Perspectives Workshop: New Frontiers for Empirical Software Engineering

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Nachi Nagappan
Dieter Rombach
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Software Engineering

"the application of *engineering*
to software"

or

"the application of a *systematic, disciplined, quantifiable approach*
to the development, operation,
and maintenance of software"

Software Engineering

systematic

disciplined

quantifiable

Empirical Software Engineering

"You can't control what you can't measure"

Tom DeMarco

systematic

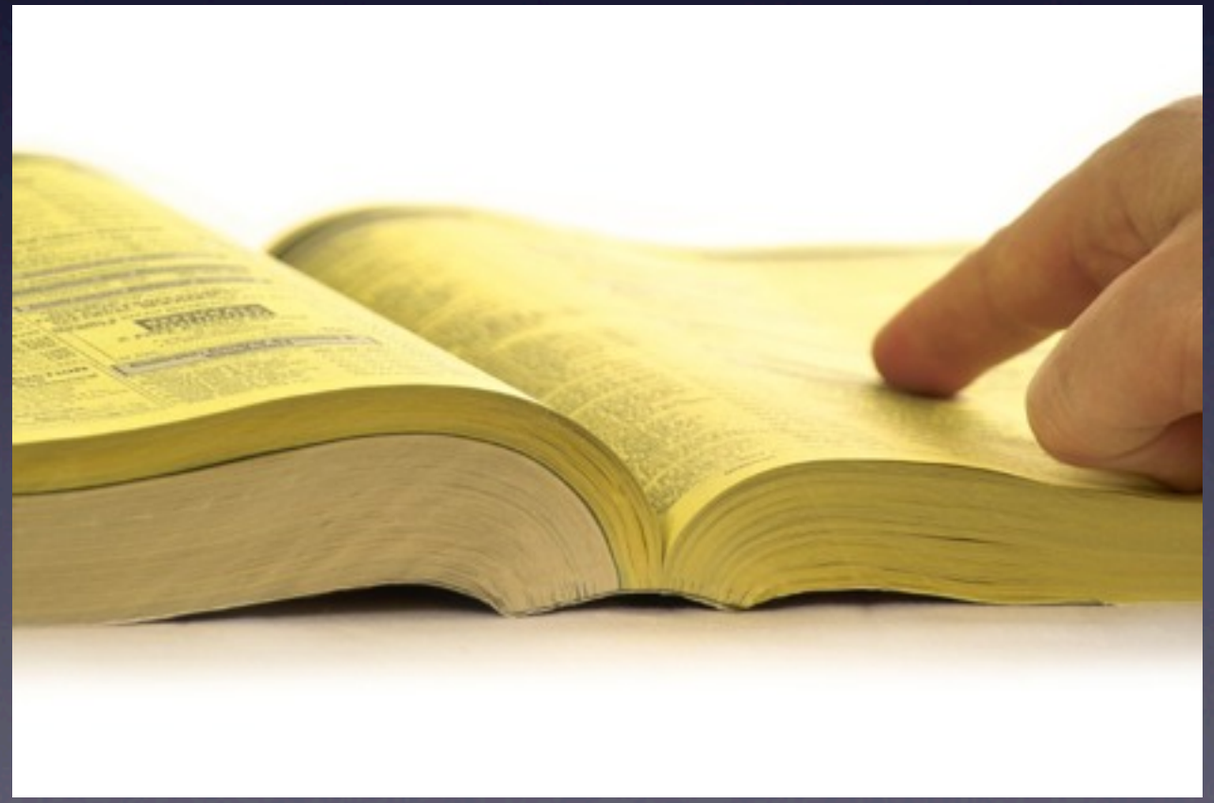
disciplined

quantifiable

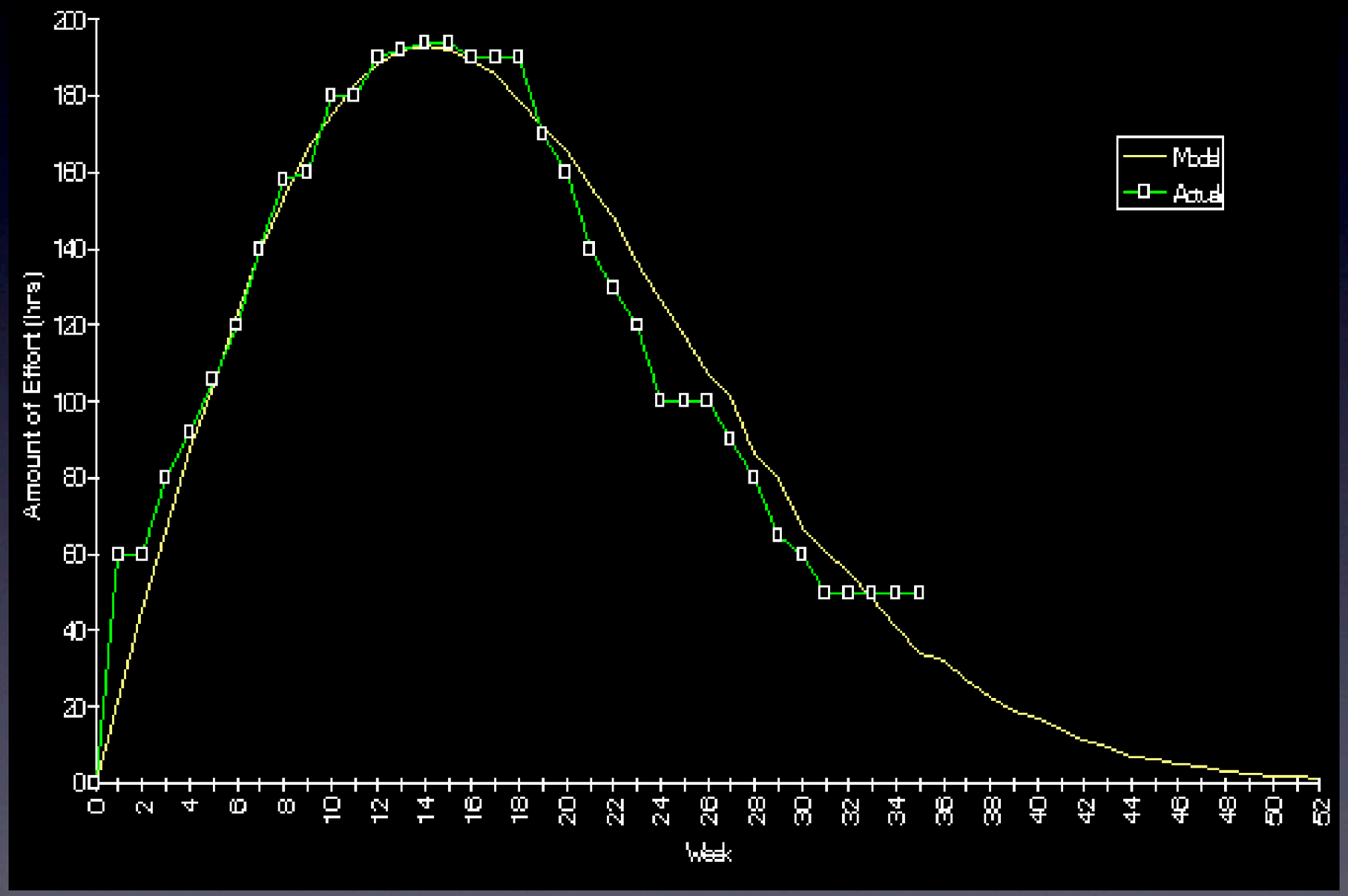
Empirical Software Engineering

"You can't control what you can't measure"

Tom DeMarco



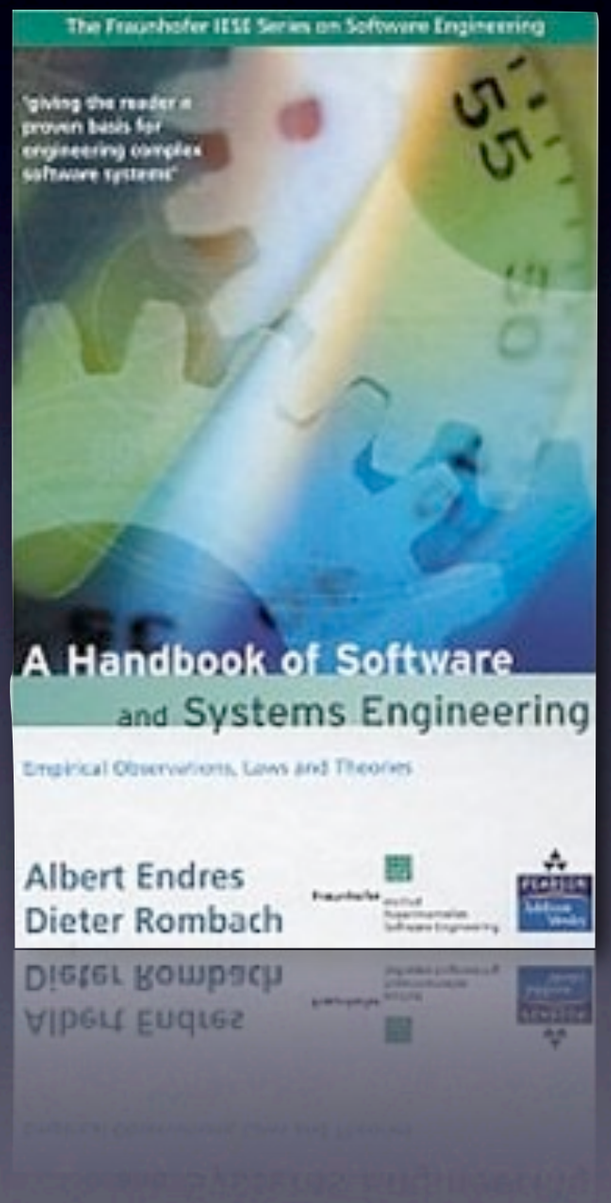
Studies

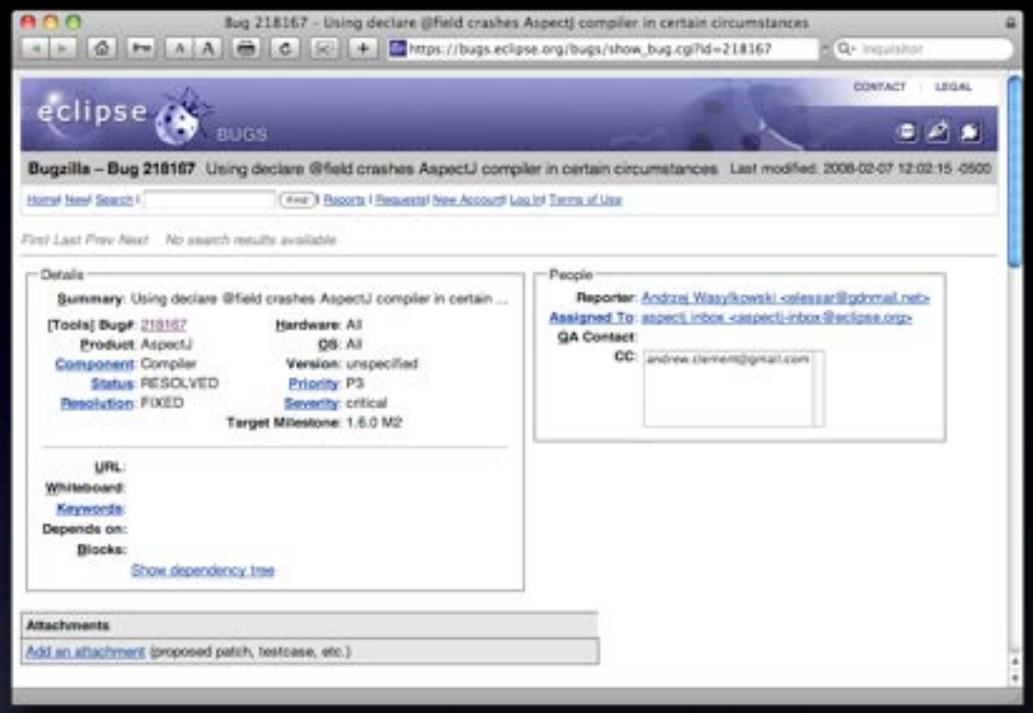


Rosenberg, L. and Hyatt, L. "Developing An Effective Metrics Program"
European Space Agency Software Assurance Symposium, Netherlands, March, 1996

Empirical SE 1.0

- Data collected manually
- Few data points available
- Few studies available

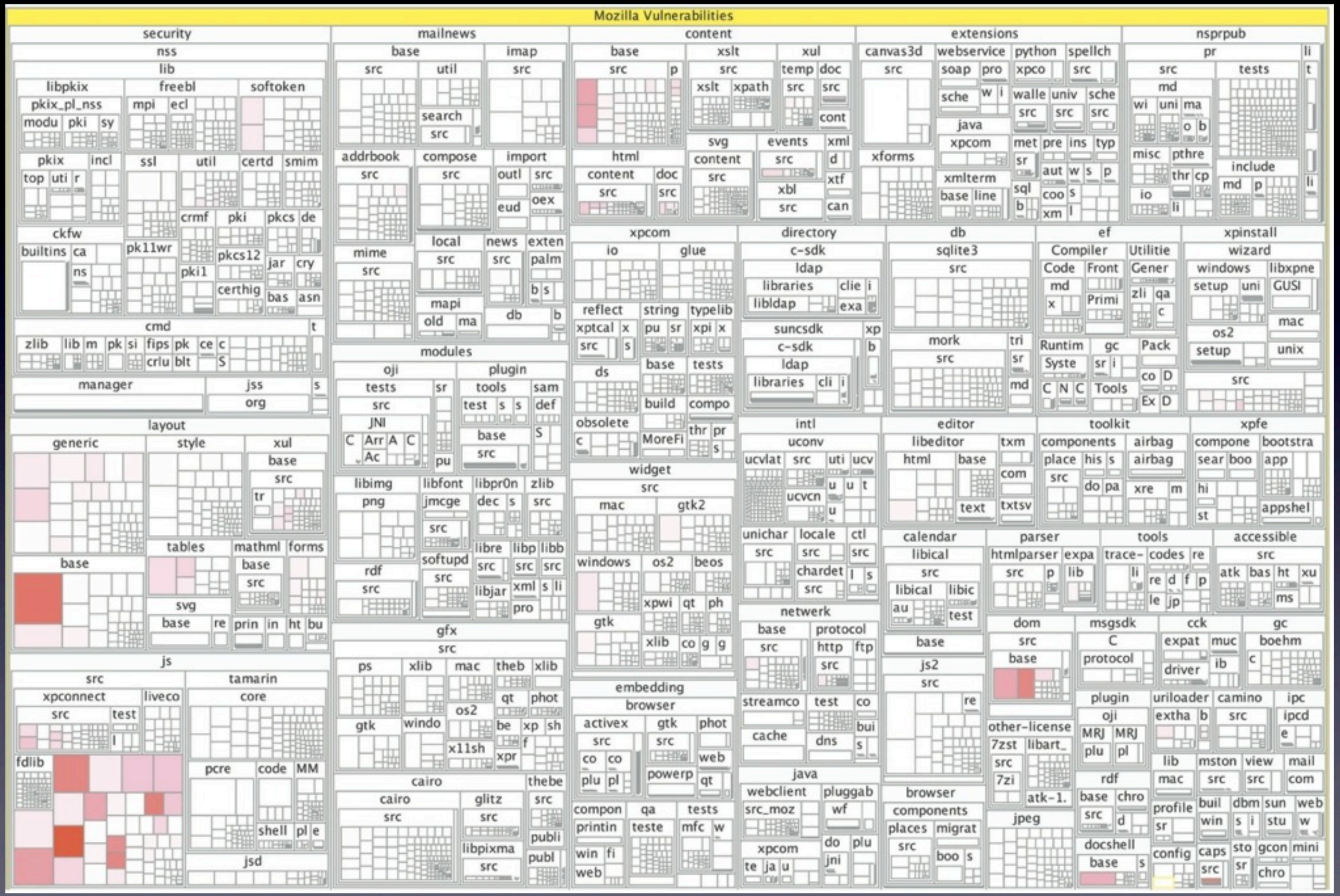




Bugs

Versions

Map *bugs* to *code*


Mozilla Vulnerabilities
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certd
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compone
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boo
hi
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bootstra
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wizard
windows
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uni
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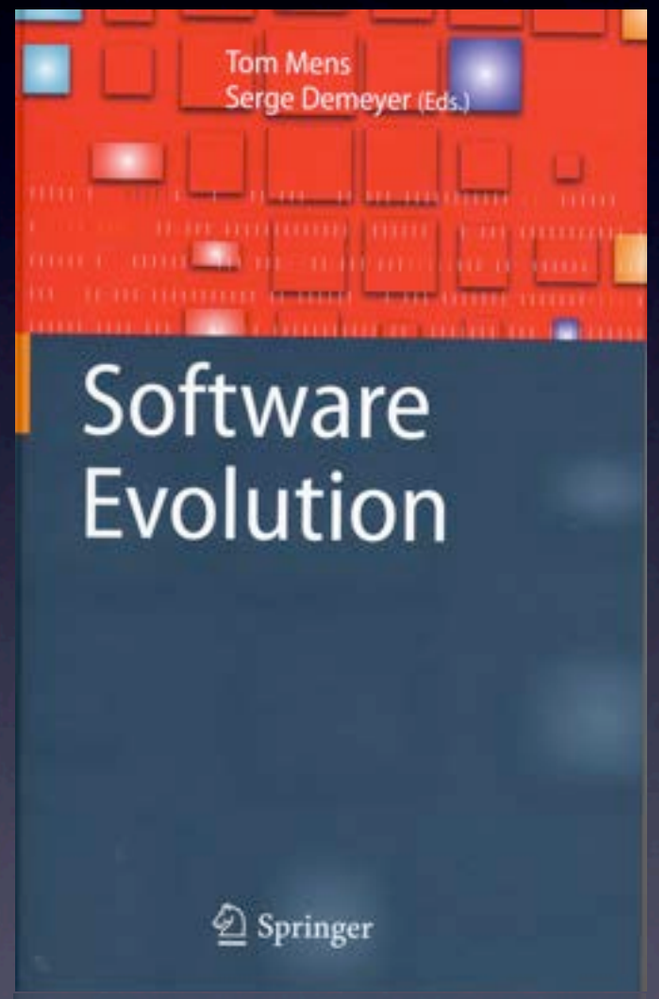
os2
setup
unix
src

Where do bugs come from?

- Earlier bugs?
- Developer experience?
- Specific domains?
- Lack of testing?
- Code complexity?

Empirical SE 2.0

- Data collected automatically
- Thousands of data points
- Can be widely automated
- Explosion in papers & topics



Invitees

- Leaders in Empirical Software Engineering
- Representatives from
  - Program Analysis + Testing
    leads to better mining of software archives
    primary target of defect prediction activities
  - Process Analysis and Modeling
    search for features that correlate with defects
  - Emerging Domains
    posing new challenges for Software Engineering

Empirical Research and Program Analysis

- Better analysis via empirical findings
- Better benchmarks (real bugs + changes)
- Better cost-benefit-risk studies
- Dealing with partial information

Empirical Research with Web 2.0

- How do Web 2.0 techniques influence SE?
- How can they help in empirical studies?
- Need new data collection methods
- Need infrastructure for shared research

Software Engineering and Climate Science

- SE in Climate Science is different
- Domain experts who develop programs
- Build high quality software w/ lots of QA
- Development = Scientific work

Software Engineering and Health IT

- Socio-technical networks for patients
- Rate my doctor; recommender systems
- How to architecture such systems?
- Privacy and reliability issues

Specific Outcomes

as reported by attendees

- Special Issues of IEEE Software
  Climate Change Science and Software (2011)
  Social Networking and Software (2013)
- "Several proposals" on
  data mining and process work
  leveraging empirical data for analysis
- Extended Editorial Boards (ESE, IST)
- PC Chairs met at Dagstuhl (ICST)

Retro-Perspectives

- Outcome was substantial
- Outcome was mostly indirect and political
- Organizer's role was matchmaking
- Driven by participants, not by vision
- Driven by opportunities, not issues

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