Quickstart on web testing on 2019

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Outline

Why do we test web application?

- Almost every software development in Costa Rica is done on web and embedded technologies
- New trends for 2019 are [7, 8, 9]:
  - Progressive web apps
  - Single page applications
  - Chat bots
  - Blockchain

Scope of this presentation

By application: desktop, embedded, mobile, **web (responsive, desktop)**

Methodology: **agile**, cascade, XP

Market: Asia, Europe, **US**

Development cycle: **legacy**, new

Role: architect, **analyst**, **automation engineer**, **designer**, **tester**

CI & CD

- Before talking about web testing we should understand how software is released
- There are two extended practices:
  - Continuous integration (CI)
  - Continuous delivery (CD)
- Testing is performed at different levels on CI & CD as we will see in short

CI & CD

Continuous integration [1]: [1]

- *Is a development practice that requires developers to integrate code into a shared repository several times a day*.
- *Each check-in is then verified by an automated build, allowing teams to detect problems early.* - Thoughworks

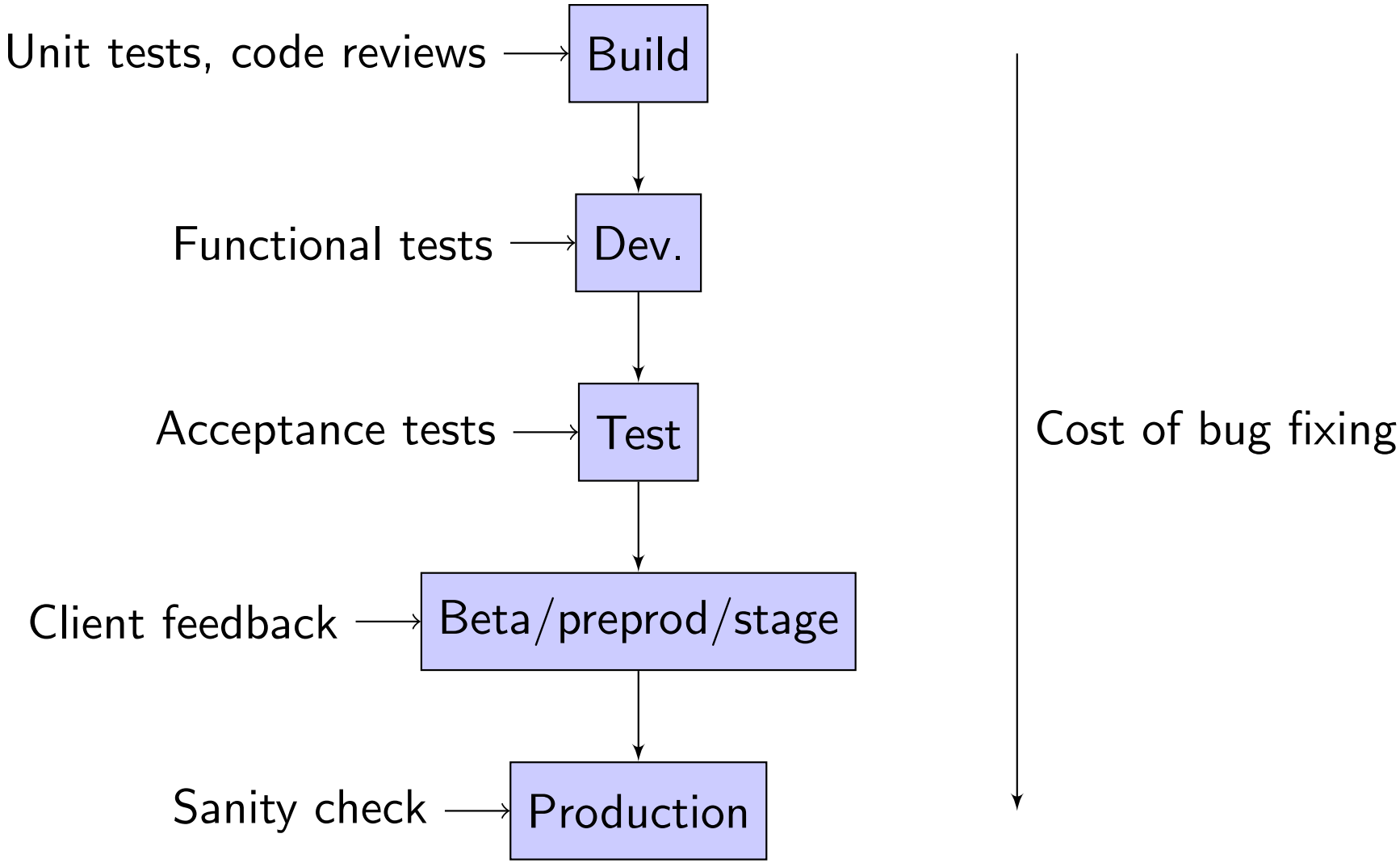
[1] Have you hear about Mr. hit n' run build breaker? `https://youtu.be/fuPFz5deX0w`

Continuous delivery (CD)

Continuous delivery [2]:

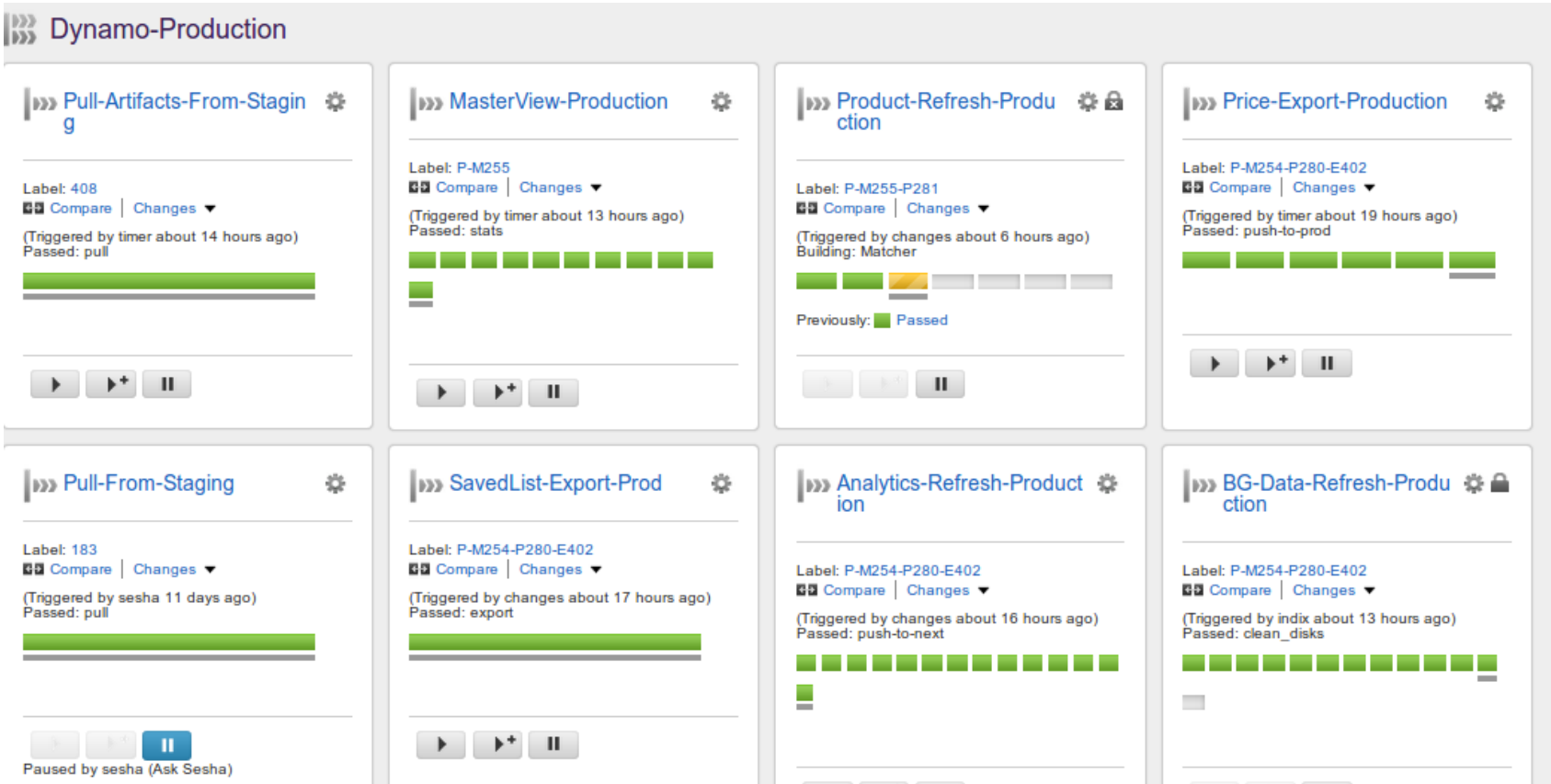
- *CD focuses an organization on building a streamlined, automated software release process.*
- *The feedback loop revolves around delivery of software to the end user as quickly as possible.* - Atlassian

Continuous delivery (CD) (cont.)



Tools used in CI/CD (cont.)

Here is an example of a pipeline implemented in GO:



`http://codingnirvana.github.io/pune-scala/pictures/go_pipelines.png`

Manual testing

- As you might already know, testing can be classified in two categories: manual and automated
- One complements the other:
  - We cannot ask a machine to test what a person can't verify itself!

Manual testing

- Some must-know concepts on manual testing are [4]:
  - TCs estimation techniques
  - Testing levels
  - Quality control vs. quality assurance
  - Verify vs. validate
  - Test life cycle

Manual testing (cont.)

- Test case estimation techniques [4]:
  - Boundary values
  - Equivalent classes
  - Cause-effect diagrams
  - Transition diagram (finite state machine)
- No one will ask you to use them, but everyone would be mad if you don't find the bugs!

Manual testing (cont.)

- **The art of software testing:**
  - Chapter 4: Test-Case Design (p. 35-69)
    - Boundary value analysis (p. 46)
    - Equivalent classes
    - Cause-effect diagrams (p. 50)
  - `http://barbie.uta.edu/~mehra/Book1_The%20Art%20of%20Software%20Testing.pdf`
- **Requirements-Based Testing- Cause-Effect Graphing:**
  - `http://barbie.uta.edu/~mehra/59_RBT_Cause-Effect_Graphing2.pdf`

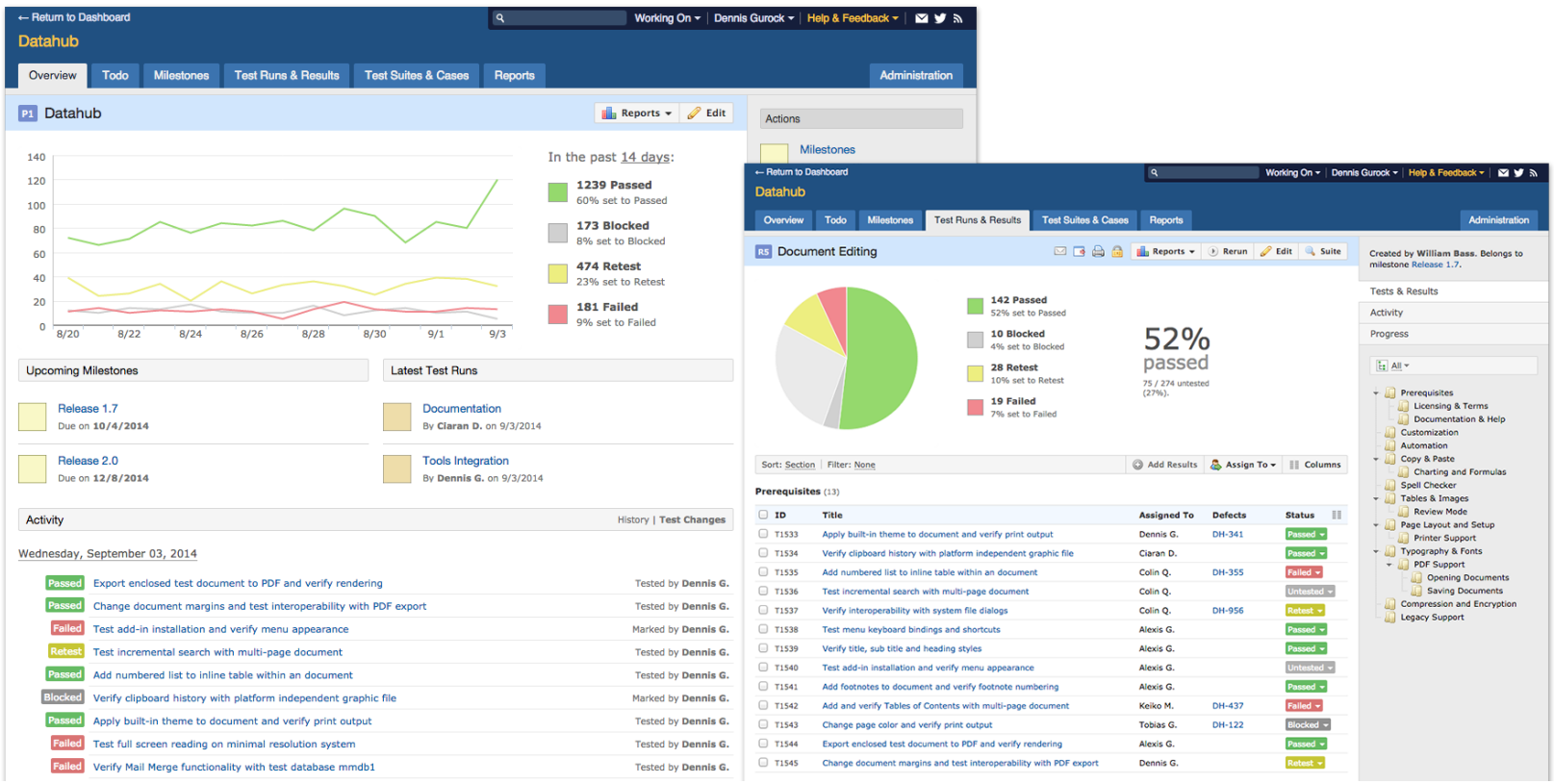
Manual testing (cont.)

You should also know about test case management systems (TCMS), which allow to:

- Maintain test cases better than using a spreadsheet
- Log test runs
- Create test reports in a visually appealing way
- Calculate quality metrics (like the number of bugs found per TC)

Manual testing (cont.)

Here is an example of a TCMS called Testrails:



https://marketplace-cdn.atlassian.com/files/images/e9a091f7-2f37-4956-870c-558f4ac3efba.png

Manual testing (cont.)

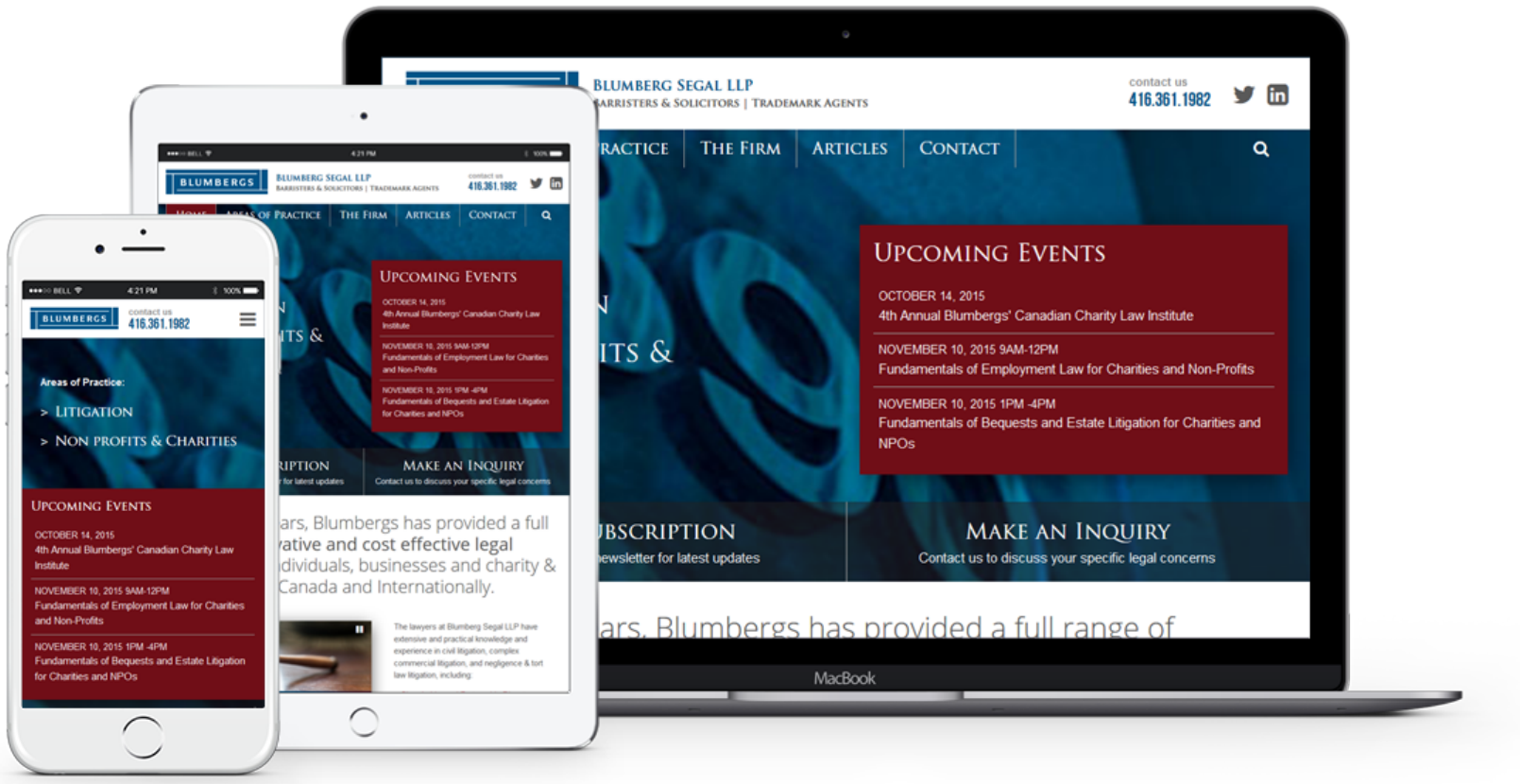
- Now let's talk about different kinds of manual testing:
  - Web responsive testing
  - Accessibility testing
  - Performance testing
  - Security testing
  - A/B testing
  - (to mention a few...)

Web responsive testing

- **Purpose:** to render the same webpage in different devices
- Must-know concepts:
  - Responsive design
  - XHTML, RHTML, HTML
- Tools:
  - Vyzor, Reflector / Airserver
  - Charles Proxy, Fiddler
  - Browser stack

Web responsive testing (cont.)

Test is performed at least in three formats:

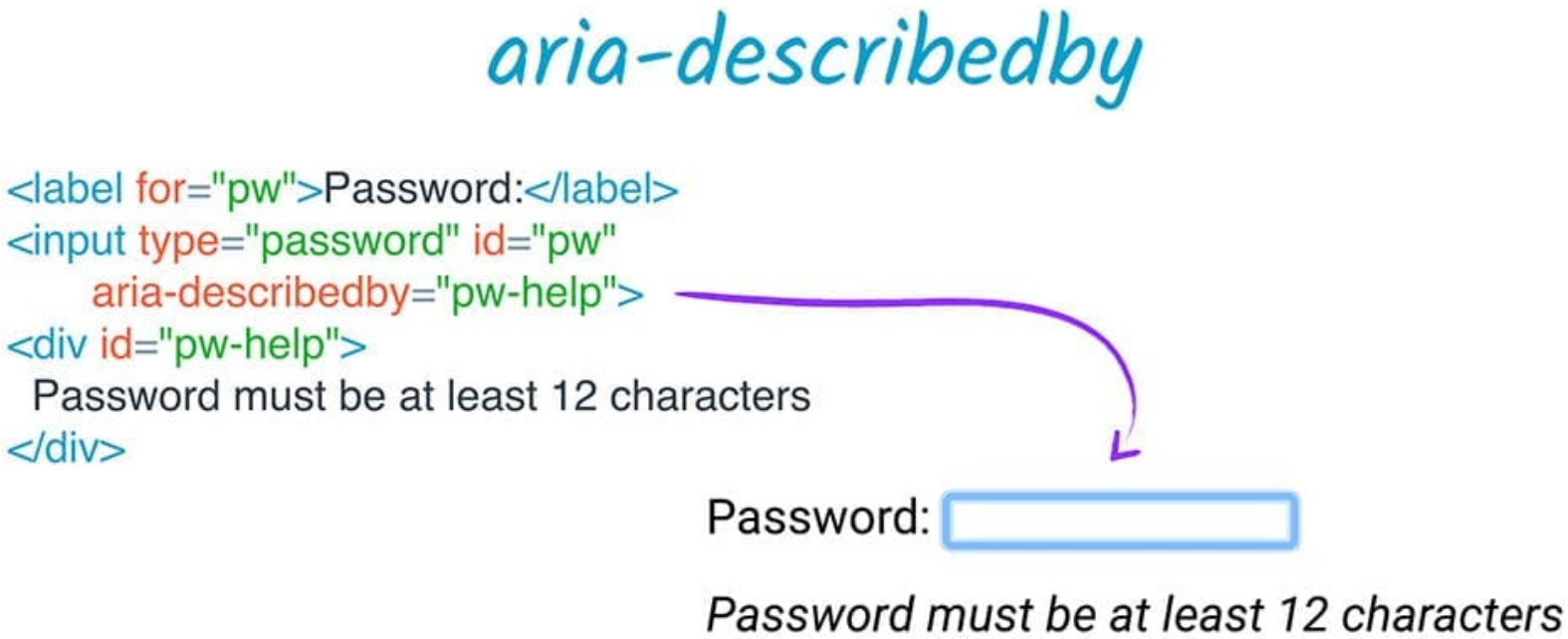


https://www.thewire.ca/media/blumbergs-hero.png

Accessibility testing

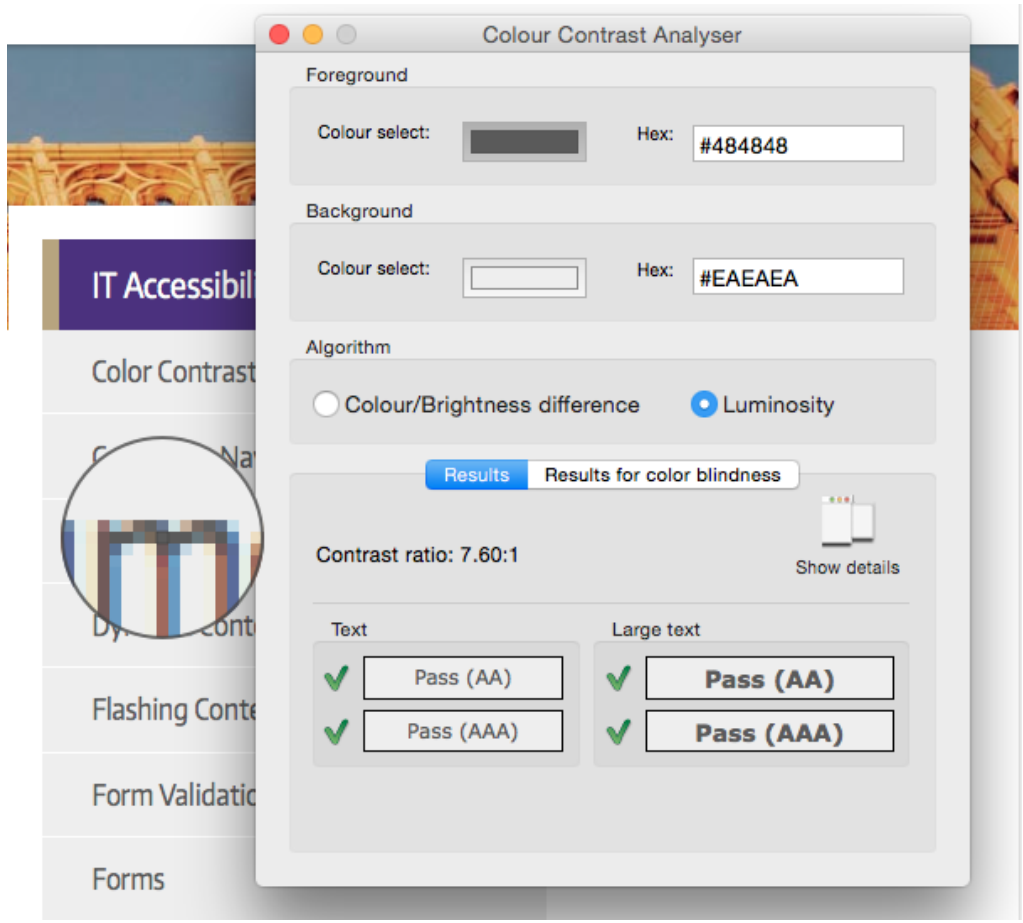
- **Purpose:** make content available for a broader range of users
- Must-know concepts [5, 6]:
  - POUR principle (perceivable, observable, understandable, robust)
  - WCAG 2.0 guidelines
  - Web Aria
- Tools:
  - Paciello toolbar, Sortsite, Webaim
  - Google Accessibility toolbar
  - Screen readers (VoiceOver, Jaws)
  - Windows high contrast mode

Accessibility testing (cont.)



https://developers.google.com/web/fundamentals/accessibility/semantics-aria/imgs/aria-describedby.jpg

Accessibility testing (cont.)



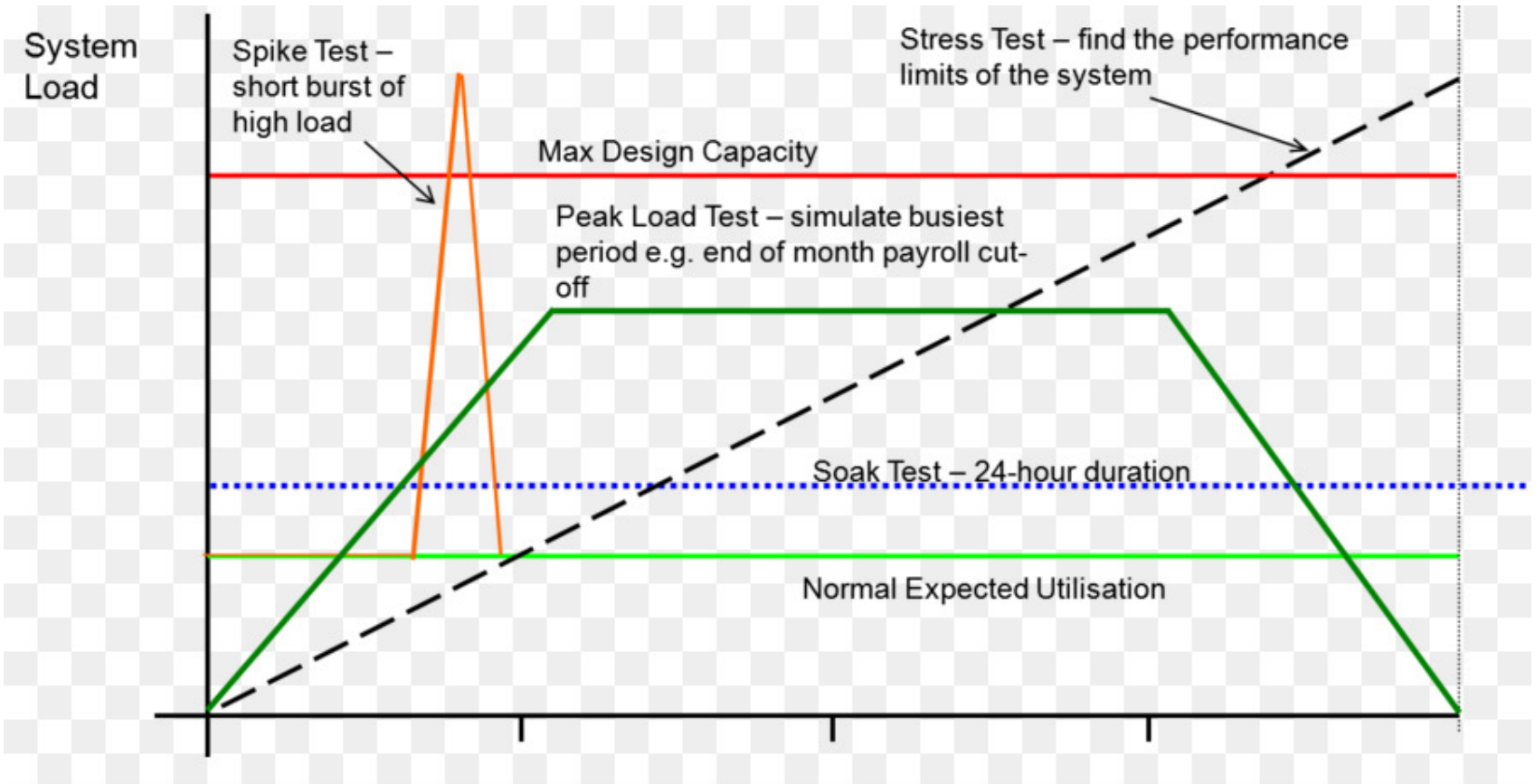
https://s3-us-west-2.amazonaws.com/uw-s3-cdn/wp-content/uploads/sites/54/2014/10/06144407/ColourContrastChecker.png

Performance testing

- **Purpose:** know how the webpage behaves on different work loads.[2]
- Must-know concepts:
  - Stress, load, performance, soak
  - Ramp-up period, throughput
- Tools:
  - JMeter, Blazemeter, Taurus

[2] Here is an example of why this is useful: `https://juanfonsecasolis.github.io/blog/JFonseca.suavizadoTraficoServidorWeb.html`.

Performance testing (cont.)



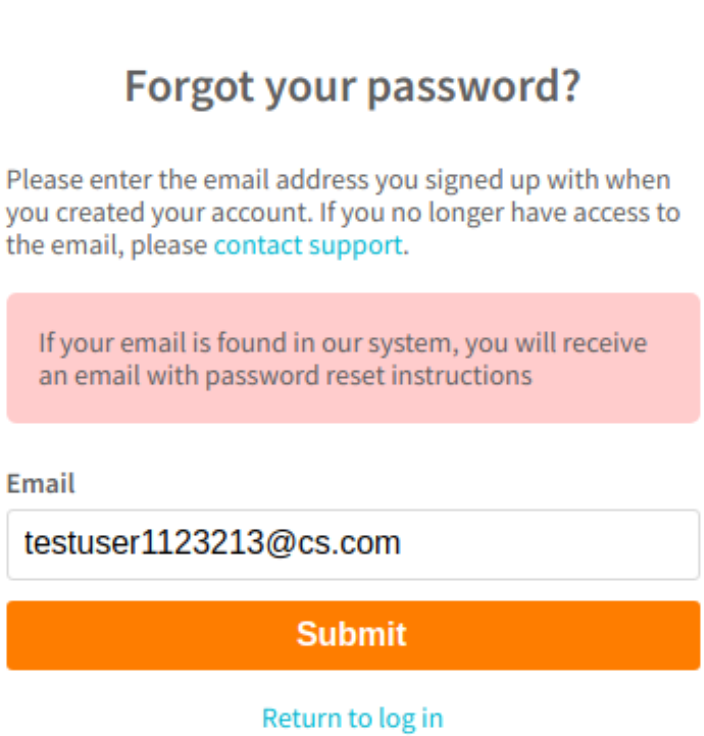
https://banner2.kisspng.com/20180420/btq/kisspng-load-testing-stress-testing-software-performance-t-peak-5ada50b21f6611.05071670152425694612 86.jpg

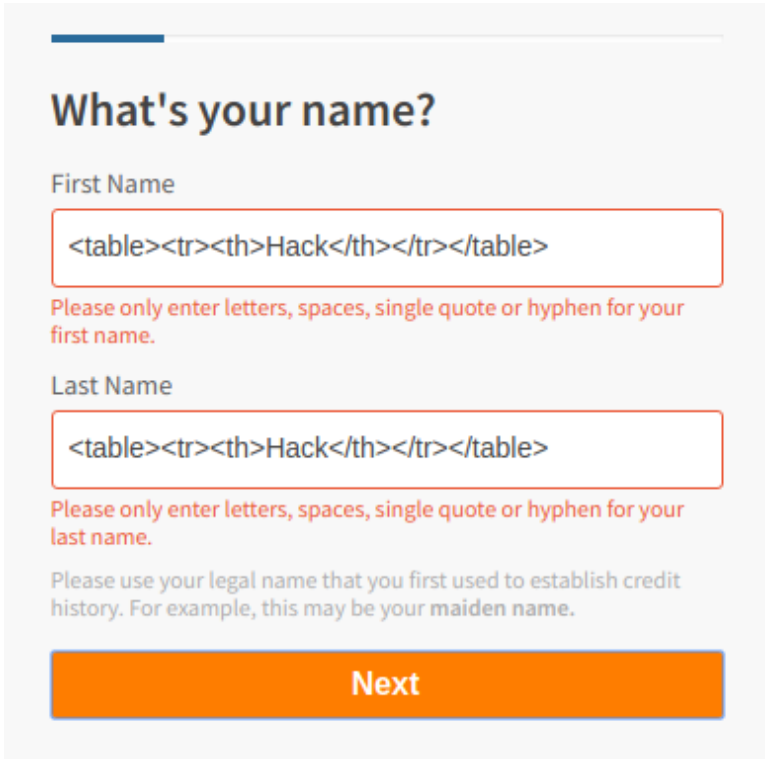
Security testing

- **Purpose:** protect data integrity and privacy
- Must-know concepts:
  - OWASP top 10
  - XSS, SQL injection, LDAP injection
- Tools:
  - BURP
  - Kali Linux and tools installed

Security testing (cont.)

Here are some examples of a fixed data leaking and XSS:

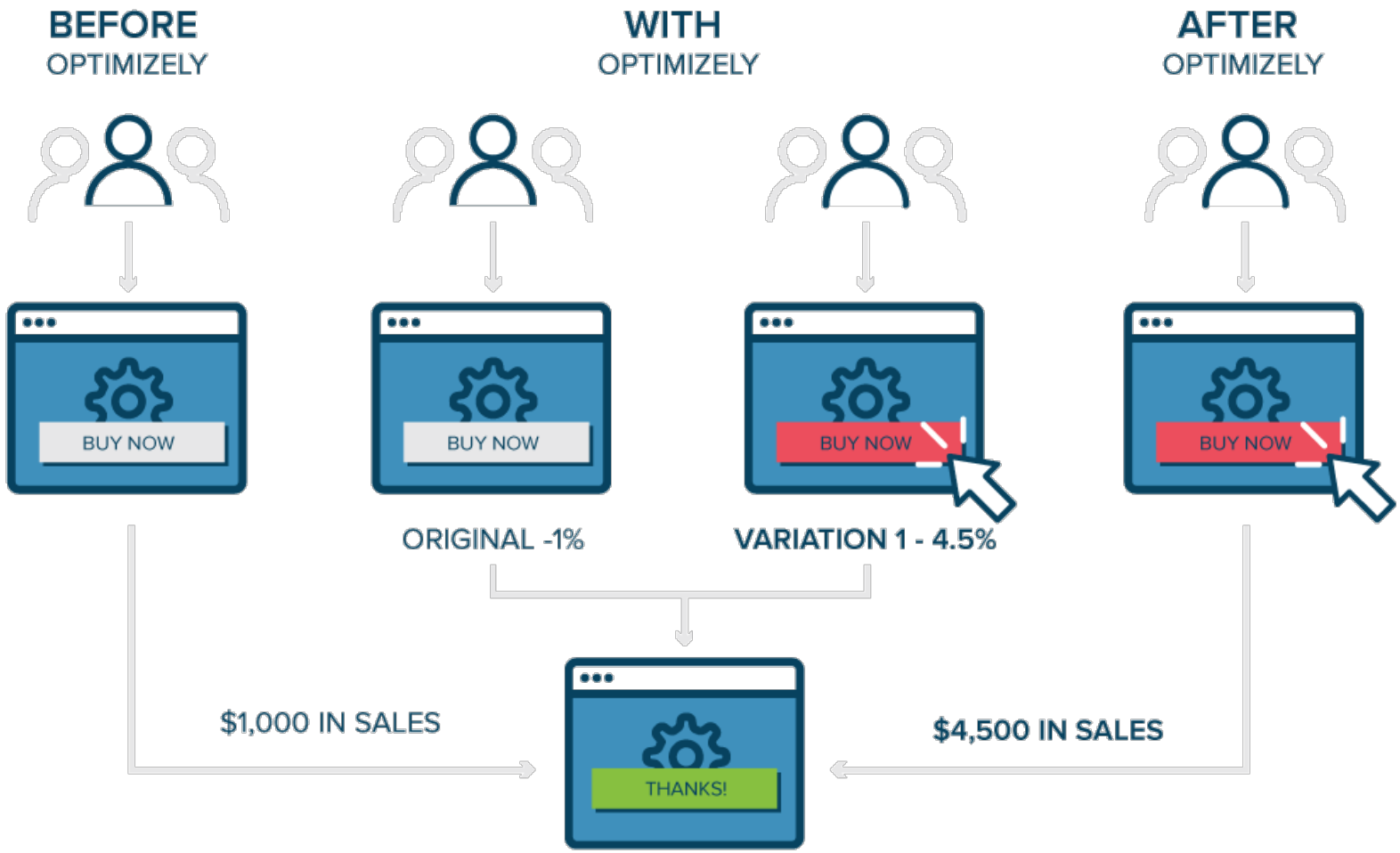




A/B testing

- **Purpose:** increase revenue by getting feedback from users
- Must-know concepts [3]:
  - Hypothesis testing (null, alternative)
    - Is the revenue increased with any variation?
  - Statistical significance
    - T-student, normal distribution
- Tools:
  - Optimizely
  - Mixpanel
  - Splunk Insights
  - Adobe Omniture

A/B testing (cont.)



https://images.ctfassets.net/zw48pl1isxmc/3lRlyAZISsG0iWyiO8Ug84/7a32f963dd0fdc3ccb4483fc56aa55d2/ab-testing-optimizely-2.png

Automated testing

- To finish, a quick overview on automated testing:
  - UI test automation
  - Web service test automation

Pros and cons of automation

- Pros:
  - Input combinations can be tested exhaustively
  - Repetitive and time consuming flows can be automated
- Cons:
  - Periodic maintenance on test suites can be time consuming and complex
  - Tests are only able to detect bugs for which they were programmed to

UI test automation

- **Purpose:** catch bugs by reproducing a flow in the web browsers
- Must-know concepts:
  - Page-object model
  - Page factory
  - Locators (XPath, CS)
  - Coding standards (.Net, Java)
- Tools:
  - Selenium (Webdriver, IDE, grid)
  - Cucumber

Web service test automation

- **Purpose:** catch bugs by checking data and operations
- Must-know concepts:
  - SOAP, RESTFul
  - XML, JSON
- Tools:
  - JUnit
  - Postman
  - SOAP UI
  - RestAssure
  - CURL, JQ

Conclusions

- CD/CI allows to serve software more frequently and with less risk.
- Proper functional testing requires knowledge on test case estimation techniques and TCMS.
- Non-functional testing covers areas like: responsive design, accessibility, performance, security, and A/B testing.
- Test automation makes testing activities easier, but at cost of maintenance and visibility.

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