Agile and Secure: Can We Be Both?

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The OWASP Foundation
http://www.owasp.org/

The Agile Practitioner's Dilemma

Agile Forces:

- More responsive to business concerns
- Increasing the frequency of stable releases
- Decreasing the time it takes to deploy new features

Secure Forces:

- More aggressive regulatory environment
- Increasing focus on need for security
- Traditional approaches are top-down, document centric

Objectives

- Background
- Goals of Agile Methods
- Goals of Secure Development Lifecycle (SDL)
- Review the Momentum of Agile Methods
- Look at An Integrated Process
- Challenges & Compromises

Notable Agile Methods

- eXtreme Programming (XP)
- Feature Driven Development (FDD)
- SCRUM
- MSF for Agile Software Development
- Agile Unified Process (AUP)
- Crystal Clear
- Dynamic Systems Development Method (DSDM)

Manifesto for Agile Software Development

Individuals and interactions over processes and tools

Working software over comprehensive documentation

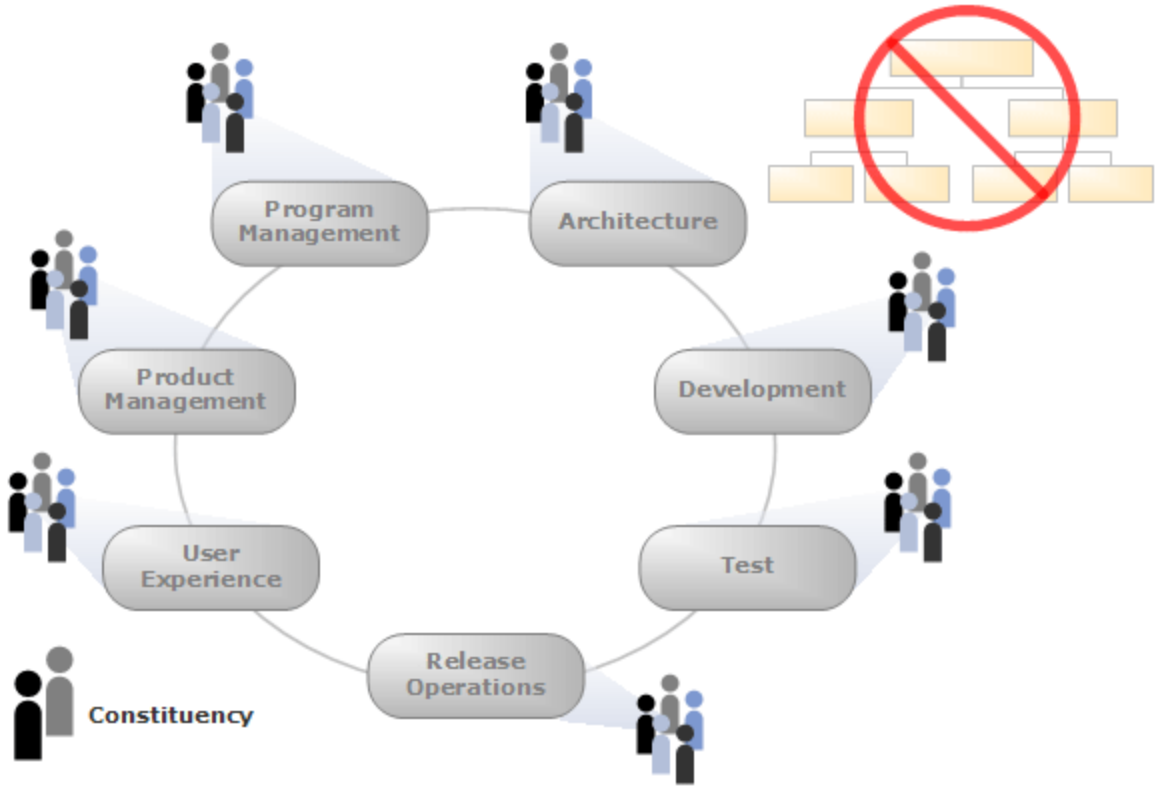
Customer collaboration over contract negotiation

Responding to change over following a plan

Source: http://www.agilemanifesto.org/

Agile's Core Values

- Communication
- Simplicity
- Feedback
- Courage



Principles of Agile Development

- Rapid Feedback
- Simple Design
- Incremental Change
- Embracing Change
- Quality Work

- The system is appropriate for the intended audience.
- The code passes all the tests.
- The code communicates everything it needs to.
- The code has the smallest number of classes and methods.

Agile Practices

- The Planning Game
- The Driving Metaphor
- Shared Vision
- On-Site Customer
- Small Releases

• Customer: scope, priorities and release dates

• Developer: estimates, consequences and detailed scheduling

• Development iterations or cycles that last 1-4 weeks.

• Release iterations as soon as possible (weekly, monthly, quarterly).

More Agile Practices

- Test Driven
- Collective Ownership
- Coding Standards
- Pair Programming
- Continuous Integration

• Programmer tests guide the development process. Red, Green, Refactor

• Customer tests provide feedback to the team that the system is working as expected.

Continuously build, deploy and execute all of the system's tests multiple times per day.

Agile Methods strive to…

- Adapt to ever-changing customer needs.
- Bring together small teams of highly talented individuals and remove obstacles that get in the way of developing quality systems.
- Maintain a strong emphasis on testing.

A secure product is one that protects the confidentiality, integrity, and availability of the customers' information, and the integrity and availability of processing resources under control of the system's owner or administrator.

-- Source: Writing Secure Code (Microsoft.com)

A Secure Development Process…

- Strives To Be A Repeatable Process
- Requires Team Member Education
- Tracks Metrics and Maintains Accountability

Sources:

"Writing Secure Code" 2nd Ed., Howard & LeBlanc

"The Trustworthy Computing Security Development Lifecycle" by Lipner & Howard

Secure Development Principles

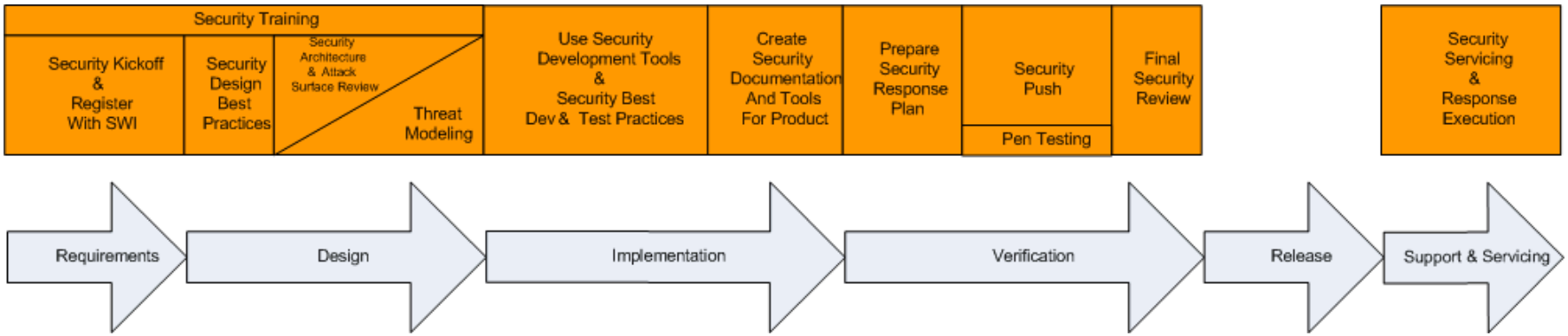
- SD^3: Secure by Design, Secure by Default, and in Deployment
- Learn From Mistakes
- Minimize Your Attack Surface
- Assume External Systems Are Insecure
- Plan On Failure
- Never Depend on Security Through Obscurity Alone
- Fix Security Issues Correctly

Secure Development Practices

- Education, Education, Education
- Threat Modeling
- Secure Coding Techniques
- Security Testing
- Security Code Reviews

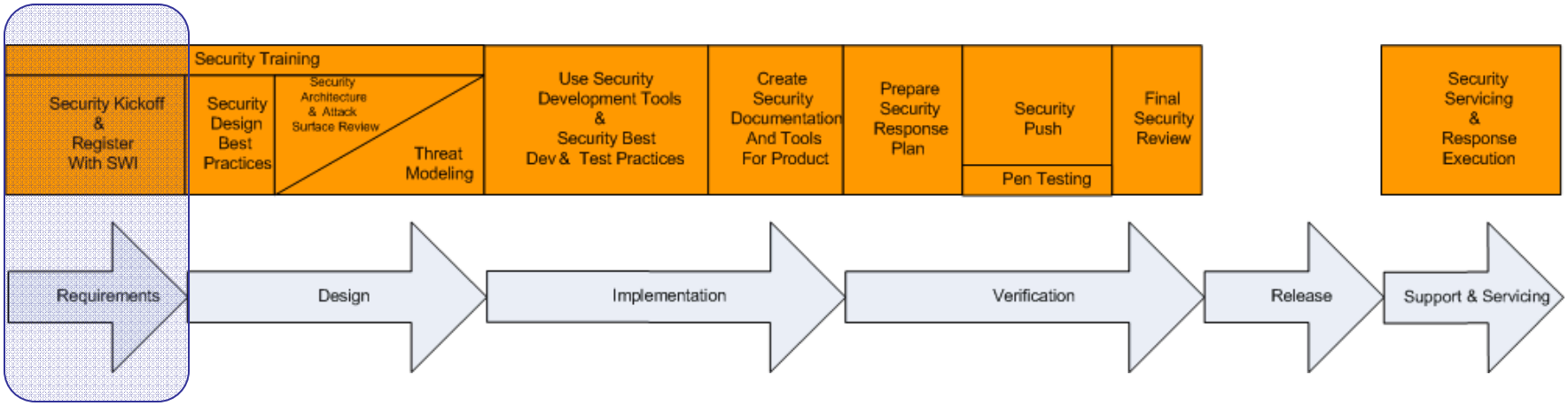
Microsoft's Secure Development Lifecycle (SDL)

- Requirements
- Design
- Implementation
- Verification
- Release



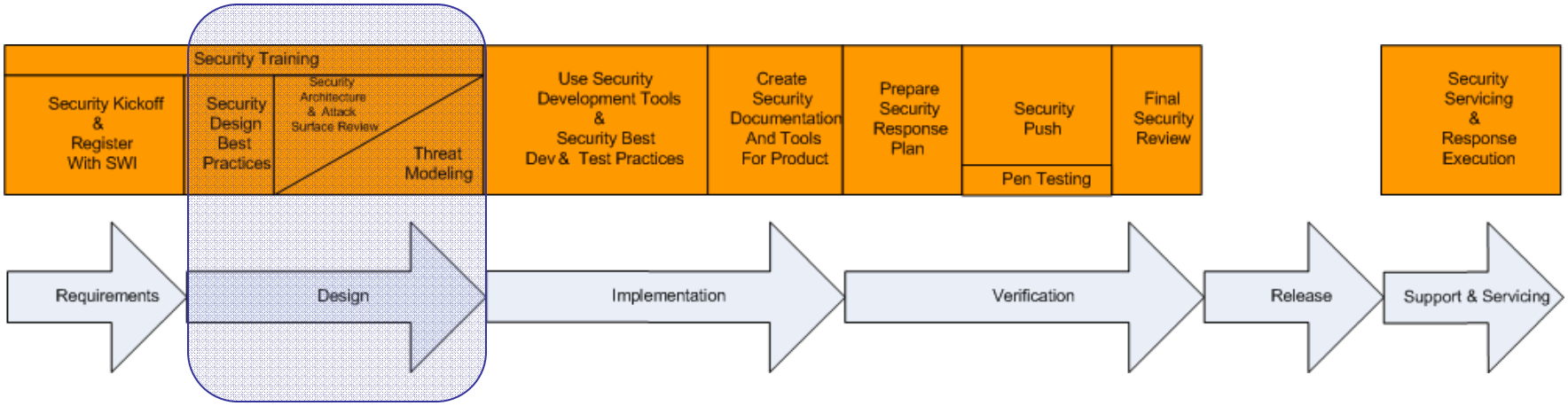
SDL: Requirements Phase Activities

- Determine (or make contact with) the security advisor *"security buddy"*
- Identify key security objectives for the system
- Consider Security Feature Requirements



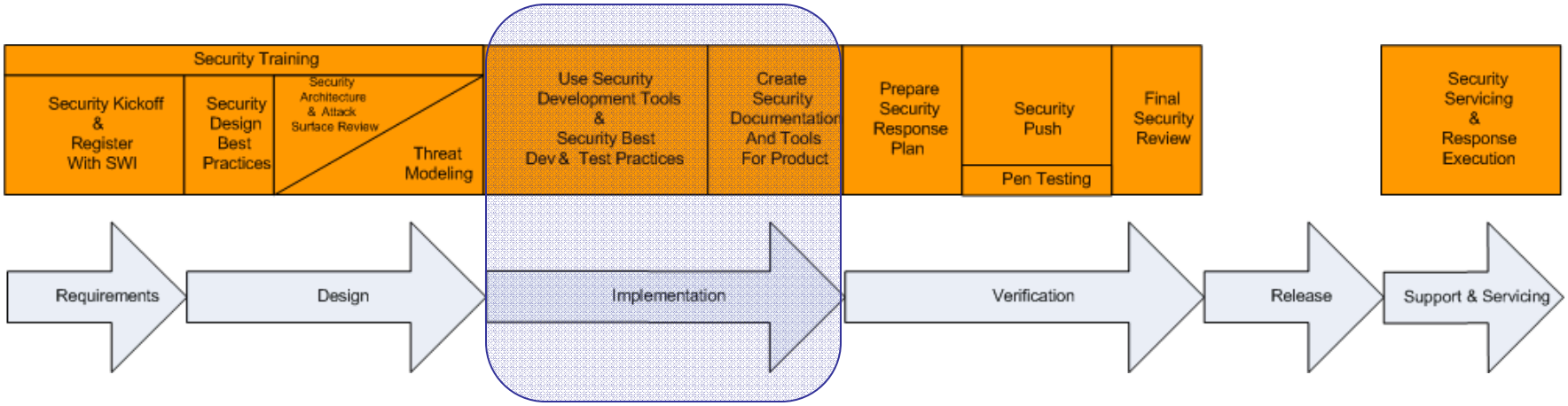
SDL: Design Phase Activities

- Define Security Architecture and Design Guidelines
- Document the Attack Surface
- Conduct Threat Modeling
- Define Supplemental Ship Criteria



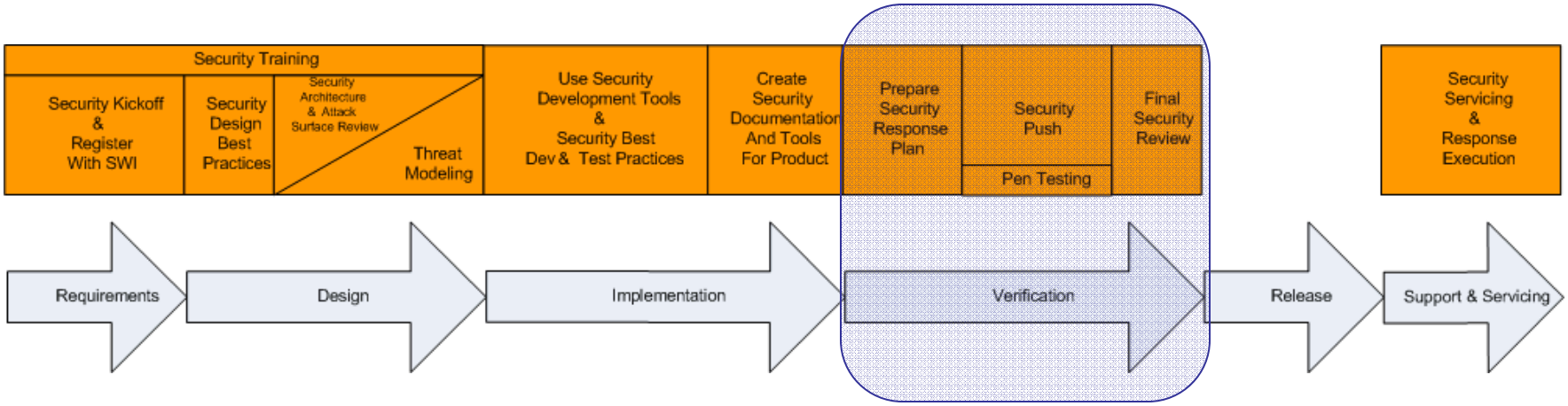
SDL: Implementation Phase Activities

- Apply Common Coding Standards
- Apply Security-Testing Tools
- Apply Static-Analysis Code Scanning Tools
- Conduct Security Code Reviews



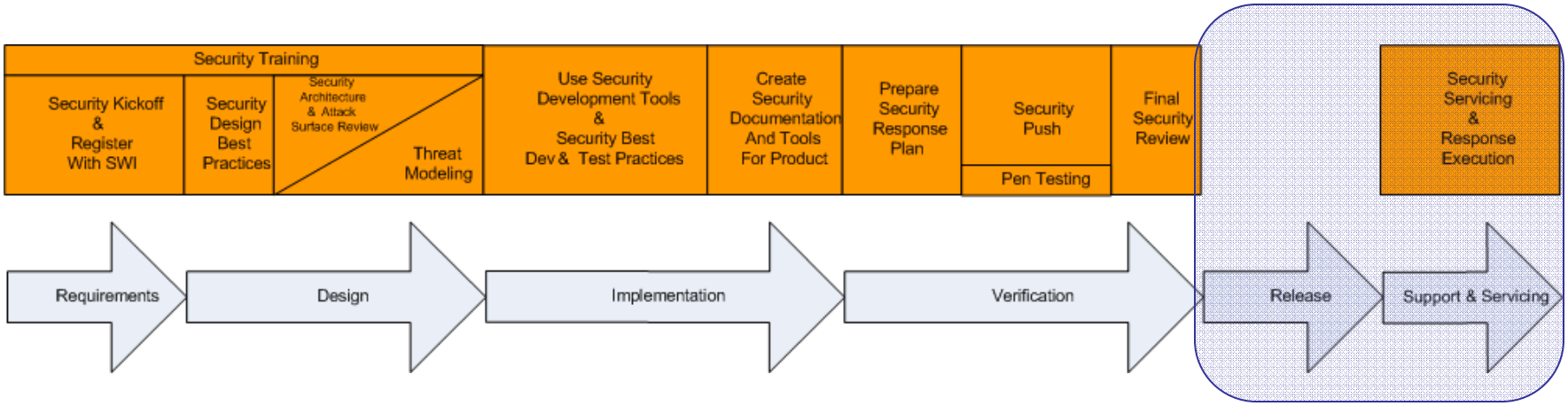
SDL: Verification Phase Activities

- Conduct the “Security Push”
  - Additional Security Code Reviews
  - Focused Security Testing



SDL: Release, Support & Servicing Activities

- Conduct the Final Security Review (FSR) Prior to Release
- Prepare to Respond to Vulnerability Reports
- Learn from Errors and Mistakes



Observations of the SDL in Practice

- Threat Modeling is the Highest-Priority Component
- Penetration Testing Alone is Not the Answer
- Tools Should be Complementary
- Microsoft's experience has indicated that the SDL has been effective at reducing security vulnerabilities in their products.

Dr. Dobb's says Agile Methods Are Catching On

41% of organizations have adopted an agile methodology

65% have adopted one or more agile techniques

Of the 2,611 respondents doing agile...

- 37% using eXtreme Programming
- 19% using Feature Driven Development (FDD)
- 16% using SCRUM
- 7% using MSF for Agile Software Development

Source: http://www.ddj.com/dept/architect/191800169

Agile Teams are "Quality Infected"

- 60% reported increased productivity
  - 6% reported a decrease
- 66% reported improved quality
- 58% improved stakeholder satisfaction
  - 3% reported a decrease

Adoption Rate for Agile Practices

Of the respondents using an agile method...

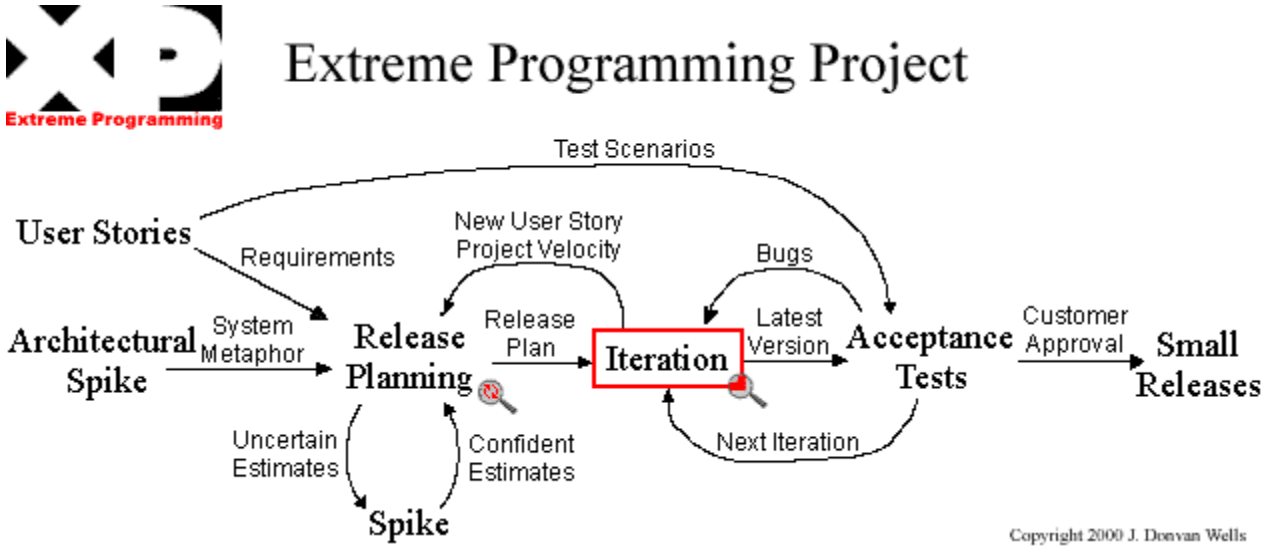
- 36% have active customer participation
- 61% have adopted common coding guidelines
- 53% perform code regression testing
- 37% utilize pair programming

Let's Look at Some Specific Agile Methods

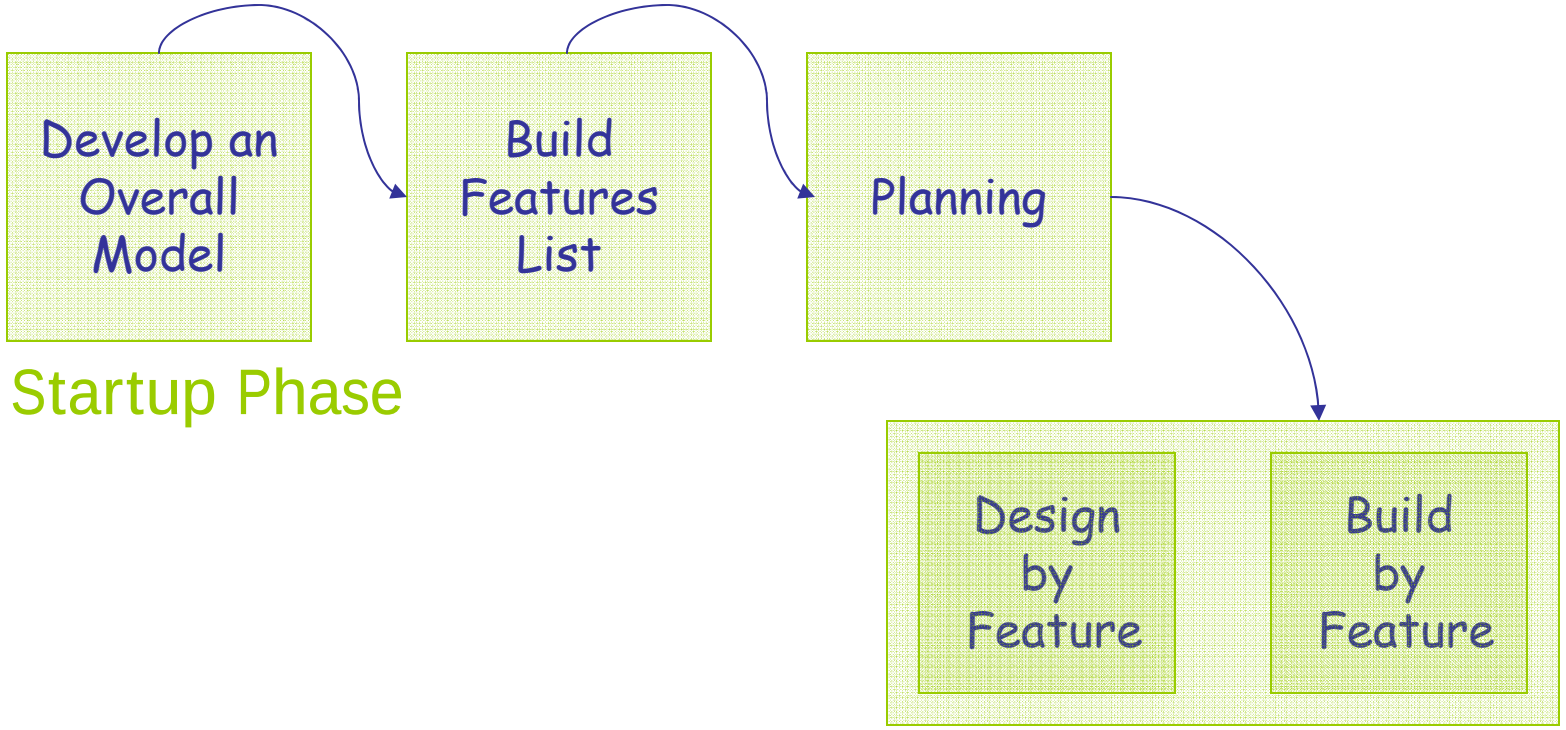
- eXtreme Programming (XP)
- Feature Driven Development (FDD)
- SCRUM
- MSF for Agile Software Development

eXtreme Programming (XP)

- Light-weight, small-to-medium sized teams
- Work on things that really matter every day
- Get the most possible value out of every development week
- Takes commonsense principles and practices to extreme levels.



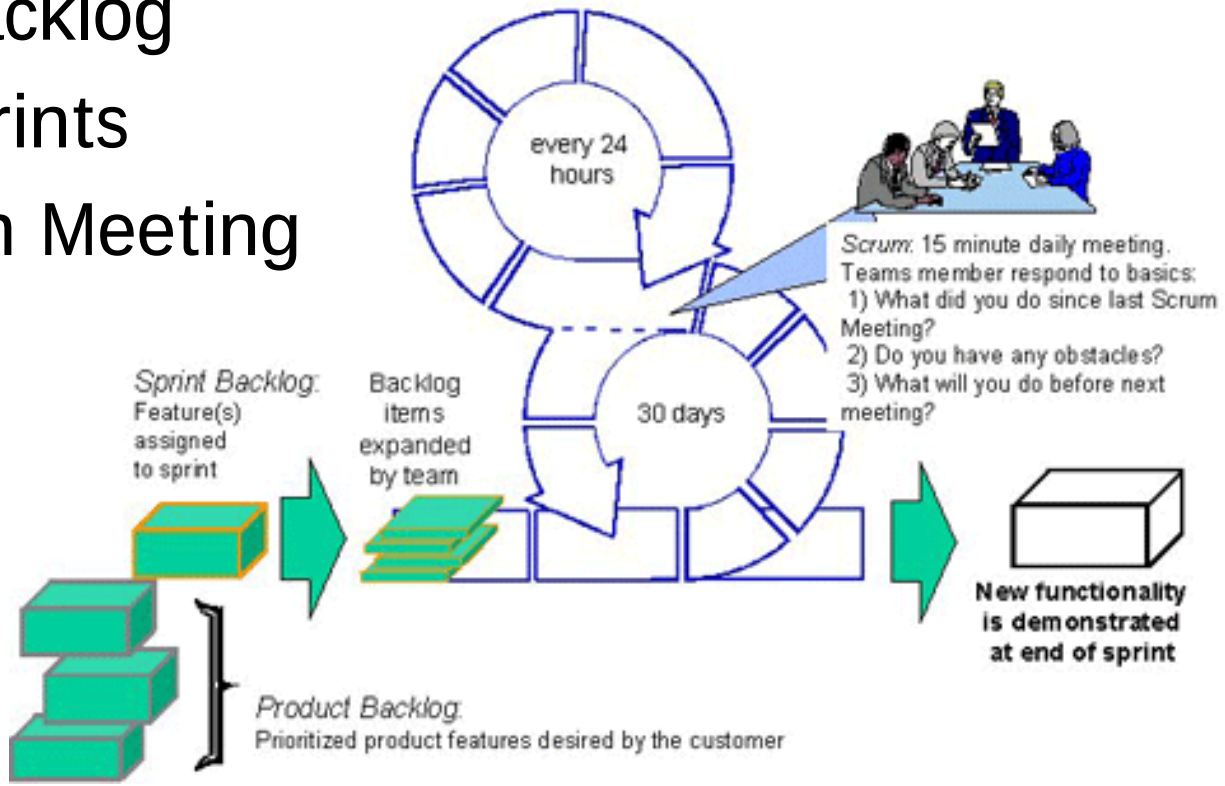
Feature Driven Development (FDD)



Source: http://featuredrivendevelopment.com/

SCRUM

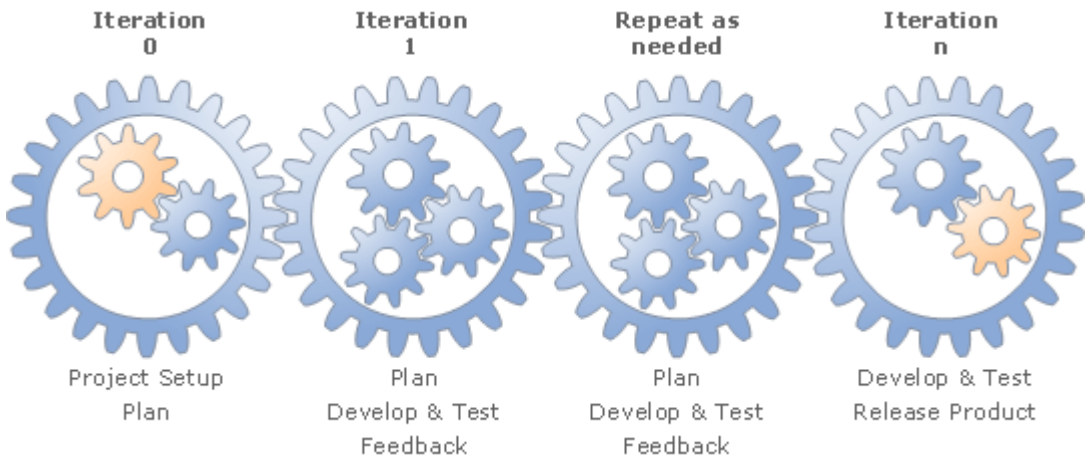
- Commonly Used to Enhance Existing Systems
- Feature Backlog
- 30 Day Sprints
- Daily Team Meeting



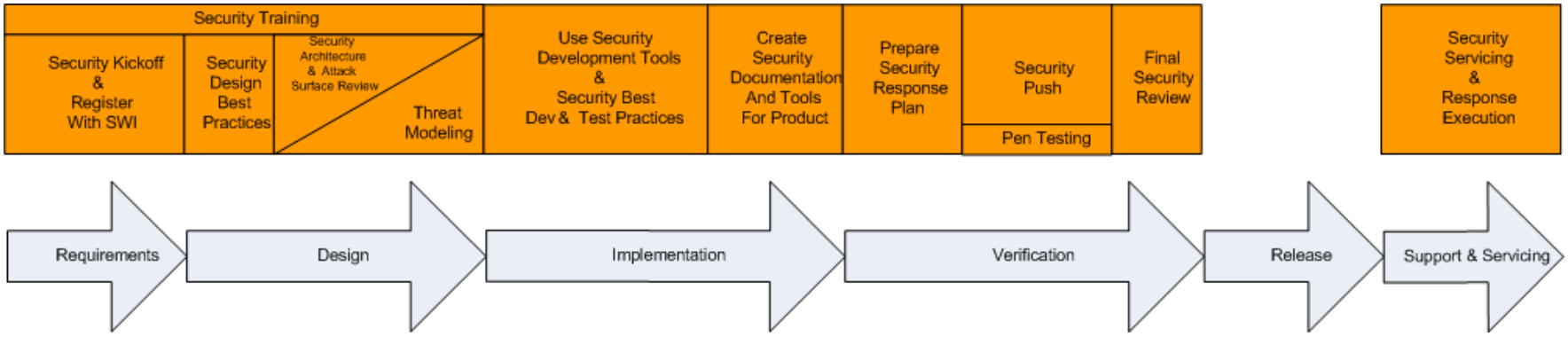
Source: http://www.controlchaos.com/

MSF for Agile Software Development

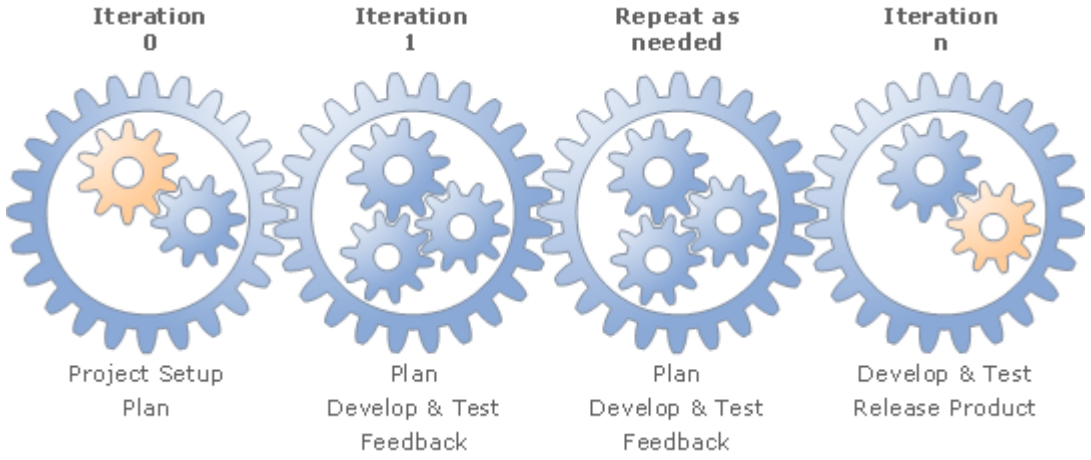
- Adapted from the MSF's Spiral / Waterfall Hybrid
- Product definition, development and testing occurs in overlapping iterations
- Different iterations have a different focus



Let's Look at an Integrated Process

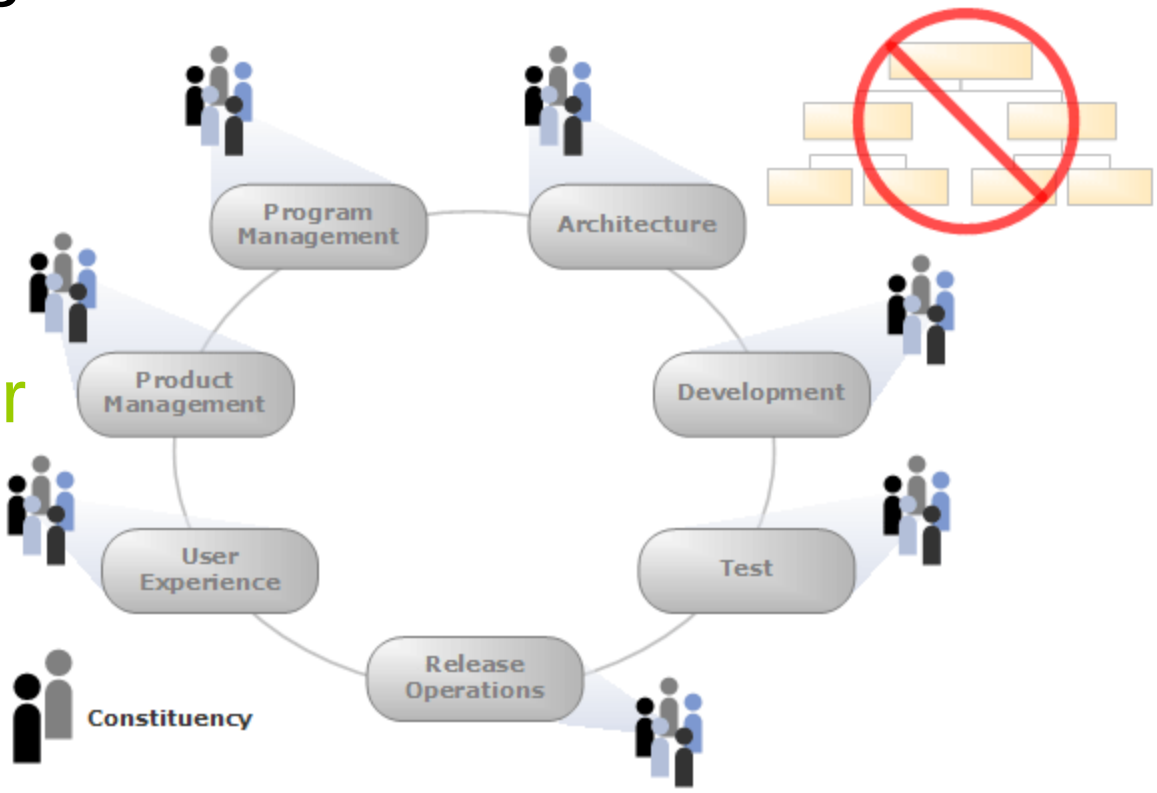


Making Agile Trustworthy



Project Roles

- Product Manager / Customer
- Program Manager / Coach
- Architect
- Developer
- Tester
- Security Adviser



Project Setup

- Education & Training *(include Security)*
  - Developers
  - Testers
  - Customers
- User Stories / Use Case Development
- Architecture Decisions (spikes)

Release Planning

- User Stories / Use Cases Drive...
  - Acceptance Test Scenarios
  - Estimations may affect priorities and thus the composition of the release
  - Inputs for Threat Modeling
  - Security Testing Scenarios
- Finalize Architecture & Development Guidelines
  - Common Coding Standards *(include security)*
  - Conduct Initial Threat Modeling (assets & threats)
  - Designer's Security Checklist

Iteration Planning

- 1-4 Weeks in Length (2 weeks is very common)
- Begins with an Iteration Planning Meeting
  - User Stories are broken down into Development Tasks
  - Developers estimate their own tasks
  - Document the Attack Surface (Story Level)
- Never Slip the Date
  - Add or Remove Stories As Necessary

Anatomy of a 2 Week Iteration

Day 1:

-Iteration Planning Meeting

- Developers signup for tasks

Days 2 & 3:

- Architectural spikes

- Agile Modeling
  - Attack surface & Threat Modeling

Days 4 – 9:

- Developers complete tasks
- Testers implement automated acceptance tests

Day 9:

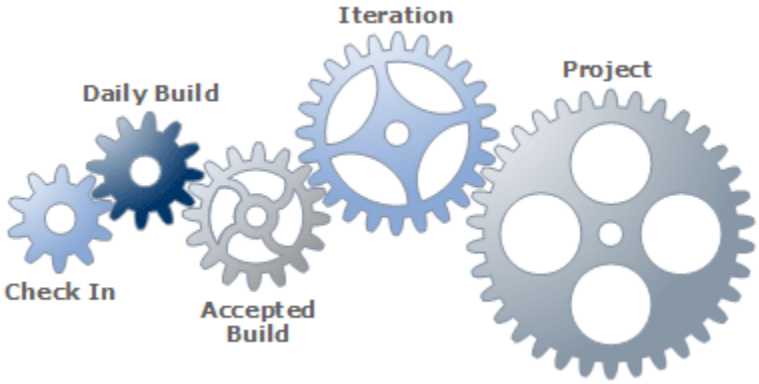
- Security Code Review

Day 10:

- Iteration close out
- Security testing

Executing an Iteration

- Daily Stand-ups
- Continuous Integration
  - Code Scanning Tools
  - Security Testing Tools



- Adherence to Common Coding Standards and Security Guidelines
- Pair Programming
  - New Features, Refactoring, Hazardous Components
- Developer's Checklist

Stabilizing a Release

- Just like any other iteration
- Schedule Defects & Vulnerabilities based on customer priorities
- Final Security Review (FSR)

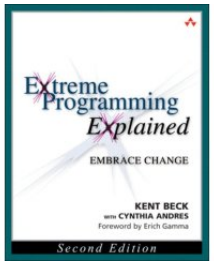
Challenges & Compromises

- Balance of Code Review vs. Pair Programming
- SDL Techniques practices in small doses throughout the duration of the project
- Threat Modeling performed against a moving target

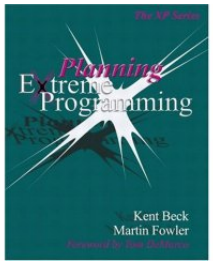
Can We Be Both?

- Communication
- Simplicity
- Feedback
- Courage
- Trustworthy

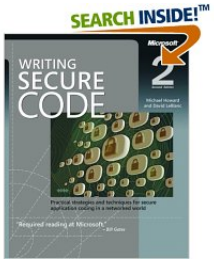
Book Resources



- Extreme Programming Explained: Embrace Change, Kent Beck, Addison Wesley



- Planning Extreme Programming, Kent Beck and Martin Fowler, Addison Wesley



- Writing Secure Code 2nd Edition, Michael Howard and David LeBlanc, Microsoft Press

Article Resources

- The New Methodology, Martin Fowler
  http://www.martinfowler.com/articles/newMethodology.html

- The Trustworthy Computing Security Development Lifecycle, Steve Lipner and Michael Howard
  http://msdn.microsoft.com/security/default.aspx

- Survey Says: Agile Works in Practice, Scott Ambler
  http://www.ddj.com/dept/architect/191800169

- SCRUM Development Process, Ken Schwaber, Advanced Development Methods
  http://jeffsutherland.com/oopsla/schwapub.pdf

Web Site Resources

- http://www.agilealliance.org
- http://www.xprogramming.com
- http://www.featuredrivendevelopment.com
- http://www.controlchaos.com
- http://msdn.microsoft.com/vstudio/teamsystem/msf/msfagile

Questions & Answers