

Applying CMMI to Services

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Agenda

- Background
- Lessons Learned
- History
- Epiphanies
- Approach
- Conclusion

“...he who attempts it must first pass the point of this lance;” and so saying he brandished it so stoutly and dexterously that he overawed all who did not know him.

*Miguel de Cervantes
Don Quixote*

Background – Critical Issues

- *Need to be CMMI (L3) to stay in Business.*
- *Service Organization (that don't fit into the traditional product development model) struggle to achieve CMMI L3 in a timely and cost effective manner.*
- *How does an organization staffed with practitioners from standard (product oriented) high maturity organizations, with large range in its technical disciplines, little or no process dollars, and little or no project autonomy achieve a CMMI level 3?*
- *Welcome to the World of Technical Services!*



Background – Pasadena Operations

- Raytheon's Pasadena Operations
 - Part of Raytheon Information Solutions.
 - Establish in 1998 with the award of the SDSIO (Science Data System Implementation and Operations) contract by the California Institute of Technology and NASA's Jet Propulsion Laboratory (JPL).
 - Umbrella services contract allowing JPL Managers to contract directly with Raytheon for technical and scientific services.
 - Consists of functional departments organized along lines of businesses reporting to a Program Manager.
 - Technical disciplines range from software and systems engineering to IT, scientific analysis, and web development.



Background – Challenges to CMMI

- Service, not product-based organization.
 - No traditional end-to-end lifecycle.
 - Customer directing work – little or no autonomy.
 - Small overhead – no funding for process support & development.
- Blurring of function within projects and across departments.
 - Project activities range from software development to graphic design.
 - Departments support operations, IT, analysis, and development.
- Raytheon and Customer culture significantly different.
 - Research versus product oriented.
 - Low process maturity (relative to industry).
 - Small teams (1-2 FTE) with modest funding.

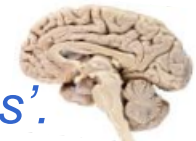
Process Improvement History

- Grass root effort
 - Started with (unfunded) special interest group in March 1999.
 - Prevailing feeling that Customer would be better served if proven process could be applied to each task.
 - Most members worked for high maturity organizations before coming to Pasadena.

- False starts and dead ends 1998 – 2003
 - Top-down approach to process improvement (unsuccessful)
 - Obstacles:
 - CMM, no CMMI yet
 - Lack of process infrastructure (QA, CM, MA, etc.)
 - Customer “owns” project areas (PP, PMC, IPM, Risk)
 - Small, diverse, short-term (< year) projects
 - Customer chooses not to perform some key practices
 - Funding

Process Improvement History (cont.)

- Alternatives
 - **Approach:** Restrict process to one or two projects where sufficient autonomy existed to apply Model.
 - **Drawbacks:** *No benefit on most projects; limited benefit to customer.*
 - **Approach:** Apply Model to a collective group of projects, with no single project performing all key practices of the Model.
 - **Drawbacks:** *Risky – might loose one or more key projects.*
 - **Approach:** Completely new (non-traditional) approach.
 - **Drawbacks:** *Not clear how to proceed; requires ‘breakthroughs’.*



History (cont.)

- Breakthroughs 2003 and 2004
 - Use bottom-up approach.
 - Develop lifecycle based on how work is actually done.
 - Map Model to lifecycle.
 - “Fill” process gaps.
 - Shift focus to delivery of service instead of delivery of a product.
 - Use Raytheon Six-Sigma for process improvement.
 - Use a traditional engineering lifecycle (requirements, design, implementation, verification and validation) to develop the process.
 - Employ an evolutionary or staged approach to implementation.



Epiphanies

- Key breakthroughs that resulted in substantial progress in applying the CMMI to services.
- Epiphany 1: *Task Orders are equivalent to projects.*
 - Apply process to every task order.
 - Re-identify each Model key practice with an equivalent practices in the service environment.
- Epiphany 2: *Project requirements are services requested by the Customer.*
 - Requirements are the Customer requests for services in the form of personnel and attendant support.

Epiphanies (cont.)

- Epiphany 3: *Every project has the same (unchanging) five requirements.*
 - Requirements are:
 - **Staffing** – e.g. supply two oceanographers.
 - **Facilities** – e.g. provide office space and equipment for assigned personnel.
 - **Finances** – e.g. monitor and report cost associated with supplying 2 oceanographers.
 - **Management** – e.g. manage the task order (find staff and facilities, monitor cost and personnel).
 - **Infrastructure Support** – e.g. provide networks, phones, computers, etc. for 2 oceanographers.

Epiphanies (cont.)

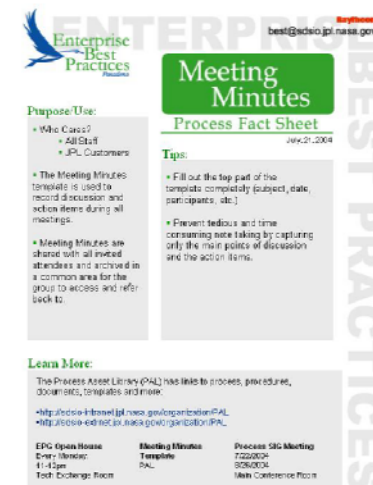
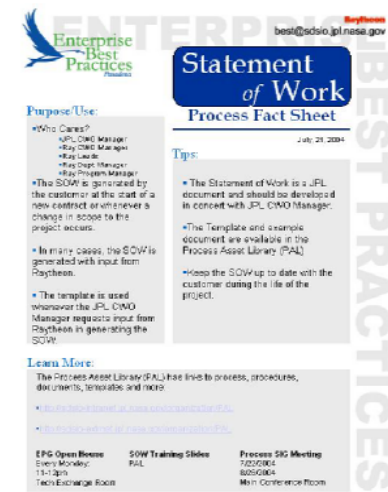
- Epiphany 4: *The relative time spent for development versus delivery in services is reversed from that of products.*
 - Products: most of the effort is spent **developing** the product.
 - Services: most of the effort is spent **delivering** the service.



Approach

- **Template-based solutions.**

- Technical staff and management not burdened with process details that are not directly applicable to their work.
- Technical staff works with solutions that are relevant to their everyday tasks without having to become versed in the CMMI.
- A relatively small group of Model experts can concentrate on insuring that the CMMI practice areas are covered via the usage of the templates.



Approach (cont.)

Approach Used

- Multi-part SCAMPI C and B.
 - SCAMPI C divided into two events.
 - 1st event examined organization's business model.
 - 2nd event examined templates.
 - SCAMPI B divided into three events.
 - 1st event examined evidence from the project area of the Model on a single focus project.
 - 2nd event examined evidence from the support area of the Model.
 - 3rd event examined evidence from the engineering area of the Model.
 - Engaged appraisal team in improvement process
 - Team recommendations, solutions, and feedback incorporated into process before deployment.
 - SCAMPI A: Traditional

Traditional Approach

- C and B SCAMPIs are conducted as single events
 - SCAMPI C reviews policies & procedures
 - SCAMPI B reviews polices, procedures and artifacts



Lessons Learned

- **Use Bottoms-up Approach**
 - Develop process solutions based on business model
 - Tailor solutions to the organization
- **Run the implementation as a (serious) project.**
 - Establish a project manager, budget, schedule, and measurable goals.
 - Track and monitor progress on a regular basis using EVMS.
 - Use phased deployment
 - Develop and validate processes before deployment.
- **Implement a 'grass roots' communications plan throughout the project.**
 - Start communication with staff and management early to establish and clarify goals.
 - Celebrate small successes publicly at all-hands meetings and other group events.
 - Setup recurring open houses and training sessions with the process developers.
 - Demonstrate the benefits to individuals.



Lessons Learned (cont.)

- ***Obtain stakeholders' support and active involvement.***
 - Gain sponsors at the highest level and understand their goals.
 - Involve Customers frequently via EPG and Steering Committee meetings.
 - Communicate the benefit of reaching goals.
- ***Make use of consultants.***
 - Leverage Model expertise from other parts of the organization.
 - Choose the lead appraiser wisely i.e. 'out-of-box' thinker.
 - Put the appraisal team to work for the organization.
 - Use their feedback to refine processes before deployment.



Conclusions

- Successfully implemented one of the first applications of the CMMI Model to Services
 - Technical Details Documented in (up-coming) SEI Technical Note
 - <https://bscw.sei.cmu.edu/pub/bscw.cgi/0/79783>

- Developed pragmatic and cost effective model to deploy CMMI in non-traditional applications

- True Process Improvement
 - Added processes meaningful and useful to organization
 - Day-to-day operations improved
 - Organization more efficient and effective at delivering services
 - Increased engagement with customer at all levels

