the eBay Buyer Protection logo and a "Find out more >" link.
- Suggestions for you:** A row of five laptop images with a "GRAB A BARGAIN Find items ending soon" banner and a "Check it out >" link.

# What our automated test actually interacts with...



Enter text here



'click'

# (Some of the) things our automated tests may miss...

The image shows a screenshot of the eBay.co.uk homepage. A horizontal bar at the top is divided into segments of red, purple, blue, orange, yellow, and green. Four blue callout boxes point to specific areas of the page:

- Navigation:** Points to the left-hand menu with categories like Electronics, Fashion, Home & Garden, etc.
- History:** Points to the 'Your recent searches' section, which lists items like 'macbook air', 'bmw f800', and 'seat arosa automatic'.
- Promotions:** Points to the 'DON'T MISS TODAY'S DEALS' section, featuring items like 'Bench Men's Overton Jeans' and 'Timberland Men's Shoes' with discount percentages.
- Problem JavaScript CSS and HTML:** Points to the bottom section, which includes 'Suggestions for you' with product images and a 'GRAB A BARGAIN' banner.
- Layout, Rendering & Formatting:** A large callout box at the bottom center points to the overall page structure and content.

# Beware of poor-quality automated 'tests'

- `AssertTrue(true) ;`
- No/Inadequate/Too many Asserts
- Poor code design
- Falsehoods (False positives / negatives)
- Focus on:
  - Improving the quality of your automated tests
  - Finding ways to improve the quality, & testability, of the code being tested

# Increasing the signal-to-noise of test results



- Suppress unwanted ‘warnings’
  - C.f. static analysis tools
- Increase potency of tests
- Consider dumping ineffective tests



# Further reading and research



The opensource project

<http://code.google.com/p/web-accessibility-testing>

Finding Usability Bugs with Automated Tests

<http://queue.acm.org/detail.cfm?id=1925091>

Fighting Layout Bugs

<http://code.google.com/p/fighting-layout-bugs/>

Experiences Using Static Analysis to Find Bugs

<http://www.google.com/research/pubs/pub34339.html>

My blog

<http://blog.bettersoftwaretesting.com/>

“Beware of Automation Bias” by M.L. Cummings

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.91.2634&rep=rep1&type=pdf>

Designing and Engineering Time by Steven Stow

ISBN 978-0-321-50918-5

# Questions now?

Questions later...

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