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XP-rience: eXtreme Programming Experience

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Confessions of a (not that) eXtreme Programmer leading a teleworking team building a Meta-Programming and Meta-Modelling Framework for Network & Service Management.

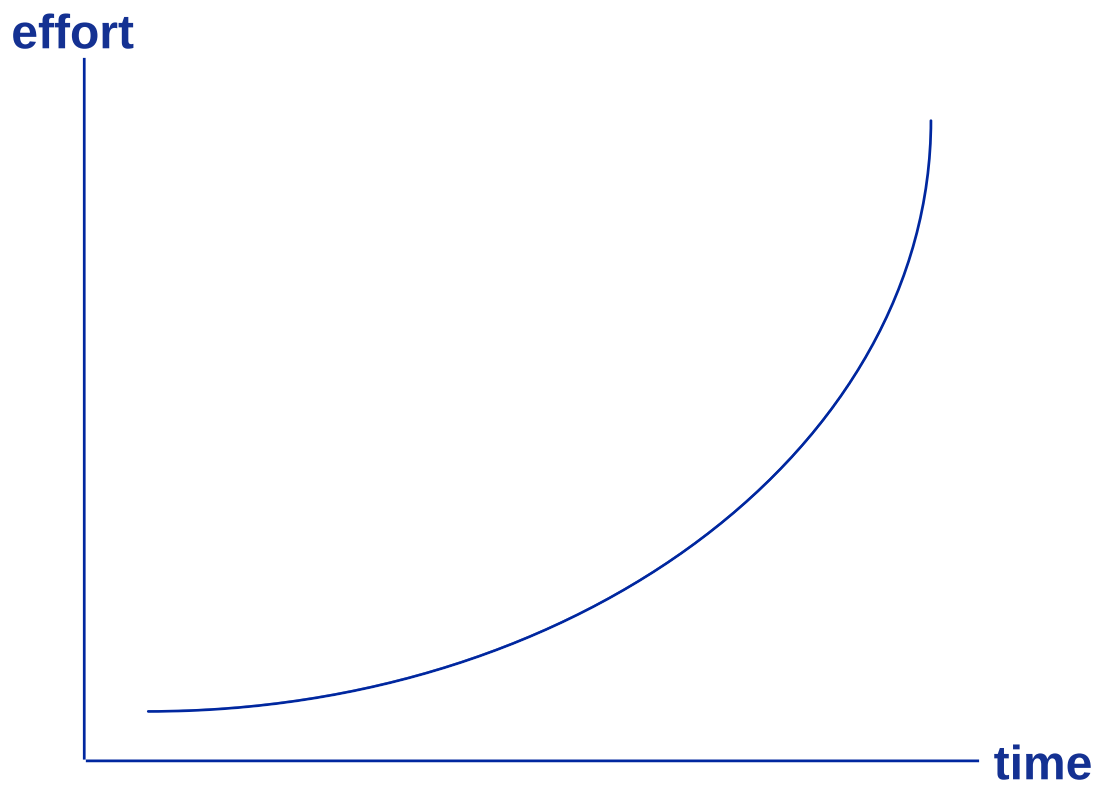
Outline of Talk

- The XP method
  - testing, refactoring and pair-programming
    - experience of each, how they combined
    - the role of architecture and design
    - pair programming experiment
- The XP process
  - what we thought it was
  - our experience of it
- Introducing XP to a team
  - Kent’s advice - pure XP from day 1
  - Niall’s practice - (comparatively) less strict
- XP FAQs
  - handover (unverified)
  - scaling up (plan based on others’ experience)

The Cost of Being Wrong

Each fault costs more to fix the later you fix it

Make decisions early; freeze them early

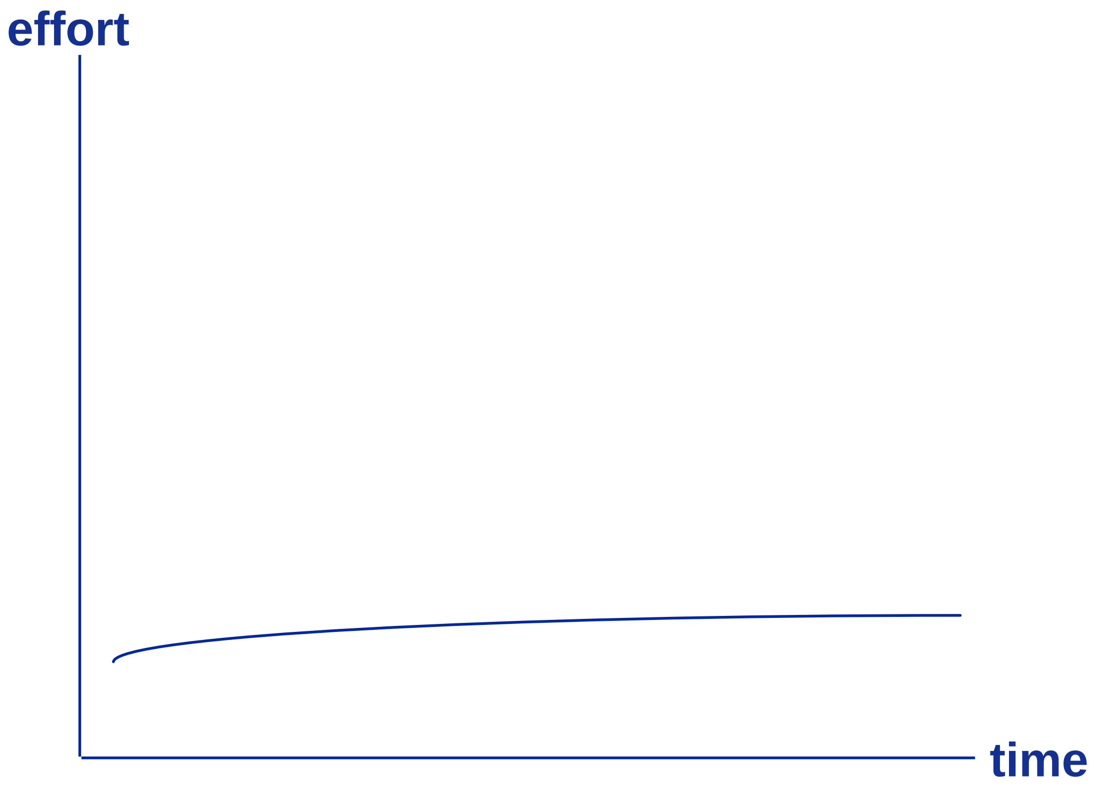


The Cost of Being Meta-Wrong

Software is not hardware

Software is malleable

The cost to fix can be steady



Experience of Test-before-Code (1)

- The need for speed
  - the current test / the whole test suite runs in
    - 10 seconds / 10 minutes: fine
    - 5 minutes / 1 hour: stop and refactor
  - ‘no time to redo test, must deliver’ WRONG!
- Beware ‘necessary but not sufficient’
  - starting with a necessary test is essence of XP
  - complete the test set
    - partition axes (e.g. lifecycle stages, config types)
  - complete the assertions
    - two wrongs don’t make a right ...
    - … but may pass a failure-reliant test
  - general domain truths: put in generic classes ?
    - e.g. tp realizer connector == tp connector realizer
- Write tests, not design docs or task lists

$$\begin{tikzcd} {} \arrow[r, "c"] \arrow[d, "r"'] & {} \arrow[d, "r"'] \\ {} \arrow[r, "c"] & {} \end{tikzcd}$$

Experience of Test-before-Code (2)

- Test case pattern only implicit in paper
  - formalizing it helped achieve common style
    - combine test cases via inheritance and delegation
- Needed flyweight pattern (SUnit 3.0 has this)
  - reuse/reset complex test configurations when
    - expensive to build or tear down
    - invariant or resettable under the tests
- Evolve hard-to-compute test results (J. Pelrine)
  - chose initial config to test simple service
  - computed deltas to config for complex service
- Testing the UI
  - ‘some XP-complete projects only test 50% code’
  - Kent says ‘O.K. to skip UI tests’ (paraphrase)
  - mea culpa !!! (and it sometimes hurt)

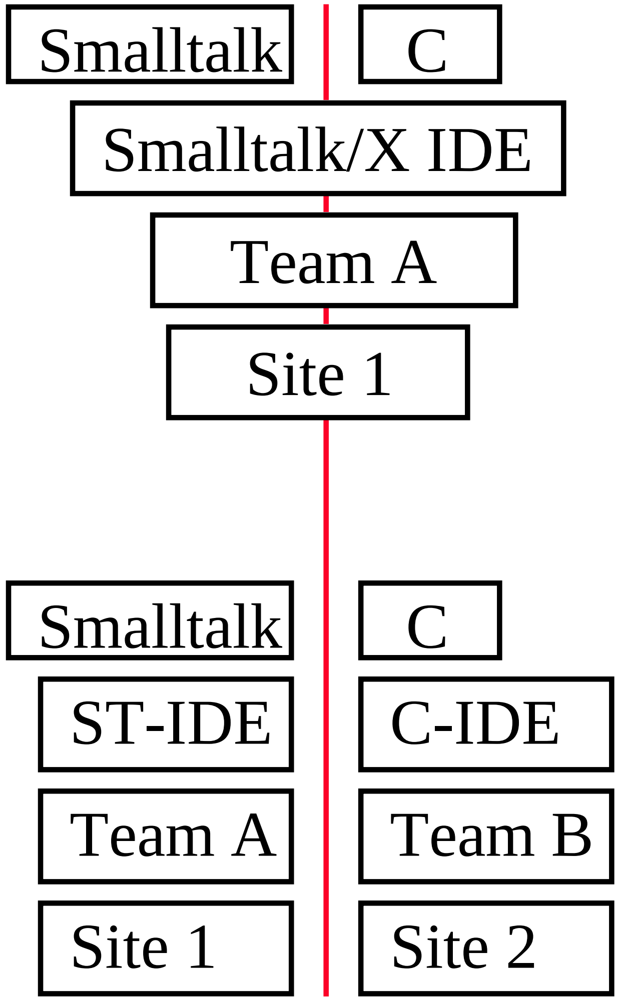
Experience of Refactoring (1)

- All coding is refactoring
  - theory: never write a line without a broken test
  - practice: after a while, we almost never did
- The need for elbow room
  - deliveries inside increments kill refactoring
    - must break to remake
    - customer understood (enforced cycles on his team)
      - 'We'll push on you, you push back on us.'
    - our new manager did not (survive :-)
      - 'Mustn't annoy them, let's do it this once.'
- What role for Architecture?
  - Refactoring demands fine-granularity
    - must be able to move behaviour incrementally
  - Barriers need architecture (or removal)
    - our ST-Corba-Java interface needed an architecture

Another Architecture Example

1) Low tax on refactoring;
use XP across boundary

2) High tax on refactoring;
architect boundary



Experience of Refactoring (2)

- What role for design?
  - XP says, ‘Let the code teach you’
    - pair-program sessions create design fragments
      - tests are primary, configure-controlled
      - models quickly sketched, useful in discussion
    - hard to reuse / refactor models due to poor tools
      - drawing tool: no understanding (bad)
      - modelling tool: wrong understanding (worse)
  - Documentation for new starters
    - most of our designs wrong / out-of-date
      - as XP says they will be
    - wrote some post-hoc designs
      - they were wrong / out-of-date too :-)
  - Design to find what tests to write
    - brief initial design helped a major refactor
    - impromptu sessions re non-code issues: helpful?

Notes for prior slide

Architecture and Design

(Slide not shown, only for notes.)

Experience of Pair-Programming

- The hardest part of XP?
  - ‘We don’t have time to pair-program’
    - you don’t have time not to
    - pays back surprisingly quickly
    - a useful pacing mechanism
  - ‘If only I hadn’t so many meetings’
    - stop meeting to talk and separating to work
    - start meeting to work and separating to think
- Pair-compatibility issues
  - powerful when both are system-experienced
  - used as training mechanism; mixed results
- Teleworking tool + handsfree phone ideal
  - better than sharing one mouse and keyboard
  - puts locals and teleworkers on even footing
  - collateral benefits: better split-site working

Notes for prior slide

Teleworking and Pair-Programming

(Slide not shown, only for notes.)

Experience of Combinations (1)

- Refactoring and Pairing
  - let the code (and talking about it) teach you
    - discover a better design than you could deduce
- example 1) object subClass: #class pattern
  - I built lightweight metaclass for special case
    - code told me, ‘metaclass wants class’ behaviour’
    - pair asked me, ‘Why not do that everywhere?’
    - suddenly we had a working system
- example 2) model-or-user-driven pattern
  - I wanted model-driven algorithms
    - but couldn’t solve every case
  - pair wanted user-driven, model-constrained
    - but couldn’t make UI comprehensible
  - union was ‘simplest thing that could work’
    - and result was tool for finding better algorithms

Experience of Combinations (2)

- Refactoring and Testing
  - basic XP: tests let you refactor
    - 100%: refactor broke feature => feature lacked test
    - 99%+: refactor broke feature, area lacked tests
- Pairing and Testing
  - pair-programming a test defines a task
    - especially good for new starters
  - test lets pair agree understanding of task
- Refactoring, Testing and Pairing
  - I several times experienced the sequence:
    - my refactor fails someone else’s tests
    - my pair worked with them earlier, so explains code
    - pair fixes, fails refactor test; I fix, get better refactor
  - discuss, and so defeat, ‘shy arrogance’
    - ‘I can’t pair till I’ve worked out how to do this task’

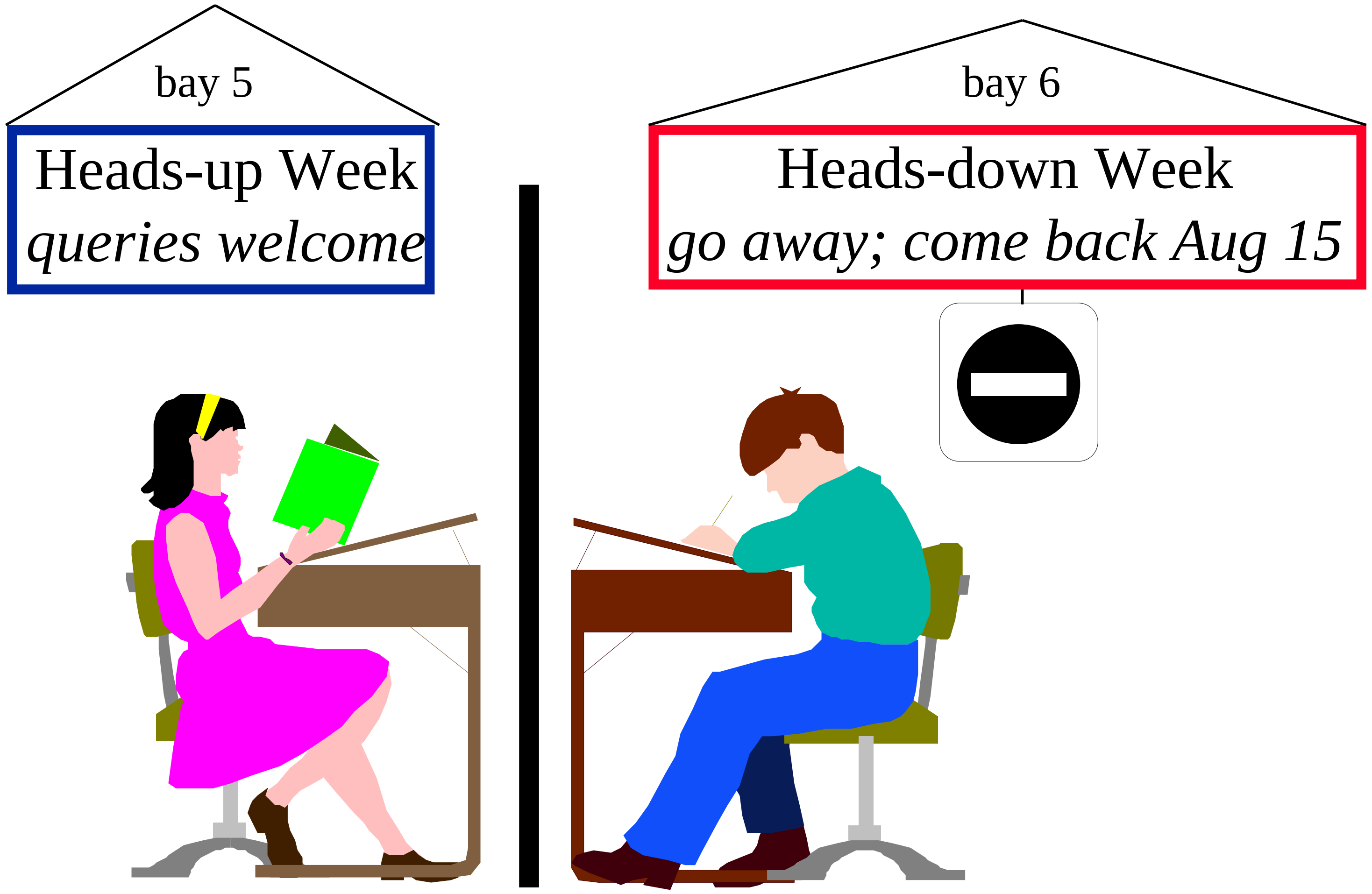
Pair-Programming Experiment

- Popularity
  - doubting start grew to 82% paired coding time
    - (industry: some always pair, some feel ‘burnt-out’)
    - (I browsed code alone, trying things out)
  - compatibility: rotate to ease clashes
    - 2 x expert great, 2 x novice good, expert-novice OK
    - extrovert-extrovert slow !!! (but they liked it :-)
    - introvert-introvert good training for v. introverted
- Effectiveness
  - paired code is of higher quality
    - pairs always write test cases
  - pairs take much the same effort
    - median: same effort, 50% elapsed time) due to 2
    - average: 115% effort, 58% elapsed time) outliers
    - pairs defeat parkinson’s law and ratholes

Our Experience: Process

- Discipline customers and managers with:
  - the planning game
    - customers always want everything yesterday
    - to get maximum value from technical synergy
      - customer maps stories to values
      - developer maps stories to iterations
  - iterative cycles
    - once upon a time we revectored every year
    - revector every month = process
    - revector anytime = no process
- Need to coach customers and managers
  - XP doesn't say how; our best customer
    - already believed in iterative cycles
    - was idea-rich but time-poor
    - was erratic in pushing XP to his team
  - XP says, 'refuse the ones who won't learn'

Interrupts: an eXtreme Solution :-)



Introducing XP: what Kent says

- Preach simple design
  - communicate in source code
    - no configure-controlled design docs
  - never duplicate logic
- Enforce XP’s rules on the team from day 1
  - if you don’t need it, don’t do it
    - no line of functional code written without broken test
  - pair program
    - no line of production code written unpaired
  - keep the feedback loop short
    - build system and run all test cases every day
  - work smarter not harder
    - concentrate work in middle of day
    - be exhausted by 16:00
    - 40-hour maximum working week (popular :-)

Introducing XP: what Niall did (1)

- Preached the theory: created champion(s)
  - talk (wanted workshop, summer school, ...)
- Started with Testing
  - chose test utility
    - ?Unit from www.XProgramming.com/software.htm
    - commercial testing tools that are XP-aware
  - for each team member, assigned starter task
    - champion pair programs test with them
    - lets them code task, running test often
  - gradually enforced rule
    - each task must have test(s)
    - all tests must be written paired or code-reviewed
  - once test suite built up, took time to
    - refactor tests for speed and common style
    - extend suite to a reasonably complete set

Introducing XP: what Niall did (2)

- Next came Refactoring
  - made first major one visible (team discussion)
    - the need to refactor arose naturally
    - waited till test suite was large enough for safety
  - got bolder as our test suite grew
- Grew into Pair Programming
  - started gently
    - thou shalt pair-program for 2 hours each week
    - thou shalt pair or review all tests
    - started by pairing equals
  - when team opinion leaders won over
    - upped weekly paired hours
    - rotated pairs
  - discussed, and so defeated, ‘shy arrogance’
    - ‘I can’t pair till I’ve worked out how to do this task’

Introducing XP: Up-front Costs

- Up-front costs: technical
  - finding, loading, learning the test utility
  - getting used to test-failure-drives-coding
    - cost is IDE-dependent
    - some benefit in all IDEs
- Up-front costs: non-technical
  - some customers / managers are keen
    - ‘the creative engagement of combative intellects’
    - ‘let’s pair-program tests to define use cases’
  - some give the uncommitted ‘yes’
    - put ‘heads-up / heads-down week’ on everything
  - some fight it
    - ‘XP doesn’t need those documents and meetings’
      - ‘those documents and meetings are what I’m about’
    - never give way, never give (avoidable) offence

FAQs (1): Handover ?

- Can you sleep / handover an XP project?
  - I followed VCAPS model
    - wrote 10 page document with pointers to tests
    - seemed O.K. to me
    - wished I could reuse design discussion diagrams
  - our handover process is not yet verified
    - recipients were reassigned
- Whether or no, should you worry about it?
  - XP's philosophy is about opportunity cost:
    - don't waste time preparing for unlikely events
    - you can refactor to handle them if they occur
  - (Almost) 'nothing that dies ever comes back'
    - spend your time on useful features => no handover
    - handover ifTrue: [self writeBetterDocNowThanBefore]

FAQ (2): Scaling Up ?

- Some say scale is an issue, others say not
  - Projects of 25 have used XP: ‘the tools creak’
  - I lack experience but have contacts
- Scaled-up extreme s/w eng process (eCom)
  - three teams with parallel increments
    - Xanalysis: 2 ‘relationship people’ model domain
    - Xreqts: 2 ‘lawyers’ write OCL use cases
    - XP: 8 programmers do standard XP
  - each team’s output feeds others’ next cycle
    - XP hate rate of business revectoring XA like
    - XA terrified by rate of system refactoring XP like
  - some programming styles collapse XR and XP
    - yes: Smalltalk, Prolog, Lisp, …
    - no: C++, Java, ...

Extreme Programming

Use it !!!

Acknowledgements

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Backup slides

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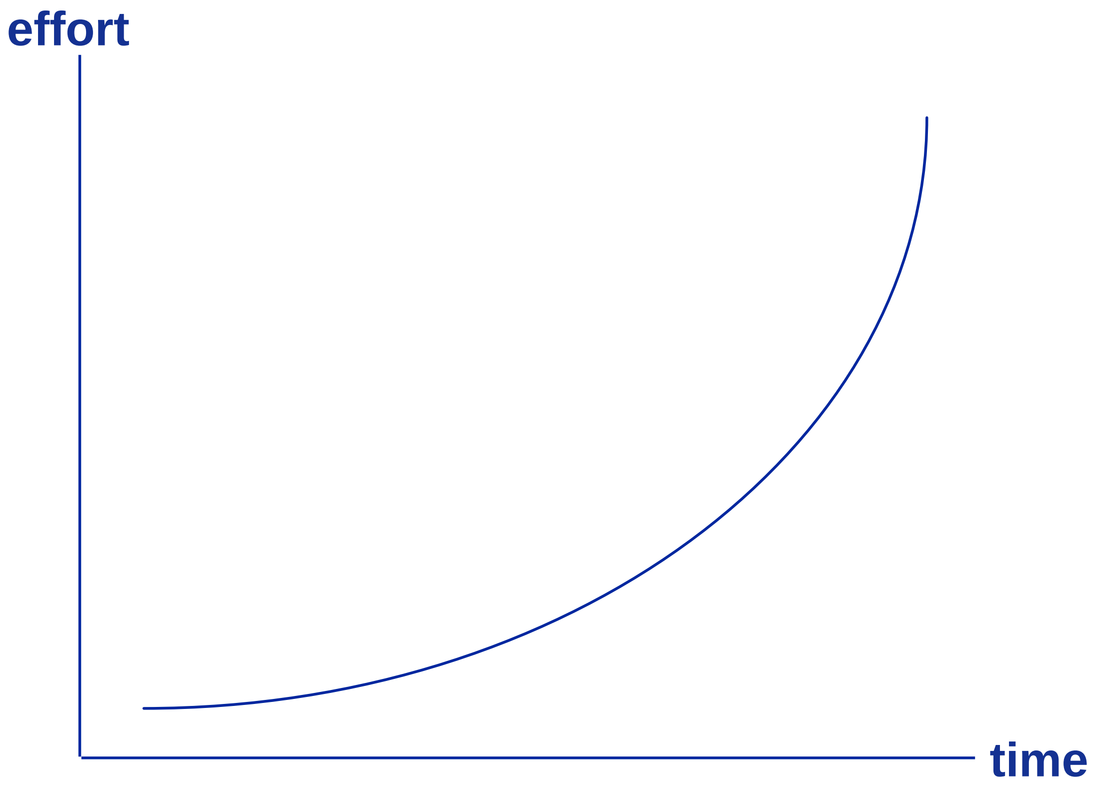

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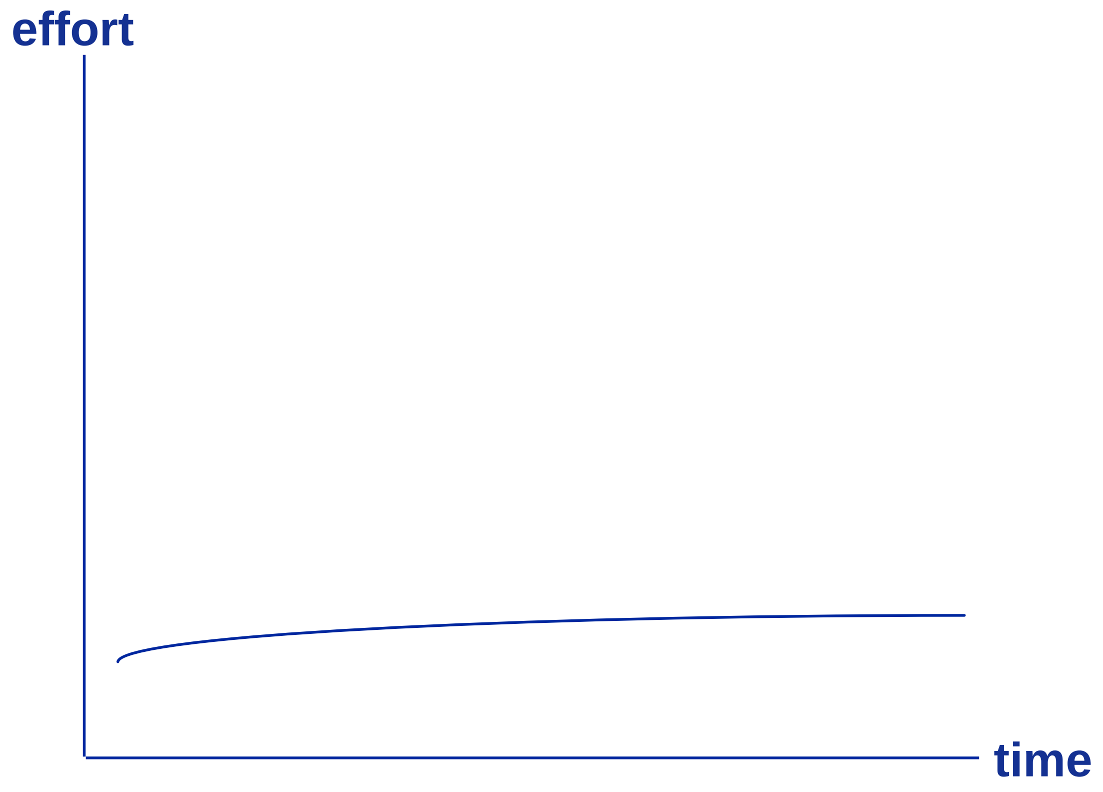

The Key Ingredients

test

- **Write the tests, then the code**
  - can't code what you don't know how to test
  - the test proves your function still works
    - next day, week, month, year
  - only write tests
    - that you know will fail, and/or
    - that capture domain knowledge

refactor mercilessly

- **Let the code teach you**
  - Learn how to do it as you do it
  - Code to learn
    - first make it run
    - then make it right
    - last make it fast

pair program

- **Frequent pair sessions**
  - force you to learn, explain and justify
  - force you to share system knowledge

The XP Process Philosophy

- Give customers what they want
  - Delivered used software is where it’s at
    - customers want code, not design documents
    - customers want features that add value
  - Building what turns out not to be wanted
    - costs effort and opportunity
    - when in doubt, just wait
  - An XP Story is the right, not obligation,
    - to build a feature at some future time
- Used software never dies
  - successful software is simultaneously
    - in production, being evolved
    - in use, being maintained
  - (almost) nothing that dies comes back
    - and VCAP did, via XP

The XP Process

- **Story: some testable features**
  - written by customer, estimated by designers
  - not what designers commit to
- **Iteration: ~ 4 weeks' worth of stories**
  - collectively, estimate iteration and list tasks
  - individually, sign-up for and estimate task
    - write test case for task
    - (re)write code till it passes test
    - either write another test or move to another task
  - customer reviews result between iterations
    - can't change story within iteration (can raise bugs)
- **Release: a set of iterations**
  - that make business sense together