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Current Trends and Future Directions in Technology for DevOps

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Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

Outline

- Business promise of tools
- Business and Development
- Development and Operation

The Business Promise of Tools Is Widely Anticipated

Companies acquire tools with the best of business-centric aspirations

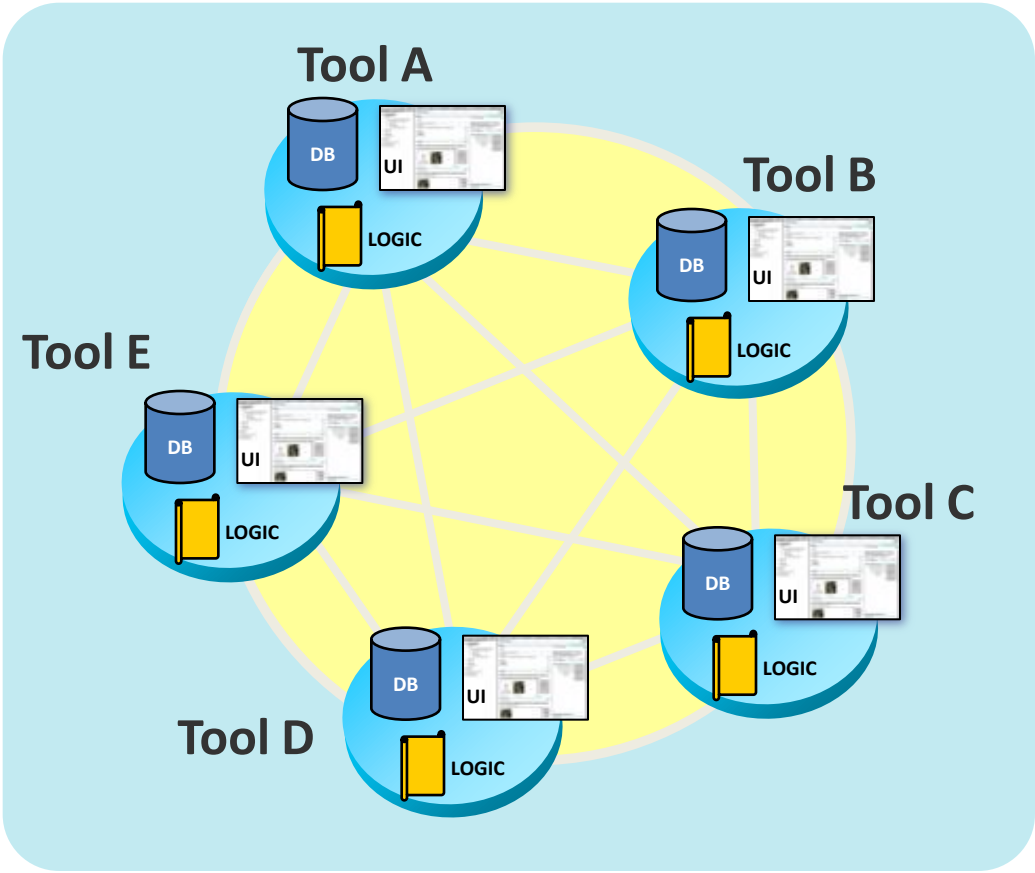
- Higher quality
- More customer satisfaction
- Aligning business and IT
- Faster time to market
- Lower costs/higher productivity
- More predictable delivery

Reality adds significant complexity

- Many tools from many vendors
  - **Heterogeneous environments** that are flexible for partners and suppliers
- Many teams in many places
  - **Distributed** development, cross site product development
  - Many levels of teams

    PMO, Bus, dev teams, ops teams, etc
- Coherent process
  - **Flexible** and **robust** process

    supporting Lifecycle / Agile Methods
  - **Measure** and **improve** effectiveness



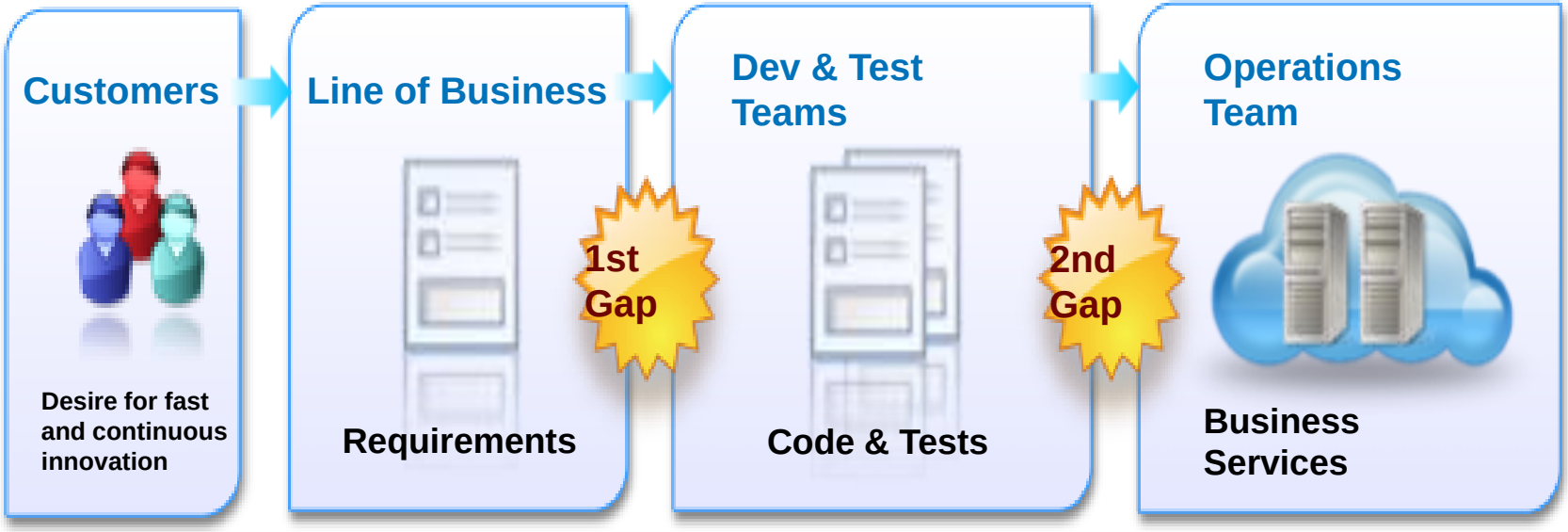
Delivery Challenges

Today's business and technical needs are pushing traditional delivery approaches to the breaking point

People

Process

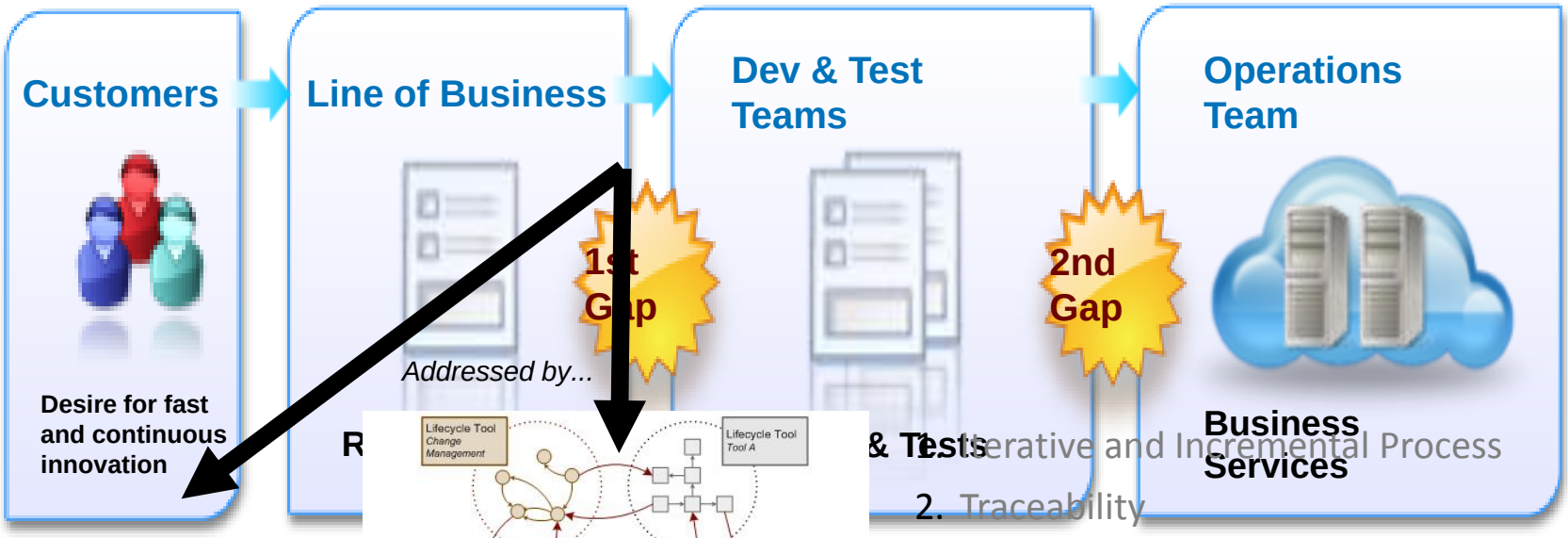
Information



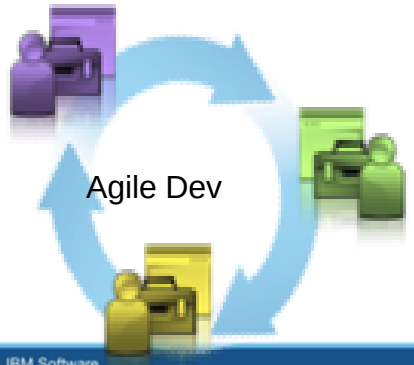
"At some point, you take a step back, and you realize you have an awful lot of **siloed systems** that are **limiting transparency** across strategic projects."

- Development Director
Temenos, Inc.

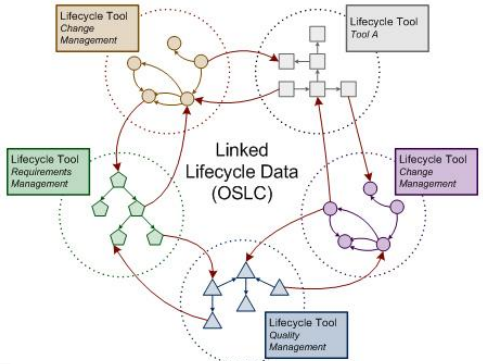
Addressing *BusDev* gaps

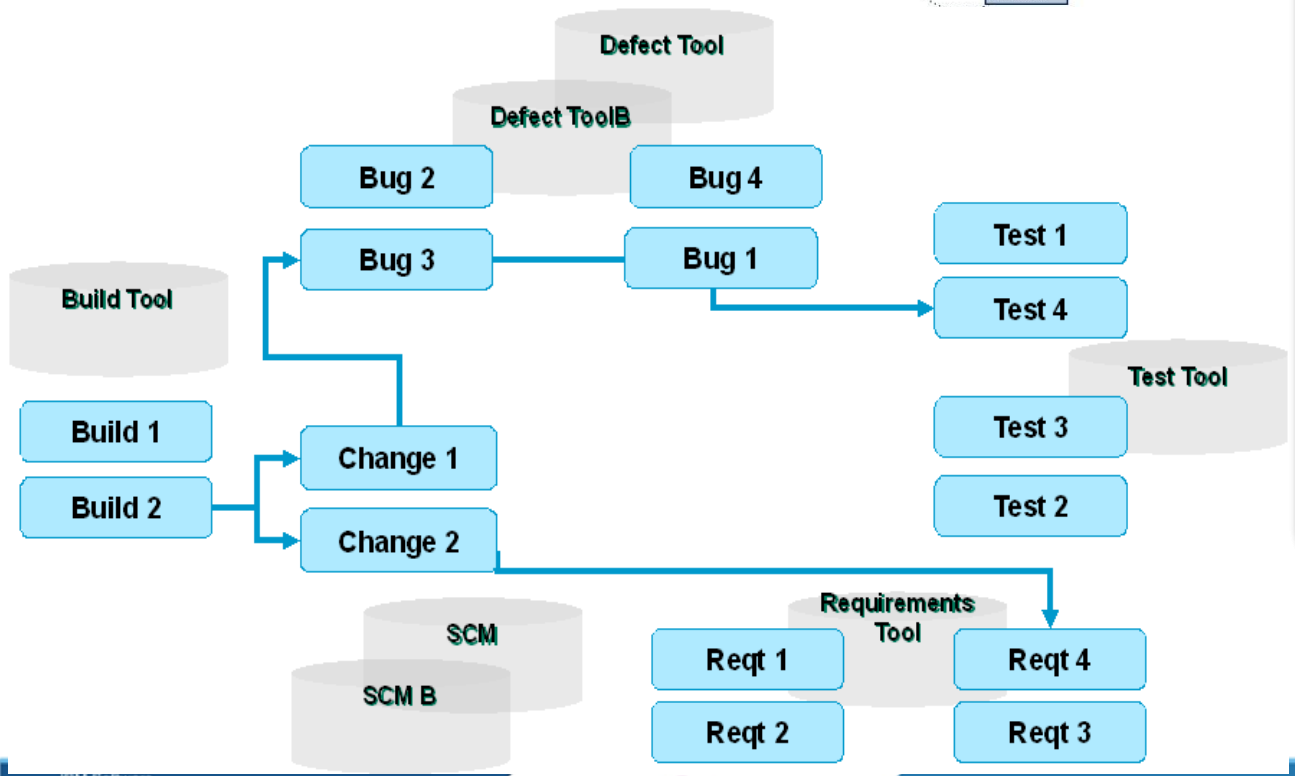


1. Iterative and Incremental Process
2. Traceability



Linked Lifecycle Data





- The data is the thing
  - Resources and relationships
  - Tools operate on the data
  - Tools execute the process
  - Tools expose their data in a common way (REST)
- Lifecycle integration:

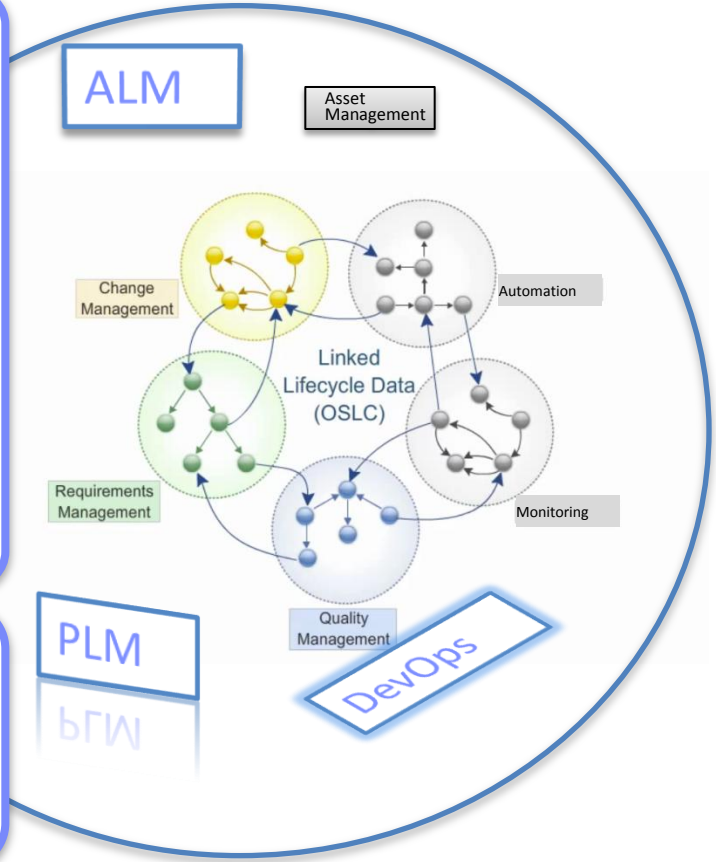
  Tracing, indexing, analyzing the web of lifecycle data where it lives
- Utilizes architecture of the internet
  - All data are resources with URLs
  - Open standards
  - Loosely coupled
  - Technology neutral
  - Scalable, extensible

Open Services for Lifecycle Collaboration (OSLC)

Working to improve the way software lifecycle tools share data

Open Services for Lifecycle Collaboration
Lifecycle integration inspired by the web

- Community driven and governed
  - 400+ registered community members
  - Workgroup members from 34+ organizations
- Wide range of interests, expertise, & participation
- Open specifications for numerous disciplines
- Defined by scenarios – solution oriented
- Implementations from IBM, BPs, and Others
- Based on W3C Linked Data



Inspired by the web **Proven**

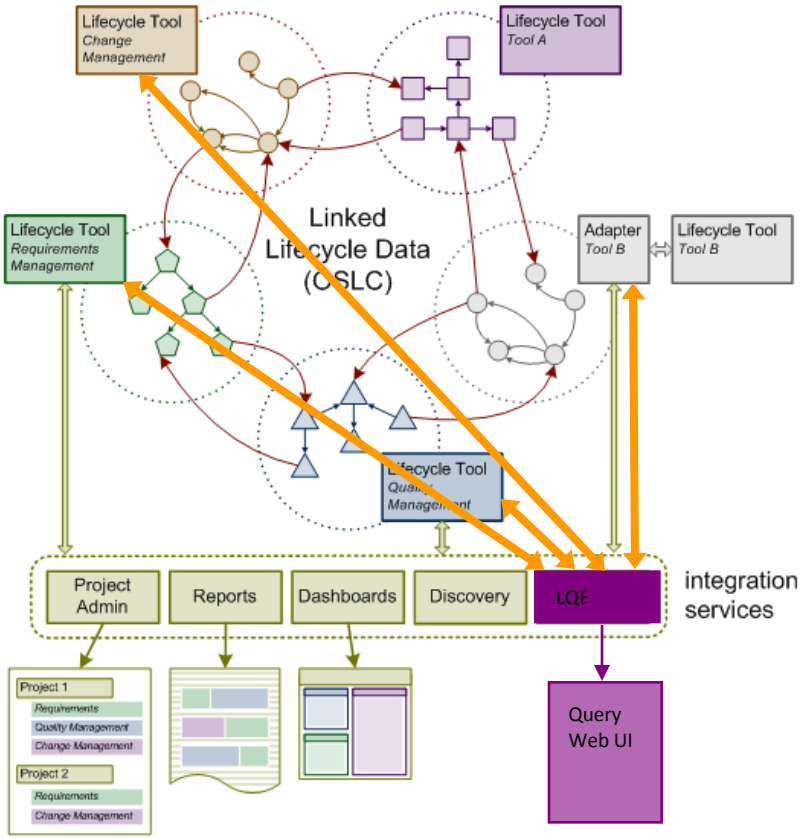
Free to use and share **Open**

Changing the industry **Innovative**

open-services.net

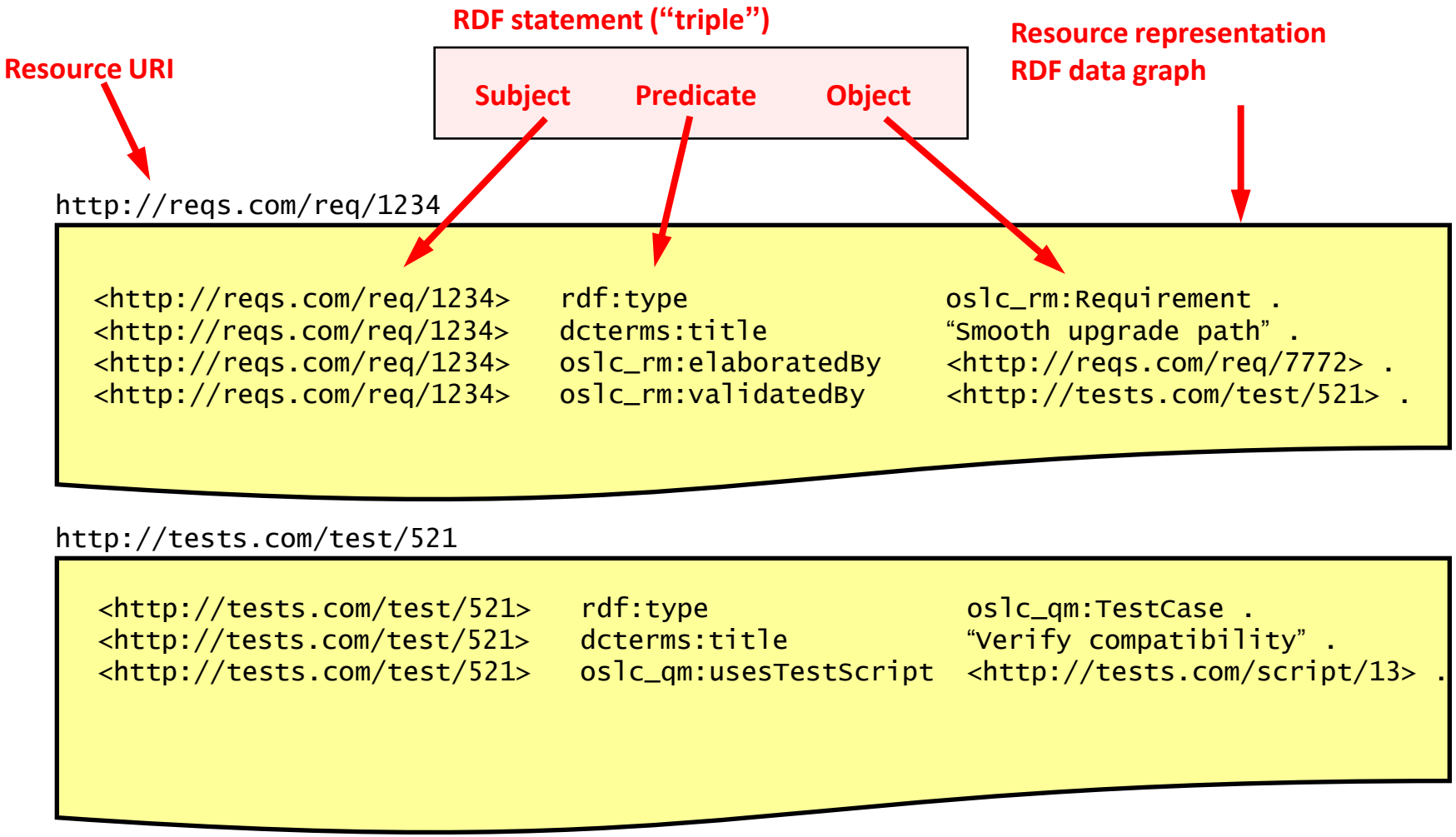
GET INVOLVED AND CONTRIBUTE!

New Integration Service - Lifecycle Query



Provides ability to run queries over linked lifecycle data aggregated from multiple lifecycle tools

Linked Lifecycle Data (LLD)



RDF standard www.w3.org/RDF/

SPARQL Query Language

- SPARQL is standard query language for RDF datasets

SPARQL query

```
SELECT ?x ?title1 ?y ?title2 WHERE {
  ?x   rdf:type             oslc_rm:Requirement .
  ?x   dcterms:title        ?title1 .
  ?x   oslc_rm:validatedBy  ?y .
  ?y   rdf:type             oslc_qm:TestCase .
  ?y   dcterms:title        ?title2 . }
```

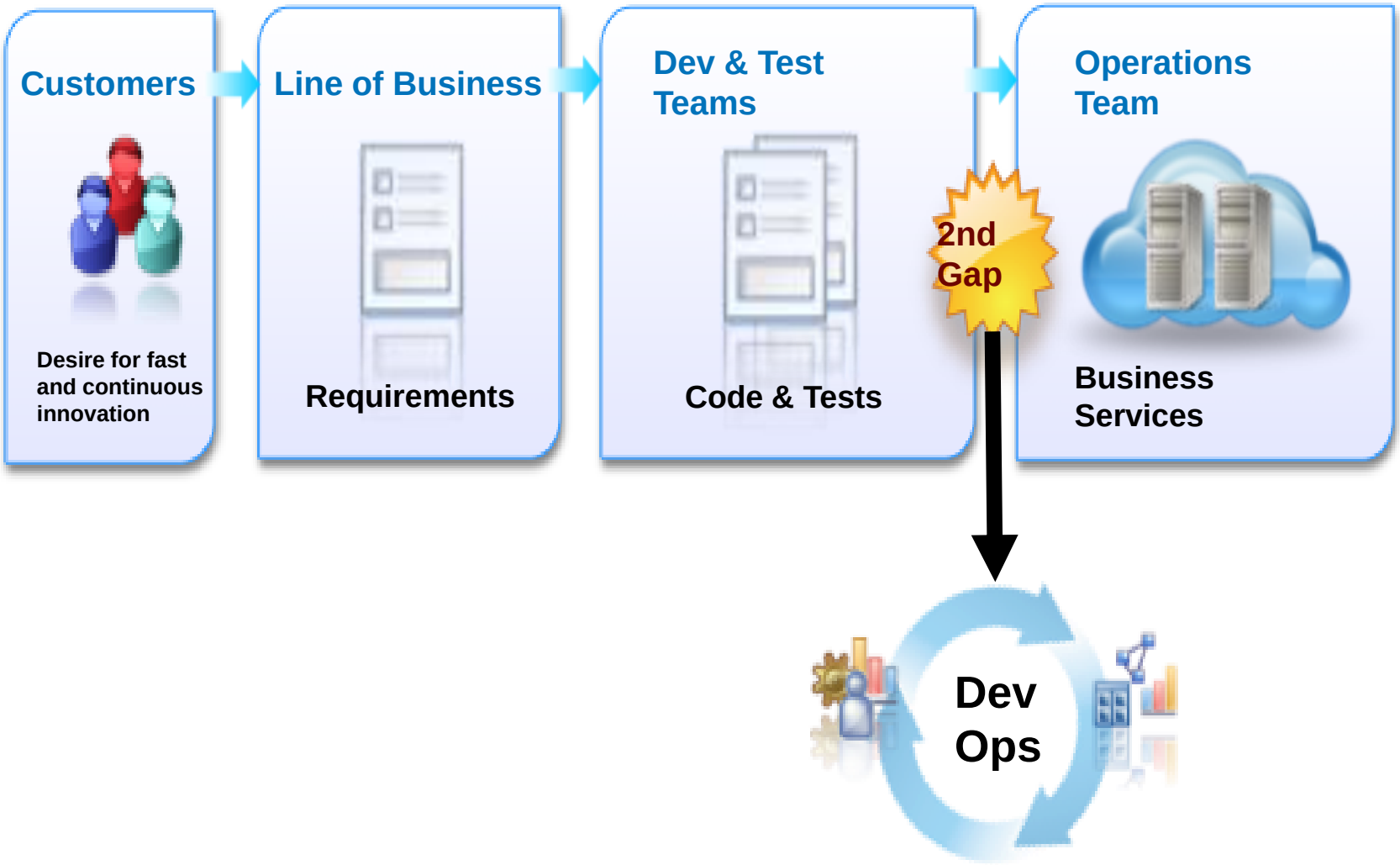
Query results

x	title1	y	title2
<http://reqs.com/req/1234>	"Smooth upgrade path"	<http://tests.com/test/521>	"Verify compatibility"

- Queries can mine linked lifecycle data aggregated from multiple lifecycle tools

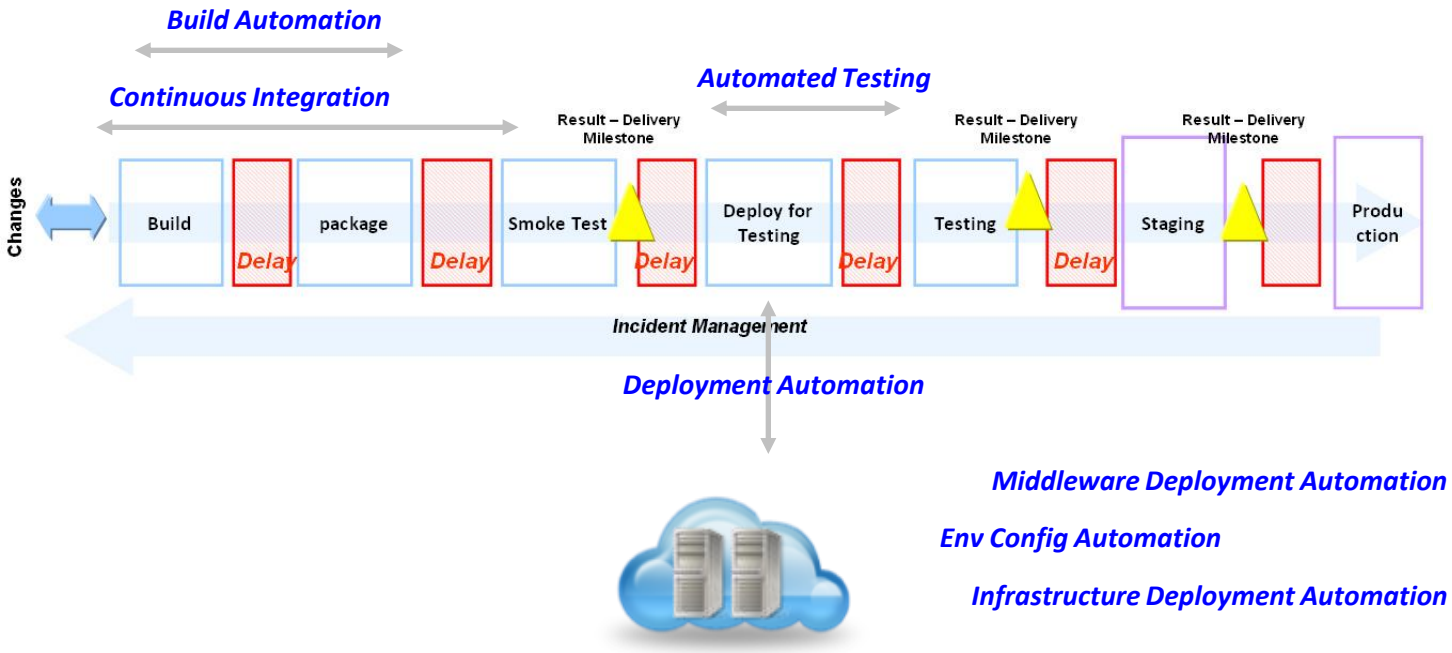
SPARQL standard www.w3.org/TR/rdf-sparql-query/

Addressing Application Lifecycle Management gaps

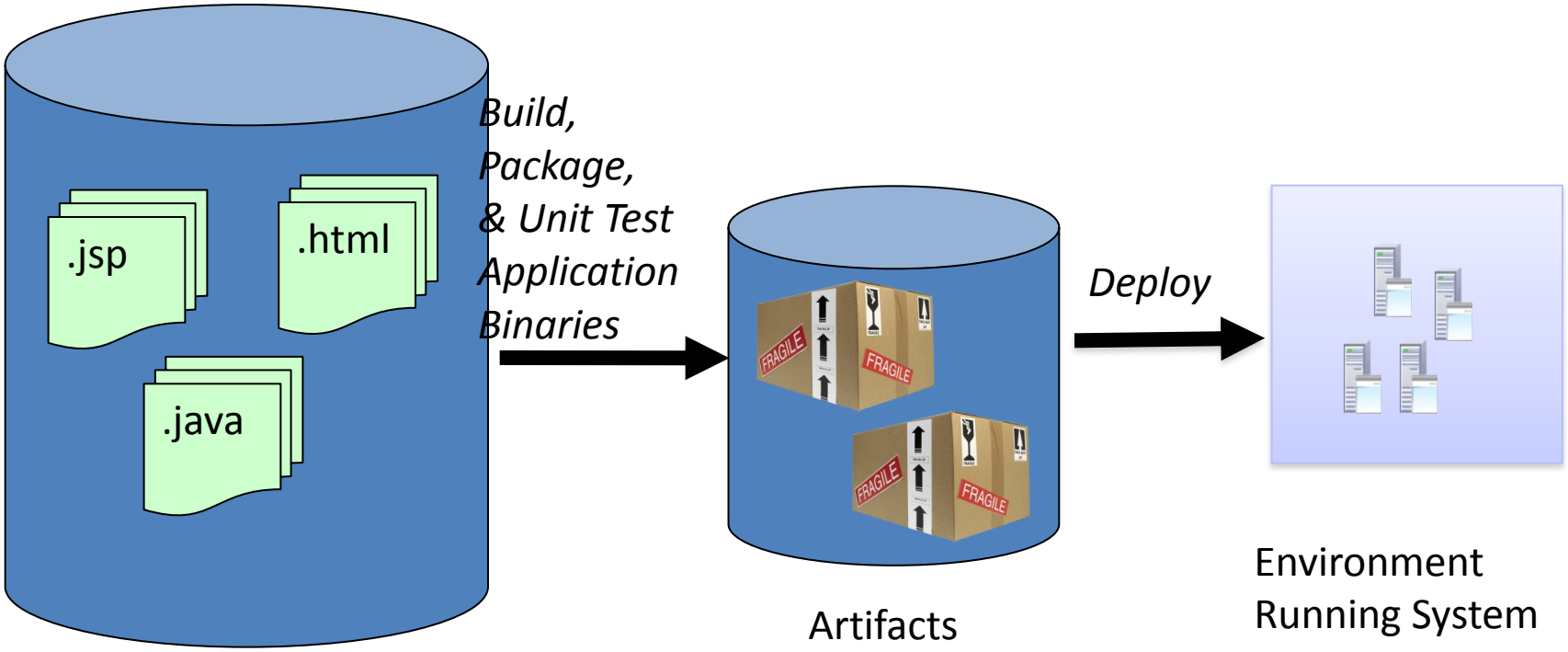


Current Customer approaches addressing these challenges..

- Selective & Siloed automation of the delivery process with limited benefits
- Poor visibility and control impacting cycle time

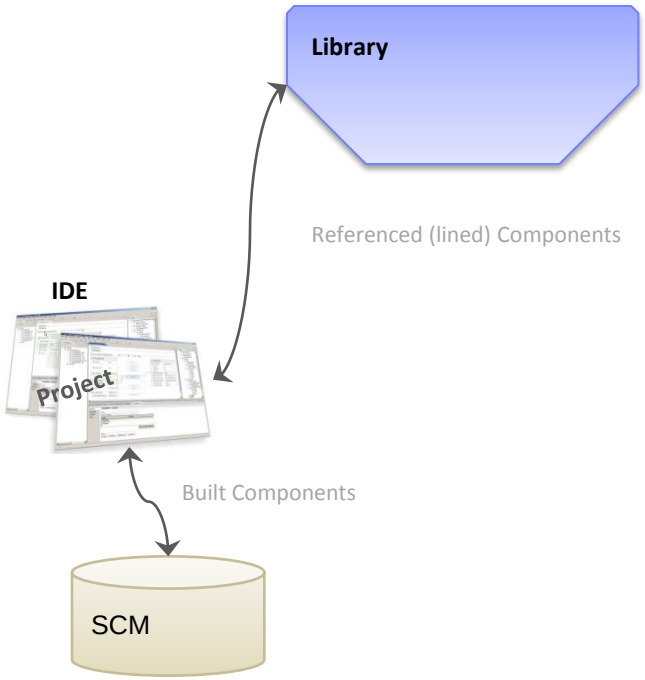


Automating development hand off today



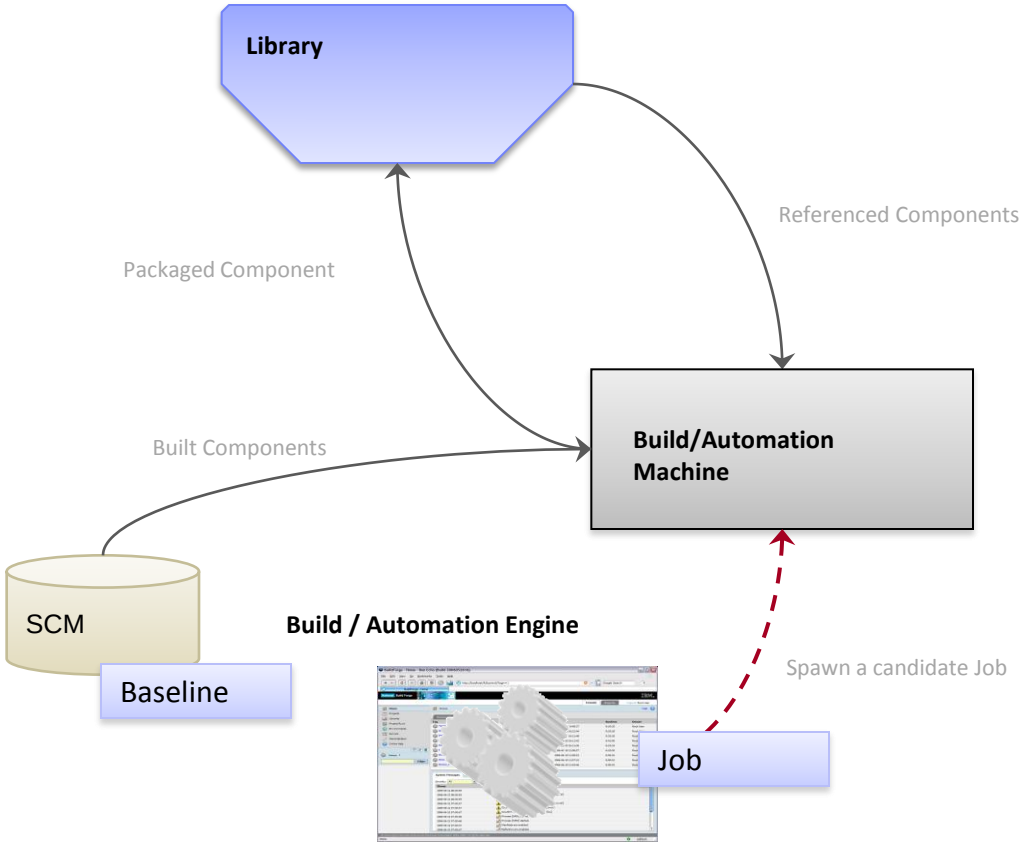
Development phase

1. Use SCM / CM to manage the things you build.
2. Use a Library to link with the thing other have built.



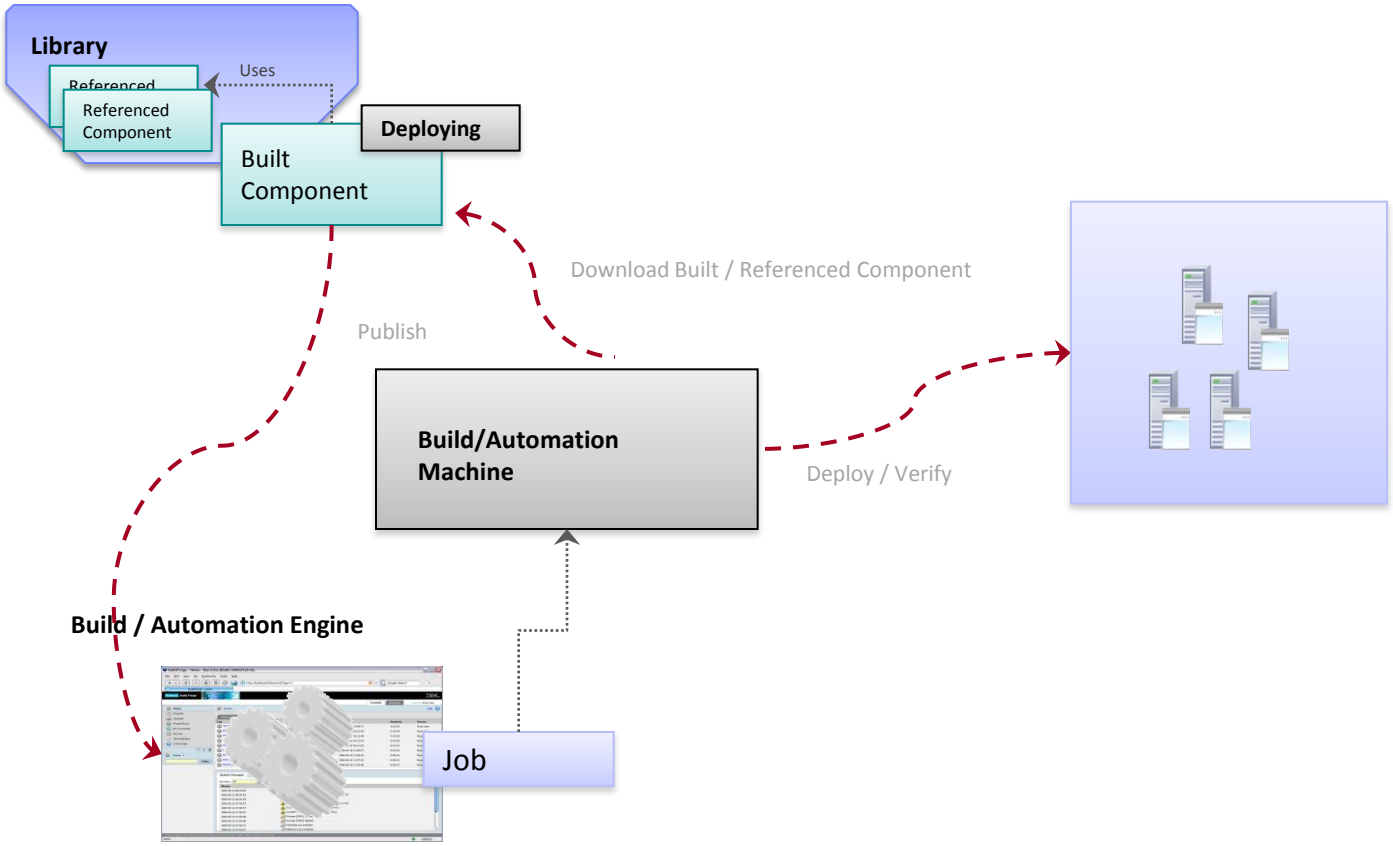
Build / Automation Phase

1. Track the Bill of Materials used in a build
2. Manage which build move onto the next stage

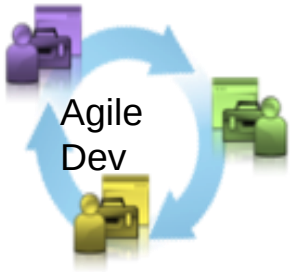


Deploy Automation Phase

1. Control what is deployed
2. Track the Bill of Materials used to deploy



With only Agile Development improvements…



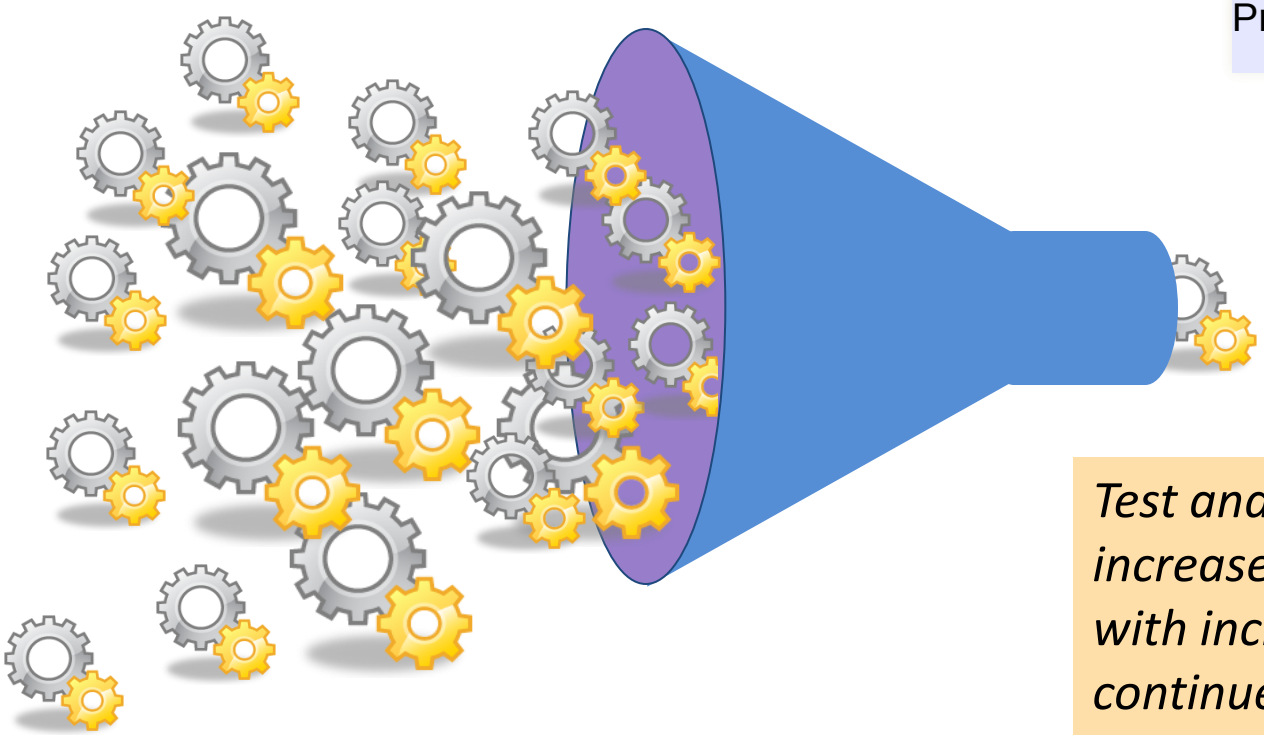
Functional Testing

Acceptance Testing

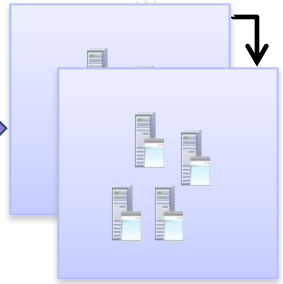
Production

Operator

Setup (weeks)



Install



Test and Ops teams have increased pressures to keep up with increased loads but continue to use waterfall approaches and traditional tools.

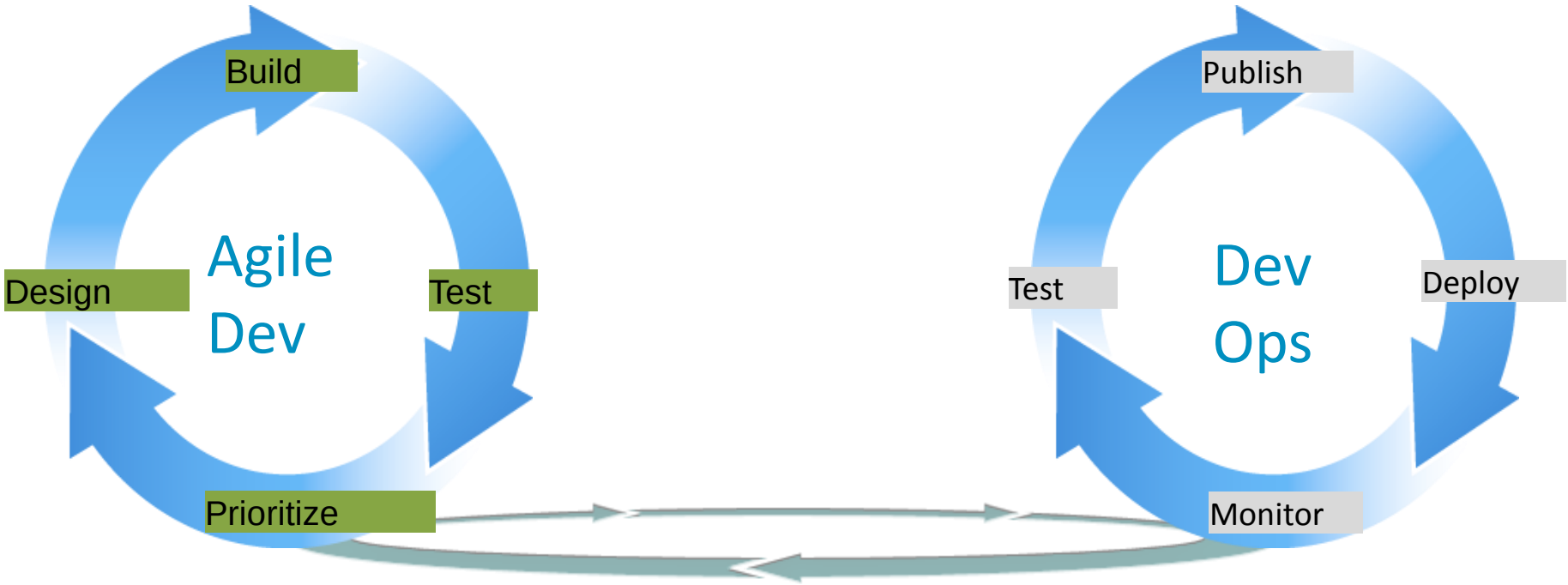
CI builds are piling up

Adjusting Delivery Mindset

- Infrastructure Developer vs. Operator/Administrator
- Need to bring a software development mindset to the operational areas
- Replicate, where appropriate, standard architecture/development tools and methodologies
- Use an Agile approach to delivery of routines
- Continuous, incremental improvements and delivery of new functionality
- Automated unit and integration testing improves operational runtimes
- Source Control Management
- Automation routines and scripts are fundamental to Operations
- Managing Operations routines like source code offers several benefits:
  - Central point of truth as routines and environments change
  - Backup in case of loss
  - Identify possible regressions by comparing with prior versions
- Example Managed Assets:
- Perl, Jython, WSADMIN, ANT scripts, Service orchestration routines (opsware, b
  Infrastructure Gold copies components

Agile Development and Delivery

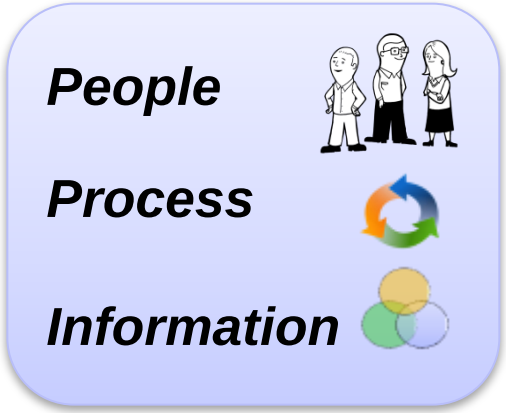
Continuous Integration extends to Continuous Delivery



Continuous Feedback

DevOps: Tighter alignment between Development & Operations to increase application velocity with managed risk

DevOps Principles & Values



- Collaborate across disciplines
- Develop and test against a production-like system
- Deploy frequently
- Continuously validate operational quality characteristics

12 Principles for Better DevOps*

Collaborate

1. Do your developers and operators communicate the production realities and the application's requirements?
2. Do you have patterns for platforms and applications, designed jointly by development and operations?
3. Do you have a delivery pipeline exposed through a summary dashboard to assess delivery velocity?

Automate

4. Are your patterns based on reusable deployment configuration scripts?
5. Can you deploy an environment (platform and application) in one step?
6. Can your developers launch and destroy production-like environments from those patterns?

*Based on "The Joel Test: 12 Steps to Better Code" http://www.joelonsoftware.com/articles/fog0000000043.html

12 Principles for Better DevOps

Validate

7.Do you have automated tests to validate your application and platform function and characteristics?

8.Do you monitor software against expectations after deploying your application?

9.Do you deploy your applications daily into production-like environments and verify them?

Manage and Control

10.Do you version deployment configuration and scripts along with your source code?

11.Do you link bugs and work items to changes in the application and configuration?

12.Do you associate tickets for production issues with relevant bugs opened for development to fix?

Installation Instructions

RedHat Linux

1. Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

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Apache Web Server

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Python

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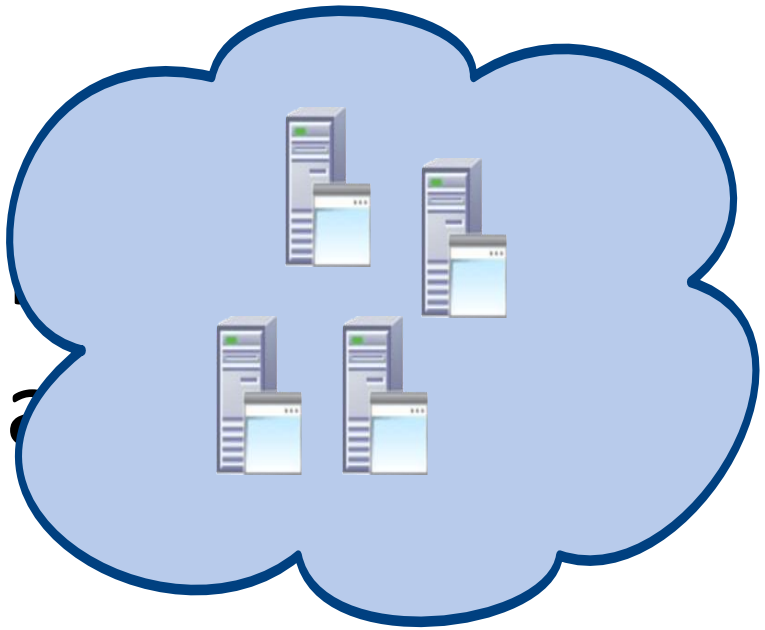
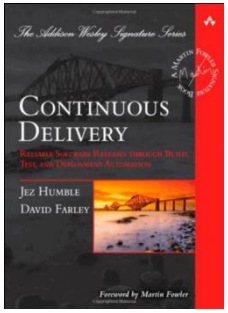
3. vel illum qui dolorem eum fugiat quo voluptas nulla pariatur?

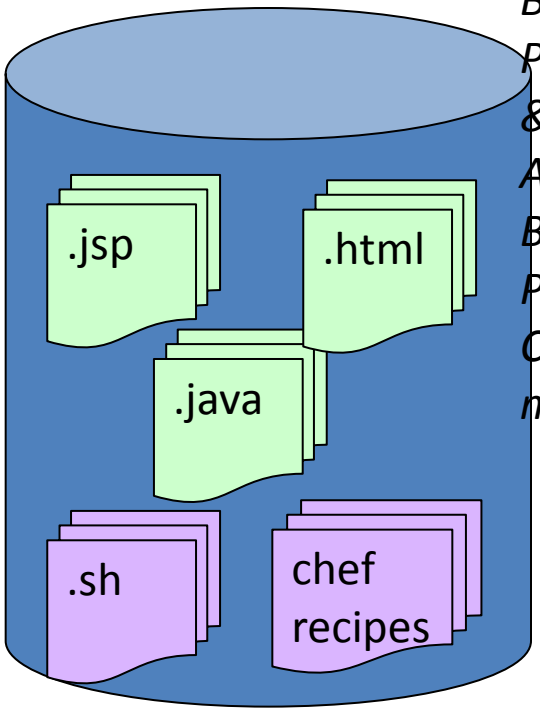
```
#!/usr/bin/env ruby

class DevopsDeployer
  def initialize(build_url, build_id)
    @log = Logger.new(LOG_FILE)
    @log.level = LOG_LEVEL

    @iaas_gateway = IaasGateway.new(HsltProvider.new(),
LOG_FILE, LOG_LEVEL)
    @server_instance = nil

    rtc_build_system_provider = RtcBuildSystemProvider.new(
RTC_REPOSITORY_URL, RTC_USER_ID, RTC_PASSWORD_FILE)
    @build = rtc_build_system_provider.resolve_build(
build_url, ENV['buildResultUUID'], build_id)
    @build_system_gateway = BuildSystemGateway.new(
rtc_build_system_provider, LOG_FILE, LOG_LEVEL)
  end

  def add_build_stamp
    template_file = WEB_APP_ROOT +
"/app/templates/pages/page.html"
    @log.info "Adding build ID stamp #{@build.id} to \
#{template_file}"

    # Read in the file's contents as a string, replace
    # the build_id, then overwrite the original contents
    # of the file
    text = File.read(template_file)
    new_text = text.gsub(/\{\{ build_id \}\}/,
"<a href=\"#{@build.uri}\">#{@build.id}</a>")
    File.open(template_file, "w") { |file|
      file.puts new_text
    }
  end

# ...
```



De

Using the same tools and methodologies to manage and deliver software and deployment configuration changes

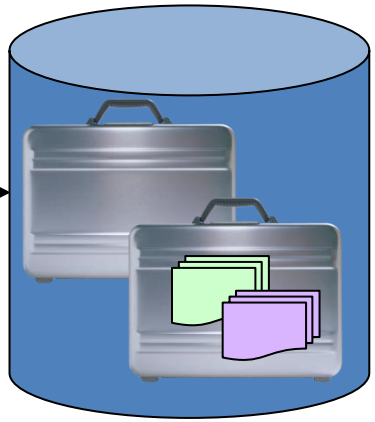




Source Artifacts

Source Control Management

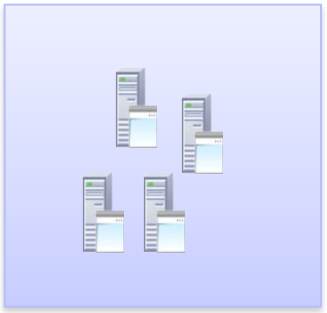
Build, Package, & Unit Test Application Binaries & Platform Configuration



Deployable Artifacts

Library

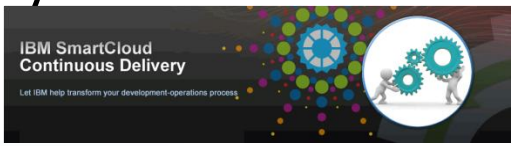
Deploy

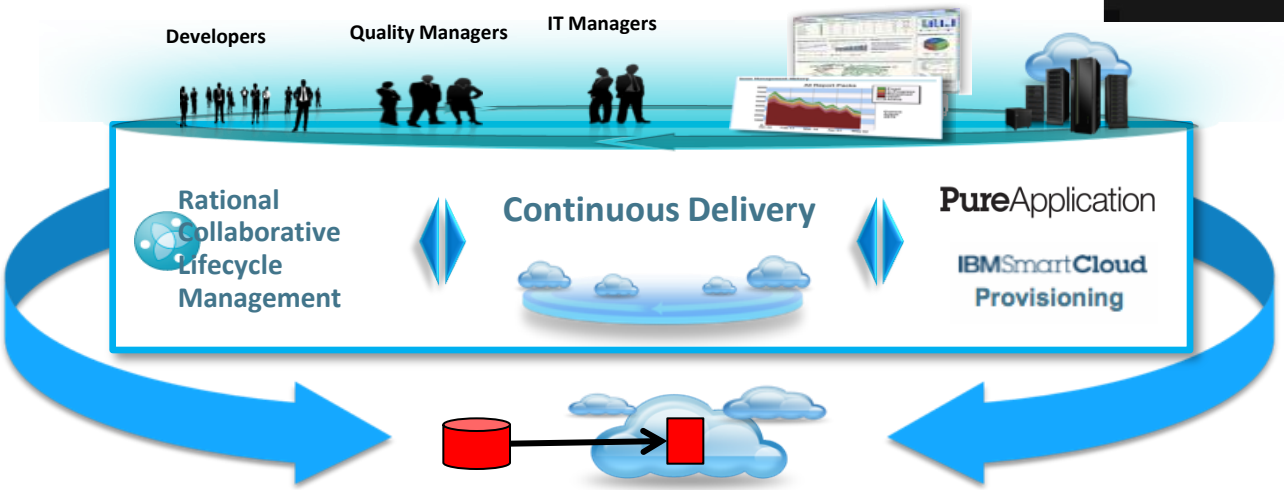


Environment Running System

IBM SmartCloud Continuous Delivery

Extending Agile disciplines through delivery





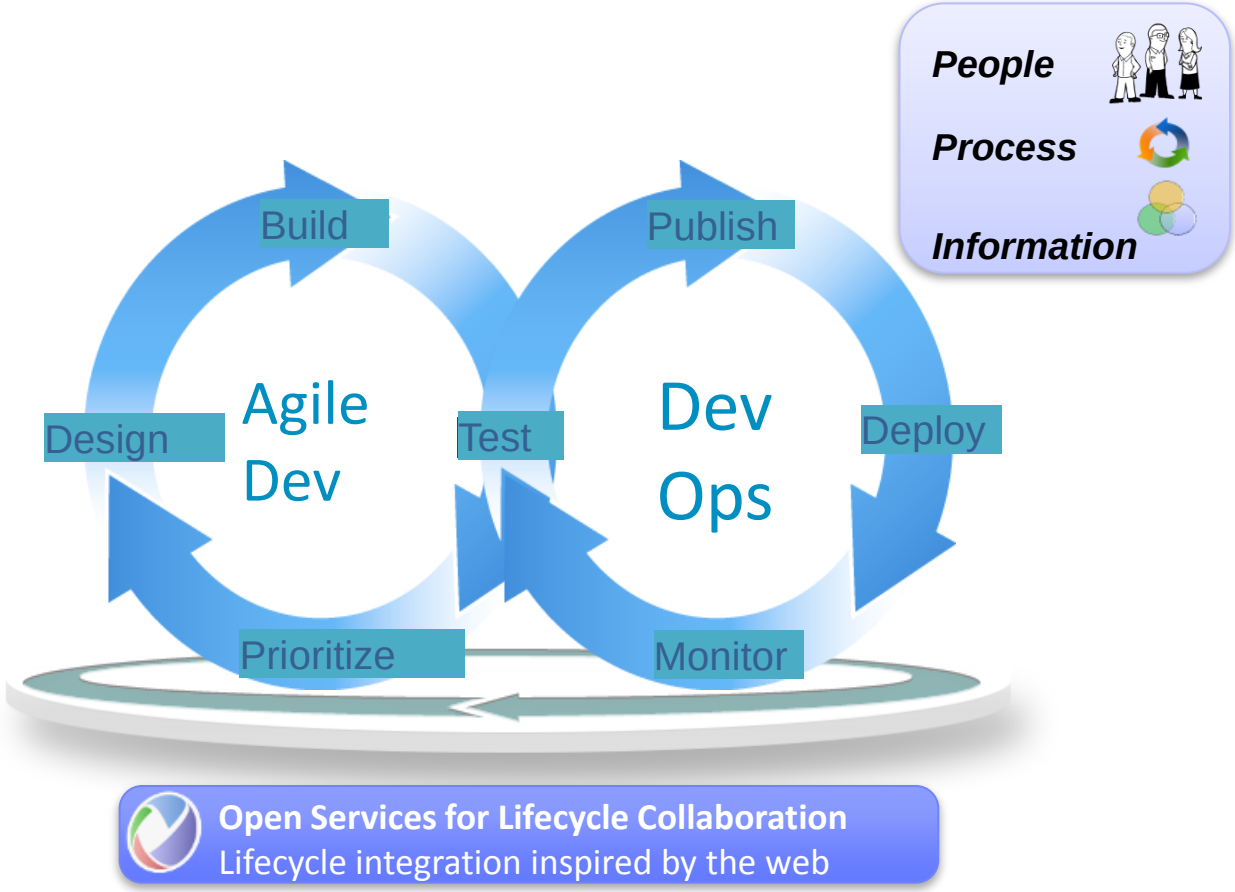
Client Value

- Reduce risk, improve quality; manage change from development to deployment
- Improve efficiency, accelerate delivery; automated handover between processes
- Optimize resources; workload pattern composition delivery

Targeted Entry

- Development team extending Agile into rapid workload deployment in the cloud
- Operation teams delivering scalable, continuous delivery services to the development organization

End-to-End Lifecycle Optimization



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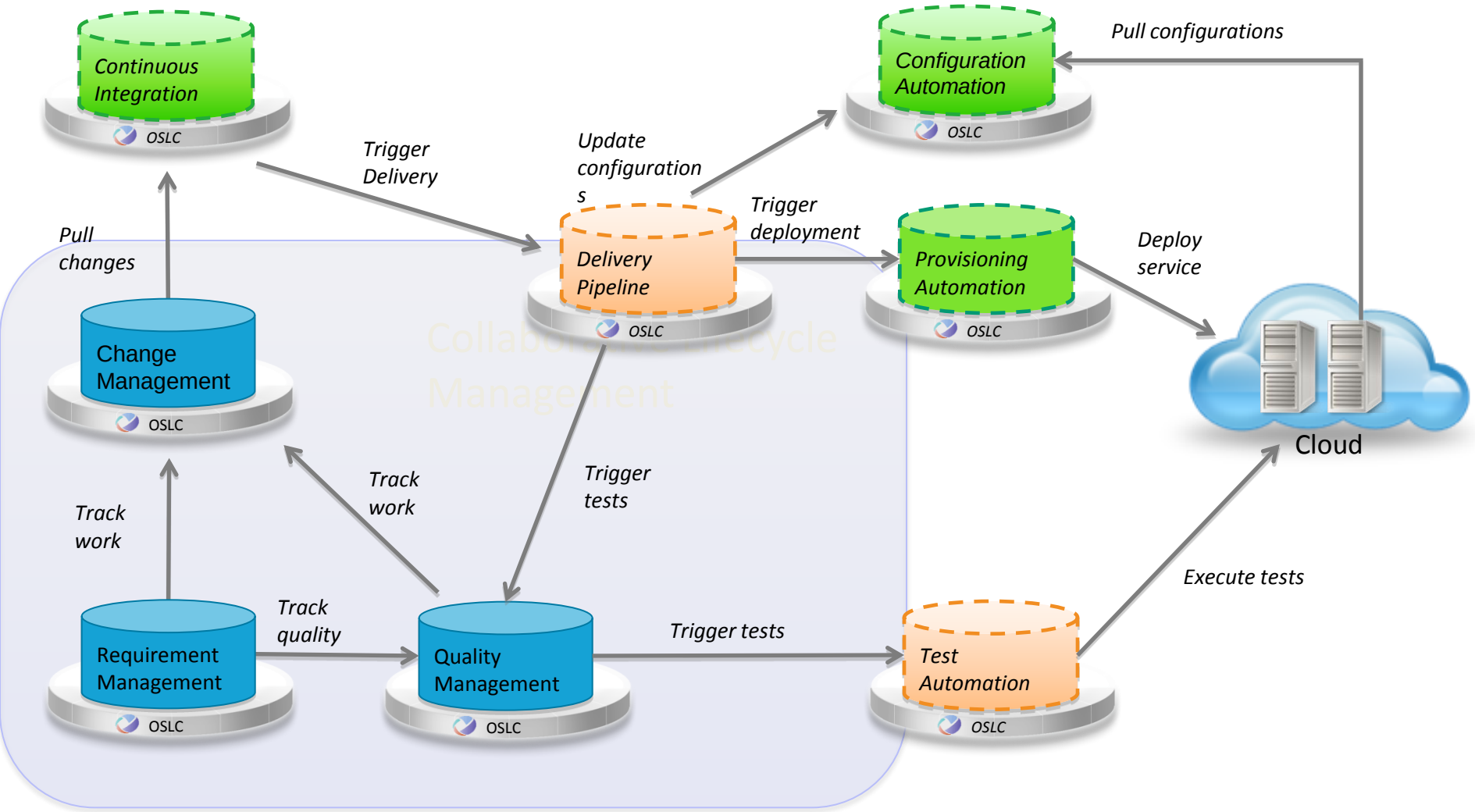
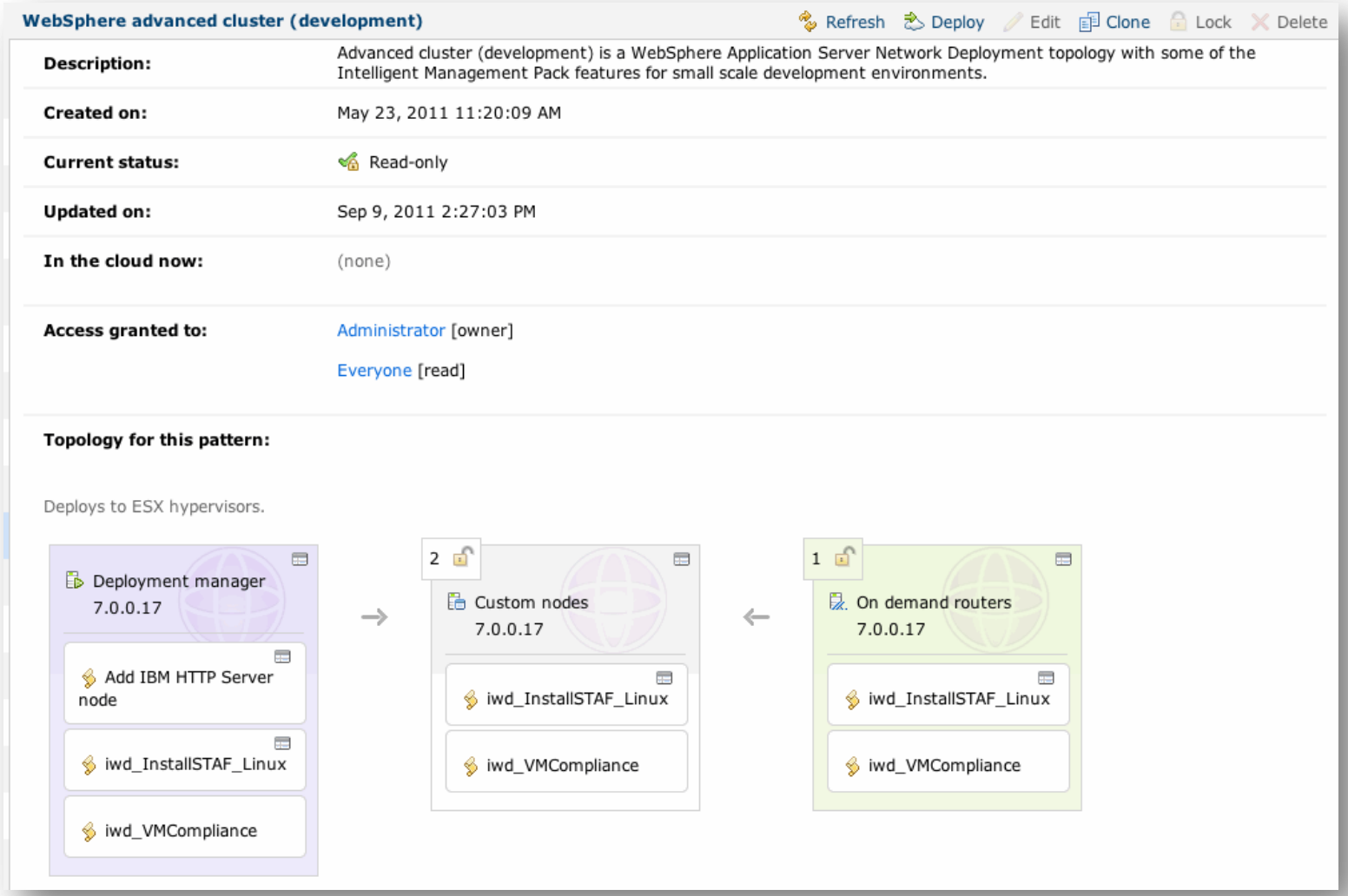
Lifecycle Management Reference Architecture

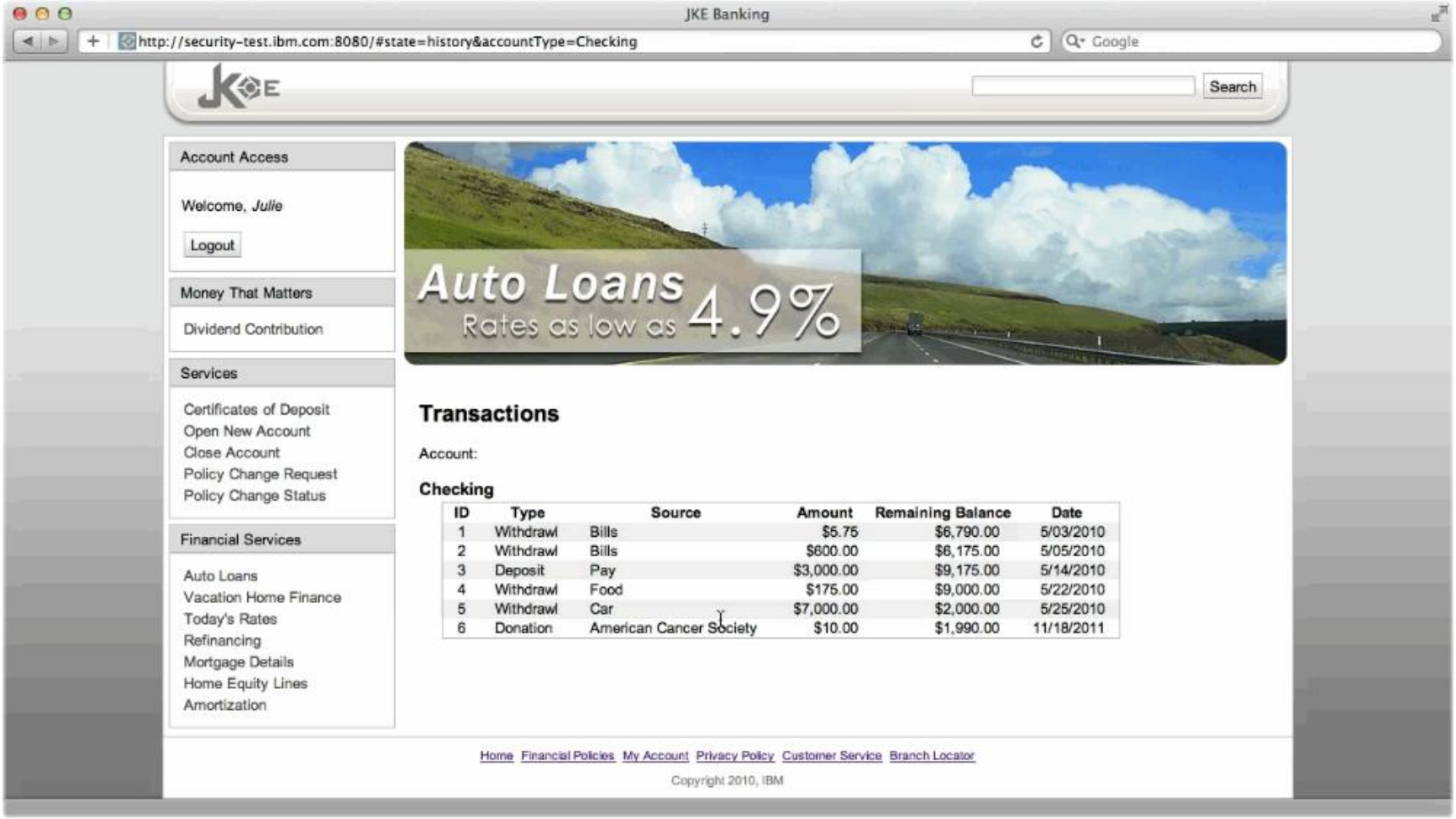


Adopt in any order, at any time

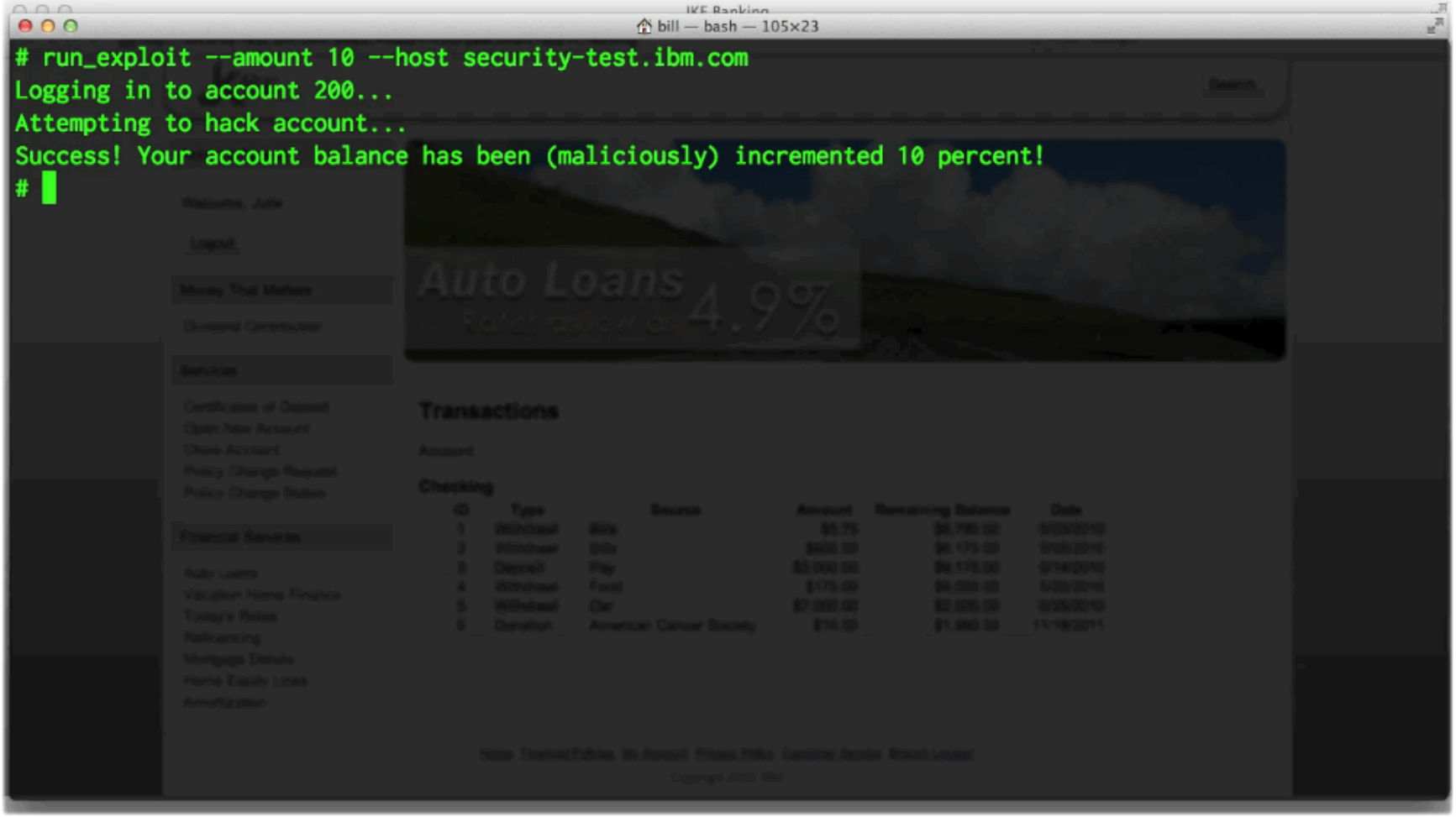
Creating standard workload patterns



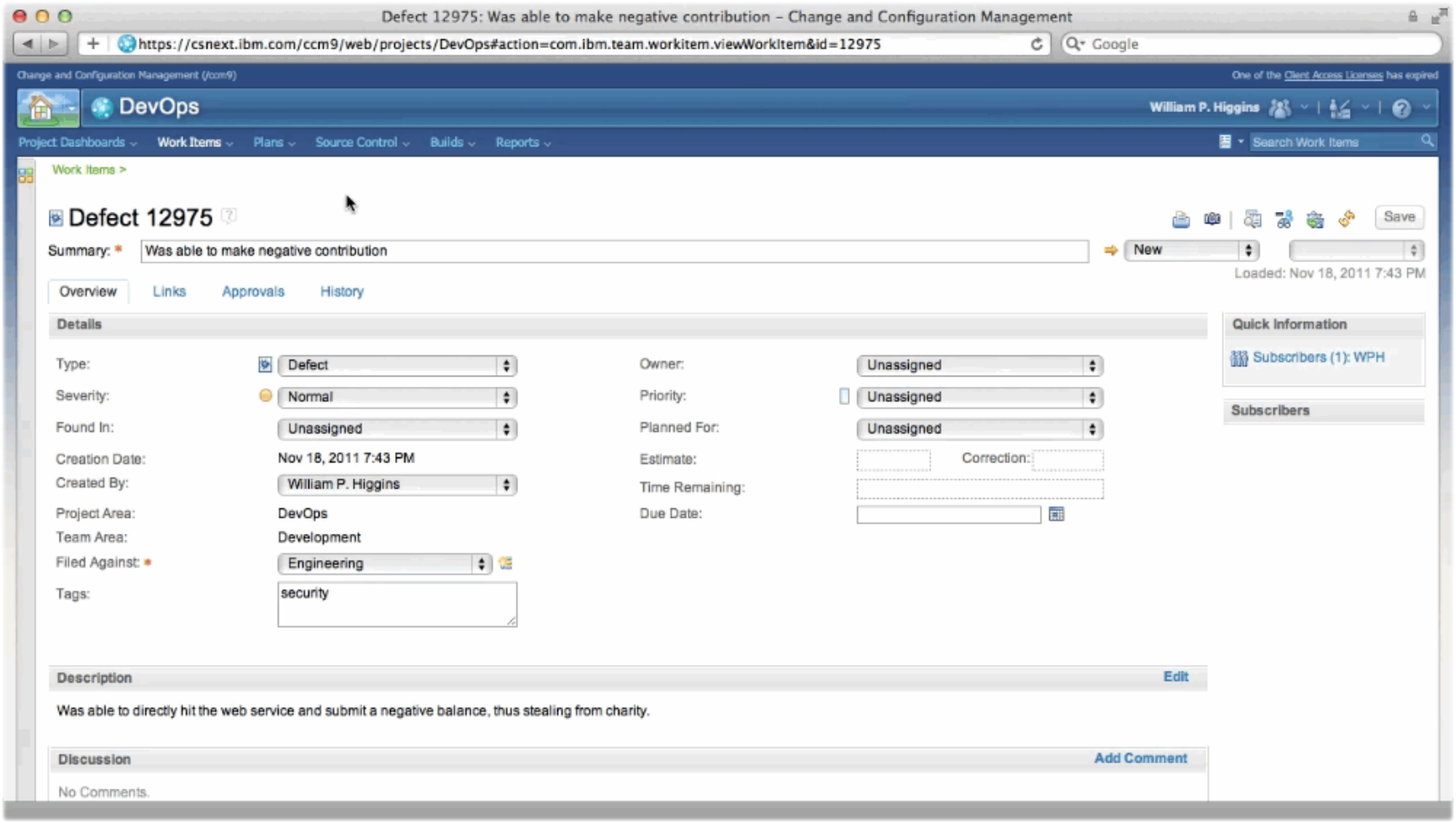
Demo: Application



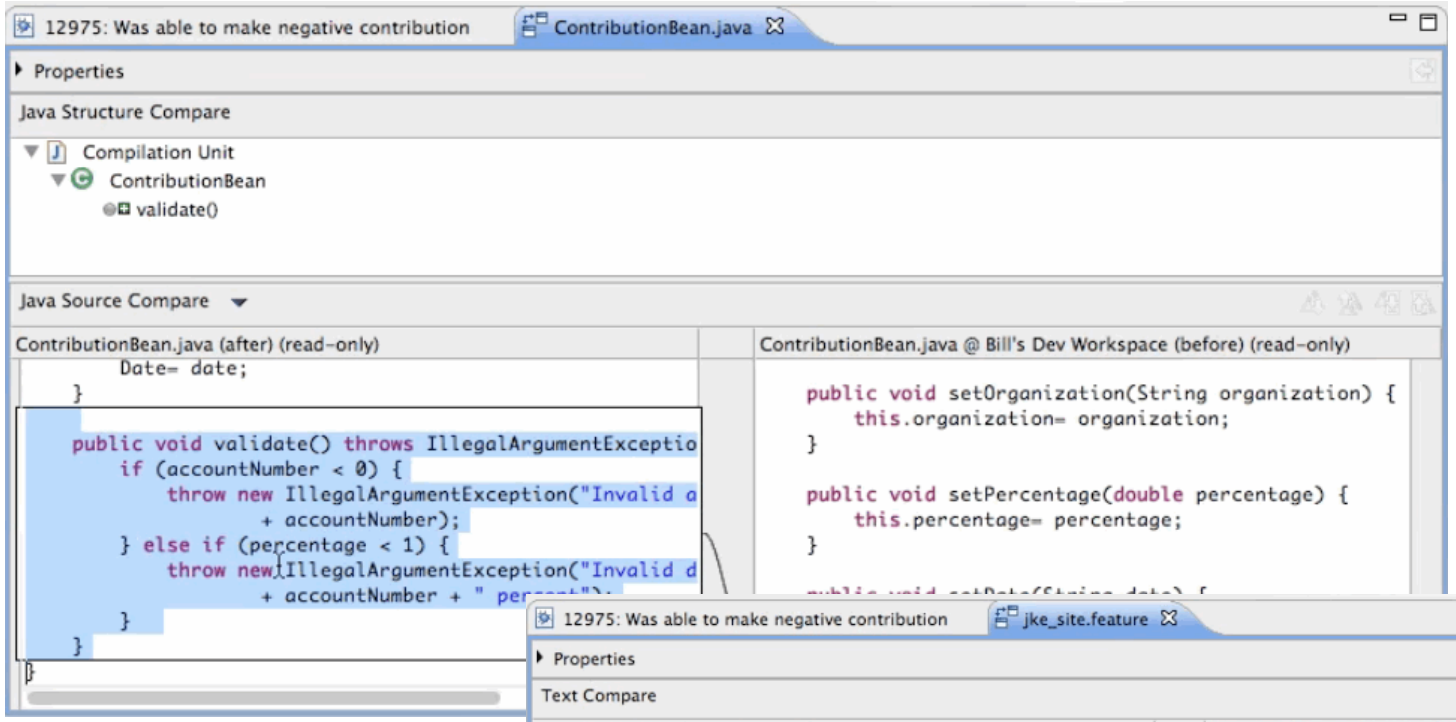
Demo: Security Test



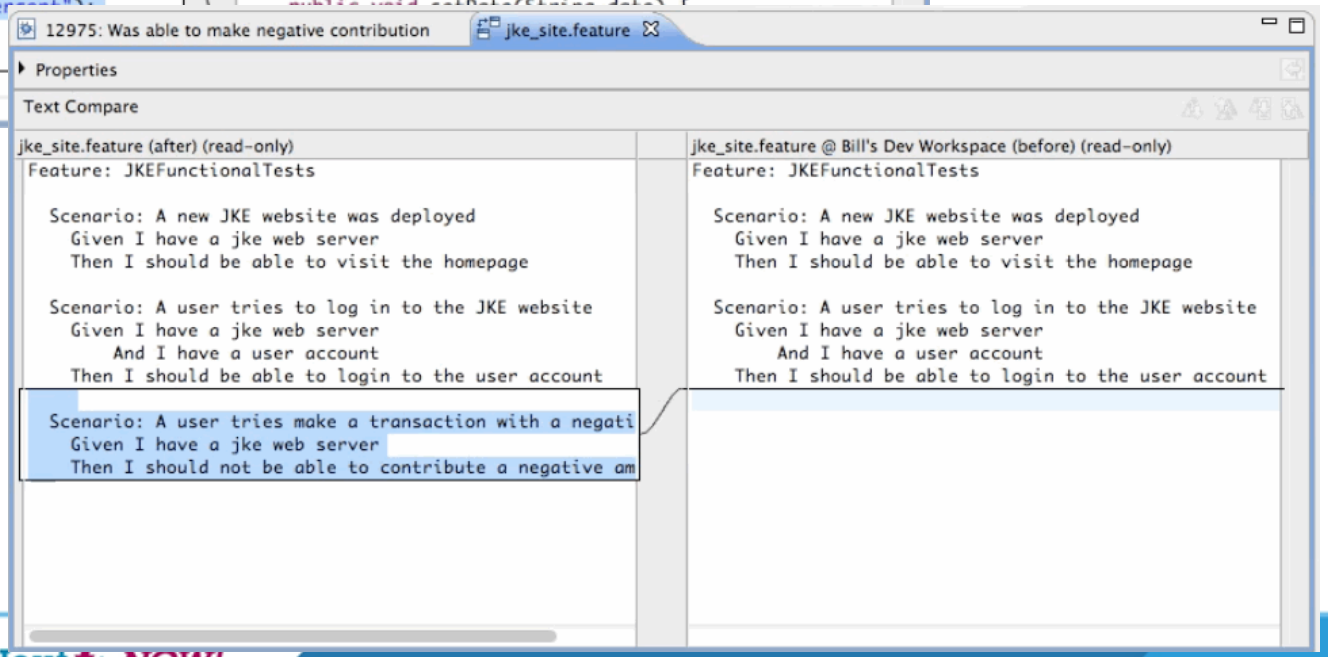
Demo: Defect created



Demo: Fix the defect

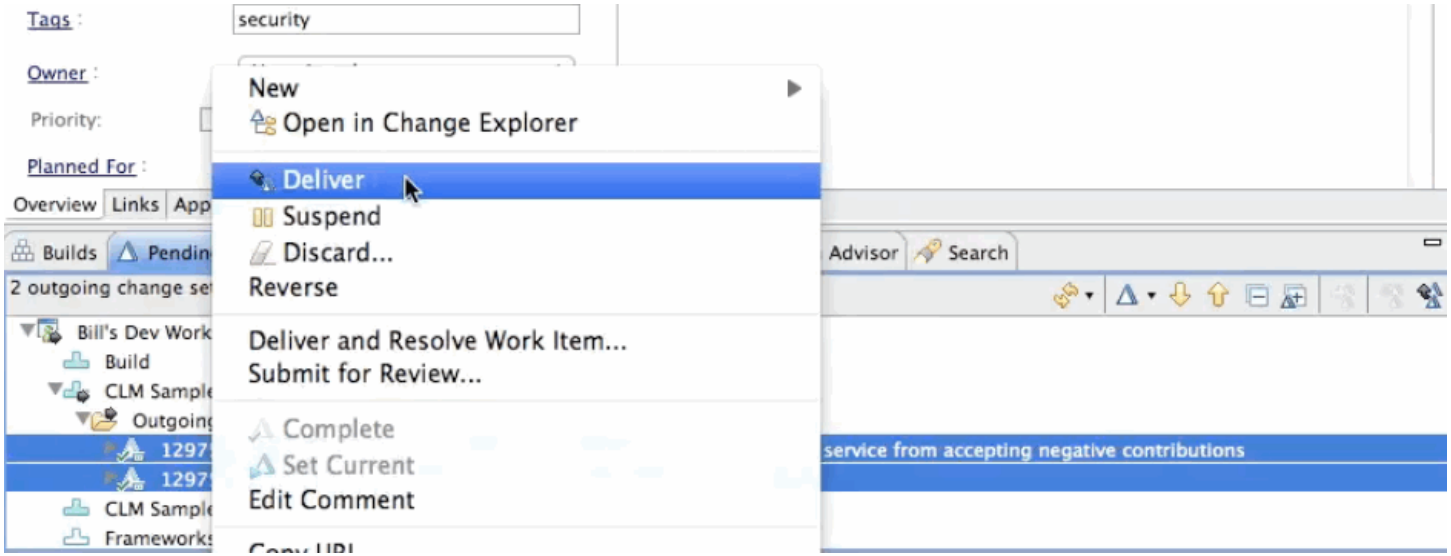


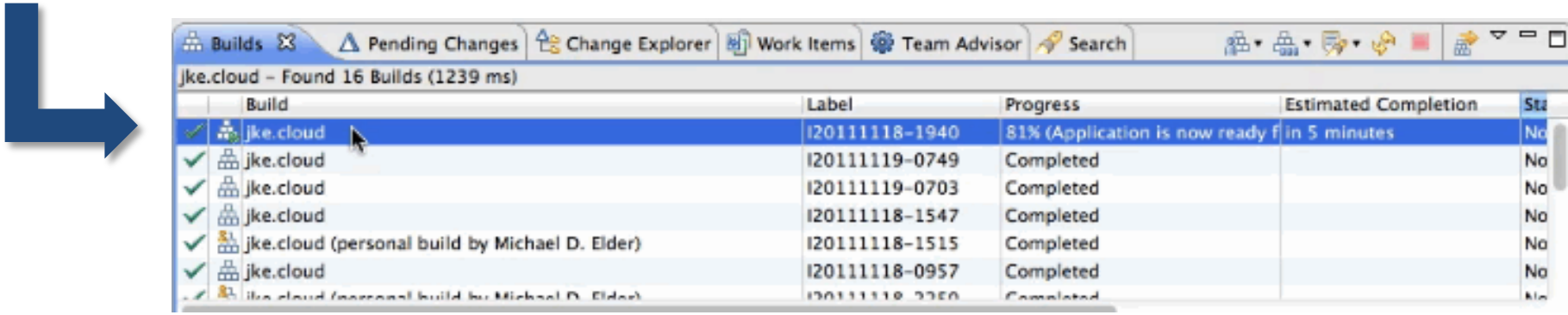
Fix



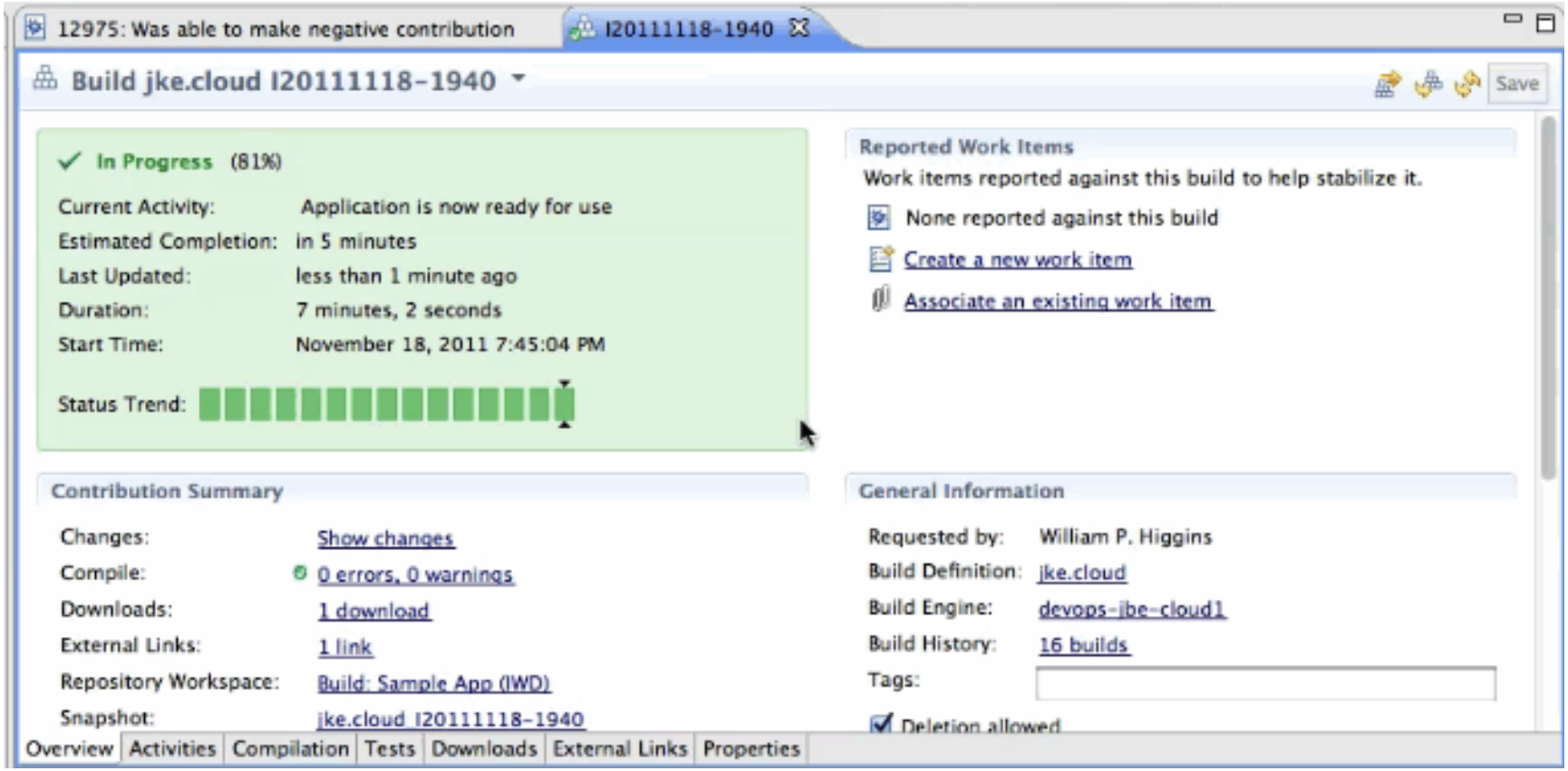
New Test

Demo: Deliver the fix

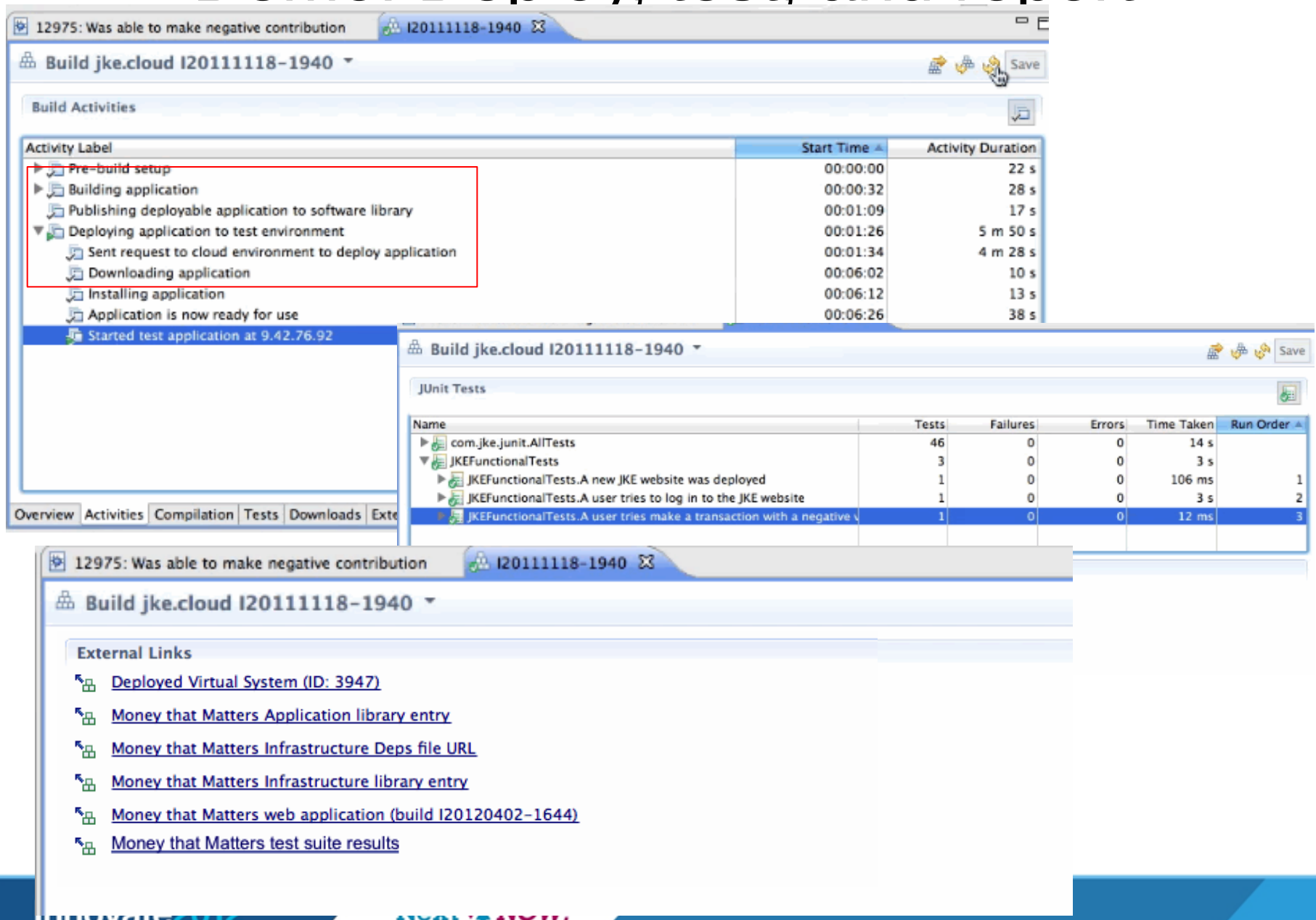




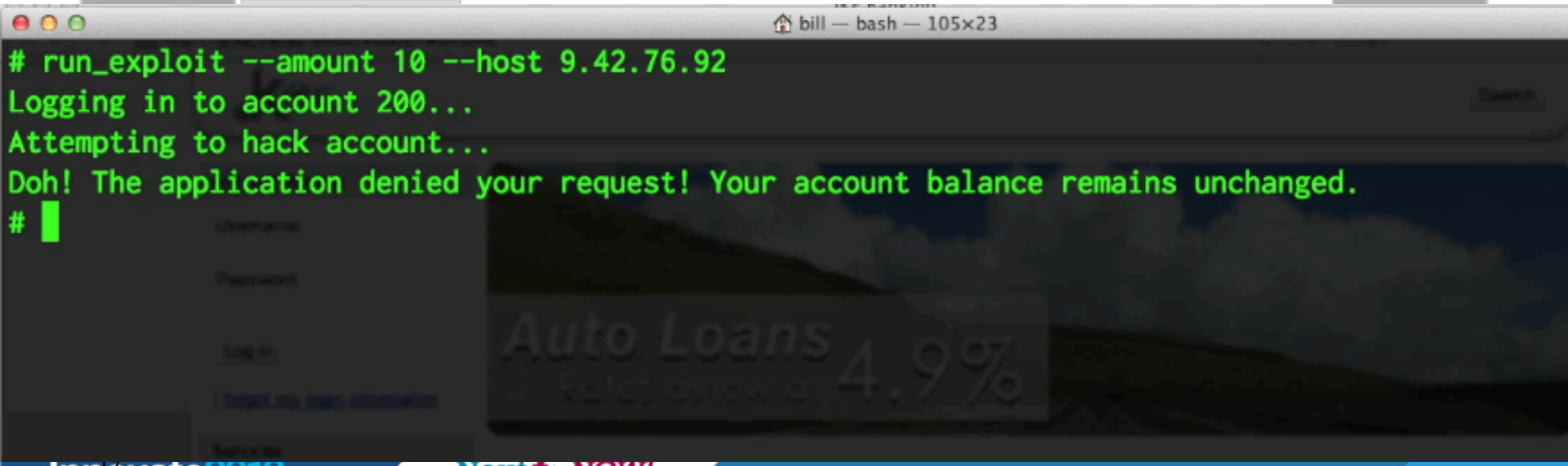
Demo: Build starts



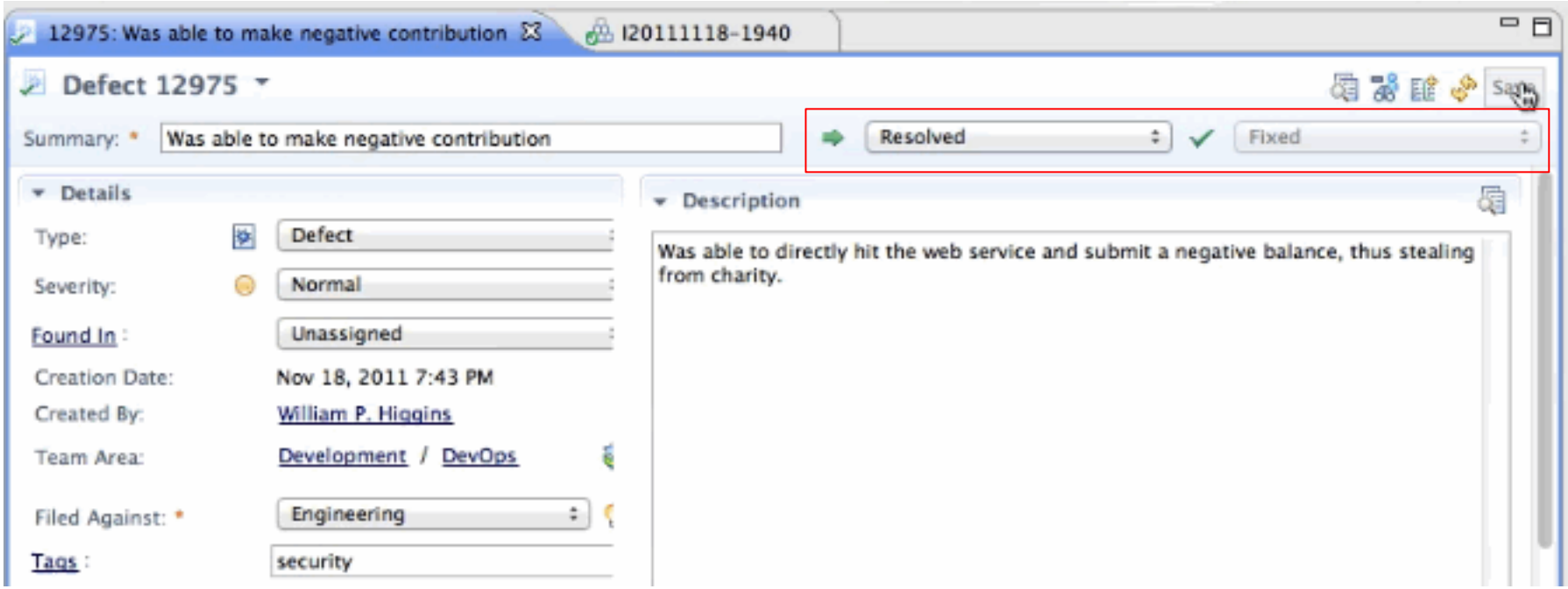
Demo: Deploy, test, and report



Demo: Test with fix



Demo: Resolve the defect



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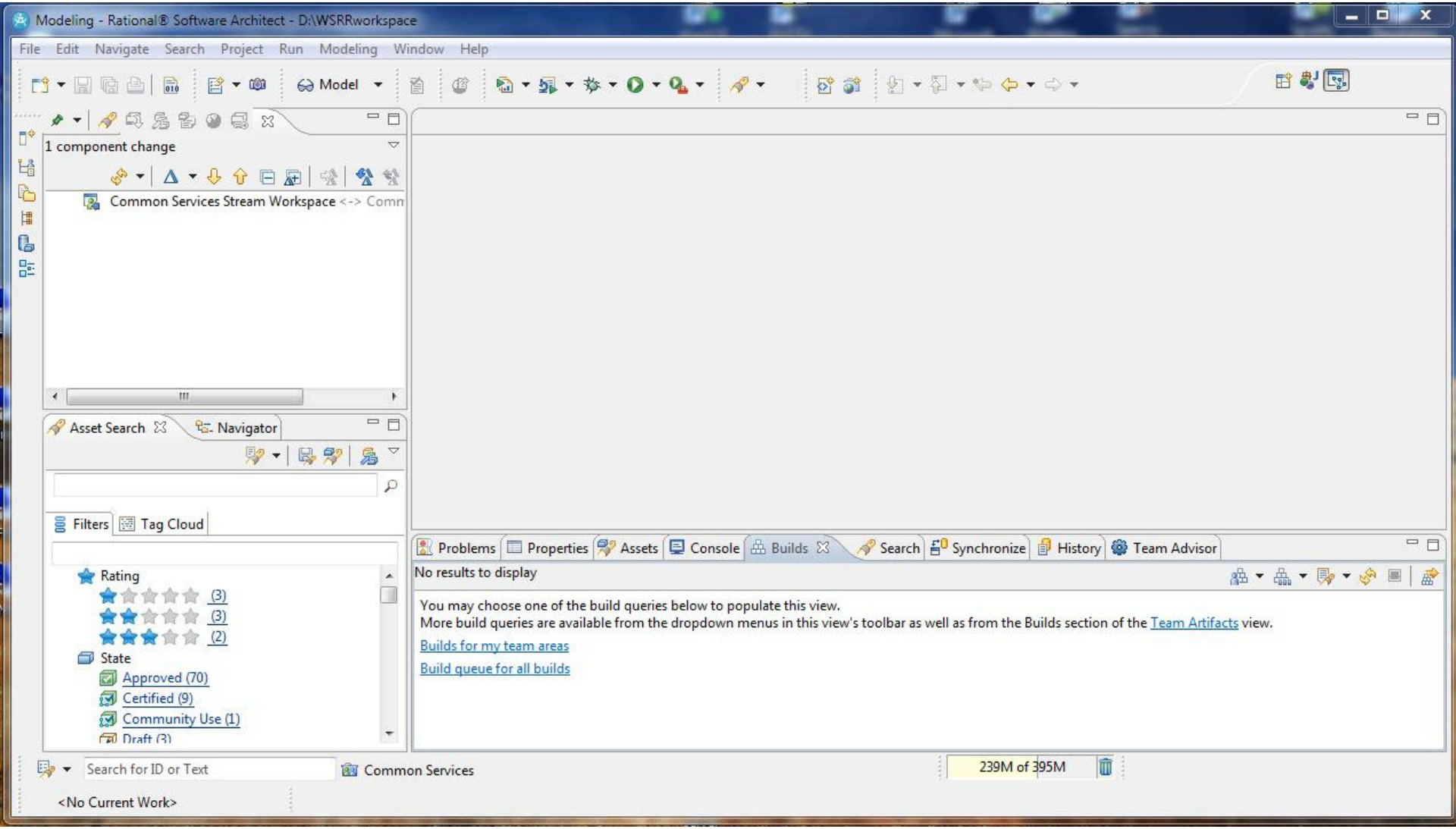
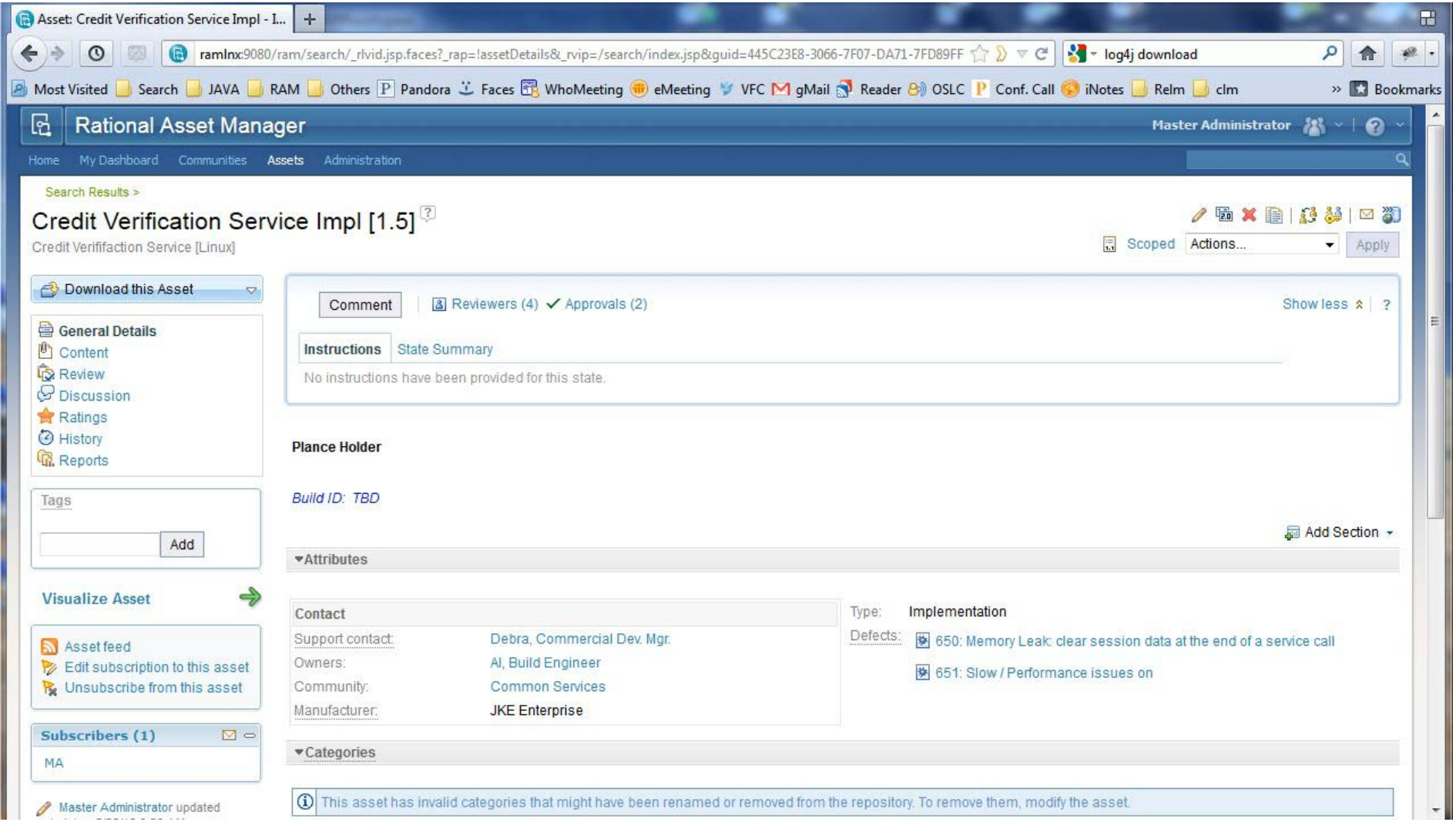
Development phase



Build Deploy automation



BACKUP

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What companies want to achieve

1. Communication of Knowledge and Integration of Pec
2. Better Process
3. Reality-based Measurements

What companies encounter instead

1. Distracted by day-to-day delivery pressures – 78%
2. Tools don't integrate properly – 62%
3. Lack the necessary internal expertise – 56%

Source: Forrester study commissioned by Wipro, 2008

Demo

- Download and configure DevOps CLI
- Generate continuous delivery project with content
- Develop infrastructure as code
- Update continuous delivery properties
- Update and customize delivery process file
- Configure RTC build definition for continuous delivery
- Request build and delivery

Installation Instructions

RedHat Linux

1. Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

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Apache Web Server

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Python

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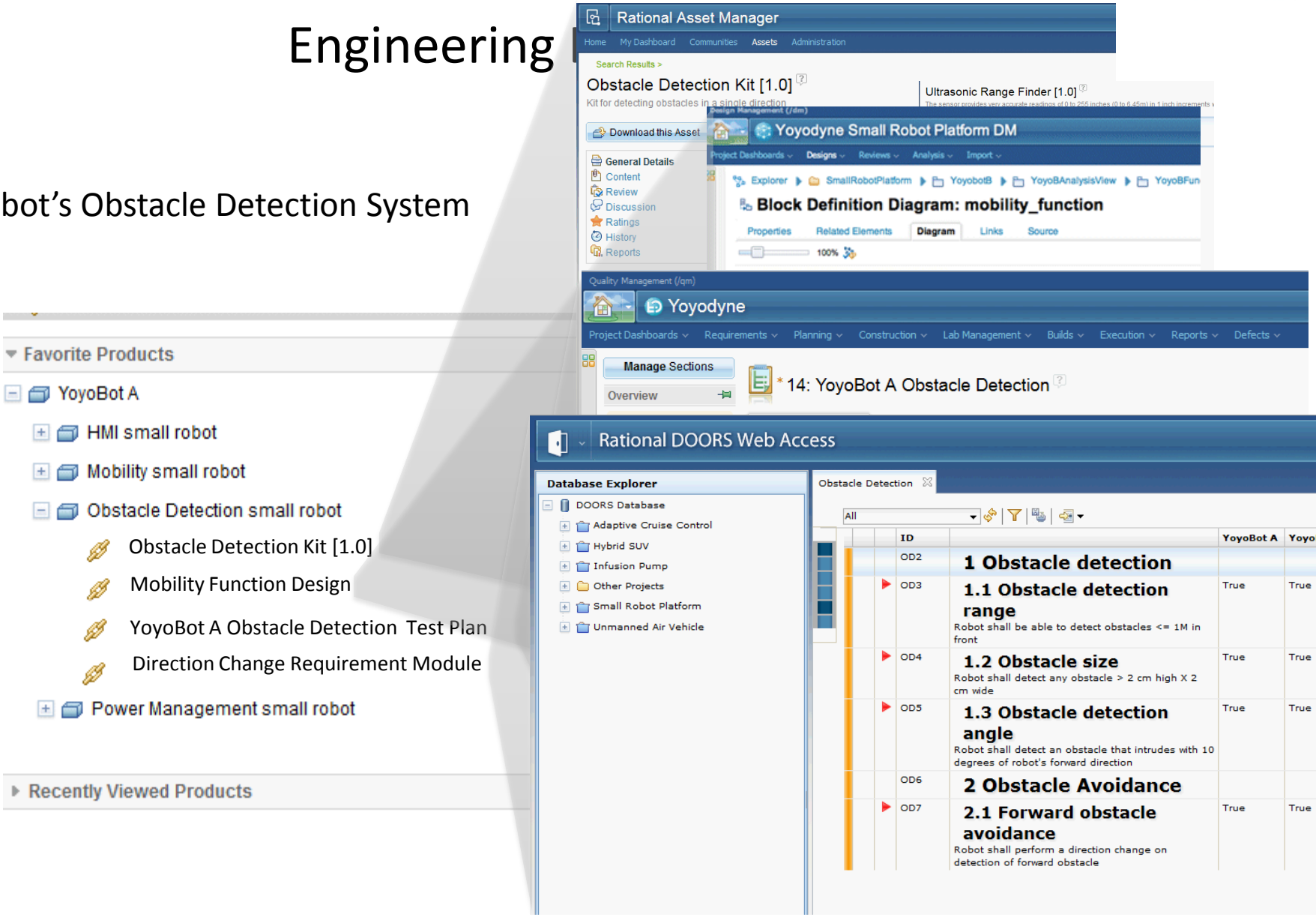
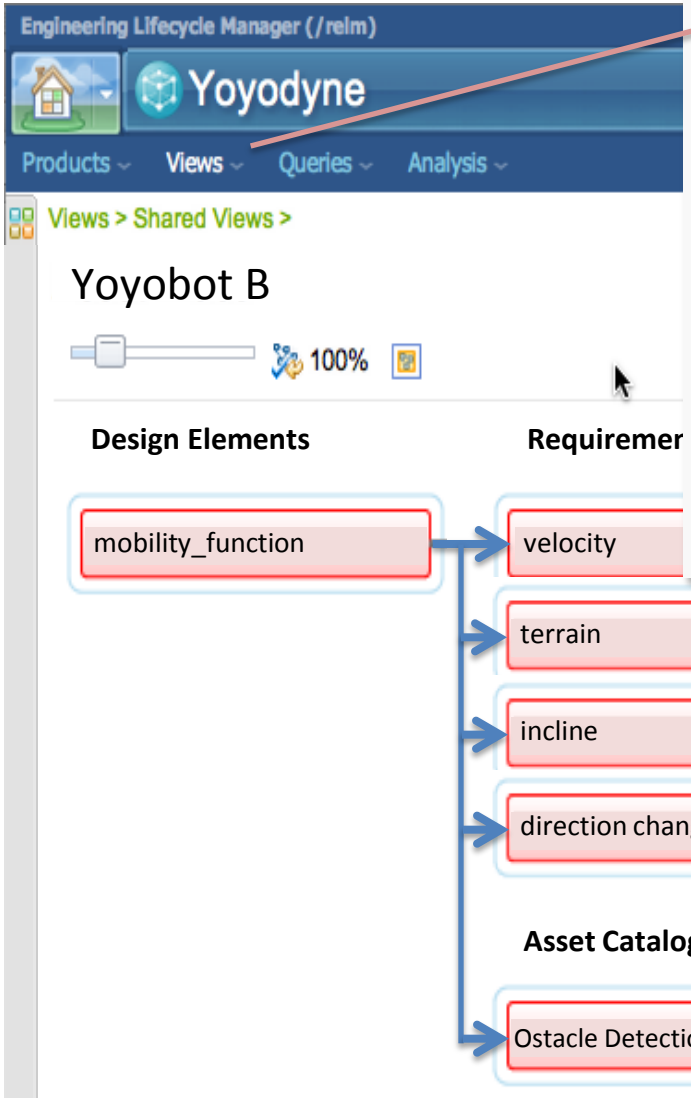
3. vel illum qui dolorem eum fugiat quo voluptas nulla pariatur?

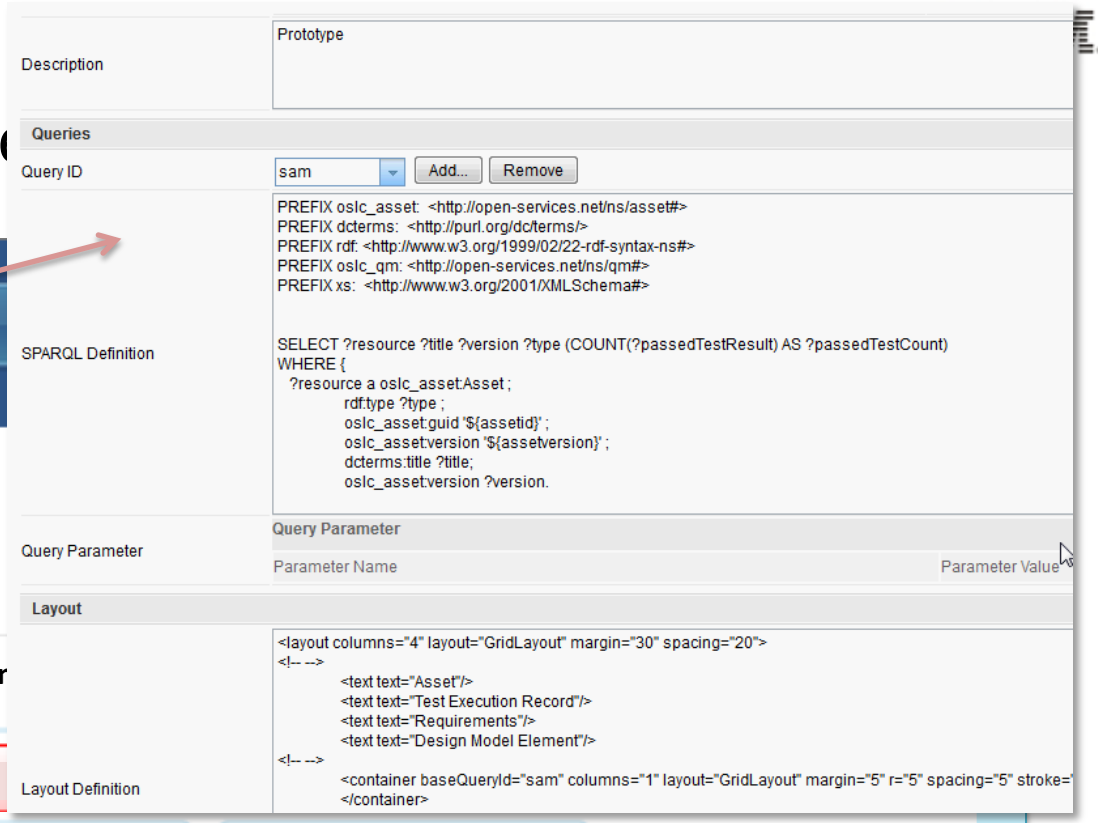
Engineering

Robot's Obstacle Detection System



Link


Engineering Lifecycle Manager (/relm)
Yoyodyne
Products
Views
Queries
Analysis
Views > Shared Views >
Yoyobot B
100%
Design Elements
Requiremer
mobility_function
velocity
terrain
MR9: Terrain
incline
MR10: Incline
direction change
MR3: Direction Change
Asset Catalog
Ostacle Detection Kit [1.0]


Description
Prototype
Queries
Query ID
sam
Add...
Remove
SPARQL Definition
PREFIX oslc_asset: <http://open-services.net/ns/asset#>
PREFIX dcterms: <http://purl.org/dc/terms/>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX oslc_qm: <http://open-services.net/ns/qm#>
PREFIX xs: <http://www.w3.org/2001/XMLSchema#>
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rdf:type ?type ;
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oslc_asset:version '${assetversion}' ;
dcterms:title ?title;
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Query Parameter
Query Parameter
Parameter Name
Parameter Value
Layout
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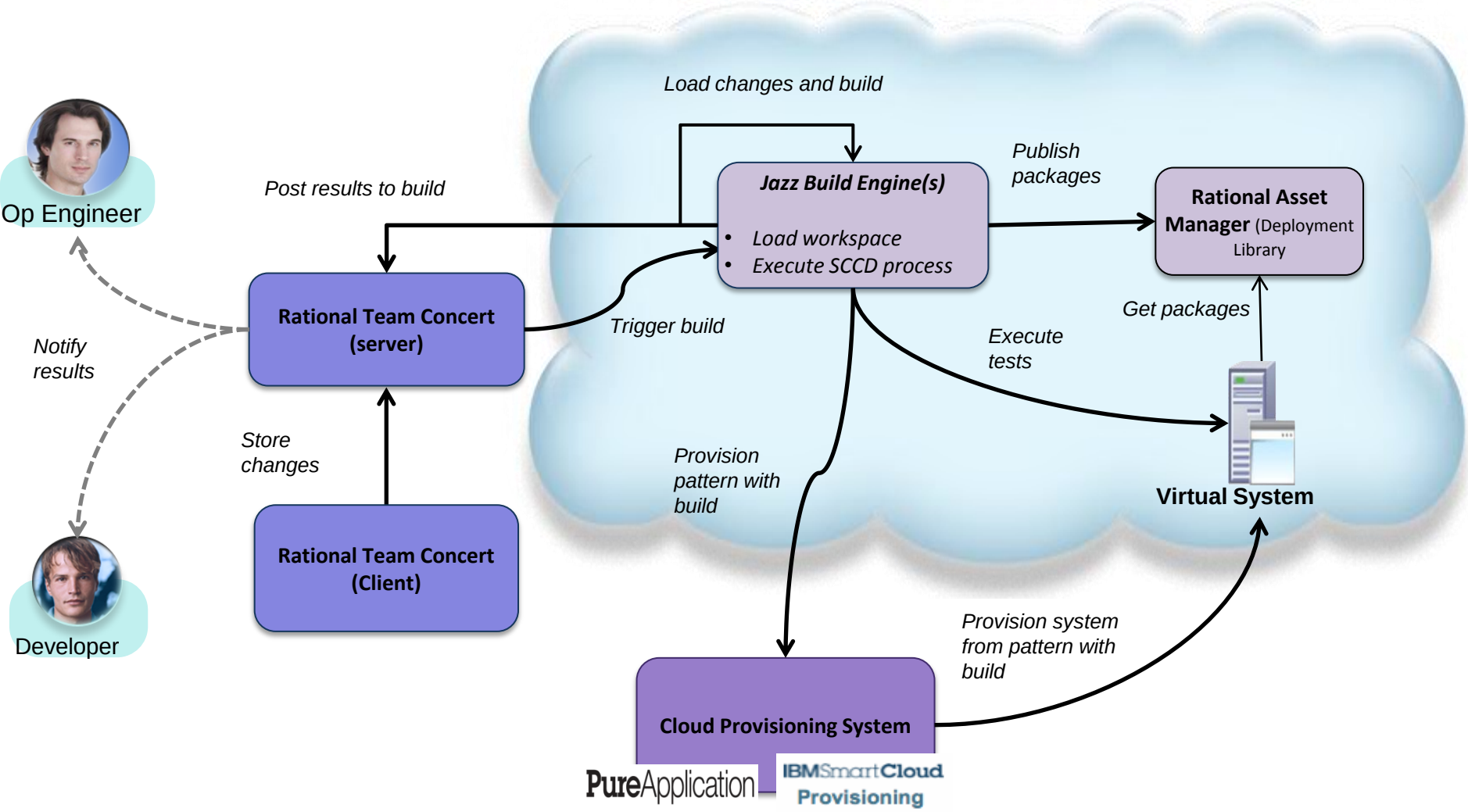
Continuous Delivery architecture flow