Perspectives Workshop: 
New Frontiers for 
Empirical Software Engineering

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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
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
Map *bugs* to *code*
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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