



Interdisciplinary Team Project Management Using TSPSM Concepts

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Presentation Objectives



- Background
 - NAVAIR and SPIKE
 - Personal Software Process (PSP) and Team Software Process (TSP)¹
- SPIKE Project Planning
 - Project Results (before and after)
 - Initial Project Planning
 - Project Execution (day-to-day)

¹Personal Software Process, PSP, Team Software Process, and TSP are service marks of Carnegie Mellon University



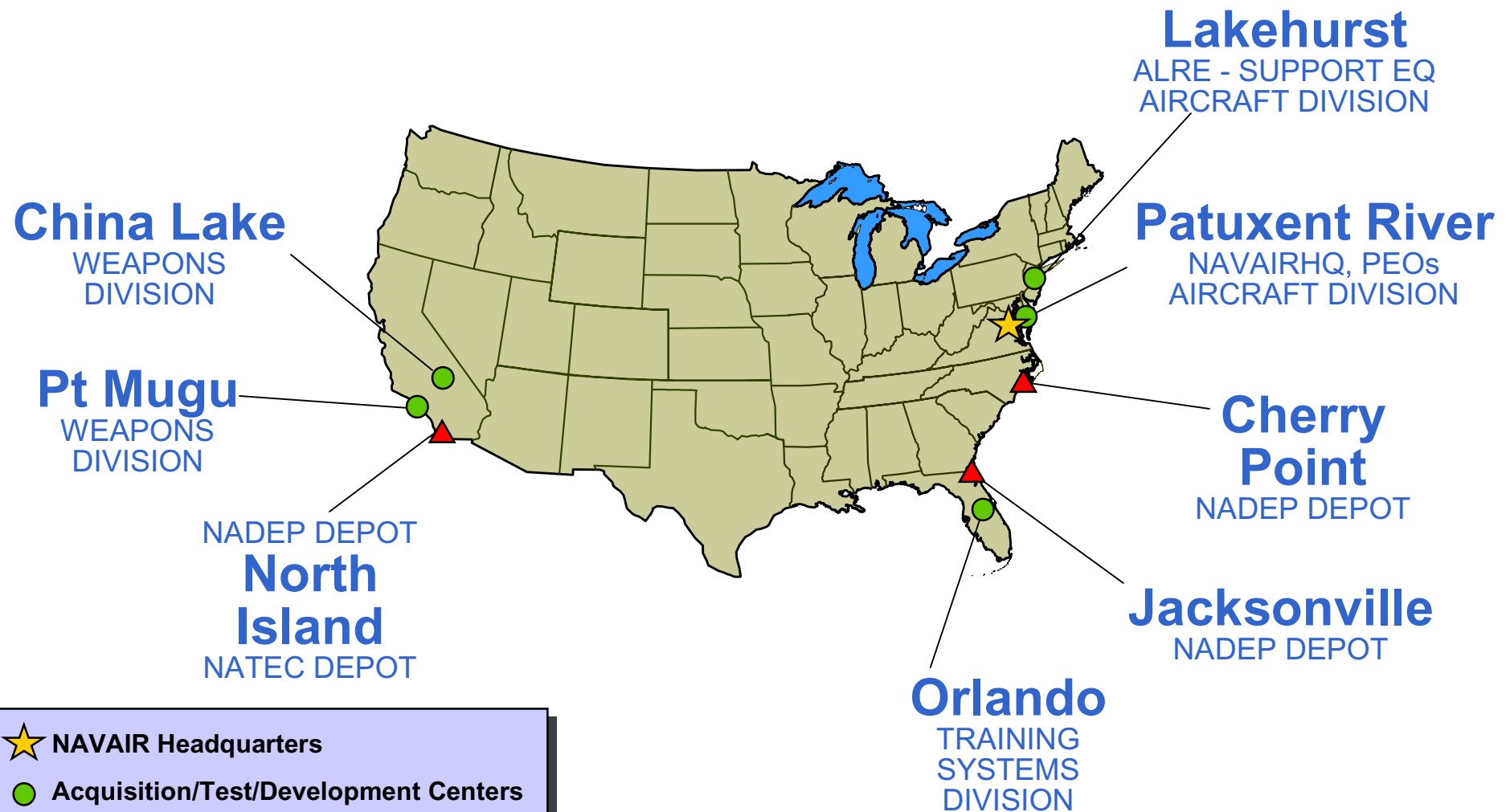
Who is NAVAIR?



- NAVAIR is the Naval Air Systems Command.
- We **develop, acquire, and support the aircraft and related weapons systems** used by the U. S. Navy and Marine Corps.
- We translate the needs of the Navy and Marine Corps into the technical and financial requirements needed by industry to actually produce an aircraft or other weapon system.
- Our goal is to **provide the fleet with quality products** that are both affordable and available when they are most needed.
- Our **support extends across the entire life span of a product**, including all upgrades and modifications to that product.



Where is NAVAIR?



Who is SPIKE?



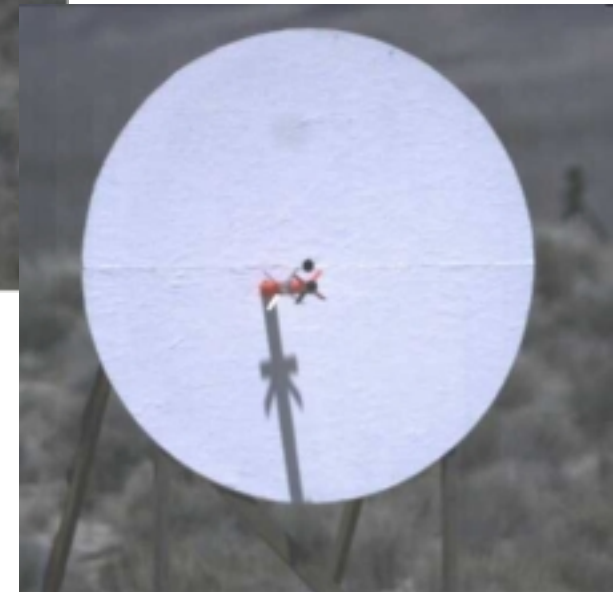
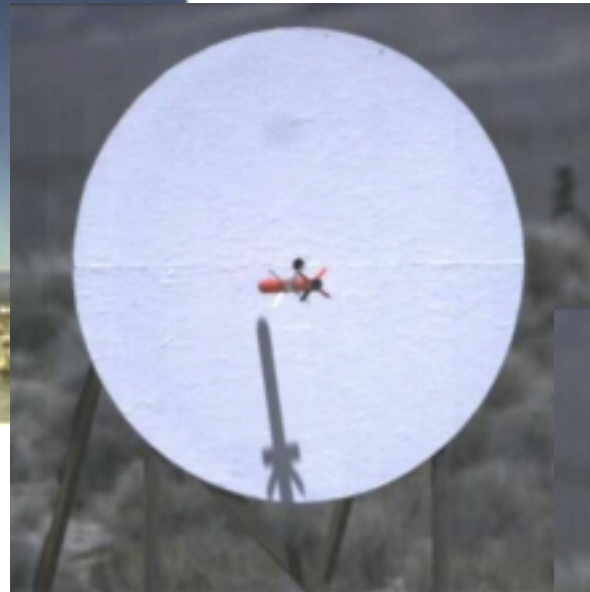
- SPIKE Project Office is part of NAVAIR Weapons Division at China Lake, Ca.
- Developing a low-cost, lightweight guided weapon for U.S. ground forces.
- Using TSP in their software projects since August 2002.





Accomplishments

Guided Missile Field Test



- 12 April 2006 at NAVAIR Weapons Division
- Target Range: 1000 meters
- Target Diameter : 2 meter
- Impact: 8 inches from center
- Missile bore sighted 35 meters left and 105 meters above the target

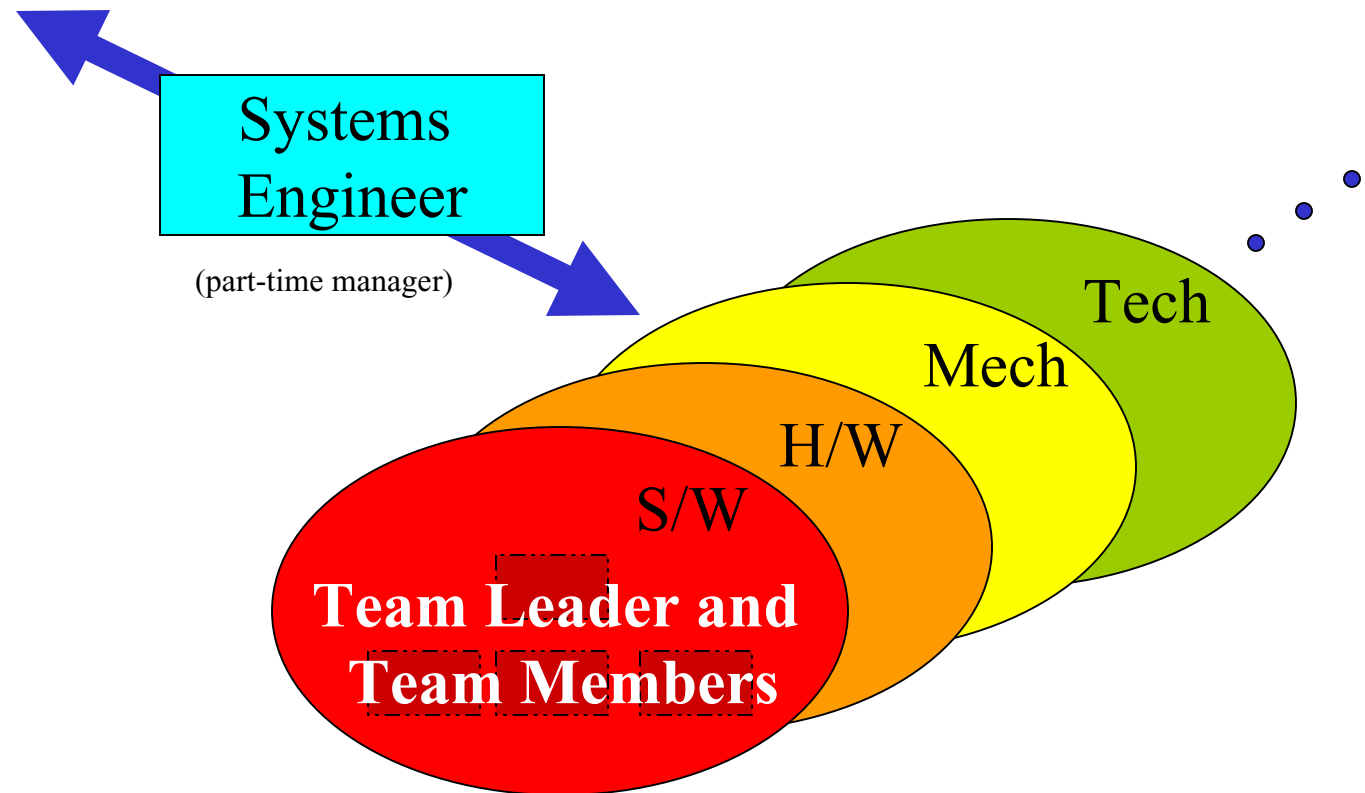


Who is SPIKE?



Project
Management

SPIKE Organizational Structure





What is PSP/TSP?



- PSP shows software professionals how to
 - plan and track their personal work
 - define processes that best suit them
 - measure and manage cost, schedule, and quality
- TSP shows teams of PSP-trained professionals how to
 - establish realistic commitments
 - keep management informed
 - deliver quality products
 - minimize project cost and schedule



PSP/TSP Benefits



- PSP/TSP **quickly improves the performance** of software groups.
- Planning and tracking is **accurate, timely, and precise**.
- Product **quality is managed and measured** from the beginning of the job.
- By finding and **fixing problems before test**, project cycle time is substantially reduced.



Typical TSP Launch



Review Management goals and project objectives.

Set Software Team goals.

Produce development strategy and process.

Produce top-down plan.

Review quality plan.

Produce bottom-up plan (detailed individual plans).

Perform risk assessment.

Brief plan to Management.



SPIKE Team Planning Meeting



Review Management goals and project objectives.

Set Software Team goals.

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SPIKE Team Project Results



Project Cycle	Completion Date	Planned Weeks	Actual Weeks	Difference in Weeks	% Error	Final Test
1	03/2003	26	29	3	+12%	Successful
2	05/2004	47	60	13	+28%	Successful
3	10/2005	15	19	4	+27%	Successful
4	04/2006	12	14	2	+17%	Successful
5	09/2006	15	15	0	0%	Pending ¹

Cycles 1, 2, and 3: Software Team used TSP

**Cycles 4 and 5: Software Team used TSP;
SPIKE Team Planning Meeting using TSP concepts**

¹Final testing waiting for test facilities to become available



SPIKE Team Planning Meeting



- Who should be there (or not)?
- How to talk to the whole system?
- What are the required activities?
- How detailed should the planning be?
- What are the task-to-task dependencies?



Who Should Be There?



- Everyone in the trenches (Producers)
 - Hardware, Software, Mechanical, Systems, Algorithms, Technical Support
- Get buy-in from producers
- Whole system solutions
- No one from high-level management
 - Detract from the details

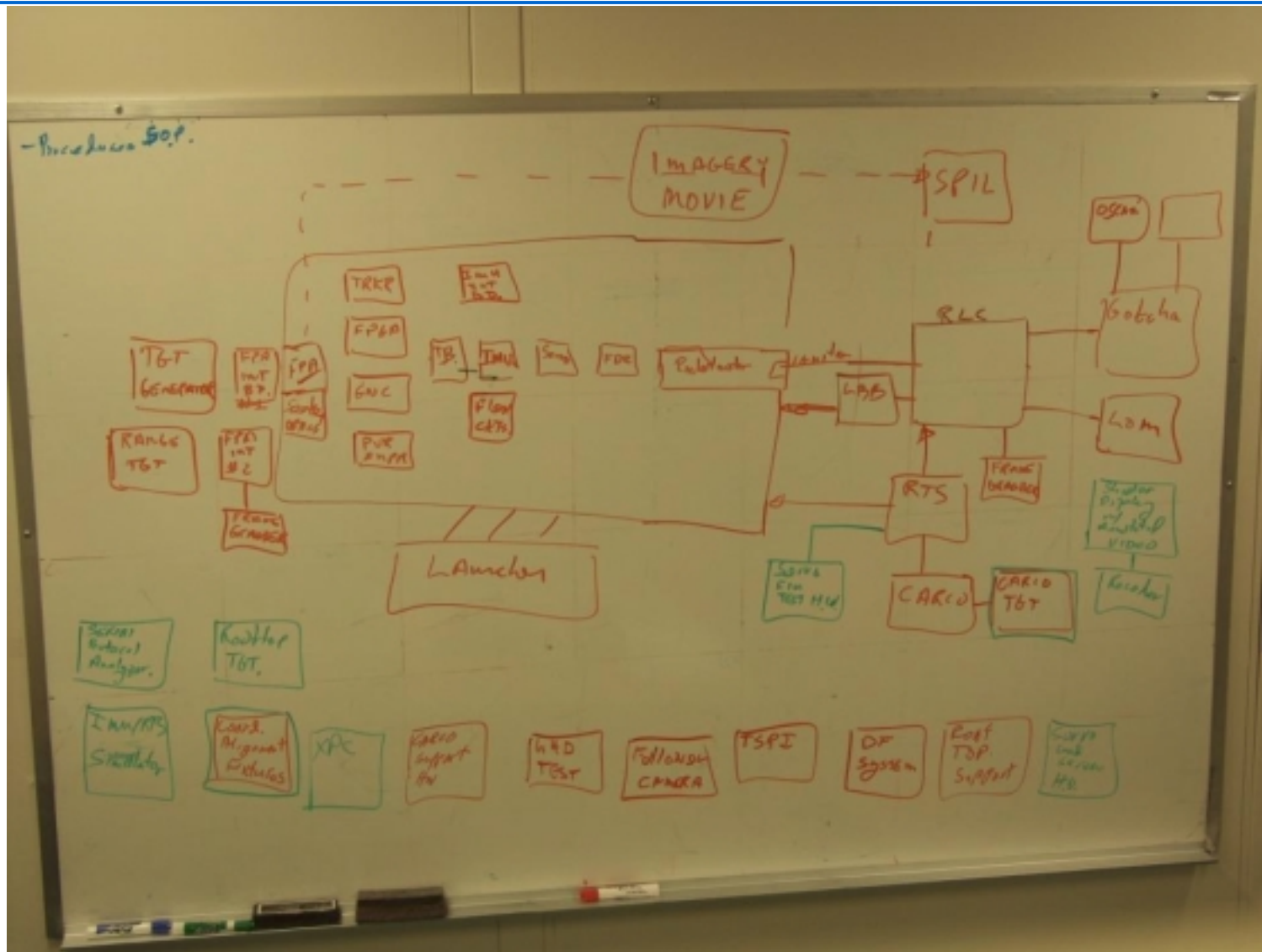


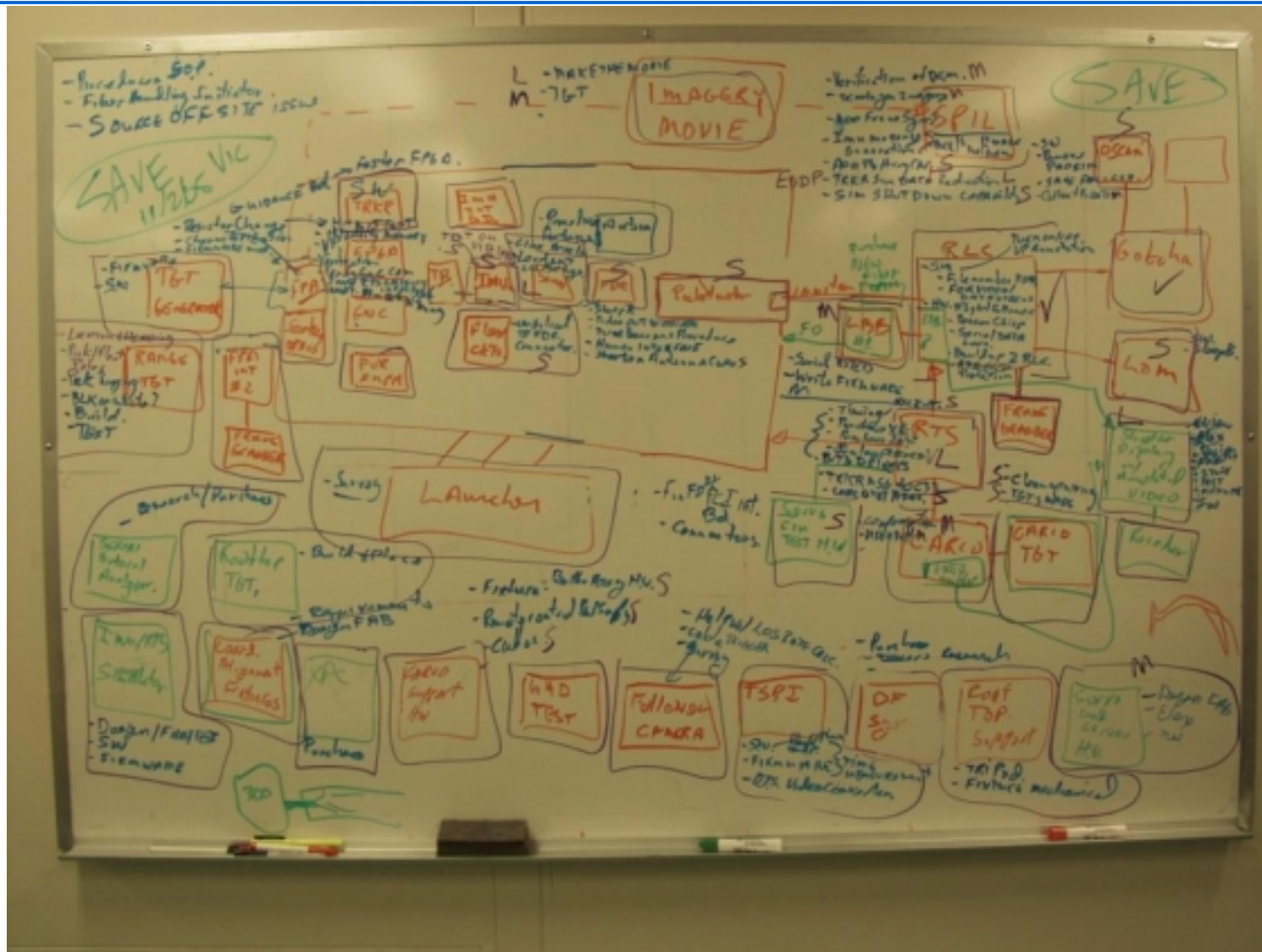
How To Talk To The Whole System?



- Create diagram of the existing system
- “red line” diagram with changes and additions
- Discuss every block on the diagram
 - Identify tasks needed

Conceptual Design - Before







How To Talk To The Whole System?



- Create diagram of the existing system
- “red line” diagram with changes and additions
- Discuss every block on the diagram
 - Identify tasks needed
- Let discussion go where it goes
- Take notes on the side
 - Lots of data (on and off the board)
 - Lessons learned from previous efforts
 - Logistics (material) needs



How Detailed Should The Planning Be?

- Only S/W team had formal PSP training
- Two-pass approach to estimating tasks
 - 1st pass: Task assigned to Engineer
Engineer gives Small-Medium-Large
 - 2nd pass: Engineer gives “number of days/weeks”
- Estimates are challenged real-time to ensure realistic basis for task sizes



What Are The Required Activities?



- It not just about software anymore
- Sample workflow for creating multi-layer circuit board (involves EE, ME, S/W Engr, others)

Design circuits	6 wks
Test design (through simulation)	4 wks
Lay out design (w/ inspections)	4-6 wks
Manufacture blank circuit board	4 wks (of waiting)
Inspect board	1 wk
Get board “stuffed” (attach components)	2 wks
Inspect board	1 wk
Debug board	2-4 wks



What Are The Task-to-Task Dependencies?



- Every task is given a Project Priority and a Milestone Priority
- Project Priorities
 - 1 – High – Critical to Next Firing -- Have to Do
 - 2 – Medium – Not Critical to Next Firing -- Should Do
 - 3 – Low – Not Critical to Next Firing -- Ought to Do



What Are The Task-to-Task Dependencies?



- Within each Project Priority, tasks are categorized into Milestone Priorities
- Milestone Priorities
 - #1 – Now
 - #2 – After now
 - #3 – For Bench Integration Testing
 - #4 – For Carco Table Testing
 - #5 – For Live Fire Testing



Wrapping Up Planning Session



- Once all tasks are assigned, sized, and given priorities, load leveling is performed.
- Risks are identified
 - Impact an event would have on the end goal
 - Systems Engineer tracks these during development
- Team members all give a “thumbs-up” that they are good with the plan
- Plan is briefed to management by Systems Engineer



Project Execution (day-to-day)



- Collecting/reporting status
- Tracking progress
- Dealing with problems
- Everybody has the task list from the SPIKE Team Planning Meeting



Collecting/Reporting Status



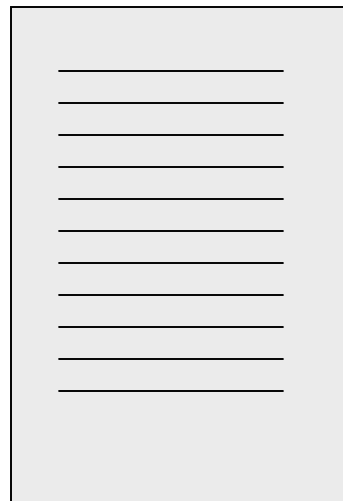
- Systems Engineer meets with Team Leads every other week
- On the off weeks, Engineers send in their status to Systems Engineer
 - Refer to the task list
 - Use a common template (< 5 mins to fill out)
 - Statuses are forwarded to Senior Management
- 6 weeks before live fire testing, daily standup meetings are held (15 mins)
 - Focuses on the task list

Tracking Progress



- Systems Engineer uses a paper copy of the task list
 - Task list sorted by priorities
 - Tasks marked off as they are completed

Before



After





Dealing With Problems



- Systems Engineer is the problem solver
 - Tracks risks identified during project planning meeting
 - Looks for scheduling problems and tasking conflicts
 - Resolves deadlocks
 - Encourages interdisciplinary communication



Summary Conclusions



- Weaknesses
 - Hard to estimate intangibles
 - Shared resources are still sometimes beyond your control (Carco Table and Test Ranges)
- Strengths
 - Low-tech tracking is easy to use (and works!)
 - Everyone knows the big picture (and what they are responsible for)
 - Everyone talks the same language (common vocabulary)



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Abbreviations



- NAVAIR – Naval Air Systems Command
- NSSC – NAVAIR Systems Software Support Center
- PSP – Personal Software Process
- SEI – Software Engineering Institute
- TSP – Team Software Process