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Managing Software Debt

Continued Delivery of High Value as Systems Age

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Hash Tag for Presentation: #swdebt

Topics Being Covered

- Problems Found with Aging Software
- Software Debt Explained
  - Technical Debt
  - Quality Debt
  - Configuration Management Debt
  - Design Debt
  - Platform Experience Debt
- The Wrap Up
  - A Story of What is Possible

Problems Found with Aging Software

- Software gets difficult to add features to as it ages
- Business expectations do not lessen as software ages
- Software must remain maintainable and changeable to meet needs of business over time

Lack of emphasis on software quality attributes contributes to **decay**

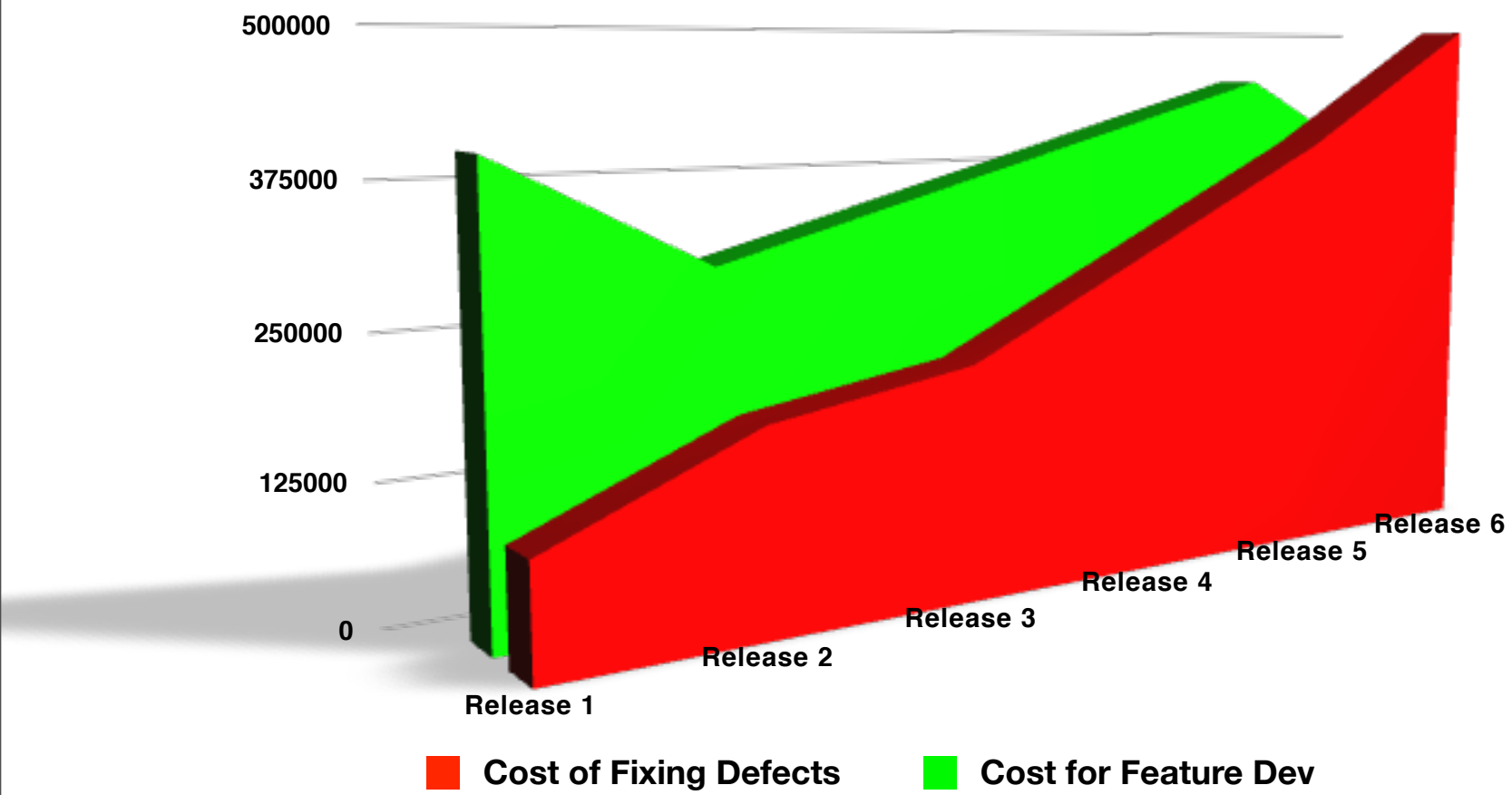
The “Rewrite”, “NextGen” or “Like-to-like Migration”

- “It will be easy since we worked on the original version” - although we understand the domain we will be fighting with new features, technology, tools, and processes
- “We don’t have any other options” - Refactoring and test automation are potential alternatives to like-to-like migrations.

Limited Platform Expertise

Risk and costs increase as expertise becomes more limited for aging software platforms.

Costs for Release Stabilization Increase Over Time



Extreme Specialization

- Knowledge and capability to maintain legacy software decays with time
- Costs to maintain rarely used software platforms are higher
- Leads to waiting for people in specialized roles to finish their tasks in support of development effort

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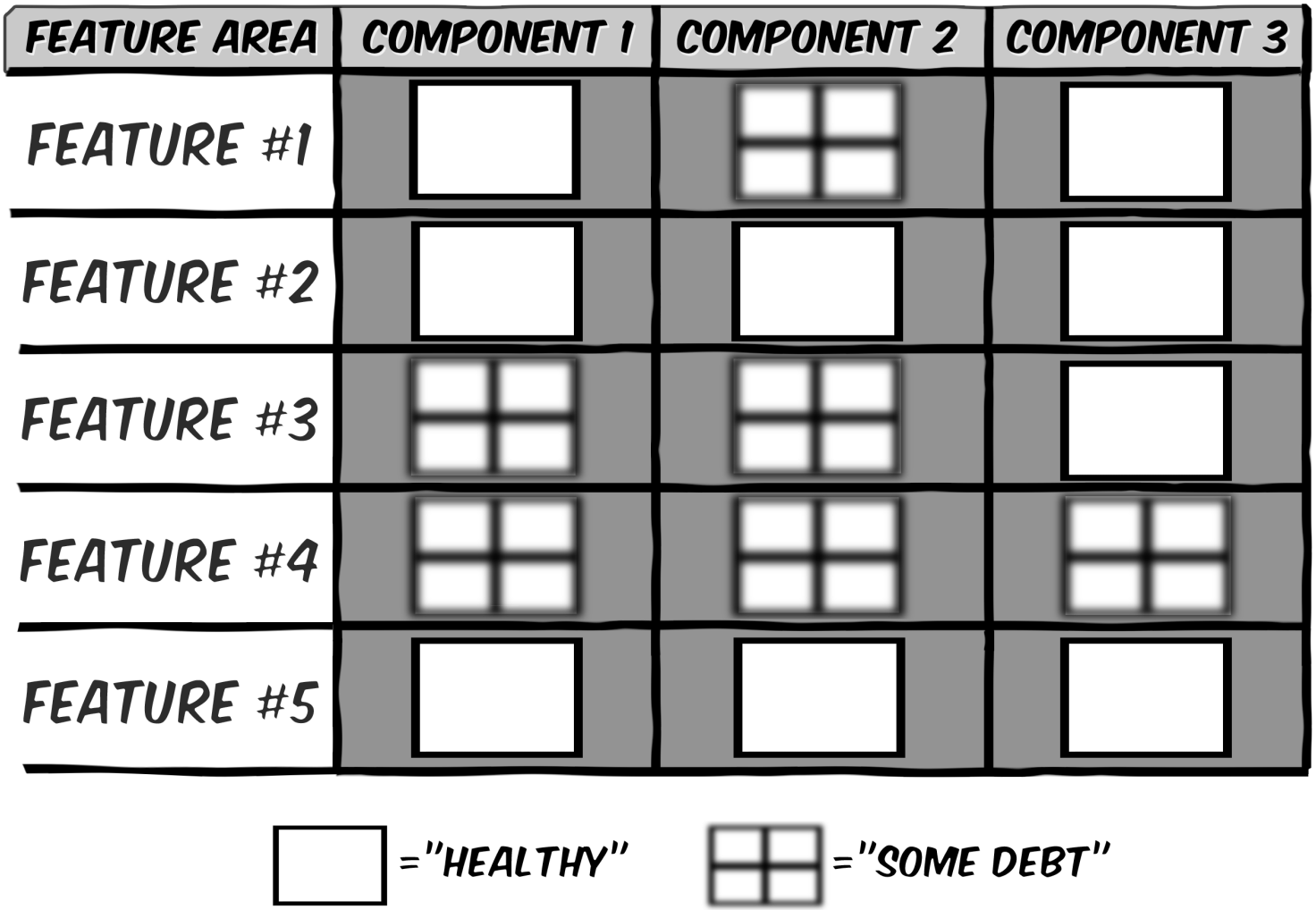
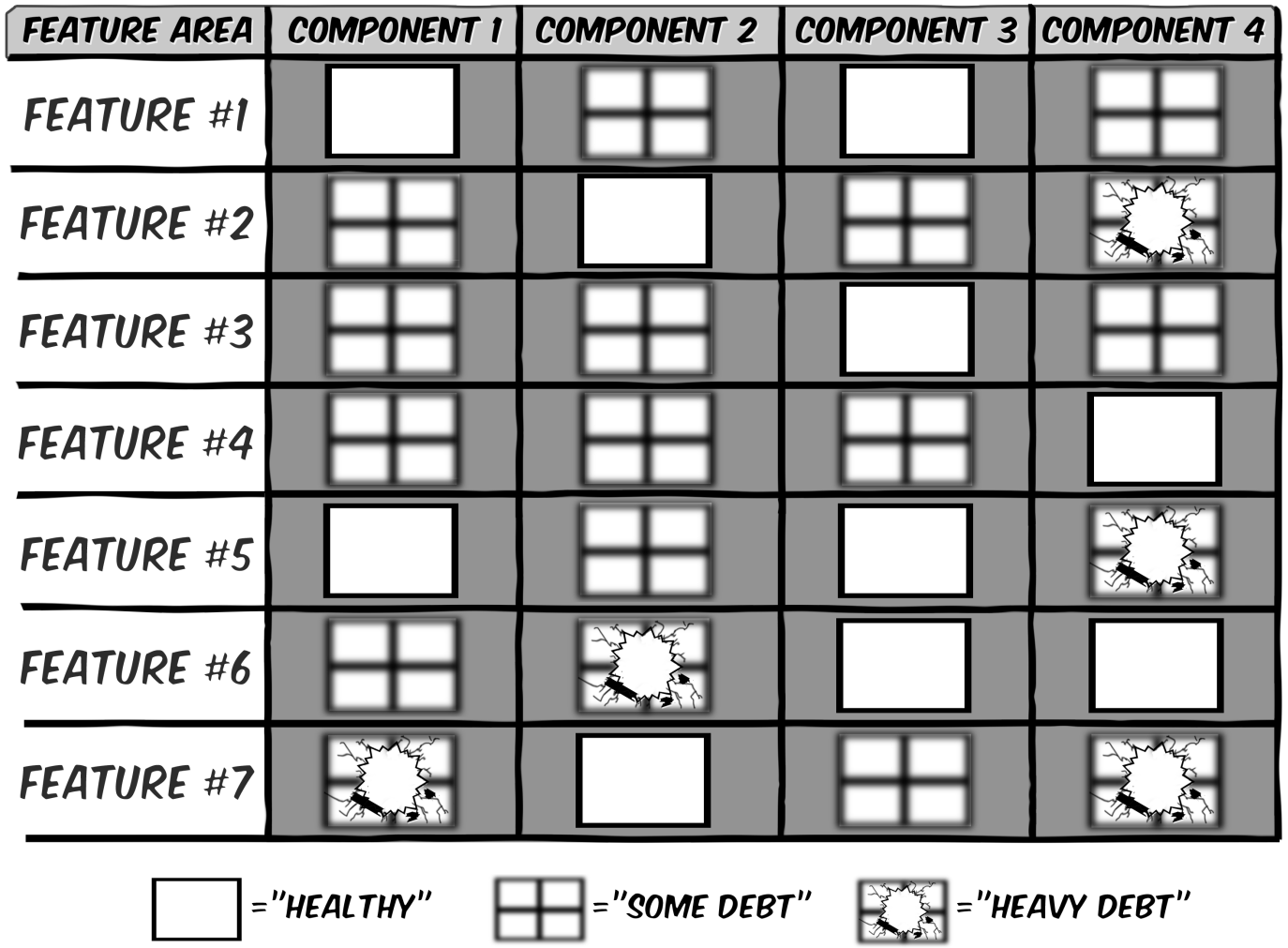
Software Debt

Creeps into software slowly and leaves organizations with liabilities

Software Debt Creeps In



Software Debt Creeps In



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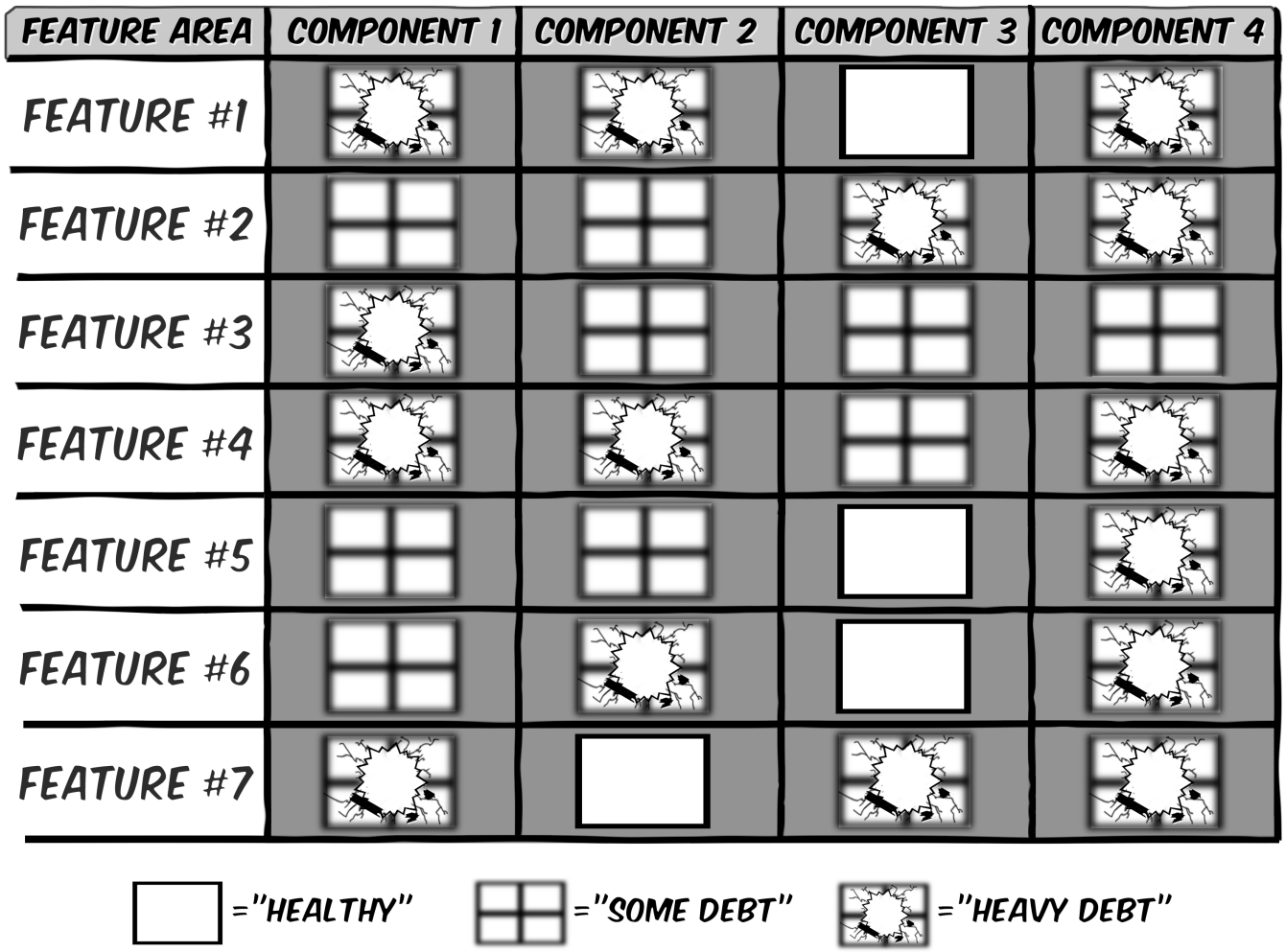
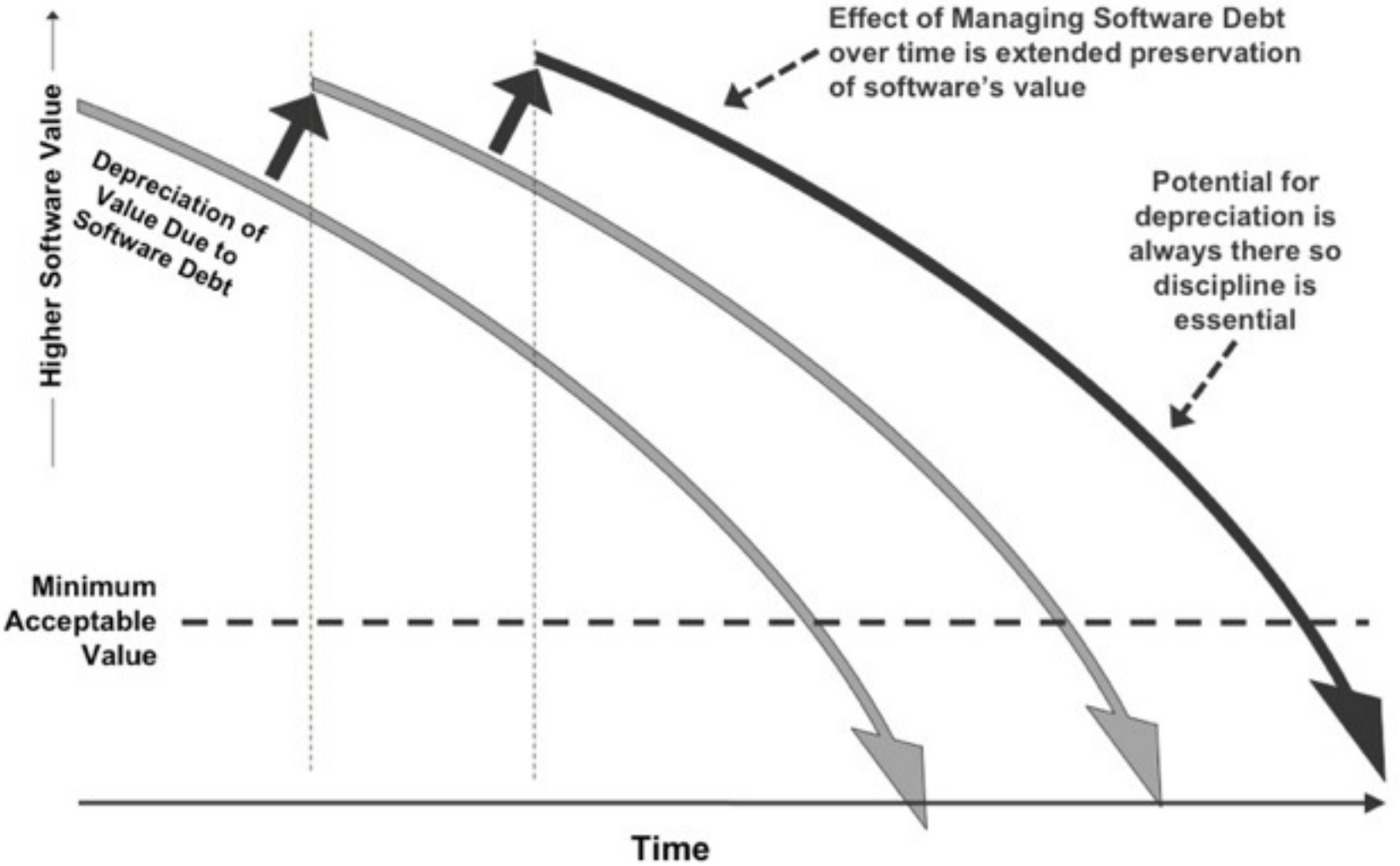


Managing Software Debt – an Overview



Managing Software Debt

- It is impossible to stop software debt from creeping into our software
- Managing debt in software is based on putting frequent feedback mechanisms in place for code, quality assurance, configuration management, design, and organization of people on project team
- Feedback mechanisms should be frequent, automated, and easy to use to support their continued use or modified to new needs

Types of Software Debt

- Technical Debt
- Quality Debt
- Configuration Management Debt
- Design Debt
- Platform Experience Debt

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Technical Debt

Issues in software that will impede future development if left unresolved

* Ward Cunningham on “Technical Debt”

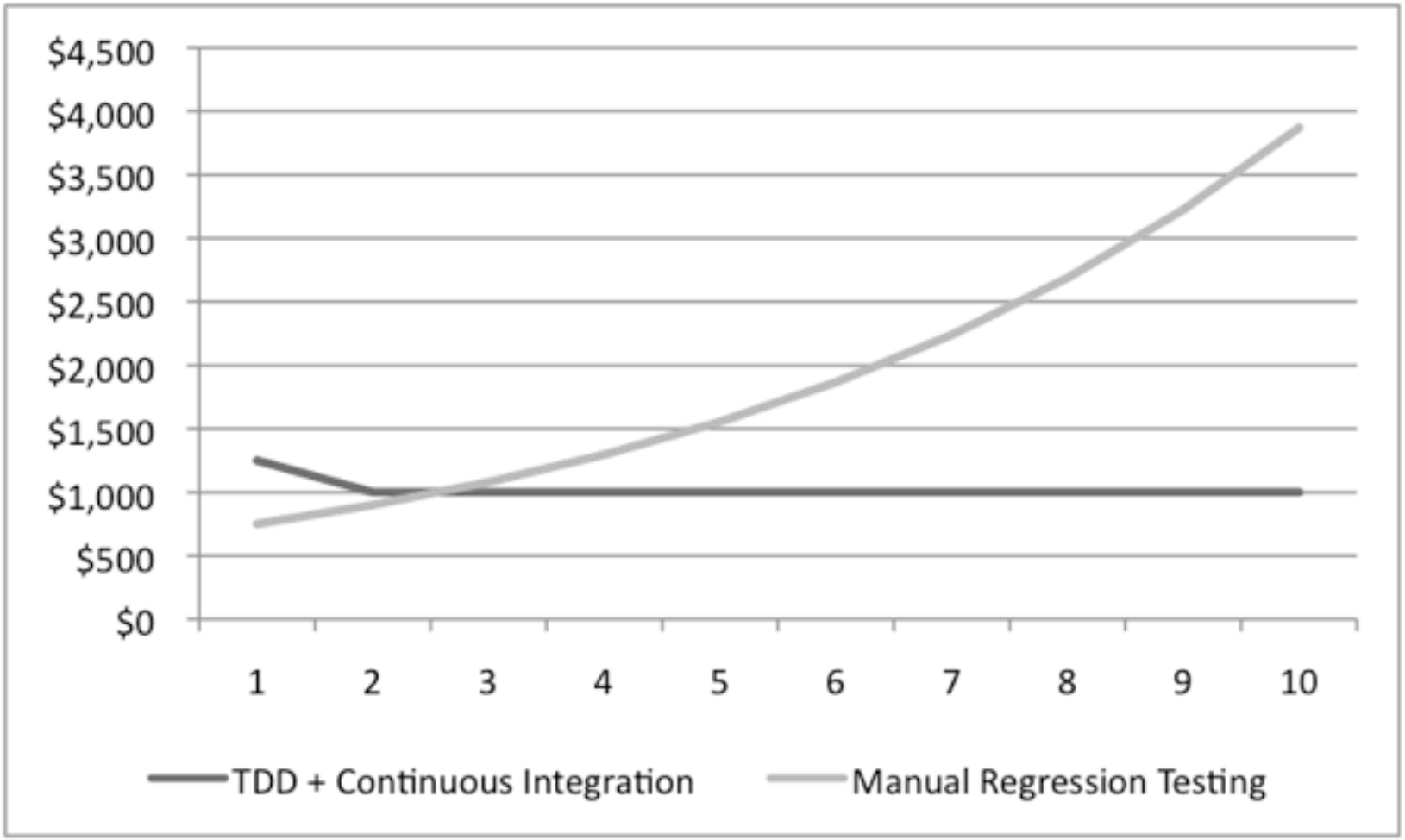
- Technical Debt includes those internal things that you choose not to do now, but which will impede future development if left undone. This includes deferred refactoring.
- Technical Debt doesn’t include deferred functionality, except possibly in edge cases where delivered functionality is “good enough” for the customer, but doesn’t satisfy some standard (e.g., a UI element that isn’t fully compliant with some UI standard).

* Ward Cunningham - “Technical Debt” - http://c2.com/cgi/wiki?TechnicalDebt

My Definition of “Technical Debt”

“Technical debt is the decay of component and inter-component behavior when the application functionality meets a minimum standard of satisfaction for the customer.”

Regression Costs - Manual vs. Automated



Principles of Executable Design

- The way we design can always be improved.
- We'll get it "right" the third time.
- We will not get it "right" the first time.
- Design and construct for change rather than longevity.
- Lower the threshold of pain.

If we are not enhancing the design then
we are just writing a bunch of tests.

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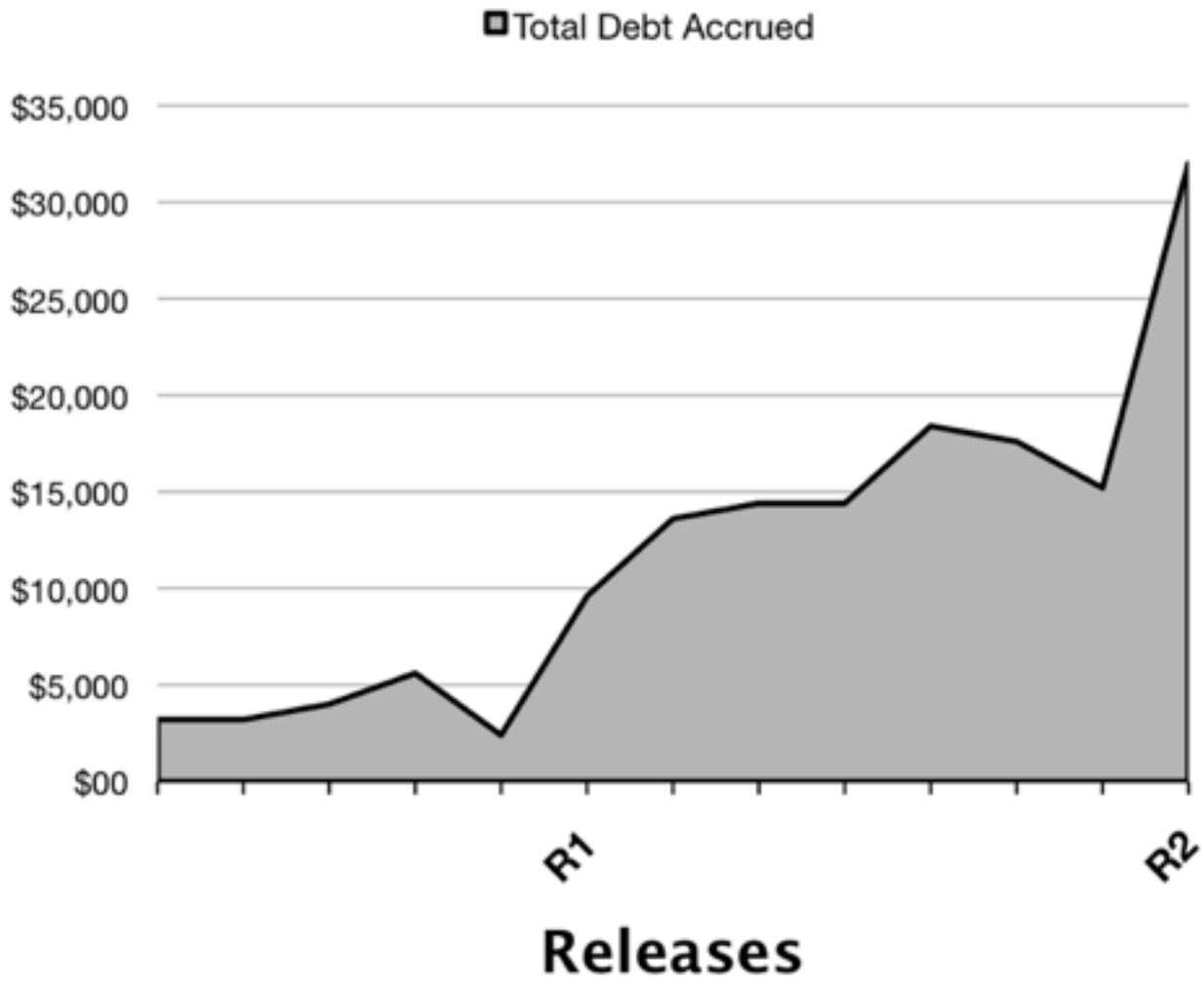
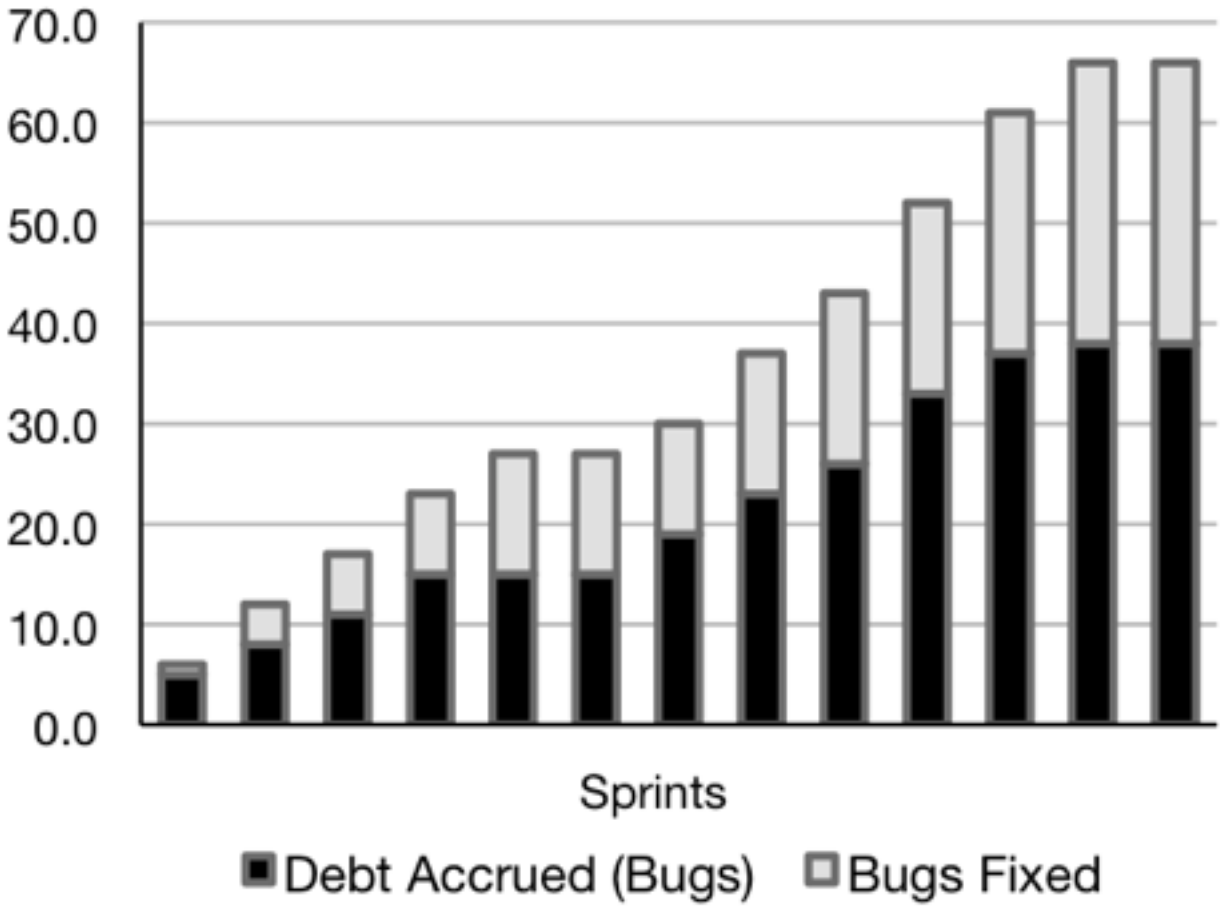
Quality Debt

A lack of quality will lessen the value per feature added over time

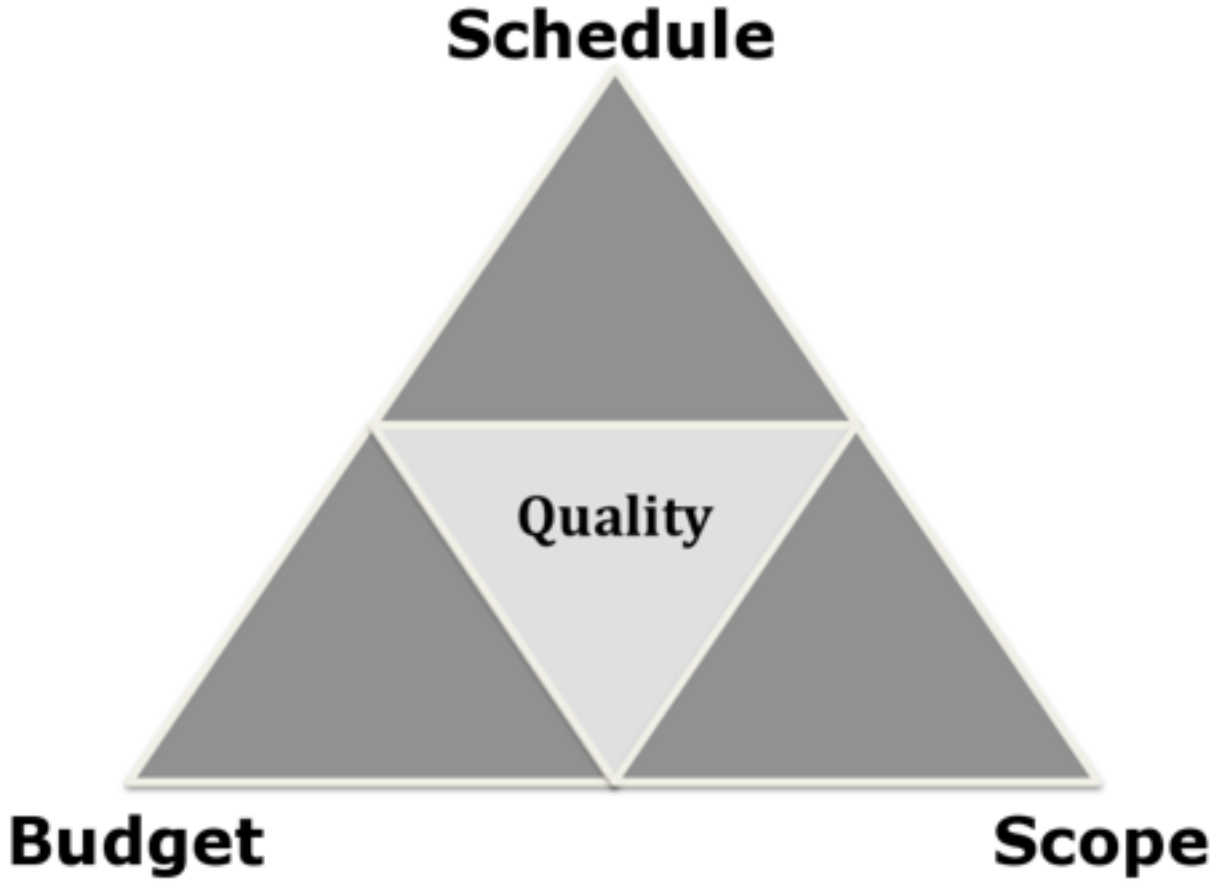
Accrual of Quality Debt with Releases



Break/Fix Only Prolongs the Agony



Effect of Project Constraints on Quality



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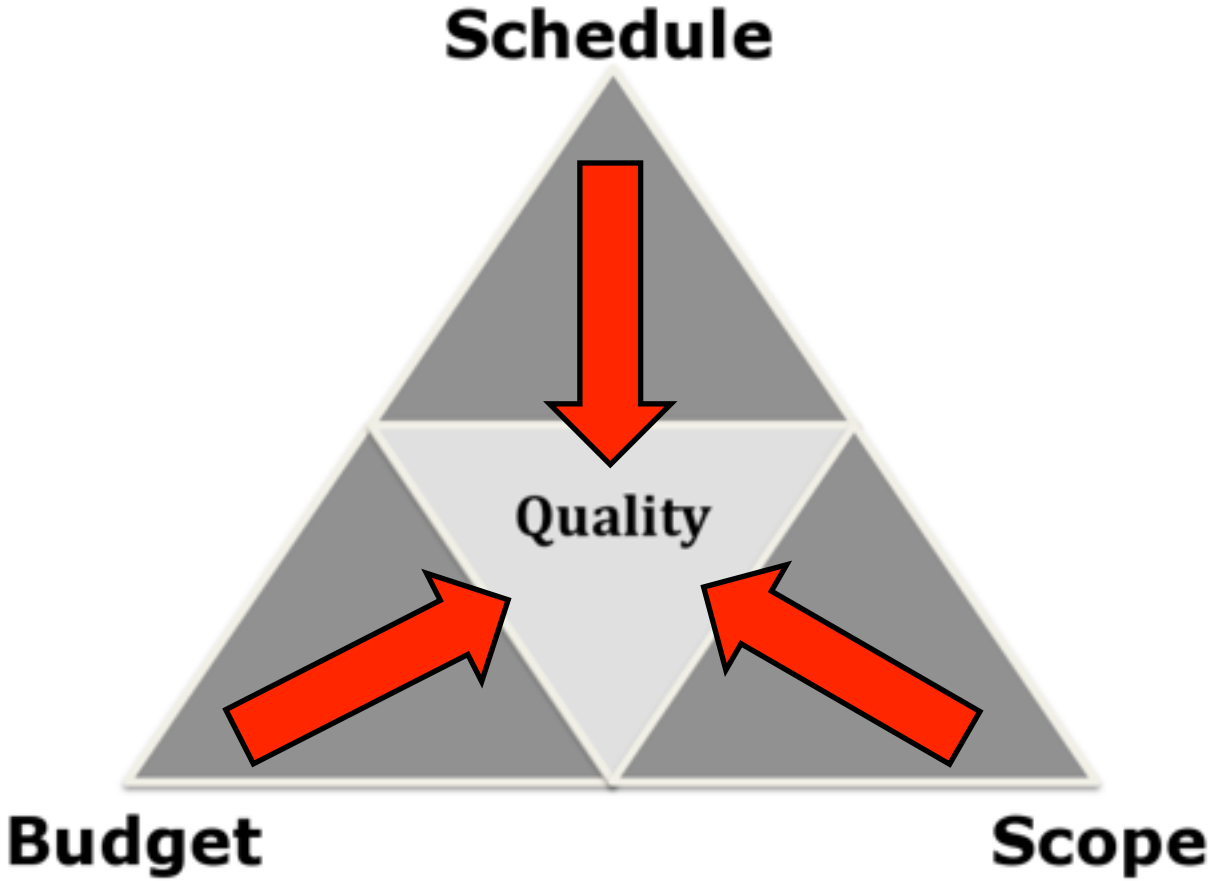
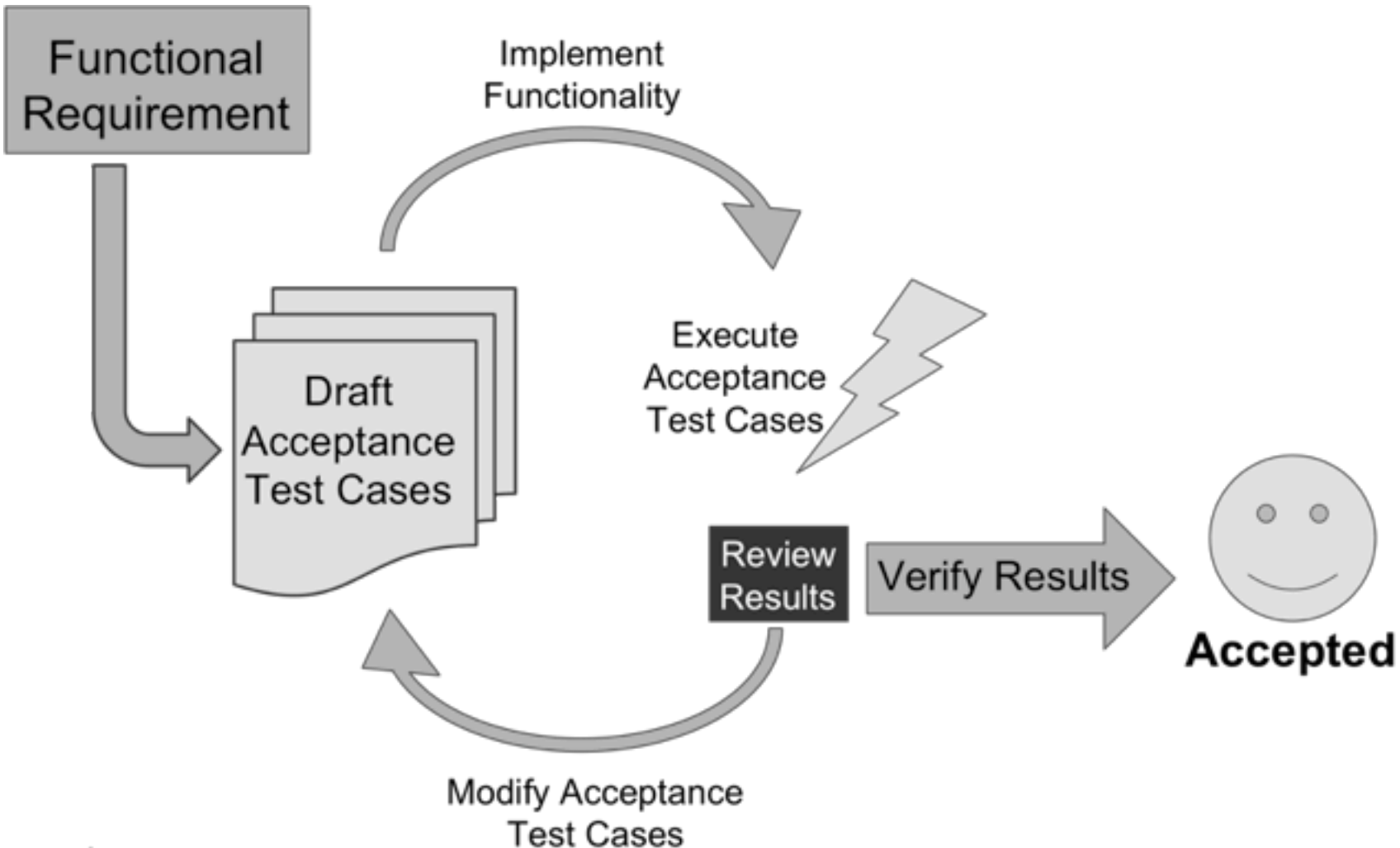


Acceptance Test-Driven Development



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A Fit Case Study

Cost reduction using Fit for test automation and data conversion

Manual Regression Testing

- Testing was taking 75 person hours during 2 full test runs consisting of:
  - Comprehensive manual regression testing
  - Data conversion and validation
- Cost for testing was $17,000 each iteration

Introducing Fit into Testing Process

- After 8 iterations team had introduced healthy amount of Fit fixtures and automated tests
- Reduced 70+ hour test runtime down to 6 hours which now included:
  - Fit automated regression testing
  - Data conversion and validation automated with Fit fixtures
- Reduced cost of testing each iteration from $17,000 to $7,000

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Configuration Management Debt

Unpredictable and error-prone release management

Traditional Source Control Management

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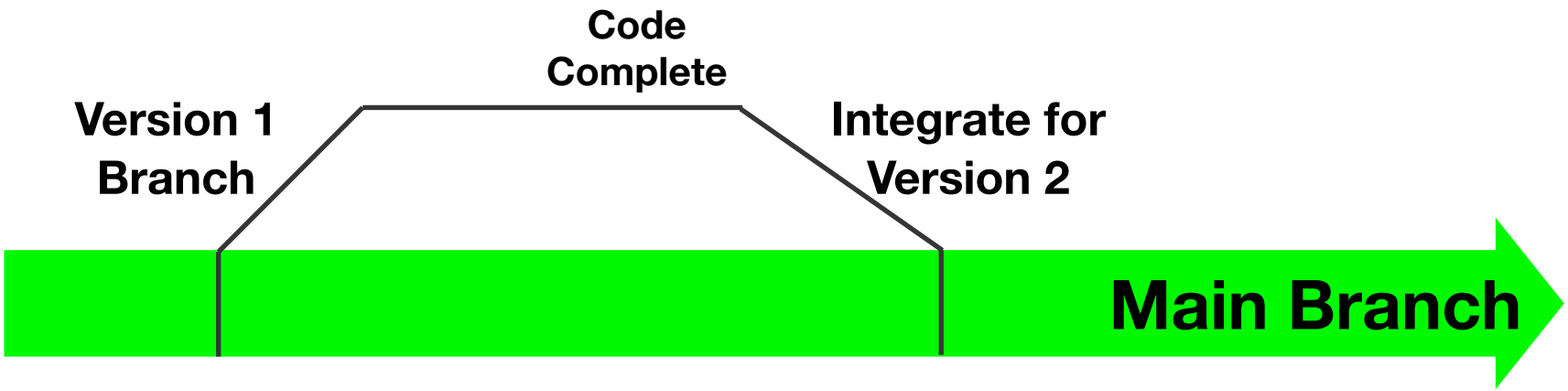
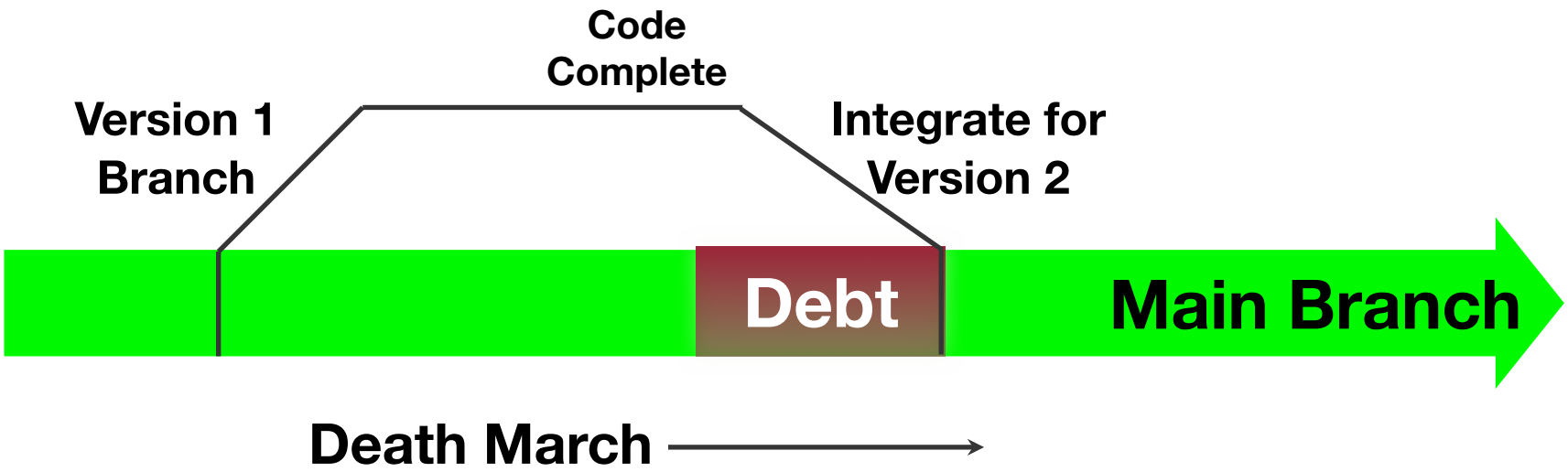


Traditional Source Control Management



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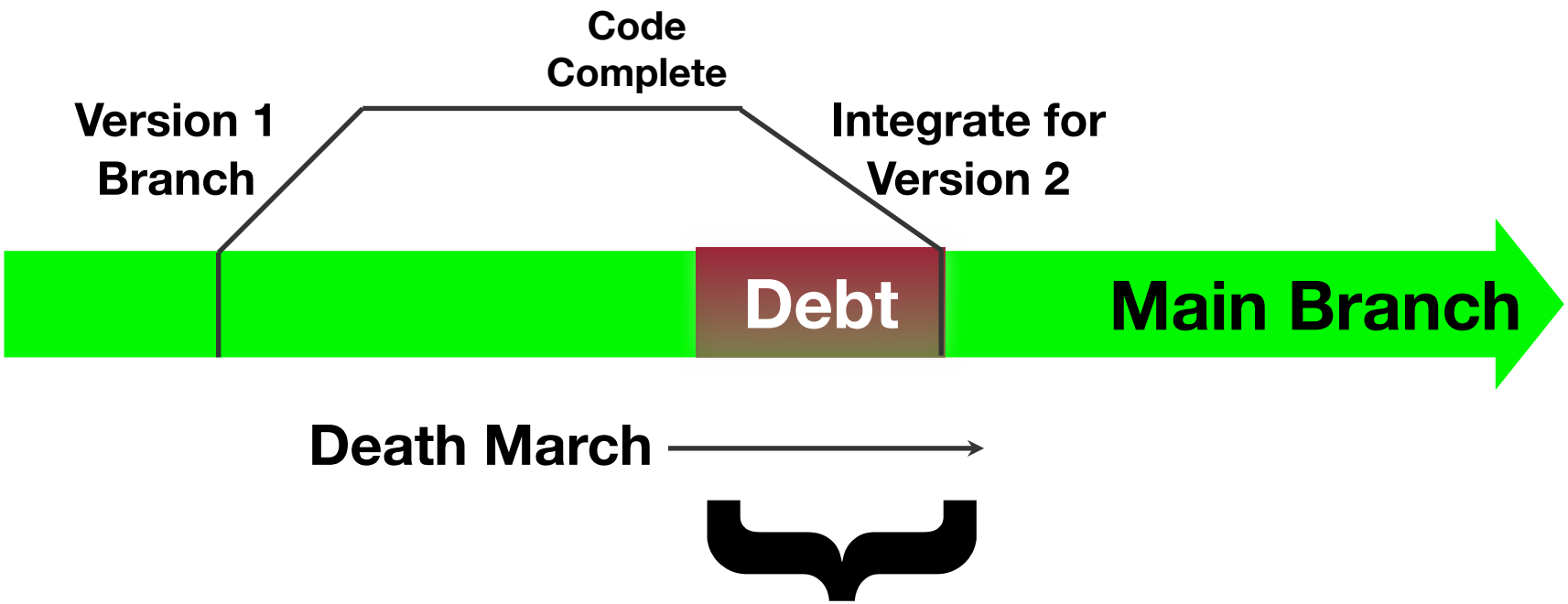

Debt accrues quickly within stabilization periods

Flexible Source Control Management

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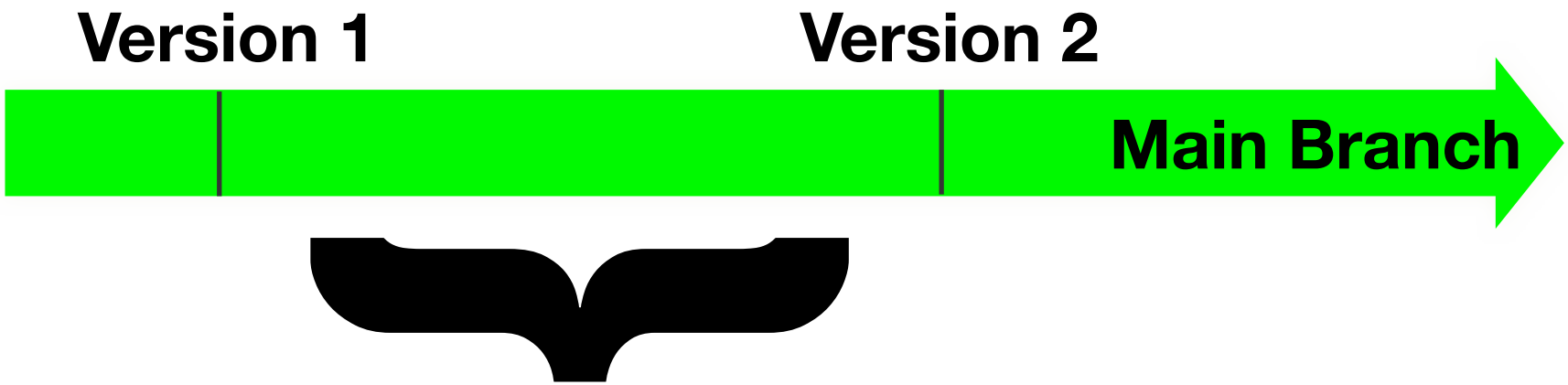
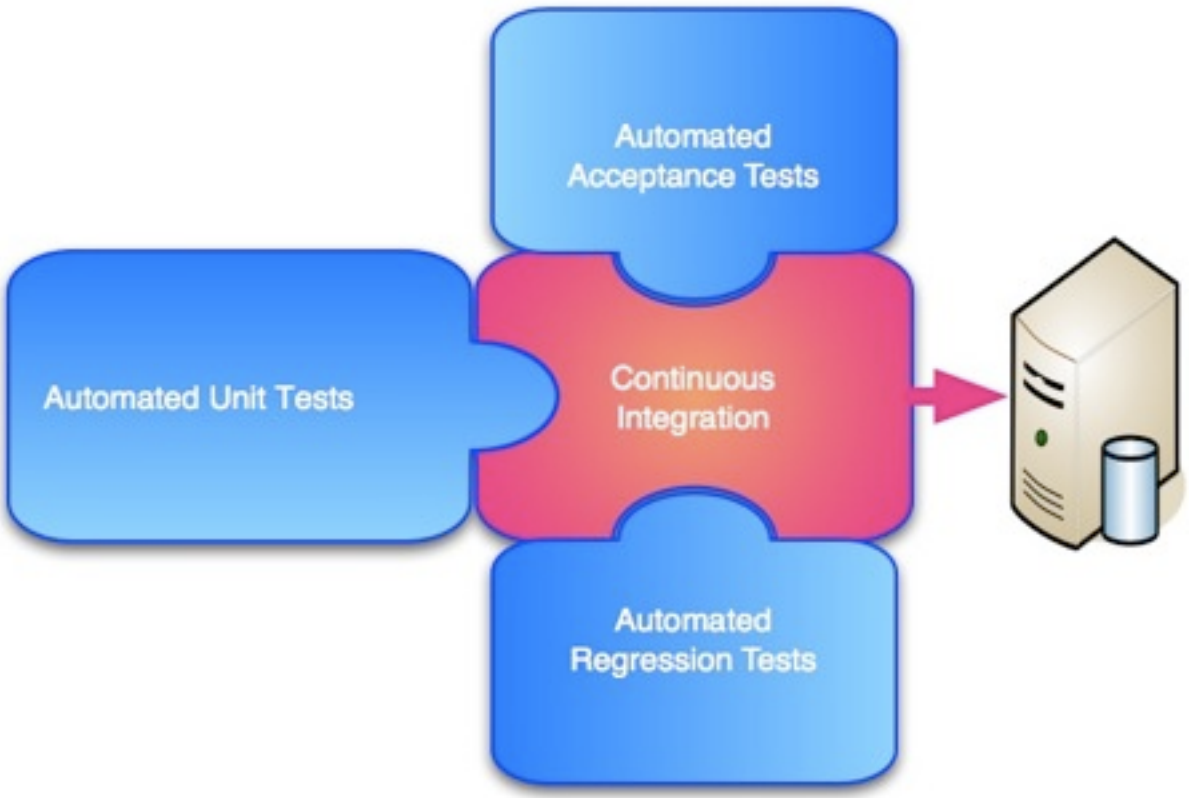
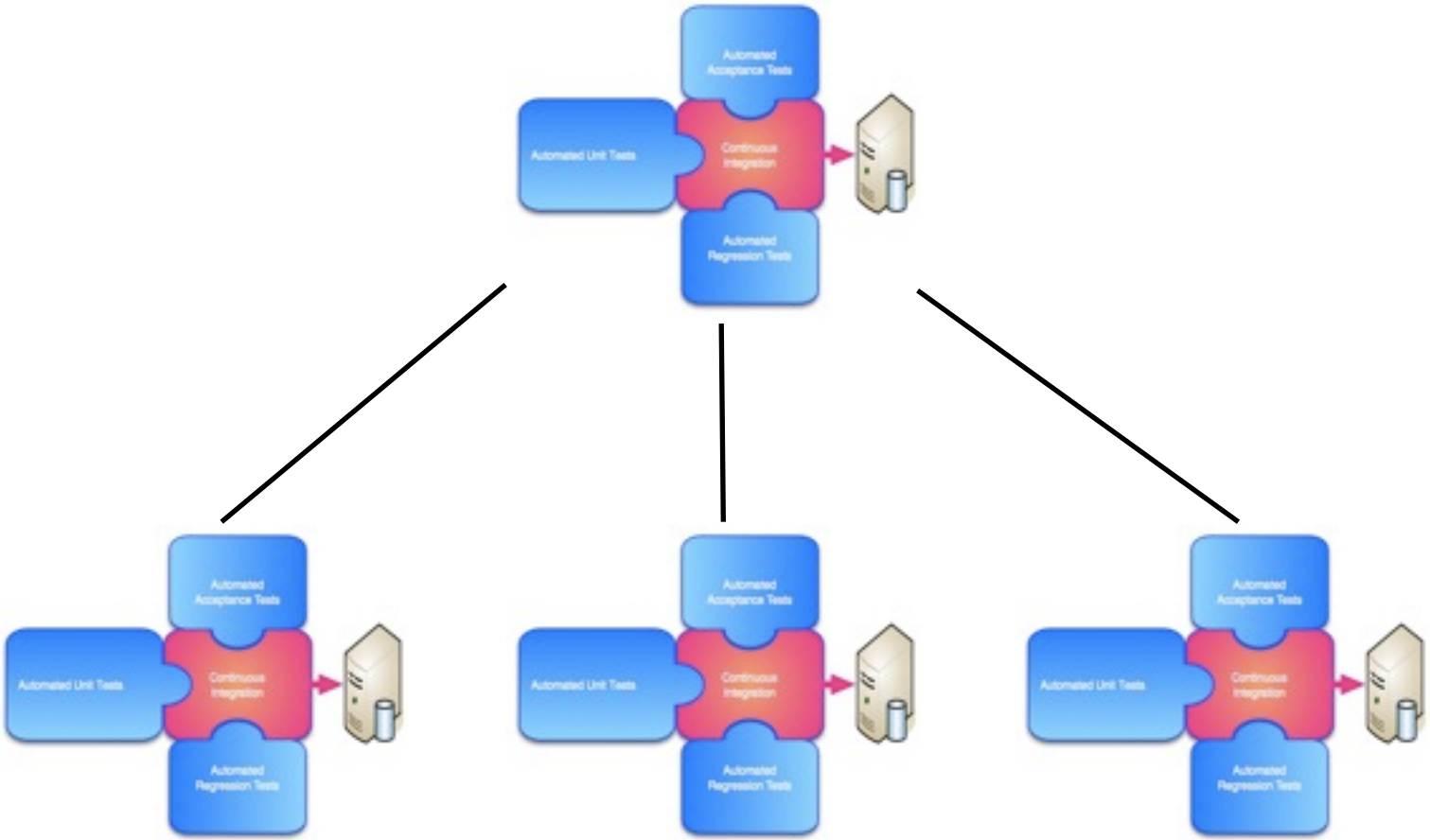


Not Easy! Must have proper infrastructure to do this.

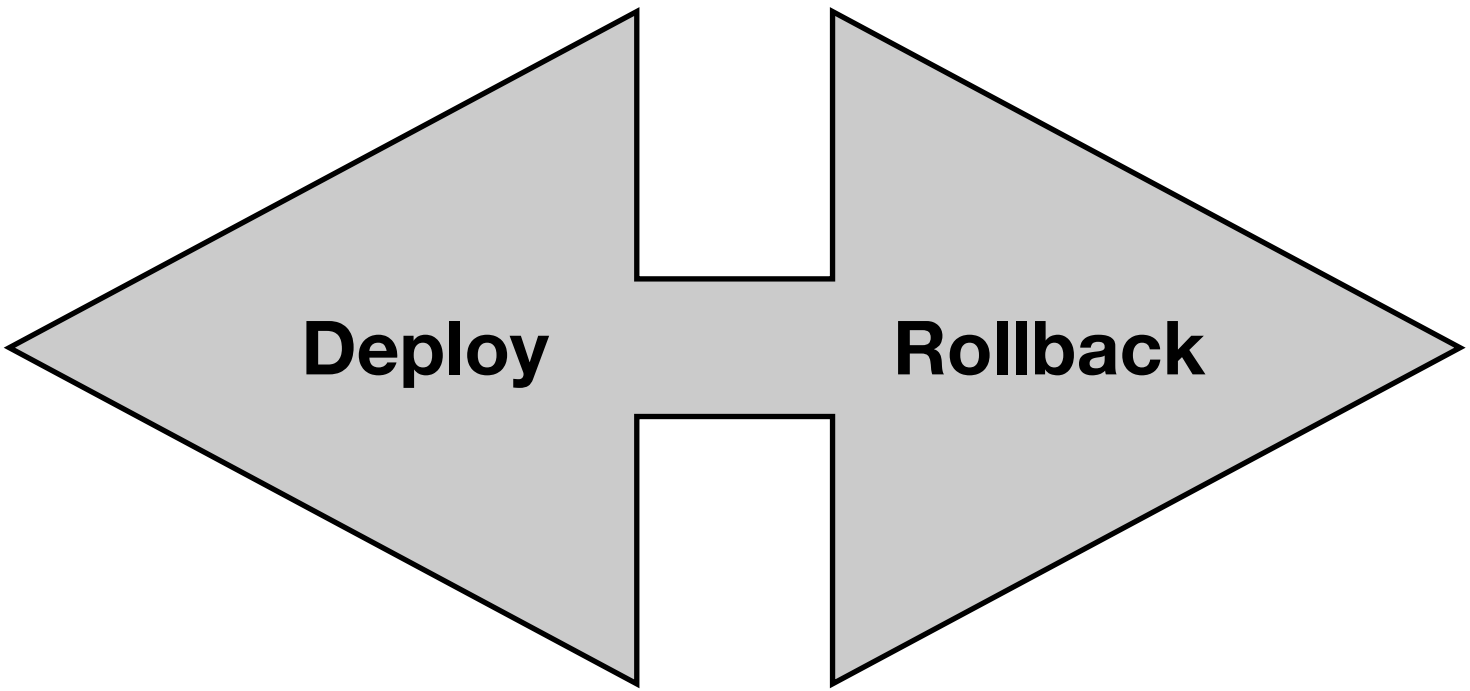
Continuous Integration



Scaling to Multiple Integrations



The Power of 2 Scripts: Deploy and Rollback



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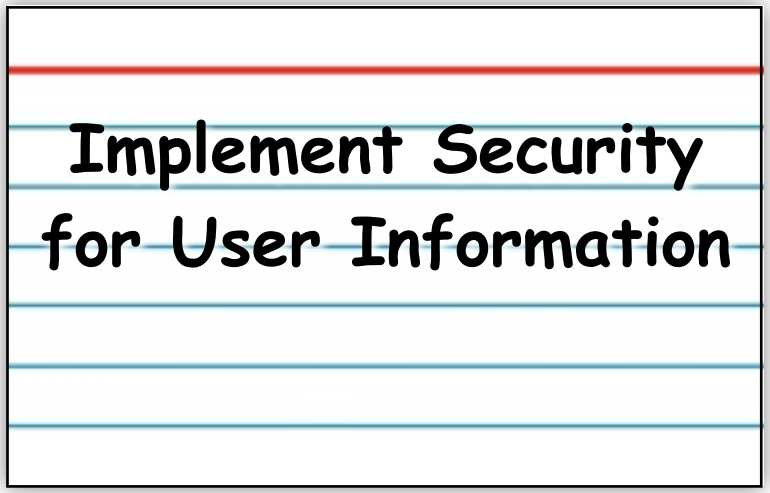
Design Debt

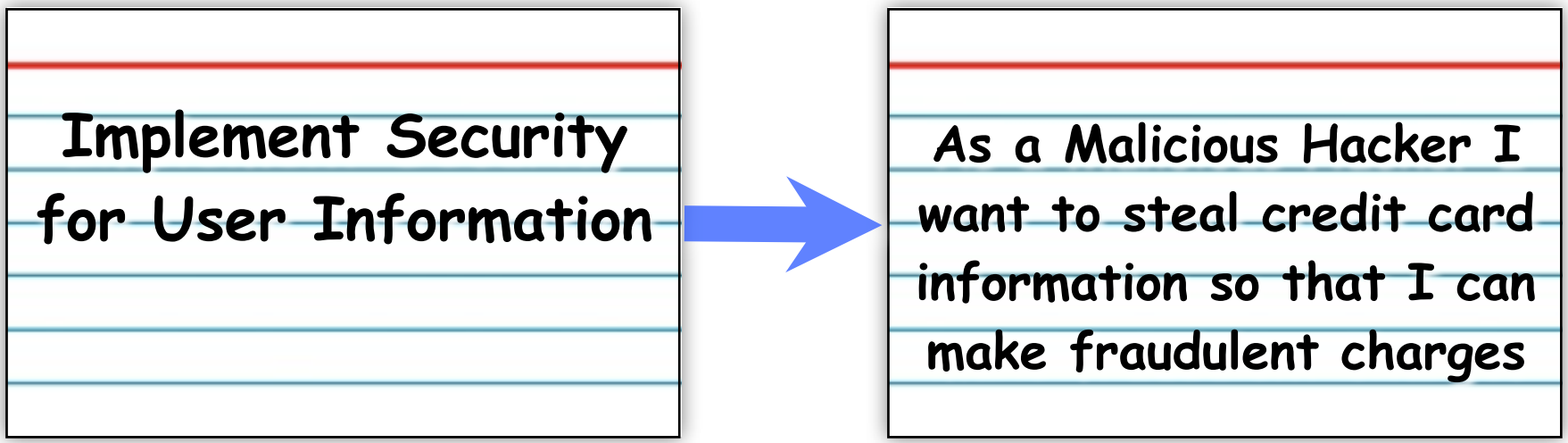
Design decays when not attended to so design software continually

* Abuse User Stories



* From “User Stories Applied” presented by Mike Cohn Agile 2006

* Abuse User Stories



* From “User Stories Applied” presented by Mike Cohn Agile 2006

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Platform Experience Debt

Silos of knowledge and increased specialization will increase cost of maintenance over time

How to Combat Platform Experience Debt

- Ignore it (I do not suggest this!)

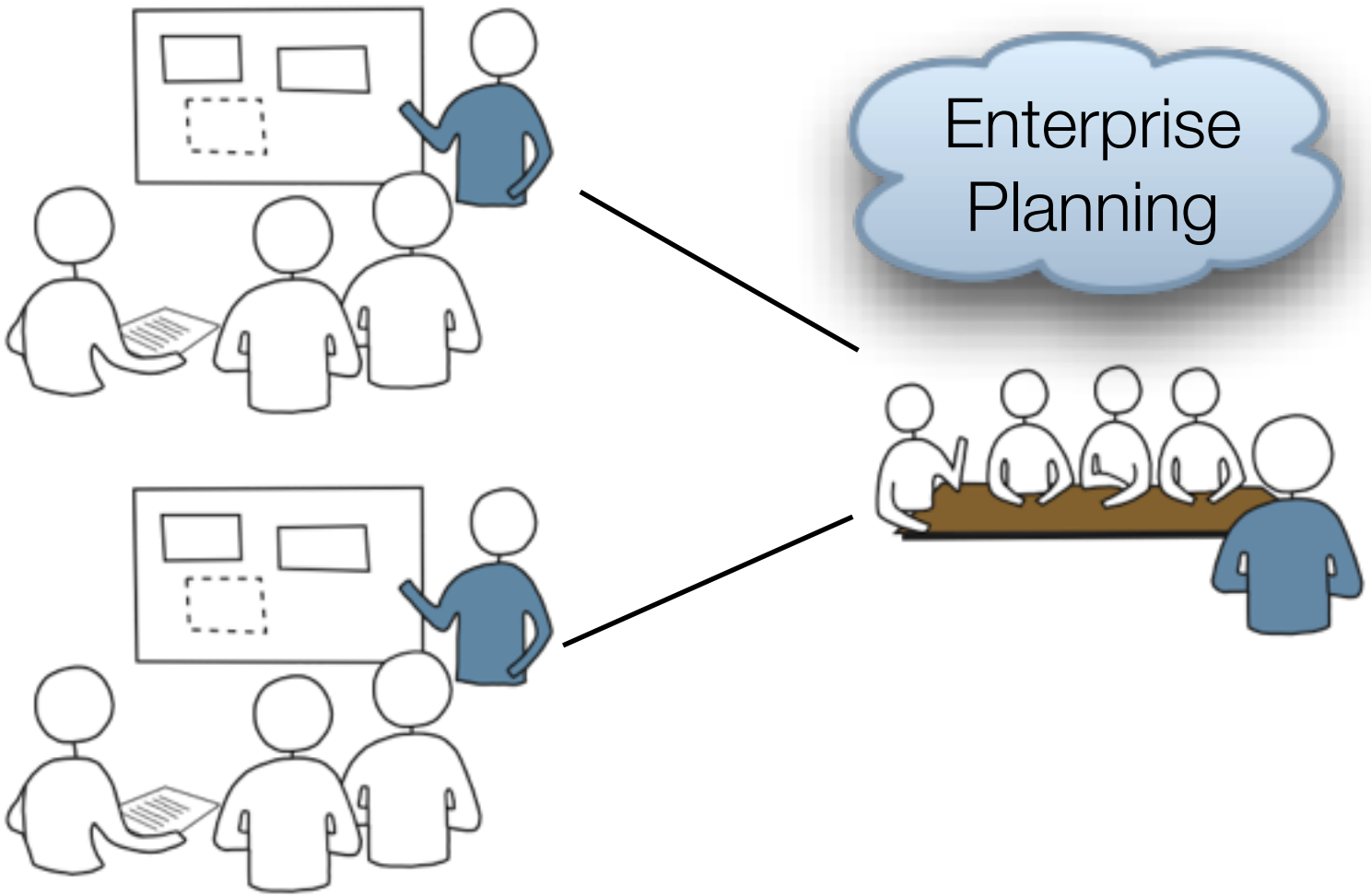
~OR~

- Surround existing functionality with automated functional tests
- Wrap platform interfaces with adapters
- Transfer knowledge of platform to more people
- Rewrite on more current platform
- Move thin slices of functionality to newer platform
- Start platform upgrade discussions and rearrange teams into known effective team

Team Configuration Patterns

- Virtual Architect Pattern
- Integration Team Pattern
- Component Shepherd Pattern
- Team Architect Pattern

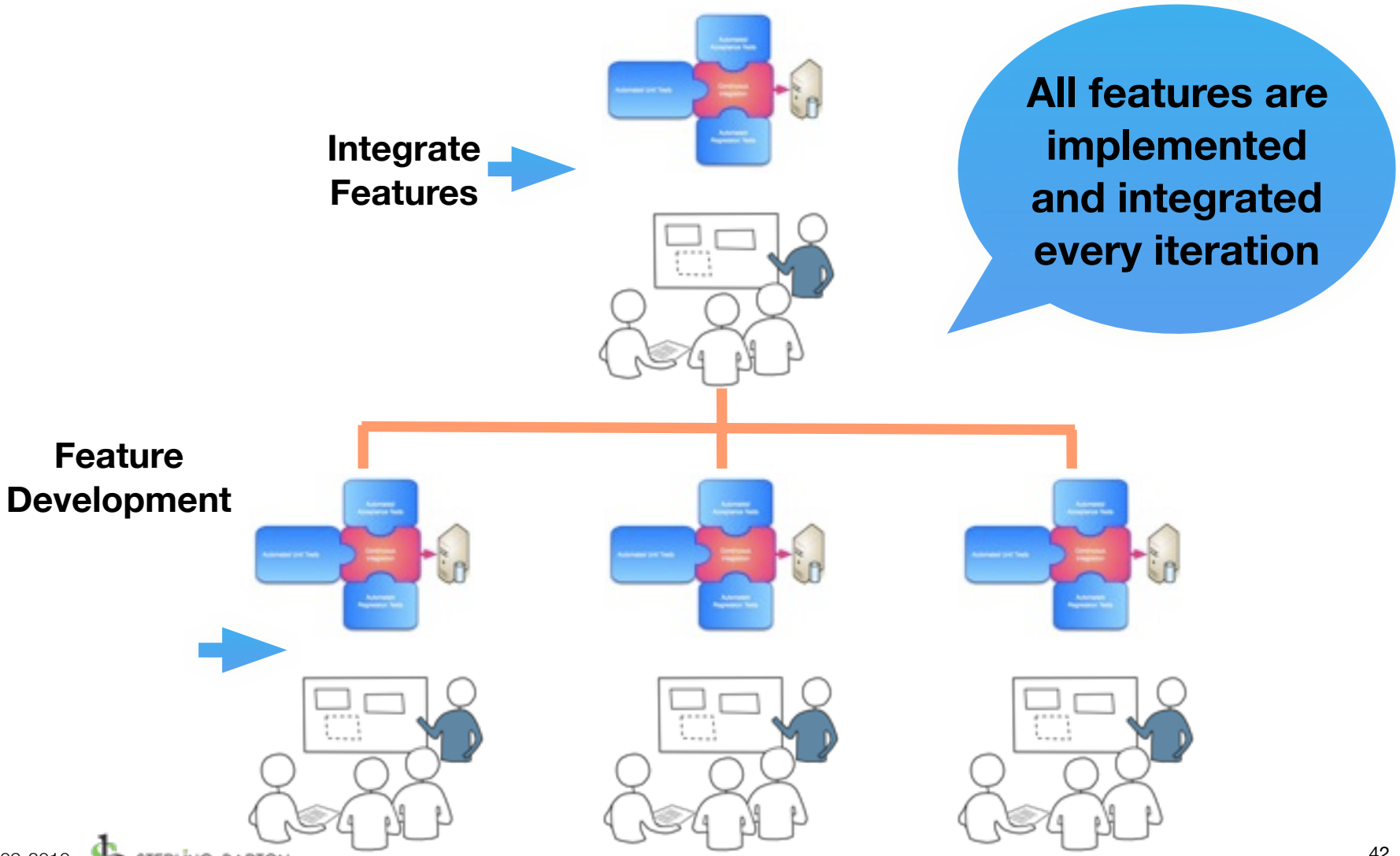
Virtual Team Pattern



Virtual Team Pattern

- Pros
  - Share architecture ideas and needs across teams
  - Based on verbal communication
- Cons
  - Usually singles out special Team Member role
  - Could lead to top-down architecture decisions
  - IT may gain extensive influence and begin to run Product Backlog prioritization for architecture needs

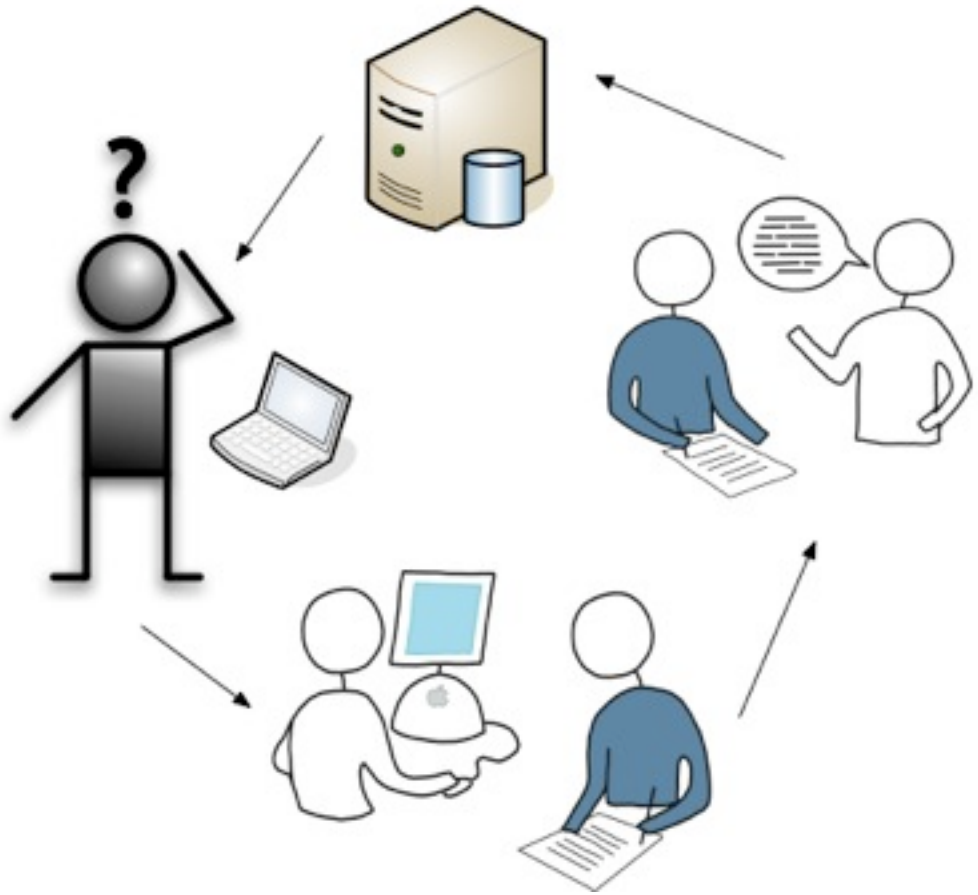
Integration Team Pattern



Integration Team Pattern

- Pros
  - Reduces complexity on Feature Teams
  - Forces delivery from Integration Team instead of interface and deployment designs
- Cons
  - Perpetuates specialized roles
  - Don’t always work on highest value Product Backlog items

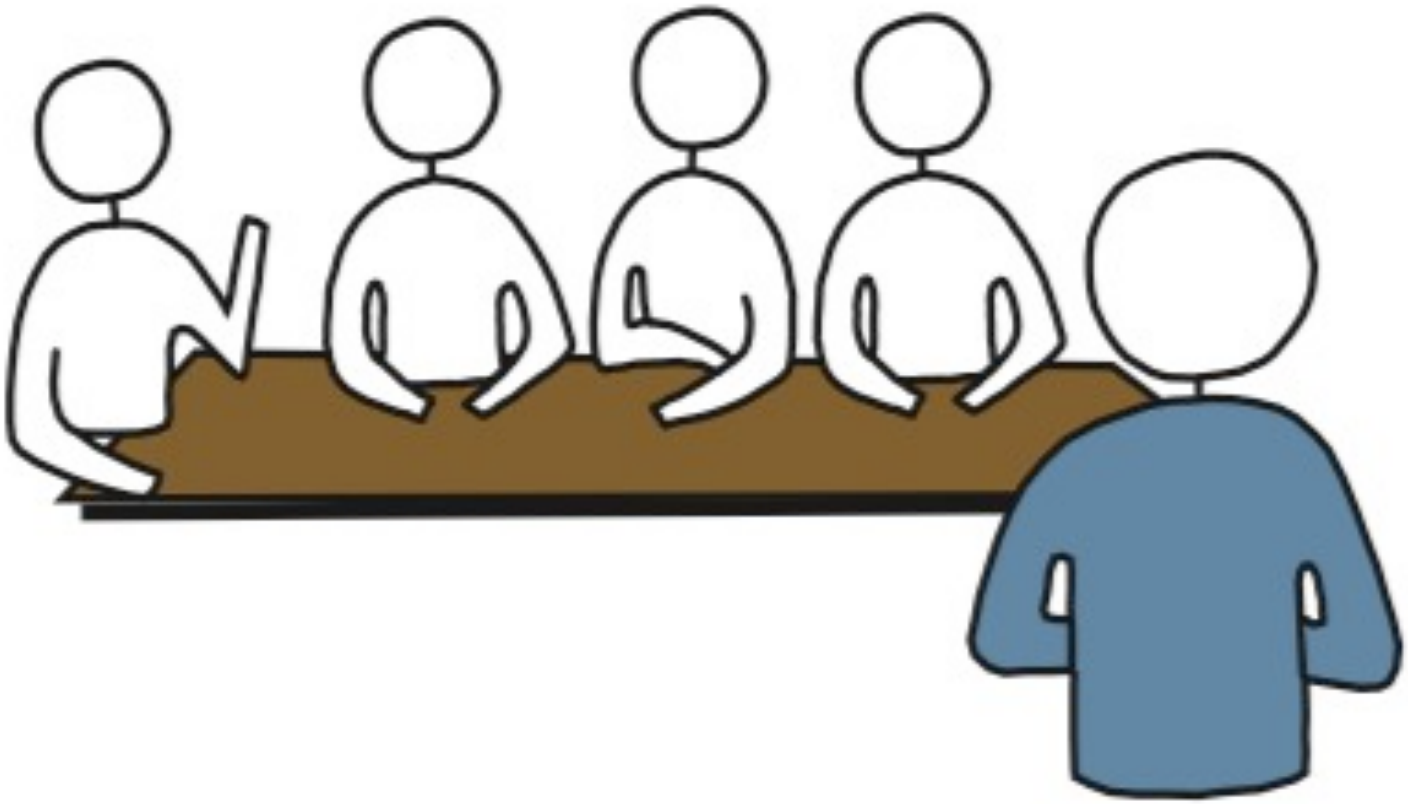
Component Shepherd Pattern



Component Shepherd Pattern

- Pros
  - Share more knowledge within organization to minimize platform experience debt
  - Work on highest value Product Backlog items
- Cons
  - Not always optimal as using individual knowledge
  - Difficult to learn multiple systems across Teams

Feature Team Pattern



Feature Team Pattern

- Pros
  - Team owns architecture decisions
  - Decisions are made close to implementation concerns
- Cons
  - May not have appropriate experience on Team
  - Team could get “stuck” on architecture decisions

What is possible?

High quality can be attained and enables accelerated feature delivery.

A Story: Field Support Application

- 2000+ users access application each day
- Application supports multiple perspectives and workflows from Field Support Operations to Customer Service
- Team of 5 people delivering features on existing Cold Fusion platform implementation
- Migrating to Spring/Hibernate in slices while delivering valuable features
- 36 2-week Sprints, 33 production releases, and only 1 defect found in production
- So, what was the defect you say? Let me tell you…

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Lets wrap this up...

What should I take away from this?

Principles for Managing Software Debt

- Maintain one list of work
- Emphasize quality
- Evolve tools and infrastructure continually
- Improve system design always
- Share knowledge across the organization
- And most importantly, get the right people to work on your software!

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Thank you

Questions and Answers

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- Innovation Games® Trained Facilitator
- Open Source Developer and Consultant
- Software technology, architecture, release management, monitoring, and design consulting for Agile Teams

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