



Summary

David M. Rogers (he/him)
Oak Ridge National Laboratory

Developing a Testing and Continuous Integration Strategy for your
Team tutorial @ Exascale Computing Project Annual Meeting

Contributors: David E. Bernholdt (ORNL), Anshu Dubey (ANL), David
M. Rogers (ORNL), James M. Willenbring (SNL)



See slide 2 for
license details



License, Citation and Acknowledgements

License and Citation

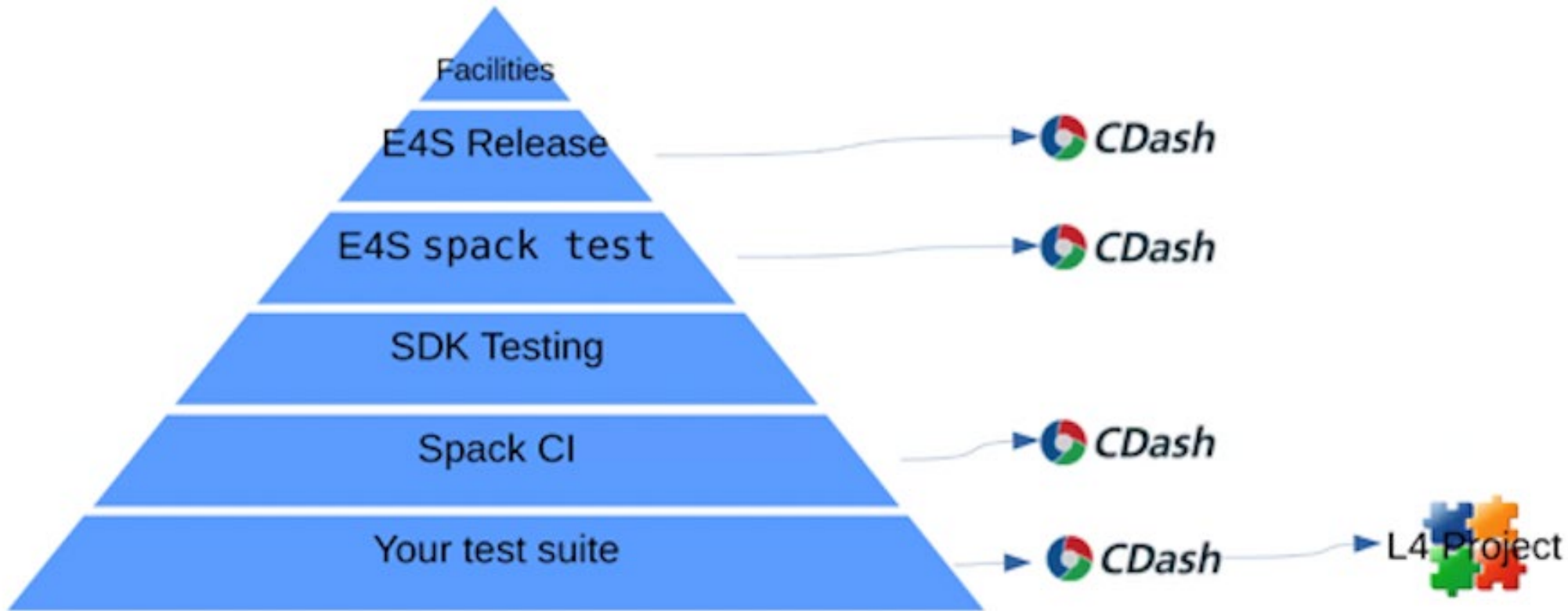
- This work is licensed under a [Creative Commons Attribution 4.0 International License](#) (CC BY 4.0).
- **The requested citation the overall tutorial is: Gregory R. Watson and David M. Rogers, Developing a Testing and Continuous Integration Strategy for your Team tutorial, in Exascale Computing Project Annual Meeting, online, 2022. DOI: [10.6084/m9.figshare.19608927](#)**
- Individual modules may be cited as *Speaker, Module Title*, in Better Scientific Software tutorial...



Acknowledgements

- This work was supported by the U.S. Department of Energy Office of Science, Office of Advanced Scientific Computing Research (ASCR), and by the Exascale Computing Project (17-SC-20-SC), a collaborative effort of the U.S. Department of Energy Office of Science and the National Nuclear Security Administration.
- This work was performed in part at the Argonne National Laboratory, which is managed by UChicago Argonne, LLC for the U.S. Department of Energy under Contract No. DE-AC02-06CH11357.
- This work was performed in part at the Oak Ridge National Laboratory, which is managed by UT-Battelle, LLC for the U.S. Department of Energy under Contract No. DE-AC05-00OR22725.
- This work was performed in part at the Lawrence Livermore National Laboratory, which is managed by Lawrence Livermore National Security, LLC for the U.S. Department of Energy under Contract No. DE-AC52-07NA27344.
- This work was performed in part at the Los Alamos National Laboratory, which is managed by Triad National Security, LLC for the U.S. Department of Energy under Contract No. 89233218CNA000001
- This work was performed in part at Sandia National Laboratories. Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

Testing Matters (Maybe even more than you think)



- Individual project test suites are the basis for many layers of testing
 - Well constructed tests add to confidence in and stability of code
 - Fragile or insufficient test suites lead to errors and frustration

We Covered Software Engineering Topics Focused on Testing...

- Testing strategies for complex software systems
- Continuous integration testing

And there are Many More Topics We Didn't Have Time For

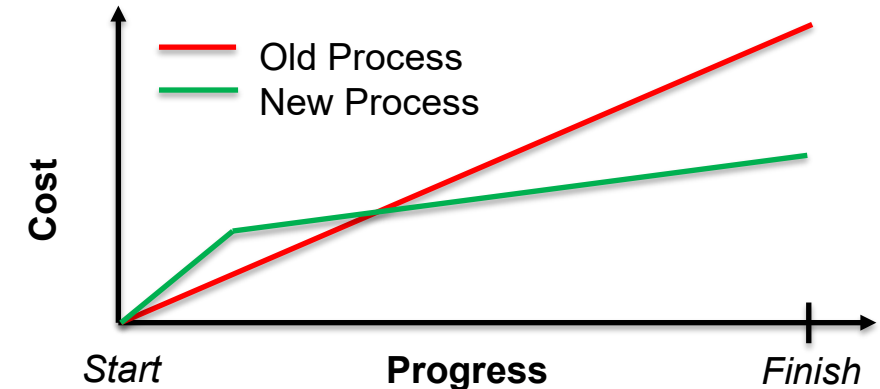
- Documentation
- Licensing
- Packaging and distribution
- Issue tracking
- Configuration and build
- Debugging strategies
- Building and sustaining communities around software
- Software publication and citation
- Requirements gathering
- Understanding and debugging floating-point math
- Performance and performance portability
- Project management
- Collaboration around software development
- Designing software for flexibility and extensibility
- Systematic refactoring of large, complex software systems
- Reproducibility
- **Also important topics, but...**
- **Less distinction between research software and other software**
- **More informational resources available**
- **Next-level concerns for starting researchers**
- **Very limited time!**

But you're a researcher.
You can't afford to spend
“all” of your time on
software engineering.

A Final Recommendation: Continual, Incremental Software Process Improvement

Target: your project should include “just enough” software engineering so that you can meet your short-term and longer-term scientific goals effectively

1. Identify your team’s “pain points” in your software development processes
 - Help: RateYourProject assessment tool:
<https://rateyourproject.org/>
 2. Set a goal for something to improve
 - Target processes and behaviors, not just tasks
 - Pick something that you can address in a few months that will give you a noticeable benefit
 3. Agree on a plan to address it, identify markers of progress and what is “done”
 - Write them down
 - Help: Progress tracking card examples:
<https://bssw-psip.github.io/ptc-catalog/catalog>
 4. Work your plan, track your progress
 5. When you are done, celebrate...
- 7 ...then pick a new pain point to address



The new process costs something to implement, but it pays off over time

Productivity and Sustainability Improvement Planning

<https://bssw.io/psip>



A goal of [BSSw.io](https://bssw.io) is to provide resources for improving your software processes. If you find useful resources that aren't on BSSw.io, consider contributing. Its easy and quick.

IDEAS
productivity

ECIP
EXASCALE
COMPUTING
PROJECT

Thanks, and Keep in Touch!

- Email comments and questions to bssw-tutorial@lists.mcs.anl.gov
- We'll provide feedback on pull requests in the hands-on repository
- See the tutorial web site for an archive of all the materials from this tutorial
 - <https://bssw-tutorial.github.io/>
- Follow us:
 - IDEAS Productivity project
 - Website: <https://ideas-productivity.org/>
 - Announcement list: <http://eepurl.com/cQCyJ5>
 - Better Scientific Software
 - Resources: <https://bssw.io/>
 - Monthly digest: <https://bssw.io/pages/receive-our-email-digest>
 - RSS feed: <https://bssw.io/items.rss>



Related Events at the ECP Annual Meeting (*all times Eastern*)

- IDEAS Desk – informal conversations about developer productivity and software sustainability
 - **Room 125** in the [Gather.Town](#) Side Meetings area (Whova -> Logistics)
 - Hours: 12:30pm-1:30pm Monday through Friday
- [ECP Broader Engagement Initiative](#)
 - 1:00pm-3:00pm Tuesday
- [AD, Hardware and Integration, and Facilities Poster Session](#)
 - 4:00pm-6:00pm Tuesday
- [Best Practices #somycodewillseethefuture Breakout](#)
 - 1:00pm-2:00pm Wednesday
- [Panel on Sustainability of ECP Software and Applications](#)
 - 1:00pm-3:00pm Wednesday
- [What Can be Learned from Applying Team of Teams Principles to the ECP Projects PETSc, Trilinos, xSDK, and E4S?](#)
 - 1:00pm-3:00pm Thursday