“Digital life is life itself, and technology is an essential part of being human.”

From Telefonica vision (www.telefonica.com)

“Digital is no longer a choice – it’s reality…”
Welcome to Generation C!
Connection | Community | Creation | Curation

Personal, intelligent experiences
Enthusiastic brand advocates
Seeking control and empowerment
The effects of Digital on our industry

- Customer channel of choice
- Community-based engagements
- Importance of immediacy

The effects of Digital on testing

- Full coverage: certified on all channels, systems, devices and browsers
- Personalized experience based on real-time statistics for device optimization
- Accuracy and quality with faster time to market, and continuous deployment
Typical challenges faced by service providers in the digital world

- Unlimited users
- Performance / user experience
- Location
- Agile / DevOps implementations
- Automation
- Availability
- Browser
- Frequent releases
- OS/platform
- Inventory management
- App type
- Pre-launched devices

Digital testing complexity
What constitutes Digital Testing today?

A Seamless User Experience addresses the complexities in digital testing
delivers quicker value to Business

Digital Testing Complexity

- Unlimited users
- Performance / user experience
- Agile / DevOps implementations
- Automation
- Availability
- Frequent releases
- Inventory management
- Pre-launched devices
- App type
- OS/platform
- Location

Scrum Cycles
Unit Test Cycles...
Component Testing
Continuous Integration Testing
QAT
UAT
BVT
What is digital testing?

Comprehensive testing framework

- Broad suite of testing services to enhance customer experience and drive revenue
- Enables omni-channel experience across demographics, locations, devices and operating systems
Introducing:

Digital User Experience Testing

Amdocs DUET

In harmony

IT operation

End user
Digitalization of the **front end**
Certified mobile devices, browsers, IoT devices....

Digitalization of the **back end**
Certification of back-end systems (billing, provisioning, CRM...)

**PARTNERING WITH LEADING DIGITAL TESTING VENDORS FOR A COMPREHENSIVE STATE-OF-THE-ART OFFERING**

**ACHIEVES FULL COVERAGE FASTER, WITH OPTIMIZED QUALITY**

- Partnership
- DevOps
- Automation
- Cloud
- Analytics
- Open Platforms
- Virtualization
Amdocs DUET - Digital User Experience Testing

Comprehensive portfolio covers all user experience aspects

Is it working?
- Functional
- Integration
- Platform
- E2E
- Regression

Is it usable, secure, fast and reliable?
- Security
- Performance
- Usability
- Visual
- Compatibility
- Accessibility

Are we able to delight the customer?
- Customer Sentiment Analysis
- Ease of use
- In the wild exploratory testing

Faster, better? cost, quality, time?
- Increasing Automation and reuse
- Productivity improvements
- Early testing

Portfolio services
## Amdocs Digital Testing Services

### Digital consideration
- Customer experience – quality
- Voice of the end user is heard – social effect
- Many types of platforms
- Rapid application development
- Large set of users

### Comprehensive offering – covers all aspects

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability</td>
<td>Statistics-based optimized device testing coverage &amp; dynamic tracking</td>
</tr>
<tr>
<td>Accessibility</td>
<td>50% time savings on mobile device testing and data preparation</td>
</tr>
<tr>
<td>Analytics</td>
<td>40% time savings from automating regression via concurrent execution on multiple devices</td>
</tr>
<tr>
<td>Functional</td>
<td>Drives business benefits</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Deep understanding of service providers’ business requirements</td>
</tr>
<tr>
<td>Automation &amp; continuous integration</td>
<td>Real-user, statistics-based optimized device testing coverage &amp; dynamic tracking</td>
</tr>
<tr>
<td>Security</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
</tr>
</tbody>
</table>

### DevOps methodology-oriented

- Drives business benefits
- Real-user, statistics-based optimized device testing coverage & dynamic tracking
- 50% time savings on mobile device testing and data preparation
- 40% time savings from automating regression via concurrent execution on multiple devices
- Deep understanding of service providers’ business requirements
# Amdocs Digital Service Portfolio

<table>
<thead>
<tr>
<th>Functional</th>
<th>User experience</th>
<th>Compatibility</th>
<th>Automation</th>
<th>Performance</th>
<th>Security</th>
<th>Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>- New functionality</td>
<td>- Usability</td>
<td>- Various browsers, device types and OS</td>
<td>- Script factory</td>
<td>- Load, stress &amp; stability</td>
<td>- Penetration testing</td>
<td>- Testing tags and keys</td>
</tr>
<tr>
<td>- Sanity &amp; regression</td>
<td>- Accessibility</td>
<td>- Visual &amp; Auditory</td>
<td>- Platform-agnostic</td>
<td>- Security audit</td>
<td>- Google Analytics</td>
<td></td>
</tr>
<tr>
<td>- Data generation</td>
<td>- Physical …</td>
<td>- Statistics-based coverage</td>
<td>- Parallel execution</td>
<td>- Network virtualization</td>
<td>- Adobe Analytics</td>
<td></td>
</tr>
<tr>
<td>- End-to-End</td>
<td>- Visual testing</td>
<td>matrix</td>
<td>- Reporting</td>
<td>- Monitoring</td>
<td>- Web trends</td>
<td></td>
</tr>
</tbody>
</table>

**MOBILE**

- Inventory management
  - Security
  - Device management
  - Lab outage prevention
  - Maintenance
Best-of-breed comprehensive offering
with leading digital testing partners

01 Perfecto
02 Applause
03 Applitools
04 User1st
Best-of-breed comprehensive offering
with leading digital testing partners

- Remote access to real devices
- Different lab types: private, public and local (on premise)
  - Anytime / anywhere
  - iOS and Android devices
  - Device reservation
  - User management
- Internal automation capabilities
Best-of-breed comprehensive offering
with leading digital testing partners

Applause
Crowdsourced testing & feedback solutions beyond the QA lab. Real people on real devices on-location around the world, with coverage where your users live, work, and play.
Best-of-breed comprehensive offering with leading digital testing partners

Next-generation visual testing engine rapidly identifies issues with GUI appearance - consistent UI across browsers and devices. Visual testing focuses on validating layout, content and appearance of each visual element within the UI.
Best-of-breed comprehensive offering
with leading digital testing partners

Provides cloud-based full stack service that makes any website accessible without changing the existing codebase. Includes automatic monitoring, as well as audit and control processes. Disconnects accessibility implementation from development functioning as configuration rather than core development.
Best-of-breed comprehensive offering
with leading digital testing partners
Delivery model – recommended approach: Agile & continuous integration

01 Continuously integrated environments
Agile team developers & QA

- New functionality
- Defect fixing-tested

02 Release environment
- Regression
- New functionality
- Defect fixing-tested

03 Production-like environment
- Automated smoke test
- Critical path scenarios
Case study 1

BUSINESS CHALLENGES

- Increase percentage of online sales
- Adaptation to DevOps, with major releases planned every month

SOLUTION

- Implementing modernization, testing mobile & web including user experience flow
- Test management and execution for digital services
- Selenium & POM automation framework for regression
- Implement in-house tools for efficiency improvements
- Established testing best practices (browser/OS coverage)
- Using mobile labs to enable effective use of mobile devices for testing
- Automated dashboard provides standard report templates for all website projects

RESULTS

- Provided thought leadership and defined mobile testing strategic direction
- \( \Rightarrow \) Mobile traffic on website grew 54%
- Satisfied customer - led to extended contract duration and its expansion to additional business areas

120M multiplay subscribers: (broadband, mobile, IPTV, satellite TV, CVoIP, prepaid & postpaid)
Case study 2

**BUSINESS CHALLENGES**

- Increase online sales
- Time to market (industry competition)
- Digital sales fragmentation complexity (many devices, OS, browsers, mobile applications and network connectivity types)
  - Performance (slower page response time, resulting in consumer abandonment)
  - Multiple releases (monthly, weekly, daily)

**SOLUTION**

- Test management and execution for digital services
- Robust automation testing framework, covering all major platforms and providing a holistic automation solution
- Performance testing at early stages, including client-side and back-end performance testing
- Implemented mobile lab for effective use of mobile devices for testing
- Automated dashboard for standard report templates for all projects
- Provided thought leadership and defined mobile testing strategic direction

**RESULTS**

- Reduced release testing cycle time via automation and efficiencies
- Mobile traffic on the website grew 62% due to strategic direction conducted
- Satisfied customer – contract extended

ecommerce website has monthly average of ~75 million unique Visits
Thank you
Digital Services portfolio
Automation testing

- Hybrid solution for desktop and mobile
- Third-party and in-house tools
- Parallel execution through multi-threading
- Supports easy recording and scripting automation scenarios
- Device and browser-agnostic scripting
- Integration with HP ALM and range of reports
- Leverages existing automation scripts
- Facilitates continuous integration
Compatibility testing

Ensuring sites and apps are compatible with all popular web browsers and mobile devices

<table>
<thead>
<tr>
<th>Compatibility types</th>
<th>Solution highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Desktop</strong></td>
<td>▪ Statistics-based approach using actual subscriber usage pattern</td>
</tr>
<tr>
<td>▪ PC &amp; Mac</td>
<td>▪ Dynamic tracking and coverage alignment using coverage deviation report</td>
</tr>
<tr>
<td>▪ Tier-1 web browsers</td>
<td>▪ Amdocs Mobile Device Lab</td>
</tr>
<tr>
<td><strong>Device</strong></td>
<td>▪ Automation - runs different platforms in parallel</td>
</tr>
<tr>
<td>▪ Android, iOS and Windows</td>
<td></td>
</tr>
<tr>
<td>▪ Native and hybrid applications</td>
<td></td>
</tr>
<tr>
<td>▪ Tier-1 web browsers</td>
<td></td>
</tr>
</tbody>
</table>

- Receive subscriber usage pattern stats on different browsers and devices
- Prepare device and browser coverage matrix based on stats
- Execute and track test cases as per planned coverage
- Track coverage with deviation report and update plan as needed
Amdocs Digital Testing Services offerings (mobile)
Testing native, web and hybrid developed mobile applications

<table>
<thead>
<tr>
<th>Functional</th>
<th>Automation</th>
<th>User experience</th>
<th>Performance</th>
<th>Inventory mgt. security</th>
</tr>
</thead>
<tbody>
<tr>
<td>New functionality</td>
<td>Script once</td>
<td>Visual</td>
<td>Load test</td>
<td>Security</td>
</tr>
<tr>
<td>Sanity &amp; regression</td>
<td>Reports</td>
<td>Accessibility</td>
<td>Monitoring</td>
<td>Device management</td>
</tr>
<tr>
<td>Generating data</td>
<td>Parallel execution</td>
<td>Auditory</td>
<td>User experience</td>
<td>Lab outage prevention</td>
</tr>
<tr>
<td>End to End</td>
<td>Script factory</td>
<td>Physical</td>
<td>Network virtualization</td>
<td>Maintenance</td>
</tr>
</tbody>
</table>

- Holistic management via Amdocs Mobile Lab on the cloud
- E2E flows extending to BSS/OSS
- Usability and accessibility testing
- Inventory management
- Dedicated Wi-Fi setup for non-cloud solution
- Native, web and hybrid apps
- Network-centric testing
- Performance testing
# Web analytics testing

## Testing of information gathered on web usage (tags and keys) as input for web analytics

### Testing of tags and keys generated from:
- Mobile web
- Native apps
- PC browsers

### Tools
- HTTP Analyzer
- HTTP Fox
- Web developer Tools

### Web activities tested
- Any call to action
- Web hits
- Page loads
- Search on web page
- Open new session
- Timeout session

### Tag management frameworks for web analytics
- Google Analytics
- Adobe Analytics
- webtrends
Accessibility testing

Testing accessibility of websites for the disabled

1. Accessibility components
   - All web elements for screen readers
   - Color contrast
   - Gestures; speech recognition
   - Text resizing and focus

2. Coverage: web & mobile
   - All tier-1 browsers
   - iOS and Android devices
   - Mobile web, native and hybrid apps

3. Compliance
   - WCAG 2.0 standard
   - US 508 compliance

Includes automation

Web Accessibility Toolbar

Includes automation

USER1st

nvaccess

FireEyes

JAWS

Information Security Level 2 – Sensitive
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Usability testing refers to evaluating software for ease of use.

Simulating personalized experience on production and non-production environments

**Testing types**
- Testing of production network experience
- Usability when working on different screen resolutions

**KPI types**
- Number of clicks to complete flow
- Time to complete flow
- Number of data entry points
- Ease of data entry, such as dropdowns instead of free text
- GUI look and feel such as color, alignment, resolution effect, wrong links, etc.
Performance testing

Non-functional testing to determine system parameters for responsiveness and stability under various workloads

- Load, stress and stability test for back-end systems
  - Client-side load for desktop and mobile
  - Native, web and hybrid application testing
- Browser testing
- Web and device monitoring

**Highlights**

- Test back and front ends (desktop, mobile and tablet)
- Simultaneously test different browsers
- Complete E2E monitoring: user monitoring and deep transaction tracing
- Experienced and skilled performance testing team
Security testing

Ensures information systems protect data while maintaining functionality as intended

- Complies with OWASP, SANS, PCI and many other industry standards (hundreds of vulnerabilities including XSS, CSRF, DDOS, injections, phishing, authorization/authentication bypass, etc.)
- Static and dynamic testing

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application penetration testing</td>
<td>Application security audit</td>
<td>Secure code review</td>
</tr>
<tr>
<td>- Manual and automated</td>
<td>- Checks compliance with security regulations based on requirements</td>
<td>- Manual and automated</td>
</tr>
<tr>
<td>- Remediation support and recommendations</td>
<td></td>
<td>- Analysis, risk rating and ranking</td>
</tr>
</tbody>
</table>

Ensures information systems protect data while maintaining functionality as intended.
# Digital pricing model

<table>
<thead>
<tr>
<th>Functional Testing</th>
<th>Basic</th>
<th>Pro</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanity Testing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>System Integration Test</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Generate Data</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Regression Testing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>E2E Testing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance Testing</th>
<th>Basic</th>
<th>Pro</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Test</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Break Test</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Browser Test</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Device Test</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Soak Test</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Bandwidth Test</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Usability Testing</th>
<th>Basic</th>
<th>Pro</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interrupt Testing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>UI/UX Testing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Accessibility Testing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Navigability Testing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Readability Testing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Battery &amp; Memory Low</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compatibility Testing</th>
<th>Basic</th>
<th>Pro</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS Compatibility</td>
<td>1 OS</td>
<td>Up to 4 OSs</td>
<td>Up to 6 OSs</td>
</tr>
<tr>
<td>Device Compatibility</td>
<td>Up to 4 Devices</td>
<td>Up to 6 Devices</td>
<td>Up to 15 Devices</td>
</tr>
<tr>
<td>Browser Compatibility</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tablet &amp; Smartphone Compatibility</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pre-Launched OS/Device Compatibility</td>
<td>OS only</td>
<td>OS &amp; Device</td>
<td></td>
</tr>
<tr>
<td>Network Compatibility (WiFi, LTE, 3G..)</td>
<td>WiFi Only</td>
<td>2 Network Types</td>
<td>All</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Security Testing</th>
<th>Basic</th>
<th>Pro</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak Server Side Controls</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Insecure Data Storage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Client Side Injection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Insufficient Transport Layer Protection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Poor Authorization and Authentication</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Improper Session Handling</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Side Channel Data Leakage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Broken Cryptography</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sensitive information Disclosure</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Security Decisions Via Untrusted Inputs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lack of Binary Protections</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Accessibility testing sample results

Color contrast

<table>
<thead>
<tr>
<th>Accessibility compliant result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreground text and background color contrast ratio should be proper; e.g. 4.5:1 or greater</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actual result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color contrast does not meet the required standard, users with impaired vision may therefore not be able to read screen contents</td>
</tr>
</tbody>
</table>
Accessibility testing sample results

Font size

Accessibility compliant result
Available option to increase font size to at least twice the size of the font size used

Actual result
Inability to increase font size which will not provide site content accessibility to visually-impaired users
Accessibility testing sample results

Alt Text

<table>
<thead>
<tr>
<th>Accessibility compliant result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Images/video do not have alt text associated. As a result, visually-impaired users will not be able to understand the purpose of image/video</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessibility market standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>There should be some alt text associated with images and video to specify the purpose of the video so that screen reader can read it and help visually impaired customers to understand its purpose</td>
</tr>
</tbody>
</table>
Accessibility testing
Proposed action plan

**Initiate**
- Appoint accessibility exec sponsor
- Appoint Bell Accessibility Committee*

**Design test**
- Present Amdocs pre-existing accessibility test suite as baseline
- Work with Accessibility Committee to make any additions to existing suite
- Build communication plan

**Approve**
- Review and approve proposed Bell Accessibility Test Suite
- Review and approve Bell Accessibility design and coding standards
- Approve and source required tools

**Communicate**
- Communicate Accessibility program and implementation steps

**Implement**
- Conduct training sessions for all delivery teams: accessibility design, coding and testing standards
- Approve and source required tools

**Validate**
- Monitor and track status of accessibility defects found
- Work with each delivery team to tweak standards as required

* The Bell Accessibility Committee is a multidisciplinary committee that includes representatives from all delivery teams, legal and any other team appointed by Bell to ensure accessibility compliance
### Compatibility testing
Supporting newly-released OS

#### 2015 Mobile Retrospective
Did you keep up with this year’s innovations and are you ready for 2016?

<table>
<thead>
<tr>
<th>MAJOR RELEASE</th>
<th>OS</th>
<th>SMALL UPDATE</th>
<th>DISRUPTIVE TECHNOLOGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apple iOS 8.2</td>
<td>Apple iOS 8.3</td>
<td>BlackBerry: OS 10.3.1</td>
</tr>
<tr>
<td></td>
<td>Android 5.1</td>
<td>Android 5.1.1</td>
<td>Enhanced Voice Commands</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In-App with Context</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Introduced Force Touch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Enhanced Mobile Payments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Apple Pay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Android Pay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Enhanced Fingerprint Capabilities</td>
</tr>
</tbody>
</table>

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Compatibility testing
Supporting newly-released devices

2015 Mobile Retrospective
Did you keep up with this year’s innovations and are you ready for 2016?

<table>
<thead>
<tr>
<th>JANUARY</th>
<th>FEBRUARY</th>
<th>MARCH</th>
<th>APRIL</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUGUST</th>
<th>SEPTEMBER</th>
<th>OCTOBER</th>
<th>NOVEMBER</th>
<th>DECEMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung Galaxy A7</td>
<td>HTC One M9</td>
<td>Apple Watch</td>
<td>Samsung Galaxy S6 Edge</td>
<td>Samsung Galaxy S6</td>
<td>Sony Xperia Z3+ Tablet</td>
<td>Samsung Galaxy Note V</td>
<td>iPhone 6S Plus</td>
<td>iPad Mini</td>
<td>LG Nexus 5X</td>
<td>LG G4</td>
<td>HTC Butterfly 3</td>
</tr>
</tbody>
</table>

DEVICES
Thank you
Comprehensive digital offering

Integration with

Amdocs
Digital Testing

Perfecto Mobile

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tools