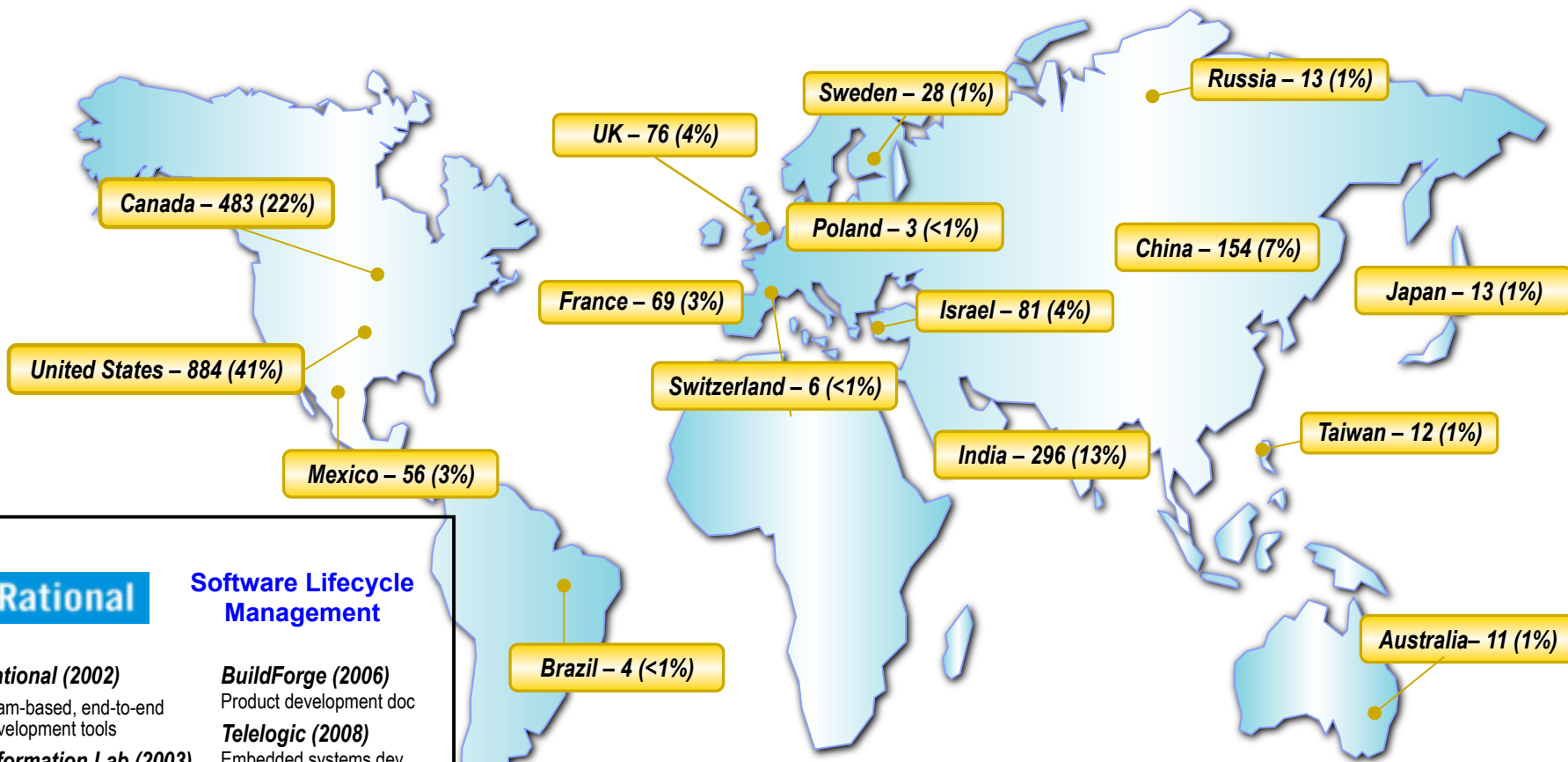


How to not Lose Your Hair Doing Distributed Java Development...

Scott Rich
Distinguished Engineer, IBM Rational
srich@ch.ibm.com



Rational Development – A Growing, Global Team



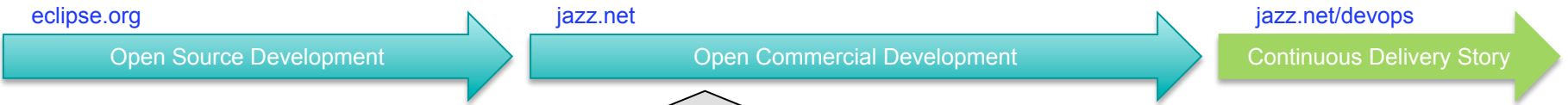
Rational	Software Lifecycle Management
Rational (2002) Team-based, end-to-end development tools	BuildForge (2006) Product development doc
Information Lab (2003) Development tool technology	Telelogic (2008) Embedded systems dev
Systemcorp (2004) Project portfolio mgmt	Green Hat (2012) Quality management
	UrbanCode (2013) DevOps

Complexity as we know it

- Highly **distributed** (client-server, server-server, clustered)
- Tightly **integrated** (features, components, clients, products)
- Very **customizable** (process, presentation, integration, UI)
- **Multi-client** platforms (Eclipse, Web, Visual Studio)
- **Multi-level** APIs (OSLC, REST, Java SDK, JS Libs)
- **Multi-language** (Java, JS, C#, JSON, XML, Ant, Ruby)

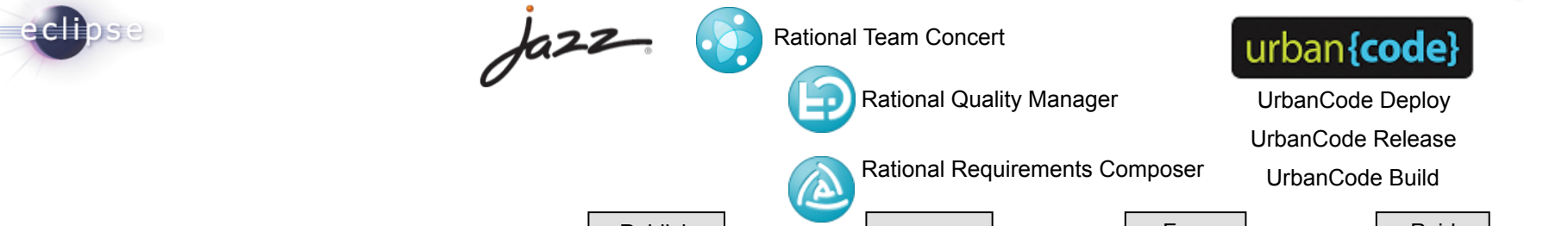
Accelerating Delivery in Rational's CLM Team

Communities for collaboration

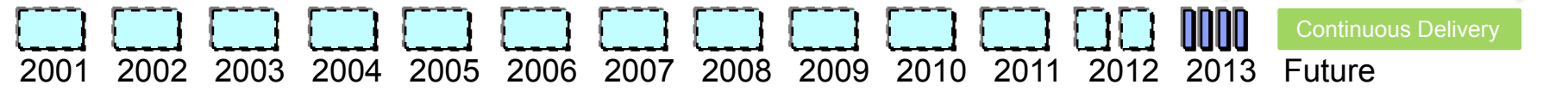
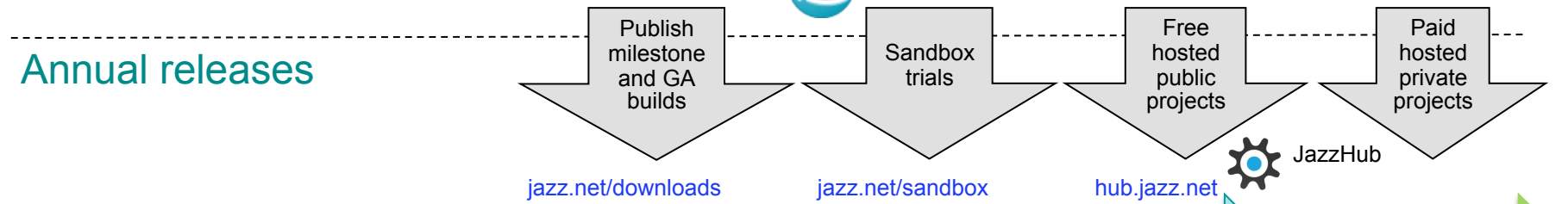


Developer-to-developer engagement

Tools for collaboration



Annual releases



smarter planet SOTI
 smarter software for a smarter planet smarter planet

tl;dr: this stuff is hard, most of the practices are not Java-specific

- We're nearly ten years into this, and we know we've got a long way to go
- We have been able to eliminate a lot of our pain points
- Most of our practices are general: collaboration, awareness, team structure
- But there are some Java-specific practices which we think are important

Seven Years Ago: Our Pain Points...

- ✓ joining a team
- ✓ get my environment configured to be productive
- ✓ what is happening in my team
- ✓ collecting progress status
- ✓ following the team's process
- ✓ ad hoc collaboration/sharing of changes
- ✓ starting an ad hoc team

Team
awareness

- ✓ is the fix in the build?
- ✓ run a personal build
- ✓ tracking a broken build
- ✓ why is this change in the build?
- ✓ reconstructing a context for a bug/build failure

Build
awareness

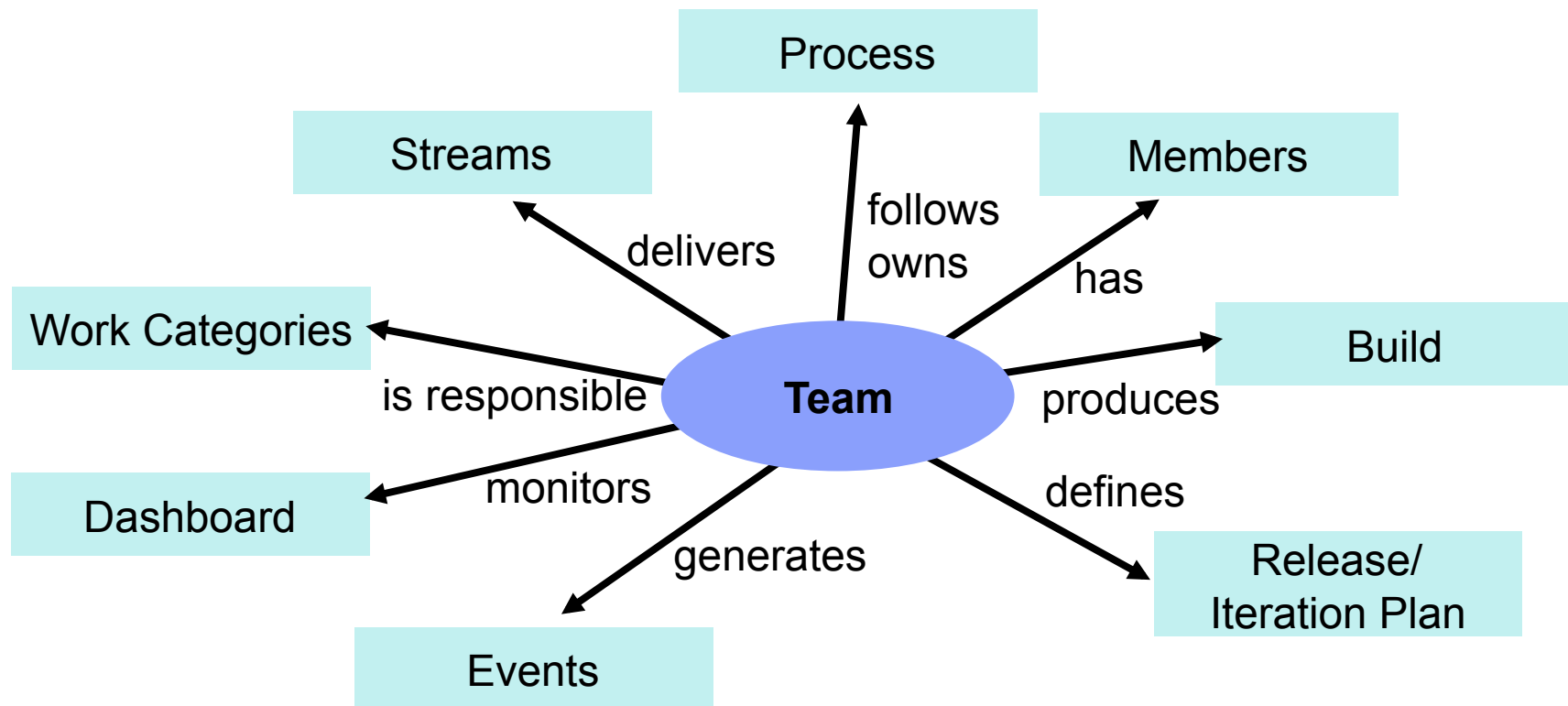
- ✓ interrupting development due to a high priority bug fix
- ✓ working on multiple releases concurrently
- ✓ tracking the code review of a fix
- ✓ referencing team artifacts in discussions
- ✓ how healthy is a component?
- ✓ collecting project data/metrics?
- ✓ keeping plans up to date

Project
awareness



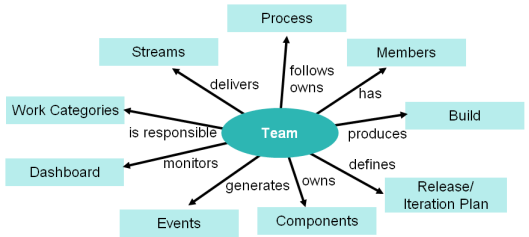
Boring and painful

Way of Working: Team Centric

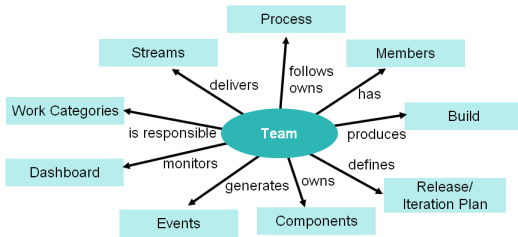


Teams are self-tuned but share a common rhythm

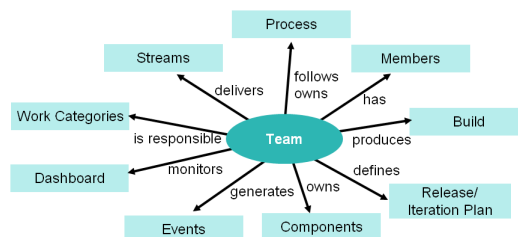
Scaling up: Teams of Teams



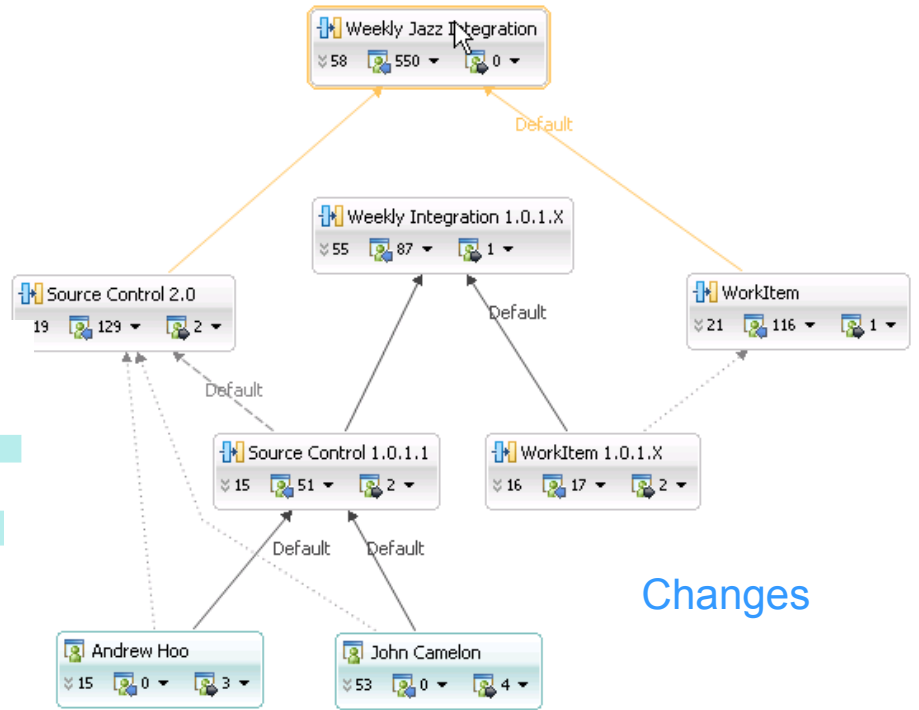
Jazz Development



Process

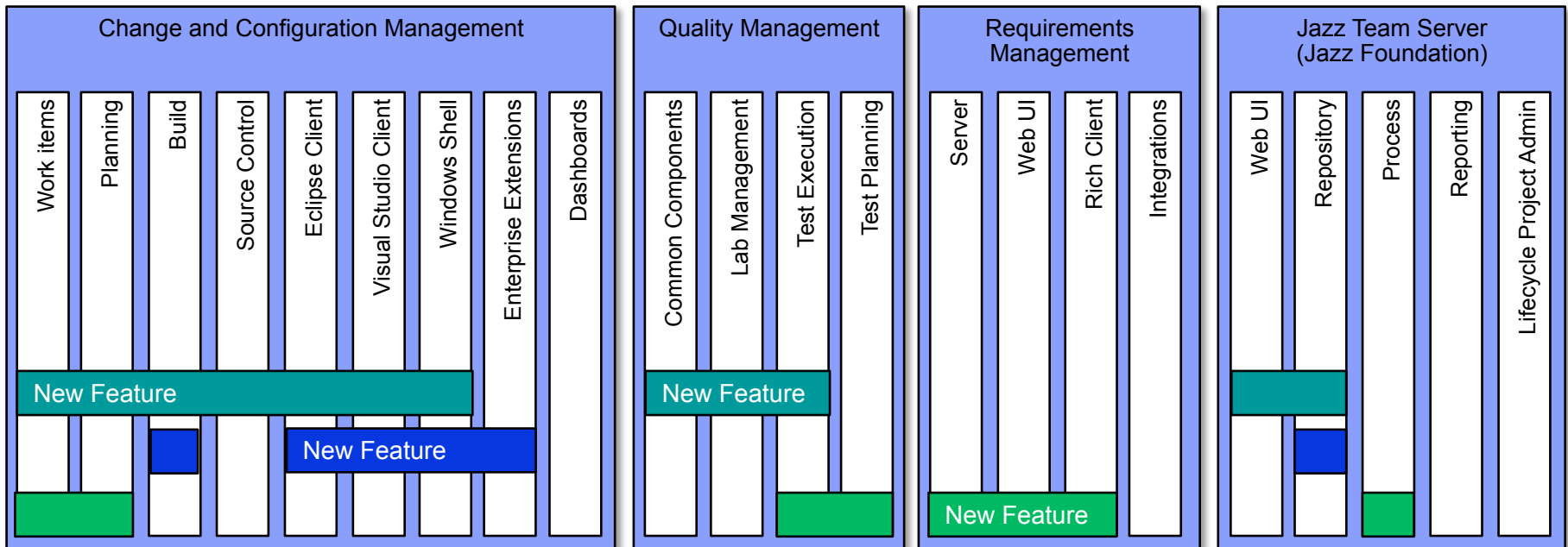


Repository



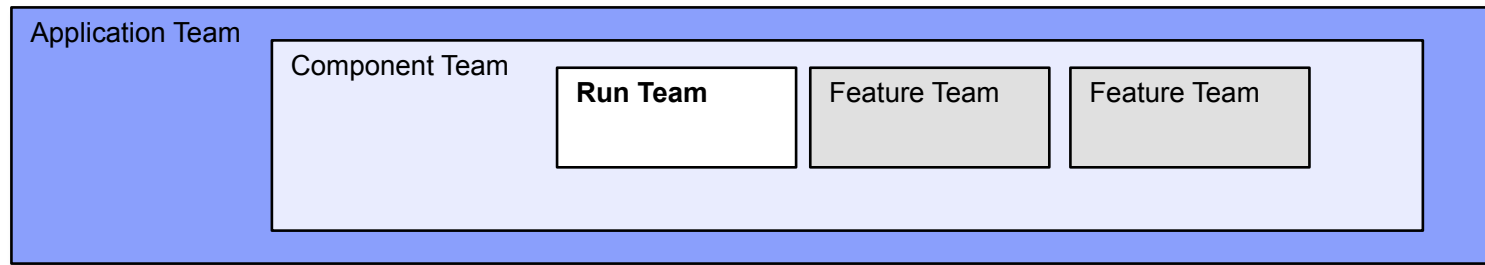
Changes

Culture – Team Organization – Feature Teams



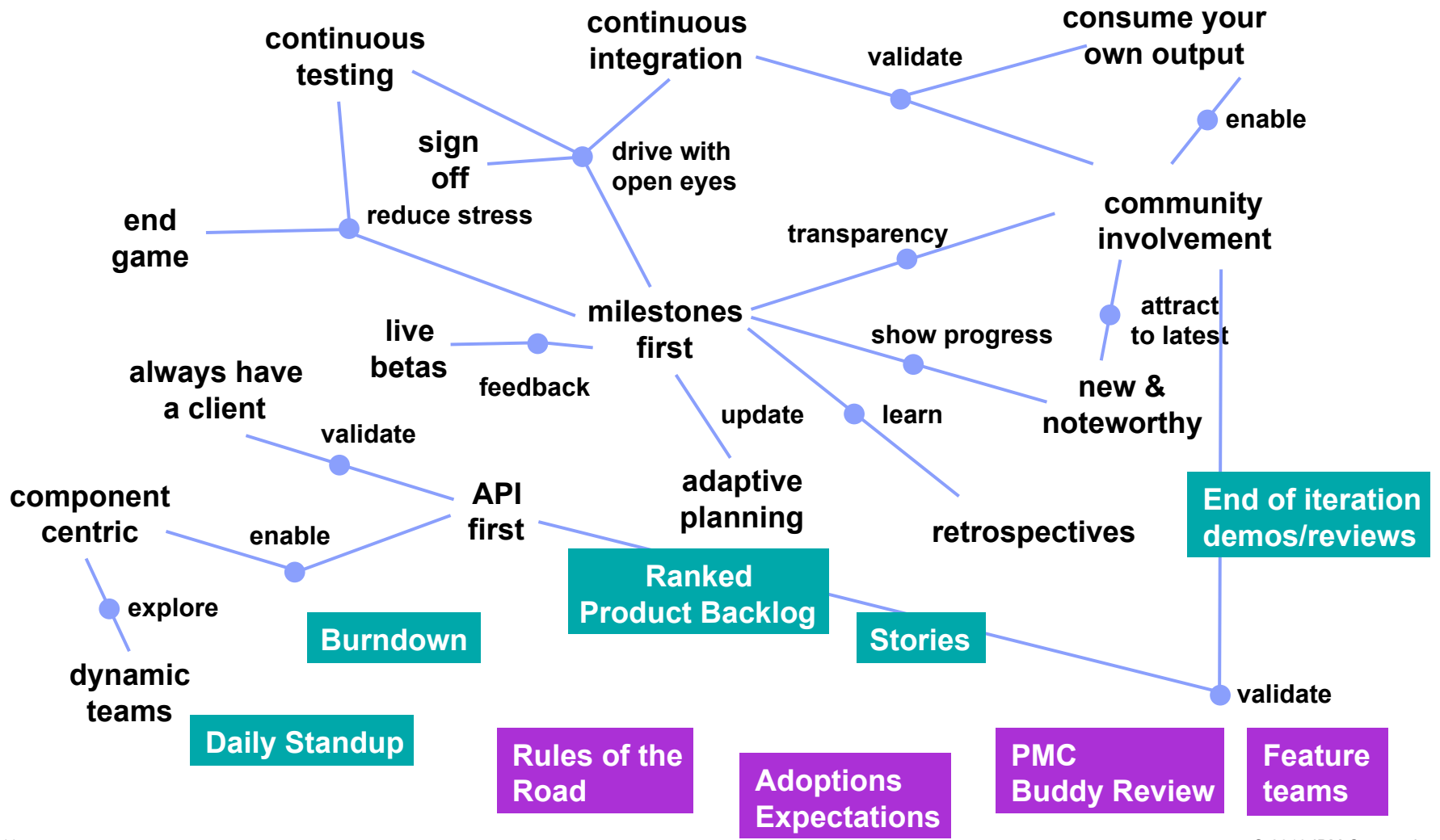
- Feature teams are virtual teams responsible for delivering a feature as specified in a plan item
- Feature teams may span components/capabilities and applications
- Each affected component/capability/test team must have a representative on the feature team
- Each feature team has a feature team lead and a senior leader from the CLM Project Management Committee (PMC) who owns the plan item
- Each feature team has its own scrum

Culture – Team Organization – Run Teams



- Run teams are permanent virtual sub-teams that handle critical, daily tasks for a component:
 - Fix bugs (in existing features)
 - Answer questions on the jazz.net forums
 - Work with Level 3 support team on customer escalations
 - Maintain SCM streams, monitor continuous builds, and manage deployments for testing
 - Monitor work items inbox, triage work items, prioritize and plan work
- Members of a component team rotate through the run team
- Run team has its own scrum
- Benefits
 - Team acquired knowledge and expertise by working/fixing defects across all areas
 - Feature teams are free to focus on new features
 - Increased quality
 - Improved interaction with the support team and improved responsive to customers

Our Current Practices



Rational Team Concert: An Overview

Agile Planning

- Integrated release/iteration planning
- Effort estimation & progress tracking taskboards
- Out of the box agile process templates

Project Transparency

- Customizable web based dashboards
- Real time metrics and reports
- Project milestone tracking and status

SCM

- Integrated stream management
- Component level baselines
- Server-based sandboxes
- Identifies component in streams and available baselines
- SVN, Git, CC bridge, connector

Work Items

- Defects, enhancements and conversations
- View and share query results
- Support for approvals and discussions
- Query editor interface
- ClearQuest bridge, connector

Build

- Work item and change set traceability
- Build definitions for team and private builds
- Local or remote build servers
- Supports Ant and command line tools
- Integration with Build Forge

Jazz Team Server

- Single structure for project related artifacts
- World-class team on-boarding / offboarding including team membership, sub-teams and project inheritance
- Role-based operational control for flexible definition of process and capabilities
- Team advisor for defining / refining “rules” and enabling continuous improvement
- Process enactment and enforcement
- In-context collaboration enables team members to communicate in context of their work

Java - Event Log - Rational Team Concert - /Users/scotrich/Documents/112011

Event Log 3

Event Log Refresh to get the latest updates

Feb 26, 2012 - Week 9 | Mar 4, 2012 - Week 10 | Mar 11, 2012 - Week 11

Sun Mon Tue Wed Thu Fri Sat Sun Mon Tue Wed Thu Fri Sat Sun Mon Tue Wed Thu Fri Sat

Showing 394 of 1026 Items from Feb 26, 2012 to Mar 18, 2012 | Expand All | Mark All News as Read

Today (36 items found)

- [2] Create a link to JKE Product Backlog in Bobs mini widget instead of current plans (201868) 1 hour ago
- [16] Select a plan by default in the persistent project dashboard area for MTM sample (196314) 1 hour ago
- [84] Track CLM 2012 RC1 (March 5 - March 23, 2012) (199951) 1 hour ago

Thursday, March 15, 2012 4:57 PM

Martha DasSarma changed:

Comments [#75]	Builds and other requests failing with SocketTimeoutExceptions (201857) is tracking the problems we have seen with builds today.
Mentions Link	added: 201857: Builds and other requests failing with SocketTimeoutExceptions

Thursday, March 15, 2012 4:55 PM

Martha DasSarma changed:

Comments [#74]	calm.jcb 20120315-0814 died: the following HTTP error occurred: "java.net.SocketTimeoutException" @mickels and @ffusier FYI. I am attempting to start a new one.
Mentions Link	added: calm.jcb 20120315-0814

Thursday, March 15, 2012 3:27 PM

Frederic Fusier changed:

Comments [#73]	re comment 72: @dassarma, @sanketja, will RM hangs indefinitely while registering applications in JTS setup (56377) fix be also included in this build?
Mentions Link	added: RM hangs indefinitely while registering applications in JTS setup (56377)

Thursday, March 15, 2012 2:20 PM

Martha DasSarma changed:

Event Log

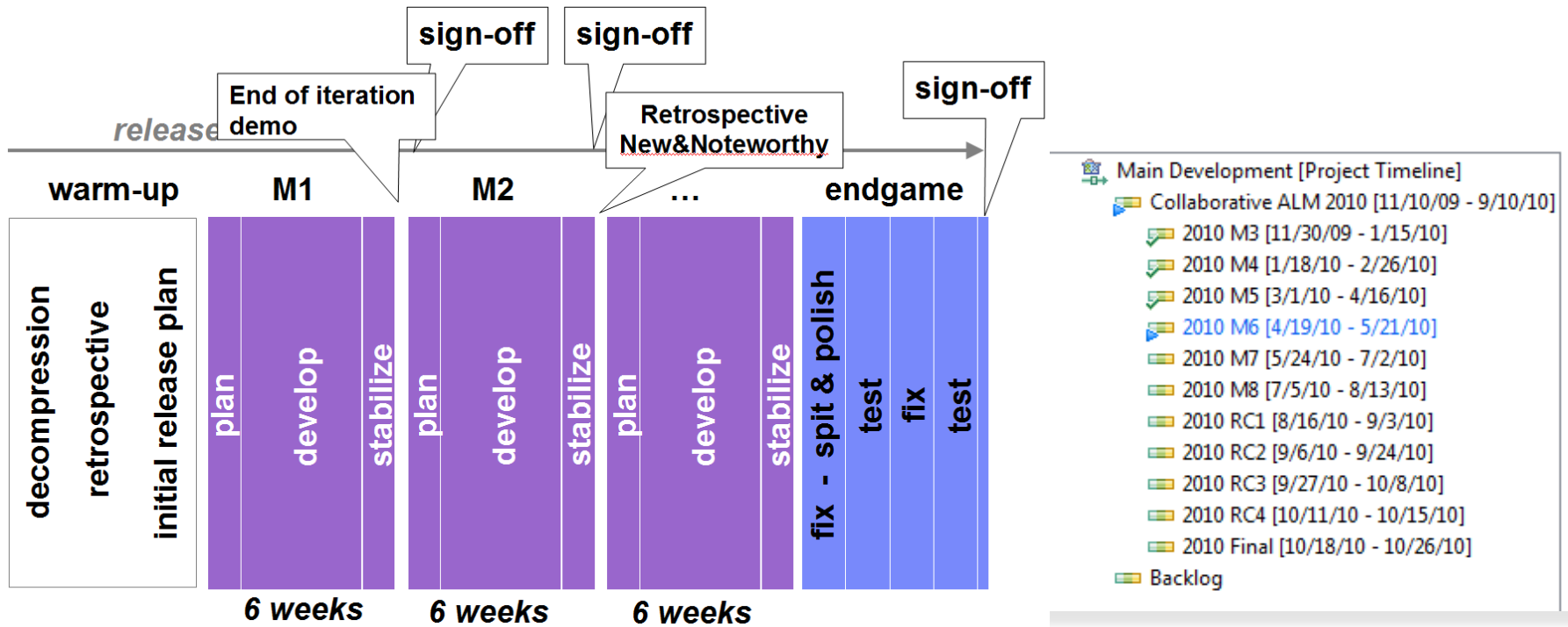
mac event log Rational Team Concert 201612: Update the MTM project a ..

Build finished with errors
 foundation.stable.jcb.edb.test
 s.db2 RJF-I20120316-2055-

smarterplanet SOTI
 smarter software for a smarter planet

Team rhythm and timeline are made explicit

- Aligned milestone schedule across products



Team awareness: What's the plan?

Jazz Collaborative ALM

Project Dashboards ▾ Work Items ▾ Plans ▾* Builds ▾ Reports ▾

CLM 3.0.1 * ?

246 items: 165 open, 81 closed | Ends in: 41 days

▸ Plan Details

Planned Items ? Links Snapshots Dashboard Definition of Done Executive Status Help Wanted Notes Planning Notes Schedule Wish list

View As: Work Breakdown ▾ | [Icons] | [Filter] Type to Filter (97 items filtered)

Actions	Summary	Priority	Commitment	Risk Status	DCP Boca
[Icons]	▸ CLM (Finish) Common administration of a project	Must	Committed	Green	Base Content
	▸ CLM (Finish) Support work items as a service	Must	Committed	Green	Base Content
	CLM Improve and deepen traceability links & views, add support for change impact/sus	Must	Unassigned	Green	Base Content
	CLM Adopt common visual style	Must	Committed	Green	Base Content
	▸ CLM (Finish) CLM reporting	Must	Committed	Green	Base Content
	▸ CLM (Finish) Provide common install for Rational Workbench for CLM products	Must	Committed	Green	Base Content
	▸ CLM CLM - Common Sample: Adopt a common sample application & project	Must	Committed	Green	Extended Content
	▸ CLM (Finish) Define and Implement C/ALM Reports	Must	Committed	Green	Base Content
	CLM Consume OSLC Architecture Management v2 specification	Should	Deferred	Green	N/A
	CLM Support RQM local Defect enhancements in C/ALM setup	Must	Unassigned	Green	Base Content
	CLM Implement C/ALM 2009/2010 to C/ALM 2011 upgrade strategy across products	Must	Committed	Yellow	Base Content
	CLM Decouple built-in Requirements from RQM	Must	Committed	Green	Base Content



Tracking and Planning [?]

General Buildmeister Wallboard **Work Item Taskboard** Planning Taskboard

Add Widget

Work Item Taskboard

Taskboard for the Work Item team for the current sprint.

Story	Open	In Progress
<div> Need a mechanism to automatically</div>		<div> Restricted access presentations 2 hours ▾<ul style="list-style-type: none">30 minutes1 hour2 hours4 hours1 day2 days3 days1 week--</div>
	<div> Create tech note on the use of "comment" as a</div> <div> Article about contributing WEB UI presentations</div>	<div> g ly Viewed f run</div> <div> Layout issues on "Link To Existing Defect" dialog</div>
	<div> Improve Work Item web WorkItemProxy</div> <div> Update http://jazz.net /library</div>	<div> te Away does not work item</div> <div> Queries marked "changed" on opening or just</div>

Track Build Item 166103

Summary: Track RTC 3.0.1 RC4 (May 16-May 27)



Green

Loaded: Jun 1, 2011 9:09 AM

Overview Links Approvals History

Details

Creation Date: May 16, 2011 2:22 PM Resolution Date: May 31, 2011 12:19 AM
Created By: Sonia Dimitrov Resolved By: Sonia Dimitrov
Filed Against: Release Engineering

Description

3.0.1 RC4: May 16-May 27

Stream: RTC Integration
Build definition: rtc.jcb
Build Schedule: 4:30 pm and 10:30 pm daily
Deploy: <https://bsinxvh04.ottawa.ibm.com:9443/jazz>
RJF's Supplier: <http://jazzweb.beaverton.ibm.com/foundation/stable//RJF.properties>
Rules of the road: see <https://jazz.net/wiki/bin/view/Main/RTCEndGame301>

RJF's TBI: TBA
CLM's TBI: [Track CLM 2011 RC4 \(May 16 - May 27\) \(166077\)](#)
Self-hosting and test server deployments: [Track self-hosting staging and deployment for CLM 2011 RC4 \(166076\)](#)

Discussion (46 comments)

Add Comment

Collapse All | Expand All

1. Sonia Dimitrov May 16, 2011 2:22 PM

Copied from work item 164121.

2. Sonia Dimitrov May 16, 2011 8:12 PM

Target files have been updated to 3.0.1 RC3.



Subscribers (166): AA, AC, AS, AH, AW, AB, AR, BS, BK, BP, ...

Quick Information

- Promote rtc.jcb RTC-... : Approved (9 of 9)
- Promote rtc.jcb RTC-I... : Approved (1 of 1)
- Promote rtc.jcb RTC-I... : Approved (4 of 4)
- Promote rtc.jcb RTC-I... : Approved (5 of 5)
- Promote rtc.jcb rtc.j... : Approved (8 of 8)
- Subscribers (166): AA, AC, AS, AH, AW, AB, AR, BS, BK, BP, ...
- Copies (1): 164121
- Copied From (1): 167621
- Mentions (58): 164813, 23, 22, 2, 3, 8, 4, 11, 5, 6, ...
- Mentioned By (5): 165983, 166077, 166124, 166844, 167074

oration

27. Sanket Jain May 26, 2011 3:57 PM
Build and Deploy Status -
- The latest build rtc.jcb RTC-I20110525-2359 is RED due to Workitem JUnit Test failure - Defect 162255
- Manually promoted rtc.jcb RTC-I20110525-2359 build
- rtc.jcb RTC-I20110525-2359 build is based on foundation.stable.jcb RJF-I20110525-2115

28. Johannes Rieken May 26, 2011 6:02 PM

10. Mr. Build Sep 10, 2013 9:21 PM
The build calm.jcb 20130910-1521 was requested at 2013-09-10 15:21:36.504.

11. Mr. Build Sep 10, 2013 11:16 PM
The build calm.jcb CALM-I20130910-1521 completed with status OK. This build is based on offerings from the following builds:
RJF - jaf.405 RJF-I20130909-2322
RTC - rtc.jcb RTC-I20130910-0957
RQM - RQMMainline RQMMainline-N20130910_1433
RMS - RMS_4.0.5_Integration_Build RMS4.0.5-I20130910_0226
Please do not use jbslnxvh02 until the BVT results are announced here.

12. Mr. Build Sep 11, 2013 12:21 AM
The build cspf.stable.clm_bvt.scenario CALM-BVT-I20130910-1717 completed with status ERROR.
The results of the BVT need to be manually analyzed.
Test configuration:
• Client: Firefox v17
• Server: <https://jbslnxvh02.ottawa.ibm.com> Linux Red Hat 5-64bit, Tomcat, DB2 v9.7
• JTS setup type: custom
• Build under test: calm.jcb CALM-I20130910-1521

36. Sonia Dimitrov May 27, 2011 1:44 PM
I have created a new approval item and moved some folks over based on new contributions between rtc.jcb RTC-I20110526-2015 and rtc.jcb RTC-I20110525-2359.

37. Guy Slade May 27, 2011 3:48 PM
SVT_RC3_W2: Binary rebuild does not rebuild COBOL file if trust output is true (165938) has just been reopened on us. Investigating now to see what the deal is and whether we can fix it today

What about those Java-specific practices?

- Continuous Integration with RTC and Jenkins
- Getting our test layers right, implementing mocking
- Using components to increase autonomy
- Enabling desktop test and debug for complex systems

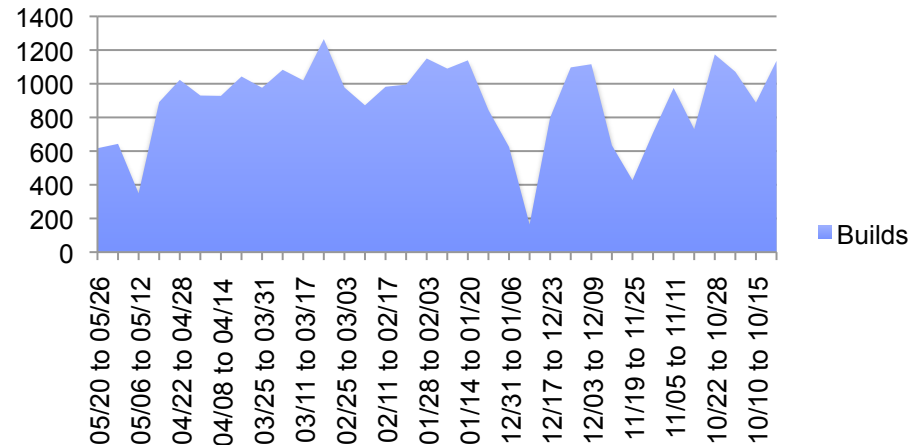
Continuous Integration with RTC and Jenkins

- We perform ~1000 builds per week
 - Components run continuous builds
 - Nightly Integration candidates
 - Weekly Integration builds – “stop the line”
 - Monthly Milestone builds

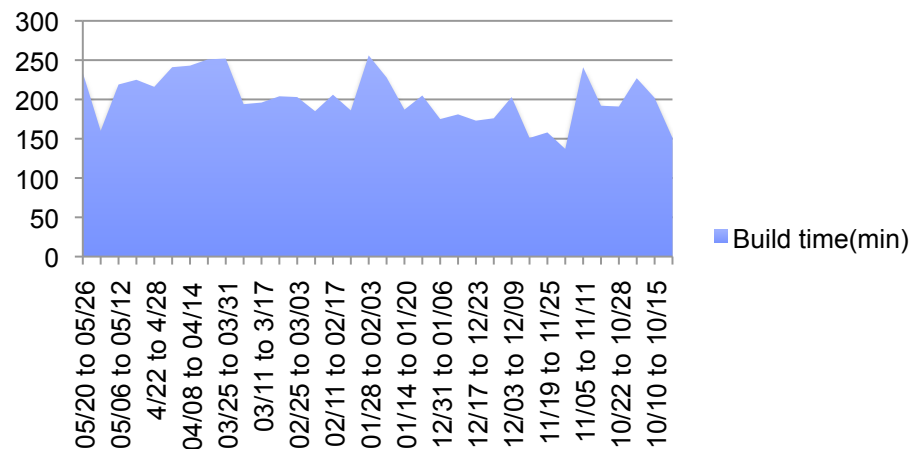
- Make it easy to run personal builds and builds for Feature Teams

- Build time is a constant focus
 - Test refactoring
 - Kicking out Integration tests
 - Increasing parallelization
 - 12 hours to 8 for full re-build
 - 10->3 hrs for average build

Builds

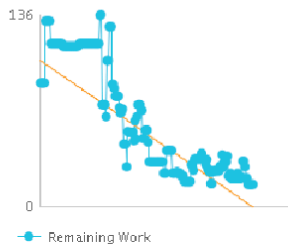
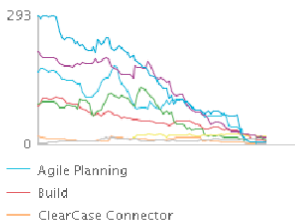
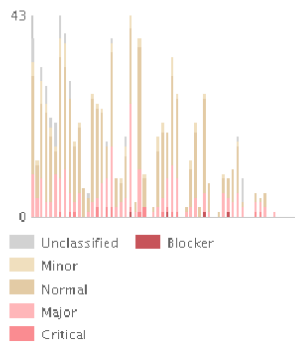


Build time(min)

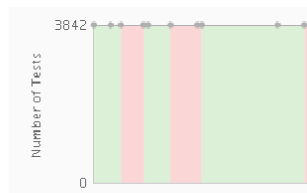


Show Header

7 days remaining

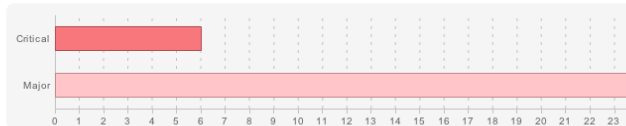


continuous.workitem.jcb
 rtc.300x.jcb
 rtc.jcb



Less ▶ More

3.0_item [2] aao **accessibility** advisors approvals avp@stg
 avpgc c_alm calm cust_412 duplicate_handling
 ibm_internal_deployment iga nis nis_rtc30 polish queryeditor
 quickie quickquery refactor rfe style svT testcase tvt_testcase
 usability UX voicenov2010 workitemtooling



- 138911: The agile scheduler does not respect iteration starts**
- 138822: Reverting a demoted work item doesn't promote it**
- 138798: Problems to display Plans via web ui on jazz07 self host**
- 138392: Cannot rearrange Work Item list - "assertion failed" message**
- 137333: Changing complexity attribute causes error to appear in Process Configuration Source editor**
- 82658: Navigating away from project prompts about losing "unsaved work"**
- 105862: Internal Error occurs after a second Task was added under an Epic**
- 100092: Work Items don't appear in the query for specific team area**
- 139431: Compact renderer code to fetch binary image is broken**
- 88454: Progress bar information not accurate for Story and Use Case WIs**

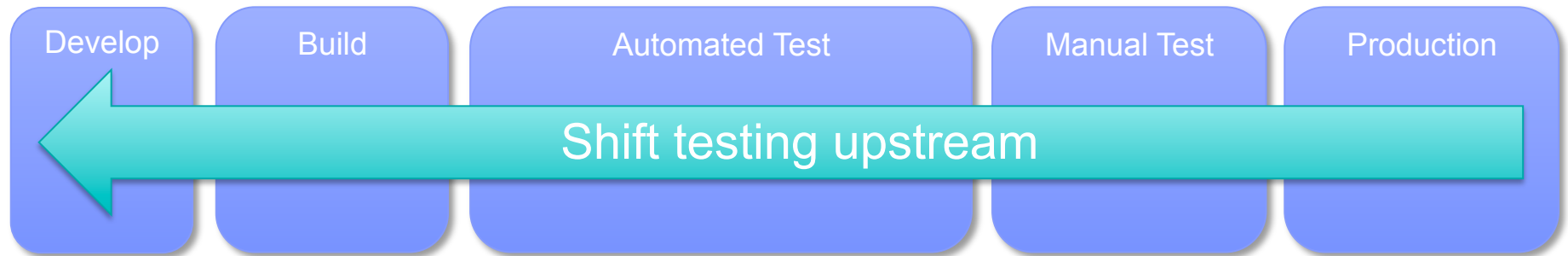
The MethodSphere Daily is out! <http://bit.ly/bcDp5t> ▶ Top stories today by @JazzDotNet @janole @WELT_Webwelt @andypiper 5 hours ago
 Nice video by resident expert @JazzDotNet: See Tasktop's IBM Rational Team Concert Connector in action <http://bit.ly/bMh109> Yesterday
 RT @JazzDotNet: See Tasktop's IBM Rational Team Concert Connector in action <http://bit.ly/bMh109> Yesterday
 vo/ RT @JazzDotNet: And Rational Team Concert 3.0 is available for FREE for up to 10 developers! <http://bit.ly/hTaUxN> << Download Yesterday

[2] Better sorting of user content assist proposals based on comments history (140355) 1 hour ago

Information Radiators: *Wallboards*



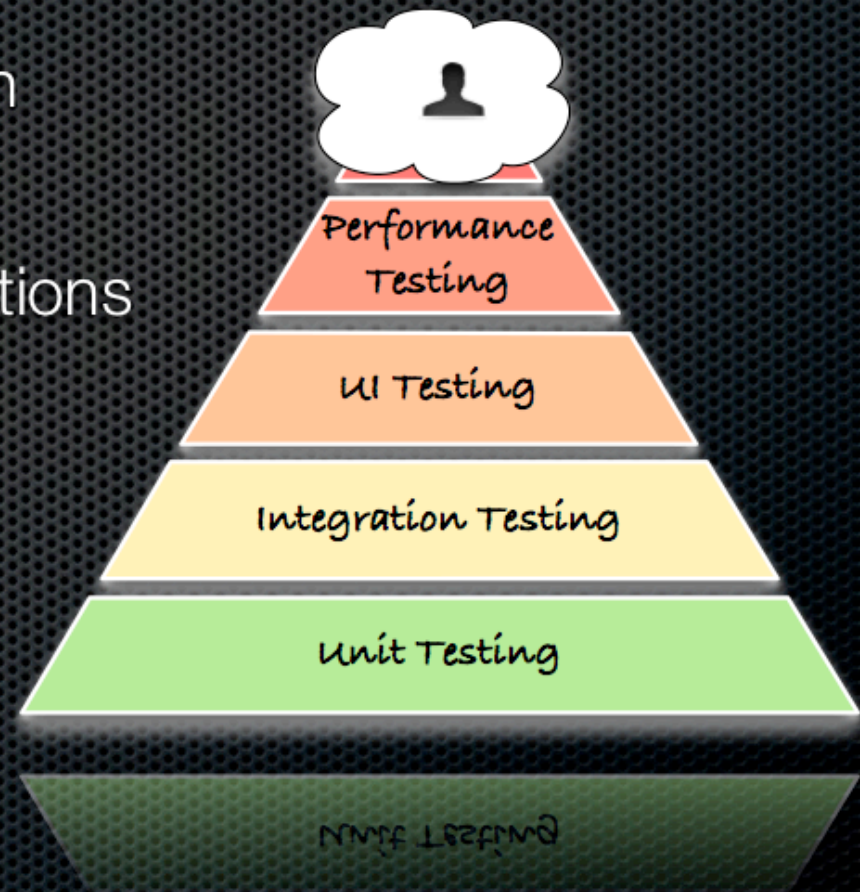
Culture – Continuous Testing



- Build quality in with testing by everyone, everywhere, all the time
 - Instill the mindset throughout the team that quality and testing is everyone’s responsibility
 - Avoid throwing untested code “over the wall” to the next team to test
- Automate as much testing as possible to increase confidence in builds
 - Some teams wrote JUnits from the beginning
 - Jazz Foundation – 55,000 Junits
 - Rational Team Concert – 18,000 JUnits
 - Other teams started later but have made good progress
 - Rational Quality Manager – 2,000 JUnits
 - Rational Requirements Composer – 2,000 Junits
 - Use tests in the pipeline to test application, product, and integration functions
 - CLM Build Verification Test (BVT)
 - Integration tests
 - Performance acceptance tests

Layered Testing Approach

- Unit test new functionality in isolation
- Integration test new interactions with other functionality
- UI test new widgets and actions
- Performance test changes to services



Java-specific practices: component-based development

“Good fences make good neighbors.”



Java-specific practices: desktop dev/testing of complex Systems

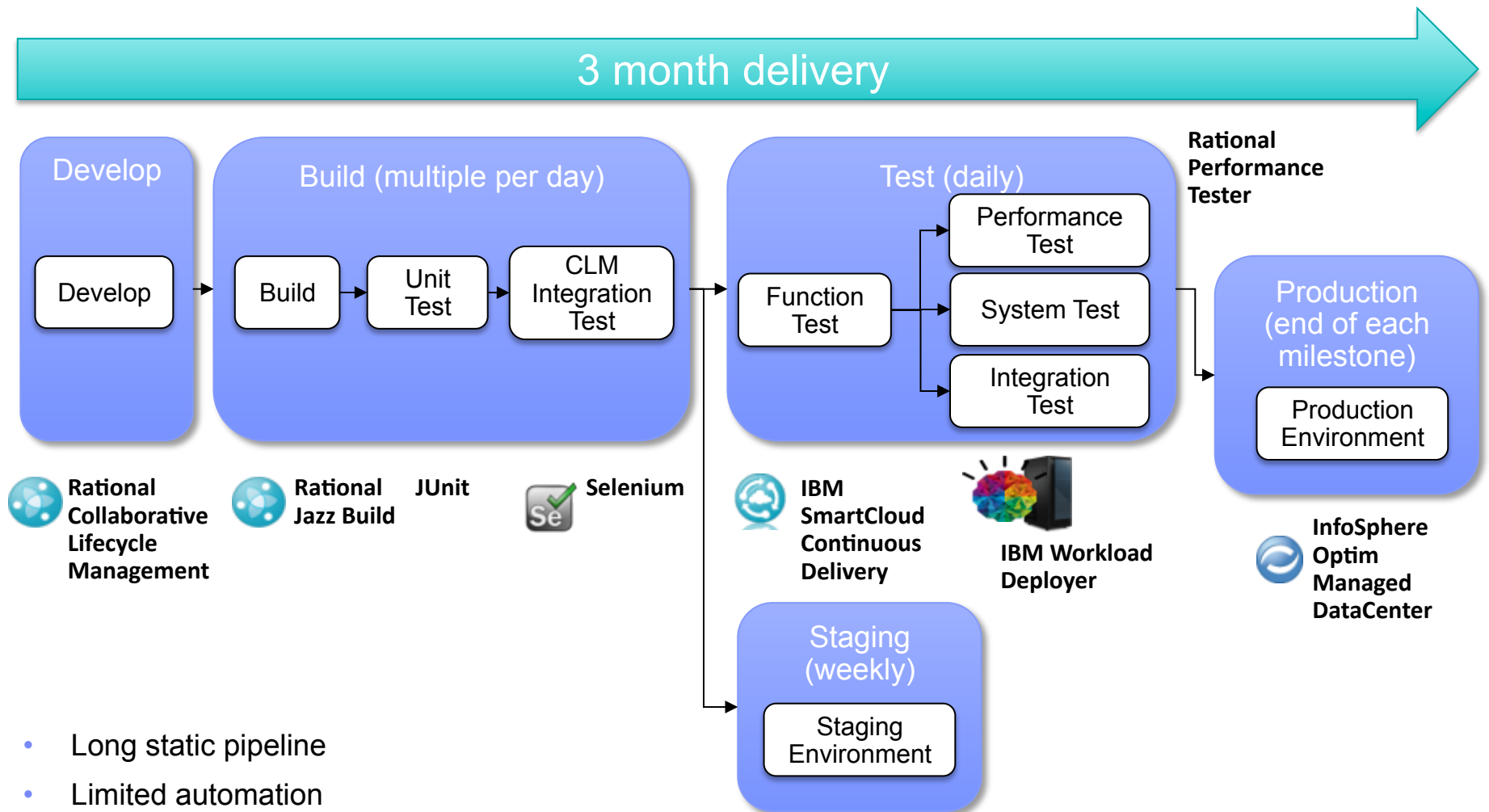
So how does a developer debug and test a Java EE beast?

- Our runtime topology relies on a relational DB, Java EE app server, user registry, etc.

Development-time profile uses lightweight components

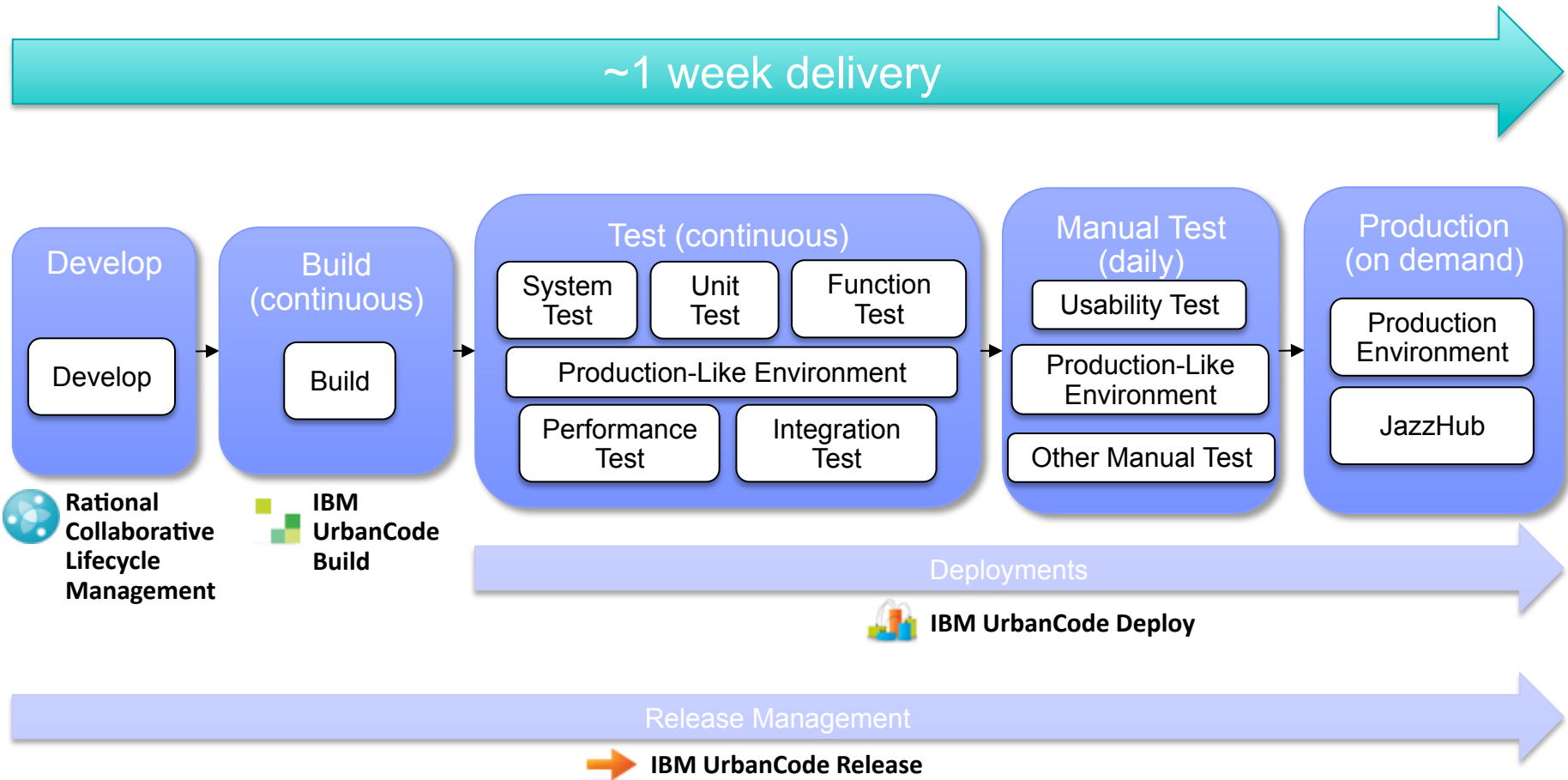
- Jetty application container hosts our bundles
- Derby database
- Shared Eclipse launch configs for dev-time servers
- Version-controlled target platforms contain server pre-reqs

We are here: CLM Continuous Delivery Pipeline



- Long static pipeline
- Limited automation
- Inconsistent deployment mechanisms
- Deployments driven by schedule and not by results

CLM Continuous Delivery Pipeline – Evolution



- Push testing upstream and automate as much as possible
- Use the same deployment mechanisms everywhere
- Strive to maintain a constant state of ship-readiness

Unsolved problems...

- Incremental builds for Java, build avoidance
 - Building in hours is still not fast enough for true continuous delivery
- Solving the platform permutations nightmare for packaged software
 - OS times DB times App Server times Browser
 - Increasing our focus on “Golden Topologies”
 - Evaluating delivering products as Virtual Machine images – one pre-configured topology
- Others?

Want to learn more?

- Follow our DevOps activity and blog at <https://jazz.net/DevOps>
- More articles from Jan and the team:
 - How to build quality in — A layered testing approach for continuous delivery [<https://jazz.net/wiki/bin/view/Main/LayeredTestingApproach>]
 - Mocking without the Hangover — Unit test complex systems with stubs, spies and matchers [<https://jazz.net/wiki/bin/view/Main/UnitTestingInTheRealWorld>]
 - Fluent Artifact Builders — A foundation for developing tests faster [<https://jazz.net/wiki/bin/view/Main/FluentBuilders>]
 - Hiding Selenium in UI tests — Web UI testing with maintainable abstractions [<https://jazz.net/wiki/bin/view/Main/WorkItemWebUITests>]