



Extending the Team Software Process for Systems Engineering

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Topics

Need

NAVAIR/SEI Collaboration

Approach

Team

Research Challenges

Conduct of Pilot Project

What's Next?

Need

TSP is being used with great results
on software teams.

There is growing interest in applying TSP
to other domains.

NAVAIR/SEI Collaboration

NAVAIR already has a great track record with TSP:

- ROI demonstrated on software projects
- other teams (SE) requested training and launch support

SEI is also receiving additional requests to apply TSP to non-software settings.

Increasingly difficult to solve software problems without addressing systems engineering and acquisition issues.

AV-8B TSP/CMM Experience

AV-8B is a NAVAIR System Support Activity.

They integrate new features into the Marine Harrier aircraft.

They used TSP to reduce the time to go from nothing to CMM Level 4.



SEI Average

6 Years

AV-8B

2.5 Years



TSP Results at NAVAIR

Program	Size of Program	Defect Density (Defects/KSLOC)	Cost Savings from Reduced Defects
AVJMPS	443 KSLOC	0.59	\$2,177,169
P-3C	383 KSLOC	0.6	\$1,478,243

Approach

Conduct a series of pilot projects to determine if extending TSP practices to Systems Engineering and Acquisition Management results in measurable improvement



Use the results of this work to establish a common process for both systems and software engineering across the NAVAIR Mission Area Teams (MATs).



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NAVAIR/SEI Team

NAVAIR

- Tim Chick
- Dennis Linck
- Linda Roush
- Jeff Schwalb
- Paula Strawser

SEI

- Anita Carleton
- Noopur Davis
- Watts Humphrey
- Jim Over

NAVAIR Systems Engineering Pilots

- AV-8B Harrier Aircraft
- E-2C Hawkeye



Research Challenges

As we kicked-off this effort, we realized that there were five areas of TSP that specifically had to be addressed for SE:

- Processes
- Measurement
- Role Definition
- Training
- Tool Support



Research Challenges - Processes

Develop prototype processes/scripts for SE

Develop prototype processes/scripts for ACQ
based on:

- the DoD 5000 series regulations
- CMMI Acquisition Module

Used “traditional” TSP Launch Process



Research Challenges – Measurement - 1

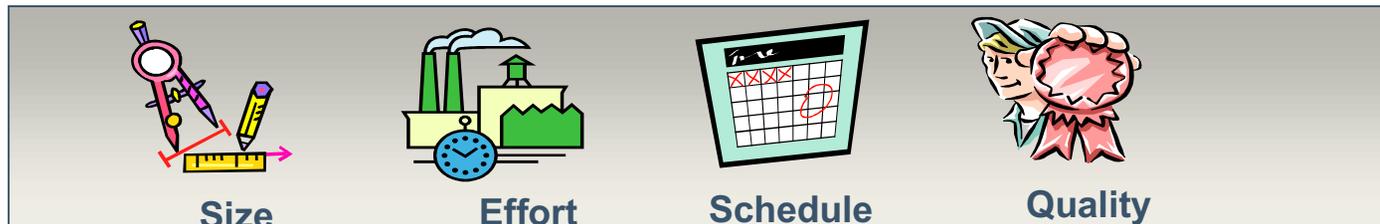
Schedule and effort measures are essentially unchanged.

Lines of Code/Function Points would not serve as relevant size measures for SE/ACQ.

Formulate size measures for SE and ACQ.

Examples:

- DOORS objects
- Requirements
- Verifies



Research Challenges – Measurement - 2

Quality measures in SE

- Define what “quality” means in SE
- Where in the process do you collect data?
- What are the derived quality measures (e.g., defects/DOORS object?)
- Establish an initial quality baseline during Build 1

Research Challenges – Measurement - 3

What are the quality goals?

Examples:

- Goal: Accuracy in the work

Measure: # of problem reports against requirements and test documents

- Goal: Conformance to standards

Measure: # of defects in peer reviews; # of defects in requirements and test documents, etc...

Research Challenges – Role Definition

Apply four primary roles—planning, process, quality, support

Assess applicability of remaining roles and define additional roles needed for SE and ACQ.

- Added Requirements Manager
- Design and Implementation roles were combined into one role
- Test Manager role expanded to Flight Test Manager and Lab Test Manager

Research Challenges – Training - 1

Currently, our training is geared to software teams.

Our challenges:

- building conviction and discipline in teams that don't write software programs
- providing just the right amount of training to get a team started
- supplementing with additional training modules as needed

Research Challenges – Training - 2

Develop “JIT” training to support SE teams

Develop Leadership Seminar and Team Member Training to focus on:

- providing the fundamentals of TSP
- launching a team
- maintaining a plan

Follow-up with additional, “JIT” training, e.g.,

- Inspections
- Measurement, data analysis, and reporting
- Checkpoints and Postmortem Analysis
- Tool

Research Challenges – Support Tool

Develop an extensible tool that allows for:

- Defining any process
- Collecting data unobtrusively
- Defining a measurement framework

Progress

SE Pilot Projects Selected (AV-8B and E-2C)

SE/ACQ Prototype Processes/Scripts
Developed

Training Developed

Prototype Support Tool Developed

AV-8B Team Trained and Launched

Some Early Data

Launch completed last week...Ran like a “normal” launch

- Two year overall plan
- Near-term plan is 4 months
- 475 tasks
- 12 team members
- 22,000 task hours
- Gantt Chart didn't provide visibility into all of the tasks that had to be completed
- Team members engaged in discussions of what the work would entail, dependencies, and what “task complete” meant

Issues:

- Level of granularity of the plan
- Defining appropriate roles for SE Projects
- Defining the SE process
- Developing a quality plan

What's Next?

Complete NAVAIR pilots

Expand NAVAIR use as warranted

Incorporate lessons learned in TSP Program
Plans

Evaluate prototype tools and courses for broader
use