



NAVAIR Process Resource Team

**Broadening the Ability to Train and Launch
Effective Engineering and Service Teams**

Sep 2011

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Agenda

- NAVAIR
- TPI Implementation
- Process Modeling
- TPI and Beyond!
- NAVAIR Team Performance
- Things to Remember



NAVAIR

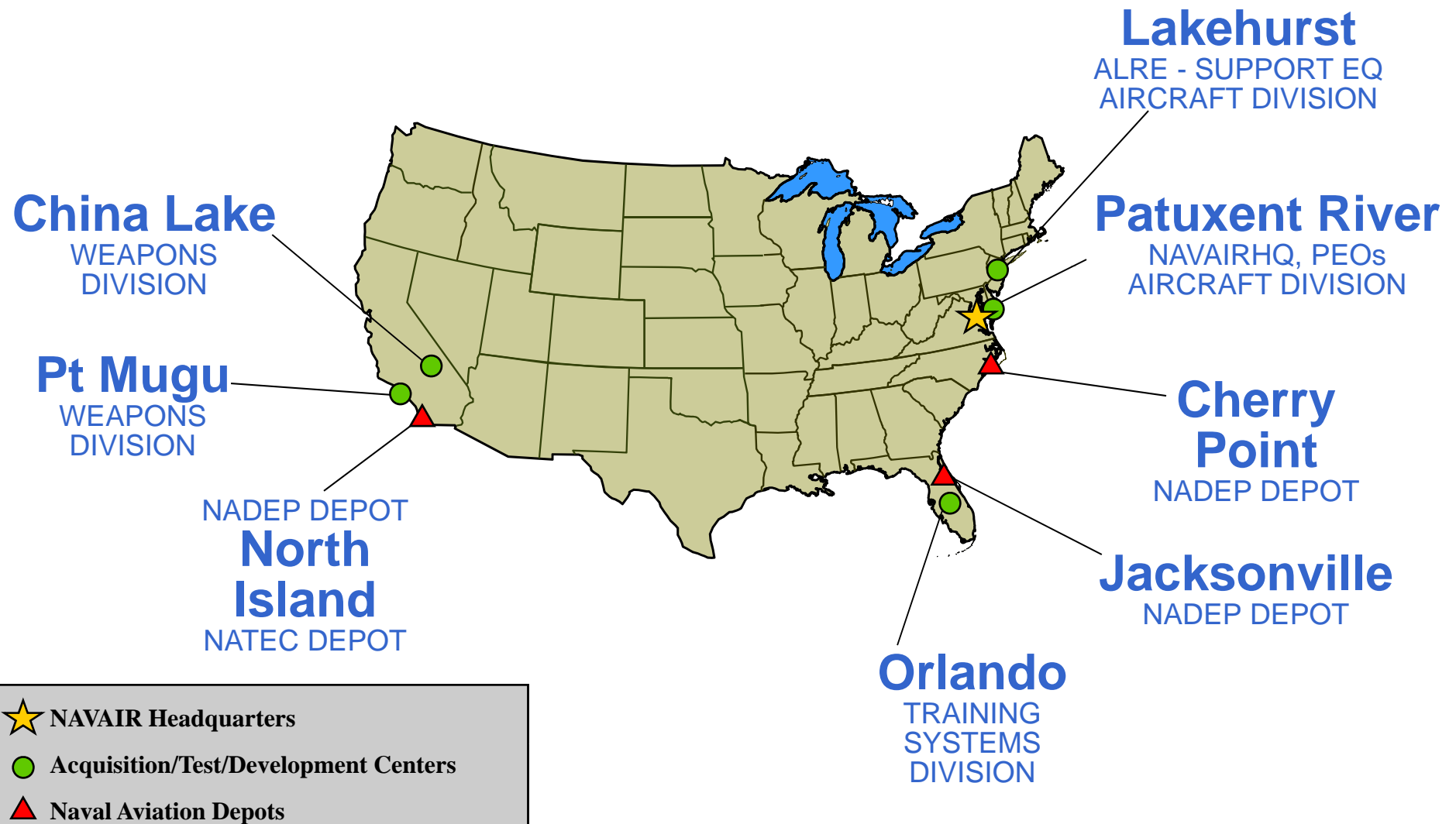


What is NAVAIR?

- NAVAIR is the **Naval Air Systems Command**
- Develop, acquire, and support the **aircraft** and related **weapons** systems used by **U.S. Navy and Marine Corps**
- Our **goal is to provide the fleet with quality products** that are both **affordable** and **available** when most **needed**
- Our support extends across the **entire life span** of a product, including all **upgrades and modifications** to that product



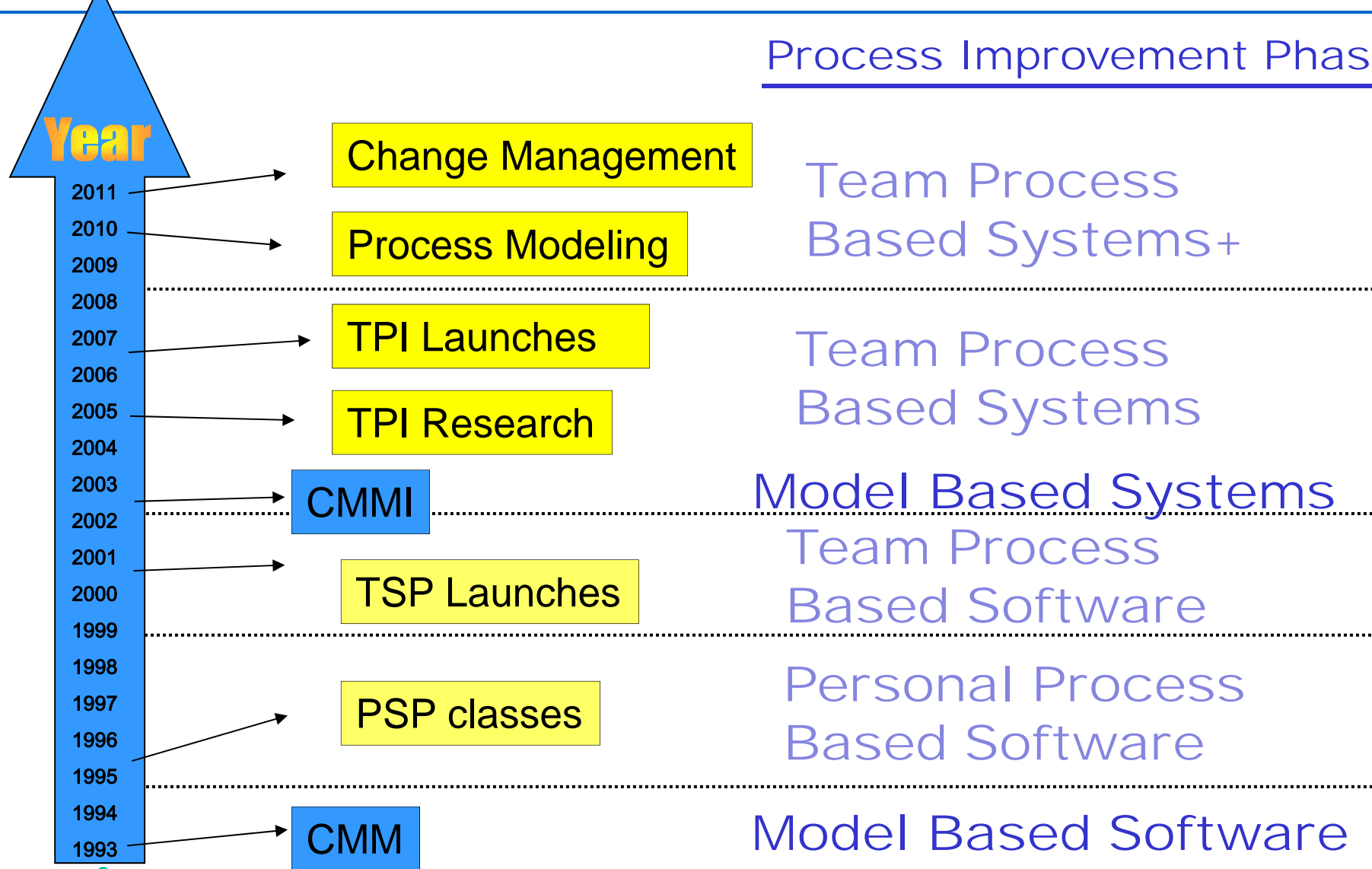
Where is NAVAIR?





NAVAIR PI History

Process Improvement Phase





TPI Implementation



Models and Processes

Capability Maturity Models:

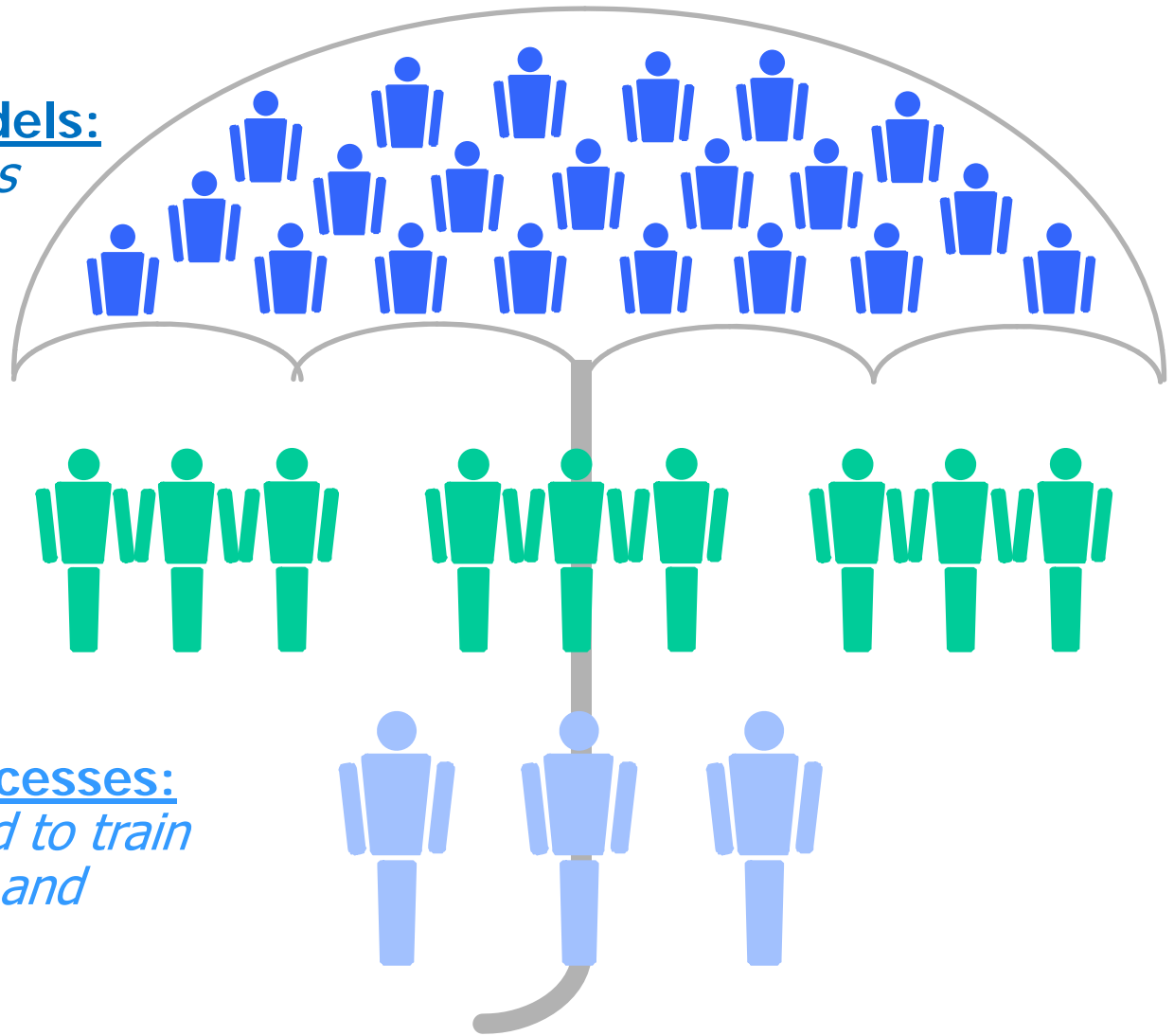
Reference for organizations building process capability

Team Processes:

Processes for teams building quality products on cost and schedule

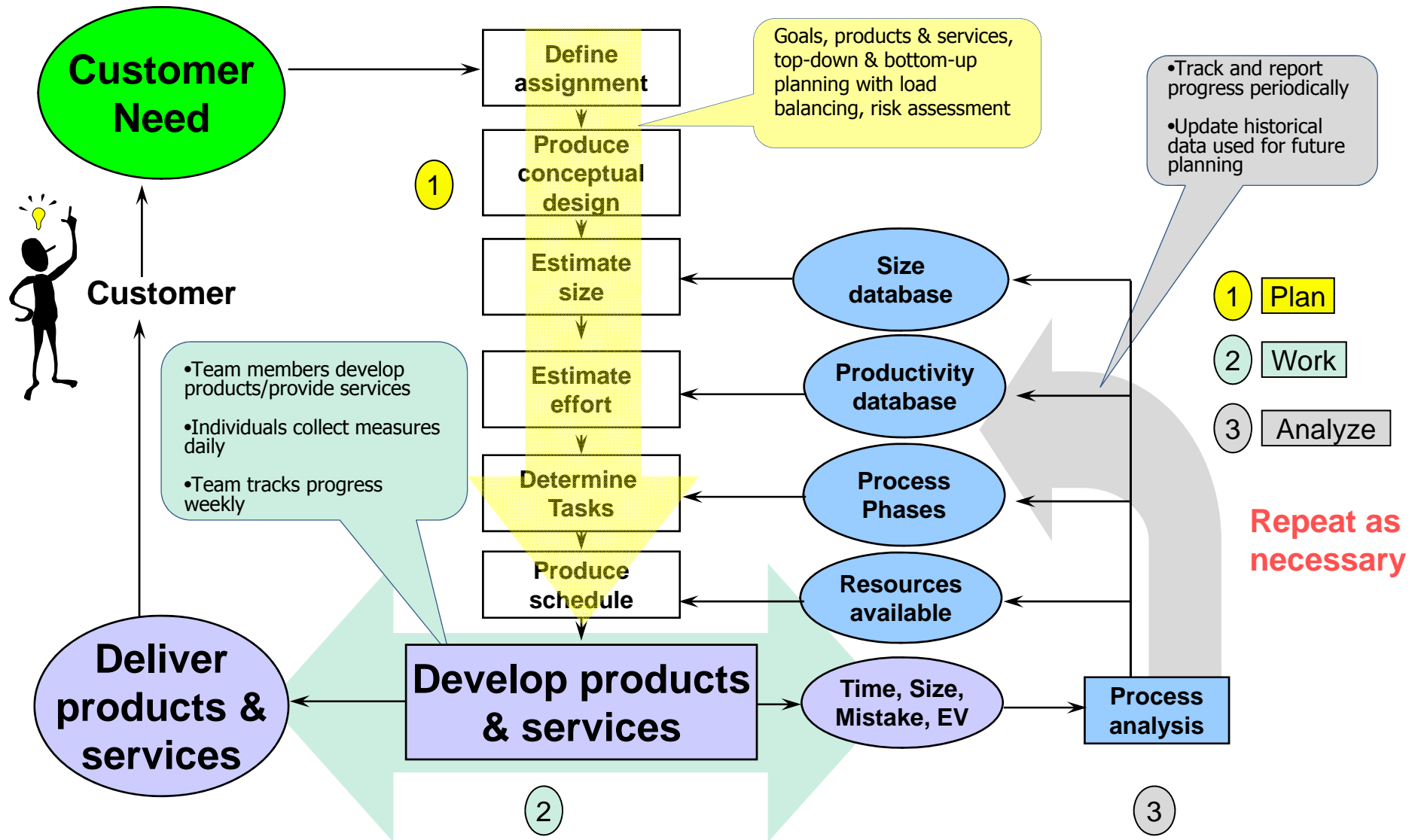
Personal Processes:

Processes used to train individual skill and discipline





Key Team Process Framework





Team Process Elements

Phase	Purpose	To guide you in developing module-level programs
	Inputs Required	Problem description PSP project plan summary form Time and defect recording logs Defect type standard Stop watch (optional)
1	Planning	- Produce or obtain a requirements statement. - Estimate the required development time. - Enter the plan data in the project plan summary form. - Complete the time log.
2	Development	- Devise the program. - Implement the design. - Complete the program and fix and log all defects found. - Test the program and fix and log all defects found. - Complete the time recording log.
3	Postmortem	- Complete the project plan summary form with actual time, defect, and size data.
Exit Criteria		- A thoroughly tested program - Completed project plan summary with estimated and actual data - Completed defect and time logs

Scripts

Document the **process** entry criteria, phases/steps, and exit criteria. The purpose is to **guide** you as you use the process.



Measures

Measure the **process** and the **product**. They provide insight into how the process is working and the **status** of the work.

Student	_____	Date	_____
Program	_____	Program #	_____
Instructor	_____	Language	_____
Summary			
LLOC (line)	_____	Plan	Actual To Date
Actual Time	_____		
Planned Time	_____		
CP/CPU Performance Index	_____		
% Error	_____		
% New Error	_____		
Test Defects/LLOC	_____		
Total Defects/LLOC	_____		
Yield %	_____		
% Approval CDD	_____		
% Failure CDD	_____		
CDD at Run	_____		
Program Size (LLOCs)			
Insert(s)	_____	Plan	Actual To Date
Deleted (D)	_____		
Modified (M)	_____		
Added (A)	_____		
Revised (R)	_____		
Total New & Changed (N)	_____		
Total LLOC (T)	_____		
Total New Revised	_____		
Total Object LLOC (O)	_____		
Upper Production Interval (70%)	_____		
Lower Production Interval (70%)	_____		
Time in Phase (min)			
Planning	_____	Plan	Actual To Date To Date %
Design	_____		
Design review	_____		
Code	_____		
Code review	_____		
Compile	_____		
Test	_____		
Postmortem	_____		
Total	_____		
Total Time LPI (70%)	_____		
Total Time LPI (70%)	_____		

Forms, Logs, Charts (paperless)

Provide a **convenient and consistent framework** for gathering, retaining, viewing data



Standards

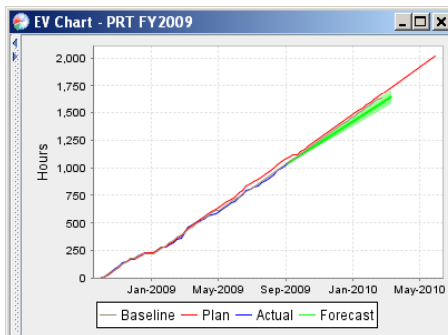
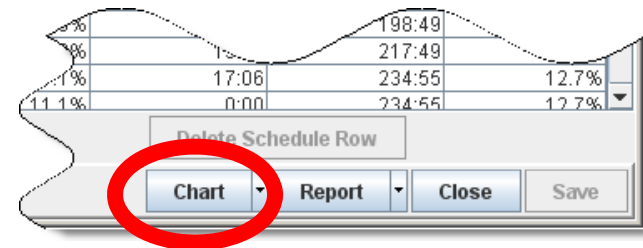
Provide consistent **definitions** that guide the **work** and gathering of **data**.



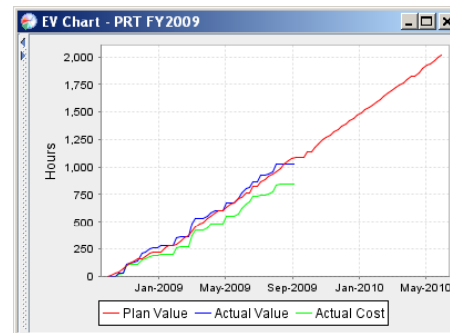
Team Measures and Metrics

- Each team member gathers four basic measures
 - Times
 - Sizes
 - Mistakes
 - Task completion dates

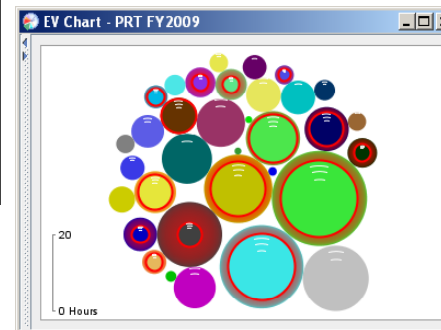
Charts and tables of project metrics are available (updated in real time)



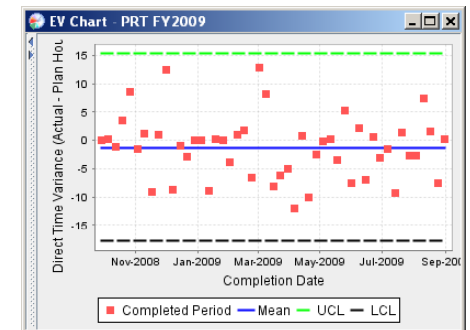
Direct Hours



Earned Value



Tasks in Progress



many more...



NAVAIR TPI

- Success of software teams using TSP led their organizations to ask for same performance on other teams
 - Worked with the SEI to develop approach
 - Based on same TSP fundamental principles
- NAVAIR approach has become TPI for all teams
 - Teams plan all work from first launch forward
 - Work is based on all products and services defined in process modeling
 - PSP for Engineers training planned as part of project if appropriate



Evolution of the TPI Approach

- Training has become just-in-time
- Teams immediately begin to define quality for themselves
 - Log mistakes during first cycle
 - First postmortem analysis of mistakes leads to identification of mistake types
 - Second launch will begin the application of mistake types
- Explicit process modeling techniques added prior to launch
 - Better supports team's unique measurement framework
 - Enables team ability to establish firm foothold on planning and tracking

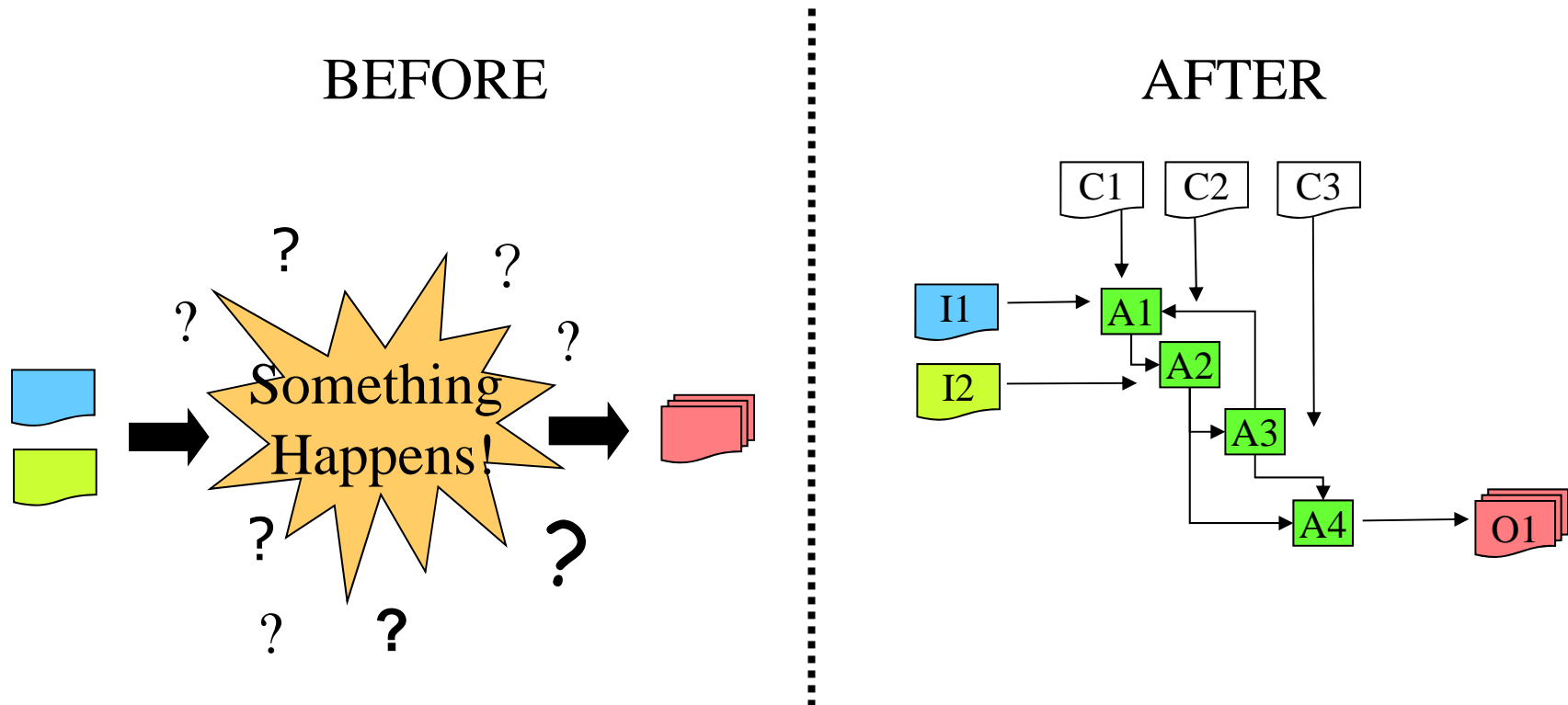


Process Modeling



Process Modeling

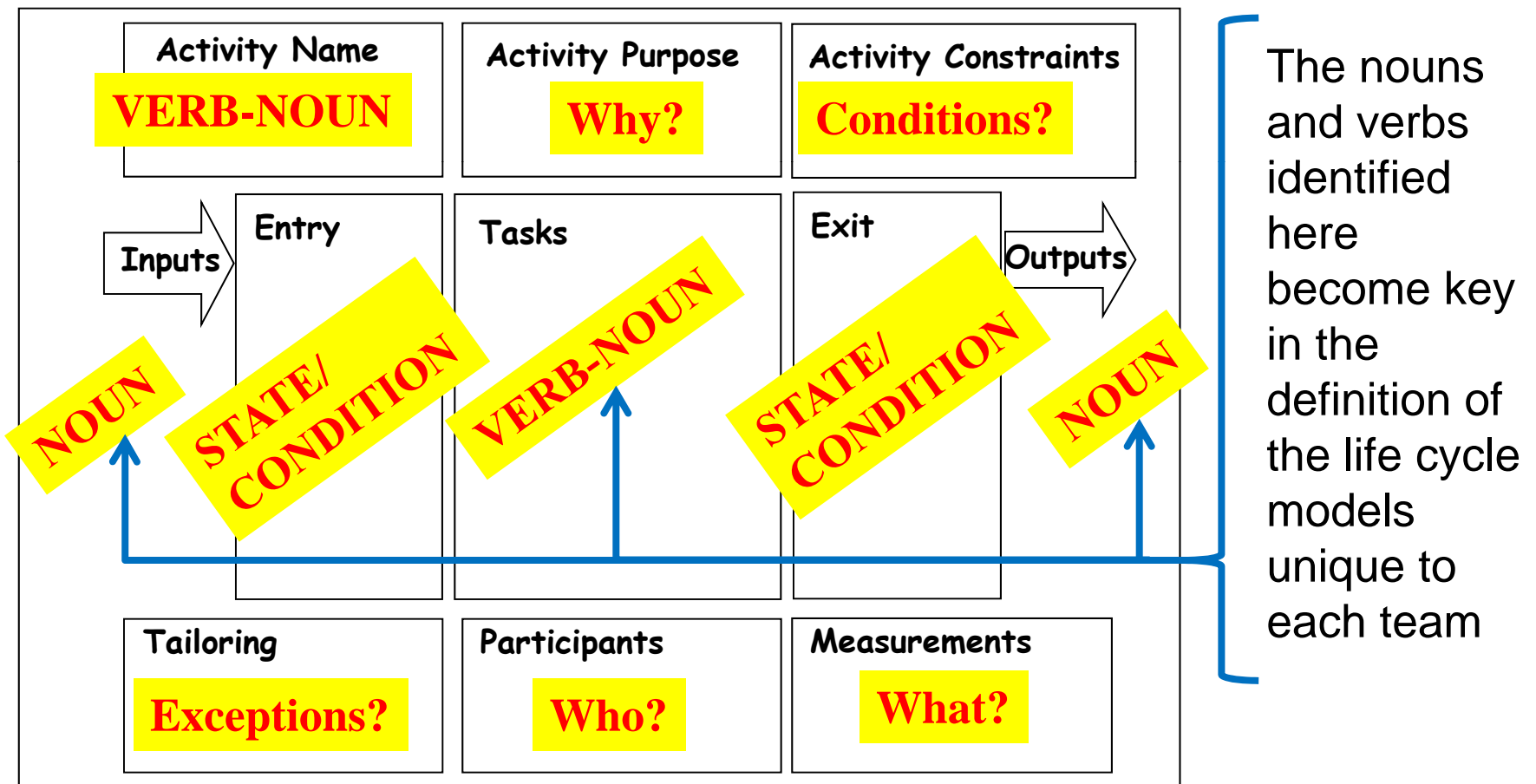
- Method for describing processes
 - Existing “as is” processes
 - Desired “to be” processes





Process Modeling

Each field captures certain aspects of the process activity





Scripted Process Results

- Given to team for peer review prior to launch
- Reviewed by team in launch for quality removal potential
- Maintainable process artifacts post launch

Process Name: Perform Ground Testing

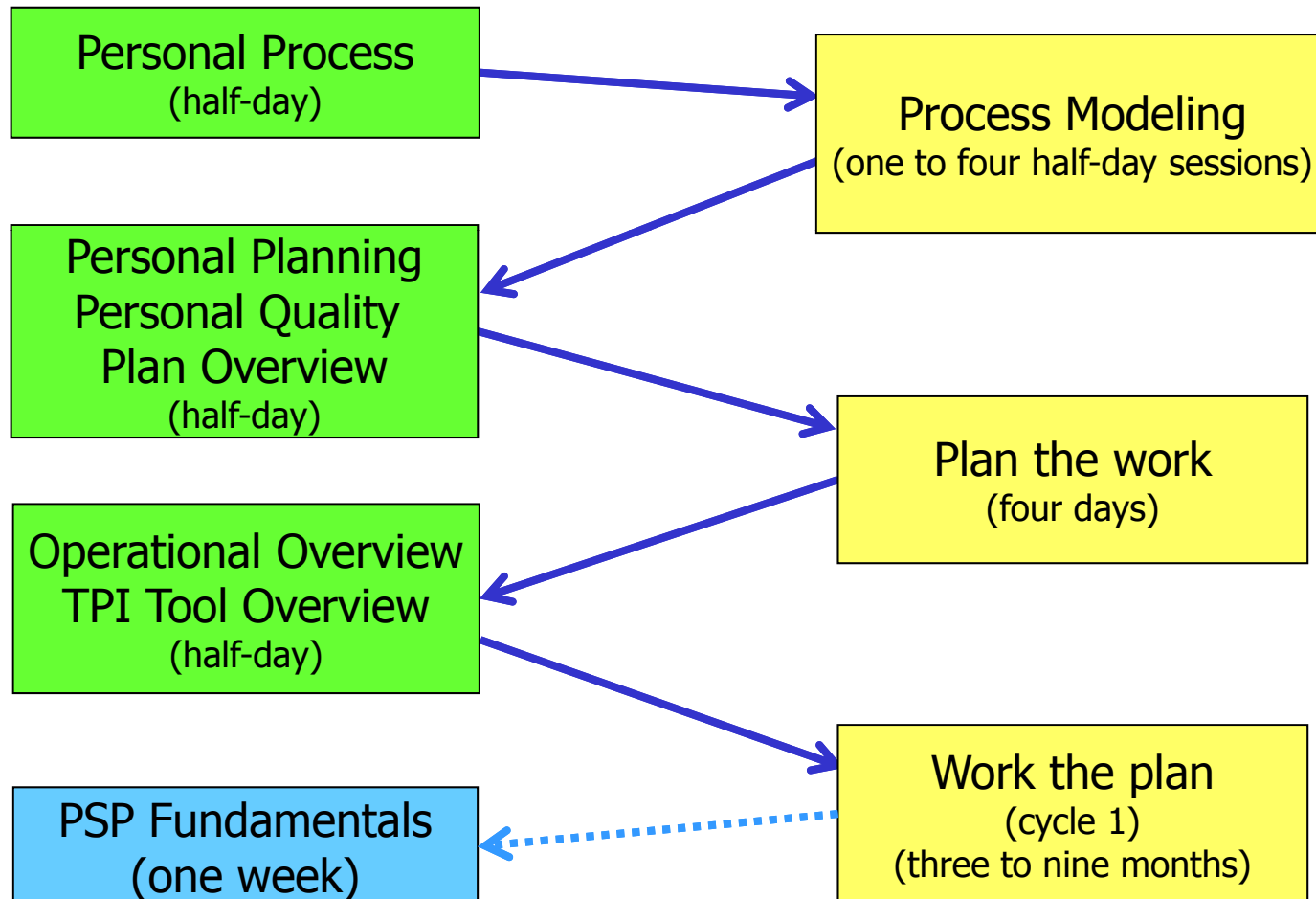
Purpose	- Verify performance of system under test in aircraft in safe ground environment	
Controls	- Constraint aircraft available - Test plan - 3960 - TECT	
Tailoring	- Xpdr testing	
Participants	- Test Engineers - MX support - Aircrew - Contractors (Bell, NG) - PMA	
Measurements	- Test coordinator spreadsheets - CM data base metrics	
Inputs	- Test procedures (from CM) - Aircraft mod package - Aircraft configuration - GSE Licenses and Certs - Fly Me - Weekly aircraft schedule	
Entry Criteria	- Ensure required hardware is installed - Ensure test equipment available - Ensure aircraft is available - Coordinate ground turn if required - Coordinate capture carry article if required - Coordinate with test coordinator	
General	- N/A	
Step	Activities	Description (details)
1	Check in with QA maintenance	- TBD
2	Perform aircraft setup ground test procedures	- TBD
3	Run procedures	- TBD
4	Redline procedures	- Verify repeatable conditions - Check out QA and maintenance - Create TAR
Exit Criteria	- Results exist for each test point - TAR created - MAE signed	
Outputs	- Performed Test - TAR# - Redlined procedures - Notes and data for SARs - Test event data	



Just-in-Time TPI

Learning

Doing





TPI And Beyond!

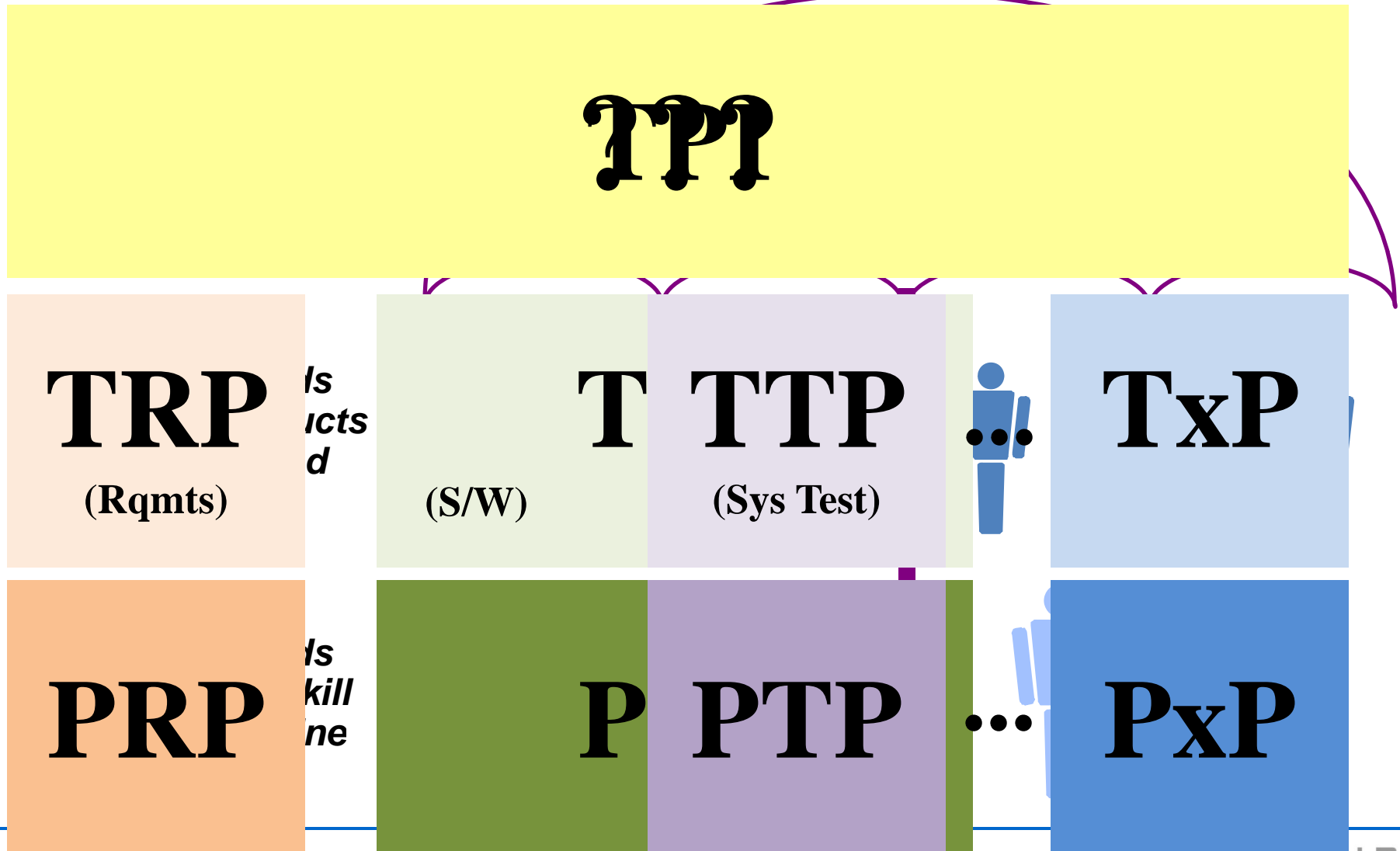


TPI **Pluses** & **Minuses**

- + A detailed plan!
- + Ability to track progress (weekly)
- + Improved estimating (over cycles)
- No mature processes
 - “Where do we put defect removal phases?”
- No defect type standards
 - “How do we populate Review Checklists?”
- No quality planning
 - “Will our plan produce a good product?”
 - No quality indicators (e.g., A/FR)



CMMI, TSP & PDP Relationship



CMMI

TPI

TRP

(Rqm ts)

TSP

(S/W)

TTP

(Sys Test)

...

T_xP

PRP

PSP

PTP

...

P_xP



TPI is Only a Waypoint

- TPI teams will hit a glass ceiling
- TPI teams need to evolve to achieve TSP-like performance (become a TxP team)
- What else does a TPI team have to do in order to become a TxP team?
- *What does a TSP team do?*



What Does a TSP Team Do?

(Plan the Work)

(Work the Plan)

(Analyze the Data)

Launch

Weekly Meetings and Day-to-Day Actions

Postmortem

Typical TSP Cycle

Time →

TSP Activities



*And they develop
software too!*



TxP Planning Activities

	From The Start	Some Time Later	Get To Last
Project and Management Objectives (LAU 1)	<input checked="" type="checkbox"/>		
Team Goals and Roles (LAU 2)	<input checked="" type="checkbox"/>		
Project Strategy and Support (LAU 3)	<input checked="" type="checkbox"/>		
Overall Plan (LAU 4)	<input checked="" type="checkbox"/>		
Planned sizes and rates used to compute times (LAU 4)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Quality Preparation (LAU 5)	<input checked="" type="checkbox"/>		
Planned Defects Injected/Removed (LAU 5)			<input checked="" type="checkbox"/>
Planned quality indicator values are acceptable (LAU 5)			<input checked="" type="checkbox"/>
Balanced Plan (LAU 6)	<input checked="" type="checkbox"/>		
Project Risk Analysis (LAU 7)	<input checked="" type="checkbox"/>		
Launch Report Preparation (LAU 8)	<input checked="" type="checkbox"/>		
Management Review (LAU 9)	<input checked="" type="checkbox"/>		
Launch Postmortem (LAU 10)	<input checked="" type="checkbox"/>		



TxP Working Activities

	From The Start	Some Time Later	Get To Last
Logging time	<input checked="" type="checkbox"/>		
Logging defects	<input checked="" type="checkbox"/>		
Tracking EV	<input checked="" type="checkbox"/>		
Using PROBE in Planning phase		<input checked="" type="checkbox"/>	
Entering actual sizes in Postmortem phase		<input checked="" type="checkbox"/>	
Defining Defect Types			<input checked="" type="checkbox"/>
Using Review checklists			<input checked="" type="checkbox"/>
Holding periodic team meetings	<input checked="" type="checkbox"/>		
Following an agenda during team meetings	<input checked="" type="checkbox"/>		
Performing/reporting on assigned roles	<input checked="" type="checkbox"/>		
Reviewing action items	<input checked="" type="checkbox"/>		
Reviewing assigned goals and risks	<input checked="" type="checkbox"/>		
Maintaining project plan and workbook	<input checked="" type="checkbox"/>		



TxP Analyzing Activities

	From The Start	Some Time Later	Get To Last
Evaluate plan vs. actual schedule hours	<input checked="" type="checkbox"/>		
Evaluate plan vs. actual component hours	<input checked="" type="checkbox"/>		
Evaluate plan vs. actual component sizes		<input checked="" type="checkbox"/>	
Evaluate team performance vs. goals and quality plan			<input checked="" type="checkbox"/>
Evaluate plan vs. actual quality of components			<input checked="" type="checkbox"/>
Update planning data for schedule hours	<input checked="" type="checkbox"/>		
Update planning data for lifecycle time-in-phase %s	<input checked="" type="checkbox"/>		
Update planning data for productivity rates		<input checked="" type="checkbox"/>	
Update planning data for defect densities		<input checked="" type="checkbox"/>	
Update planning data for defect rates and yields		<input checked="" type="checkbox"/>	
Update planning data for quality indicator thresholds			<input checked="" type="checkbox"/>



Transitions

Training & First Launch

- ✓3-part TPI Training
- ✓Process Modeling
- ✓First Launch

Product Size Definition

- ✓Define size measures
- ✓Add Planning and Postmortem phases
- ✓Begin use of PROBE

Defect Removal

- ✓Define Defect Types
- ✓Refine Processes with Defect Removal Phases

Quality Indicators

- ✓Define Product Quality Indicators
- ✓Define Process Quality Indicators

Stages

TIME-
Based

SIZE-
Based

QUALITY-
Based

TxP

Planning
Activities

Working
Activities

Analyzing
Activities



Things to Remember

- TxP may be applied to any team that has recurring work to perform
- TxP teams should plan their work, work their plans, and analyze their data to improve
- This analysis gives them insight into the quality of their processes used to produce their products and provide their services



Questions?

NAVAIR PRT

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Brad Hodgins: 760 939-0666



Backup Slides



NAVAIR Team Performance



NAVAIR Team Data Profiles FY10-FY11

Num of Teams 19

Num of Teams (by type of work performed)

Tactical/Embedded Software Dev 12

Desktop Software Dev 6

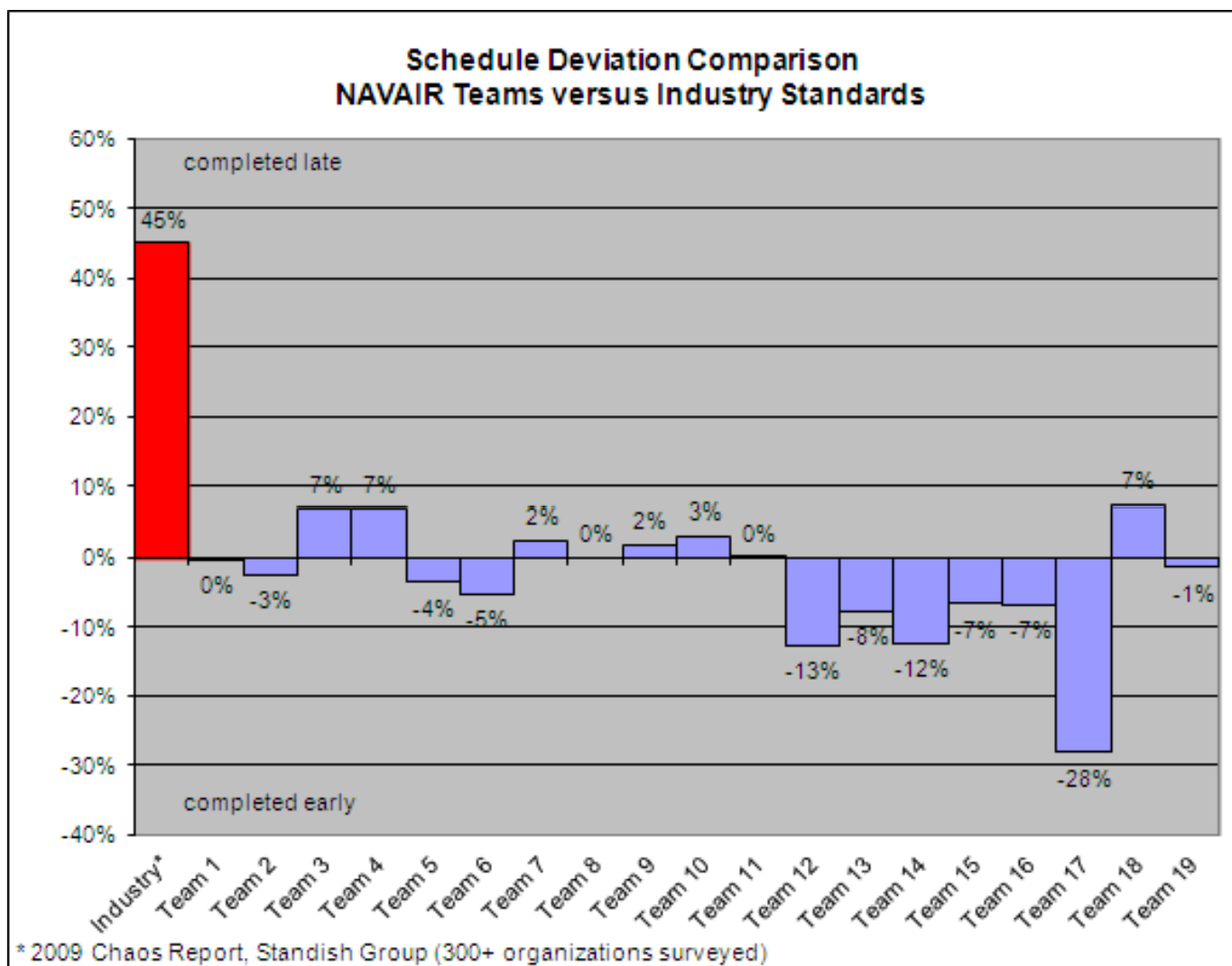
Systems Integration 1

	Min	Avg	Max
Num of Team Members	2	6	12
Performance Period (months)	4	9	18



NAVAIR Teams

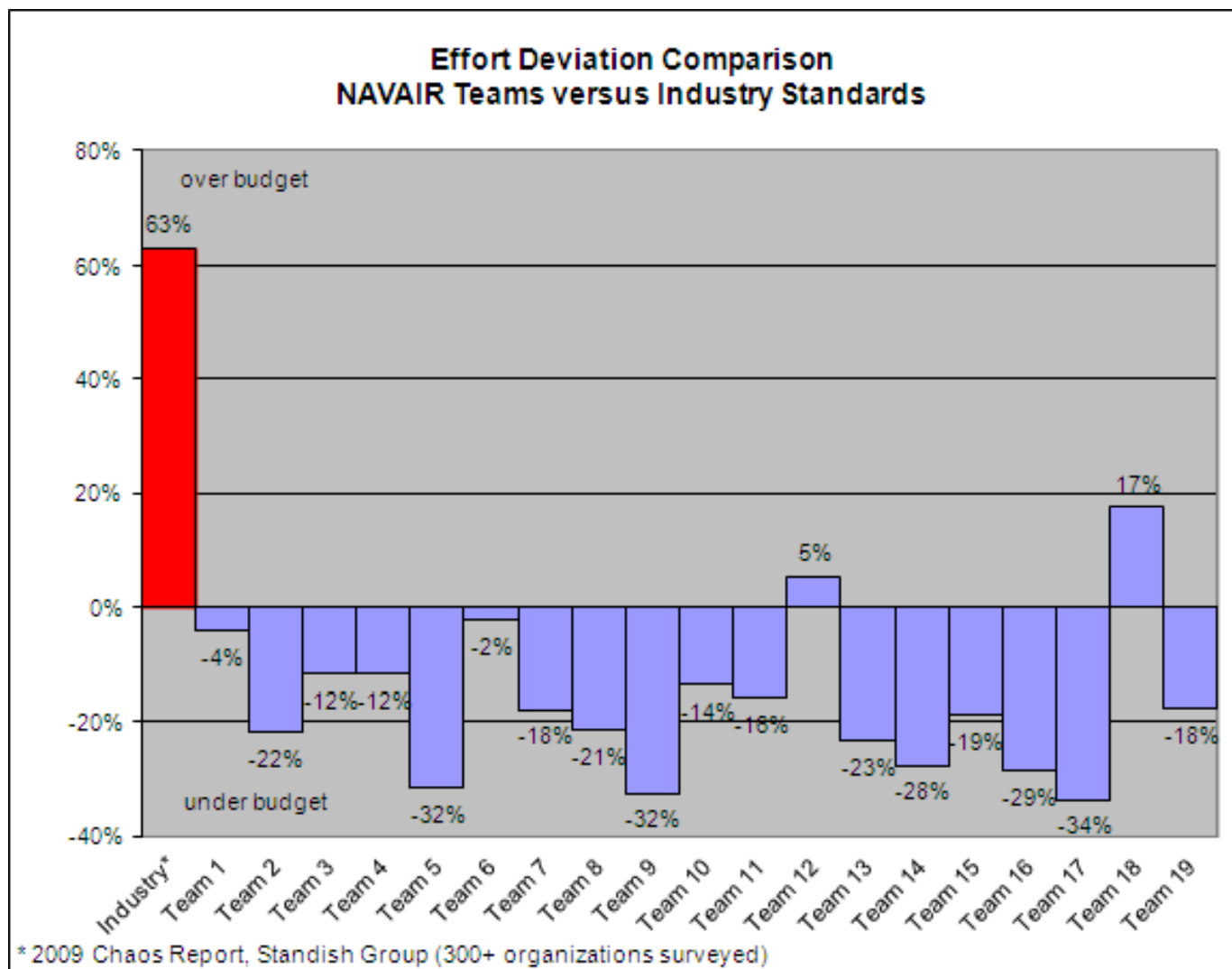
Schedule





NAVAIR Teams

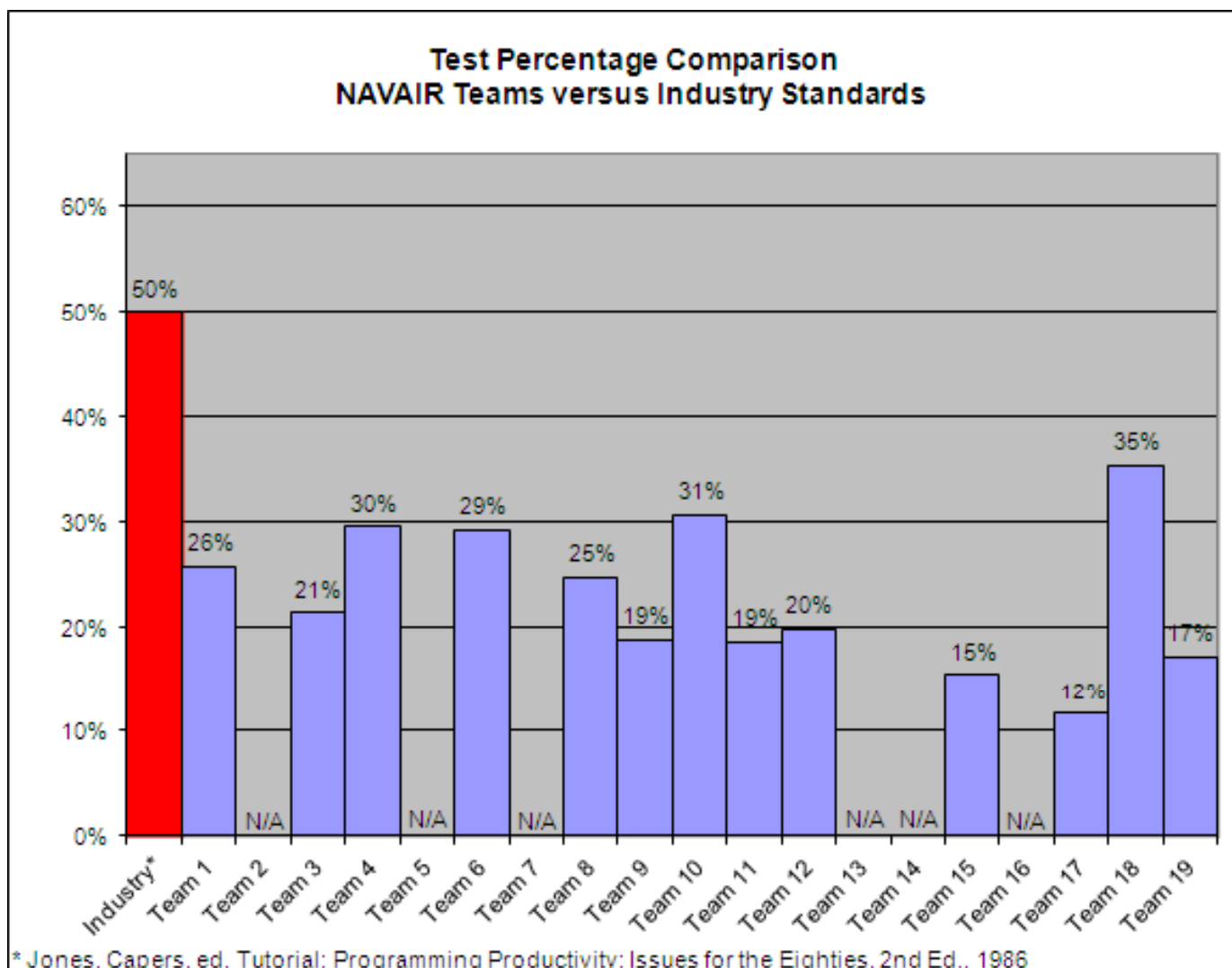
Effort Performance





NAVAIR Teams

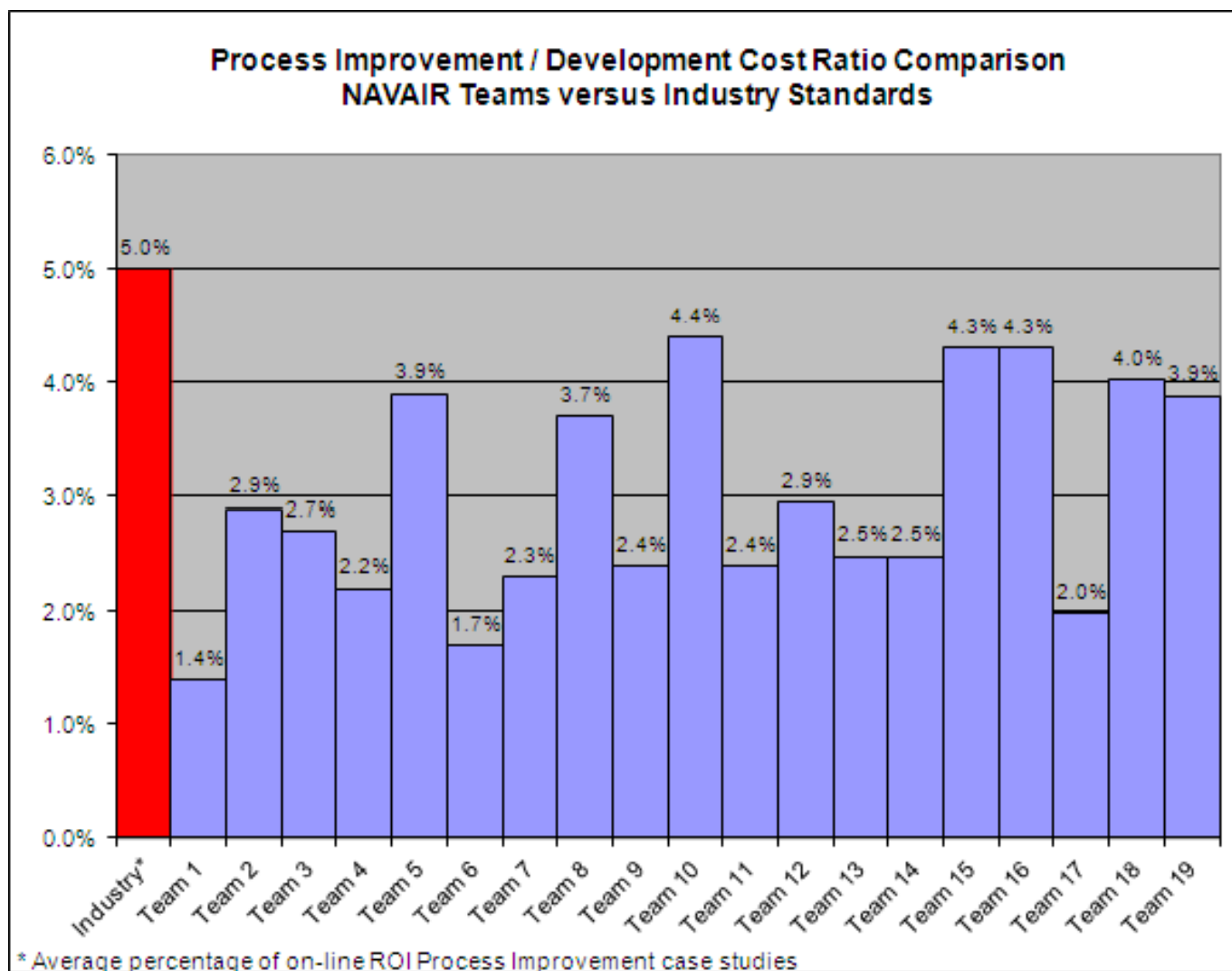
Quality in Test Time





NAVAIR Teams

Cost of Improvement





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