Useful Practices for Software Engineering on Medium-sized Distributed Scientific Projects

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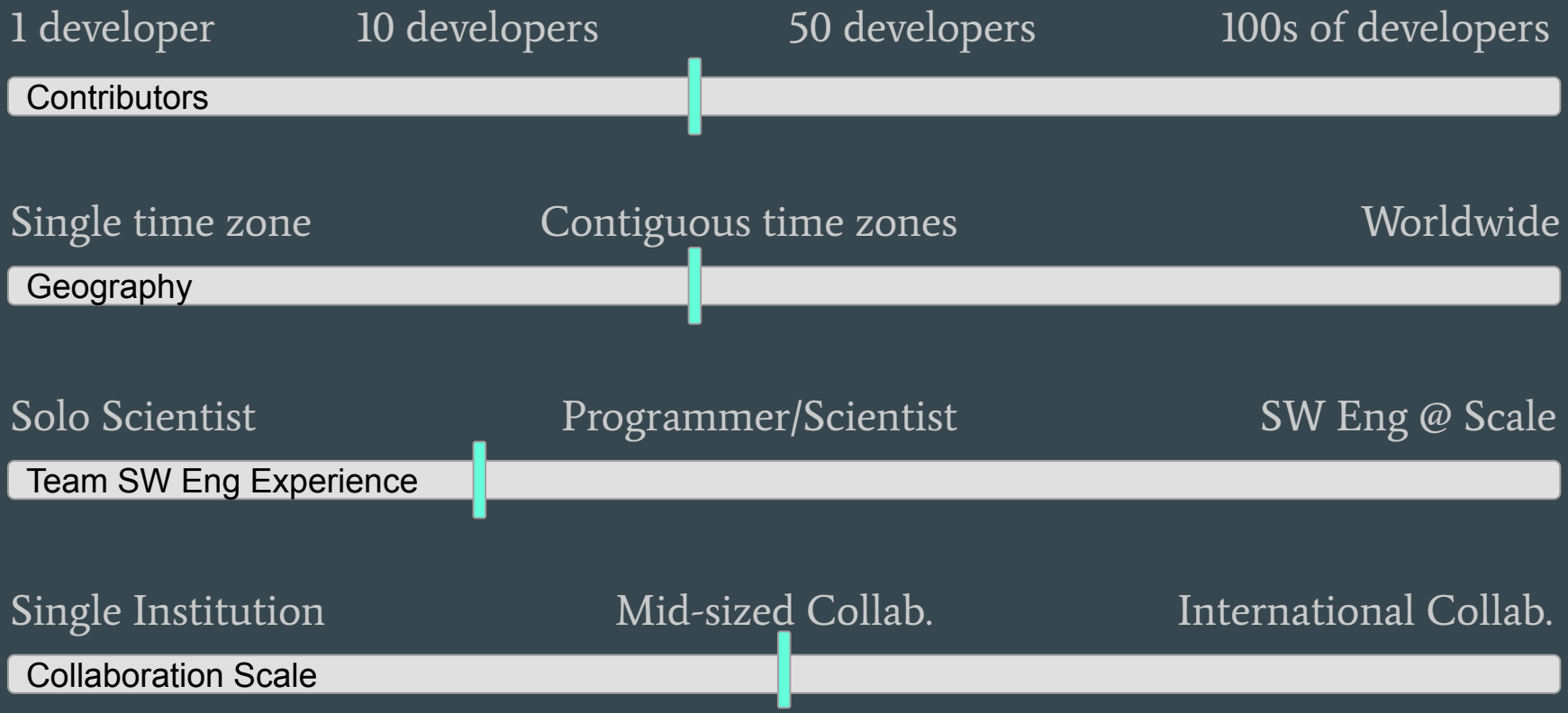
Our Context, Our Challenge

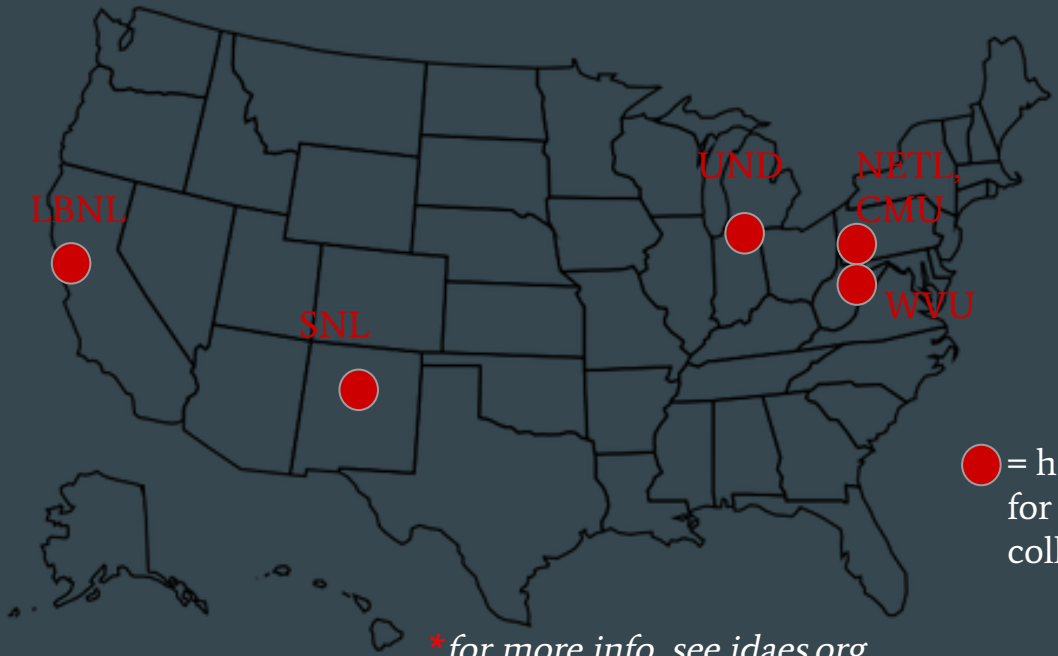


Example project: Institute for the Design of Advanced Energy Systems (IDAES)*

IDAES
Institute for the Design of Advanced Energy Systems

Software framework for modeling chemical processes with a focus on power plants (main funding from DOE Fossil Energy)

About 40 contributors
(mostly part-time)
~30 chemical or process engineers
~5 are computer scientists
~5 are chemists / material scientists



● = home location for IDAES collaborator(s)

*for more info, see idaes.org

The Scrum answer...

At the end of a presentation at LBL on the Scrum software development framework, when the presenter was asked:

> *How can we, in a research and scientific environment where our collaborators are spread across both multiple unrelated projects and time zones, best apply the Scrum methodology?*

After a long pause, his answer was to....

"*find another job*".

Lesson and Effective Approach

- Scrum makes assumptions that don’t apply in a scientific/research environment
  - All participants full-time
  - All participants at single location
  - Single authority
- What parts do still apply?
- There are still many effective ideas from an Agile approach

Approach

Scheduled Meetings

Scheduled Releases

Iterative, incremental improvements

Evangelism, Soapbox, Education

Scheduled Meetings, Scheduled Releases

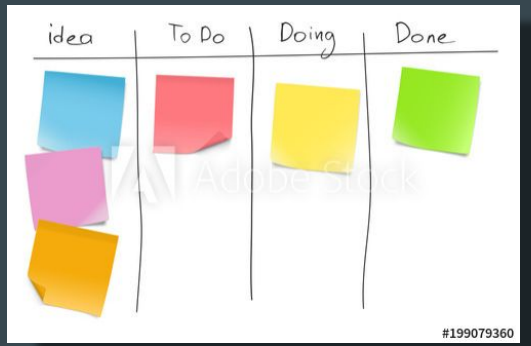
Weekly telecons with tech team

- Daily stand-ups impractical, weekly call usually possible

Date-driven over feature-driven releases

- *"If you miss this bus, there will be another one coming along soon."*
- Subtle but effective motivation to meet date

- Kanban inspired project boards
  - Priority board: All issues and PRs (backlog)
  - Release board: Issues and PRs targeted for a given release
- Results
  - Development is open to all
  - Engagement using screen share of agenda, project boards, CI results, high-level project milestones
  - Open forum for technical discussions
  - Build camaraderie (video on, if possible)



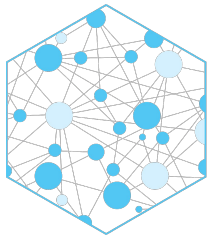
Iterate and SoapBox

- Example: Testing
  - Start small, with simple examples, build incrementally
  - Add test coverage, linting, style guide enforcement
- Iteration is educational, forgiving and forceful
- Evangelize and Document the Process
  - Technical team, of course must know about it
  - Project Management
  - Funding Sources
- Sharpen the Saw
  - Improve the Approach itself
  - Engage with Professional Organizations

Summary and Conclusion

- Challenges of our environment
  - Distributed, Multi-disciplinary, Time-sliced developers
  - Example: IDAES project
- Scrum is not the answer
- Proposed approach
  - Scheduled meetings
  - Scheduled releases
  - Iterative improvement
  - Soapboxing (evangelism, proselytization)
- What else?
  - Technical challenges will remain
  - Social challenges need to be conquered for any technical solution to "stick"

idaes.org



IDAES
Institute for the Design of Advanced Energy Systems

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Thank You!

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