Welcome!

TESTING IN THE 21ST CENTURY
Testing in the 21st Century

The Cloud

Mobile

Agile

24 Hours

2-4 Weeks

Daily Scrum Meeting

Product Backlog

Sprint Backlog

Potentially Shippable Product Increment
IT OF THE PAST

Back Office Support of Traditional Business
THE DIGITAL ECONOMY
Which of the following has created/will likely create changes for your testing or QA teams?

- **Mobile**: Last 12 Months - 20%, Next 12 Months - 40%
- **ERP**: Last 12 Months - 10%, Next 12 Months - 30%
- **Cloud**: Last 12 Months - 30%, Next 12 Months - 20%
- **Big Data**: Last 12 Months - 20%, Next 12 Months - 10%
- **Agile & Other Methodologies**: Last 12 Months - 50%, Next 12 Months - 50%
“The hardest part is what to leave behind. It's time to let go.”

Winnie the Pooh

CLOUD COMPUTING
CLOUD SOLUTION – TESTING CONSIDERATIONS

• Collect info from any/all sources
  > What was obtained during selection process?
• Use risk-based testing approach
  > 3rd party software automatically = big risk (my opinion)
• Use exploratory testing
  > Discover how application works, what tests to define
• Start out with test scenarios
  > Only develop feature/function tests for problem areas
• Focus on integration points
  > With other upstream and downstream systems
• Other ideas??
VIRTUAL MACHINES

¢ Virtual Servers
  > Test Environments on Demand
  > Cost effective compared to Physical Servers
¢ Virtual desktops
  > Citrix & remote desktop protocol
  > Automation challenges - No UI objects
¢ Performance test challenges
  > VM overhead
  > Performance monitoring
“Out in the woods or in the city, it's all the same to me.
When I'm drivin' free the world's my home, when I'm mobile.”

_Pete Townshend – The Who_
MOBILE USAGE ON THE RISE

![Bar graph showing U.S. Web vs. Mobile App vs. TV Consumption, Minutes per Day](image)

- **Dec 2010**
  - Web Browsing: 70
  - Mobile Applications: 66
  - Television: 162

- **Dec 2011**
  - Web Browsing: 72
  - Mobile Applications: 94
  - Television: 168

- **Dec 2012**
  - Web Browsing: 70
  - Mobile Applications: 127
  - Television: 168

Sources: comScore, Alexa, U.S. Bureau of Labor Statistics, Flurry Analytics
INEVITABILITY OF MOBILE

Global Internet Device Sales

Source: Gartner, IDC, Strategy Analytics, company filings, BI Intelligence estimates
August 2012 – **3997** distinct device running some version of Android OS
ANDROID OS FRAGMENTATION

![Android Market Fragmentation Chart](image-url)
# iPhone Fragmentation

<table>
<thead>
<tr>
<th>Model</th>
<th>iPhone</th>
<th>iPhone 3</th>
<th>iPhone 3GS</th>
<th>iPhone 4</th>
<th>iPhone 4S</th>
<th>iPhone 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Picture</strong></td>
<td><img src="image" alt="iPhone" /></td>
<td><img src="image" alt="iPhone 3" /></td>
<td><img src="image" alt="iPhone 3GS" /></td>
<td><img src="image" alt="iPhone 4" /></td>
<td><img src="image" alt="iPhone 4S" /></td>
<td><img src="image" alt="iPhone 5" /></td>
</tr>
<tr>
<td><strong>Initial OS</strong></td>
<td>iPhone OS 1.1</td>
<td>iPhone OS 2.0</td>
<td>iPhone OS 3.0</td>
<td>iOS 4.0 (GSM)</td>
<td>iOS 4.2.5 (CDMA)</td>
<td>iOS 5.0</td>
</tr>
<tr>
<td><strong>Highest Supported OS</strong></td>
<td>iPhone OS 3.1.3</td>
<td>iOS 4.2.1</td>
<td></td>
<td></td>
<td></td>
<td>iOS 6.0.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discontinued</th>
<th>Current</th>
</tr>
</thead>
</table>

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QUALITY DRIVERS IN MOBILE

Retention of App Users Acquired in Q3 2010 vs Q3 2011

- 19% increase in long-term mobile app retention

Source: Localytics, June 2012
MOBILE APPS

Å Web Apps
  > HTML 5
  > Device/OS agnostic (sort of)
  > Limited hardware integration

Å Native Apps
  > OS specific
  > OS look and feel (HIG)
  > Tighter device hardware integration
  > Connectivity not required
  > App stores
MOBILE TESTING TASKS

Get Test Devices
Build Test System
Build Test Harness
Map Poor Cell Coverage Areas
Engage Crowd Source Testing
Get Microwave Oven
Create Test Data
Create Test Cases
Build Test Automation
Provision Test Devices
EMBEDDED DEVICE TESTING

- Chip dependencies
- GPS/location service
- Accelerometers
- NFC
- WIFI/cellular
- Photo/video cameras
- Memory management
TEST AUTOMATION

Robot Testing Army

MVC Automation
WHAT’S NEXT?

Wearable Computing
"Information is the oil of the 21st century, and analytics is the combustion engine..."

- Peter Sondergaard
  Gartner SVP

BIG DATA
Big Data: techniques and technologies that make handling data economical at extreme scale.
## THIS IS BIG DATA

<table>
<thead>
<tr>
<th>Multiples of bytes</th>
<th>SI decimal prefixes</th>
<th>Binary usage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name (Symbol)</strong></td>
<td><strong>Value</strong></td>
<td></td>
</tr>
<tr>
<td>kilobyte (kB)</td>
<td>$10^3$</td>
<td>$2^{10}$</td>
</tr>
<tr>
<td>megabyte (MB)</td>
<td>$10^6$</td>
<td>$2^{20}$</td>
</tr>
<tr>
<td>gigabyte (GB)</td>
<td>$10^9$</td>
<td>$2^{30}$</td>
</tr>
<tr>
<td>terabyte (TB)</td>
<td>$10^{12}$</td>
<td>$2^{40}$</td>
</tr>
<tr>
<td>petabyte (PB)</td>
<td>$10^{15}$</td>
<td>$2^{50}$</td>
</tr>
<tr>
<td>exabyte (EB)</td>
<td>$10^{18}$</td>
<td>$2^{60}$</td>
</tr>
<tr>
<td>zettabyte (ZB)</td>
<td>$10^{21}$</td>
<td>$2^{70}$</td>
</tr>
<tr>
<td>yottabyte (YB)</td>
<td>$10^{24}$</td>
<td>$2^{80}$</td>
</tr>
</tbody>
</table>
# Qualities of Big Data

<table>
<thead>
<tr>
<th>Quality</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volume</strong></td>
<td>Exceeds physical limits of vertical scalability</td>
</tr>
<tr>
<td><strong>Velocity</strong></td>
<td>Decision window small compared to data change rate</td>
</tr>
<tr>
<td><strong>Variety</strong></td>
<td>Many different formats makes integration expensive</td>
</tr>
<tr>
<td><strong>Variability</strong></td>
<td>Many options or variable interpretations confound analysis</td>
</tr>
</tbody>
</table>

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*As data Variety and/or Variability increase, big data becomes more attractive.*

*Extremes of Volume or Velocity maybe better handled by traditional BI up to a point.*
BIG DATA TECHNOLOGIES

Â Big Data platforms:
  > Apache Hadoop
  > NoSQL: Mongo & Apache Cassandra

Â Data stream processing: Storm & Kafka

Â Statistical analysis tool: R & Julia

Â Graph analysis: Gremlin & Giraph

Â In memory analytics platform: SAP Hana
**Big Data Testing Considerations**

<table>
<thead>
<tr>
<th>Traditional DW/BI Testing</th>
<th>Big Data Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use SQL with structured database</td>
<td>Find other means to tests Unstructured or Semi Structured</td>
</tr>
<tr>
<td>ETL – test source to target</td>
<td>- Sampling of live streams combined with ETL</td>
</tr>
<tr>
<td></td>
<td>- More complex transformations possible, therefore exponentially more testing permutations</td>
</tr>
<tr>
<td>Tools like QuerySurge</td>
<td>No automated testing tools available</td>
</tr>
<tr>
<td>PL SQL</td>
<td>- Hadoop HIVE SQL</td>
</tr>
<tr>
<td></td>
<td>- PIGLatin –scripting language</td>
</tr>
</tbody>
</table>

Big Data is in its infancy.
“Stop doing Agile and start being Agile.”

Jim Highsmith

AGILE METHODOLOGIES
How do you anticipate your organization will adjust budgets in the following areas over the next two years related to Agile or other process implementation/support?
Agile Manifesto

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

Agile = Analysis + Agility
TRADITIONAL VS. AGILE

Traditional Software Development

Start → Requirements → Design → Code → Test → Deliver

Agile Software Development

Start → Sprint#1 → Sprint#2 → Sprint#3 → Sprint#N → Done!
**QA Life Cycle**

- **Plan**: who, what, where, when and how
- **Design**: build tests & data
- **System Test**: technical tests
- **UAT**: business user tests
- **Reflect**: improve for next time
TEST PLANNING – HOW AGILE DOES IT

Product Backlog → Release Planning Meeting → Sprint Scrum Board

Release Plan

Sprint Planning Meeting

Sprint Planning Meeting

Sprint Planning Meeting

Sprint Planning Meeting
TEST DESIGN

- User Story Acceptance
- Happy Path
- Negative Scenarios
- System Tests
- Exploratory Testing .... but with a Plan

Selective Attention Test by Simons and Chabris
OUTSOURCING
Survey Results

Change in Resource Strategy
Moving to Outsource

- Positive: 13% Last 12 Months, 8% Next 12 Months
- Neutral: 56% Last 12 Months, 59% Next 12 Months
- Negative: 21% Last 12 Months, 18% Next 12 Months
- No Response: 10% Last 12 Months, 15% Next 12 Months

Change in Resource Strategy
Moving Back In house/Local

- Positive: 13% Last 12 Months, 15% Next 12 Months
- Neutral: 59% Last 12 Months, 51% Next 12 Months
- Negative: 8% Last 12 Months, 8% Next 12 Months
- No Response: 21% Last 12 Months, 26% Next 12 Months
As an indicator of your organization's priorities, how do you anticipate your organization will adjust budgets in the following areas over the next two years:

**QA/Test Contract Resources**
- Increase: 19%
- Stay the Same: 40%
- Decrease: 19%
- I don't know: 22%

**QA/Test Full-Time Resources**
- Increase: 0%
- Stay the Same: 35%
- Decrease: 8%
- I don't know: 57%

**Outsourcing QA or Testing**
- Increase: 11%
- Stay the Same: 22%
- Decrease: 16%
- I don't know: 51%
WHAT DOES THIS MEAN FOR QA?
Testing Skills of the 21st Century

Å Manual function tester ↓
  > Evolving to become Business Process Testers

Å Highly technical tester ↑
  > SW Engineer/Automation
  > Dramatic increase in need to be technical:
    Å data, test environments, automation, performance

Å Strong soft skills/leadership ↑
  > Ability to manage others
  > Dynamic communication skills
  > Ability to function as a BA
  > Ability to learn, evolve (Agility)
YOUR OBSERVATIONS

• What skills have you seen changing/do you think will be changing in testing and QA?
• What skills and capabilities are hard to find?
• How will you build or acquire the skills you need?
TESTING ROLES IN THE 21ST CENTURY

Â Business Testers

> Must adapt testing approaches to streamline and support engagement of business

Â Wizards and GUI’s for test cases

Â UAT approaches must evolve to support 3rd party/cloud, etc.

Â Train the business on testing

Â Estimating effort & resources

> Old rules do not apply anymore

Â Dev : Test Ratio
YOUR OBSERVATIONS

• How has your organization adapted to engage the business in the process of testing?
• How will or how should the role of professional tester change?
• What is the right ratio of developers to testers?
  > How has estimating changed?
  > What are the factors you use in estimating?
• Who should do testing in Agile?
WHAT ARE YOUR QUESTIONS?
THANK YOU FOR ATTENDING!

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