

Extreme Programming

Best Practices, Tradeoffs, and Variants

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Recommended XP Books

The basic XP book

- ***Kent Beck, Extreme Programming Explained: Embrace Change, 1999.***
- ***Kent Beck and Cynthia Andres, Extreme Programming Explained: Embrace Change, 2nd Edition, 2004.***

The anti-XP book (not anti-agile!)

- ***Matt Stephens and Doug Rosenberg, Extreme Programming Refactored: The Case Against XP, 2003.***

Other Books on Agile Methods

Viewing agile methods from a risk management perspective

- **Barry Boehm and Richard Turner, Balancing Agility and Discipline: A Guide for the Perplexed, 2004.**

Comparing agile methods

- **Craig Larman, Agile and Iterative Development: A Manager's Guide, 2004.**

Feature Driven Development (FDD)

- **David J. Anderson, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, 2004.**

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Topics

→ An Overview of XP

XP Management Practices

XP Design Practices

XP Code and Test Practices

Summing Up Agile and XP

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Extreme Programming Practices

Planning game

Pair programming

Small releases

Collective (code) ownership

Metaphor

Continuous integration

Simple design

40-hour week

- (sustainable pace)

Testing

- (test-driven development)
- (customer tests)

On-site customer

- (whole team)

Refactoring

- (design improvement)

Coding standard

*Kent Beck, [Extreme Programming Explained: Embrace Change](http://www.xprogramming.com/xpmag/whatisxp.htm), 1999.
(<http://www.xprogramming.com/xpmag/whatisxp.htm>)*

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The 2004 XP Practices

Primary Practices

- Sit together
- Whole team
- Informative workspace
- Energized work
- Pair programming
- Stories
- Weekly cycle
- Quarterly cycle
- Slack
- Ten-minute build
- Continuous integration
- Test-first programming
- Incremental design

Corollary Practices

- Real customer involvement
- Incremental deployment
- Team continuity
- Shrinking teams
- Root-cause analysis
- Shared code
- Code and tests
- Single code base
- Daily deployment
- Negotiated scope contract
- Pay-per-use

K. Beck and C. Andres, [Extreme Programming Explained: Embrace Change, 2nd Edition](#), 2004.

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The Sweet Spot for XP

Very volatile (emergent) requirements

Small to medium sized systems

Small teams of highly competent generalists

Co-located with empowered customer

Not life-critical or essential moneys systems

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XP: On-Site Customer (Whole Team)

A real, live user on the team full-time to answer questions.

An on-site customer, or some reasonable proxy, is a prerequisite for the planning game and small releases to work – an implementation prerequisite.

Antecedents

- ***Joint Application Design (Davidson 1999)***
- ***end-user development (Janvrin 1996; Burnett 2004)***

XP: Planning Game

Quickly determine the scope of the next release, combining business priorities and technical estimates.

The customer decides scope, priority, and dates from a business perspective.

Technical people estimate and track progress.

Antecedents

- ***JAD***
- ***Quality Factor Development (Zultner 1995)***

XP: Small Releases

Put a simple system into production quickly.

Release new versions on a very short (two-week) cycle.

“If you can’t plan well, plan often.”

• Watts Humphrey

An implementation decision on the right kind of life cycle.

Small Release Antecedents

Iterative / incremental / evolutionary life cycles

- Mills 1976***
- McConnell 1996***
- Larman 2003***

evo (Gilb 1988)

Prototyping (Baskerville 2006)

Rapid Application Development (Beynon-Davies 1999)

*XP: 40-Hour Week
(Sustainable Pace,
Energized Work)*

Work no more than 40 hours per week as a rule.

Never work overtime two weeks in a row.

***Work only as many hours as you can be
productive and only as many hours as you can
sustain.***

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Sustainable Pace Antecedents

Peopleware (DeMarco 1999)

Multitasking, fragmentation (Constantine 1995)

Slack (DeMarco 2001)

***Critical chain project management (Goldratt
1997)***

People CMM (Curtis 2001)

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2004 Additions

Sit together

- develop in an open space big enough for the whole team

Informative workspace

- make your workspace about your work... big, visible charts

Weekly cycle

- plan work a week at a time

Quarterly cycle

- plan work a quarter at a time

Slack

- in any plan, include some minor tasks that can be dropped if you get behind.

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XP: Metaphor

Guides all development with a simple, shared story of how the whole system works.

Antecedents

- *Unique to XP as far as I know!*
- *Not another name for architecture...*

“Few practitioners claimed to understand the intent of metaphor as a practice, how to devise and evaluate metaphors, or the relationship of metaphor to design and the other XP practices. As XP evolved metaphor was demoted and is no longer a separate practice. Most agile proponents mention metaphor and acknowledge minor uses. This paper argues that XP was wrong to abandon metaphor and advocates a more systematic discussion of how metaphor informs development.” (West 2005)

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XP: Simple Design

Design as simply as possible at any given moment.

An implementation philosophy on how to design.

Antecedents

- *Structured programming: information hiding, abstraction, high cohesion, low coupling, ...*
 - *Pressman 2004*
 - *plus Dijkstra, Mills, Constantine, Knuth, etc.*

“... resolution of these design issues was based on a simple rule: do not implement a solution to a problem you may not have.”

- *M.C. Paulk, “The ARC Network: A Case History,” IEEE Software, Vol. 2, No. 3, May 1985, pp. 62-69.*

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XP: Refactoring (Design Improvement)

Restructure the system without changing behavior to remove duplication, improve communication, simplify, or add flexibility.

An implementation philosophy on how to design.

Antecedents

- *No antecedents that I am aware of!*
- *Refactoring: Improving the Design of Existing Code (Fowler 1999)*

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XP: Coding Standards

Rules emphasizing communication throughout the code.

Antecedents

- *DOD, IEEE, ISO standards...*
- *Programming Proverbs (Ledgard 1975)*
- *Programming Pearls (Bentley 1986/8)*
- *Literate programming (Knuth 1984)*

XP: Pair Programming

All production code is written by two programmers at one machine.

An implementation philosophy – and a culture shift! – on how to continuously do peer reviews.

Antecedents

- *Walkthroughs (Weinberg 1971/98)*
- *Dynamic duos (Constantine 1995)*
- *Peer reviews (Paulk 1995)*
- *Pair Programming Illuminated (Williams 2002)*

XP: Collective (Code) Ownership

Anyone can improve any code anywhere in the system at any time.

An implementation philosophy – and a culture shift! – on how to address problems (and make improvements) that depends on “continuous integration” to work.

Antecedents

- ***Unique to XP as far as I know...***
- ***Worker empowerment conceptually...***
- ***Depends on continuous integration as an enabling practice!***

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XP: Continuous Integration

Integrate and build the system many times a day, every time a task is finished.

Continual regression testing means no regressions in functionality as a result of changed requirements.

Integrate and test changes after no more than a couple of hours.

Antecedents

- ***Daily build and smoke test***
 - Cusumano 1995
 - McConnell 1996
- ***Compile and smoke test frequently***
 - SPMN critical software practice, Lochner 1999

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XP: Testing
(Test-Driven Development; Test-First Programming; Customer Tests)

Continually write unit tests that must run flawlessly.

Customers write tests to demonstrate functions are finished.

“Test, then code” means a failed test case is an entry criterion for writing code.

Antecedents

- ***Early reference in NASA’s Project Mercury***
 - *Williams 2003*
 - *Larman 2003*

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2004 Additions

Incremental design

- **invest in the design of the system every day**
- **the question is not whether or not to design, the question is when to design**

Ten-minute build

- **automatically build the whole system and run all of the tests in ten minutes**

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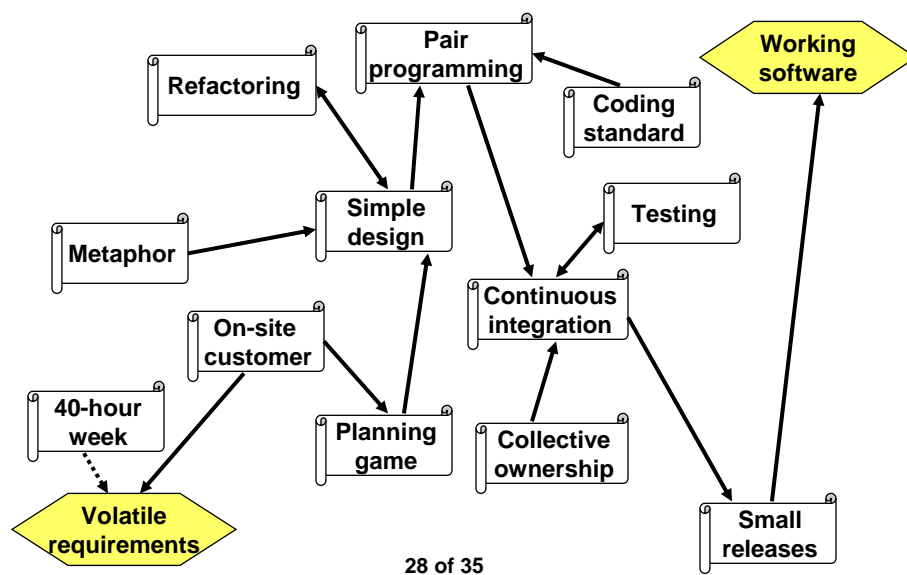
XP Design Practices

XP Code and Test Practices

➔ Summing Up Agile and XP

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(Some) XP Practice Relationships



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Principles of Agile Software Development

A. Cockburn, "Learning From Agile Software Development," Crosstalk: The Journal of Defense Software Engineering, October & November 2002.

- 1) Different projects need different methodology trade-offs.
- 2) A little methodology does a lot of good; after that, weight is costly.
- 3) Larger teams need more communication elements.
- 4) Projects dealing with greater potential damage need more validation elements.
- 5) Formality, process, and documentation are not substitutes for discipline, skill, and understanding.
- 6) Interactive, face-to-face communication is the cheapest and fastest channel for exchanging information.
- 7) Increased communication and feedback reduces the need for intermediate work products.
- 8) Concurrent and serial development exchange development cost for speed and flexibility.
- 9) Efficiency is expendable in non-bottleneck activities.
- 10) Sweet spots speed development.

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Tacit vs Explicit Knowledge

"The difference between agile methods and the Unified Process is knowledge management – agile is tacit, UP is explicit."





"80% of software work is no-brain work."

"60% of change requests for MS-Word are for features that are already there."







- ***Ivar Jacobson, Software Engineering Conference (Russia), 27-28 October 2005.***

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Aligning Agility and Discipline

-  Early and continuous delivery
-  Changing requirements, even late in development
-  Work with business people (customers and end users)
-  Motivated individuals with support they need . . . *People CMM*

Face-to-face conversation

-  Working software
-  Sustainable development, constant pace
-  Continuous attention to technical excellence and good design
-  Simplicity
-  Self-organizing teams . . . *CMMI / IPPD*
-  Reflect on how to become more effective, then adjust behavior

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Barriers to the Success of XP

A customer who insists on the big specification...

A culture that requires long hours to prove commitment...

Projects that are too big (more than about ten programmers)...

An environment with a long time to gain feedback (e.g., realistically test the software)...

The wrong physical environment (e.g., team members on different floors, not co-located)...

We do XP, just not most/any of the practices...

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Cultural Misfits
(Using the DoD as an Example...)

Regulatory requirements for a level playing field raise challenges for evolutionary and incremental development...

The need by the contracts officer for a requirements specification...

Progress payments defined from a waterfall mentality...

Barriers – regulatory and cultural – to a collaborative customer relationship...

Protests from competitors...

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Questions and Answers



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