



Making Haste Deliberately

Launching PSP/TSP Efforts at Honeywell

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Honeywell

About this Presentation

- **Our Objective**

Share the process we use to launch PSP/TSP initiatives at Honeywell, and the experience we have gained in using it.

- **Agenda**

History and Context

Getting Started with PSP/TSP

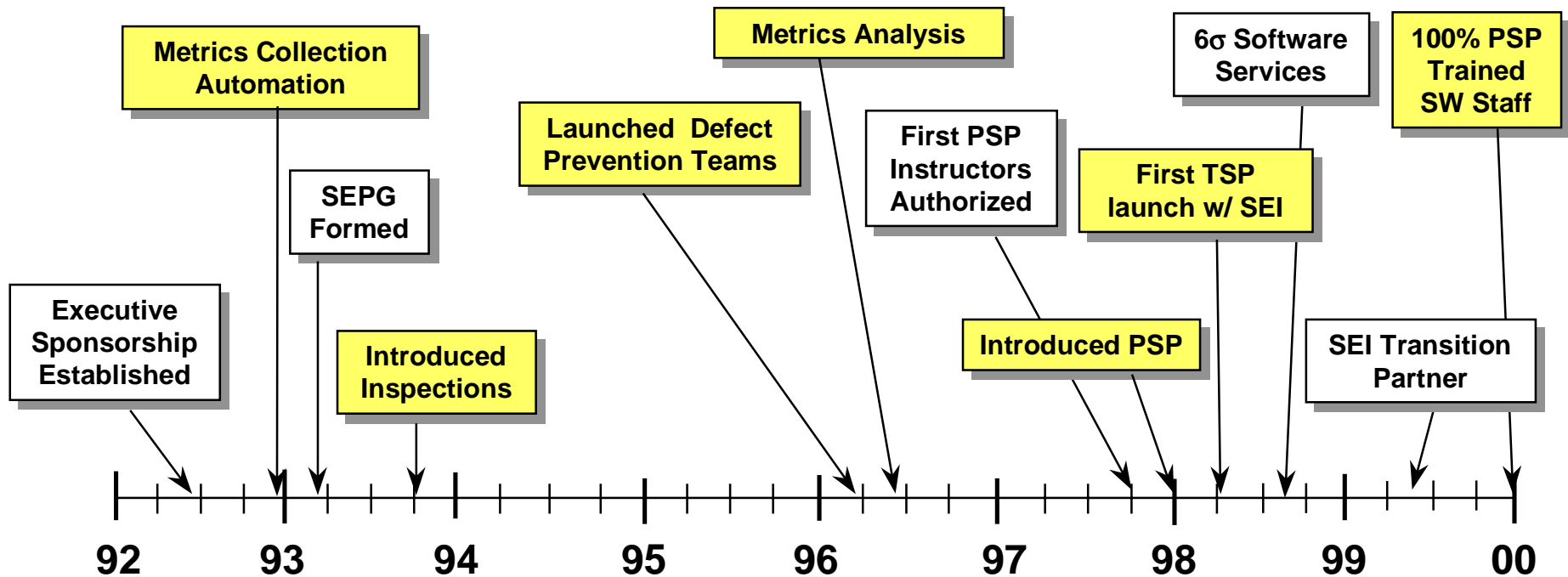
The Technical Launch Process

Managing Organizational Elements

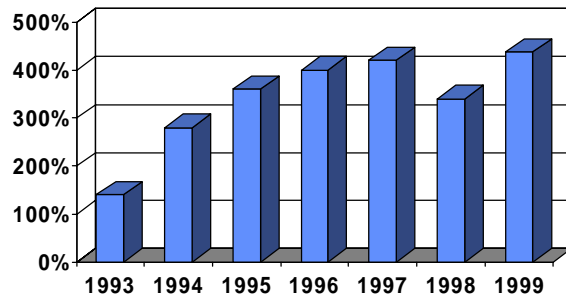
Experience to Date

Summary and Conclusions

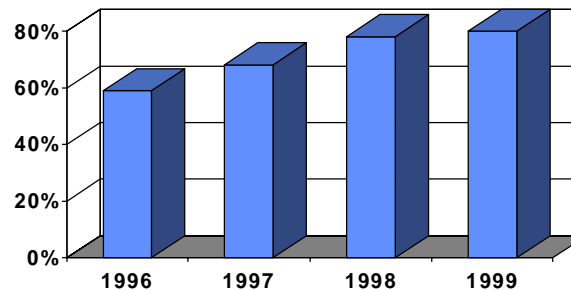
SPI Experience - Teterboro



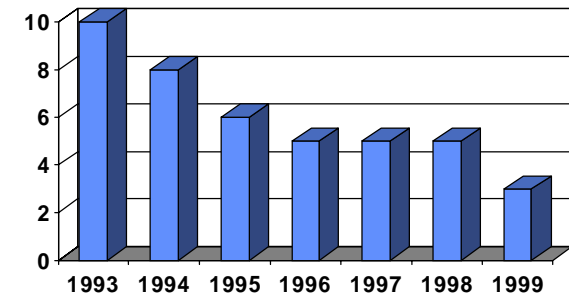
Return On Investment



Peer Review Yields



Defect Density into Integration



Metrics Automation

- Robust automation is essential for metrics collection and analysis when using PSP/TSP.
- Provided by ISPE (Integrated Software Process Environment)
 - multi-user client server data base application
 - originally developed in 1992 for CMM level 5 metrics collection
 - continuously refined since 1992
 - extended to full PSP/TSP support in 1998
 - over 200 forms, 1000 queries, and 50 KSLOCs code

ISPE Features

ISPE includes support for

- Scheduling and keeping records of meetings and inspections
- Logging and tracking the status of action items
- Risk management
- Problem reports
- TSP launch planning and tracking
- PSP time and defect logging
- Estimation (PROBE)
- Automated metrics collection and analysis

Teterboro TSP Pilot Data

- **Introduced on last cycle of embedded avionics program**
 - Software staff approximately 30
 - Program has a history of missed commitments
 - About half complete at the time
- **PSP used for the last build cycle**
 - Overall estimating accuracy 7% low (27 weeks planned vs. 29 weeks actual)
 - Reduction in defect escapes into integration & test over pervious cycle > 4x
- **Other data**
 - Attrition rate 3% vs. site average 15%
 - Second level manager on TSP: “I would never go back to doing it the old way.”
 - On completion the program stated: “I never missed a significant milestone once PSP was deployed.”

Honeywell Software Development Vision

- The merger between AlliedSignal and Honeywell provided a unique opportunity to combine the strengths of two companies.
- Our CEO set corporate goals for the new Honeywell.
 - delight customers, make the numbers, deploy Six Sigma Plus, deliver learning to all associates
- The SW Integration Team defined a software development vision.
 - comprised of the most productive, creative, innovative, and quality-conscious workforce in the world
 - enabled by data-driven, disciplined development processes, and state-of-the-art tools
 - supported by learning programs that foster personal excellence and continuous improvement

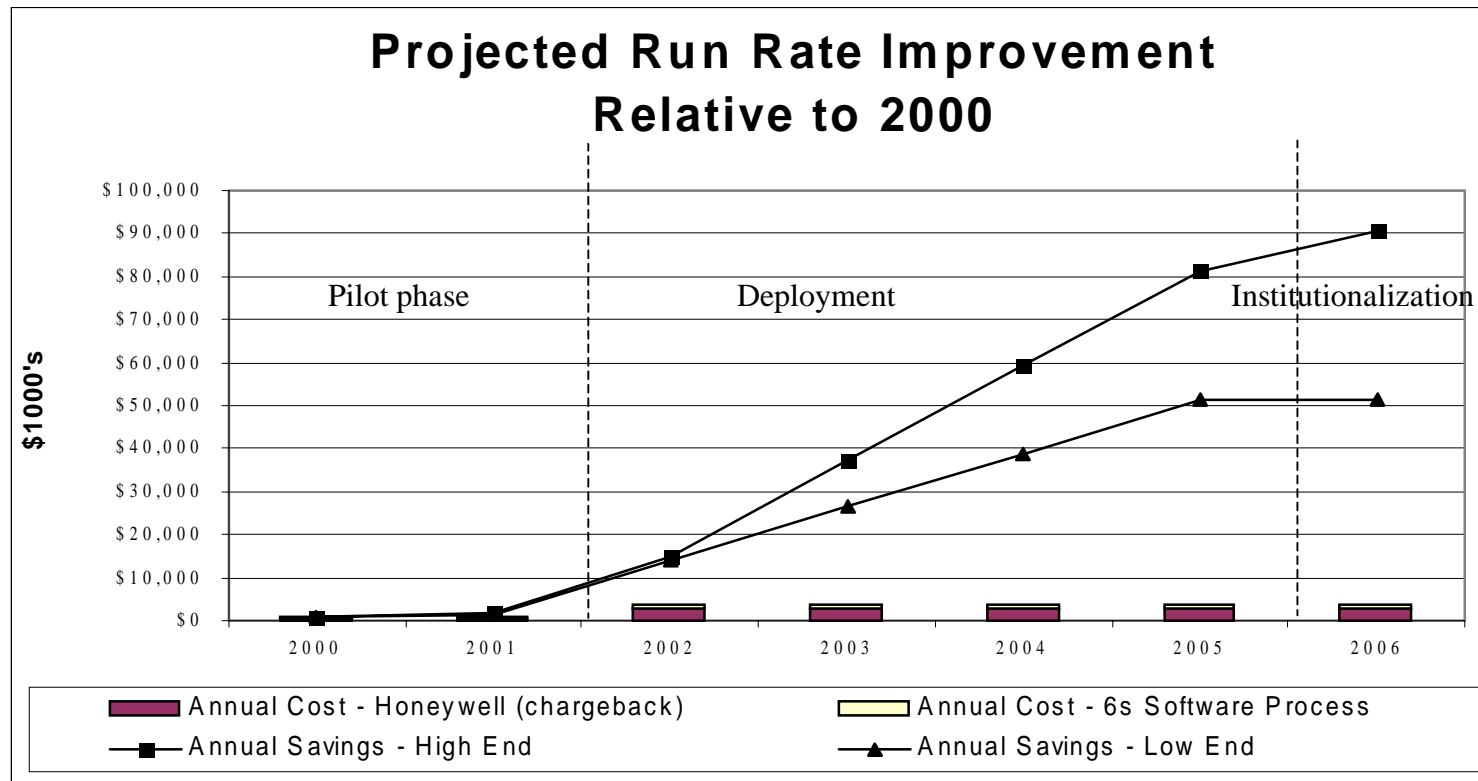
The Software Six Sigma organization was created to move Honeywell towards achieving its vision.

Honeywell Software 6σ Program

- Improve the quality and reduce cost and cycle time of systems and software development, freeing up resources and enabling growth
 - monitor, identify, pilot emerging software process technologies
 - deploy proven processes and tools throughout Honeywell
 - provide CMM-based process assessment to Honeywell sites
 - drive alignment of Six Sigma Plus, PSP/TSP, and CMM
- Offer training and consulting services to external customers
- Establish Honeywell as the leader in high quality systems engineering and software development

Introduce PSP/TSP as a means of meeting corporate objectives

Projected Organizational PSP/TSP Savings



- 25% to 40% cost reduction at full institutionalization
- annual cost avoidance of \$50 to \$90M

...the power of quality on the scale of Honeywell's workforce

Honeywell's SPI Vision

- SPI is driven top down by business goals
- Accountability - SPI contributes to business goals at each site
- Each site has a **published** SPI plan.
 - Baselines cost structure and quality levels
 - Identifies targeted process improvements
 - Calculates ROI
- Deployment and ROI are tracked:
 - Manage to planned performance
 - Quarterly rollup
- Measurable benefits are available and provide the basis for a sustainable continuous improvement culture.
- Sites are achieving quantifiable annual productivity improvements in the 5% - 15% range.
- Sites are setting their own SEI level goals each year—moving through a progression of levels at an appropriate pace—culminating in a sustainable six sigma process at SEI level 5.

Strategy - Measurements Drive Results

- Top down thrust enlisting senior site management to commit to a metrics driven policy requiring continuous SPI with measurable business results with investments recovered within one year
- SPI Planning Workshop at each site to help develop: Baseline Cost Model, SPI Plan, ROI Calculation, Tracking Metrics, and relation to business goals
- Provide training, mentoring, process automation, and passive metrics collection for productivity improvements and process standardization
- Pilot PSP/TSP and deploy where appropriate
- Deploy 6σ Software Scorecard on all new projects
- Integration of Green Belt and SPI Initiatives through software specific training on statistical process control and related tools
- Total solution implementation approach that incorporates change management

... high SEI levels are achieved by pursuing business results

Revised Approach to SEI Assessments

- Strengthen the connection between process improvement and measurable business results in order to
 - guarantee real improvements
 - make continuous improvement sustainable by providing direct linkage to the bottom line
- Process improvement planning workshops provide hands on help to organizations to baseline current process performance, plan improvements, perform ROI analysis, and track quantitative results.
- Tracking results via quarterly scorecard keeps focus on continuous improvement
- Metrics based approach with hard deliverables moves focus from general CMM level compliance to point improvements with measurable business results
- Mentoring to focus on achieving planned results

Software 6σ Tools & Training – A Total Solution

- **Enablers**

- Executive Management Seminars
- Program Management Training Tie-in
- One-on-one management meetings
- SPI Workshops, Cost Model, Mentoring, CMM Assessments (PA, CBA)
- SW Scorecard Tracking and Reporting
- Change Management and Implementation Training (CRM)
- Measuring, planning, and monitoring organizational factors using the O₁₀TM survey (CRM)

- **Technologies**

- Requirements Management (Training)
- Appraisals & Defect Prevention (Training, Automation)
- Design (Training)
- Software Project Management (Training)
- PSP/TSP/GB for SW (Training, Pilots, Coaching, Automation)

Getting Started with PSP/TSP

- Identifying Opportunities via Planning Workshop
- Building Sponsorship
- Selecting a Pilot Project
- Training the Engineers
- The TSP Launch
- Supporting TSP Team

SPI Planning Workshop

- 3-day planning workshop

Goal gathering, baseline data gathering, prioritization and selection of SPI initiatives, ROI planning.

- Puts an effective metrics-driven SPI plan in place
- Parameterizes a cost model (spreadsheet) with organization numbers
- Presents resulting plan and ROI analysis to management
- Secure funding
- Management reviews plans and actuals quarterly to maintain focus

Product line leads and the SEPG work together to define common goals that are addressed by software process improvement plan

Building Sponsorship

- **Secure management commitment through planning workshop**
- **Develop cost/benefit analysis**
- **Establish linkage of PSP/TSP to organizational initiatives**
- **Provide senior management with PSP Executive Seminar training**
- **Provide Managing PSP-Trained Engineers training to first and second line supervisors and managers**
 - **Honeywell uses a 2-day version of the course to make it accessible to managers with busy schedules**
 - **PSP Executive Seminar does not provide adequate technical depth for this management group**
- **Instructors with first-hand PSP/TSP experience provide credibility for managers and executives**

Selecting a Pilot Project

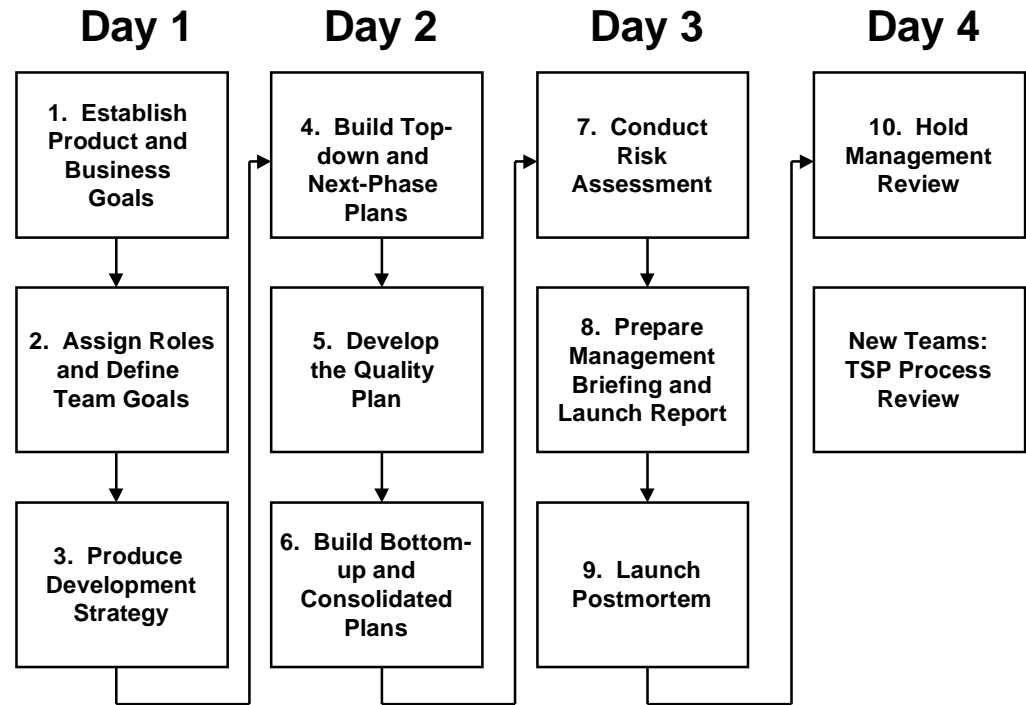
- **Choose pilot projects that best fit the following criteria:**
 - are not in perpetual crisis
 - majority of the team members view change as opportunity
 - good leadership by first tier managers
 - will break even on training and deployment costs within one year based on ROI analysis
- **Lower maturity level organizations can still implement PSP**
 - but need basic CM and QA in place
 - need the capability to implement change, identify pitfalls, and to deal with them effectively
 - desirable to have a process capability baseline
 - level 3 is not a requirement!

Training the Engineers

- Provide training on successfully implementing process changes to vertical management chain
- Just-in-time training for engineers prior to project start
- One week on, two weeks off, one week on
- Dedicated training facility; preferably offsite
- Each student is provided with a laptop computer
- Use ISPE during training to facilitate data capture and analysis
- Entire team is trained together
- First line supervisor and mentor trained with the team after completing the Managing PSP-Trained Engineers class
- Recognize developers for taking the training and for completing the homework assignments

The TSP Launch

- **Developers have completed homework and demonstrate quality improvement**
- **Management launch for**
 - authorizing sponsors through first line supervisors
 - other affected managers
- **External facilitation**
- **Initial four-day launch**
- **Quarterly three-day re-launch**
- **Monthly checkpoints (or more frequently)**
- **ISPE automated tool use during launch**



Support Structure

- **Sustained senior management support and experienced mentoring are twin pillars for pilot project success**
- **Senior management shows support by**
 - communicating interest
 - regularly asking for and visibly using TSP metrics
 - tracking progress against SPI plan through quarterly scorecard updates
- **Team mentor**
 - participates in weekly status meetings
 - helps team surmount obstacles and gain process maturity
 - should be trained with the pilot team and should complete the homework assignments
 - should not be doing tasks on the program critical path

Addressing Organizational Elements

- **Preparing for Implementation**
- **Key Success Elements**
- **Gathering and Using Organizational Data**
- **The Management Launch**
- **Completing the Plan**

Preparing for Implementation

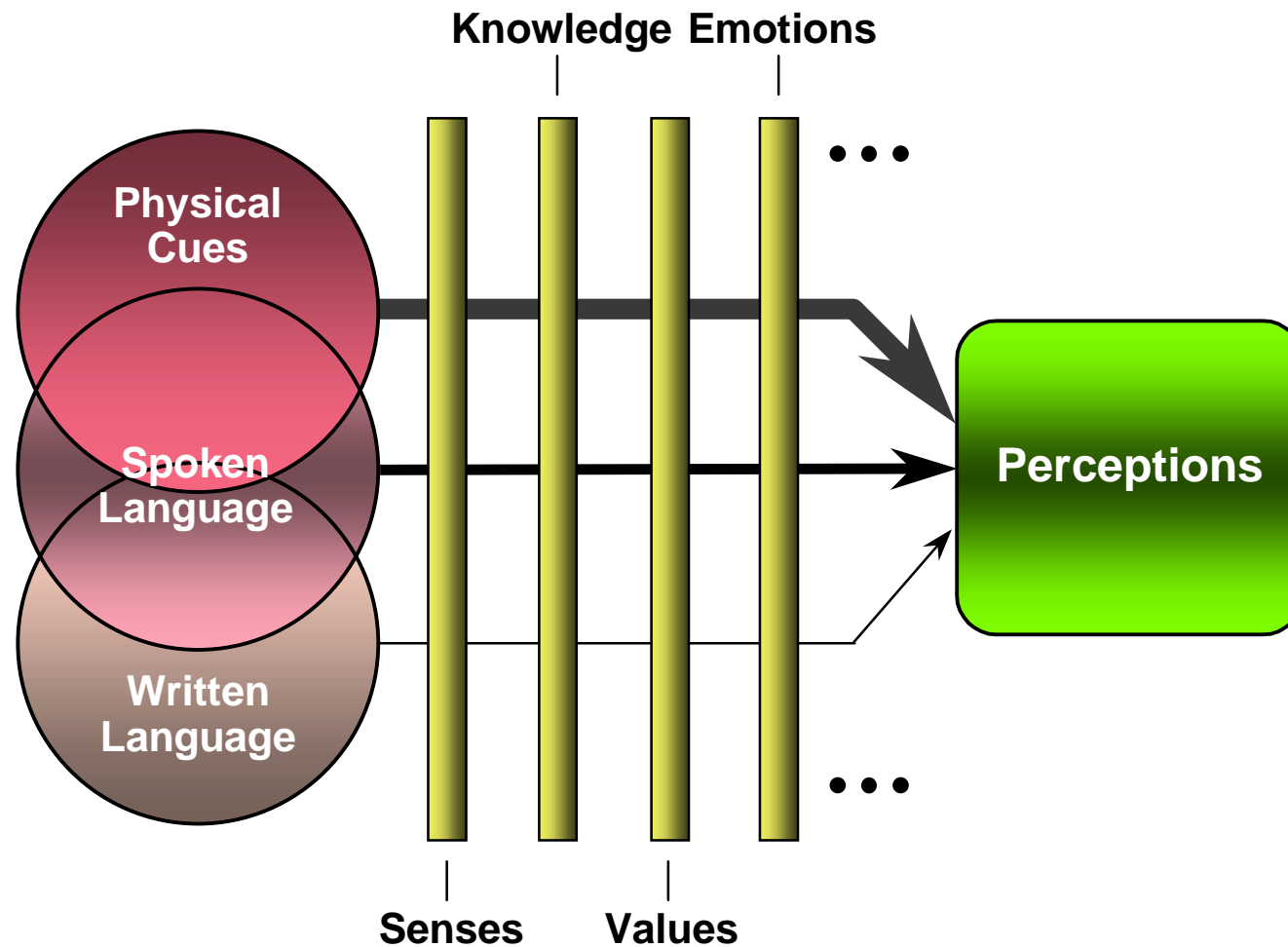
- Technical organizations tend to focus on technical factors, often to the exclusion of organization issues
- The key implementation success factors are organizational, not technical.
- Management, and the organization as a whole, need to be prepared for the changes that will be made:
 - Critical data are gathered, analyzed, and fed back to management
 - Initiating and Diagnosing concerns are addressed as part of a management launch.
 - A complete plan is developed and implemented.

An improvement plan cannot succeed by addressing technical factors and ignoring organizational factors!

Key Success Elements

- **Environmental Elements**
 - Perceived Sponsor Commitment
 - History
 - Cultural Alignment
 - Support (versus Resistance)
 - Communication
- **Ingredient Elements**
 - Vision
 - Skills
 - Incentives
 - Resources
 - Action Plan

Perceived Sponsor Commitment



Perceived Sponsor Commitment

Perceived sponsor commitment is the most critical element of successful change.

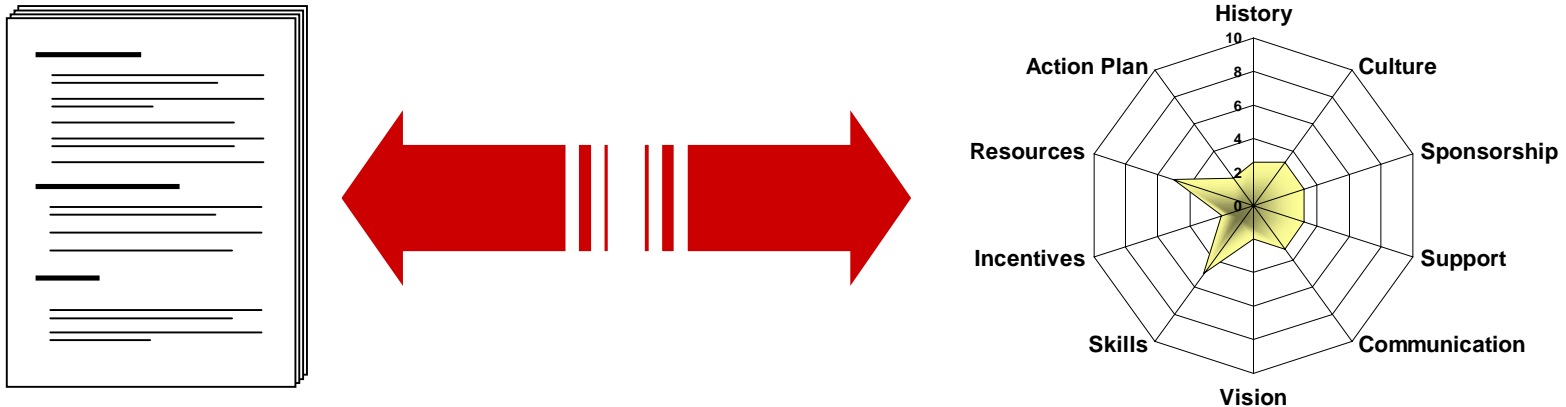
Without sponsor commitment some (usually many) of the other success elements will not be present.

With it, all the other elements may be present if they are addressed and managed explicitly.

Management Actions that Build Perceptions

- What they pay attention to, measure, and control on a regular basis
- What they get angry about
- How they react to critical incidents and organizational crises
- Observed criteria by which they allocate scarce resources
- Deliberate role modeling, teaching, and coaching
- Observed criteria by which they allocate rewards and status
- Observed criteria by which they recruit, select, promote, retire, and excommunicate organizational member

Gathering and Using Organizational Data



Use both hard and soft indicators using O₁₀TM Survey instrument and group/individual interviews

- Hard (numerical) can be treated statistically to track progress over time
- Soft (verbal) facilitates understanding and helps achieve consensus on interpretation hard data
- Combination gives clear picture of challenges and how they might be addressed
- Results are used in Management Launch and subsequent planning and implementation activities.

The Management Launch

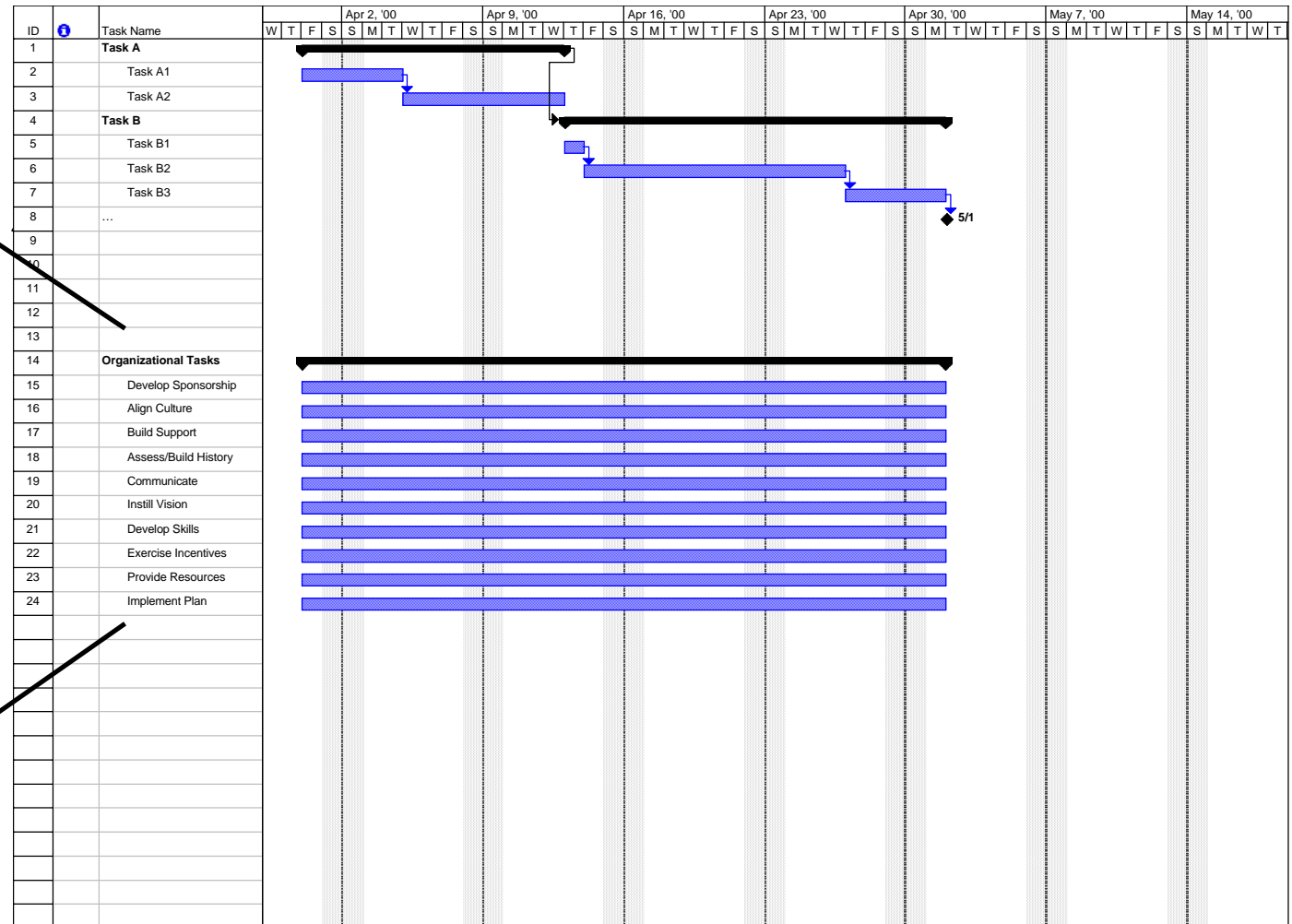
A workshop to lay the ground work for implementation:

- **Identify the Stimulus**
 - What is your organization doing well?
 - Why do you feel change is necessary?
 - What needs to change?
 - What does PSP/TSP address and not address?
 - What will get in the way of making the planned changes?
- **Set Context**
 - What else is going on?
 - What impact will these activities have on this initiative?
 - Who will be affected?
 - How are they likely to perceive the changes
 - What actual effect will PSP/TSP have on them and their work?
- **Start Support Building**
 - What is the direct benefit to those who will be affected?
 - What is the realistic cost to them?
 - What might convince them of the benefit?
 - How might their costs be mitigated?
- **Begin Organizing Infrastructure**
 - What temporary and permanent entities will need to be created?
 - Who should be involved?
 - What resources and support will be needed?

Completing the Plan

Organizational Tasks

Sponsor Activities
Align with Culture
Build Support
Assess/Build History
Communicate
Instill Vision
Develop Skills
Exercise Incentives
Provide Resources
Implement Plan



Experience to Date

Deployment

- **Technical Training**
 - 90 executives
 - 170 managers
 - 200 engineers
- **12 organizations (Honeywell & external)**
- **20 launches**
- **2 management launches**
- **10 pilots (in progress or scheduled)**
- **Change Agent Training**
 - Change management
 - Personal skills
 - Consulting skills

CES TSP Pilot Results

- **Started in July 00, completed initial deliveries**
- **Two small scale PSP/TSP pilot programs at CES Phoenix, Boeing 737-900 & BAE flight control upgrades**
- **PSP/TSP process applicable to software and systems engineering activities**
- **Results from first two cycles**
 - 4500 new and modified lines of code complete and delivered
 - 1.7x improvement in productivity
 - Under-ran initial estimate by 20%
 - Rolling estimate to go accurate to within hours

Summary and Conclusions

- All aspects of CMM-based SPI, including PSP and TSP, yield high return on investment.
- Following a standardized launch process greatly enhances effectiveness and reduces frustration and waste.
- The PSP/TSP training materials and launch process developed by the SEI provide a solid foundation on which to build.
- Specialized training packages may be needed for some stakeholder categories.
- Using an automated tool for metrics collection and analysis greatly simplifies all aspects of PSP/TSP adoption.
- Addressing organizational elements explicitly and effectively is essential for successful implementation.