Extreme Programming:

What it is any why you should care

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Presentation based on material from Nick Southwell, WilliamWake, and others

XP is...

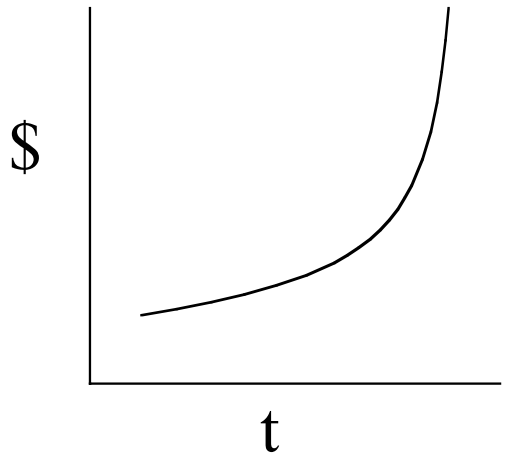
A lightweight development methodology that emphasizes:

- ongoing user involvement
- testing
- pay-as-you-go design

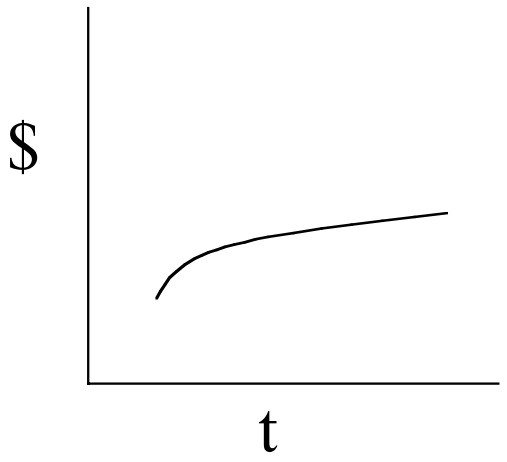
Why should you care

- Spring Quarter 2001: I'm teaching an XP class at OGI
  - The ultimate Chutzpah
- I need help!
  - Teaching assistants
  - "Customers"
  - Students
  - "Pre-teachers"

Background: Cost of Changes

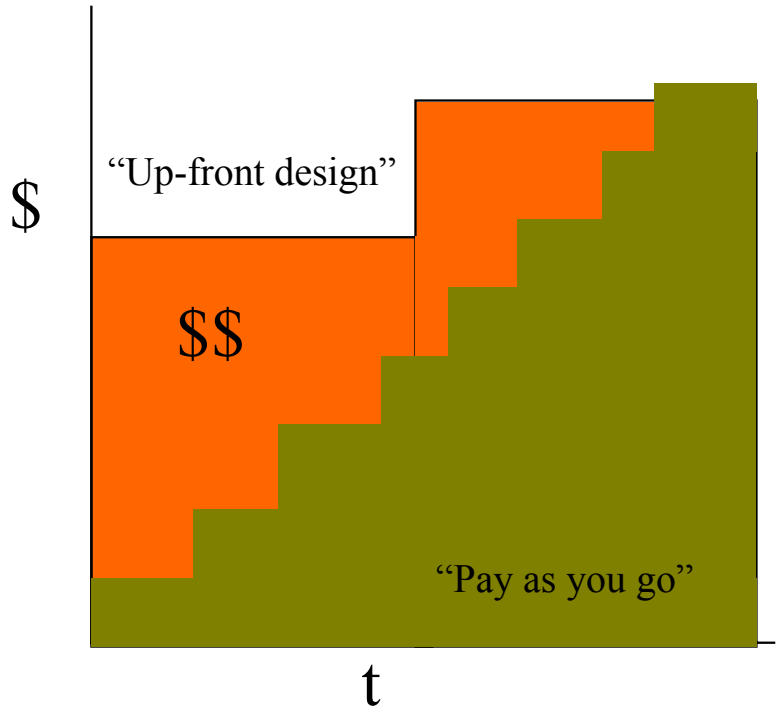


"Then" (exponential)



"Now" (flattened)

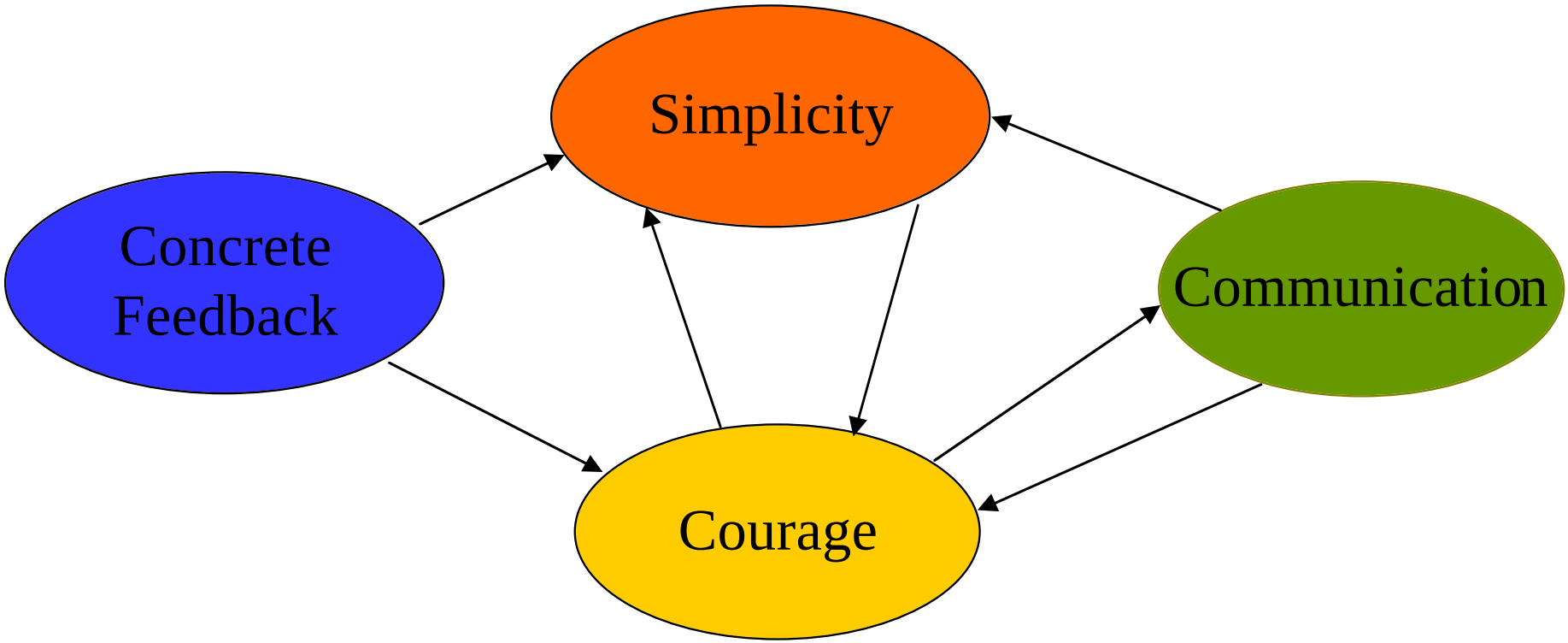
Background: Cost of Money



Key values of XP

- Communication
  - Problems with projects can invariably be traced back to somebody not talking to somebody else.
- Simplicity
  - It is better to do a simple thing today, and pay a little more tomorrow, than to do a complicated thing today that may never be used.
- Concrete Feedback
  - Feedback at all time scales keeps the project on track.
- Courage
  - Together with the first three values, Courage allows you to make high-risk, high-reward experiments. Without them, it's just hacking.

XP values



XP Principles

- Get rapid feedback
- Assume simplicity
- Incremental change
- Embrace Change
- Do quality work

XP Practices

- Planning Game
- Metaphor
- Testing
- Refactoring
- Pair programming
- Small releases
- On-site customer
- Simple design
- Collective ownership
- Continuous integration
- 40-hour week
- Coding Standards

Planning Game

User stories = lightweight use cases

- 2-3 sentences on a file card that
  - —the customer cares about
  - —can be reasonably tested
  - —can be estimated & prioritized

Planning Game (cont.)

- Users write stories
- Developers estimate them
- Users split, merge, & prioritize
- Plan overall release (loosely) and the next iteration
  - Don’t plan too far ahead

Small Releases

- Make every release as small as possible
  - Release makes sense as a whole
- Make simple designs, sufficient for the current release
- Small releases provide:
  - rapid feedback
  - sense of accomplishment
  - reduced risk
  - customer confidence
  - adjustments to changing requirements

Metaphor

- Guide the project with a single Metaphor
  - *e.g.*, the UI is a desktop
- Must represent the architecture
  - makes it easier to discuss
- The customer must be comfortable with it

Simple Design

- The right design for software is:
  - Runs all the tests.
  - Has no duplicated logic (DRY principle)
  - States every intention important to the programmers.
  - Has the fewest possible classes and methods
- Don’t worry about having to change a design later

Testing

- XP tests everything that might possibly break, all the time
- The tests *are* the specification:
  - An *executable* specification
- Two kinds of tests:
  - Functional Tests
  - Unit Tests

Functional Tests

- Specified by the user
- Implemented by users, developers, and/or test team
- Automated
- Run at least daily
- Part of the specification

Unit Tests

- Written by developers
- Written before and after coding
- Always run at 100%
- Support design, coding, refactoring, and quality.

Pair Programming

- Role of one partner
  - uses the mouse and the keyboard
  - thinks about the best way implementing the method
- Role of the other
  - is the approach going to work
  - think about test cases
  - can it be done simpler
- Pairing is dynamic
- Pairing provides discipline
- Pairing spreads knowledge about the system

Collective Code Ownership

- Anybody can add to any portion of the code
  - subject to current requirements
  - subject to simple design
- Unit tests protect the system functionality
- Whoever find a problem, solves it
- Everybody is responsible for the whole system

Continuous Integration

- Integration of tested code every few hours (max. a day)
- All unit tests need to run successfully
- If a test fails the pair has to repair it
- If you can’t repair it, throw away the code and start again

40 Hour Week

- If you can’t do your work in 40 hours, then you have too much work
- 40-Hour weeks keeps you fresh to tackle problems
- It prevents making silly, hard to find mistakes late at night
- Frequent planning prevents you from having too much work
- Overtime is a symptom of a serious problem

On-site Customer

- Writes functional tests
- Makes priority and scope decisions for the programmers
- Answers questions
- Does his or her own work

If you can’t get an On-site Customer, maybe the project isn’t important enough?

Coding Standards

- Complicated constructions are not allowed
  - let’s keep things simple
- Code looks uniform
  - easier to read
- No need to reformat the code
  - no ‘curly brackets wars’

Design

- Pay as you go
- Re-design when necessary
- “You aren’t gonna need it”
- “Simplest thing that could possibly work”
- “Once And Only Once”

Refactoring

- Refactor = to improve the structure of code without affecting its external behavior
- Done in small steps
- Supported by unit tests, simple design, and pair programming
- Seek “once and only once”
- Refactoring in pairs gives you more courage and confidence

Refactoring Example

Replace Magic Number by Constant:

```
return 32.5 *
    miles_traveled;
```

```
static final double
   MILEAGE_RATE = 32.5;
…
return MILEAGE_RATE *
    miles_traveled;
```

Separate Query from Modifier:

```
Stack:
    Object getTopAndPop();
```

```
    Object getTop();
    void pop();
```

Adopting XP

- Some practices can be done solo, others by team, others require users to help.
  - —Customer involvement
  - —Functional tests and unit tests
  - —Simple design & refactoring
  - —Pair programming

Nick Southwell (Motorola Personal Networks) asks: Can We Use XP?

- XP is for small teams
  - XP relies on verbal communication instead of formal documentation
- XP is for “greenfield” as opposed to “legacy” projects
  - We have lots of code with no tests, or documentation
  - We have no coding standards
  - Many parts of the system are understood by only one person
- XP requires leadership, discipline and team buy-in
  - All the team must believe that XP can work
  - There are no shortcuts
  - Need a leader to drive XP

Pretty Adventuresome Programming (PAP)

- About as much excitement as you're going to want
- Dials up pretty high: 9.3 or so.
- Wow that XP is neat! We almost do it too!

See Alistair Cockburn at
http://c2.com/cgi/wiki?PrettyAdventuresomeProgramming

Extreme Programming Requires:

- Pair Programming
- Deliver an increment every 3 weeks
- Customer on the team full-time
- Regression tests that pass 100% of the time

In return you don’t have to:

- Put comments in the code
- Write formal requirements
- Write design documents

Now, on this project we're pretty close:

- Our guys are spread around the building and the country, so we don't actually do pair programming
- Actually, we deliver our increments every 4-6 months
- We don't have customers anywhere in sight
- We don't have any unit tests

But at least:

- We don’t have many comments in the code
- We don’t have formal requirements document
- We don’t have design documents

So we're ALMOST extreme!

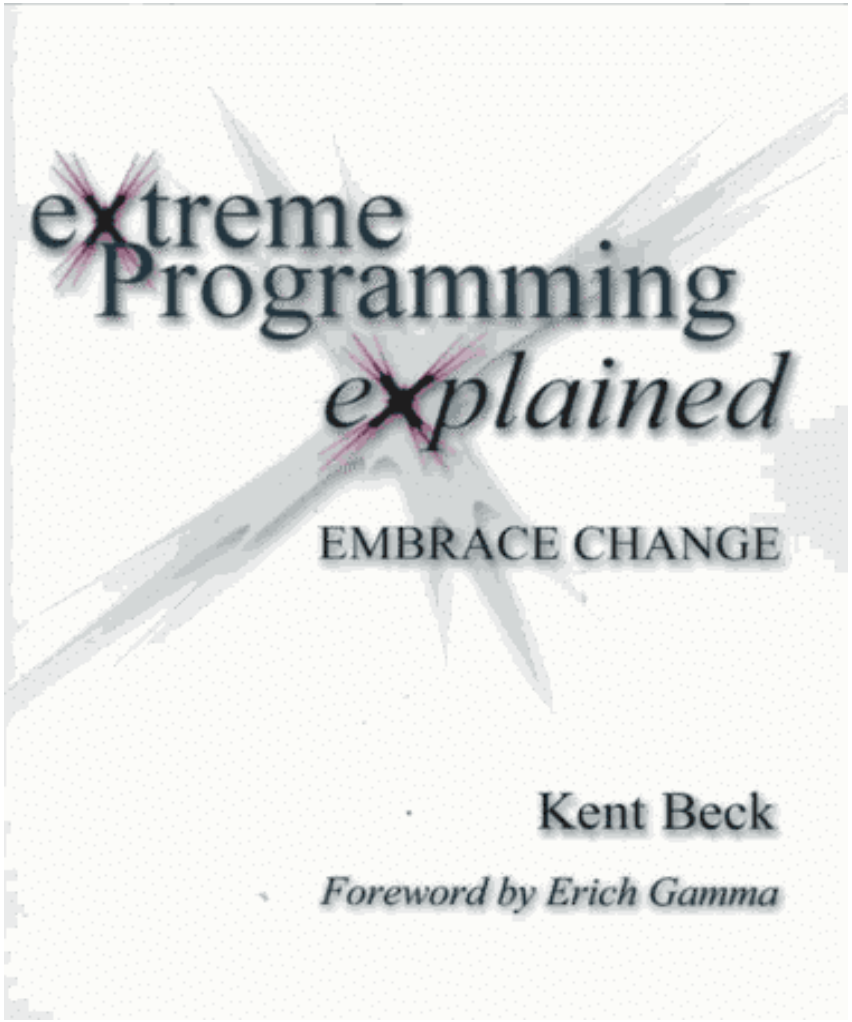
Don't use XP to legitimize not doing those things that you don't want to do, without doing the XP practices that protect you from not doing them!

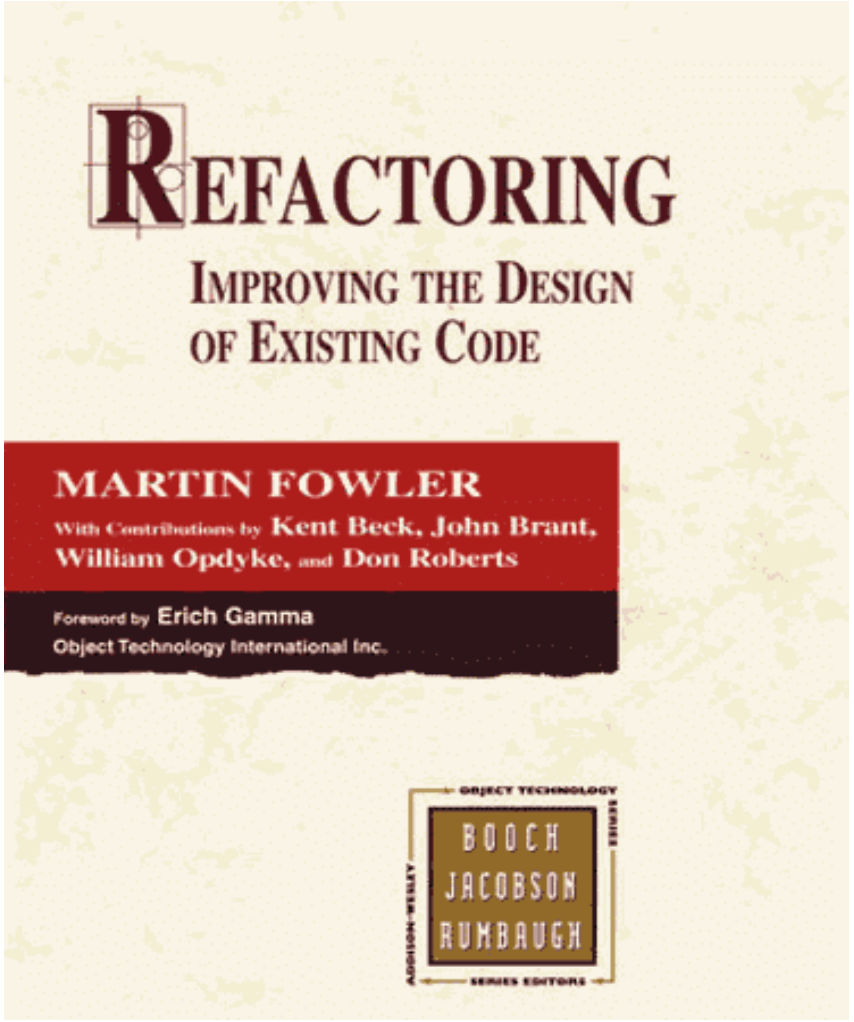
"Almost XP" = not XP at all

Internet Links to XP

- http://www.xprogramming.com
  - Ron Jeffries's site. Explains xp and offers resources for learning more.
- http://www.extremeprogramming.org/
  - Don Well's site. A great intro to XP. Presents rules and practices clearly.
- http://c2.com/cgi/wiki?ExtremeProgramming
  - The Twelve Practices of ExtremeProgramming
- http://c2.com/cgi/wiki?ExtremeProgrammingRoadmap
  - roadmap to find your way to the most important pages in a logical order.
- http://www.ObjectMentor.com/
  - Offers XP training. Based in Libertyville. Various papers on XP.
- http://www.cs.utah.edu/~lwilliam/Papers/
  - Articles on Pair Programming

Books About XP





Other Approaches

- UML: XP uses it on the whiteboard
  (if at all)
- Rational Unified Process: XP has many fewer roles & documents; XP emphasizes team over artifacts
- SCRUM: XP compatible

Summary

- XP is code centered
  - do only those things that speed up code production
  - do only those things developers like to do
    - coding and direct feedback through testing
- XP is people oriented
  - knowledge transfer through communication with real people
- XP is lightweight
  - do away with all overhead
  - create quality products by rigorously testing the code
  - only tested for small groups of developers
- The XP principles are not new