



FAA's Experience with Process Improvement & Measurements

PSM User Conference

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Agenda

- **Process Improvement (PI) program**
- **Measurement aspects of PI program**
- **FAA-iCMM Assessment findings**
- **Measuring impacts of PI**
- **Revising Measurement support**
- **Executive Metrics initiative**
- **What next**



FAA's Process Improvement Program

- **Began 1995**
- **WHY PI?**
 - **Resource pressures**
 - **External -GAO, OMB, ...**
 - **Desire for High quality products/services**
 - **Opportunity for capturing 'best practices'**
 - **Necessity for business survival of certain functions**
- **Released FAA-iCMM - 11/97**



FAA-iCMM

- **Integrates three CMM's**
 - **Software CMM v1.1, 2/93**
 - **Systems Engineering-CMM v1.1, 11/95**
 - **SW Acquisition-CMM v1.01, 12/96**
- **A framework for systematic, integrated improvement across disciplines & life cycle**
- **Combines 'Staged' and 'Continuous'- type models into a hybrid**
- **The first, most comprehensive model available today**



PI using FAA-iCMM

- **Across FAA major lines of business**
 - Acquisition, System Requirements, Operational, ...
 - Beginning to include R&D, Regulatory, ...
- **Major joint ARA/ATS PI Goal in 1999:**
 - high *quality* solutions to Agency and user needs
 - predictable *cost & schedule*
 - increasing *productivity*
- **FAA Acquisition Management System [AMS] - PI policy added in 9/99...** Processes throughout the agency are continually improved to increase *capability, efficiency, and effectiveness....*



Measurement Aspects of PI

- **FAA-iCMM**
 - **Specific Process Areas [PA] require measurements; e.g., Project Management [PA11] requires estimation and monitoring of product size, effort, cost, schedule, and critical technical parameters**
 - **Generic Practices for Level 2 process capability requires that each PA ‘measures the process’ by statusing [examples are cycle time, resources, and quality]**
 - **Measurement is a PA at Level 4**
- **Need to measure impact of PI itself**



Measurement Approach

- **Measurement WG set up under the integrated Process Group (iPG); senior FAA executives**
- **Offers training and consulting to PAT's**
 - **PSM overview class**
 - **tailored for 'Systems Acquisition programs'**
 - **Process-focused workshops to develop measurement plans**
 - **Now have 8 PSM trainers**
- **Oversight of ARA's Executive Metrics program**
- **Assist in measuring impacts of PI**



1999 iCMM Assessments

- **Several Organizational appraisals conducted (both ARA and ATS) using FAA's own method [FAM]**
- **ARA specific goal was 75% of selected projects reach level 2 maturity**
- **Results - some Organizations' goals met; others not - but PI progress was perceived**



Key Positive observations

- **Predictability** - better *costs and schedule* predictability; greater consistency and structure; *measures* being established to assist in estimation; work easier to track
- **Productivity** - work effort more streamlined and easier to perform; easier training of new hires; time savings
- **Costs** - some cost reductions, cost savings being realized
- **Quality** - increased quality and consistency of work products; document quality improved, can be relied on to make decisions
- **Communication** - better communications; shared info; fewer misunderstandings



Positive observations [con't]

- **Teaming** - improved teamwork across disciplines, more unity of vision among team members; management and practitioners working together
- **Clarity** - of roles, responsibilities and processes; more awareness and appreciation of roles of different disciplines and their relationships
- **Confidence** - management has more confidence that the project has its act together
- **Practitioners want more** - more programs and organizations to participate; more processes to be improved using the iCMM



Key measurement - related weaknesses

- **Project Management:**
 - resource estimates lack a historical database
 - estimation process not documented
 - no effort to react to overstaffing
 - no effort on an accounting system
- **Quality Assurance & Management:**
 - QA for FAA activities and products is a new concept
 - little evidence of measures for deviations/ noncompliances
- **Transition:**
 - resource needs not always adequately planned



Measuring Impacts of PI

- **Most findings were anecdotal and, due to agreed confidentiality, could not be attributable**
- **MWG thus is implementing ...**
 - a focused set of interview questions for project managers
 - a survey questionnaire for staff
 - questions have a *scale* for ratings
 - seek ‘quotes’ of perceived impacts
 - seek *quantitative info* to back up perceptions



Example Questions

1. Are there indications of changes in productivity within your organizational unit?

- Do you have reduced cycle time?
- Are you expending fewer resources to do same job?
- Do you now have a better quality output that is leading to less rework?
- Does it take less time to train new people?

2. Are your estimated schedules becoming more realistic?

- Do you now do less replanning?
- Do you now have reduced Schedule Performance Index [SPI], Schedule Variance [SV]?
- Do you now have fewer slipped milestones?
- Are you experiencing a lesser amount of variation from planned schedule?
- Are your deliveries more timely?
- Do you now have better information available for future planning?



More Questions

3. Are your cost & resource estimates more realistic?

- Do you now do less replanning?
- Do you now have reduced Cost Performance Index [CPI], Cost Variance [CV]?
- Do you now have better information available for future planning?
- Are you better able to allocate resources to meet requirements?

4. Are there indications of changes in product quality?

- Are your products meeting user needs?
- Do you have fewer defects?
- Do you have less rework?
- Is your product more reliable?



Survey/Interview results will...

- **Provide PR ‘quotes’ for top management
- quick feedback**
- **Become a baseline/benchmark for future assessments**
- **Begin a foundation for a solid measurement program by identifying ‘issues’**



Lessons Learned

- **We began measurement workshops before the PATs were ready - didn't understand completely iCMM, PI, or own processes**
- **Measurement was incorrectly perceived by the PATs as low priority because:**
 - staged at maturity level 4 [PA 18]
 - buried as 1 of 14 level 2 Generic Practices
- **PM, QA and GP 2.11 were usually scheduled last in organization' PI implementation plans**
- **We didn't follow up on draft measurement plans**



Revised Approach

- **Still offer PSM overview class with ‘systems’ focus - be sure those who attend will be a POC in that organization for measurement**
- **Focus workshops on Project Management [or organization] - issues will drive out which processes need good measures**
- **Ensure team is familiar with their processes; and PM participates**
- **Integrate ‘issue’ identification with the PI ‘Gap Analysis’ activity**



Executive Metrics (ExM) program

- **Related to general PI initiative**
 - **Initiated by top management [Acquisition & Research Administrator] as to what he needed to monitor health of selected projects**
- **Changed 4 times by 3 different ARA execs since 1996**
- **Current set...**
 - **EV,**
 - **Schedule [long and short term],**
 - **Requirements Stability,**
 - **Technical Issue of high importance/risk [e.g., quality]**
 - **Summary chart with Red/Yellow/Green status**



Lessons Learned from ExM Review

- **Involving Senior management is critical; provide feedback**
- **Establish small set of unified measures for program baseline**
- **Include measurement criteria in contracts [EV, Quality]**
- **Establish program baselines and measures early**
- **Share Lessons learned among programs for maximum benefit**
- **Communicate changes to program baseline to interfacing Orgs**
- **Measure Quality throughout the lifecycle.**
- **Determine reduced funding impacts quickly; and communicate**
- **Measure requirements to at least level B to be meaningful**
- **Use Measures as performance predictors; not only for results**
- **Make changes in estimates more quickly, as well as implement corrective actions**
- **Incorporate Thresholds in measurements for taking actions**
- **Track accuracy of program estimates**



Key Impact of ExM

- **Exec Manager is taking it seriously**
- **PMs recognize that their programs are being tracked and thus are taking a closer look at the metrics**
- **Programs are being more open with issues**
- **Programs recognize this as another conduit to bring problems forward for more visibility and needed decisions**



Major revision to process

- **MWG now conducts monthly independent evaluations of ExM**
 - **includes organization's MWG representative reviewed with PMs, AIO-2[Deputy CIO], and then ARA-1 with invited management executives**
 - **provides an overall risk rating [R/Y/G], key findings, and recommendations**
- **The ExM's are sent to all Executives on the management team**



What's next?

- **Complete PI survey analyses; use as basis for institutionalizing measurements**
- **with more PSM trainers, expanding PSM training and consulting; integrated into PI 'gap' analysis and PI planning**
- **Continue ExM to track programs selected by Acquisition Executive (ARA-1)**
- **Still looking into adopting INSIGHT tool**
- **Future of iCMM - new domain areas [security, deployment, EIA-731, CMMI,...]**
- **Work with Process Asset WG in implementing a Process Asset Library re measurement DB.**