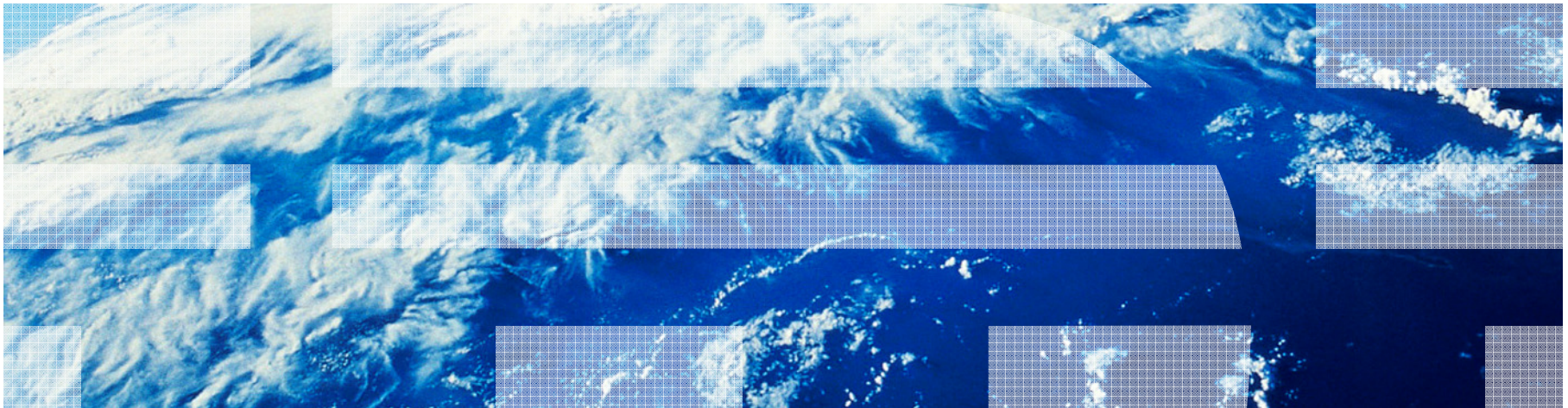

Current Trends and Future Directions in Technology for DevOps



Please note

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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

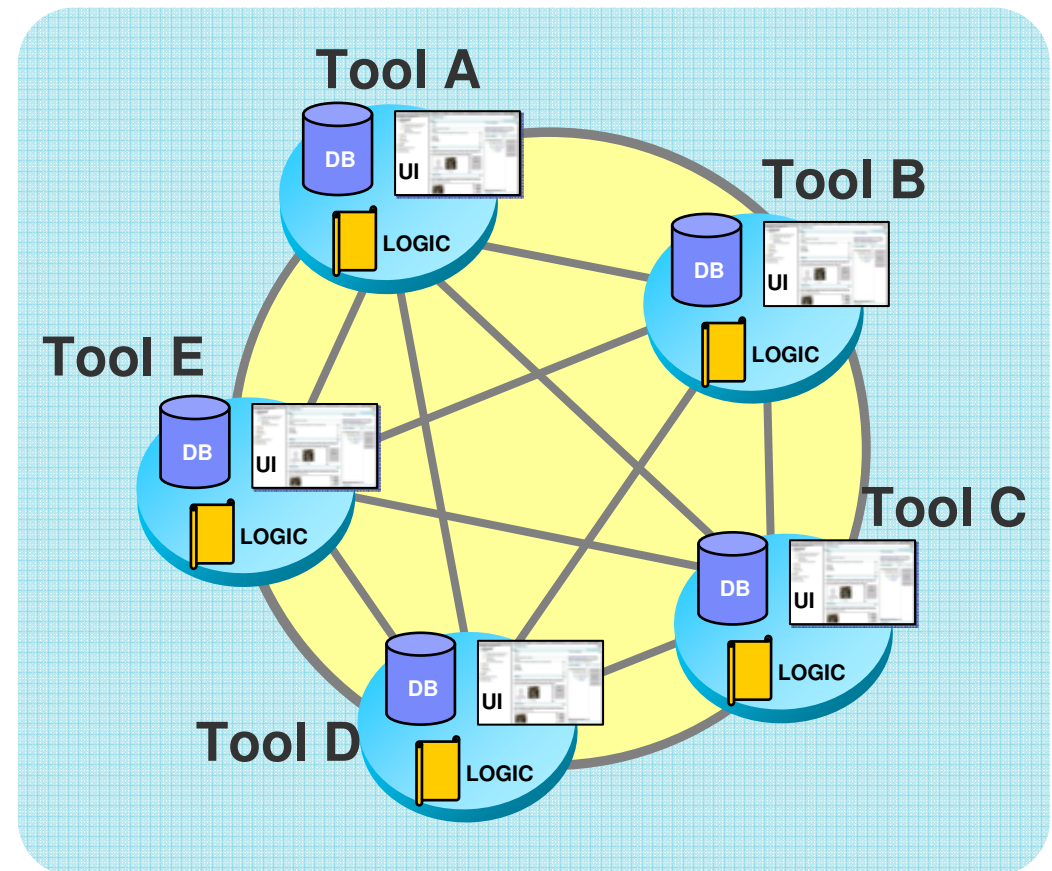
Companies acquire tools with the best of business-centric aspirations

- 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



What companies want to achieve

1. Communication of Knowledge and Integration of People
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

Delivery Challenges

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

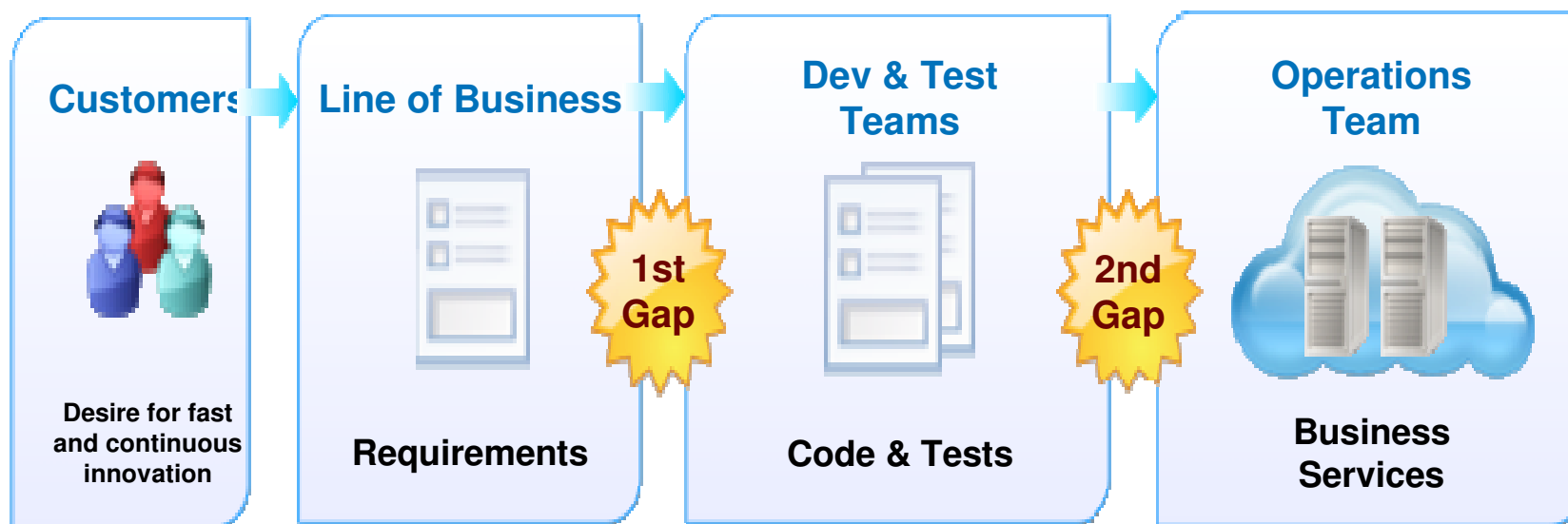
People



Process



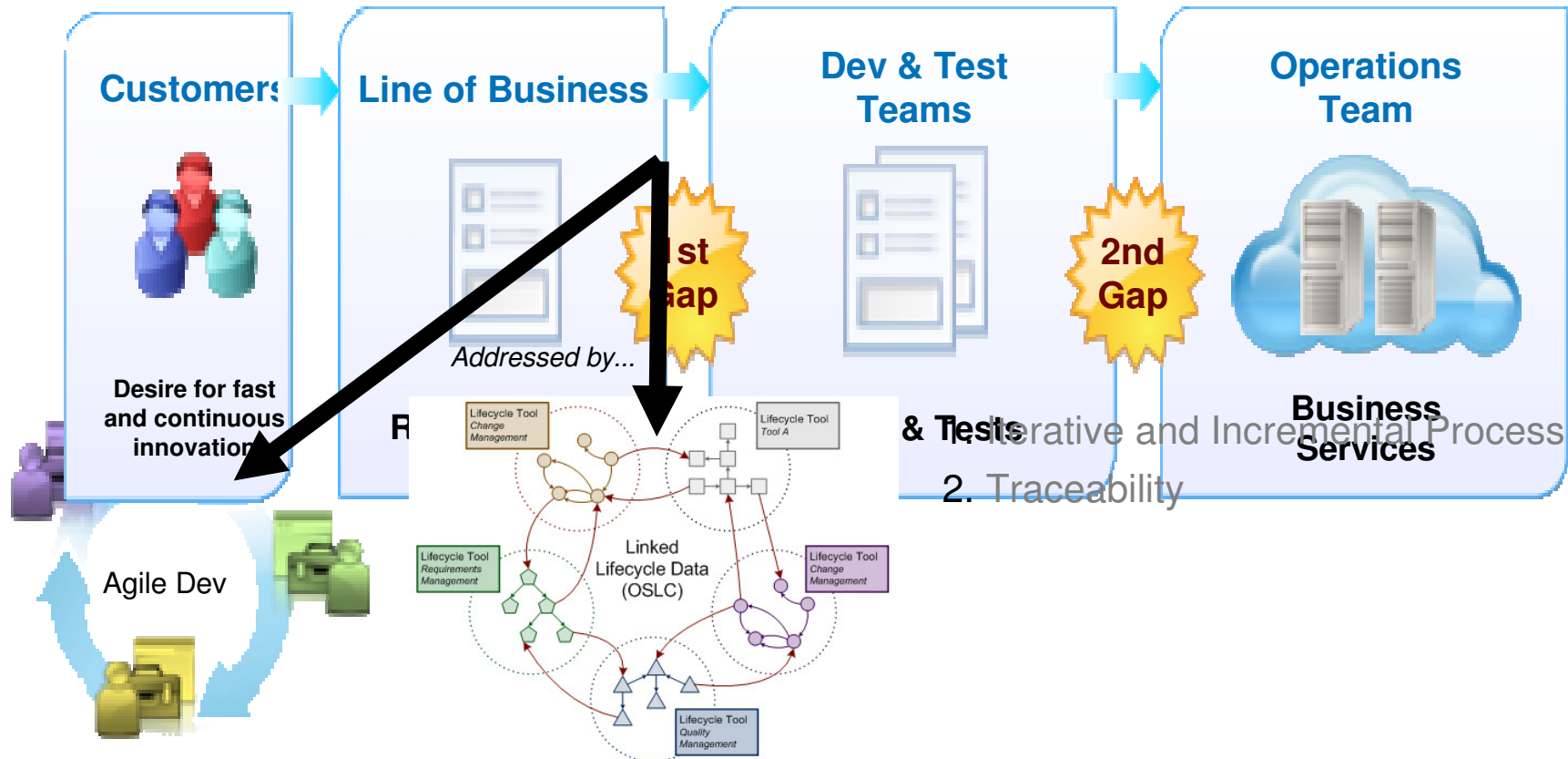
Information



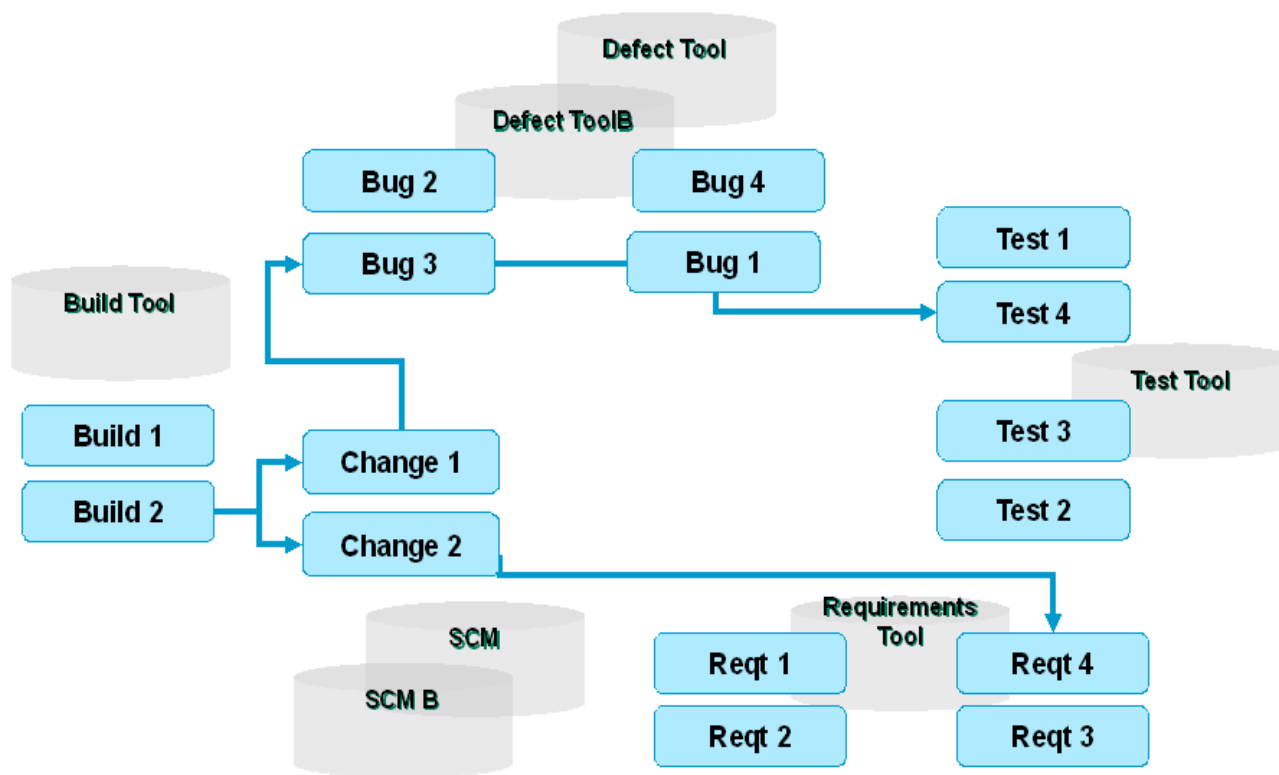
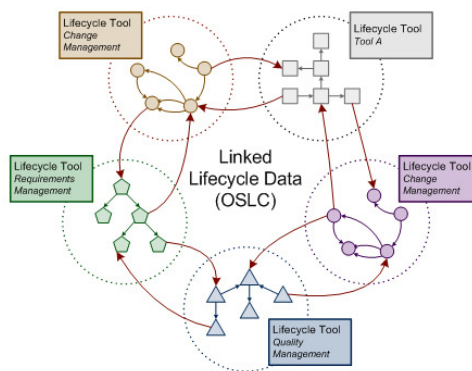
“At some point, you take a step back, and you realize you have an awful lot of **siload systems** that are **limiting transparency** across strategic projects.”

- Development Director
Temenos, Inc.

Addressing *BusDev* gaps



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)

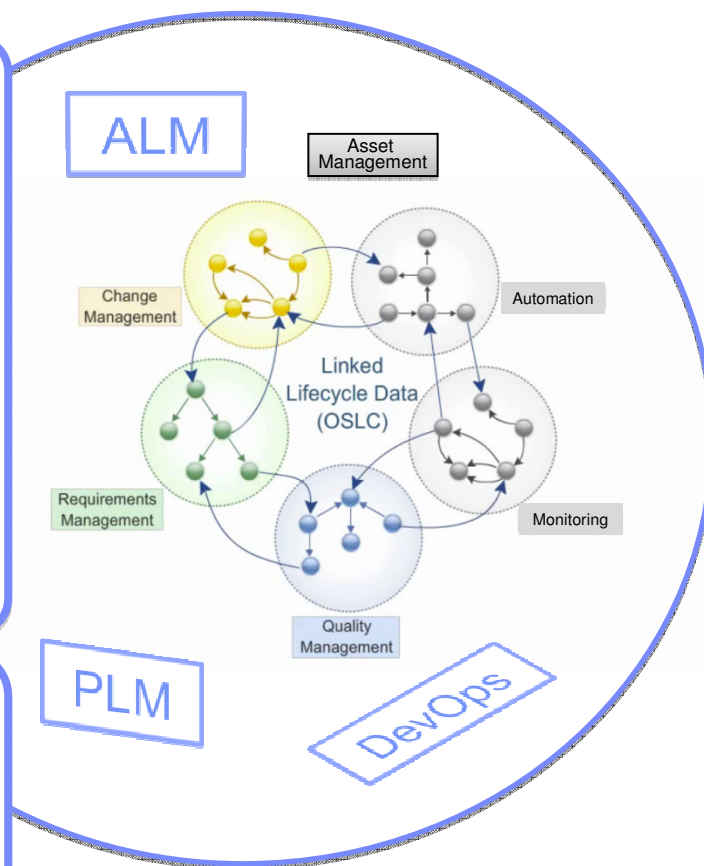
Working to improve the way software lifecycle tools share data



Open Services for Lifecycle Collaboration

Lifecycle integration inspired by the web

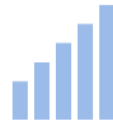
- Community driven and governed
 - 400+ registered community members
 - Workgroup members from 34+ [organizations](#)
- Wide range of interests, expertise, & [participation](#)
- Open specifications for numerous disciplines
- Defined by scenarios – solution oriented
- Implementations from IBM, BPs, and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



Inspired by the web
Proven



Free to use and share
Open



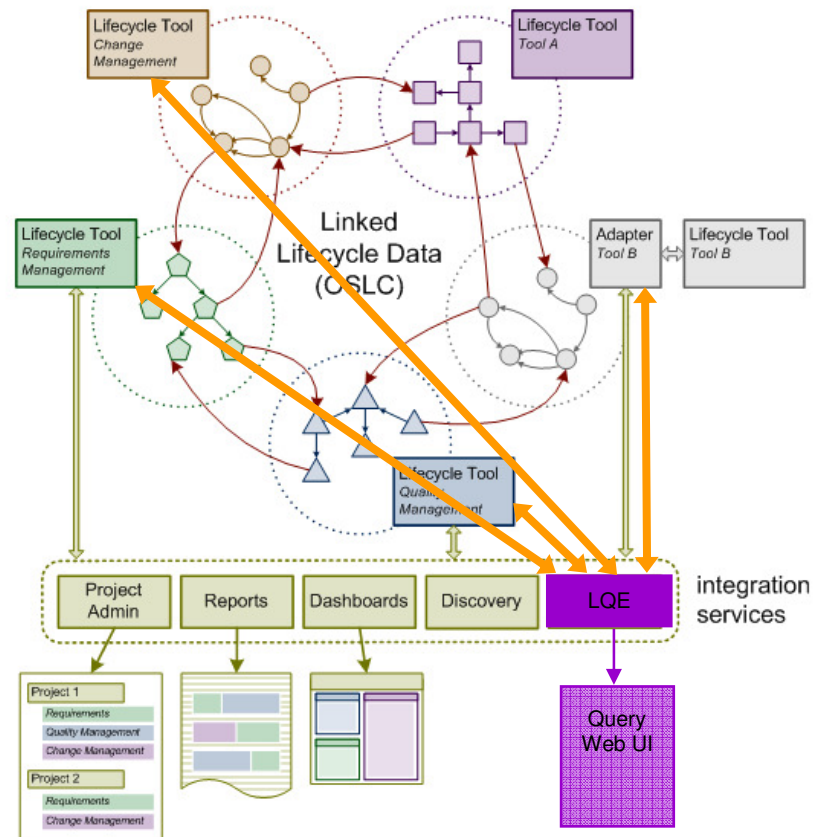
Changing the industry
Innovative

open-services.net



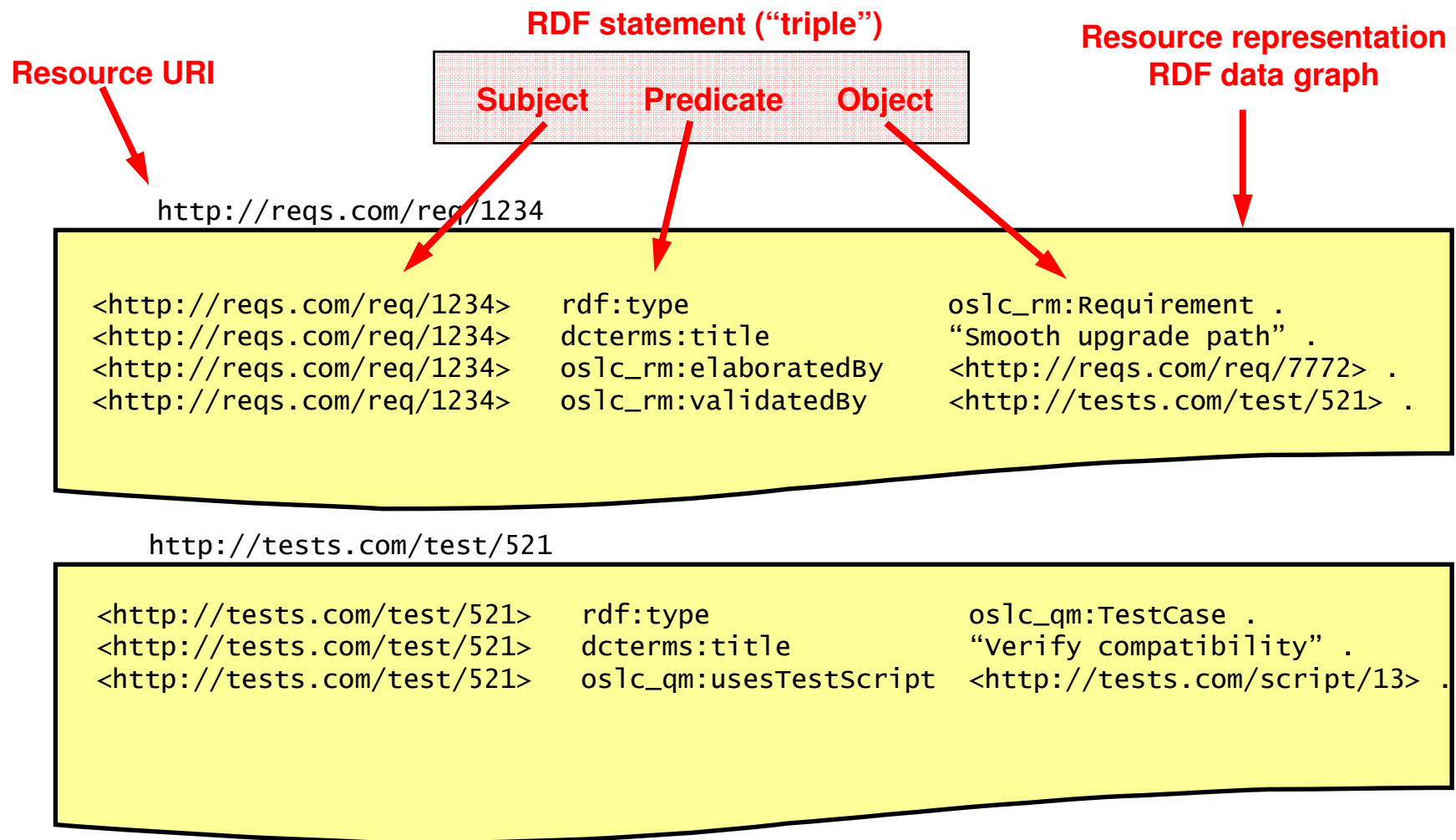
GET INVOLVED AND CONTRIBUTE!

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/

Engineering Lifecycle Example

Robot's Obstacle Detection System

Favorite Products

- [-] YoyoBot A
 - [+] HMI small robot
 - [+] Mobility small robot
 - [-] Obstacle Detection small robot
 - [+] Obstacle Detection Kit [1.0]
 - [+] Mobility Function Design
 - [+] YoyoBot A Obstacle Detection Test
 - [+] Direction Change Requirement Module
 - [+] Power Management small robot

Recently Viewed Products

Rational Asset Manager

Search Results >

Obstacle Detection Kit [1.0]
Kit for detecting obstacles in a single direction

Yoyodyne Small Robot Platform DM

Block Definition Diagram: mobility_function

Quality Management (/qm)

Yoyodyne

Project Dashboards | Requirements | Planning | Construction | Lab Management | Builds | Execution | Reports | Defects

Manage Sections

Overview

* 14: YoyoBot A Obstacle Detection

Rational DOORS Web Access

Database Explorer

- DOORS Database
 - Adaptive Cruise Control
 - Hybrid SUV
 - Infusion Pump
 - Other Projects
 - Small Robot Platform
 - Unmanned Air Vehicle

Obstacle Detection

ID		YoyoBot A	YoyoBot B
OD2	1 Obstacle detection		
OD3	1.1 Obstacle detection range Robot shall be able to detect obstacles <= 1M in front	True	True
OD4	1.2 Obstacle size Robot shall detect any obstacle > 2 cm high X 2 cm wide	True	True
OD5	1.3 Obstacle detection angle Robot shall detect an obstacle that intrudes with 10 degrees of robot's forward direction	True	True
OD6	2 Obstacle Avoidance		
OD7	2.1 Forward obstacle avoidance Robot shall perform a direction change on detection of forward obstacle	True	True

Linked Lifecycle Data

Engineering Lifecycle Manager (/realm)

Yoyodyne

Products ▾ Views ▾ Queries ▾ Analysis ▾

Views > Shared Views >

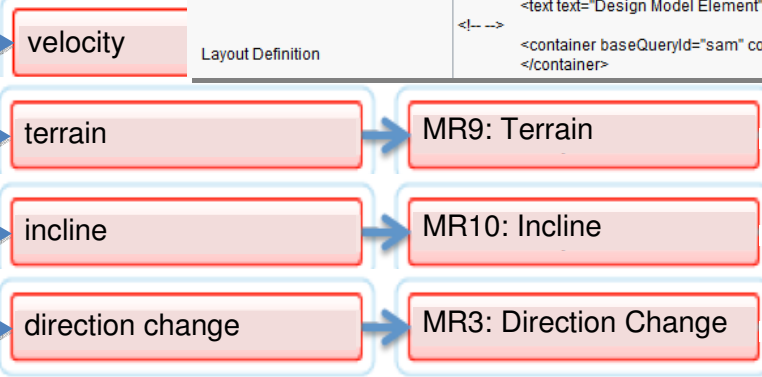
Yoyobot

▢ B 100%

Design Elements

mobility_function

Requirements

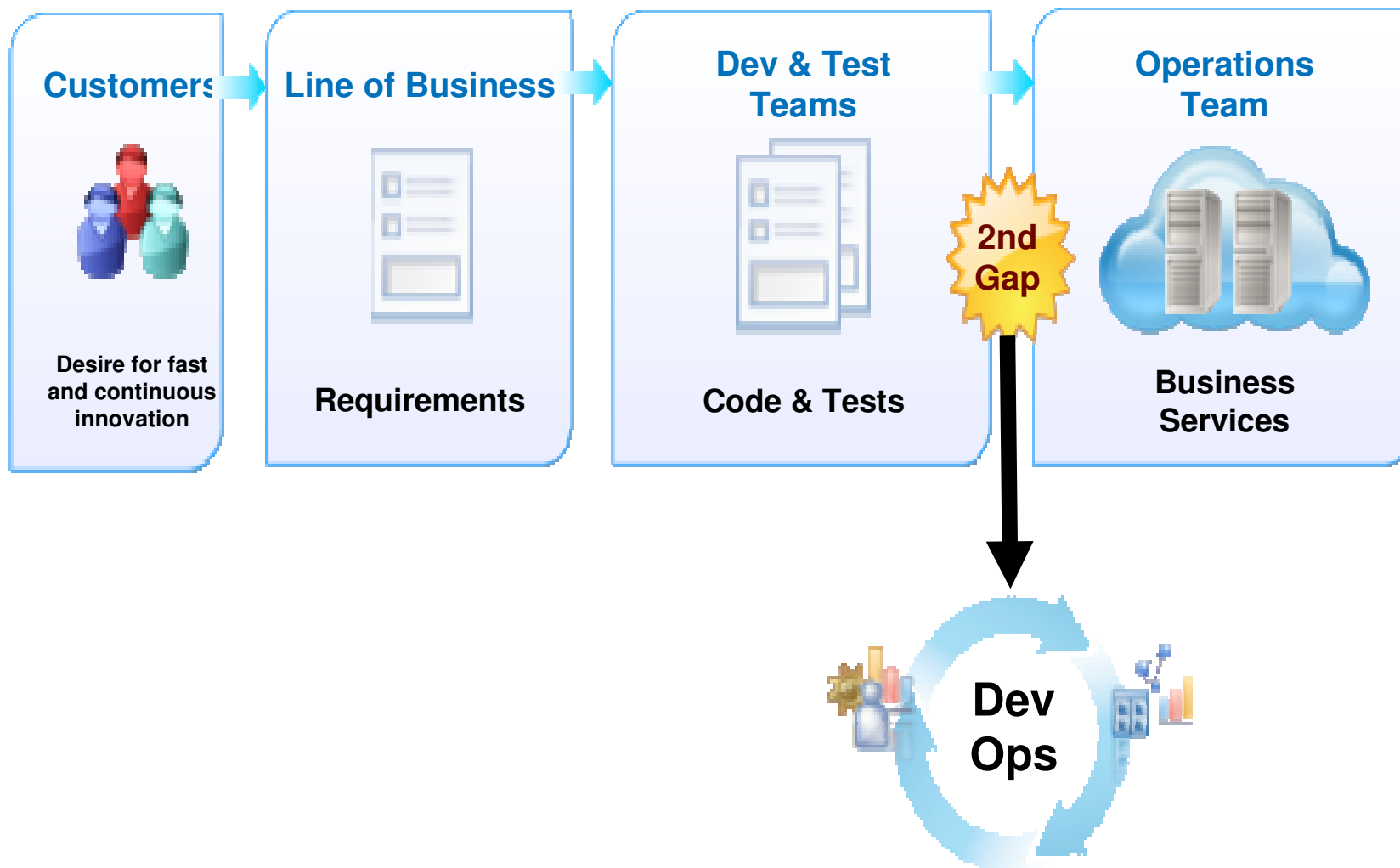


Asset Catalog

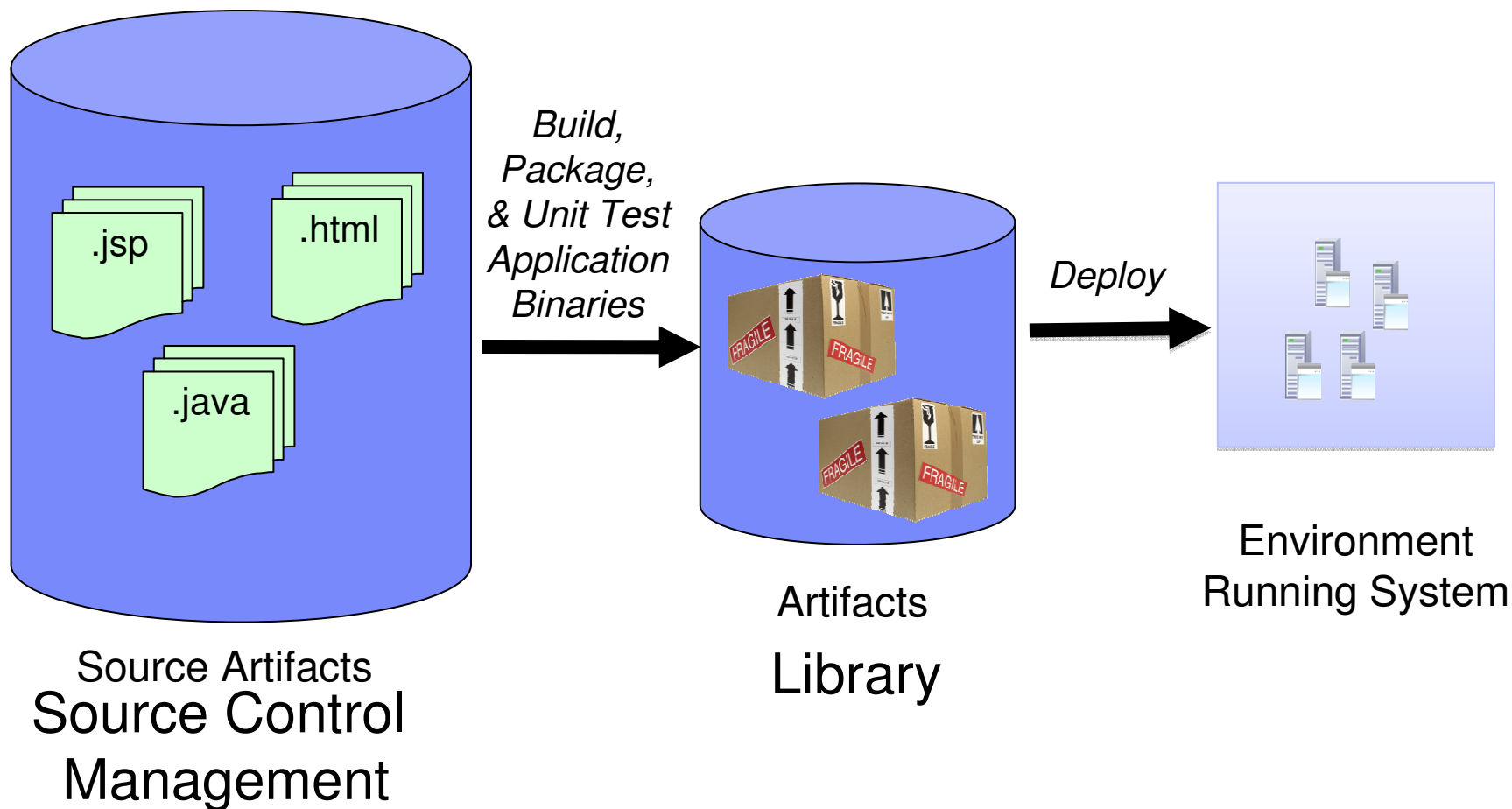
Ostacle Detection Kit [1.0]

Description	Prototype
Queries	
Query ID	sam Add... Remove
SPARQL Definition	<pre> PREFIX oscs_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 oscs_qm: <http://open-services.net/ns/qm#> PREFIX xs: <http://www.w3.org/2001/XMLSchema#> SELECT ?resource ?title ?version ?type (COUNT(?passedTestResult) AS ?passedTestCount) WHERE { ?resource a oscs_asset:Asset; rdf:type ?type; oscs_asset:guid "\${assetid}"; oscs_asset:version "\${assetversion}"; dcterms:title ?title; oscs_asset:version ?version. } </pre>
Query Parameter	Query Parameter
Query Parameter	Parameter Name Parameter Value
Layout	
Layout Definition	<pre> <layout columns="4" layout="GridLayout" margin="30" spacing="20"> <!-- --> <text text="Asset"/> <text text="Test Execution Record"/> <text text="Requirements"/> <text text="Design Model Element"/> <!-- --> <container baseQueryId="sam" columns="1" layout="GridLayout" margin="5" r="5" spacing="5" stroke= </container> </pre>

Addressing Application Lifecycle Management gaps



Automating development hand off today

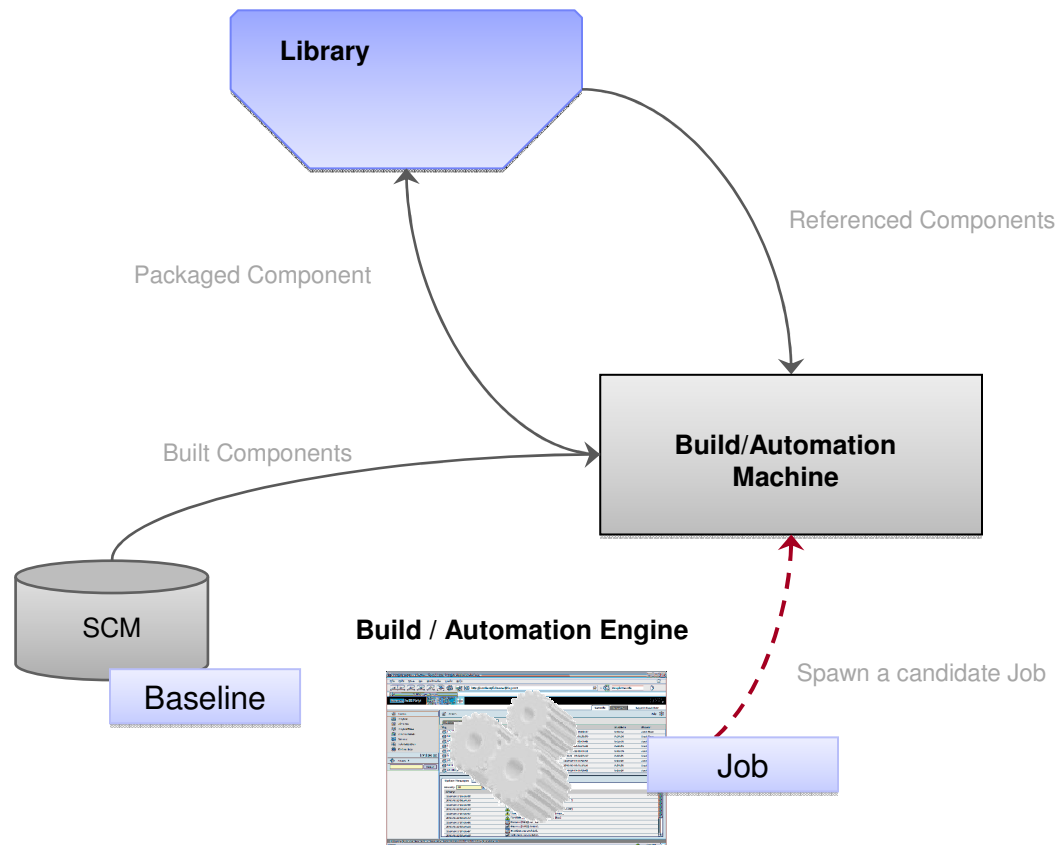


Development phase

The screenshot displays the Rational Software Architect (RSA) interface during the development phase. The main workspace is currently empty. The left sidebar is active, showing a component change view for 'Common Services Stream Workspace'. Below this, there is an 'Asset Search' section and a 'Filters' panel. The 'Filters' panel is expanded to show 'Rating' and 'State' categories. The 'Rating' category includes three star levels with counts: 3 stars (3), 4 stars (3), and 5 stars (2). The 'State' category includes 'Approved (70)', 'Certified (9)', 'Community Use (1)', and 'Draft (3)'. The bottom toolbar shows various icons, including 'Builds' and 'Search'. The status bar at the bottom indicates '239M of 395M'.

Build / Automation Phase

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



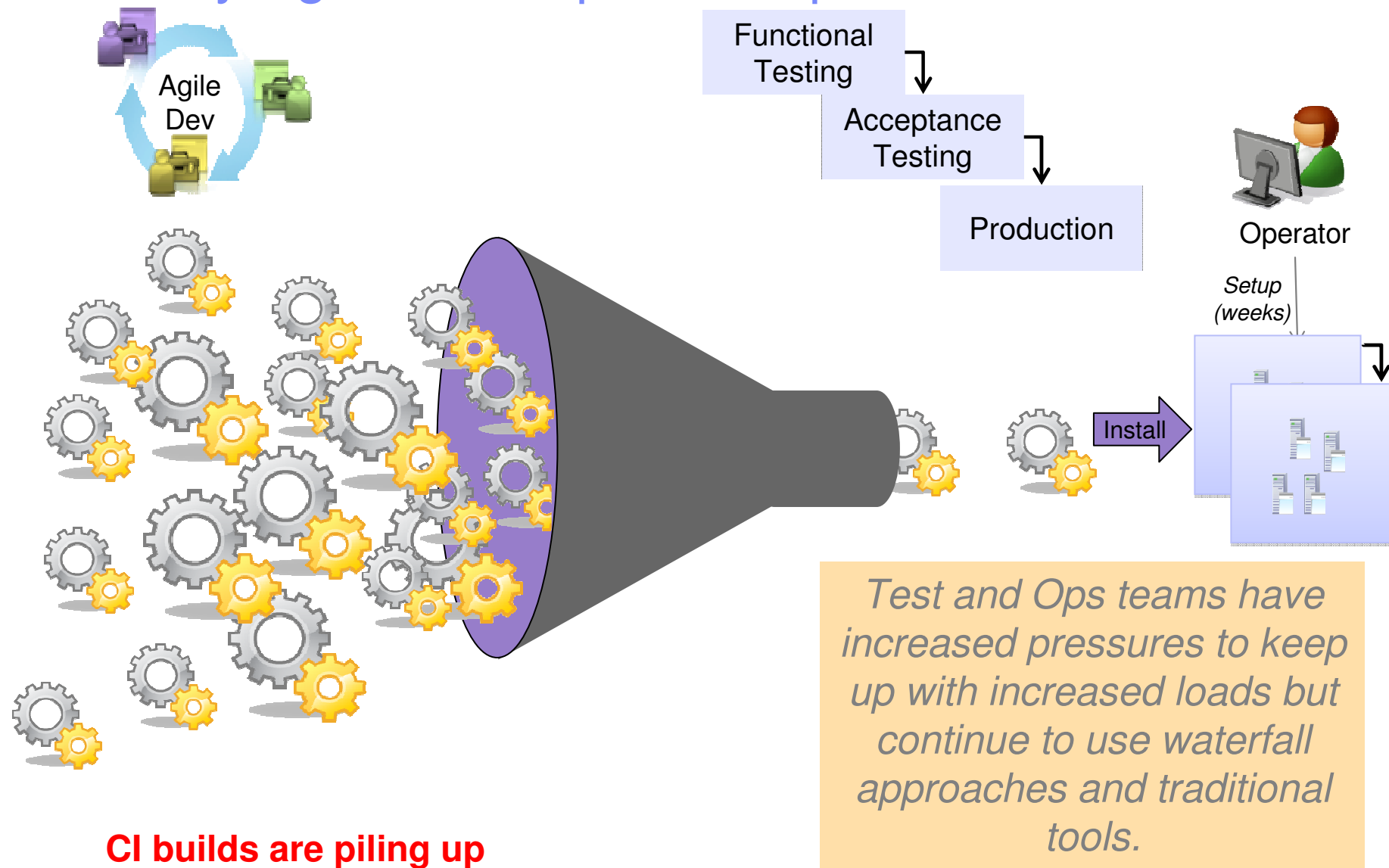
Deploy Automation Phase

The screenshot displays the IBM WebSphere Studio interface during the Deploy Automation Phase. The main window shows a search for assets, returning 3 results in 27 ms. The search results are as follows:

Name	Version	State	Community	Rating
Credit Verification Service Specification	1.0	Approved	Sample Application ...	★★★★★
Credit Verification Service Specification	1.5	Scoped	Common Services	★★★★★
Customer Schema	1.0	Identified	Common Services	★★★★★

The interface also shows the Outline view with 1 component change, the Asset Search view with a list of files (e.g., .settings, src, WebContent, META-INF, WEB-INF, Address.xsd, CreditCheck.xsd, Customer.xsd, customerschema.dnx, customerschema.gif, CustomerStatusCheckInterface.wsdl, index.jsp, report1_650.html), and the Properties view with tabs for Problems, Properties, Assets, Console, Builds, Search, Synchronize, History, and Team Advisor. The status bar at the bottom indicates 'Common Services 0 items selected' and '240M of 403M'.

With only Agile Development improvements...



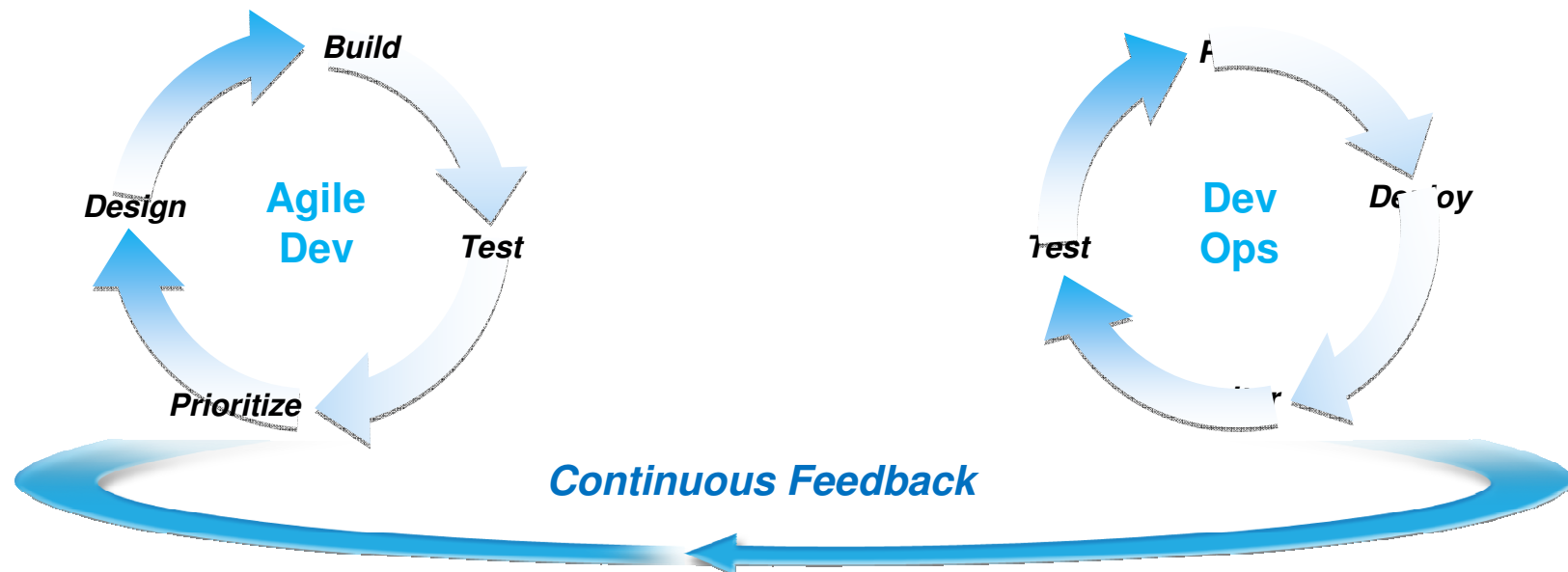
Adjusting Delivery Mindset

- 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, buildforge, etc), Infrastructure Gold copies components



Agile Development and Delivery

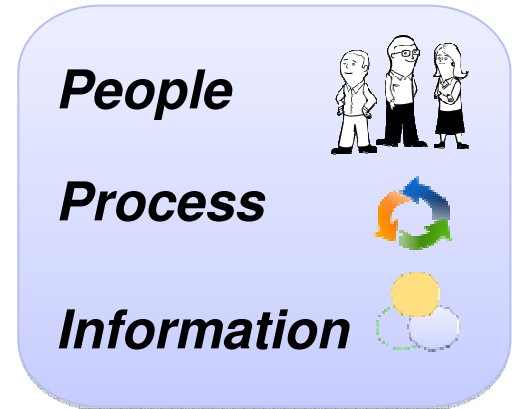
Continuous Integration extends to Continuous Delivery



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 Ops and Dev teams collaborate? Regularly?
2. Do you have agreed upon patterns for apps and platforms?
3. Do you have well defined delivery pipeline for apps and platforms?

Automate

4. Do your operation engineers understand how to developed well-structured reusable system configuration scripts?
5. Can you deploy a system in one step?
6. Do you provide Infrastructure and Platform as a Service for your development teams?
7. Can your developers launch, use, and destroy representative environments on demand without operator support?

*Based on "The Joel Test: 12 Steps to Better Code"

<http://www.joelonsoftware.com/articles/fog0000000043.html>

12 Principles for Better DevOps

Validate

- 8. Do you have automated tests to validate your application and platform function and security?
- 9. Do you validate platform software against expected KPIs, before deploying your application?
- 10. Do you deploy your applications daily and verify them?

Manage and Control

- 11. Do you use source control?
- 12. Do you have an issue tracking system for operations, linked to a bug database used for development?

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.

2. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

Apache Web Server

1. Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque laudantium, totam rem aperiam, eaque ipsa quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo.

2. Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos qui ratione voluptatem sequi nesciunt. Neque porro quisquam est, qui dolorem ipsum quia dolor sit amet, consectetur,

3. adipisci velit, sed quia non numquam eius modi tempora incidunt ut labore et dolore magnam aliquam quaerat voluptatem.

Python

1. Ut enim ad minima veniam, quis nostrum exercitationem ullam corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur?

2. Quis autem vel eum iure reprehenderit qui in ea voluptate velit esse quam nihil molestiae consequatur,

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

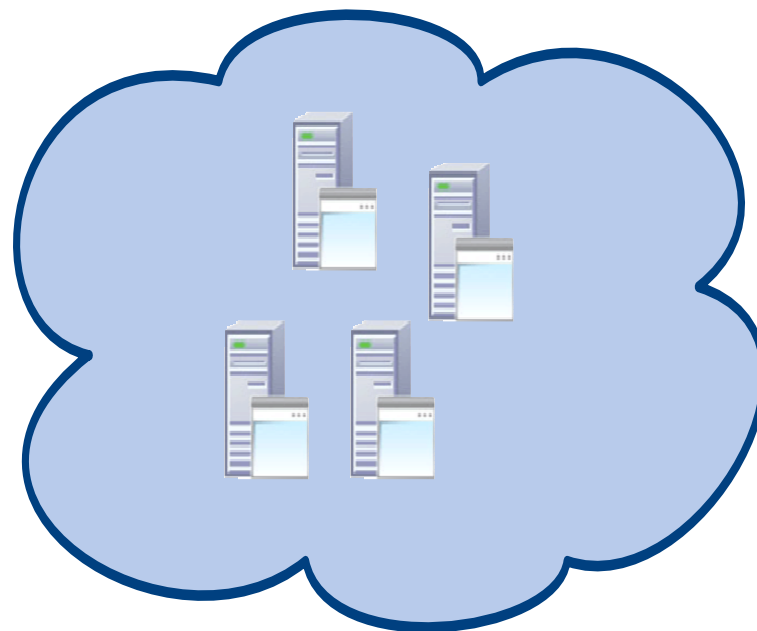
    @iaas_gateway = IaasGateway.new(HsiltProvider.new(),
    LOG_FILE, LOG_LEVEL)
    @server_instance = nil

    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}"

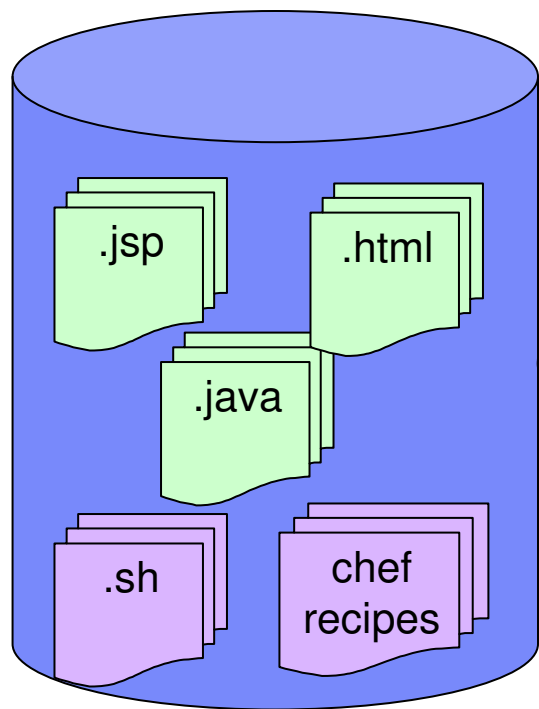
    # Read in the file's contents as a string, replace
    # the build_id, then overwrite the original contents
    # of the file
    text = File.read(template_file)
    new_text = text.gsub(/\{\{ build_id \}\}/,
    "<a href=\"#{@build.uri}\">#{@build.id}</a>")
    File.open(template_file, "w") { |file|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

  # ...
end
```



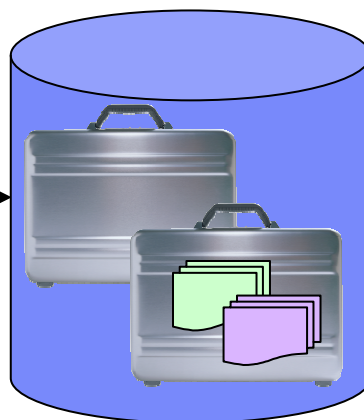
Delivery Pipeline

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



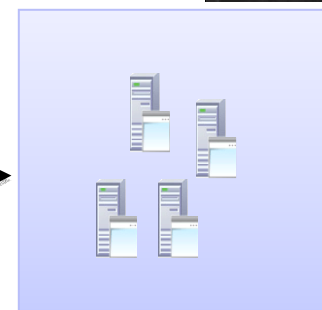
Source Artifacts
Source Control
Management

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

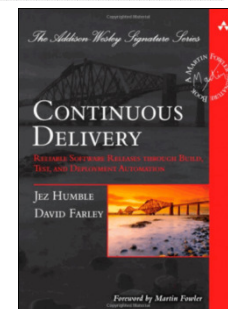


Deployable Artifacts
Library

Deploy

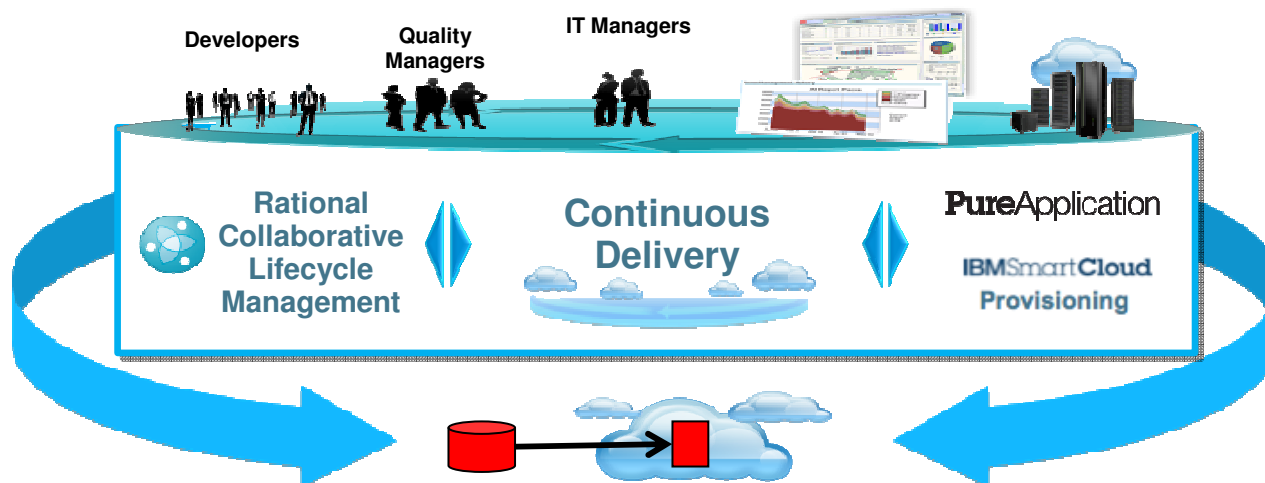
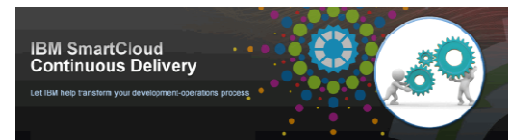


Environment
Running System



IBM SmartCloud Continuous Delivery

Extending Agile disciplines through delivery



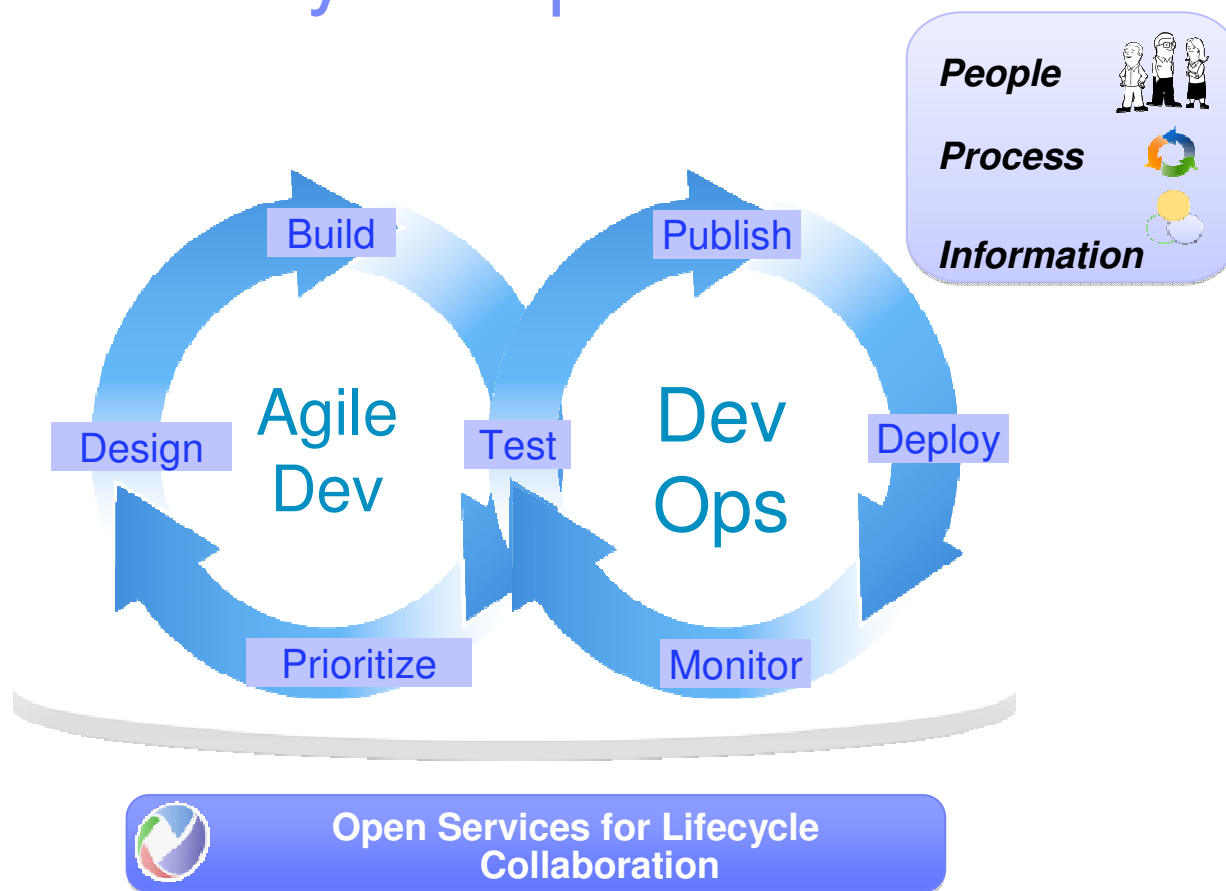
Client Value

- 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

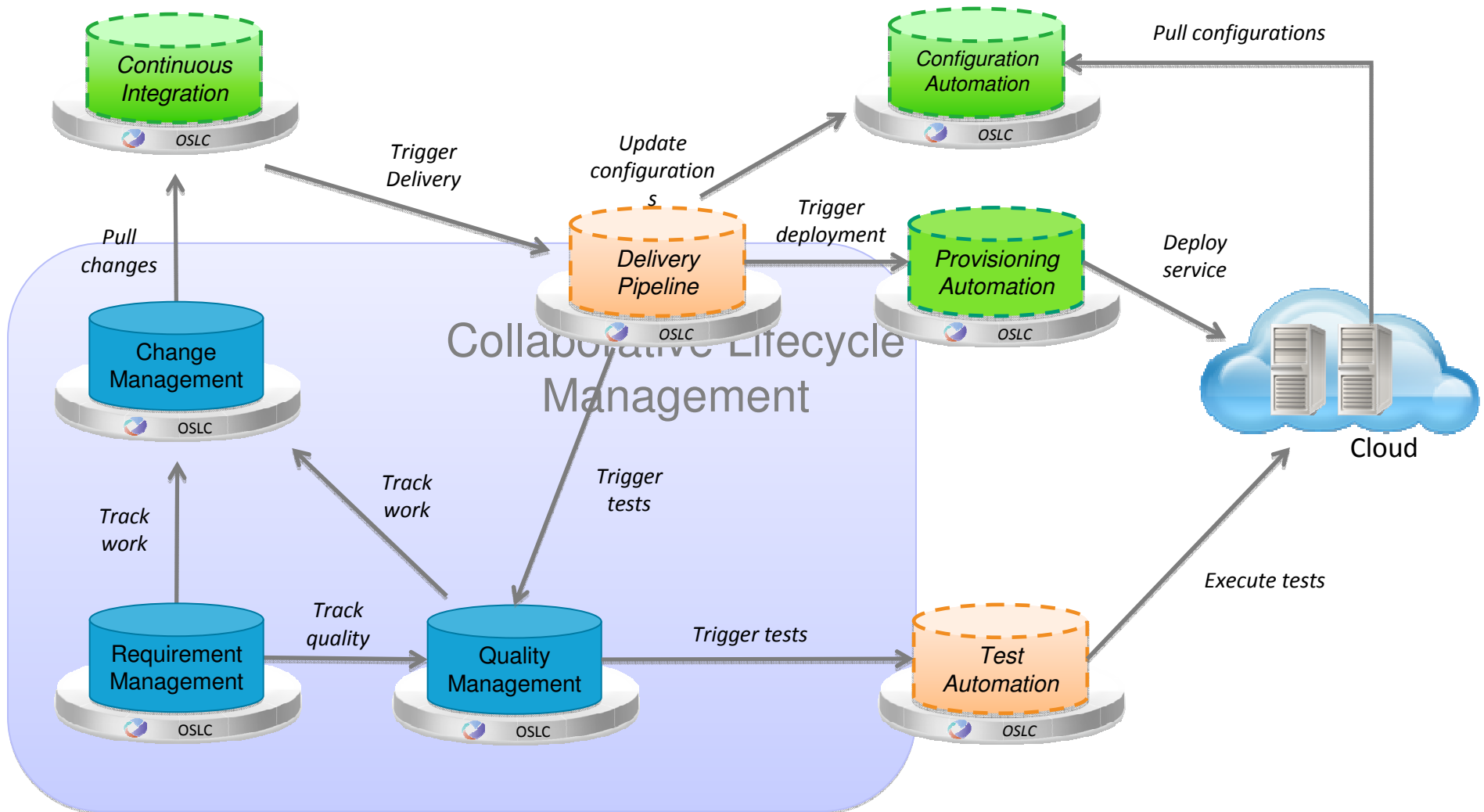
- Development team extending Agile into rapid workload deployment in the cloud
- Operation teams delivering scalable, continuous delivery services to the development organization

End-to-End Lifecycle Optimization



Follow us on the Enterprise DevOps and Jazz Team Blogs

Lifecycle Management Reference Architecture



Adopt in any order,
at any time

Corporation