



Agile Methodologies Redux



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- **The requested citation the overall tutorial is: David E. Bernholdt, Anshu Dubey, Rinku K. Gupta, and David M. Rogers, Software Productivity and Sustainability track, in Argonne Training Program on Extreme-Scale Computing (ATPESC), online, 2021. DOI: [10.6084/m9.figshare.15130590](https://doi.org/10.6084/m9.figshare.15130590)**
- Individual modules may be cited as *Speaker, Module Title*, in Better Scientific Software tutorial...

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Outline

- Refining our Epic
- PSIP: Productivity and Sustainability Improvement Planning

More on Epic, Story, Task

- Definition of Done
- Refining Issues
- Agile Estimation

Epic, Story, Task Review

- Break down and refine when and as needed
 - Close to when the work will be done
 - Only for work that will take place
 - Can be valuable for estimating
 - There is no “correct” level of granularity
- Epics are very high level objectives
- Stories should represent an increment of value to the customer
 - “Definition of Done” – understandable to user
- Tasks are the steps necessary to complete a story
 - May not individually provide value to the customer

Definition of Done

- Simplified definition: When all acceptance criteria are met
- Acceptance criteria
 - “Conditions that a software product must satisfy to be accepted by a user, customer or stakeholder.” – Microsoft Press
 - “Pre-established standards or requirements a product or project must meet.” – Google
 - Can include functional, non-functional, and performance requirements.

Definition of Done

- Important to establish for a story before estimating or beginning a task
- Defined by the team, acceptable to customer
 - Customer language
- Should not specify an implementation unnecessarily

Refining Our Epic

- Epic: Refactor code for enhanced modularity
 - Description: The heat equation code needs refactoring to improve modularity. Specifically, there are utilities that could be generalized and used with for other applications. Also, the integration function is currently hard-coded. In the future, we want to use alternative integration functions, so we should generalize the interface for this function.
 - Story 1: Separate out utilities
 - Definition of Done
 - Task list
 - Story 2: Separate out integration function
 - Definition of Done
 - Task list

Refining Our Epic

– Story 1: Separate out utilities

- Definition of Done
 - Unit tests pass
 - Code review completed
 - Integration/system tests pass
 - Utility performance is at least 95% of pre-separation performance
 - Utility usability demonstrated outside of heat equation application

– Story 2: Separate out integration function

- Task 1: Add testing for integration function to protect functionality during refactor
 - Needed testing should be specified
- Task 2: Generalize interface to allow alternative implementations
- Task 3: Expose current integration function through the new interface & run tests

Agile Estimation

- Estimating is hard
 - Requires practice
 - With practice, it is still hard
- Stories are estimated using “story points”
 - Relative estimate
 - Many estimating techniques
 - Should NOT map to hours, days, etc
 - Definition of done needed, tasking not required
- Tasks are estimated in hours
 - Absolute estimate
- Useful for planning schedules

Key concept:

It is easier to accurately estimate many small tasks than to estimate a large epic.

Epic: Huge refactor effort

Tasks:

- Add tests
- Generalize interface
- Expose existing interface

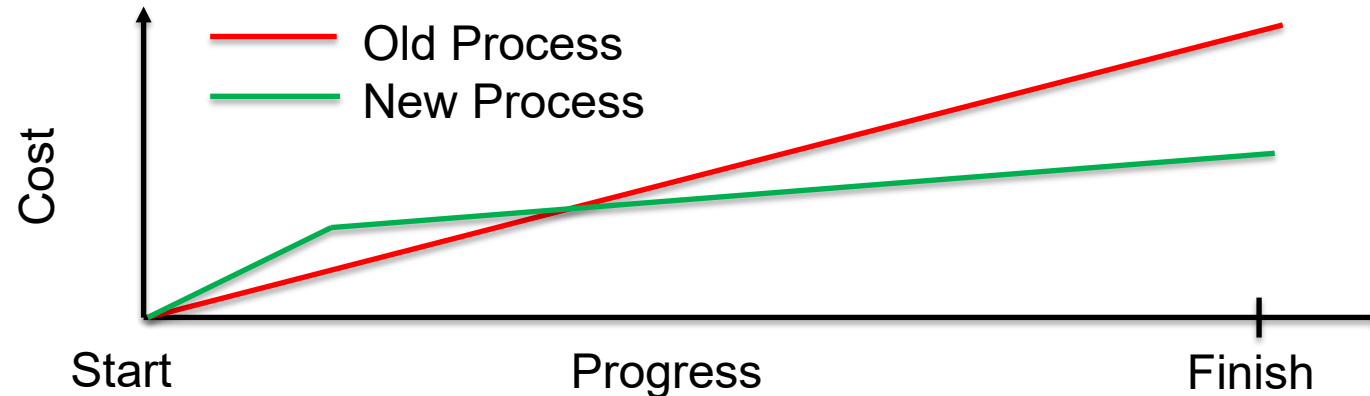
How To Get Better

“Use iteration and incrementation only for projects you want to succeed.”

- *Adaptation of Martin Fowler quote*

Strategy for Incremental Productivity Improvements

- Identify, analyze, prototype, test, revise, deploy. Repeat.
- Realistic: There is a cost.
 - Startup: Overhead
 - Payoff: Best if soon, clear



- Working model:
 - Reserve acceptable time/effort for improvement.
 - ***Improve how you do your work on the way to getting it done.***
 - Repeat.

Productivity and Sustainability Improvement Planning (PSIP) Examples: EXAALT & MPICH



PSIP workflow helps a team create user stories, identify areas for improvement, select a specific area and topic for a single improvement cycle, and then develop those improvements with specific metrics for success.

EXAALT PSIP: Continuous integration (CI) testing

BSSw blog article: [Adopting Continuous Integration for Long Timescale Materials Simulation](#), Rick Zamora (Sept 2018)

PSIP Process: Continuous Integration (CI)	PSIP Process: Testing
<p>Target: Implement and document a basic CI pipeline to act as the foundation for automated build and functionality testing.</p> <ul style="list-style-type: none"> 0. Initial Status. No comprehensive CI framework in place 1. Develop a minimal docker image, with EXAALT dependencies 2. Implement a minimal 'yaml' script for the CI pipeline 3. Update EXAALT docker image to leverage CMake, and create a ParSplice-specific image for build testing 4. Generate step-by-step "how-to" Docker-image documentation 5. Extend CI to automate build and functionality testing with both CMake and Boost. <p>Score (0-5): 4</p>	<p>Target: Implement and document practical testing examples for ongoing EXAALT development.</p> <ul style="list-style-type: none"> 0. Initial Status. No comprehensive testing framework in place 1. Add 1-3 example tests using the existing CMake infrastructure (CTest) 2. Add 1-3 example tests using the 'Boost Test' library 3. Integrate the CTest infrastructure with the new Boost tests 4. Integrate the Boost-enabled CTest framework into the CI pipeline 5. Bonus: Work with EXAALT team to add more advanced tests to improve code coverage <p>Score (0-5): 3</p>

MPICH PSIP: Onboarding new team members

Practice: Create Centralized Training Resources		
Score (0-4)	Description	Tracking
0	Initial Status : No training process in place.	
1	Understand MPICH requirement for developers and typical challenges for new hires	✓
2	Review and gather specific training materials	✓
3	Design "MPICH Training Base" website	✓
4	Solicit feedback, improve, add and prune content to ensure effectiveness	2019

<https://bssw.io/psip>