Defining Policies to Turn a Team and Project Around

JASON M. GATES | SANDIA NATIONAL LABORATORIES | ALBUQUERQUE, NM, USA

THE PROBLEM

EMPIRE

- Code development & process info for next generation electromagnetic/ electrostatic/fluid dynamic codes
- US Department of Energy
  - → Advanced Simulation and Computing
  - → Exascale Computing Project
  - → Advanced Technology Development and Mitigation
- 4 main code repos & 7 auxiliary ones
- Built on Kokkos, Trilinos

THE TEAM

- ~20 core developers ≈ 8 full time
- ~90 people total interacting on project
- ~6 development teams
- Development team distributed across Albuquerque and elsewhere in the US

PRIOR TO SUMMER, '17...

- Confusion as to:
  - Who's on the team?
  - What are people working on?
  - What needs to be done?
  - How do I get started?
- Pushes directly to `master`
- Minimal testing, code review, documentation, etc.
- Largely every man for himself

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of NTESS, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04 94AL85000. SAND2018-9107 C

THE SOLUTION

Need to decide how we're going to work as a team and then stick to those decisions. They aren't set in stone forever.

GITLAB ISSUES

- All work starts as an issue
- Issue templates
  - → More & better information
- Kanban board to organize work-in-progress
- Commits reference issue #'s for traceability

GITLAB MERGE REQUESTS

- Required to get changes into `develop`
- Reviewed & approved by > 1 person
- Reviewer tests feature branch
- Code review:
  - → Catch problems sooner rather than later
  - → Disseminate code knowledge throughout the team

- Design discussions happen that would not have otherwise
- Individuals are more knowledgeable about what the team is doing

COMMON LOOK AND FEEL

CODE DOCUMENTATION

- Doxygen
- Minimum requirements (`\brief`, `\parameter`, `\returns`)
- Enforced by MR reviewers

GIT WORKFLOW

- `master` & `develop` locked down
- Feature branches off `develop`
- Changes get to `develop` via MRs
- `master` updated via nightly testing

CODE STYLE GUIDE

- Doesn't matter what you decide
- Just pick something
- Guaranteed to upset someone
- Team vote on options:
  - → Maximize agreement
  - → Minimize retraining

AUTOMATED TESTING

- Jenkins Pipelines
- Jobs build/test multiple machines/configurations
- Used to update libraries, `develop` to `master`
- Automated emails
  - → Team aware of where/when things are failing

MORE STABLE CODE BASE

PRIMARY ENFORCEMENT MECHANISM = PEER PRESSURE

IMPROVEMENT

MONTHLY RETROSPECTIVE

- How are we doing as a team?
- Are our policies working well for us?
- Do they need to be amended?

CURRENT/FUTURE EFFORTS

- Improved automated testing
  - → Better stability
  - → Easier to debug failures
- Team room hackathons
  - → Dedicated collaboration time
  - → Knowledge transfer
- Onboarding checklist
- More official Scrum adoption
  - → Better defined/enforced rules of engagement
  - → Formalized communication & documentation of work/decisions
  - → Better engagement with component teams

OBSERVATIONS

- Requires project lead open to experimenting with new ideas & individuals passionate about improving the software engineering side of research
- High initial commitment to some policies, e.g., GitLab usage, has waned, to an extent, due to real or perceived time pressures
- Requires periodic reevaluation of & recommitment to team policies

Sandia National Laboratories | U.S. DEPARTMENT OF ENERGY | NNSA