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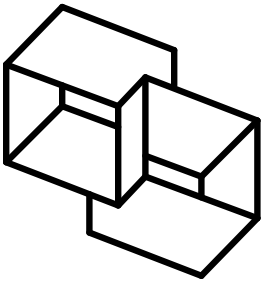
# Alternatives to Software Engineering



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## The *software engineering* metaphor allows us to talk about software development

**This metaphor allows us to identify the major activities in software development**

Analysis, design, coding, testing and integration

**Once these activities are identified they start to shape our thinking**

*Software engineering is the application of a systematic, disciplined, quantifiable approach to development, operation, and maintenance of software; that is, the application of engineering to software* -- IEEE definition

## This idea of a systematic, disciplined and quantifiable approach originated in 1968

**Overall the software engineering approach has been successful for large projects**

- Structured Analysis and Structured Design was a great leap forward compred to previously
- The Space Shuttle software is a great poster child for this approach
  - *The last three versions of the program -- each 420,000 lines long-had just one error each. The last 11 versions of this software had a total of 17 errors.*
- Similarly, the ***Software Engineering Institute's*** Capability Maturity Model has great results



## Unfortunately the implications of the *software engineering* are not all positive

**Fred Brooks wrote *The Mythical Man Month* to address one set of problems**

**Parnas and Clemens wrote *A Rational Process: How and Why to Fake It* to address another set of problems**

**Methodology wars have been fought over the *one best way* to develop software**

**The *Waterfall lifecycle* still dominates thinking about software development**

## For most projects, software engineering is espoused rather than actually practiced

**The resulting disconnect between thought and action is the cause of many problems**

Projects overrun because the team did not take the time to realistically estimate or plan the project

Design is started with a sketchy understanding of what is actually needed

Designers do not put enough details into their CASE tool models to enable coding to be a mechanical task

Testing is cut short because coding overruns the original schedule



## The software engineering metaphor is limiting our ability to deliver software

**The time has come to start looking for alternate metaphors that work better**

**The test for a new metaphor is simple: *Appropriate metaphors invoke appropriate behaviour***

Software engineering manifestly fails this test

- We think of ***software projects*** not ***software assets***
- We forget about ***emergent behaviour***
- We argue against ***incremental development*** even though ***all software is developed incrementally***
- We do a lousy job of ***nurturing new developers***

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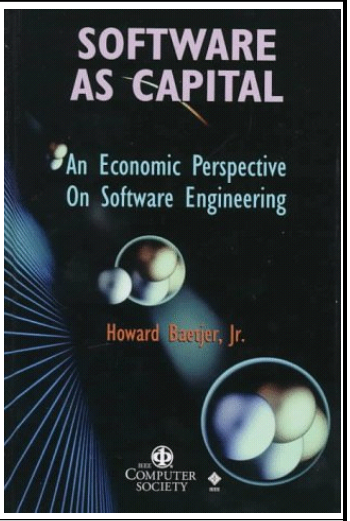
## Howard Baetjer has shone a spotlight on the economics of software development

**Thinking of software projects downplays the role of maintenance**

**Software as capital assets puts maintenance in a central role**

In what other field do we have very expensive artifacts maintained by the cheapest labor we can find?



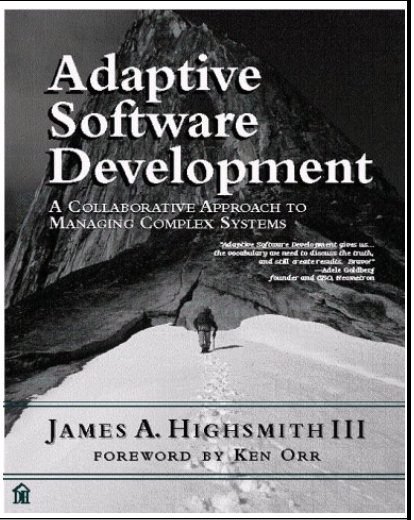



## Jim Highsmith has looked at how emergent behaviour affects software development

**Managing the *workstate* rather than the workflow is the key difference**

**Collaboration and self-organization enable *emergence***

**Describes a new lifecycle Speculate, Collaborate, Learn**



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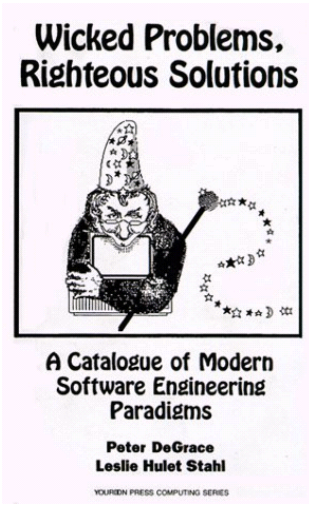
## DeGrace and Stahl dissected the waterfall model and looked at incremental development

**Recognized that getting complete requirements is hard**

**Changing requirements are a natural consequence of software delivery**

**Attempted to place people at the center of the software development process**






## Putting people at the center of software development is becoming a recurring theme

**The Agile Alliance (www.agilealliance.org) is a group of methodologists who "value *Individuals and interactions* over processes and tools"**

***Scrum***, ***eXtreme Programming*** and ***Feature Driven Development*** are all Agile approaches

**Software development is not a *mechanical* task, it is a *social, intellectual* task**

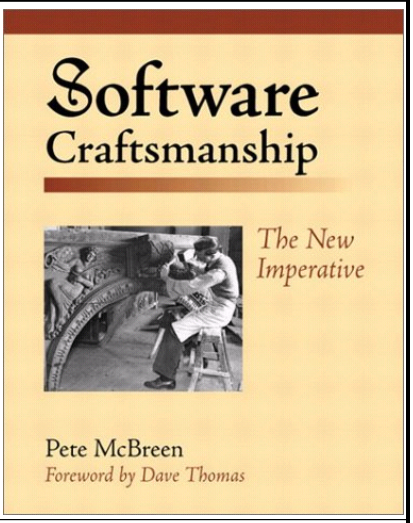
Unfortunately the software engineering metaphor hides this aspect of software development

## *Software Craftsmanship* is a new metaphor that directs attention to skilled developers

***Software Craftsmanship*** **explicitly looks back to the craft tradition**

**Apprenticeship and situated learning are the way to pass on esoteric knowledge**

**Experienced people are more important than the specific process used**






## Many other metaphors are possible for software development

**The GNU/OpenSource community talks about *the Cathedral and the Bazaar***

**Richard Gabriel talks about *Habitable Software* as the place developers live**

***eXtreme Programming*** **is attempting to create a new vocabulary for development**

***Gamasutra.com*** **is attempting to articulate how to create great game software**

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## Closing thoughts

**Software engineering is not going to go away any time soon**

but we need to distinguish ***working harder*** and ***working smarter***

**We all need to act congruently with what we know about software development**

and ***push back*** against unrealistic constraints

**Software Craftsmanship may be a way to get mentoring and coaching happening**



## Sources and references

**Space Shuttle software**

http://www.fastcompany.com/online/06/writestuff.html

**www.agilealliance.org**

**www.xprogramming.com**

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