



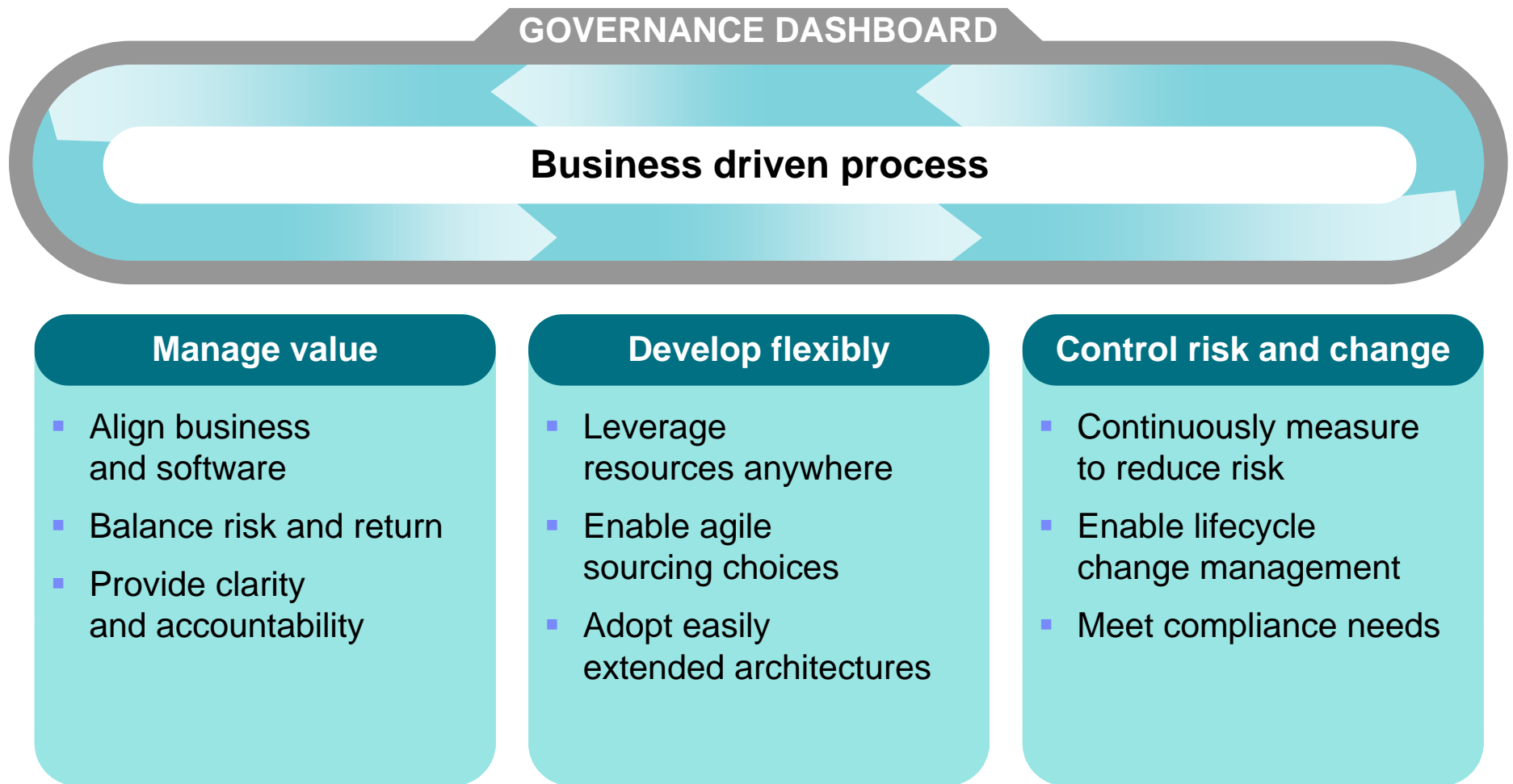
Software Development Best Practices

The 7 Attributes of a Good Software Configuration Management System

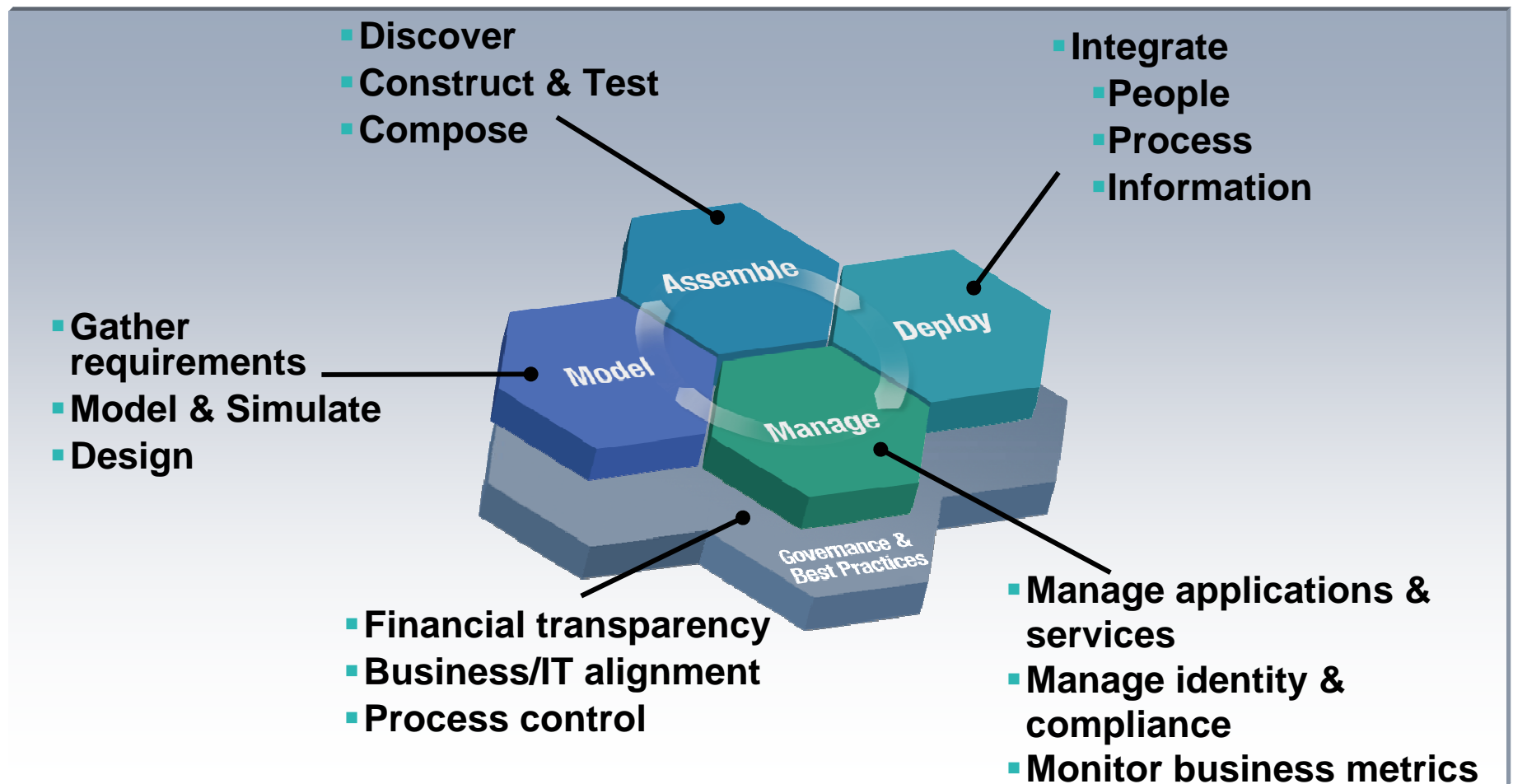
Robert Kennedy
IBM Rational software



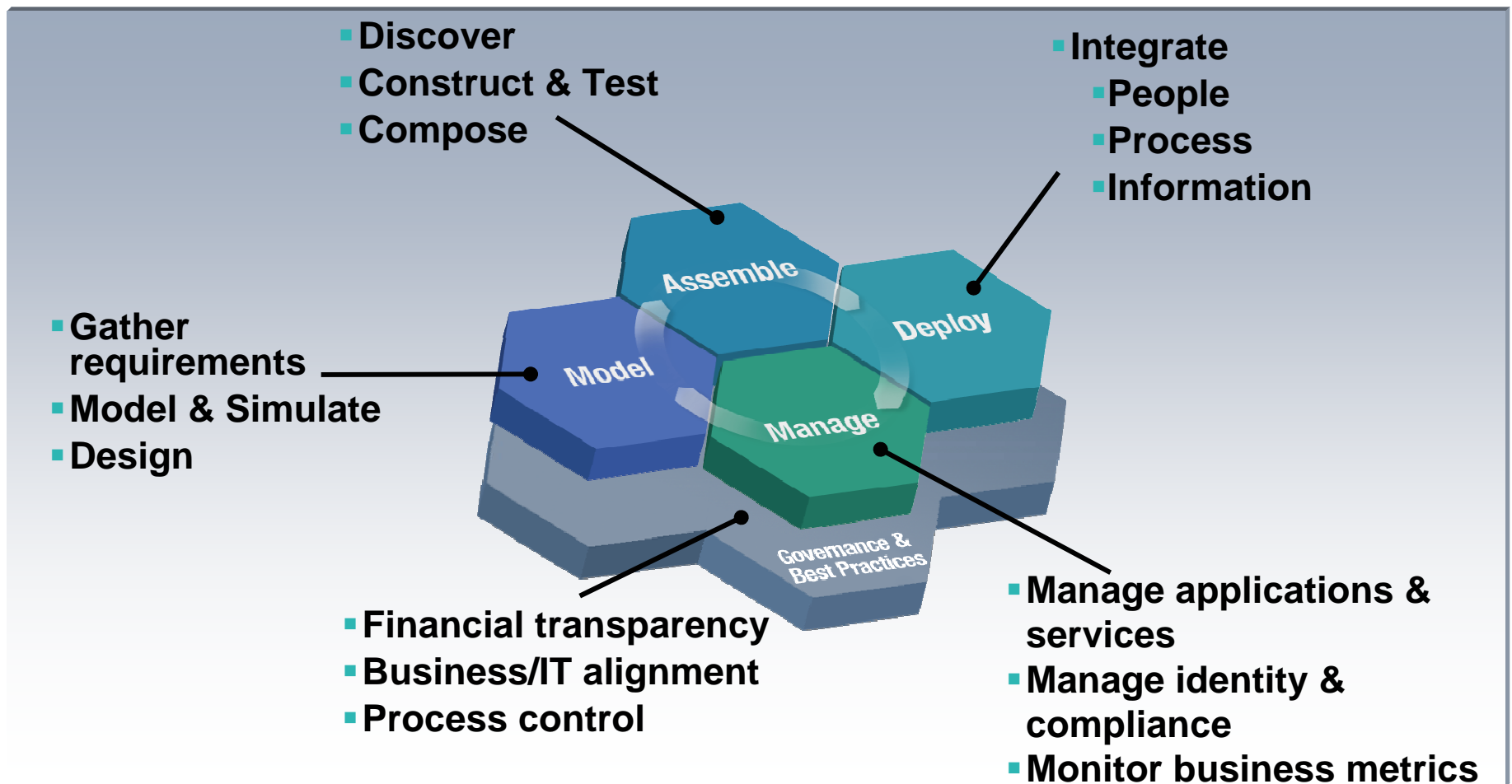
Benefits of Business Driven Development



The SOA Lifecycle



Governance is key to a successful transition to SOA



Why should you care about good SCM?

Good Software Configuration Management yields a positive Return on Investment



The Fundamentals

Know what you want

- Not understanding what you want guarantees failure
 - ▶ What is this Software Configuration Management (SCM) thing?
 - “[SCM] is a software engineering discipline comprising the tools and techniques (process or methodology) that a company uses to manage change to its software assets” – Brian White
 - *SCM is how you control the evolution of a software project.*



“If you don’t know where you are going, you don’t know when you’ve arrived.”



The Fundamentals

Tools force process

- We've seen organizations say they implement [good] CM processes because they have a tool like X or whatever.
- When we interview the practitioner's it's clear they haven't got a clue and are using the tool in an ad-hoc manner.
- On the other hand, we've done a CMMI Class B appraisal on an organizations using [tools] Y and Z linked together, and while they had made no attempt to do anything related to the CMMI prior to the appraisal, it was clear that their use of the tools was following a process, the tools were tightly integrated, and they met almost all of the CM requirements (they missed a few of the generic practices)...



The Fundamentals

What is it that you need?

- Fuzzy definitions lead to failure
- Approach from a requirements perspective
 - ▶ Project Management
 - Protect the project
 - Know where you're going
 - Know where you are
 - Know when you've arrived
 - ▶ Development
 - Know what you're supposed to be doing
 - Be able to work on your tasks
 - Keep track of what you've done
 - Deliver stable work to the Project



What Does “Good SCM” Mean?

1. Safety
2. Stability
3. Control
4. Reproducibility
5. Auditability
6. Traceability
7. Scalability



What Does “Good SCM” Mean?

1. Safety
2. Stability
3. Control
4. Reproducibility
5. Auditability
6. Traceability
7. Scalability



Safety

Does one or more of these apply to you?

- ▶ Your repositories are prone to corruption
- ▶ Developers have the ability to directly manipulate your code repositories
- ▶ Staff members can make changes that bypass the audit process
- ▶ You have no, or limited, means to secure your repositories against unauthorized access or modification



The 7 Attributes of a Good SCM System

1. Safety

- The system must provide fundamental protection against a catastrophe
 - ▶ A narrow window for “catastrophe”
- Users shouldn’t be able to damage the system
 - ▶ Reasonable procedures for doing reasonable things
- The system must provide protection against unauthorized access and/or manipulation of data under control of the system



Business Value: Protection of key business assets.

What does it mean to Manage Change?

1. Safety
2. **Stability**
3. Control
4. Reproducibility
5. Auditability
6. Traceability
7. Scalability



Stability

Does one or more of these apply to you?

- ▶ Developers are afraid to check in changes to their code for fear of destabilizing the project or other developers
- ▶ Developers are afraid that someone else will check-in their code
- ▶ Developers are afraid to update their workspace because they will need to integrate everyone else's changes with their code all at once
- ▶ Developers are afraid to update their workspace because they have no confidence that what they will get has been tested.
- ▶ Developers have no confidence that what worked in their workspace when they left work yesterday evening will still work when they return this morning



The 7 Attributes of a Good SCM System

2. Stability

- The system must be able to provide stable developer/user work areas
 - ▶ A developer must be able to leave work on a Wednesday evening with an assurance that when they come back on Thursday morning (or any other morning), the data in their environment will not have shifted out from under them without their consent

"No one likes surprises in a software project"

- The system must provide the individual user control over when they introduce instability into their environment

Business Value:

Developer and Team productivity improve dramatically

Better predictability for project deliveries

- The system must provide the individual user control over what specific points of instability they want to introduce into their environment



What does it mean to Manage Change?

1. Safety
2. Stability
3. **Control**
4. Reproducibility
5. Auditability
6. Traceability
7. Scalability



Control

Does one or more of these apply to you?

- ▶ Developers have no way of working on the same artifacts at the same time as their peers
 - Developers have no way of managing conflicts introduced by working on the same artifacts at the same time as their peers
- ▶ Developers have no way of knowing all the activities they are currently working on
- ▶ Developers have no way of delivering to the project only those activities of theirs that are stable or complete
- ▶ Developers can't remember all of the files they worked on to fix a bug.



The 7 Attributes of a Good SCM System

3. Control

- The system must be able to provide constructs to enforce the *appropriate* measure of control of the flow of work for a project
- The system must provide constructs to allow extension and customization of built-in controls
- The system must be able to provide different controls and different flows of work for different projects
- The system must provide useful information from controlled processes



Business Value:

Controlled development enables automated project tracking to achieve the desired result

What does it mean to Manage Change?

1. Safety
2. Stability
3. Control
4. **Reproducibility**
5. Traceability
6. Auditability
7. Scalability



Reproducibility

Does one or more of these apply to you?

- ▶ You have no way of rearranging your source code to make sense
 - You can't improve your build system because you can't work on it without making current development unbuildable
- ▶ You can't fix a bug in a prior release and keep it independent from other releases
- ▶ You use the "backup to tape" method to ensure that you can reproduce the last release
 - You can't reproduce a release that wasn't "backed up to tape"
- ▶ You can't reproduce your system as it was at an intermediate stable point
- ▶ You have clients running old versions of your software that you need to support.



The 7 Attributes of a Good SCM System

4. Reproducibility

- The system must be able to reconstruct the configuration of files, directories and namespace for specific “important” points in a project
- *“If you can't build today, the thing you built yesterday, you haven't tested it.”*
- The system must be able to reconstruct the configuration of files, directories and namespace as of a specific stable point in (past) time
- The system must allow development to occur based on one of the configurations specified above.



Business Value:

Better Quality

Reduced cost of support



What does it mean to Manage Change?

1. Safety
2. Stability
3. Control
4. Reproducibility
5. **Auditability**
6. **Traceability**
7. Scalability



Auditability and Traceability

Does one or more of these apply to you?

- ▶ You have no way of determining exactly what is in your current software release
- ▶ You can't determine exactly what is different from one release to another
- ▶ You can't determine who did what
- ▶ You can't determine why a specific activity was included in a release
- ▶ You can't determine how your production releases were built
- ▶ You have legal, contractual, or governmental requirements for auditability/traceability
 - Warranty requirements



The 7 Attributes of a Good SCM System

5. Auditability

- The system must provide the means to answer questions like:
 - ▶ Who did this work and when?
 - ▶ What bug fixes/features/enhancements are in this build?
 - ▶ What bug fixes/features/enhancements are new in this build as compared to the previous build?
 - ▶ Are the changes for bug fixes/features/enhancements X included in this build?
 - ▶ Is version 5 of foo.c included in this build?
 - ▶ How was a given release built?



Business Value:
Compliance
Cost
Time to Market



The 7 Attributes of a Good SCM System

6. Traceability

- The system must provide the means to identify the version of the software running on any arbitrary machine
- The system must provide a means to determine why the changes that make up a release made?
 - ▶ Change requests
 - ▶ Requirements



Business Value:
Validation of customer deliverables



What does it mean to Manage Change?

1. Safety
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Scalability

Does one or more of these apply to you?

- ▶ Your project is currently small, (or medium or large), and you anticipate that it will grow
- ▶ Your project used to be a lot smaller, now it's bigger
- ▶ Your project is entering its maintenance or sustaining phase and is shrinking
- ▶ You want to start a new project and leverage the work done before on larger projects
- ▶ Contributors to your project aren't just in one place



The 7 Attributes of a Good SCM System

7. Scalability

- The system must provide the means to support both small and large projects as well as projects whose size is changing
 - ▶ Size is measured in several ways: e.g., number of contributors, complexity, count and type of managed assets
- The system must provide a means to allow projects to share code
- The system must provide the means to support geographically distributed teams



Business Value:

- No retooling for changes in project size or configuration**
- Standardized solution across the enterprise**
- Code reuse enables increased developer efficiency**

The Seven Attributes of a Good Software Configuration Management System

1. Safety
2. Stability
3. Control
4. Reproducibility
5. Auditability
6. Traceability
7. Scalability



The Bottom Line

What does it cost your organization to not have a good SCM System?

Some attributes are hard to quantify because they are spurious events (or should be)

Safety

Are you prone to catastrophe?

Can users damage your SCM system?

Is your SCM system secure?

Some attributes are hard to quantify because you can't do them at all without a good SCM solution

Reproducibility

Can you reorganize your source code?

Can you improve your build system?

Can you work on a prior release without corrupting your current development?



The Bottom Line

What does it cost your organization to not have a good SCM System?

Some attributes are easy to quantify because they happen everyday as part of the process forced by the SCM system

Stability and Control

Developers

Workspace management – 15 minutes/day

Workspace stabilization – 15 minutes/day

Activity management – 15 minutes/day

*45 minutes/day/developer * 50 developers*

= 37.5 hours/day \$1875/day @ \$50/hour

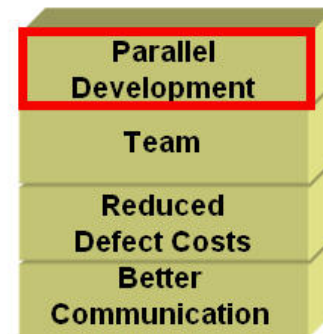
= 187.5 hours/week \$9375/week

= 9750 hours/year \$487,500/year

The Bottom Line

How much can you save?

Rational ClearCase Economic Value Model - Parallel Development			
Previous		Table of Contents	
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Parallel Development			
<p>Rational ClearCase provides a parallel development infrastructure, so teams can effectively write, edit and maintain common code components in parallel. By using Rational ClearCase, even distributed development teams can collaborate on common code yet proceed with isolated projects as though they were working in isolation.</p>			
		Default	Your Company
14	% developer time saved in developers not blocked waiting for access to common elements	2%	2%
15	% developer time saved in creating, maintaining and merging branches	2%	2%
16	% build engineer time saved in freezing baselines	10%	10%
17	Hours worked per user per month, loaded for time off	152	152
18	Value of one hour of staff time	\$82	\$82
19	Value of parallel development per developer per month	\$500	\$500
20	Value of parallel development per build engineer per month	\$1,250	\$1,250
21	Number of potential ClearCase users -- Developers	90	90
22	Number of potential ClearCase users -- Build Engineers	10	10
23	Annual Value of Parallel Development	\$690,000	\$690,000



The Bottom Line

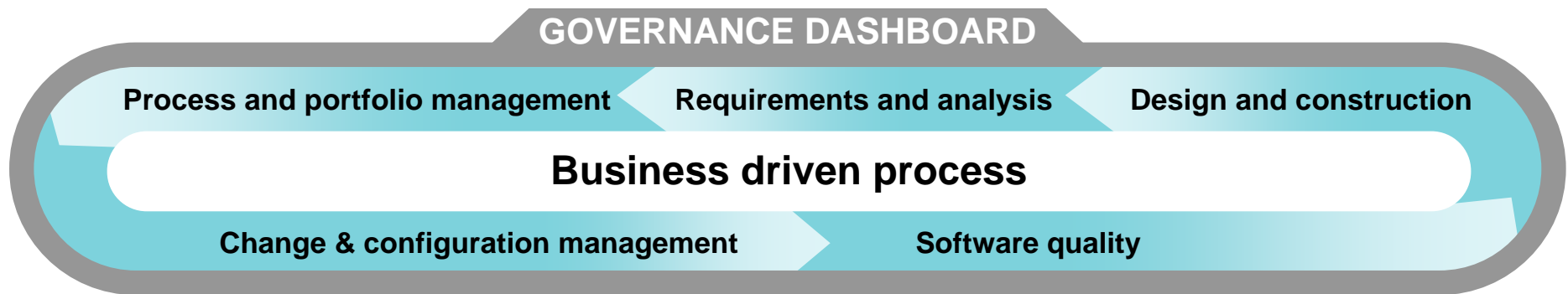
Where's the Proof?

BT Financial Group

- **Build/release times were reduced by a factor of eight**
- **Merges, which previously required five hours to complete, were finished in one hour.**
- **"When people saw the power of branching and merging, and realized how it would make their lives easier, their new solution became the undisputed choice among our developers."**
- **"With their new solution, we didn't overlook any files, we didn't miss any changes, and most merges were performed automatically."**
- **"Our new solution gave us massive performance gains."**



How does IBM software make this possible?



Manage value

- Real-time analytics linking financial and software information
- Real-time resource management
- Comprehensive dashboard reporting and drilldown

Develop flexibly

- Proven best practices
- Integrated requirements management
- SOA design and construction capabilities
- Open, role-based team environment

Control risk and change

- Lifecycle change and asset management
- Built-in audit and status information on projects and assets
- Performance testing
- Service-level monitoring



IBM Rational Software Development Platform

GOVERNANCE DASHBOARD

Solutions for Geographically Distributed Development, Compliance, SOA

Process & portfolio management

- IBM Rational Portfolio Manager
- IBM Rational Method Composer
- Best practices content (RUP, ITUP, Portfolio Management)

Requirements & analysis

- IBM WebSphere® Business Modeler
- IBM Rational RequisitePro®
- IBM Rational Software Architect
- IBM Rational Software Modeler
- IBM Rational Rose® Data Modeler

Design & construction

- IBM Rational Software Architect
- IBM Rational Software Modeler
- IBM Rational Data Architect
- IBM Rational Application Developer
- IBM Rational Web Developer

Software quality

- IBM Rational Performance Tester
- IBM Rational Functional Tester
- IBM Rational Manual Tester

Change & configuration management

- IBM Rational ClearCase®
- IBM Rational ClearQuest®
- IBM Rational Team Unifying Platform
- IBM Tivoli® Provisioning Manager
- IBM Tivoli Configuration Manager
- IBM Tivoli Intelligent Orchestrator

Partner Ecosystem & Open Computing (Eclipse, Linux, Windows, UNIX, zOS)



Thank
YOU

