Testing as a Service - Models
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jonathon.wright@hitachiconsulting.com

Hitachi Consulting
We make it happen. Better.
Hitachi - a global industry leader.
Society Changes, Hitachi Transforms It.

$93.4 Billion
FY13 Revenue

947
Companies

320,000+
Employees

Invested
$3.4 Billion
in R&D (2013)

100 Years
of product &
service innovation,
ing engineering,
& quality

Focus on
Social Innovation
answering society’s challenges

Hitachi ranks 78th on the 2014 FORTUNE Global 500®.
Hitachi – Digital Business in Europe

Information & Telecommunication Solutions
- Service Opportunities
  IT Service, Data Centre Solutions, Consulting
- System Solutions
  Large-scale systems, Highly reliable systems
  Finger Vein Authentication
- Worlds Fastest Elevator (40mph)
- Platforms
  Hardware, Software

Railway Solutions
- Rolling stock + maintenance
- Electrical components
- Signaling / Train control systems

Distribution Solutions
- Nuclear Power Business
- Mining Equipment
- Water & Natural Resources

Smart Cities
- Smart eco cities
- Big Data Infrastructure
- Energy Consumption

Floating train 500kmph

Link: www.sigist.org.uk
What is BiModal? and how is FluidIT going to affect CoreIT?

“the creation of new business designs that connect people, business and things (physical objects that are active players and contribute to business value) to drive revenue and efficiency.”

Gartner® 2014
Digital Enterprise - BiModal

How is FluidIT going to affect CoreIT?

Core IT
- Reliable, compliant, secure
- Think price/performance
- Plan and approvals driven
- Long life-cycles

Fluid IT
- Agile and fluid
- Innovation, brand, profit measures
- Think continuous
- Think days, weeks
Digital Enterprise is **not** just about “disrupters”
Testing in the Digital Enterprise

Gartner, 2014, 'Building your Digital Enterprise' Gartner event, Poland, 15th May 2014
Testing in a ‘Digital Enterprise’ Transformation Age

‘Digitalised’ businesses are able to better adapt and exploit opportunity

Digital Enterprise Blueprint + Roadmap

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#BCS_SIGIST

*Gartner, 2014, ‘Building your Digital Enterprise’ Gartner event, Poland, 15th May 2014
Testing industry is changing forever

Does ‘Testing as a Function’ still have a future?
Hitachi – Smart Cities - Copenhagen
Effecting Copenhagen Cleantech Cluster

"Green and Comfortable Transportation"
- City of bikes
- ITS
- Mobility Management
- Copenhagen Connecting

"Carbon-neutral city"
- Smart meter by 2020
- Wind turbines
- Biomass in power plant
- Smart Cities

"Lower energy consumption"
- Buildings
- Transport
- Procurement
- Street Lighting
Testing as a Function
Legacy Methodologies

Software Development Lifecycle

Hardware | Analysis | Process
---|---|---
Business | Testing | Methodology

Software Development Lifecycle (SDLC) Model
Testing industry is not ready
Support for business intelligence powered by testing ‘small data’

During deployment of the Hitachi Content Platform Solution 70TB of satellite information was ingested into the solution platform with a daily growth rate of 50GB/day.

@jonathon_wright  
#BCS_SIGIST

Testing as a Activity
Future Methodologies

Solution Delivery Lifecycle integration (SDLCi) Model
Testing industry needs new models

Global challenges are not suitable for ‘Testing as a Function’ silos

Complex eco-infrastructures intelligent machine-to-machine interconnections empowered by ‘Big Data’


@jonathon_wright #BCS_SIGIST
New Model for Testing*
Model Based Testing (MBT)

Testing as a Service - Models


https://leanpub.com/taas
**Business Delivery Management**

Model Based Design (MBD)

<table>
<thead>
<tr>
<th>Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Lifecycle Management</td>
</tr>
<tr>
<td>Portfolio Lifecycle Management</td>
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<tr>
<td>Solution Lifecycle Management</td>
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<tr>
<td>Application Lifecycle Management</td>
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</table>

**Business Abstraction Layer**

<table>
<thead>
<tr>
<th>Business Delivery Management - ‘As A Service’ layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Abstraction Layer - Solution Delivery Lifecycle integration (SDLi)</td>
</tr>
</tbody>
</table>

**Test Abstraction Layer – Test Solution Delivery**

**Solution**

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*Jonathon Wright, 2014, ‘Testing as Service’ Models’ discussion paper published, 26th October 2014*
Business Lifecycle Management

Business Delivery Management

• Business Lifecycle Management
  – Business on a Page (BoaP) level abstraction or encapsulation representing the core businesses differentiators such as agility, visibility and flexibility

• Portfolio Lifecycle Management
  – number of solutions that are represented by a logical grouping as part of a Business Portfolio or split by Business Domain or Workstream

• Solution Lifecycle Management
  – covers logical groupings of applications that make up the solution landscape

• Application Lifecycle Management
  – refers to a single application instance
## Business Abstraction Layer

**Model Based Design (MBD)**

<table>
<thead>
<tr>
<th>Business Solution Discovery</th>
<th>Business Solution Delivery</th>
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<tbody>
<tr>
<td><strong>Business on a Page</strong></td>
<td><strong>Business Process Validation</strong></td>
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<tr>
<td><strong>Business Level Questions</strong></td>
<td><strong>Business Definition Language</strong></td>
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<tr>
<td><strong>Business Level Stories</strong></td>
<td><strong>Business Level Keywords</strong></td>
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<td><strong>Business Requirements</strong></td>
<td><strong>Business User Stories</strong></td>
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<td><strong>Business Process Modelling</strong></td>
<td><strong>Business Process Design</strong></td>
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<td><strong>Business Domain Knowledge</strong></td>
<td><strong>Business Process Intelligence</strong></td>
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<td><strong>Business Process Design</strong></td>
<td><strong>Business Process Reporting</strong></td>
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<td><strong>Business Process Scenarios</strong></td>
<td><strong>Business Process Tests</strong></td>
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<td><strong>Business Process Data</strong></td>
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<tr>
<td><strong>Business Process Behaviours</strong></td>
<td><strong>Business Acceptance Tests</strong></td>
</tr>
<tr>
<td><strong>Business Non-Functional (NFRs)</strong></td>
<td><strong>Business Acceptance Criteria</strong></td>
</tr>
<tr>
<td><strong>Business Acceptance Criteria</strong></td>
<td><strong>Business Epic Themes</strong></td>
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**Testing as a Service - Models**

*Jonathon Wright, 2014, ‘Testing as Service’ Models’ discussion paper published, 26th October 2014*
## Business Delivery Management

Model Based Design (MBD)

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### Business Delivery Management (‘As A Service’ Abstraction Layer)

Service Abstraction Layer - Solution Delivery Lifecycle integration (SDLi)

<table>
<thead>
<tr>
<th>Test Abstraction Layer</th>
<th>Logistics</th>
<th>Test Solution Delivery</th>
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<td>Test Definition Layer</td>
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### Solution

*Jonathon Wright, 2014, ‘Testing as Service’ Models’ discussion paper published, 26th October 2014*
Why ‘As A Service’
Testing in the Wild - Autonomous Vehicles

• Testing as a Service (TaaS)
• Software as a Service (SaaS)
• Platform as a Service (PaaS)
• Infrastructure as a Service (IaaS)
• Hardware as a Service (HaaS)
‘As A Service’ - Model

Model Based Design (MBD)

Business Problem, Idea or Challenge (cost, benefit, time to market)

- Business Problem
- Problem Definition
- Business Innovation

- ‘As A Service’

- Solution Decommission
- Social Intelligence

- Solution

- Business Intelligence
  (CIO, COO, CTO)

- Business

- End-Users
  Social Innovation

Business Solution Delivery Quality (cheap, good, fast)

Testing as a Service - Models

Business Delivery Management

Service Abstraction Layer - Solution Delivery Lifecycle integration (SDLCi)

Continuous Delivery vs. Continuous Deployment

Domain Standards (Language/Communication)
- CMMI
- BPMn v2
- BPEL4ws
- CSBA
- SRS
- TOGAF
- ADLs
- UML
- OMG
- OASIS
- TMMI/TP
- LAB
- ISO/IEC
- ISTQB
- ITIL

Domain Tools (Solution Implementation Platform)
- BUSINESS
- CRM
- STORY
- UML
- IDE
- BUILD
- TEST
- BUILD
- SUPPORT

Testing as a Service (TAAS)

Testing as a Service - Model
Model Based Design

Solution Delivery Lifecycle integration (SDLi)

Business Enterprise (CIO, COO, CTO)
Shift Up

Test in Dev
Shift Left

Shift Down
Social Enterprise

User Acceptance Testing
Shift Right

Test Ops
Business Acceptance Testing

Continuous, Integration, Build & Deployment (CIBD)

Testing as a Service - Models

Introduction to Model Based Design (MBD)

Testing as a Service - Models

Blueprint(s)

Pattern(s)

Recipe(s)

* Test Automation Patterns, testautomationpatterns.wikispaces.com & testing-store.com
Model Based Design (MBD) – Blueprint(s)

Testing as a Service - Models

We used drawing (visual 2D art) to represent the foundation of basic blueprints

“Truly wonderful, the mind of a child is.”

This demonstrates that models created from a single entity (transcendence) only represent ontology of the domain of discourse and exclude the quantitative intelligence of others.

“No matter their experience, masters can still learn from their apprentices.”

Enterprise Collaboration is the Evolution (not revolution) of detailed expert Blueprints

“In Digital Enterprise = Business on a Page

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www.sigist.org.uk
Model Based Design (MBD) – Blueprint(s) – Real World Example

SAFe™ 4.0

An example Blueprint(s) could be any process template that defines the high level flows.

“The best aspects of these proven test approaches demonstrate how they have evolved over the past decade, and this echoes some of the changes towards more lean and agile business methodologies. They are in a constant state of evolution – just as the underpinning technology evolves over time.”
Model Based Design (MBD) – Pattern(s)

Testing as a Service - Models

Applying constructive patterns from two or more point sources (interference) to render multi-dimensional (3D) models

Collaboration of individual applies unique *patterns* that will refine, predict and inform the model through exploration (enquiring and challenging) each other

Each iteration can increase the representation of the model by applying and interpreting data

Death Star Interior / Inner Chasm & Corridors

Quantum Multifractality

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Model Based Design (MBD) – Pattern(s) – Real World Example

Test Infrastructure as a Service (TIaaS.net) – TestOps 1.0 (VM Role Dispenser)

“Over the last five years we have been developing a azure cloud based solution to provide true **Test Automaton as a Service** using the hybrid approach specifically designed with the Hybrid Cloud (Private/Public) in mind to utilise the instant scalability, flexibility and availability of the Cloud.”

“The best aspects of these proven test approaches demonstrate how they have evolved over the past decade, and this echoes some of the changes towards more lean and agile business methodologies. They are in a constant state of evolution – just as the underpinning technology evolves over time.”

* Test Automation as a Service – Architecture, [TAaaS.net](http://www.taas.net) or [TestOps.net](http://www.testops.net)
Model Based Design (MBD) – Recipe(s)
Testing as a Service - Models

Early recipes date back to 1600BC, IFTTT recipes (conditional statements) =

- **Channels** are the basic building blocks
- **Triggers** are the "this" part of a recipe
- **Actions** are the "that" part of the recipe
- **Recipes** are the "equations" made from Triggers and Actions
- **Ingredients** are the basic data model, node, quantum materials (dot) particles or even atom(s)

Enterprise Gamification represents the success criteria e.g.

**DestroyDeathStar1.0**

I. All wings report in
II. Lock S-foils in attack position
III. Switch deflectors ON
IV. Keep visual scanning
V. Start attack run
VI. Move into position
VII. Stay in attack formation
VIII. Stay on target
IX. Use the FORCE

“Great shot kid that was one in a million.”
Model Based Design (MBD) – Recipe(s) – Real World Example

Test Automation as a Service (TAaaS.net) – TestOps 1.0 (>5 Years)

“Based on business process modelling to create business level keywords written in natural language validated against content sensitive validation to create reusable, jigsaw pieces representing the Solution Under Test (SUT).”

“The best aspects of these proven test approaches demonstrate how they have evolved over the past decade, and this echoes some of the changes towards more lean and agile business methodologies. They are in a constant state of evolution – just as the underpinning technology evolves over time.”

Test Automation as a Service

Introduction to Model Driven Delivery integration (MDDi)

Agile Engineering

Core IT

Agile Engineering

Fluid IT

Open Innovation

* Adam Mann, Google Innovation Officer, 'Creating the inter-planetary Internet protocol', Wired.com, 6th May 2013
Introduction to Model Driven Delivery (MDDi) - Charter(s)

Domain Driven Design (DDD)  Domain Driven Delivery (DDDi)

Test First Delivery (TFD)  First Day Delivery (FDDi)  Transcendence Driven Delivery (TDDi)

Test First Delivery (TFD)

* Jonathon Wright, 2014, Gartner, [http://www.slideshare.net/mobile/Jonathon_Wright/addi-ha-apytestinghybridcloud](http://www.slideshare.net/mobile/Jonathon_Wright/addi-ha-apytestinghybridcloud)
Charter – First Day Delivery (FDDi)
Model Driven Delivery (MDDi) integration

Business Process Modelling
Blueprint | Node Maps
---|---

Business Process Scenarios
Patterns | Node Learning
---|---

Business Process Components
Recipes | Node Strengthening
---|---

• Model the proposed solution

• Learning (Turing machine) adapting to simulate logic algorithms

• Validate all possible states

Smart Learning Machines

*The Advanced Research Projects Agency Network (ARPA) Network, 1969, 2 & 4 Nodes the precursor to the Internet
Charter – Transcendence Driven Delivery (TDDi)
Model Driven Delivery (MDDi) integration

Business Process Components
Recipes: NodeJS (Controller)

- Each Node creation (LOC) passes requirement, story, behaviour, acceptance test

Business Process Scenarios
Patterns: Node (View)

- Each Node generates a testable view (UI, Service, or Data layer) of the solution

Business Process Modelling
Blueprint: Node (Model)

- Models Nodes and Links

Charter – Domain Driven Delivery (DDDi)
Model Driven Delivery (MDDi) integration

**Business Process Modelling**
- Blueprint
- Node Discovery

**Business Process Components**
- Recipes
- Node Systems

**Business Process Scenarios**
- Patterns
- Node Validation

- Model the current solution
- Apply:
  - Systems Dynamics (epistemic & systemic entropy)
  - Systems Thinking
- Learn:
  - Ontology – formal naming, definition of node types, properties and interrelationships
  - Domain – universal set of nodes (domain of discourse)
  - Context – nouns/verb discovery to enable context sensitive validation.

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Model Based Design (MBD)
Advanced Modelling Simulation Technologies

Models can be analysed, visualized, and optimized

Prediction of water pollution
Watershed management
Pipe-network Management
Pipe-network analysis

Models can provide assurance through, analysis, simulation and prediction

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Testing as a Service - Models

Business Delivery Management - ‘Testing as a Service’ layer

• **Test Platform as a Service (TPaaS)**
  – Social Enterprise Collaboration
  – Actionable Business Insight
  – Enterprise Gamification
  – Global Testing Marketplace
  – All-Channel Customer Experience
• **Test Infrastructure as a Service (TlaaS)**
• **Test Automation as a Service (TAaaS)**
• **Functional Testing as a Service (FTaaS)**
• **Performance Testing as a Service (PTaaS)**
• **Mobile Testing as a Service (MTaaS)**
• **Security Testing as a Service (STaaS)**
Global Testing Marketplace
Instant Scalability, Flexibility and Availability

Test Platform as a Service (TPaaS) Model

Global Testing Marketplace
Improved Communication, Collaboration and Mobility

Test Platform as a Service (TPaaS) Model
*Jonathon Wright, 2012, 'Test Automation as a Service' at Fusion, Sydney, 10th September 2012
Global Testing Marketplace

Become a Testing Rock Star!

Test Platform as a Service (TPaaS) Model

Enterprise Gamification
Service Thinking (Service as a Experience) Business Model

Test Platform as a Service (TPaaS) Model

Enterprise Collaboration in the Crowd – Real World Example

Test Intelligence 2.0 – Global Testing Insight (UX, Exploratory & Testing in the Wild)

1. Request

2. Run

3. Test

Enterprise CrowdTesting

* Real Crowd Tester, Liam Warrilow, 24th Friday 2015 @15:13 (Ramp up to 100 iWatch testers in under 24hrs)
Actionable Business Insight powered by ‘Small Data’

### Test Platform as a Service (TPaaS) Model

- **Test Automation as a Service (TAaaS)**
- **Benefit Analysis (Presentation Layer)**
- **Story Board (Presentation Layer)**
- **Risk Dashboard (Presentation Layer)**
- **Business Questions**
- **Business Stories**
- **Business Specific Language**
- **Risk Management (BPMN)**
- **Business Process Scenarios (BPS)**
- **Business Process Friences (BPI)**
- **Business Process Design (BPD)**
- **Business Process Tests (BPT)**
- **Data Under Test (SUT) Layer**
- **Solution Under Test (SUT) Layer**
- **Solution Delivery Lifecycle Integration (SDLi)**
- **Funnel Virtualisation**

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Social Enterprise Collaboration

Embracing Agile Portfolio Management in the Cloud

• Delivering true business value
  – Not just driving process efficiency
  – Across the SDLCi with cross-functional domain tools
  – Providing instant actionable business insight

• Supporting individual, team, organizational, and enterprise collaboration
  – Integration with the Global Testing Marketplace (GTM) platform
  – Produce high-quality reusable business assets in the cloud
  – Capture specialist technical and cross-domain knowledge (i.e. DIDO)
  – Game mechanics to encourage collaboration (i.e. Enterprise Gamification)
  – Produce design patterns that allow business rules to be codified in business-specific meta-languages (i.e. BPMNv2.2, xPDL, XAML)

• Managing software that gets deployed everywhere
  – All-Channel Customer Experience

Test Platform as a Service (TPaaS) Model

Testing as a Service - Models

Business Delivery Management - ‘Testing as a Service’ layer

- **Test Platform as a Service (TPaaS)**
- **Test Infrastructure as a Service (TIaaS)**
  - H(API)y Testing in the Cloud
  - Test First Delivery
  - Building bridges in the Cloud
  - Cloud 2.0 beyond legacy
- **Test Automation as a Service (TAaaS)**
- **Functional Testing as a Service (FTaaS)**
- **Performance Testing as a Service (PTaaS)**
- **Mobile Testing as a Service (MTaaS)**
- **Security Testing as a Service (STaaS)**
Building Bridges in the Cloud

“If you build it, they will test” (IYBITWT)
Cloud 2.0
Moving beyond the legacy cloud

Cloud Recipe (IFTTT)

if this then that

If <Solution Under Test>
Then <Build Cloud 2.0>

Cloud Recipe for Solution Under Test

select <IaaS>
select <PaaS>
select <SaaS>
select <TaaS>
select <TaaaS>

Testing Cloud

Internet Service Bus
Identity Services Connectivity Workflow

“Heterogeneous test cloud that are open, flexible and extensible”

Test Infrastructure as a Service (TIaaS) Model

Test First Delivery

Service / Network Virtualisation as part of Test Driven Delivery integration (TDDi)

Learn physical endpoint(s)

Define virtual endpoint(s)

Test Infrastructure as a Service (TIaaS) Model

Lean = Open
Open (Digital) Innovation results in Open (Digital) Businesses

Lean  |  Testing  |  Practices
---    |  ---      |  ---
Open   |  Digital  |  Platforms
Smart  |  Enterprise |  Blueprints

“Sharing intellectual property such as software code or research rules, adhering to open standards rather than creating your own, and giving customers the freedom to easily exit your platform”

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Open Digital Enterprises
Open Innovation 1.0 - Real World Example
SDLCi - Grid-Tools connected intelligence to PerfectoMobile

Ha(API)y Testing in the Cloud

Unlock true delivery innovation

• Build Bridges in the Cloud
  – Use Cloud Maps to Learn, Discover and Model endpoint(s)
  – Create Bridges (VNet to VNet) “If you build it, they will test” (IYBITWT)
  – Embrace Test Infrastructure as a Service (TIaaS) in the Hybrid Cloud (TQA™ Lab)

• Avoid Legacy Cloud
  – Heterogeneous Test Infrastructure as a Service (TIaaS) that are open, flexible and extensible
  – Continuous Build, Integration & Delivery in YourTestCloud
  – Embrace Community Test Clouds (Collaborate/Share Recipes)

• First Day Delivery
  – Enable Day-zero Performance, Penetration & Security Testing as a Service

• Support for powerful Test Automation as a Service (TAaaS)
  – UI Testing that is Scalable and Cost-Efficient
  – API Testing that is Repeatable, Reliable and Fast

Test Infrastructure as a Service (TIaaS) Model

Testing as a Service – Models - Summary

Business Assurance provides the visibility and transparency throughout the solution delivery lifecycle
- Digital Enterprise
- Business on a Page
- Business Delivery Management
- Business Intelligence (Actionable Business Insight)
- Business Innovation (Enterprise Gamification)

Business Quality allows enforceable quality across the entire solution delivery lifecycle owned by everyone
- Business Lifecycle Management
- Business Solution Discovery / Delivery
- Business Enterprise Collaboration
- Business Acceptance Testing

Business Testing is integrated across the solution delivery lifecycle as an activity not a function.
- Testing as a Service - Models
- Solution Delivery Lifecycle integration (SLDCi)
- Test First Delivery / First Day Testing
- Continuous Integration, Build & Delivery
- Shift Everywhere (UP/DOWN/LEFT/RIGHT)
- All Channel Customer Experience
Hitachi Consulting
Hitachi’s Global Management Consulting & IT Services Business.

$740 Million FY13 Revenue
Delivered over $10 Billion in overall Business Improvements
6,500 experienced & dedicated professionals
Commit to deliverables & measurable results
We speak 25 languages. We work in over 50 countries

More than 25 Years of consulting experience
Collaborative, Committed & Results Oriented


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