Using the PSIP Toolkit to Achieve your Goals – A Case study at The HDF Group

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SAND2021-6862 PE

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Outline

Overview of PSIP	PSIP Facilitator (Reed)
Overview of PTCs	PSIP Facilitator (Elsa)
The HDF Group PSIP	THG Project Lead (Elena)

Bottom Line Up Front: Our team is actively working on several tools and technologies for software process improvement that your team can start using now to

– Realize process improvements **with minimal disruption to current development.**

– Mitigate **technical risk** so that you can develop software with **confidence**.

Focus of this Webinar

PSIP allows you to realize process improvements without disruption to any current development.

- *Introducing…*

- A practice that can help your team mitigate technical risk and develop software with confidence. (PSIP)

- How to identify topics for improvement by rating your project

- Progress tracking cards (PTC)

- Online resources such as RateYourProject and the PTC Catalog

- Integrating PTCs into your projects

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PSIP: Productivity and Sustainability Improvement Planning

- PSIP is a lightweight workflow that can be used on its own or alongside frameworks you may currently use such as Kanban, Agile, etc.

- You *implement PSIP* by creating and using Progress Tracking Cards (PTCs) to achieve quality goals.

PSIP helps software teams to **IDENTIFY** opportunities to iteratively and incrementally **IMPROVE** software team practices and processes.
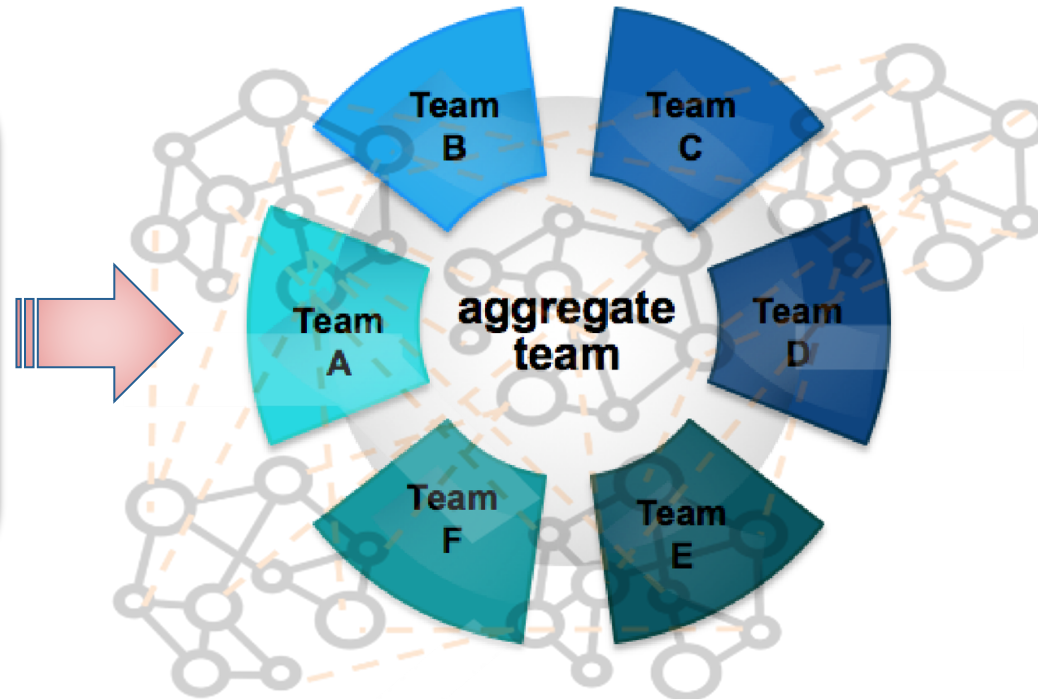
Who is using PSIP?

The HDF Group — Improvements to documentation to create reference manual, setting code style standards, transition to GitHub

ALPINE/ZFP — Create a VTK-m filter for APLINE in situ algorithm users

Oak Ridge National Laboratory — Using a more detailed version for internal project assessment

Sandia National Laboratories — Using internally for updating version control systems, updating documentation to support better onboarding

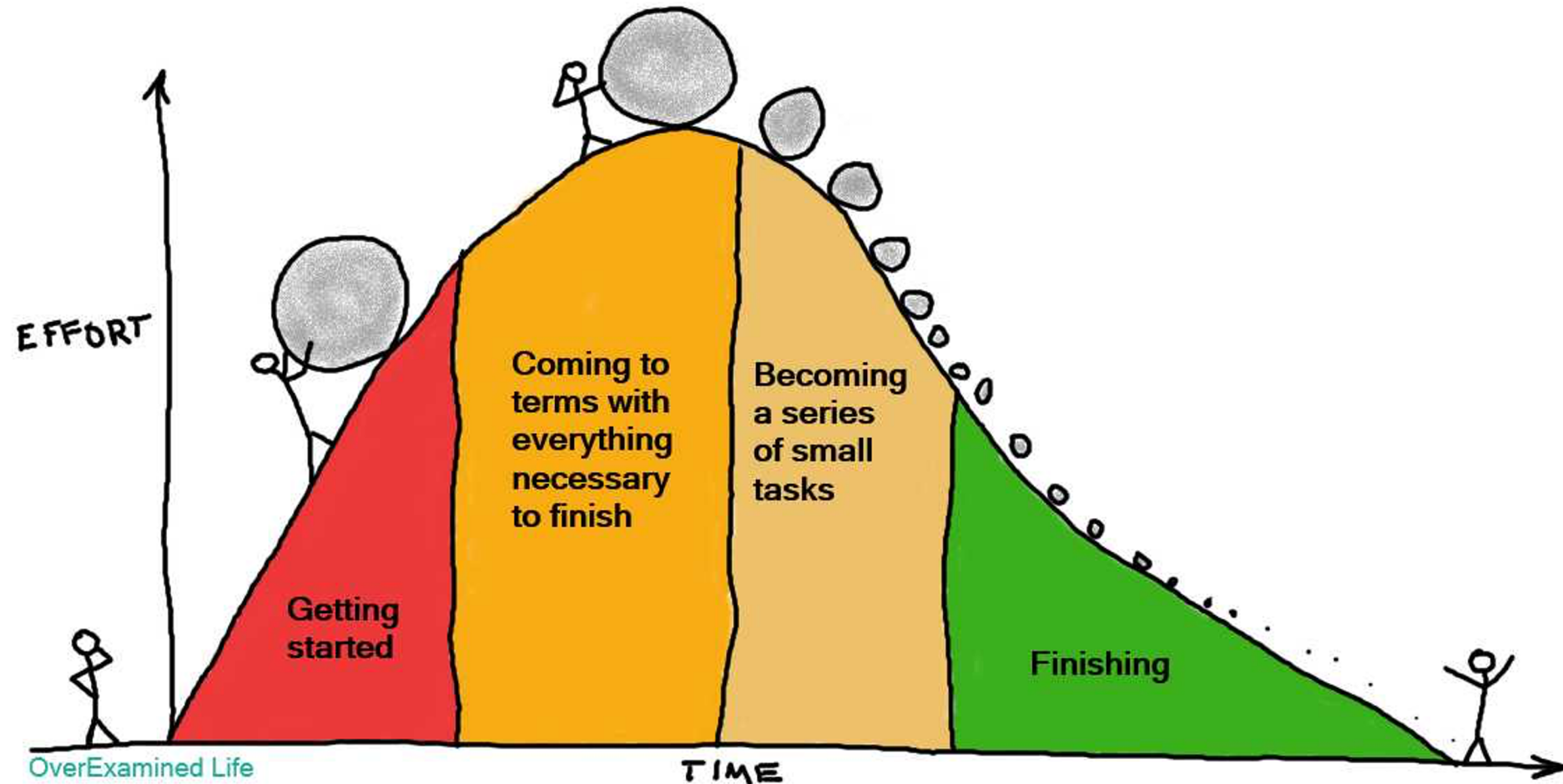**Technische Universität Darmstadt** — Used to adopt and mature continuous integration capabilities.
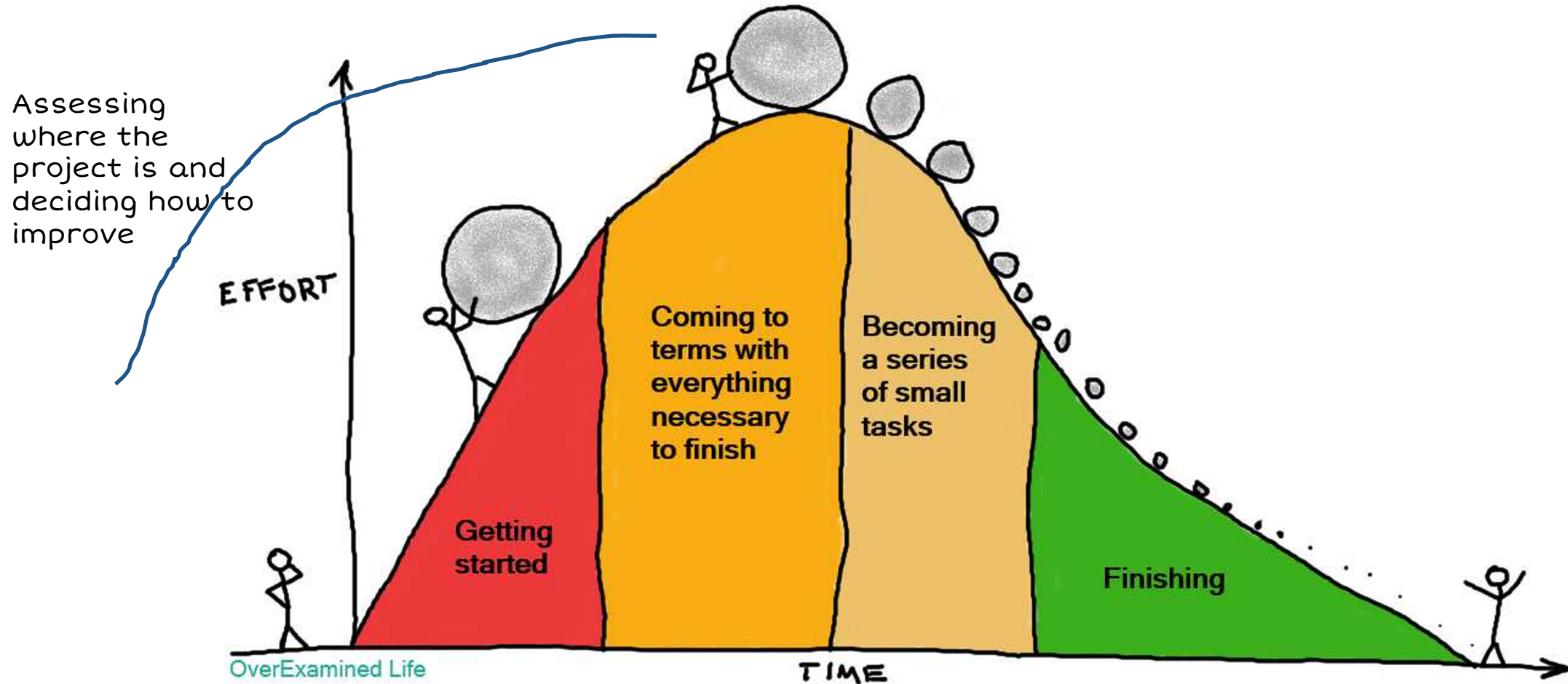
PSIP: At A High Level

- Why improve?
  - Improving the means of production (teams and their technologies and practices) we can improve the final product, the software.

- Teams often know where they want to go, but not necessarily how to get there, and getting started on that path is the major hurdle.

- PSIP provides tools and resources to set, measure, and realize improvement goals.
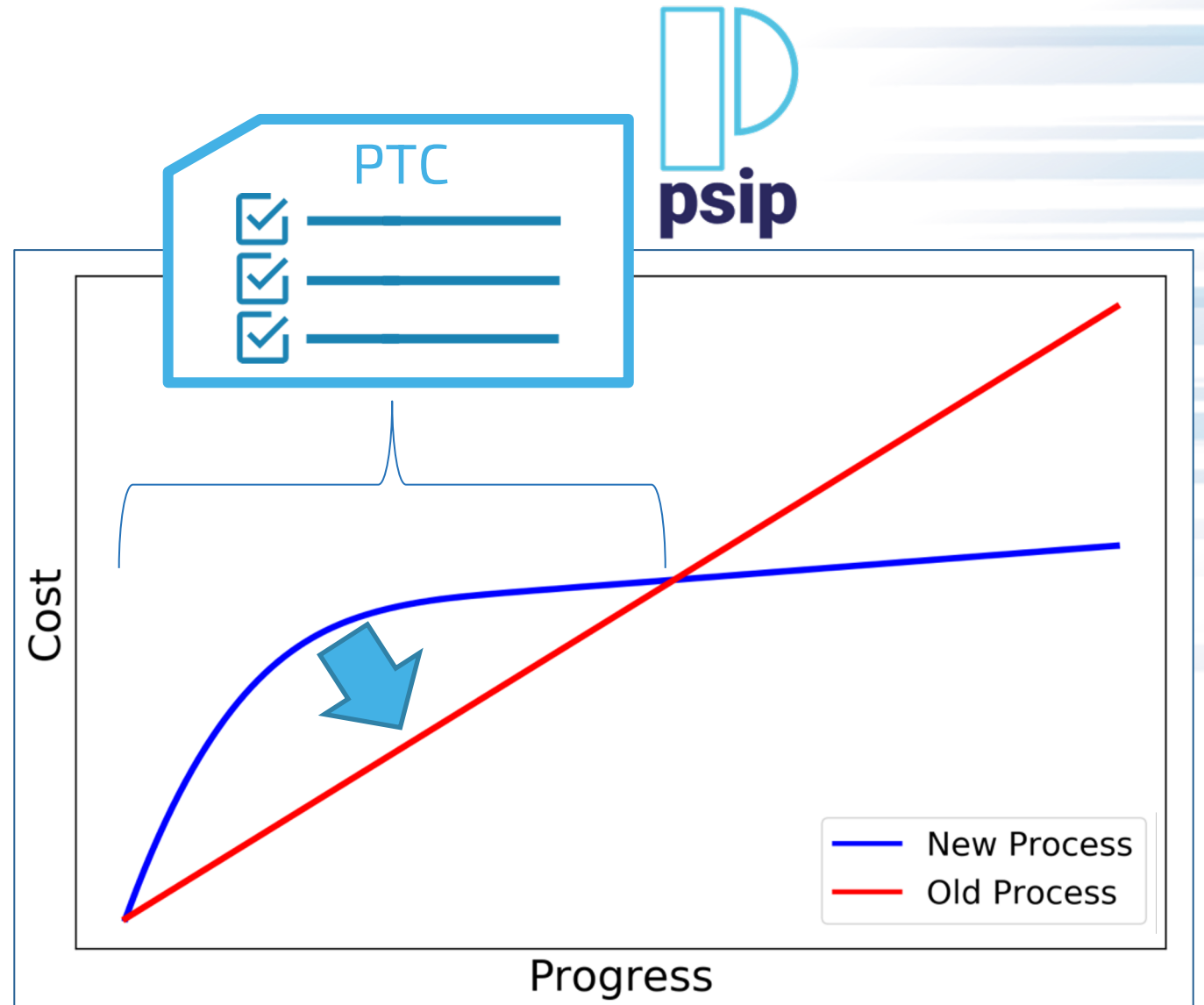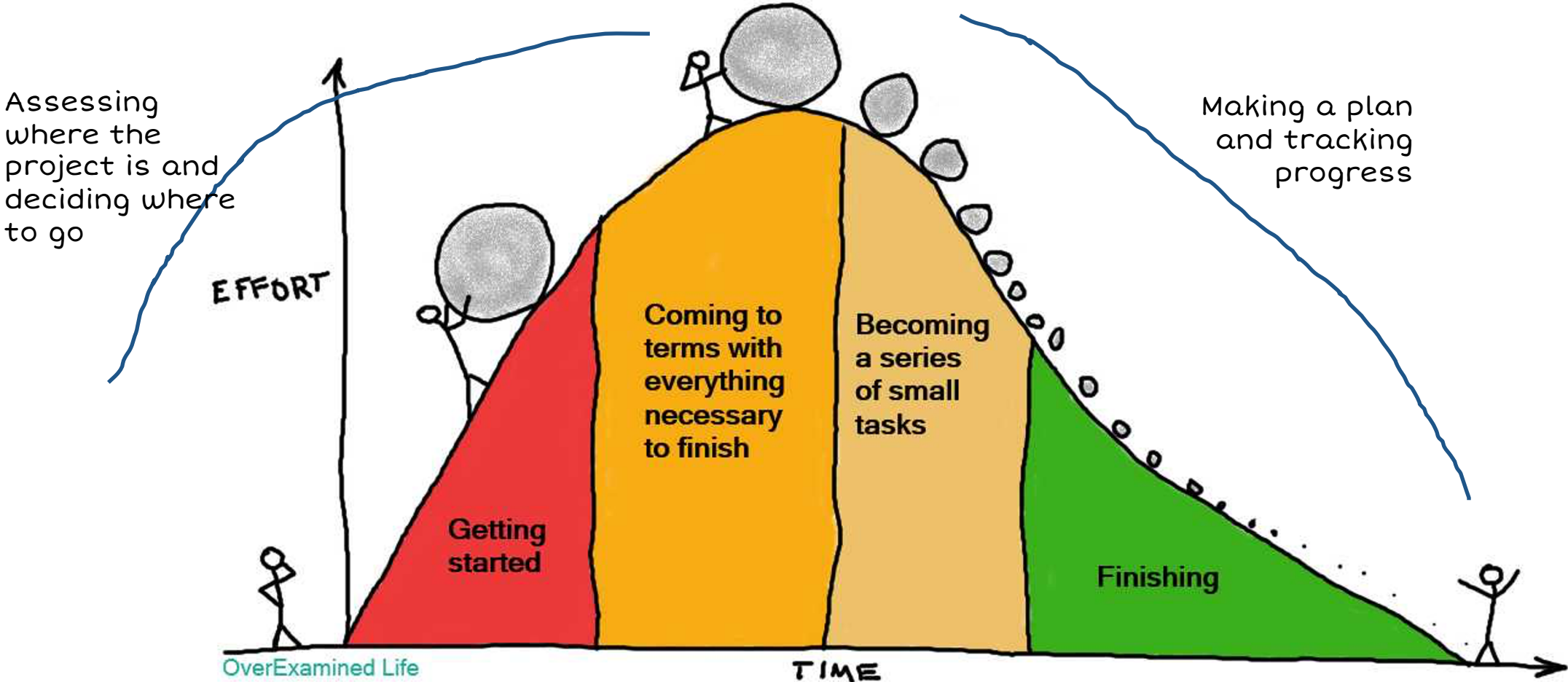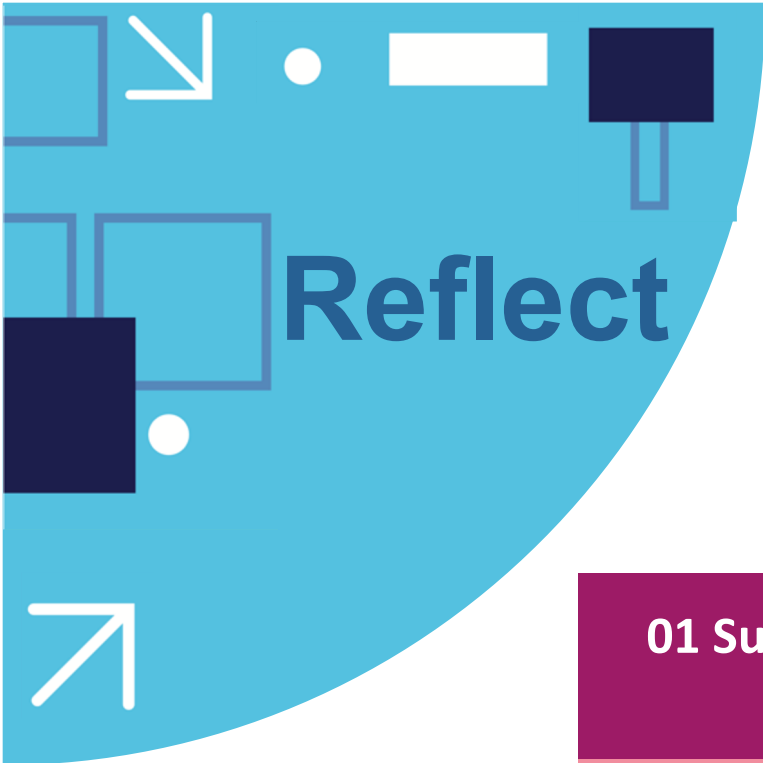
How to overcome the barrier of getting started?

https://overexamined.life/how-overcome-procrastination/

How to overcome the barrier of getting started?

Assessing where the project is and deciding how to improve

How to overcome the barrier of getting started?

Assessing where the project is and deciding where to go

EFFORT

Getting started

Coming to terms with everything necessary to finish

Becoming a series of small tasks

Finishing

OverExamined Life

TIME

Making a plan and tracking progress

Reflect: How does your software deliver value to your users?

Reflect

Q: If the new software requires teaching other how to use it, how does that happen?

A: Our project tasks students and postdocs with formulating their own tutorial for how to build and run the code […]

01 Summarize Current Project Practices

- Generate brief practices summary
- High level description
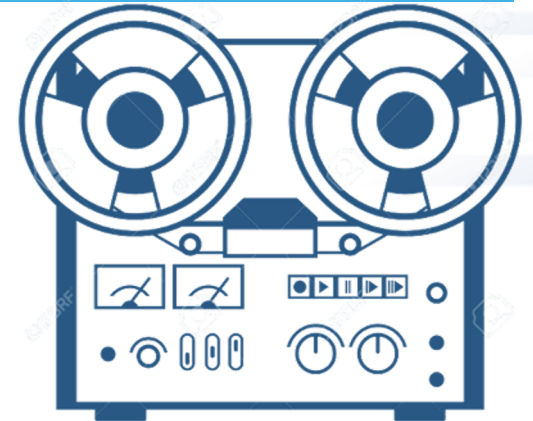
The PSIP Team is Using Automation and Data-Driven Analysis to Deliver Value to ECP Teams
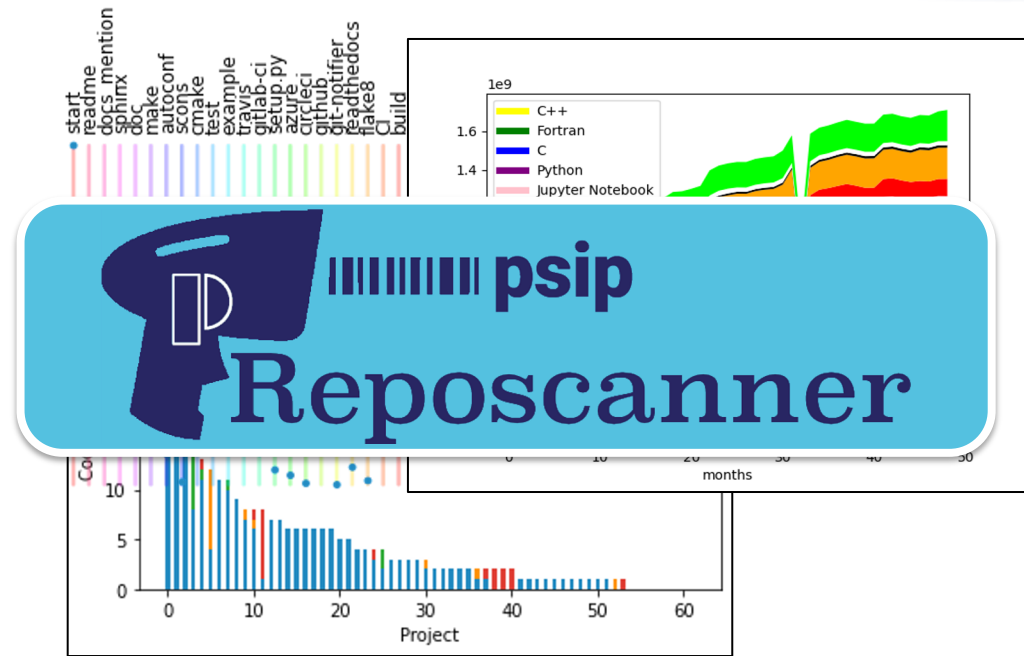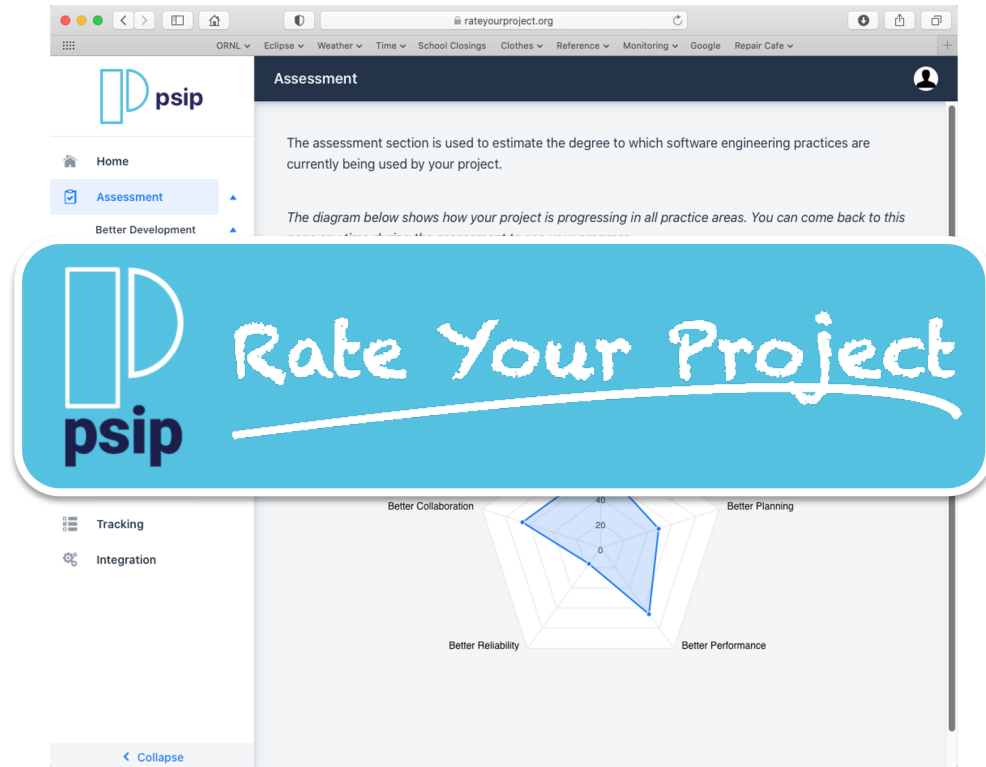

- Realize process improvements **without disrupting current development.**
- Mitigate **technical risk** so that you can develop software with *confidence*.

What is RateYourProject?

- In the past, assessment of team practices to identify improvement goals was a labor intensive practice for both the teams and their facilitators.

- Our solution: a guided self-assessment that enables the examination of software development, planning, performance, reliability, and collaboration practices.

13
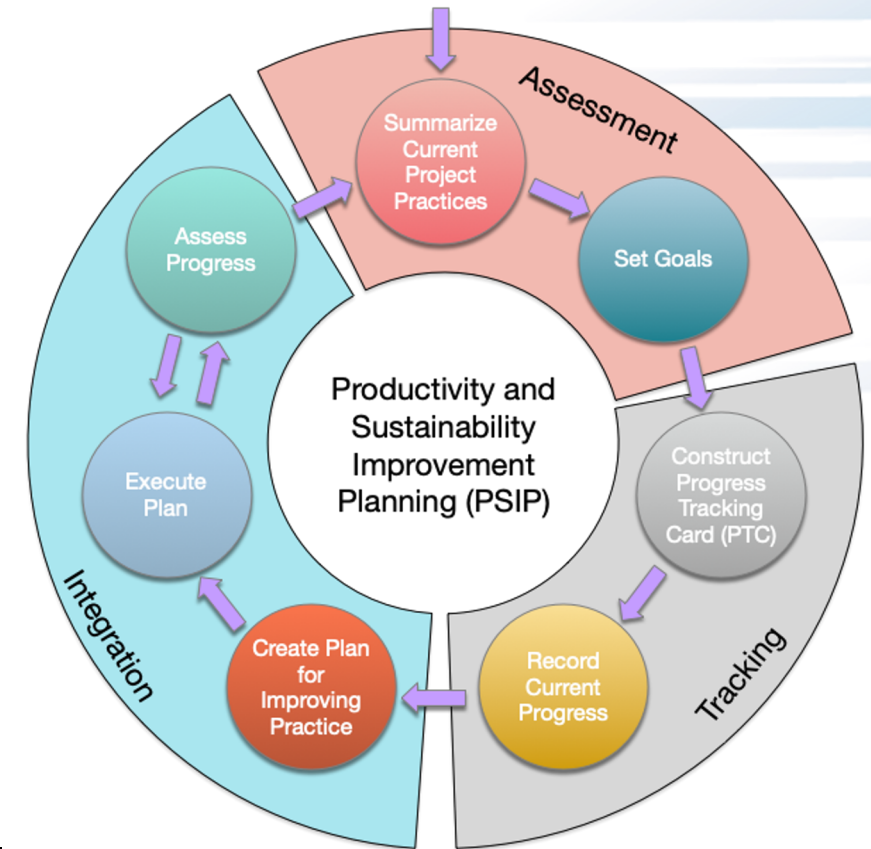
RateYourProject Provides Resources for Setting Improvement Goals

- RateYourProject (https://rateyourproject.org) aims to automate phases of the PSIP process, from self-assessment to PTC creation to integration of PTCs into a project.

- Practices are rated using a modified four-point Likert scale, which forces one of four responses (none, basic, intermediate, advanced) and no neutral response. Scores are aggregated in each practice area, and then used to generate a visual indication of overall progress using a spider chart.
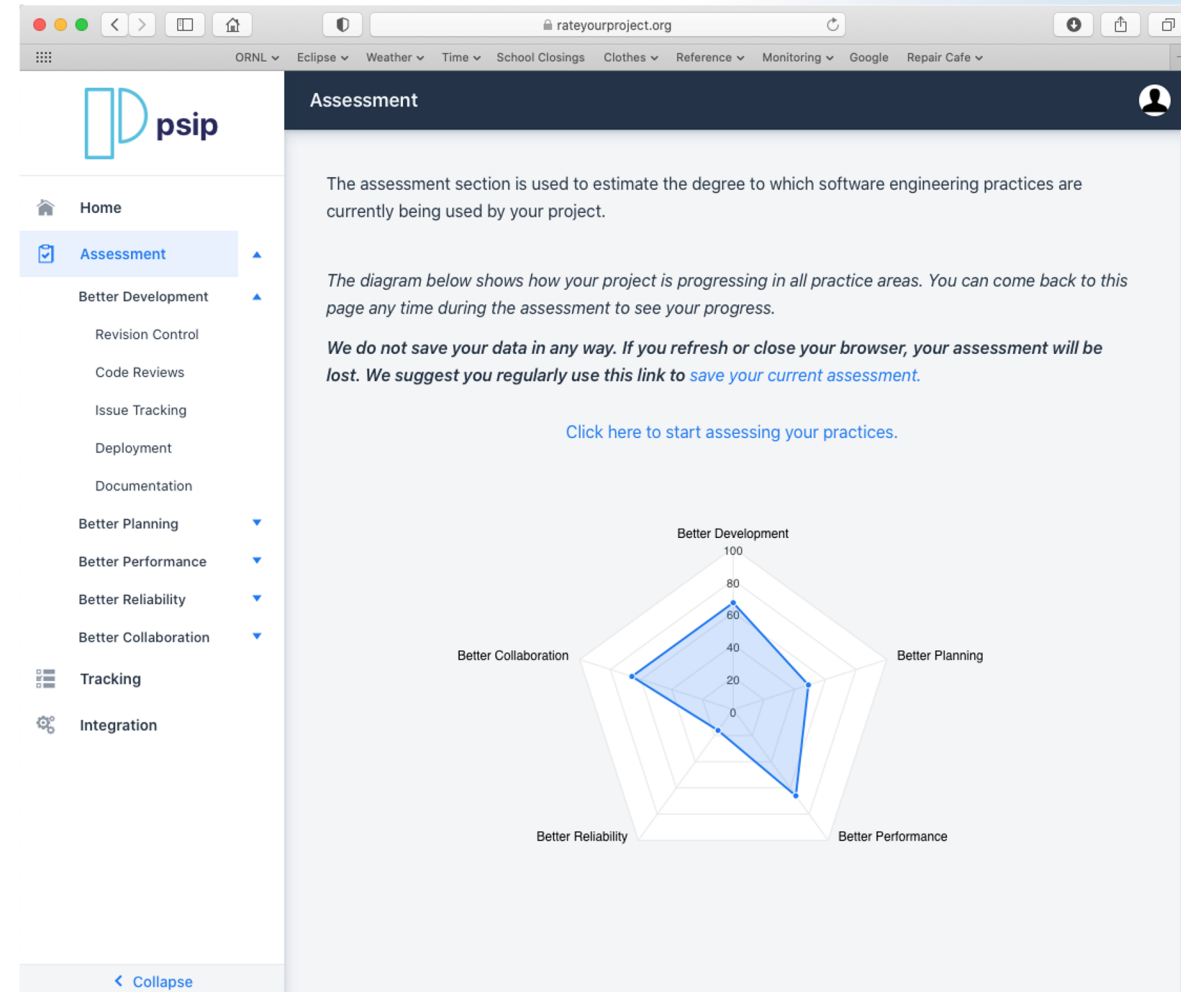
Scope: What are the barriers to quality and efficiency?

www.github.com/bssw-psip/ptc-catalog

Progress Tracking Card

Step 1
Step 2
…

02 Set Goals

- Identify practices ready for improvement.
- Select those with near-term payoff.

03 Construct Progress Tracking Card (PTC)

- Construct from PTC catalog or on your own.
- Select only a few items.

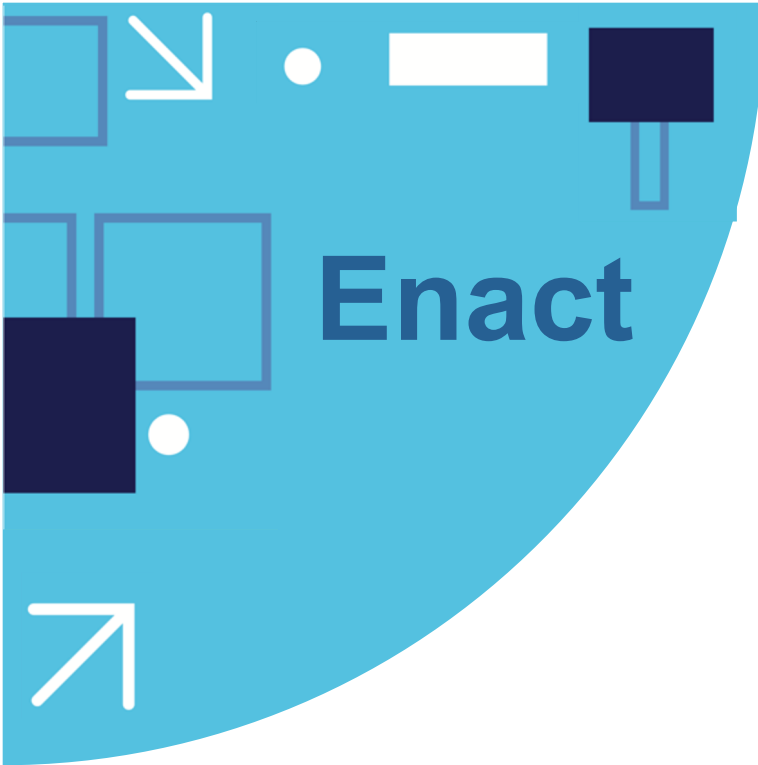# Plan: What actions can you take in a predictable span of time?

Plan

04 Record Current PTC Values

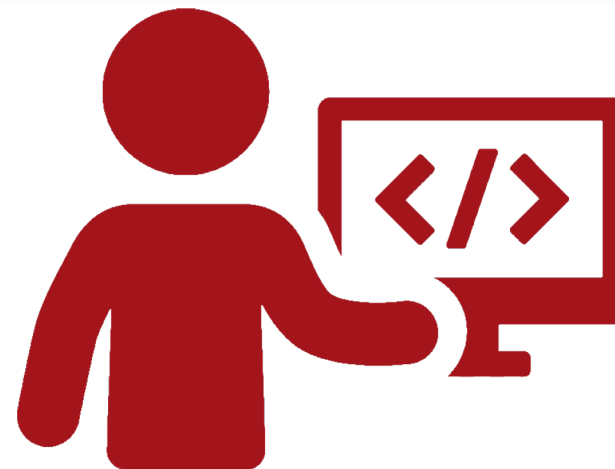- Set baseline values for future reference.

05 Create Plan For Increasing PTC Values

- Define practice improvement steps.
- Be specific, track issues.

Enact: Can you execute on the plan? Are these changes impactful?

Enact

06 Execute Plan

- Increase PTC values by improving selected practices.
- Track issues progress.

07 Assess Progress

- Track PTC values.
- Adjust strategy if needed.

Recall: What is PSIP?

- We find that teams often need help getting started on the path towards software process improvement.

- The **Productivity and Sustainability Improvement Planning** (PSIP) is a lightweight workflow for software process improvement.

- PSIP is implemented via **identifying improvements** and executing plans based on **Progress Tracking Cards** (PTCs).

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Questions?

What Are PTCs?

Title	The topic of the card
Target	Practice is changed
User Story	As a ___, I want to ___, so that ___.

Score	Description
0	Initial State
1	Intermediate state of practice (+)
2	Intermediate state of practice (++)
3	Intermediate state of practice (+++)
4	Desired state of practice

Card (brackets the Score/Description table)

Comments: Relevant links or details

Creating a PTC Can Be Challenging!

Title	X
Target	We Achieve X!
User Story	**As a** developer, **I want** X, **so that** our project has higher values of X-related-quality.

Score	Description
0	We Are Here
1	
2	
3	
4	Where We Want To Be

We have no idea…

Comments: Some notes about X

Creating a PTC Can Be Challenging!

Title	X
Target	We Achieve X!
User Story	As a developer, I want X, so that our project has higher values of X-related-quality.

Score	Description
0	We Are Here
1	
2	We have no idea…
3	
4	Where We Want To Be

Comments: Some notes about X

1. Did team actually reach a consensus that X was important?

2. Is everyone in agreement about **why** X is important?

3. What does achieving X entail in practice, and how do you get there?

What Makes for a Good Process Improvement Goal?

1. **Collaborative** and **team-oriented** (think project policies).

2. **Measurable** and **specific** (think artifacts).

3. **Realistic** and able to be realized in **increments** (over weeks, months)

PSIP helps software teams to **IDENTIFY** opportunities to iteratively and incrementally **IMPROVE** software team practices and processes.
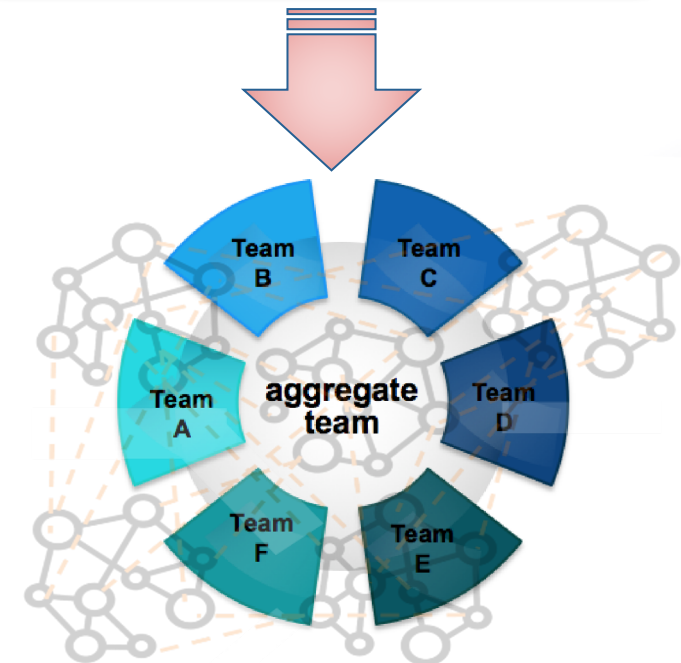
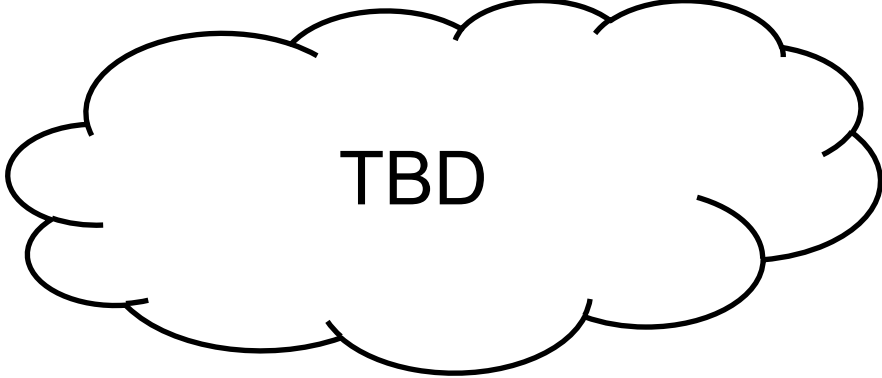# Making A Card for Continuous Integration

Title

Continuous Integration

Target

Testing is run at appropriate times without human involvement and reports are direct and concise.

User Story

As a person responsible for software quality and correctness for my project, **I want** code regularly tested **so that** regressions are guarded against and new code is tested against itself and other commits the developer might not have had.

Making A Card for Continuous Integration

Score	Description
0	Regression and unit tests exist but are only run when requested by a developer.
1	
2	
3	
4	Code may not be integrated if automated tests fail.

TBD

We have to have tests in place before we can approach CI.

The end goal is to guard against regressions.

Making A Card for Continuous Integration

Score	Description
0	Regression and unit tests exist but are only run when requested by a developer.
1	Tests are run automatically according to the teams' policy.
2	Test reports are generated as needed and archived.
3	Archived reports are posted to appropriate maintainers.
4	Code may not be integrated if automated tests fail.
5	A mechanism and policy exists to integrate code without passing tests in rare circumstances.

implies

Reviewing and consistently acting on feedback is key.
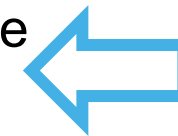
The CI process should only be circumvented in a disciplined, cautious manner.
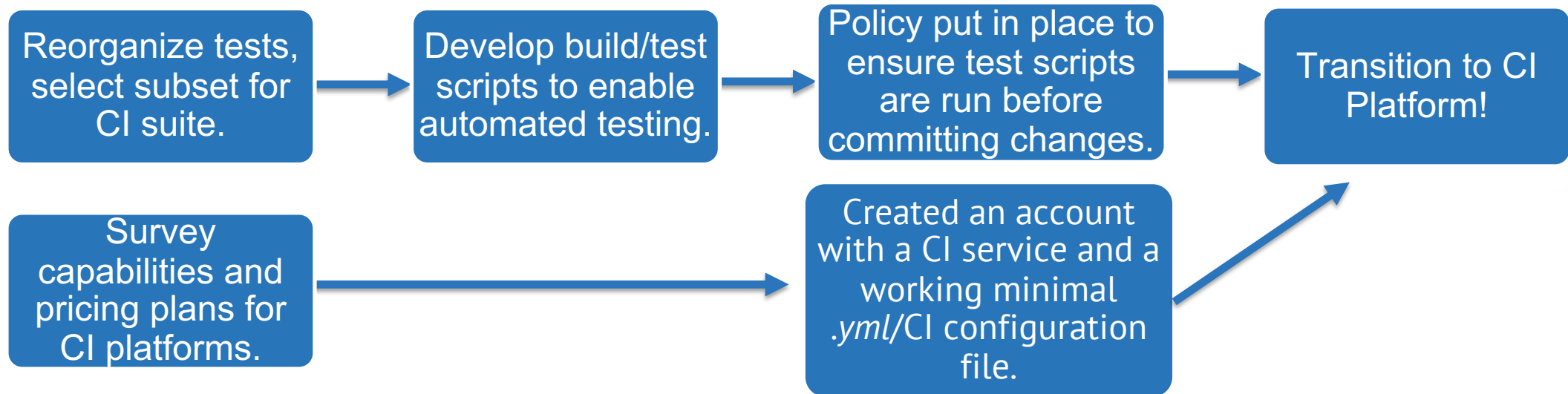
How to Get Started

1 As a team, identify a practices to improve

2 Construct the PTC

– Select from the example catalog

– Work with a facilitator to build one from scratch

3 Adapt the card for the team, filling in any specific technologies and possible deadlines.

4 Add the card to the team's work tracking system

How to Use a PTC

- Once the card is constructed, it should be integrated into the team's work-tracking/planning system and referenced frequently

- Review it during team meetings

- Continually assess progress towards each step

Tasks Needed To Reach Score of 1

Tests are run automatically
according to the teams' policy.

Reorganize tests, select subset for CI suite. → Develop build/test scripts to enable automated testing. → Policy put in place to ensure test scripts are run before committing changes. → Transition to CI Platform!

Survey capabilities and pricing plans for CI platforms. → Created an account with a CI service and a working minimal *.yml*/CI configuration file. → Transition to CI Platform!
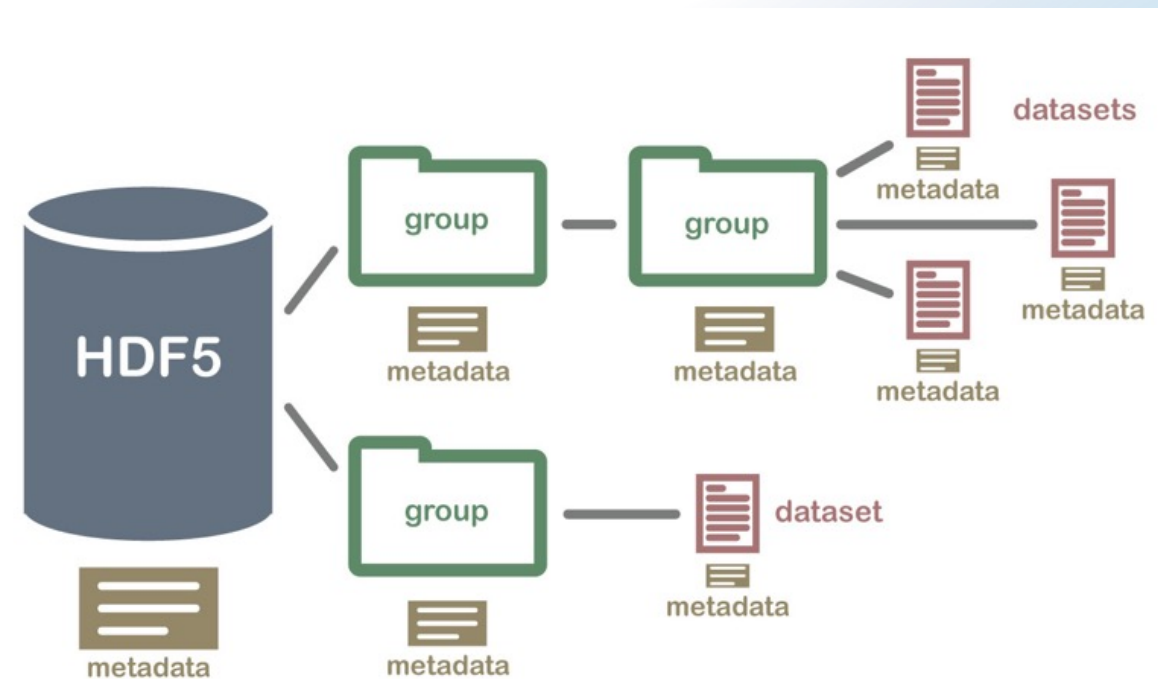
Questions?

Example: The HDF Group (THG)

- Last year, LLNL had a contract with THG to study the effectiveness of PSIP in improving software development processes.

- A few THG developers went through PSIP training.

- THG identified and prioritized 13 areas of improvement. Three areas were chosen:
  - Adopting a workflow for updating HDF5 reference manual
  - Migrating HDF5 repo to GitHub
  - Adopting coding standards

- Progress was made on all fronts! In particular, coding standards were agreed upon, something that had eluded the team for 20+ years.
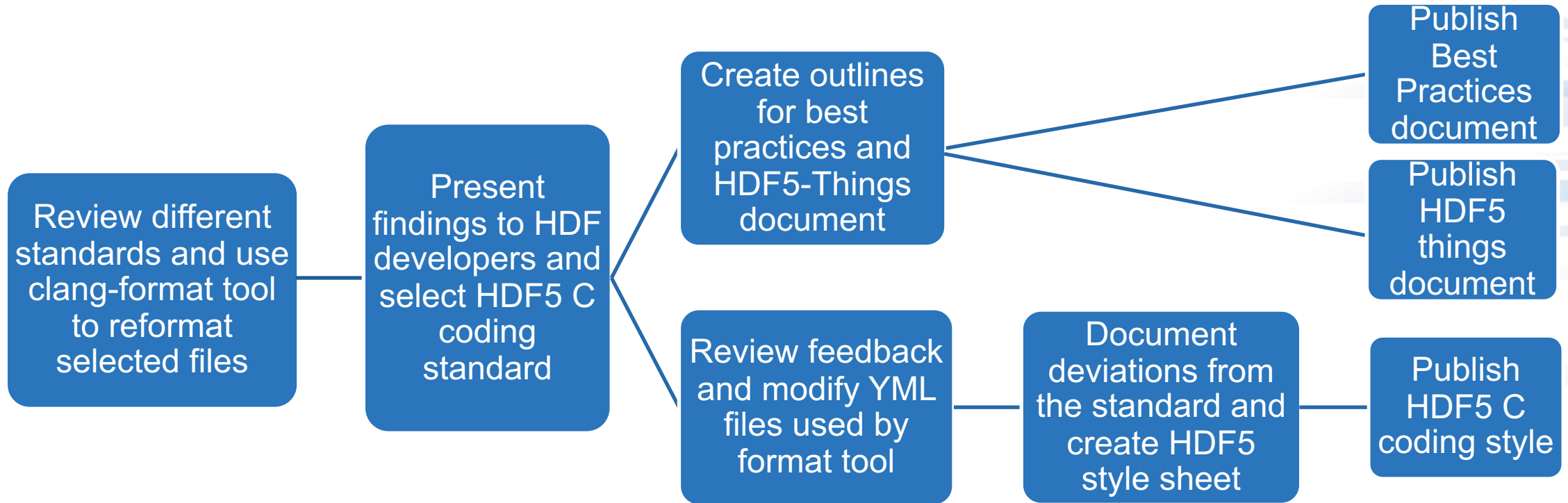
Real-World Example: THG Coding Standards PTC

Title   THG Coding Standards

Target   Steadily convert the codebase over to an agreed-upon standard.

User Story   **As a** person responsible for software quality and correctness for the HDF5 library, **I want** guidance on selecting and implementing coding standards **so that** we can make our code easy for everyone to read and understand.

As an HDF5 library developer or community contributor, **I want** support **so that** I am complying with the standards with minimal additional effort or ambiguity.

Real-World Example: THG Coding Standards PTC

Score	Description
0	No coding standard adopted.
1	The team has selected and documented an agreed-upon standard.
2	New code that is written is required to comply with the standard, and the team has conducted a feedback session to assess and revise the standard.
3	The team has developed and put into place a refactoring plan to bring preexisting code into compliance with the standard.
4	Tool support has been put in place to help ensure compliance, and running the tool is made part of the contribution process.

HDF5 Tasks Needed To Reach Score of 1

Review different standards and use clang-format tool to reformat selected files

Present findings to HDF developers and select HDF5 C coding standard

Create outlines for best practices and HDF5-Things document

Publish Best Practices document

Publish HDF5 things document

Review feedback and modify YML files used by format tool

Document deviations from the standard and create HDF5 style sheet

Publish HDF5 C coding style

The team has selected
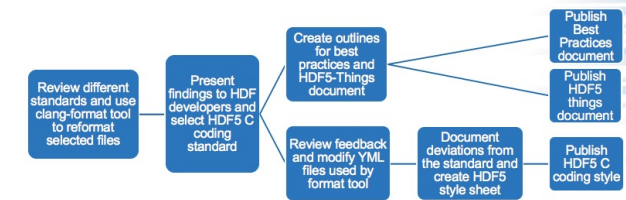and documented an agreed-upon standard.

THG Coding Standards PTC - Lessons Learned

- PTC for the project brings the team together

- PTC may (and will) change as team's work progresses
  - THG team realized that getting to scores 2 and 3 was
    - Expensive
    - Unrealistic - hard to enforce
    - Score 4 can be achieved without some tasks listed for score 1 and without getting to scores 2 and 3
  - THG team invested time in automation and minimum code cleanup
    - Set up automated code reformatting when PR is committed on GitHub
    - Identified a small portion of HDF5 code that caused problems and fixed it
    - Compromised on how the rest of the code is formatted

- Focus on PTC's end goal

- Create new PTCs as needed
  - Work on the "Best practices" and "HDF5 things" documents would benefit from PTCs

Real-World Example: THG Coding Standards PTC

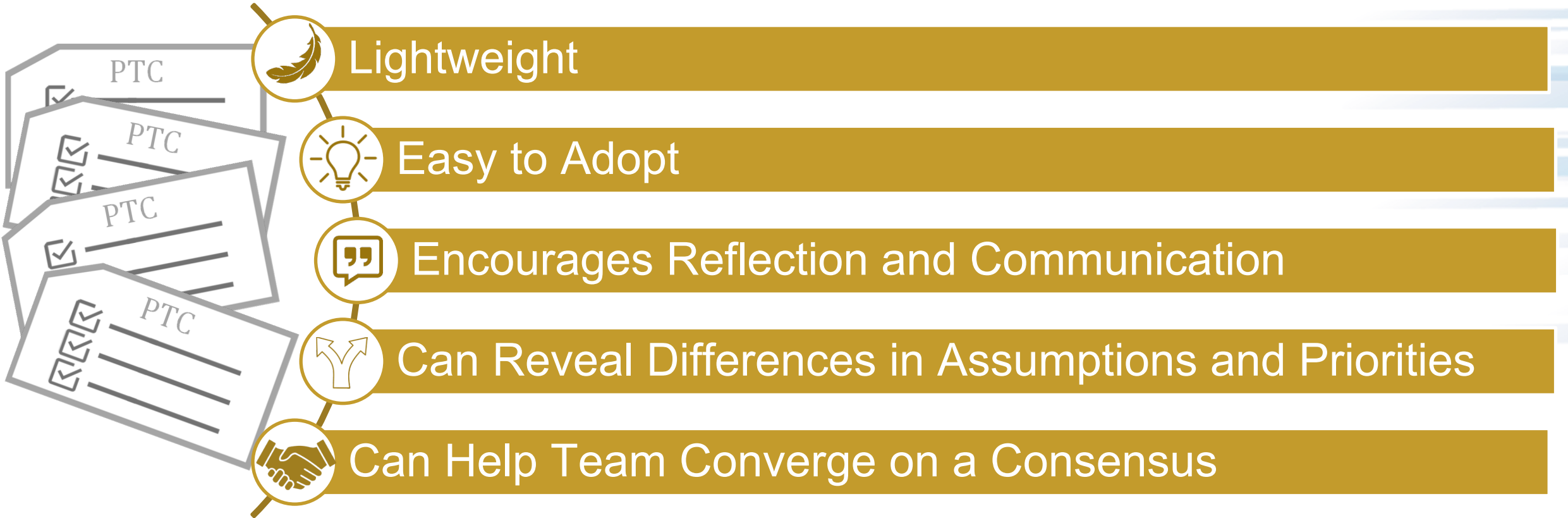| Score	Description
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HDF5 Tasks Needed To Reach Score of 1

The team has selected
and documented an agreed-upon standard.

Questions?

Recap: Why PSIP?

- Lightweight
- Easy to Adopt
- Encourages Reflection and Communication
- Can Reveal Differences in Assumptions and Priorities
- Can Help Team Converge on a Consensus

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Conclusion

PSIP allows you to realize process improvements with minimal disruption to any current development.

- *By now you should understand …*

- A practice that can help your team mitigate technical risk and develop software with confidence. (PSIP)

- How to identify topics for improvement by rating your project

- Progress tracking cards (PTC)

- Online resources such as RateYourProject and the PTC Catalog

- Integrating PTCs into your projects

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https://bssw.io/psip/

Next Steps

- Point-of-Contact: Elaine Raybourn emraybo@sandia.gov

- Follow-up questions about PSIP & PTCs
  - Contact PSIP via https://bssw.io
  - PSIP team on Gitter https://gitter.im/bssw-psip/community

- Additional Resources:
  - Learn more at https://bssw.io/psip

- View PTC Example Catalog at https://github.com/bssw-psip/ptc-catalog

- Take the first steps on your own at https://rateyourproject.org

License and acknowledgements

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Acknowledgements