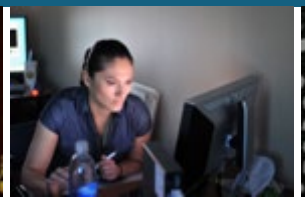
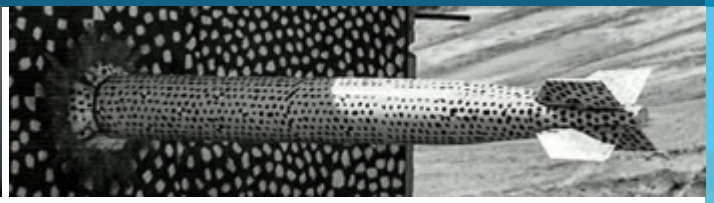
Research Software Science


PRESENTED BY

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Research Software Science: Key Idea

Apply the scientific method to study and improve how we develop and use research software.

Common (and noble) engineering approach:

- ID a problem, sample the space of possible solutions, pick one, move on.
- What's lost?
  - A record of the problem being solved, which options were considered, why one was picked.
  - Dissemination of techniques and finding, verification and validation of outcomes.

What's needed to make it science?

- New team skills: Social and cognitive sciences.
- Realistic expectations: Scientific progress takes time and money.
- Moving forward: Growing the approach and getting buy-in.

https://bssw.io/blog_posts/research-software-science-a-scientific-approach-to-understanding-and-improving-how-we-develop-and-use-software-for-research

Why A Research Software Science Focus now: The "No CS" Scenario

Scenario:

Suppose our research centers had no formally trained computer scientists and CS work had to be done by people who learned it on their own, or just happened to study a bit of CS as part of their other formal training. This situation is undesirable in three ways:

1. We have non-experts doing CS work, making them less available in their expertise.
2. CS work takes a long time to complete compared to other work.
3. We get suboptimal results and pay high ongoing maintenance cost.

Replace "CS" with "Software" and the situation describes research software today.

Why focus on research software science now:

- The role of software has become central to much of our work and the knowledge base is too sophisticated to rely only on non-experts.
- Scientific software success depends on producing high-quality, sustainable software products.
- Investing in software as a first class pursuit improves the whole scientific ecosystem.

Applying Social and Cognitive Science to Software Teams

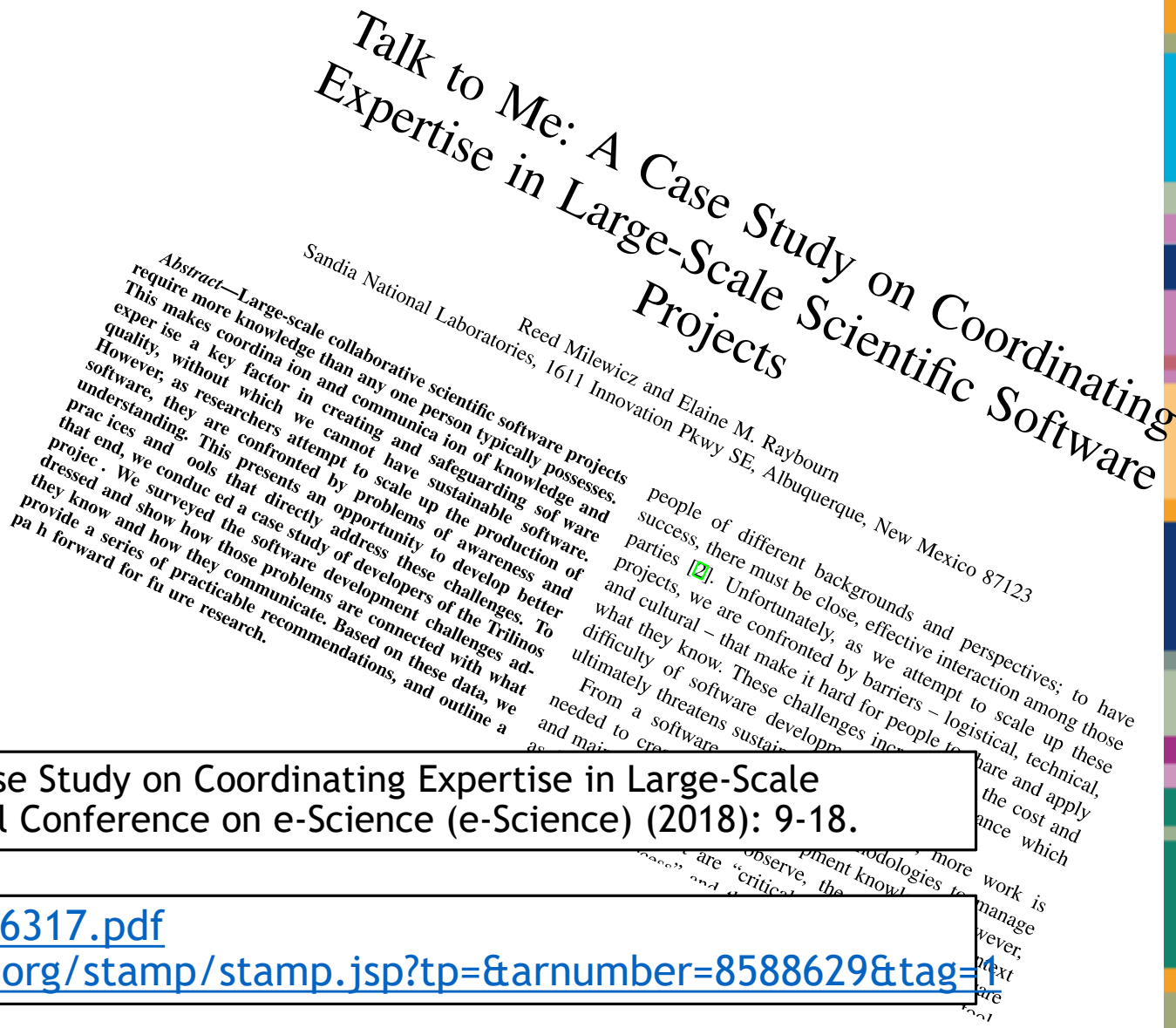
Reed Milewicz – my postdoc, now staff.

Elaine Raybourn – Sandia applied cognitive scientist, joined my team several years ago.

New scientific tools to study and improve developer productivity, software sustainability.

Correlation: Happiness and connectedness.

Next: Design experiments to detect cause and effect.



Talk to Me: A Case Study on Coordinating Expertise in Large-Scale Scientific Software Projects

Reed Milewicz and Elaine M. Raybourn
Sandia National Laboratories, 1611 Innovation Pkwy SE, Albuquerque, New Mexico 87123

Milewicz, Reed and Elaine M. Raybourn. “Talk to Me: A Case Study on Coordinating Expertise in Large-Scale Scientific Software Projects.” 2018 IEEE 14th International Conference on e-Science (e-Science) (2018): 9-18.

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