

# Software Development Practices

Jeffrey Liu 2013/10/09

# Critical factors of Software Delivery

Project  
Management

Team Collaboration

Continuous  
Integration

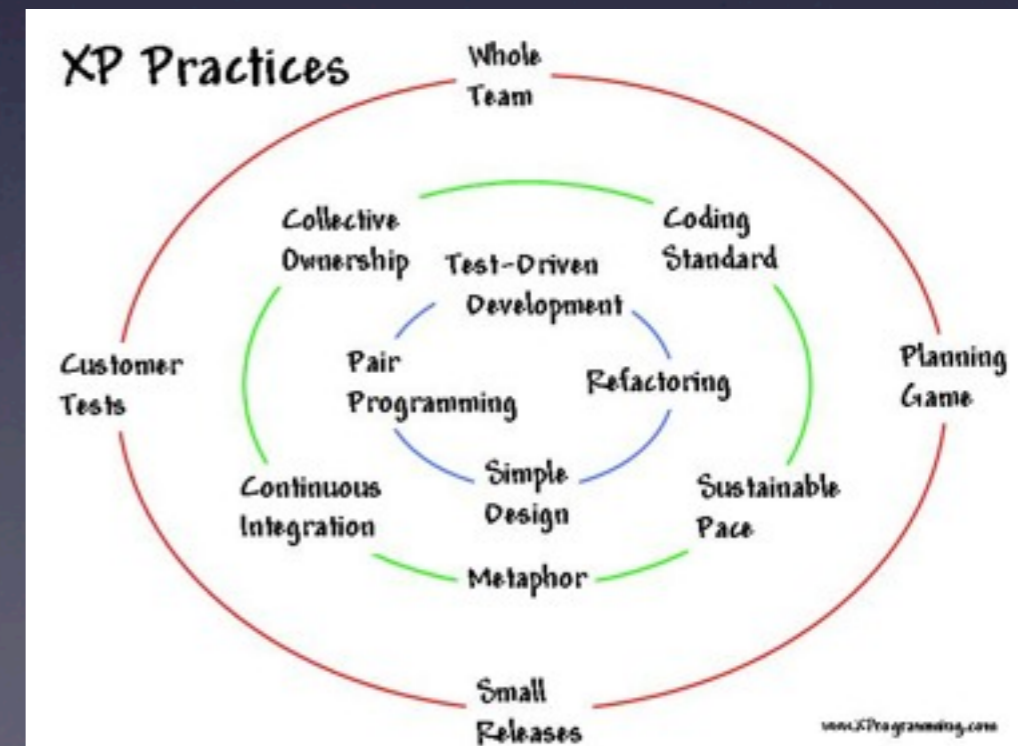
Issue Tracking

# Agenda

- Part 1 : Agile Development Process
- Part 2 : Team Collaboration
- Part 3 : Continuous Integration
- Part 4 : IBM Experience

# What I won't cover in this session

- Pair Programming
- Test-Driven Development
- Refactoring
- ...

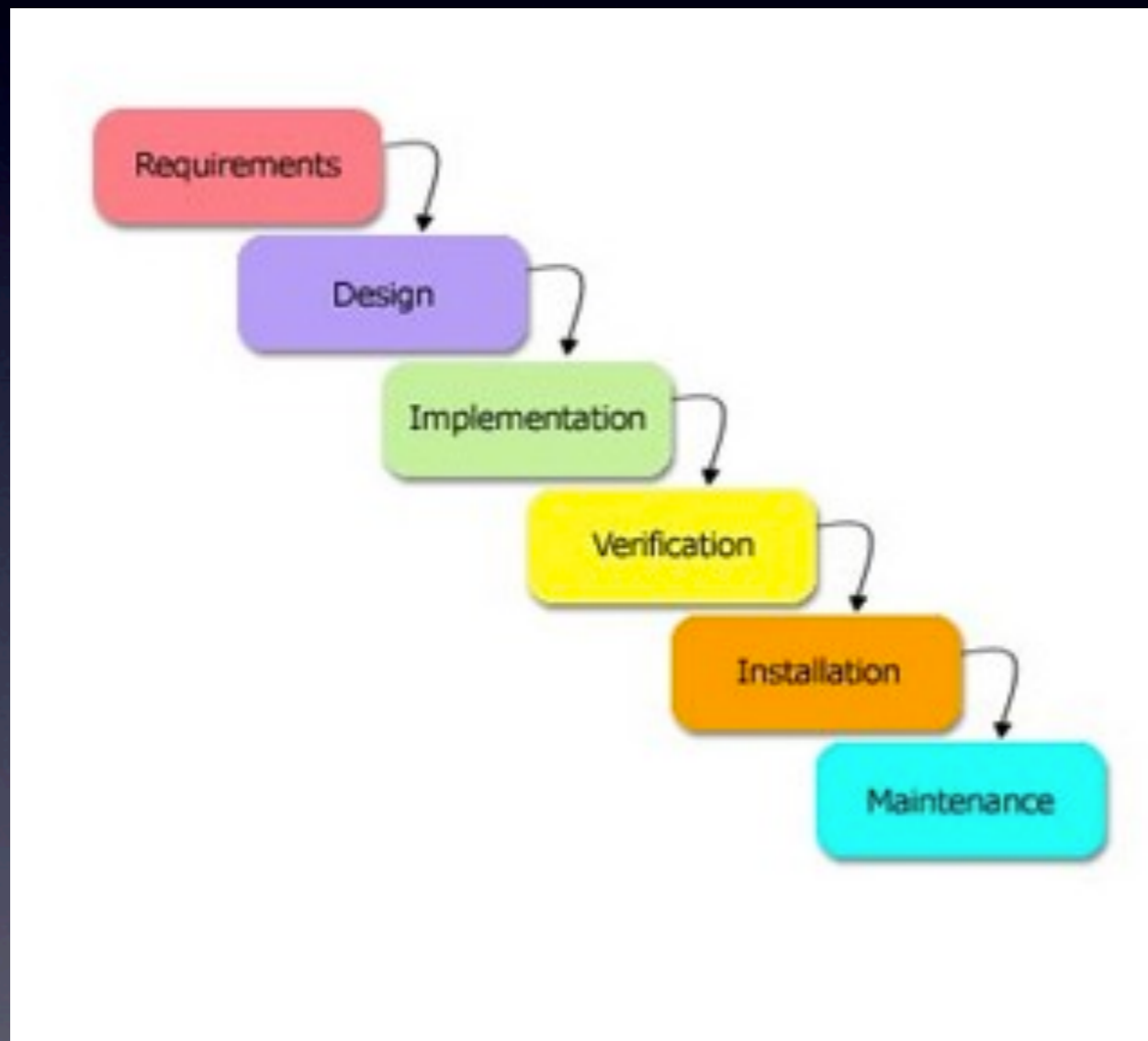




# Agile Development Process

**What is Agile ?**

# What is the problem of waterfall development process



- Risk
- Cost
- **Satisfaction**

# When to use waterfall development process ?

- When requirement and schedule are well-defined
- Quality is more important than cost
- The uncertainty of technology and external impacts are low

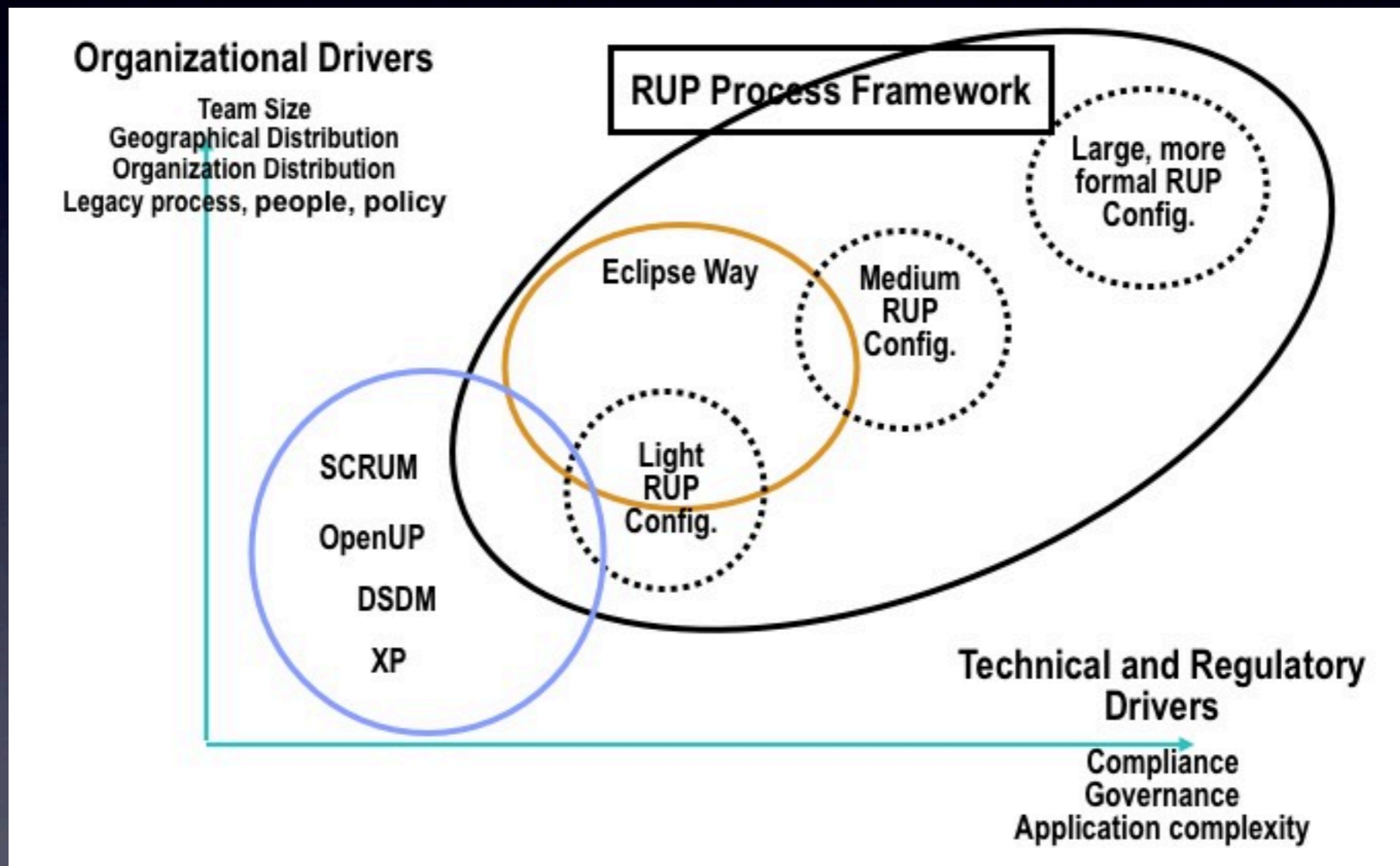


# Agile in a Nutshell

- Not just a set of methodologies
- Not just a set of practices
- It feels like a set of goals, principles, or values
- Do what you need to do to leverage instead of resist changes
- Reduce Risk
- Communication, Feedback, Simplicity, Teamwork

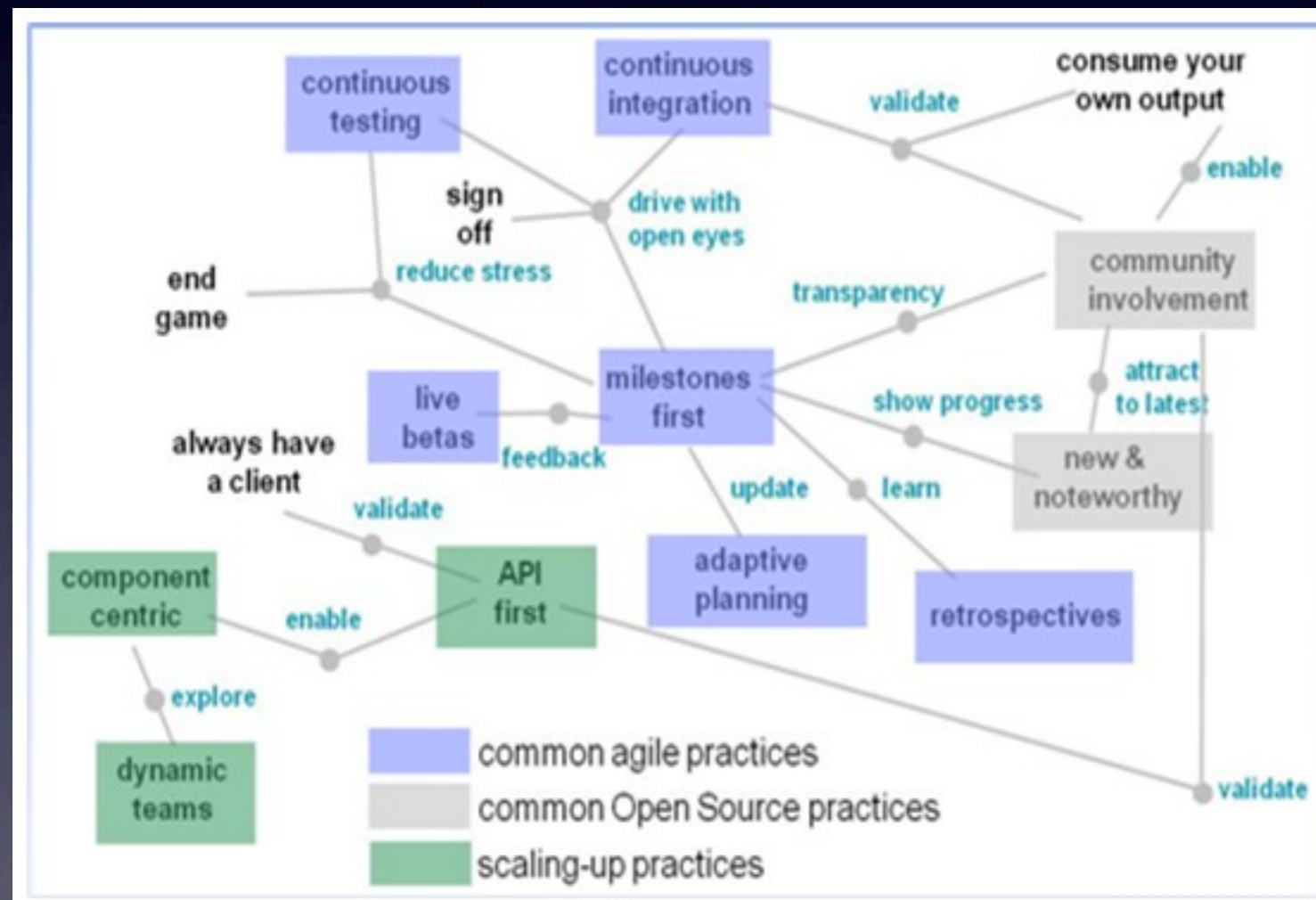


# Difference Dev Process for different needs



# Eclipse Way

The Eclipse Way combines principles adopted from agile approaches



- 1 Continuous iterative and adaptive planning
- 2 Continuous design/refactoring
- 3 Continuous integration/testing
- 4 Continuous delivering/demos
- 5 Continuous feedback
- 6 Continuous learning
- 7 Continuous health

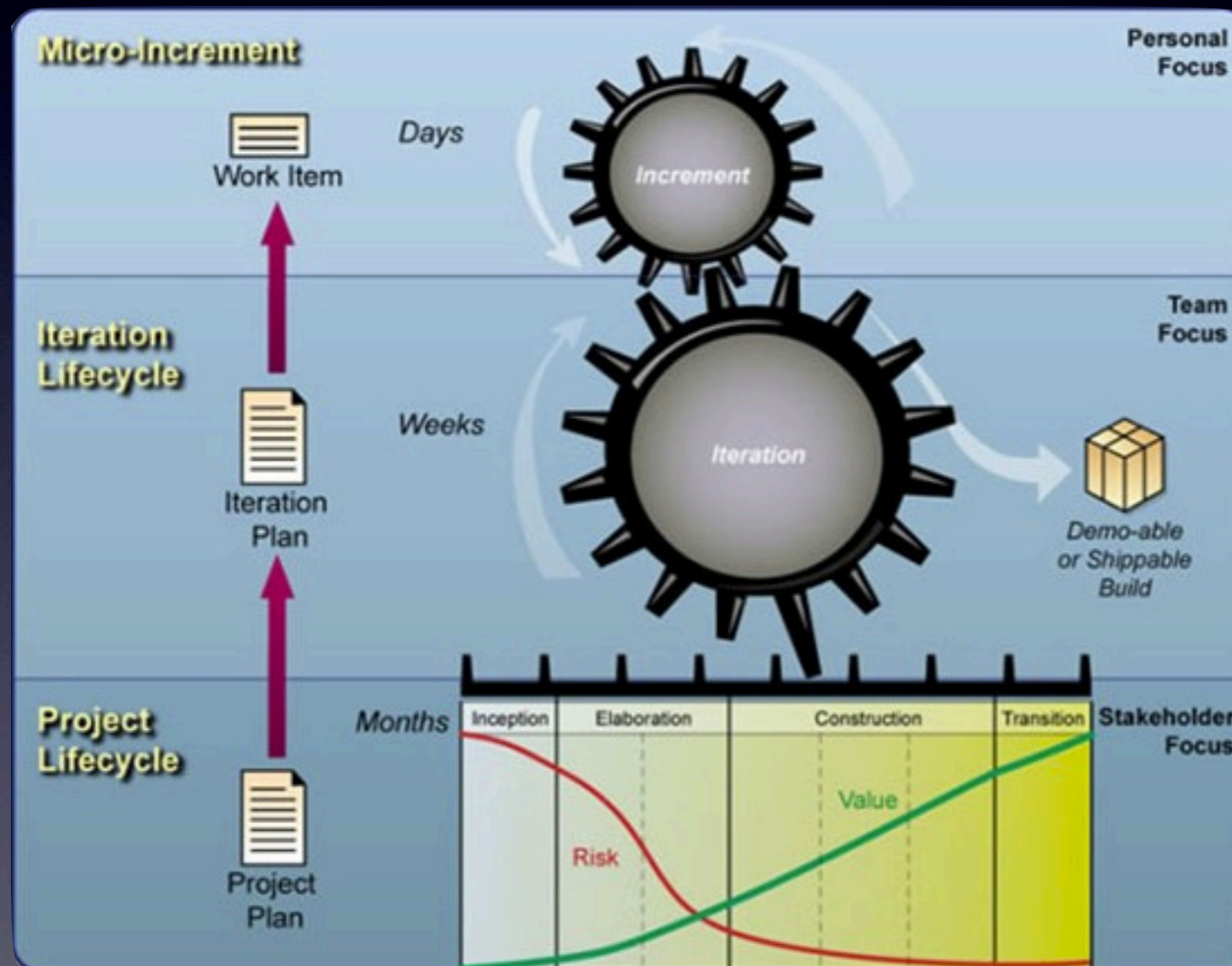
<http://www.ibm.com/developerworks/rational/library/edge/08/jul08/vanVelzen/>



# OpenUP

OpenUp structures the project lifecycle into four phase iterations:

Inception, Elaboration, Construction, and Transition



## Core Principles

**Collaborate to align interests and share understanding**

**Balance competing priorities to maximize stakeholder value**

**Focus on the architecture early to minimize risks and organize development.**

**Evolve to continuously obtain feedback and improve**

<http://www.eclipse.org/epf/general/OpenUP.pdf>

# Agile Development with Scrum



# What is scrum ?

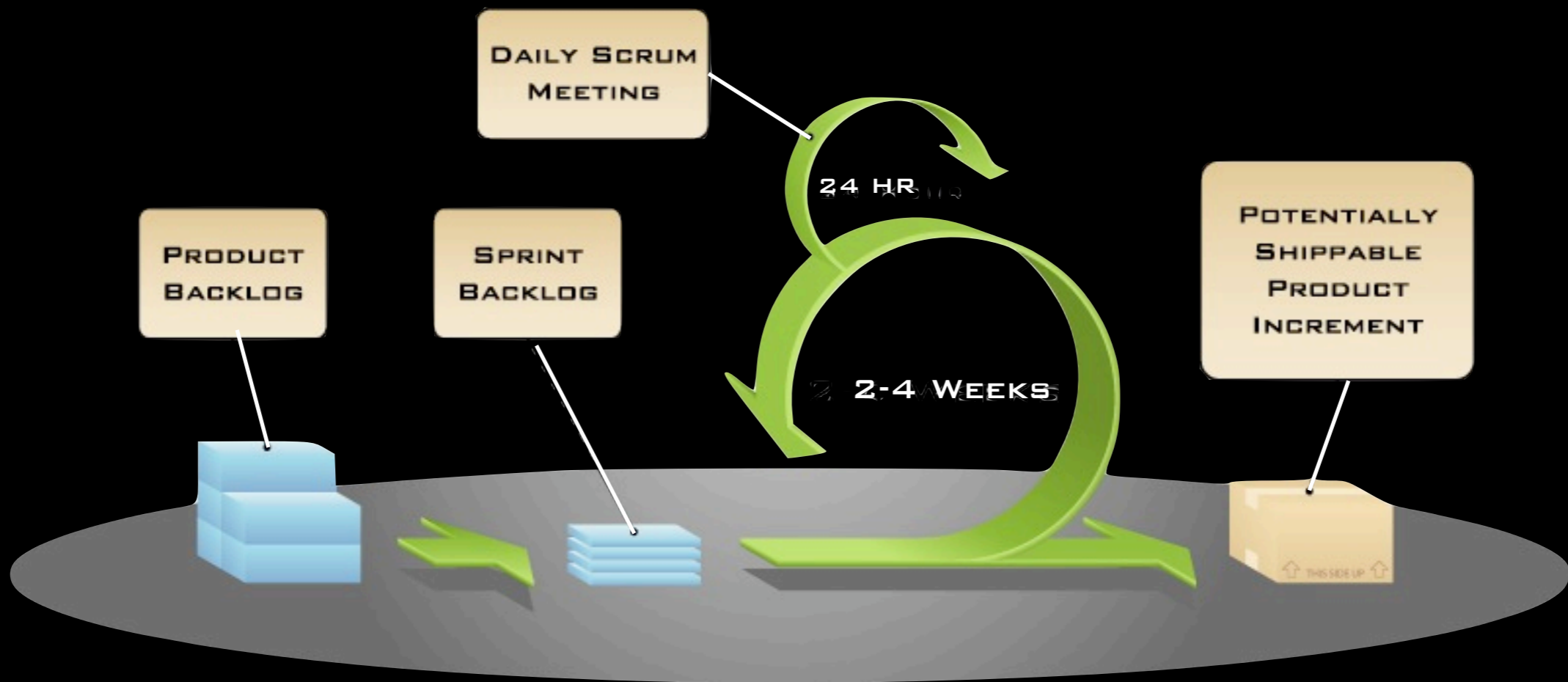


**Fig. 6: The Scrum**

The scrum is a pushing contest between two teams of eight players. The ball is fed in from the side by the scrumhalf and the team that drives their opponent backwards and hooks the ball out past the last foot of their own scrum wins possession. A scrum down is used to restart play after certain infractions such as a “knock on” or a forward pass.

<http://www.oberlin.edu/stuorg/womrugby>





## ROLES

PRODUCT OWNER  
 SCRUM MASTER  
 TEAM MEMBER

## CEREMONIES

SPRINT PLANNING  
 DAILY SCRUM  
 SPRINT REVIEW  
 SPRINT RETROSPECTIVE

## ARTIFACTS

PRODUCT BACKLOG  
 SPRINT BACKLOG

# Iteration Exit ?

- Exit Check List
- Done, Done, Done
- Stakeholder Demo/Review
- Time Boxed Iteration

**What if we can't finish all the content planned for this iteration ?**

# Team Collaboration



# The Value of Time Machine



# Version Control

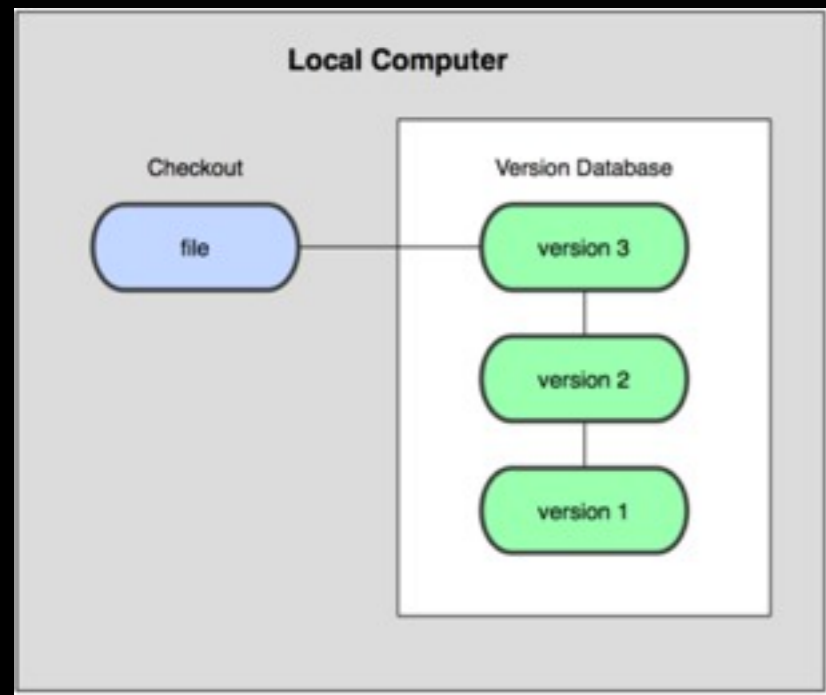
- Why Version Control ?
  - Backup and Restore
  - Source code sharing and synchronization
  - Merges
  - Branches

It is the very first thing you need to start a project

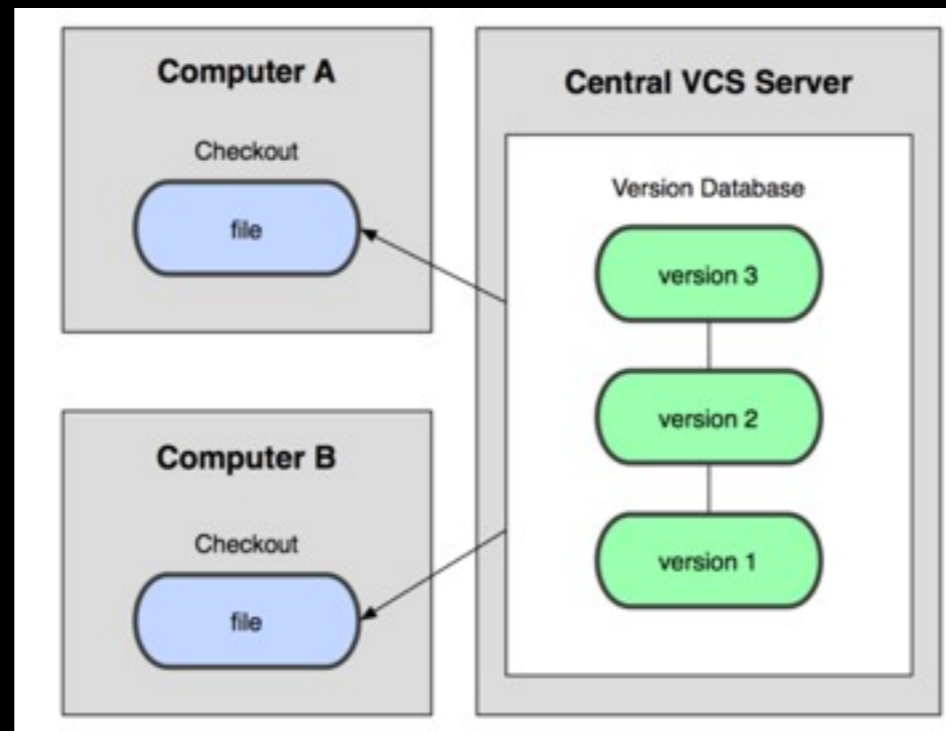
# Version Control

- Tools available
  - CVS
  - Subversion
  - GIT
  - Mercurial
  - ClearCase
  - ...

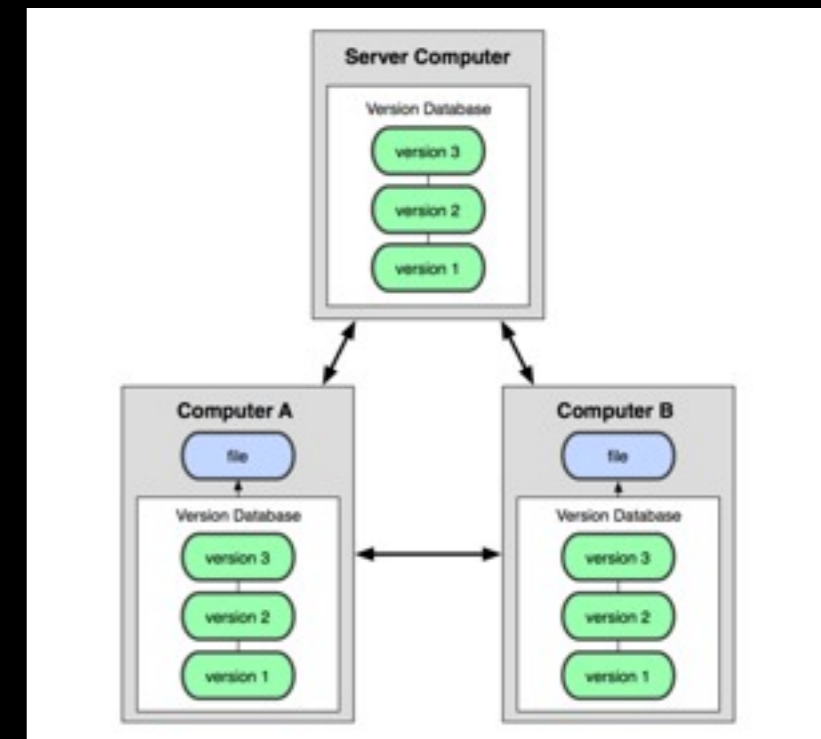
# Different Topologies



Local



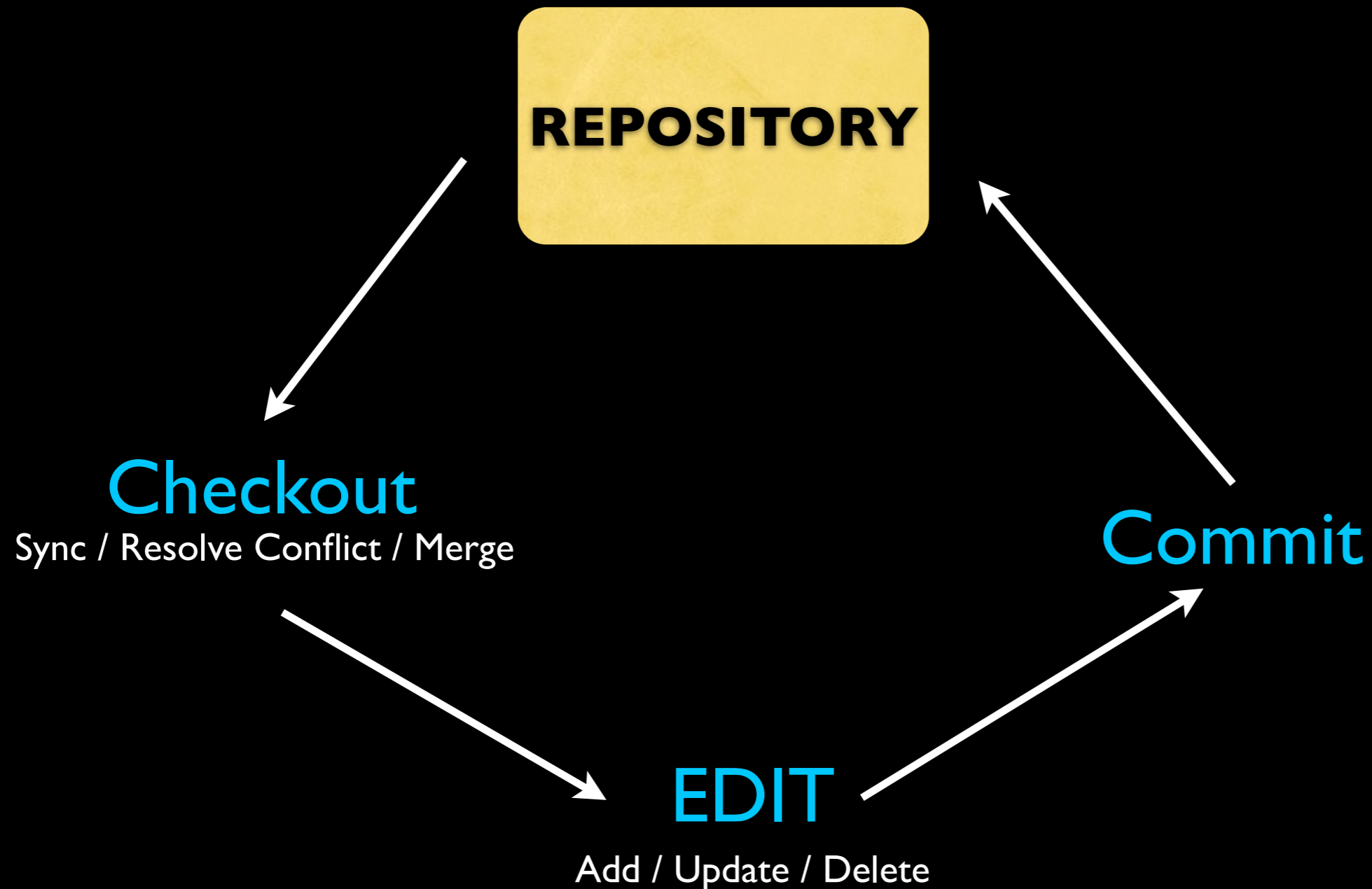
Centralized



Distributed



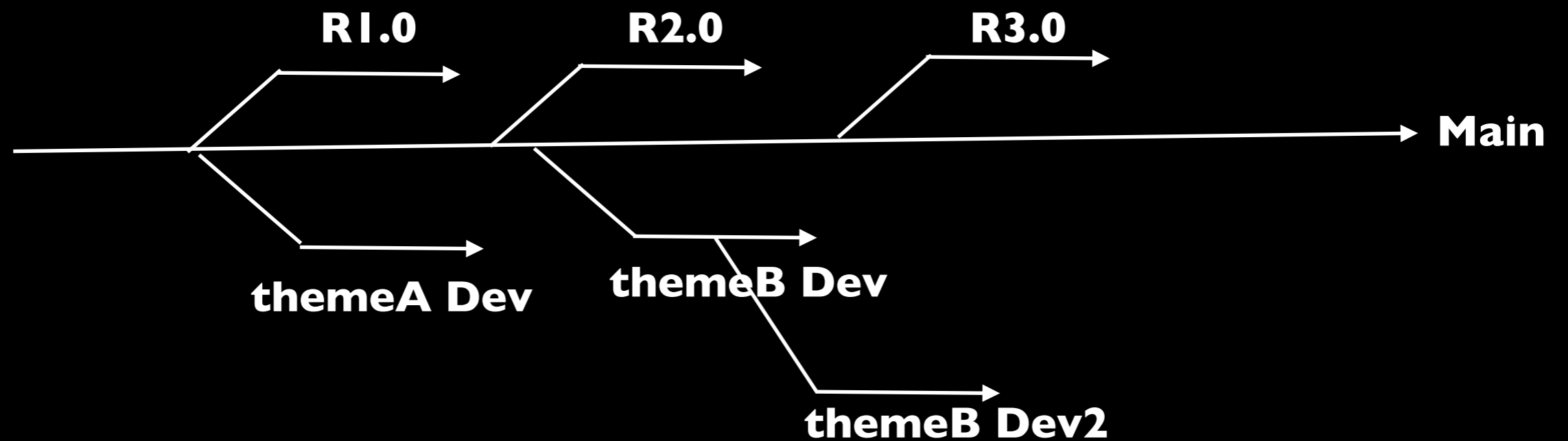
# Common Usage Pattern



# Basic Principles

- No build breaks
- Review your changes before submit
- Each submit should only deal with one task
- Make your submit comment clear

# Common Branching Strategies





# Issue Tracking System

- A centralized place to track all the “issues” that need to be followed up
  - Todos
  - Bugs
  - PMR
- The system maintain the life cycle of the issue, and provide the facilities for team members to collaborate on these issues

# Rational Team Concert

# What is RTC ?

- A collaboration framework that includes
  - Project Planning
  - Requirement Management
  - Issue Tracking
  - Version Control
  - Continuous Integration

# MEMBER



**Profile**

**Availability**

**Preference**



# TEAM



**Team Members**  
**Development Line**  
**Process**

# PROJECT



**Teams**

**Release**

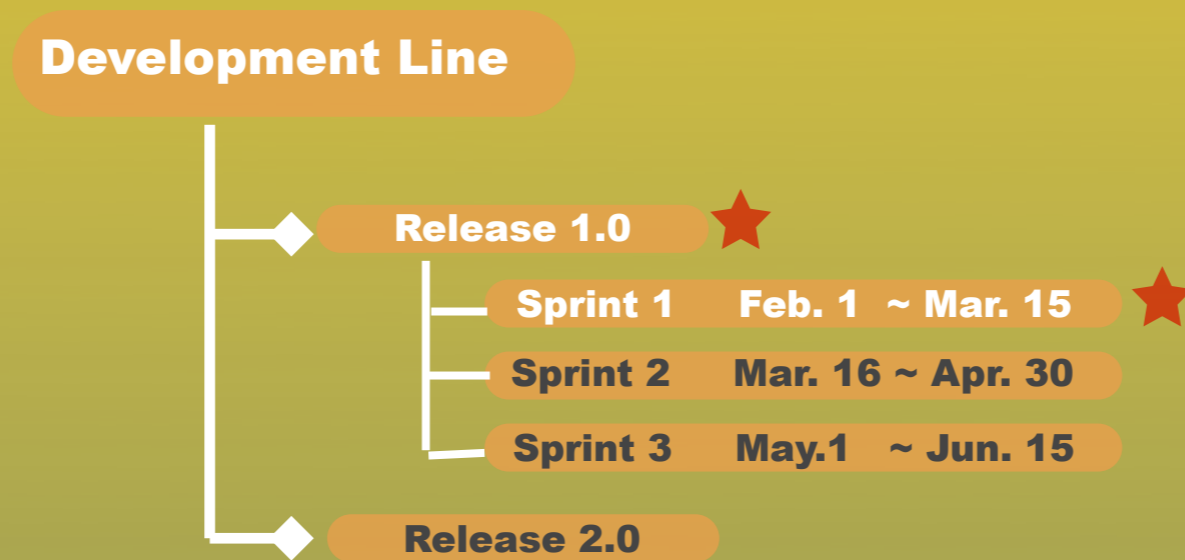
**Process**



# Process

<b>Naming</b>	<b>Product Backlog , Sprint</b>
<b>Roles</b>	<b>Scrum Master, Product Owner</b>
<b>Permissions</b>	<b>Only Scrum Mater Can create iteration plan</b>
<b>Precondition</b>	<b>All code must be code reviewed before checkin</b>
<b>Follow up</b>	<b>When bug fixed, QA will be notified to verify the fix</b>

# Release



# WORK ITEM

- Each Work item will be associated with an **estimate**
- Along with team member's available resource, the progress and loading of each individual/team/iteration plan could be transparently tracked
- Supported notification mechanisms : mails , event views, RSS , pop-up



4.4 m1 Apr 19, 2008 - May 19, 2008		
Name	Team Area	Progress
JUnit Plan	JUnit Team	79 / 79   - h <input type="text" value="No Open Work Estimated"/> 0%

4.4 m2 May 19, 2008 - Jun 18, 2008		
Name	Team Area	Progress
JUnit Plan	JUnit Team	13 / 186   -47 h <input type="text" value="75%"/>

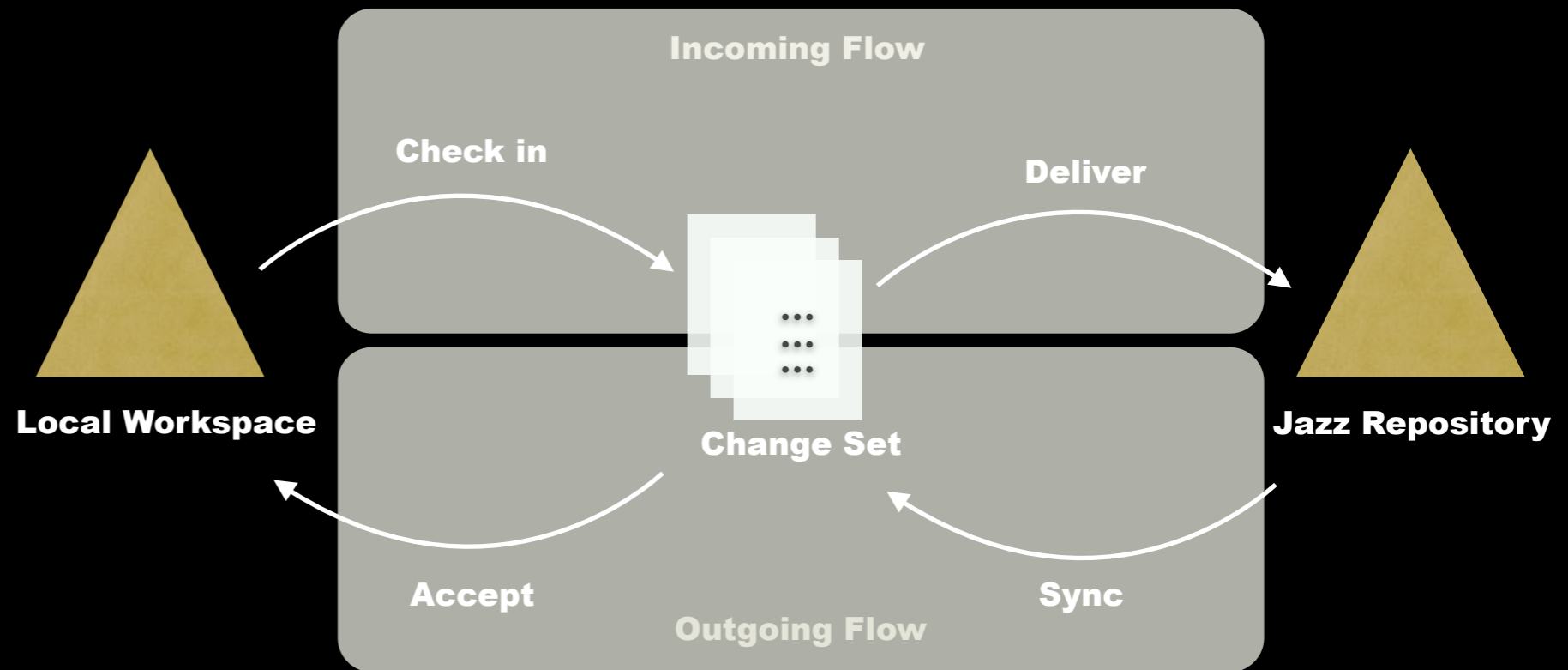
4.4 May 19, 2008 - no end date		
Name	Team Area	Progress
JUnit Release Plan	JUnit Team	0 / 0 h <input type="text"/>

	<b>Bill Cassavelli</b> Closed Items: 8   Open Items: 0	<input type="text" value="Progress: 25 / 25   - h"/> Estimated: -
	<b>Jason Mitchell</b> Closed Items: 1   Open Items: 0	<input type="text" value="Progress: 0 / 0   - h"/> Estimated: -
	<b>Markus Kent</b> Closed Items: 13   Open Items: 1	<input type="text" value="No Open Work Estimated"/> Estimated: 0%



# VERSION CONTROL

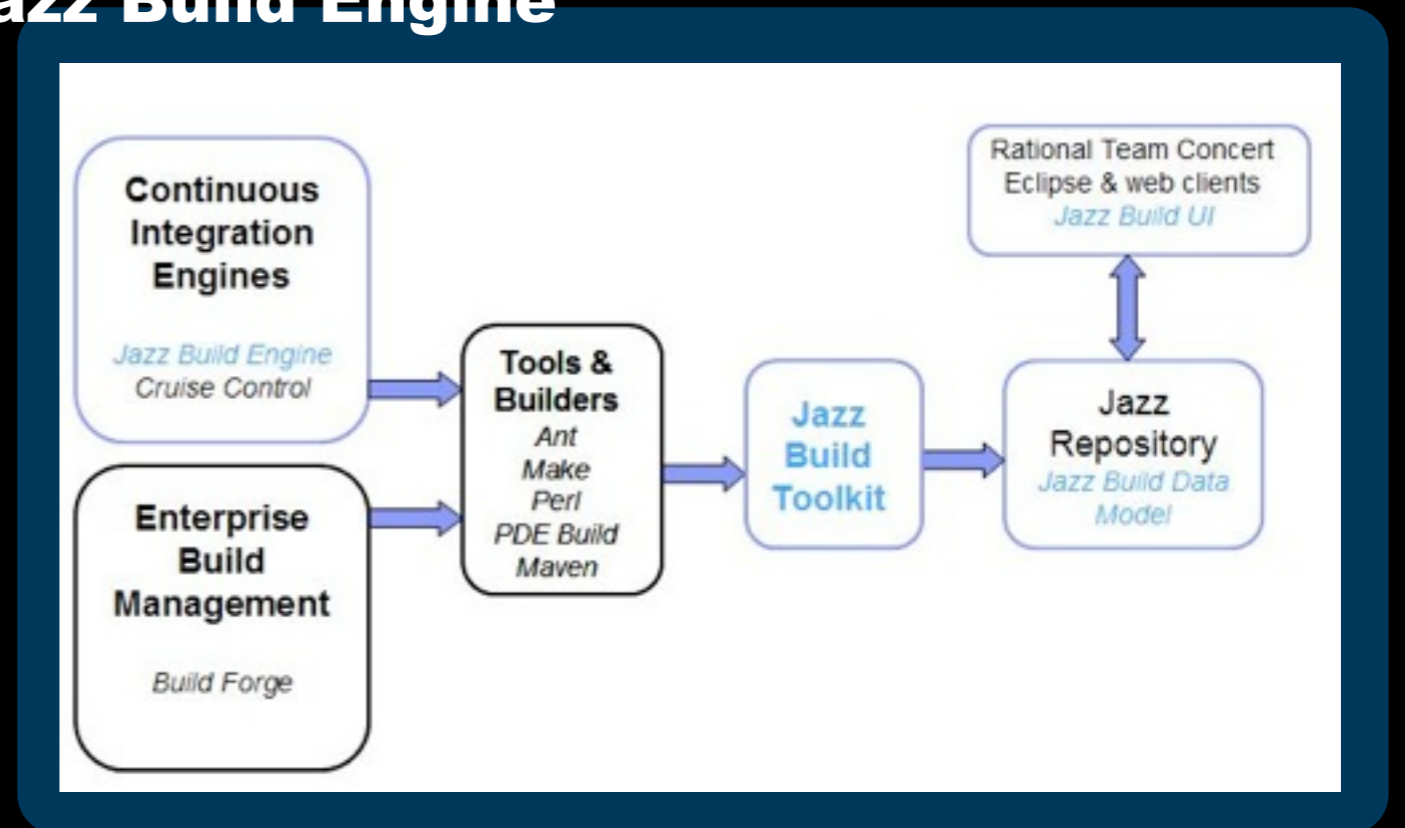
- Stream
- Component
- Change Set
- Baseline
- Snapshot



# CONTINUOUS INTEGRATION

- **Build Scheduling**
- **Build Progress monitoring**
- **Build Alert**
- **Build Result Viewing**
- **Regression Testing**
- **Coverage Testing**
- **Linkage with other artifacts**
  - **Work items**
  - **Change Sets**

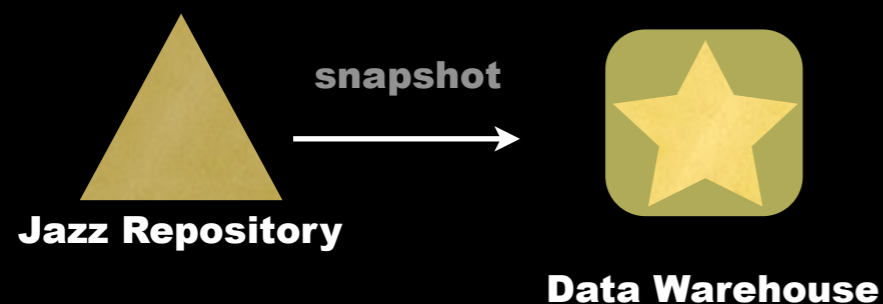
## Jazz Build Engine



# REPORT

**Various project artifacts make it expensive to create report on-the-fly**

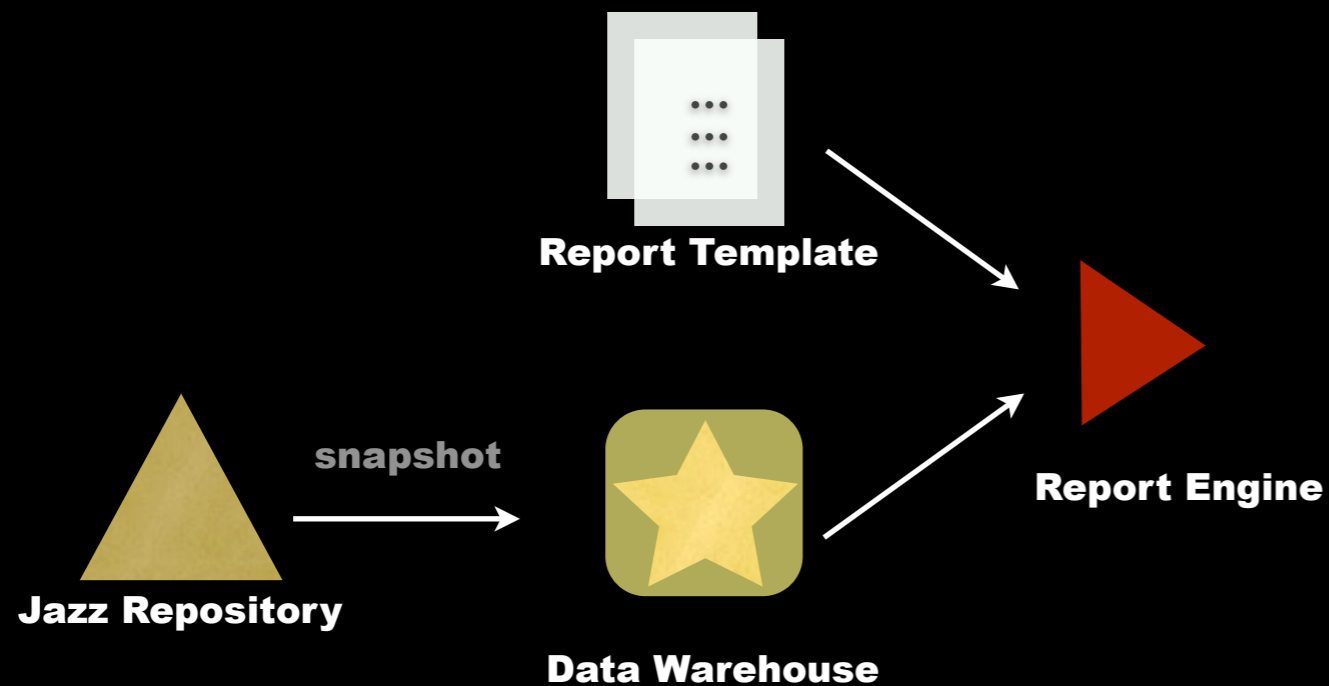
**A **data warehouse** is a storage facility for read-only, historical and aggregated data.**



# REPORT

**Various project artifacts make it expensive to create report on-the-fly**

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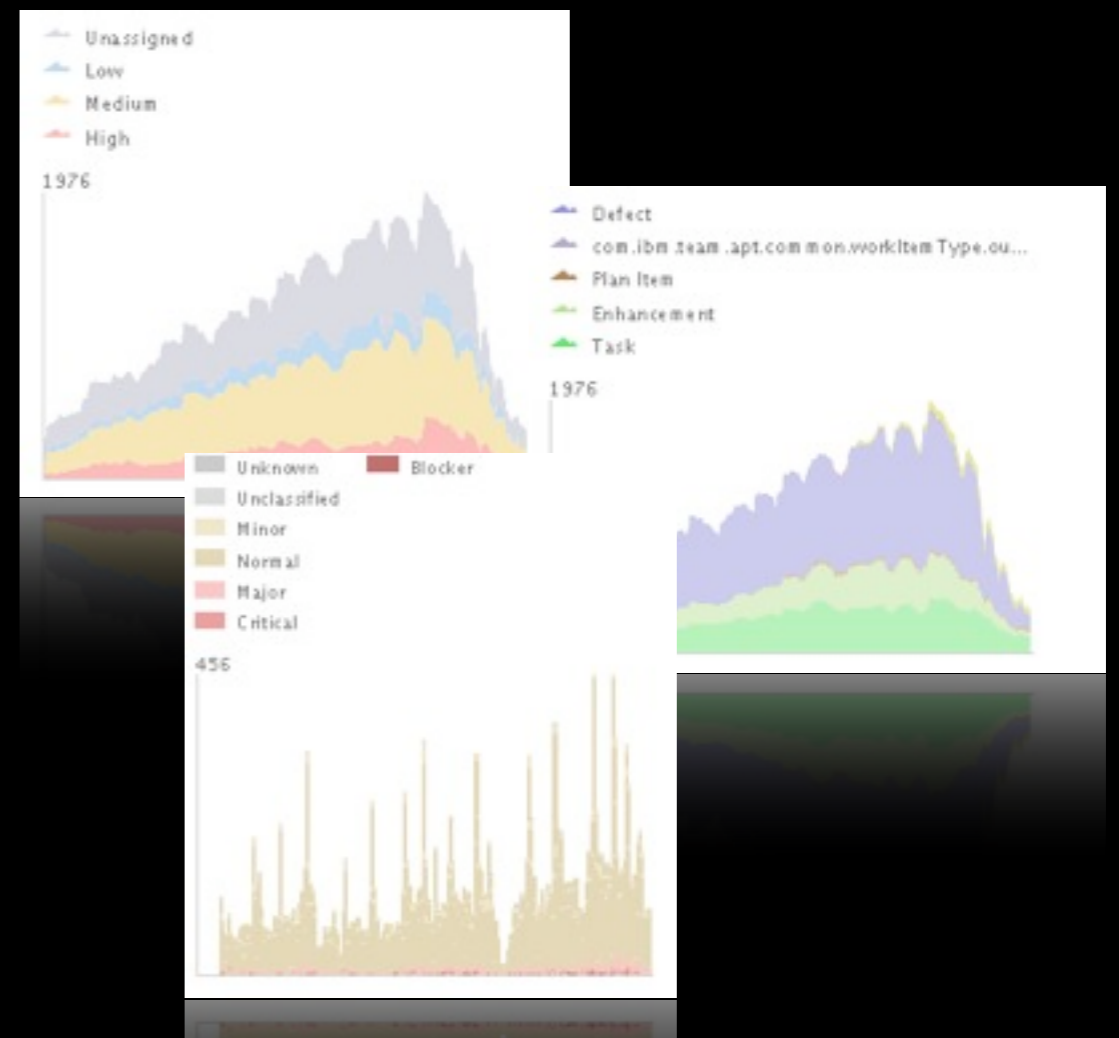
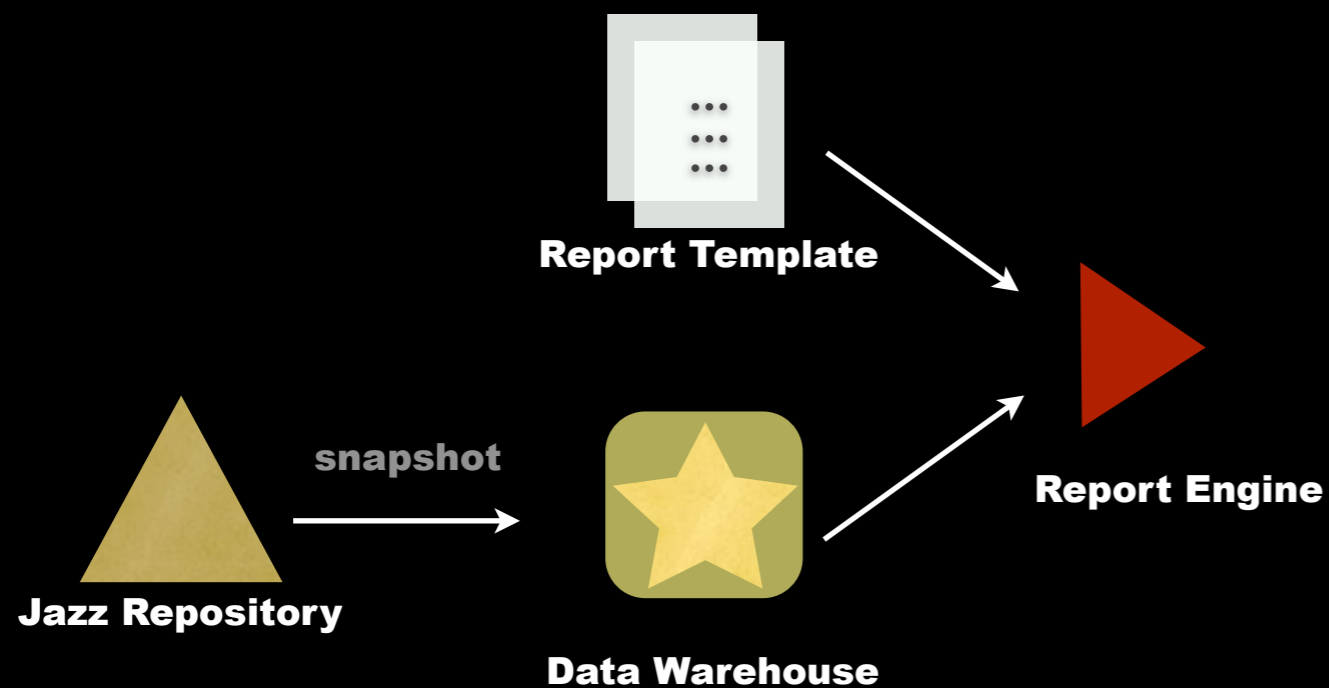




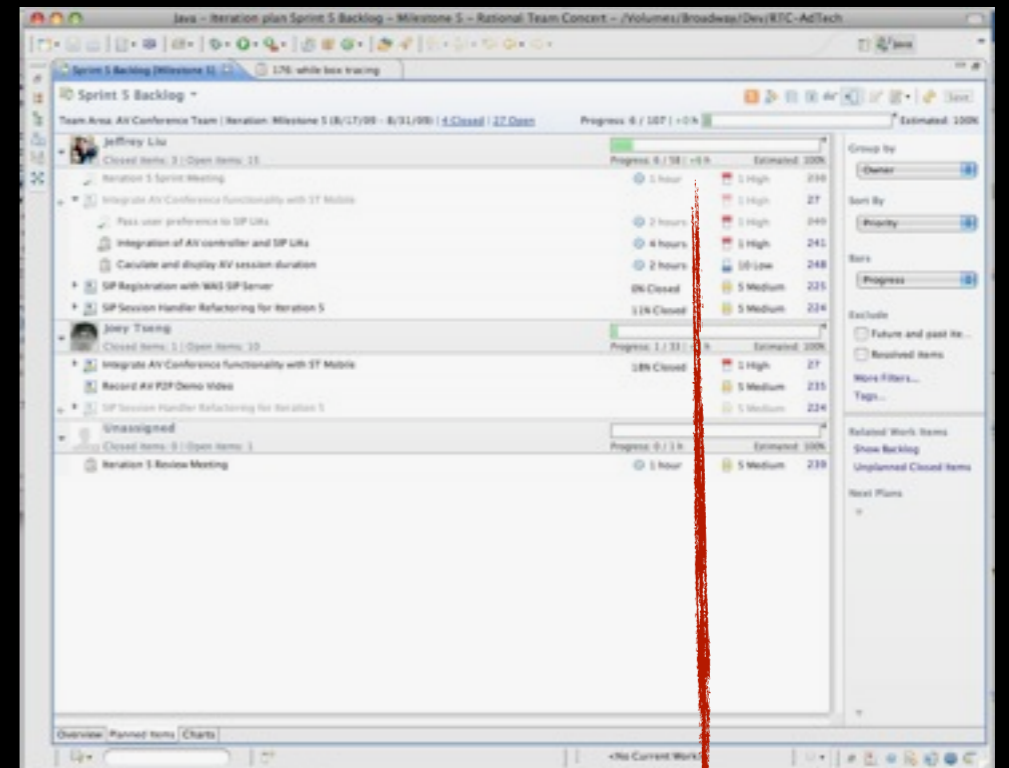
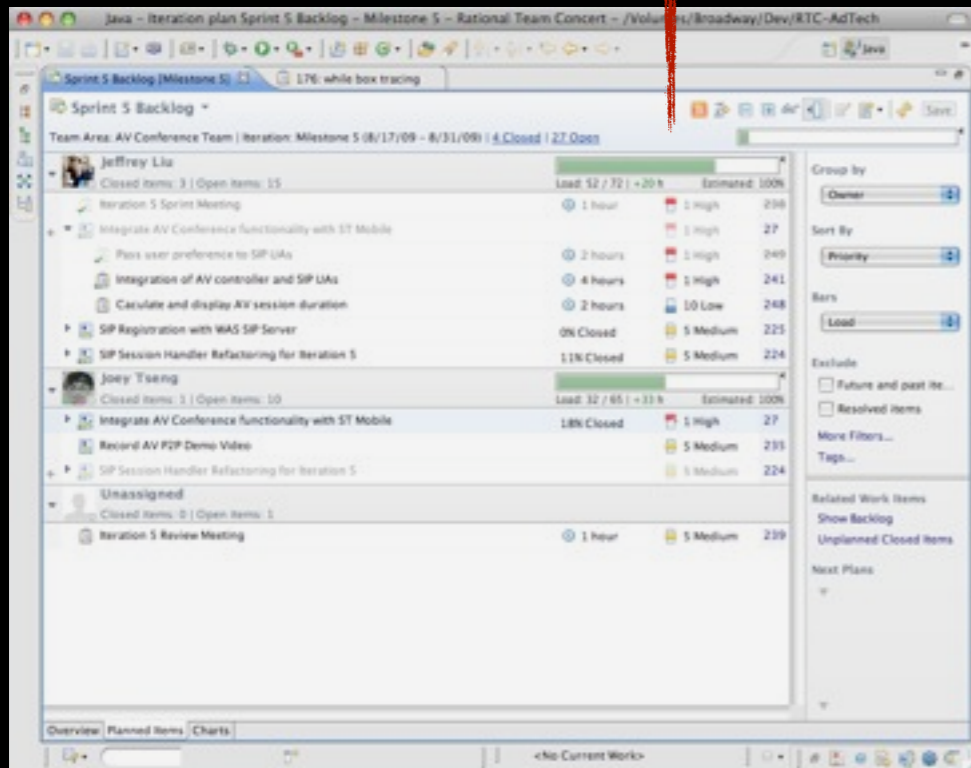
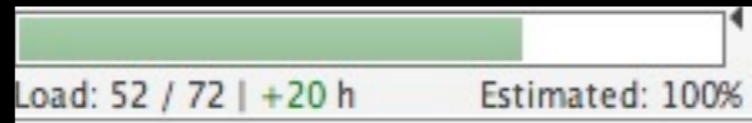
# REPORT

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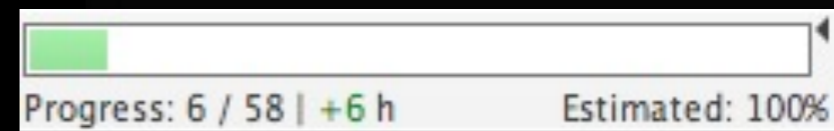
A **data warehouse** is a storage facility for read-only, historical and aggregated data.



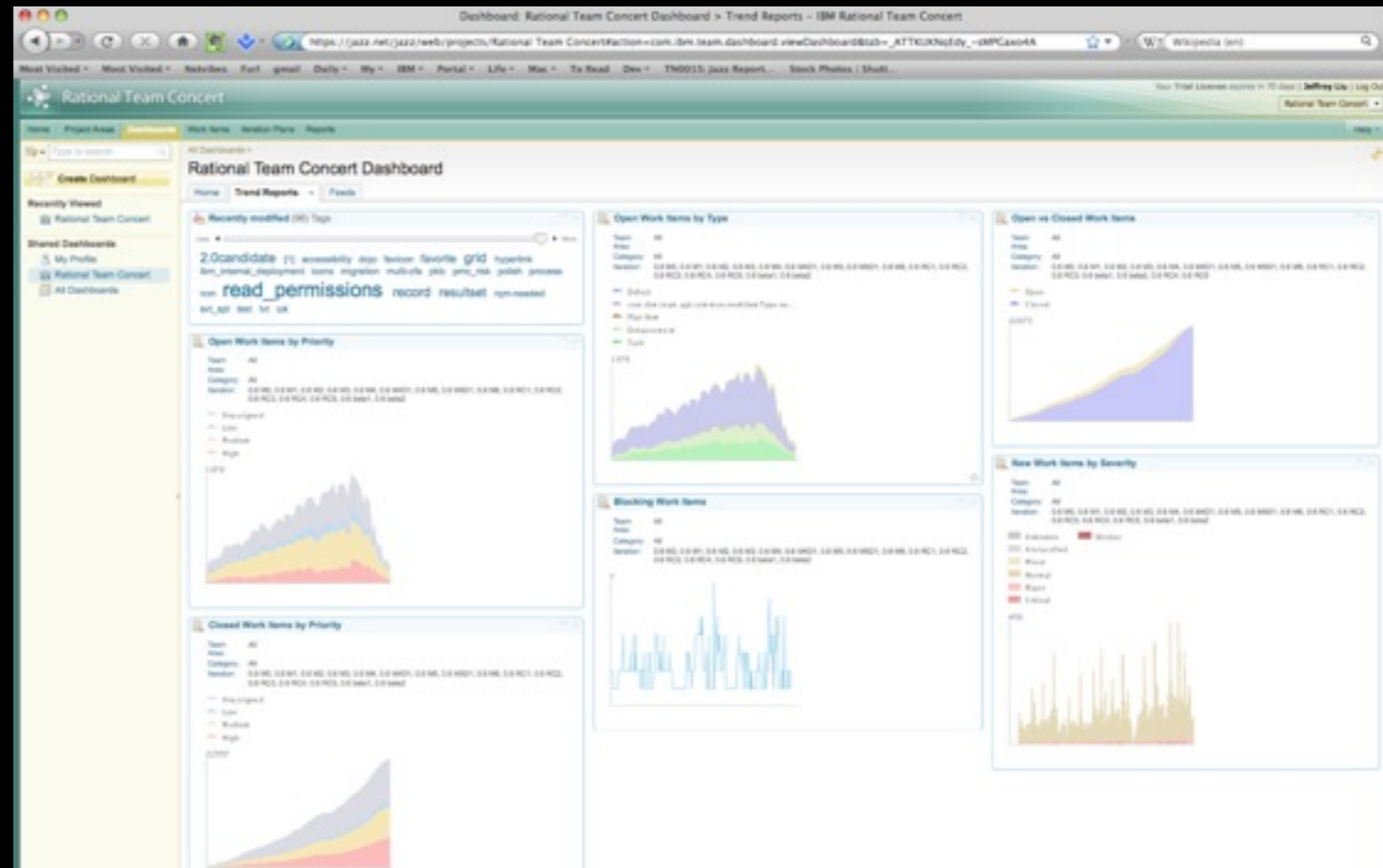
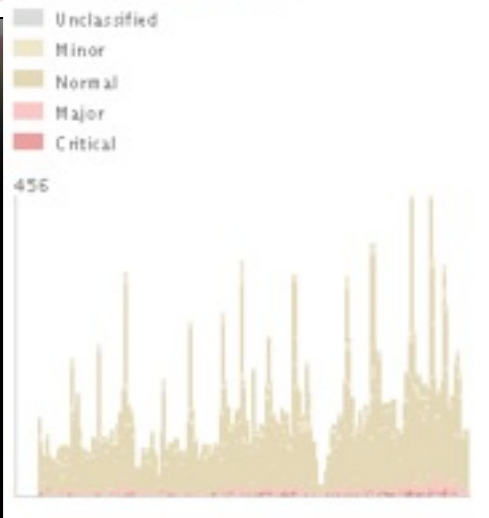
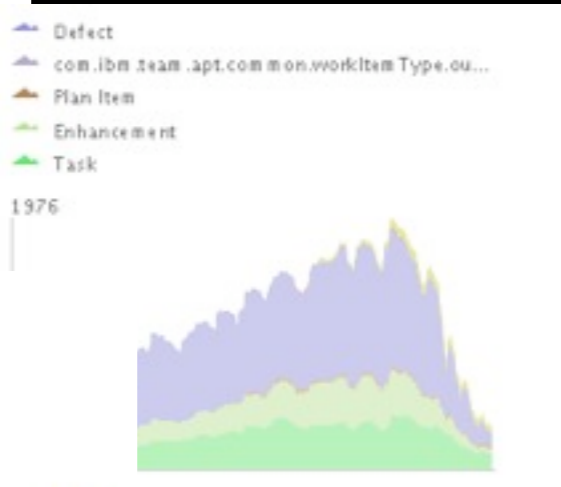
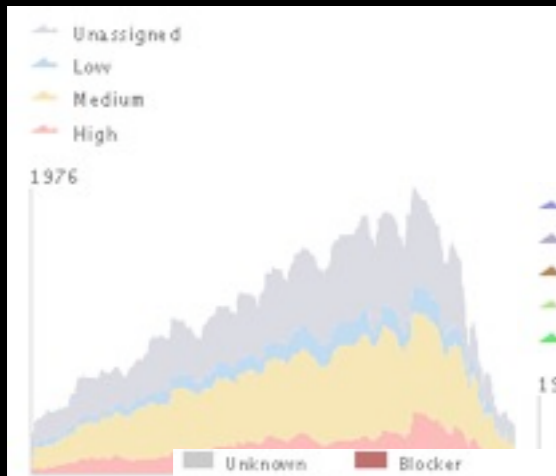
# Work Load



# Work Progress



# Development Velocity



# Other Tools ?

- Basecamp : Online Team Collaboration tool
- Trac : Open-Source Collaboration tool
- Dropbox : Cloud-based file sharing system
- Evernote : Cloud-based notes system
- ...



# Continuous Integration



# Life without CI ...

- Hard to pinpoint the root cause of failures
- Depending on project natures, it might take significant effort for integration
- It increase the testing efforts
- Low release quality

# Practices of CI

- Single Source
- Automate the build
- Make your build self-testing
- Every commit should be built
- The status of the build and test is available to everyone in the team

# Introduction to CruiseControl



- An open-sourced CI framework for continuous build process
- Supports most of the version control systems (Subversion, Perforce ...)
- Supports many build tools (ANT, Maven)
- Support UT frameworks (e.g. JUNIT)
- Various notification delivery channels (RSS, email, Blogs)



# RTC Build History

Work Items - 20110928-0332 - Rational Team Concert

File Edit Navigate Search Project Run Window Help

Team Team Projec My Wo Team

20110928-0332

### Build Trunk Integration MCP7 build express - 9005 20110928-0332

✓ **Completed**

Duration: 1 hour, 30 minutes, 51 seconds  
 Start Time: September 28, 2011 3:32:17 PM  
 Completed: September 28, 2011 5:03:08 PM

Status Trend:

Reported Work Items  
 Work items reported against this build to help stabilize it

- None reported against this build
- [Create a new work item](#)
- [Associate an existing work item](#)

Contribution Summary

- Changes: [Show changes](#)
- Downloads: [19 downloads](#)
- Logs: [7 logs](#)
- Repository Workspace: [Trunk Integration MCP7 express 9005 build workspace](#)
- Snapshot: [Trunk Integration MCP7 build express - 9005\\_20110928-0332](#)
- Tests: [293 tests, 0 failures, 0 errors](#)
- Work items: [1 included in build](#)

General Information

- Requested by: (scheduled build)
- Build Definition: [Trunk Integration MCP7 build express](#)
- Build Engine: [build2](#)
- Build History: [33 builds](#)
- Tags:
- Deletion allowed

Overview Activities Tests Downloads Logs Properties

Work Items Tag Cloud Problems Team Advisor Change Explorer Pending Changes Builds History Console Repository Files Search Properties

Trunk Integration MCP7 build express - 9005 - Found 33 Builds (8093 ms)

Build	Label	Progress	Estimated Completion	Start Time	Duration
Trunk Integration MCP7 build express - 9005 (personal build by CLEMENT SU)	20110928-0629	4% (Pre-build setup)	in 1 hour and 17 minu...	September 28, 2011 6:29:40 PM	23 seconds
Trunk Integration MCP7 build express - 9005 (personal build by Robert D. Callaway)	20110928-0628	8% (Fetching files)	in 1 hour and 16 minu...	September 28, 2011 6:28:52 PM	1 minute, 11 secc
Trunk Integration MCP7 build express - 9005	20110928-0332	Completed		September 28, 2011 3:32:17 PM	1 hour, 30 minute
Trunk Integration MCP7 build express - 9005 (personal build by Robert D. Callaway)	20110928-0144	Completed		September 28, 2011 1:44:52 PM	1 hour, 21 minute
Trunk Integration MCP7 build express - 9005 (personal build by CLEMENT SU)	20110928-0016	Completed		September 28, 2011 12:16:06 PM	1 hour, 29 minute

Search for ID or Text Bedrock Hub

<No Current Work>



# Build Failed

Work Items - 20110927-2042 - Rational Team Concert

File Edit Navigate Search Project Run Window Help

Team Team Projec My Wo Team

All Project and Team Areas (11 of 12 areas selected)

- 0.5.3 build
- 0.5.4 build
- 0.5.5 build
- 0.5.6 build
- 0.5.7 build
- 2.0.0 build
- 3.0.0 build - MCP6 express - 9004
- 3.0.0 build - MCP6 express - 9005
- 3.0.0 build - MCP6 with the works 9004
- 3.0.0 build - MCP6 with the works 9005
- BVT only
- Trunk Integration MCP6 build express - 9004
- Trunk Integration MCP6 build express - 9005
- Trunk Integration MCP6 build express without protected-sr
- Trunk Integration MCP6 build with the works - 9004
- Trunk Integration MCP6 build with the works - 9005
- Trunk Integration MCP7 build express - 9004
- Trunk Integration MCP7 build express - 9005
- Trunk Integration MCP7 build express - Blade
- Trunk Integration MCP7 build express without protected-sr
- Trunk Integration MCP7 build with the works - 9004
- Trunk Integration MCP7 build with the works - 9005
- VM builder - Trunk Integration MCP7 build with the works -

Enterprise Extensions

Plans

### Build Trunk Integration MCP7 build express - 9005 (personal build by CLEMENT SU) 20110927-2042

**Completed**

Duration: 1 hour, 29 minutes, 44 seconds  
Start Time: September 28, 2011 8:42:22 AM  
Completed: September 28, 2011 10:12:07 AM

Status Trend:

Contribution Summary

Downloads: [19 downloads](#)  
Logs: [7 logs](#)  
Repository Workspace: [Trunk Integration Workspace](#)  
Tests: **293 tests, 10 failures, 0 errors**

Reported Work Items

Work items reported against this build to help stabilize it.

- None reported against this build
- [Create a new work item](#)
- [Associate an existing work item](#)

General Information

Requested by: CLEMENT SU  
Build Definition: [Trunk Integration MCP7 build express - 9005](#)  
Build Engine: [build3](#)  
Build History: [34 builds](#)  
Tags:   
 Deletion allowed

Overview Activities Tests Downloads Logs Properties

Work Items Tag Cloud Problems Team Advisor Change Explorer Pending Changes Builds History Console Repository Files Search Properties

Trunk Integration MCP7 build express - 9005 - Found 33 Builds (8093 ms)

Build	Label	Progress	Estimated Completion	Start Time	Duration
Trunk Integration MCP7 build express - 9005 (personal build by Jeannie K. Hawrysz)	20110927-2114	Completed		September 28, 2011 9:14:31 AM	1 hour, 34 minutes, 5...
Trunk Integration MCP7 build express - 9005 (personal build by Jeannie K. Hawrysz)	20110927-2043	Completed		September 28, 2011 8:43:55 AM	1 hour, 35 minutes, 3...
Trunk Integration MCP7 build express - 9005 (personal build by CLEMENT SU)	20110927-2042	Completed		September 28, 2011 8:42:22 AM	1 hour, 29 minutes, 4...

Search for ID or Text Bedrock Hub

<No Current Work>



# Failed Test Cases

The screenshot shows an IDE window with the title "Build Trunk Integration MCP7 build express - 9005 (personal build by CLEMENT SU) 20110927-2042". The "JUnit Tests" panel displays a table of test results. The table has columns for Name, Tests, Failures, Errors, Time Taken, and Run ... The table shows that the test suite "FVT-onbox-JUnit-remanufacture" has 245 tests, 10 failures, and 0 errors, taking 23 m 44 s. The failed tests are listed in the "Run ..." column with red 'X' icons.

Name	Tests	Failures	Errors	Time Taken	Run ...
FVT-onbox-JUnit-remanufacture	245	10	0	23 m 44 s	
com.ibm.bedrock.fvt.suites.BedrockFvtFilteredTestSuite	245	10	0	23 m 44 s	
com.ibm.bedrock.fvt.LicenseAcceptanceCliTests	6	2	0	24 s	
testLicenseRejectSSH6	1	1	0	11 ms	5
testLicenseAcceptSSH6	1	1	0	2 ms	6
com.ibm.bedrock.fvt.FileGetPutCliTests	36	8	0	3 m 17 s	
testGetFileSCP6	1	1	0	2 ms	14

Details

Class name:

Method:

Time taken:

Overview Activities Tests Downloads Logs Properties

# Build Logs

The screenshot displays a web-based build system interface. The top window shows a project titled "Build Trunk Integration MCP7 build express - 9005 (personal build by CLEMENT SU) 20110927-2042". Below this, a "Log Files" section contains a table with columns for "File Name", "Description", and "File Size".

File Name	Description	File Size
Build		
comple-3.9.7.0-mcp7-REL-20110927-2042.log	...Compiling lo	
virtual-20110927-2042.log	...Virtual imag	
Test		
beam-20110927-2042.log	Performing BEA	
bvtRun-20110927-2042.log	BVT Client serial	
smoketest-prepped-REL-20110927-2042.log	...Smoke test	
unittest-3.9.7.0-mcp7-REL-20110927-2042.log	...Running uni	
<no component>		
build-1317170540945.log	Full Build Log	

The bottom window shows the content of the selected log file, "build-1317170540945.log". The log output is as follows:

```
2011-09-27 20:42:21 [Jazz build engine] running on host: bedrock.rtp.raleigh.ibm.com
2011-09-27 20:42:21 [Jazz build engine] Should build occur?
2011-09-27 20:42:21 [Jazz build engine] Yes: Always build a user initiated request.
2011-09-27 20:42:23 [Jazz build engine] Invoking pre-build participant "com.ibm.team.build.jazzscm"
2011-09-27 20:42:27 [Jazz build engine] Deleting fetch destination "/home/build3/jazz/buildsystem/buildengine/
2011-09-27 20:42:44 [Jazz build engine] Fetching files to fetch destination "/home/build3/jazz/buildsystem/bui
2011-09-27 20:45:02 [Jazz build engine] Invoking build participant "com.ibm.team.build.ant"
Buildfile: /home/build3/jazz/buildsystem/buildengine/eclipse/workspace/src/rtc-build.xml
[echo] bvt.pxeFirmwareFilename: build3.tar.gz

buildall:
[echo] bvt.pxeFirmwareFilename: build3.tar.gz

setup:
[echo] SDK version: 3.9.7.0
[echo] buildDefinitionId: Trunk Integration MCP7 build express - 9005
[echo] Personal build: [no]
[echo] buildLabel/RTCBUILDID: 20110927-2042
[echo] buildResultUUID: _revswOlqEeC8LpMKdz5Pgw
[echo] build userid: build3
[echo] BRDEVHOME: /home/build3/jazz/buildsystem/buildengine/eclipse/workspace
[echo] BRHOME: /home/build3/bedrock-sdk
[echo] MCP_CACHE_DIR: /home/mcp-cache-dir
[echo] JAVA_HOME (OK if unset): [unset]
[echo] mcp.env: mcp7
[echo] mcp64.env: mcp7_64
[echo] Ant version: Apache Ant version 1.7.1 compiled on June 27 2008
[echo] build cache hostname: bedrock.rtp.raleigh.ibm.com
```

# Summary

- Before You Start your project
  - Decide the development process that works for your team
  - Identify the tools to use for team collaboration
    - Version Control, Issue Tracking, Information Sharing, Todo...
  - Identify your build tools, unit testing framework, and setup your continuous integration system.
  - Setup the development disciplines



# Questions

