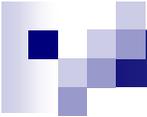


Improving Processes and Widening Process Adoption

**Embracing process
improvement within small
projects**



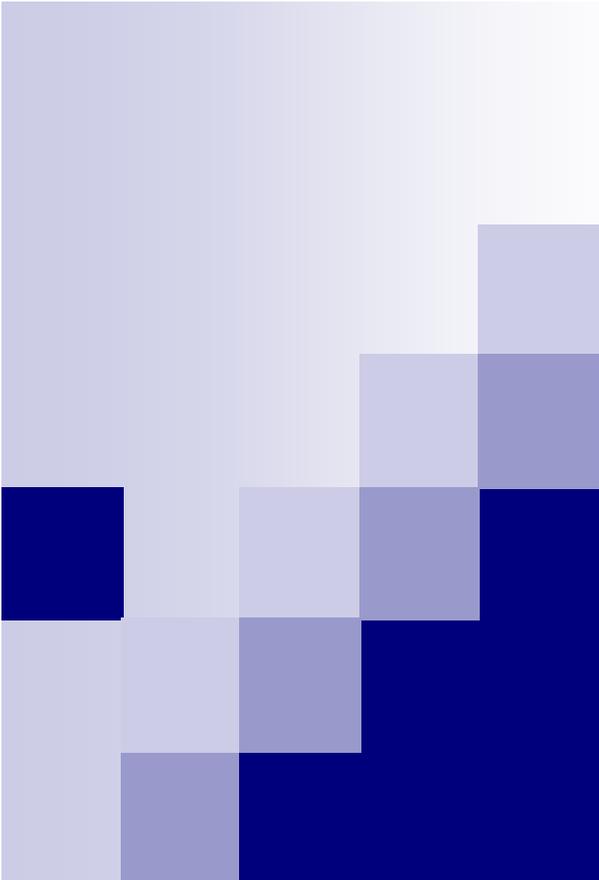
My opening disclaimer

- I will provide reviews and observations into a lot of areas, some of which may be well known to the audience. I ask that you indulge me for the length this brief, which I hope will be beneficial for everyone by the time I reach the end of the presentation
- Since this is a brief, I did not provide exhaustive details or evidence for every issue. I collected a broad-range of observations and have selected those things I feel are most notable. Wherever possible, I offered suggestions and recommendations, although in some cases I did not provide any suggestions. Given the pace of events; process and otherwise; during my last CMM-based cycle I did not have a lot of time to experiment with alternate practices, methods, etc. There will likely be issues that are purely a matter of perception or misunderstanding on my part and may not require any changes or improvements. On the other hand, I hope to identify areas that both the organization and the project can improve upon as I look forward to CMMI
- If some content appears negative, that was/is not my intent. From my perspective... if I say nothing at all, I will never really know if I missed an opportunity to improve the organization or my own projects
- My primary focus was to try and provide an honest and unfiltered representation of my experience in the hopes that I can start an open dialog with organizational process improvement teams
- This discussion will focus on process approaches independent of the tools used to implement them. Therefore, I will de-emphasize processMax since it is not germane to the larger concepts of process implementation that I will be discussing



Terms

- The following defines some specific terms used throughout this presentation:
 - **Organization:** When used to define a group of people this consists of the project StC, members of the OCCB, and members of the process improvement and assessment teams
 - **Customer:** This refers to those personnel within your customer-base (internal and/or external) that actually provide funding for this and related efforts
 - **Process:** This is a neutral term covering CMM, CMMI, ISO, or any other informal/formal process approaches



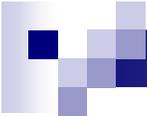
Process Concepts and Vernacular

Bringing everyone together on a complex subject... What do I call it? What does it mean? What is my perspective?



Purpose of the CMM(I) Frameworks

- The overall purpose of capability models is to establish a process improvement roadmap upon which a route can be drawn from “where I are today” to “where I want to be”
- Capability models define the characteristics of good processes and avoid prescribing how the processes must be enacted.
 - The details are determined within the organization



Who CMMI targets

- Although the Carnegie Mellon Software Engineering Institute (SEI) does not explicitly define who should use it and who should not, they imply that CMMI is most successful in projects with greater than 25 people and process organizations with more than 250 stakeholders
- CMM/CMMI in organizations smaller than 100 people and/or projects with 20 people or less is widely considered to be problematic within the SEI and they have three pilot programs underway with industry partners to identify working processes for such small enterprises

<http://www.sei.cmu.edu/cmmi/adoption/cmmismall.html>

- Carnegie Mellon is also sponsoring reviews into community proposed models such as *CMMI Lite* and others
- This presentation will focus on small project issues in an attempt to widen adoption of standardized organizational processes



CMM(I) attempts to help you... (their words)

- **Verify process content**

- Capability models encapsulate basic industry knowledge for an organization to use to help improve quality, customer satisfaction, productivity, and cycle time

- **Demonstrate progress**

- Another primary use of capability models is to demonstrate improvement from year to year

- **Benchmark**

- A model can be used to validate process improvement progress in comparison with competitors

- **Structure new processes**

- Organizations that have not yet captured their basic engineering practices in documented processes frequently will look at capability models as a list of what needs to be included



What CMM(I) wants in a nutshell (in English)

- The things they are looking for... 30K foot view...
 - Documentation and adherence to **plans**, procedures, standards, and processes... In some cases, established at an organizational level
 - **Role** definition and participation
 - Collection of process **Artifacts** and **Evidence**
 - Documentation of process activities
 - Proposals, Requirements, Design, Development, Test, Produce, Support, etc
 - Process performance **metrics**
 - Size, cost, schedule, etc
 - Product **Verification** and **Validation**
 - **Risk management**
 - Definition and monitoring of thresholds and contingency plans
 - **Look-forward** and **Lessons Learned** analysis
 - Continuous process improvements
 - Application of **Oversight** and **Quality Assurance**

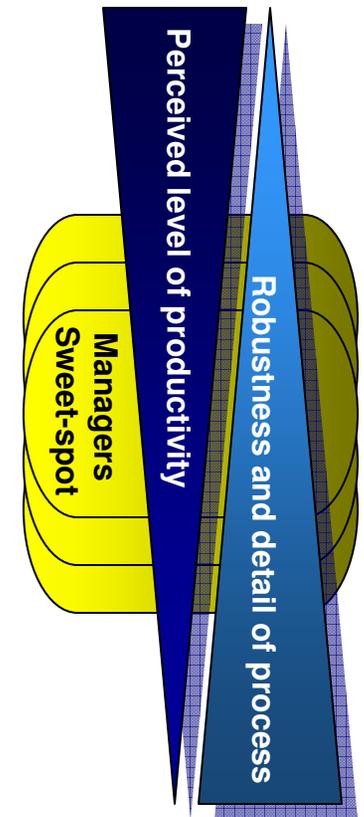


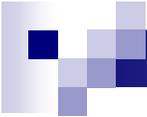
What developers and project managers want

- Produce working software on a regular basis
- Remain product-focused
- Write high-quality code that is maintained under CM control
- Welcome and respond to changing requirements
- Respond quickly to defects and failures
- Automate the drudgery out of working processes
- Embrace stakeholder relationships and end-user collaboration
- Participate in the larger development community and technology exploration to support product evolutions
- Architect and Visualize product capabilities and features
- Focus on development methodologies to remain Agile
 - Project processes

Battling Perspectives

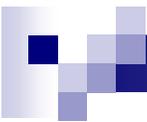
- There are three major philosophies competing
 - **Technical** – *Build it better, faster, smarter*
 - The developers want as much access and flexibility as possible to develop the required solutions as quickly as possible
 - **Managerial** – *Cost conscience*
 - Managers want to reduce duplication of effort and maximize leveraging with as limited amount of risk as possible
 - **Process** – *Common documented approaches*
 - Process driven organizations want things done in a common, documented, traceable, evidence (e.g. artifact) producing manner
- Everyone wants to get the job done, but they don't always want to do it the same way





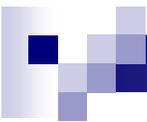
The inevitability of many processes

- The disparate CMM(I) and Project (team) perspectives often lead to duplicative, disconnected, and costly activities that management teams need to be able to identify and correct/mitigate
 - Results lead to mounds of disconnected activities
 - Half to acknowledge appraisable process requirements
 - Half to produce the end product(s)
 - Personnel spending more time trying to identify the correct process steps, rules of conduct, role boundaries, etc... verse performing processes
 - Check-in-the-box approaches to process artifact creation
 - Creation of work products that have limited or no value to the evolution of the product being developed
 - Removal of key production steps and/or technical resources that don't fit into organizationally approved processes
 - Etc...



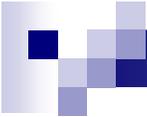
Why does this happen?...

- The reasons vary widely however some trends are easy to spot
 - Processes and Organizational Standards (OS) are often defined without working consideration of engineering processes
 - If not developed around core production processes, the burden and distractions of carrying both manifests itself in the end-product
 - Processes and OS defined with too much overhead/detail
 - Too much overhead or detail can lead to confusion and may require costly reworks.
 - Process scope and executing projects are not compatible
 - Space-shuttle processes are not appropriate for 'Hello World' projects
 - Doing things for the sake of the process or the assessment
 - Chasing the grade leads to activities with a low Return On Investment, proceed with caution... This will catch up with you
 - Fear of challenging the relevance of processes
 - While 'conceptually' many processes may make sense, in reality it may not make sense for you. Lets not make the "lemmings" mistake
- These elements can be mitigated or even avoided by applying additional resources which can; over time; mold the process to meet a project's individual needs
 - This is not generally possible in small projects which often do not have the additional resources to apply (*e.g. people, tools, funding*)



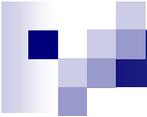
Should I do this?... whatever this is...

- Adoption considerations for any process proposal
 - Return on investment (ROI) for adopted processes, procedures, etc...
 - Time, money, manpower, material, realized value to the end-product, etc
 - Impacts on cognitive bandwidth for project stakeholders
 - Probability of reliable execution by stakeholders
 - Acceptance or embrace-ability by project sponsors
 - Relevance of processes and artifacts (i.e. content staleness, actionable content, etc...) to future products and/or project initiatives
 - Leverage power of artifact
 - Portability of processes and artifacts to neighboring projects
 - Often an issue where resource sharing is common
 - Cost to implement, train, and sustain
 - Effect on team morale
 - Can this be automated
 - “Real” motivation behind adoption (*e.g. check-in-the-box or truly bettering the product*)



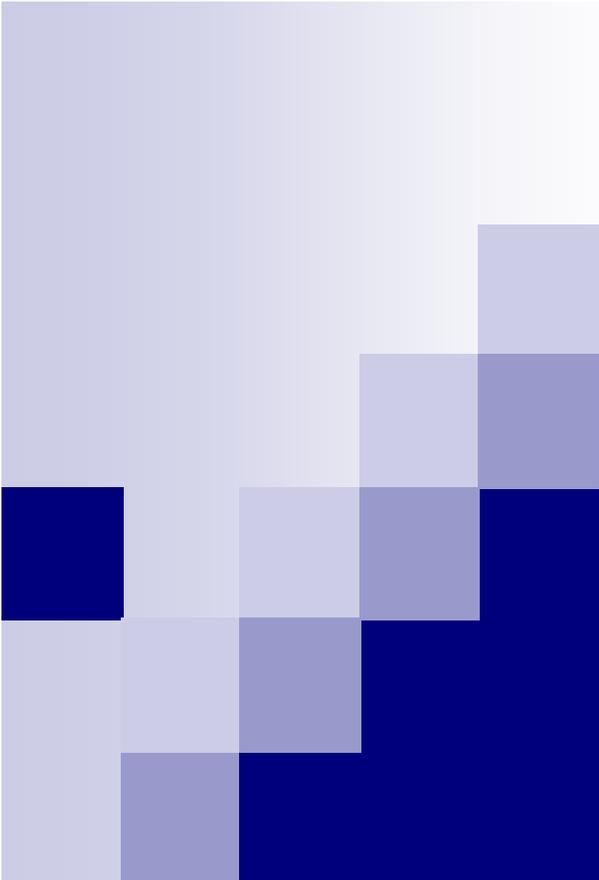
A common process pitfall...

- In small projects or projects with very limited resources all of these problems are exacerbated
 - Distractions can cause significant problems in project productivity
 - Changes in 'apparent' efficiency or cost-effectiveness can be more easily identified by project sponsors, and may adversely affect business relationships
 - Already tight schedules can become critical
 - Etc...
- Adoption of processes; while necessary and even preferred; needs to be done in a way that realistically measures 'realized' benefit of process adoption
 - Does it really make the product better? Is it really worth the effort, cost, complexity, etc...
 - Sometimes you won't have objective metrics... Sometimes, process managers need to allow product experts to follow their gut



What to do in resource poor projects?

- Some trends are becoming clear in the case studies
 - Heavy adoption of automation tools in all process areas can go along way to empowering the process stakeholders
 - Realization that Risk mitigation vs. avoidance is more likely in some projects
 - Convergence and fusion of roles, tools, project plans, reviews, and artifacts will likely be a necessity in small projects
 - Any one work product will have to be more comprehensive, giving up many refinements
 - Multiple organizational process definitions
 - Organizational process definitions that define process tenets in lieu of actual process artifacts, formats, etc...
 - This will provide project managers with the flexibility to meet individual project and customer needs in a cost-effective way
 - Streamlined processes for tailoring from organizational standards
- For development projects
 - Pick your defined development process first (*e.g. Agile, XP, etc...*), then build your process around it



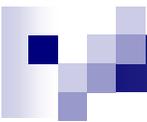
Ok... So... What
now?

Now that I have laid the foundation for some key concepts and considerations, I will explore some '**actionable**' topics



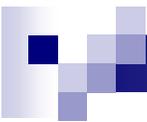
Observed process challenges

- These are observations made during my experiences during recent CMM initiatives, working with PAT and OCCB teams
 - The current organizational standard process targets larger projects and does not scale well to projects with limited resources (*e.g. people, tools, funding, etc...*)
 - This has effectively alienated niche communities of development/engineering initiatives within many organizations or places undue burden on projects that cannot support the overhead/cost of the organizations standard process
 - The current organizational standard forces project managers to either adopt a disconnected system of process artifacts/evidence using Office document formats or tailor, tailor, tailor, which is an arduous process (*pun intended*)



Potential solutions

- Define looser tenet-based definitions leaving more of the details of implementation up to individual projects
 - Provide projects with options to define technical implementations that best suite there working requirements
 - Existing work product templates would then serve as best practice examples vice de-facto mandates
- Define a tier of pre-tailored tenet-based organizational standard processes that target common projects archetypes observed across the organization (*ex. Small, Medium, Large, Distributed, etc...*)
 - Each tier is pre-tailored to acknowledge, resolve, or mitigate unique challenges/requirements faced by each project archetype
 - I would encourage the development of processes that revolve around industry standard development and engineering methodologies that more directly support desired product end-states (*ex. Agile, XP, etc...*)
- Adoption of organization level top-hat role consultants for small to medium projects



Tenets vs. Detailed Specifications

- The current organizational standard process is strictly defined and detail-oriented, many times dictating format, structure, and content
 - As a “*document*”-based model, this reinforces the implementation of disconnected, often inefficient, evidence authoring processes
 - This makes assessments easy, but comes with a high productivity cost for implementing projects
 - Pursuits to collect detailed project evidence do not necessarily better the end-product
 - Out-of-the-box tailoring options are very lengthy and the current tailoring guidelines still do not provide adequate flexibility by requiring the full implementation of current template’d content
- Tenet-based approaches would offer project managers more flexibility in implementing appropriate evidence models for their projects without dictating too many of the implementation details

ten-et n.

“An opinion, doctrine, or principle held as being true by a person or especially by an organization”

Tenets vs. Detailed Specifications (Cont)

■ Example: **Requirements**

□ Product shall use the organizational standard SRS template... (MS Word)

- Address all twelve sections per requirement...
- Conduct Peer Review in accordance with organizationally defined peer review methods (4+ people, 9+ process steps, *n* hours)
- Route and approve requirements through organizationally defined top-hat roles (4+ people, 5+ process steps, *n* hours)
- Etc...

□ A tenet-based approach would define the need to document requirements in an objective manner in a format that best suites the projects working environment, available tools, experience level, etc...

- Requirements need to be reviewed and approved by project stakeholders with evidence of reviews documented in some manner that can be viewed by the process and standards compliance teams

4 DETAILED REQUIREMENTS
In the following major subsections, 4.1 through 4.6, provide all the detailed requirements necessary for the developer to design the software. Each major subsection, 4.1 through 4.6, groups together the related detailed requirements that constitute a major capability, subject, or other entity useful for presenting related requirements. The outline of this section may be rearranged as desired to avoid repetition of requirements that apply to all or most capabilities.

4.1 Capability X
Specify all detailed requirements for Capability X in the following subparagraphs:

4.1.1 Functional Requirements
Specify the input, output, and processing requirements for Capability X.

4.1.1.1 Introduction
Describe the purpose of the functions of Capability X, including all clarifying introductory or background material.

4.1.1.2 Inputs
For all inputs to the functions of Capability X, describe the source, quantity, units, timing, format, protocol, range, and tolerance. Where applicable, describe all operator control actions. Address attributes as follows: data, values, attributes, and so on.

4.1.1.3 Outputs
For all outputs of the functions of Capability X, describe the destination, quantity, units, timing, format, protocol, range, tolerance, and error message. Address attributes as follows: data, values, attributes, and so on.

4.1.1.4 Processing
Define all operations to be performed on the input to obtain the output. Specify the requirements for (but do not design) of validity checks, response to abnormal inputs, and error codes.

4.1.1.5 Database
Specify the requirements for any database that is to be developed as part of Capability X. Such requirements may include the type of information described in 4.1.1.2, accessing capabilities, data sources and file descriptors, data and file relationships, and retention.

4.1.2 Performance Requirements
Specify the static and dynamic requirements that apply to the quantitative performance of the software related to Capability X. Such requirements may include number of transactions per second, memory utilization, number of files and records to be handled, size of file and records, and maximum length of resource capacity. Dynamic requirements may include number of transactions to be processed within certain time periods, and response times.

4.1.3 Design Constraints
Identify all other constraints on the design for Capability X that may be imposed by standards, operational environment, or other issues.

4.1.3.1 Standards Compliance
Specify the requirements for compliance with all applicable standards.

4.1.3.2 Operational Hardware and Software Limitations
Specify all requirements for operation on or with specific hardware, software, and communications devices, platforms, and configurations.

Case Study / Re-planning

See slide notes for details



- **Stated Requirement: For the Windows Version: The product should support configuration of Windows Auto-Logon settings implemented as a User Control.**

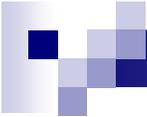
□ Required Processes (# of Activities / # of People) by work product and milestone event:

- Change Request (8/4)
- SRS (6/4)
- Requirements Peer Review (8/5)
- RTM (6/2)
- WBS/S (9/2)
- SDP (4/4)
- Plan Peer Review (8/4)
- SEWG (11/1)
- UTD (5/5)
- UTD Peer Review (8/4)
- **Write Code (1/1) [half a day]**
- Code Peer Review (8/4)
- Defects (2/2) [repeats as needed]
- UTR (3/1)

- **BUR (3/2)**
- **SITD (5/4)**
- **Test Peer Review (8/4)**
- **S/ATD (5/4)**
- **Test Peer Review (8/4)**
- **SITR (3/1)**
- **STR (3/1)**
- **ATR**
- **CM requirements vary, there are a wide range of activities not calculated in this total**

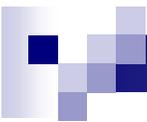
Process Start: May 15th
Process End: June 5th
Total activities: 84 [+32]
Total people interventions: 45 [+18]

\$\$\$



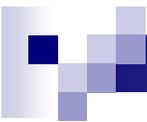
Recommended Organizational Standard Process Templates

- In order to meet the needs of different projects, business models, etc... many organizations have constructed multiple organizational standard processes
 - Each defines criteria for applicability
 - Each is scaled (*pre-tailored*) to meet the needs of the various project archetypes
 - Size
 - Small vs. Large projects based
 - Size could be a measure of personnel, funding, duration, etc...
 - Complexity of work
 - Type and number of resources
 - Business models
 - Etc...
- To facilitate this brief I will explore a three-tier approach based on project size
 - Large
 - Medium
 - Small



Organizational Standard Process Template Definition

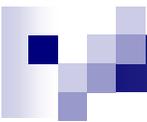
- **Large** (*Ostensibly, the current Organization Process is scoped at this level*)
 - This is the most thorough process model targeting large projects. Provides for a considerable amount of oversight and process evidence collection needed to effectively manage complex project elements and coordinate between many internal/external stakeholders/groups
 - Common attributes for this project archetype
 - 20 or more employees (*As defined by CM SEI*)
 - Long task cycles (*months, years*)
 - Long project life-spans
 - Dedicated personnel for top-hat process roles
 - Products that by-definition have product “support” beyond final acceptance
 - Heavy intra/inter-group interaction and/or coordination required
 - Deep resource pools
 - *Tools, funding, personnel, etc...*
 - Process artifacts often need to contain a high level of detail
 - These types of projects generally follow a pattern of risk avoidance vs. risk mitigation



Organizational Standard Process Template Definition

- **Small** (*Defined as a small project by SEI*)
 - This is the most streamlined process model targeting very small projects with very limited resources and fast-moving/volatile schedules
 - Common attributes for this project archetype
 - 1 to 5 employees (*e.g. Fewer employees than can cover organizationally defined project roles*)
 - Very short task cycles (*e.g. hours, days, weeks, months*)
 - Short project life-spans (*ex. IR&D, NCTA, etc...*)
 - Products that by-definition have no product “support” beyond final acceptance
 - Limited intra/inter-group interaction and/or coordination required
 - Project tasking changes rapidly
 - Extremely limited project resources (*e.g. Tools, funding, personnel, etc...*)
 - Customers commonly demand immediate! Action
 - Process artifacts require significant consolidation & streamlining and often remain in very raw forms (*e.g. XML exports, database entries, etc...*)
 - These types of projects often need to rely heavily on automated solutions due to the small staff, are not complex in nature, require very little oversight, and generally follow a pattern of risk mitigation vs. risk avoidance

Abstract Example



Organizational Standard Process Template Definition

■ Medium (*Defined as a small project by SEI*)

- This is a moderately streamlined process model targeting small projects that have a complexity or volatility that requires more oversight and/or process evidence, while at the same time dealing with limited project resources and fast-paced production schedule
 - Common attributes for this project archetype
 - 6 – 19 employees
 - Some overlap of top-hat process roles, limited overlap of classically managerial verse technical execution roles
 - Short task cycles (*weeks, months*)
 - Moderate intra/inter-group interaction and/or coordination required
 - Limited project resources
 - Tools, funding, personnel, etc...
 - Process artifacts require consolidation and streamlining
 - These types of projects often need to rely automated solutions, and generally follow a pattern of risk mitigation vs. risk avoidance

As seen from the CMMI perspective

- Anticipated PA coverage by defined project archetype
 - Can be mitigated if recommended solutions are implemented

	PP	PM C	SA M	IPM	RSKM	IT	ISM	QP M	REQM	RD	TS	PI	VER	VAL	CM	PPQA	MA	DAR	CA R
S M A L L																			
M E D . . .																			
L A R G E																			

Legend

- Targets full satisfaction of stated PAs
- Unknown or will target satisfaction of part of the stated PAs
- Not targeted

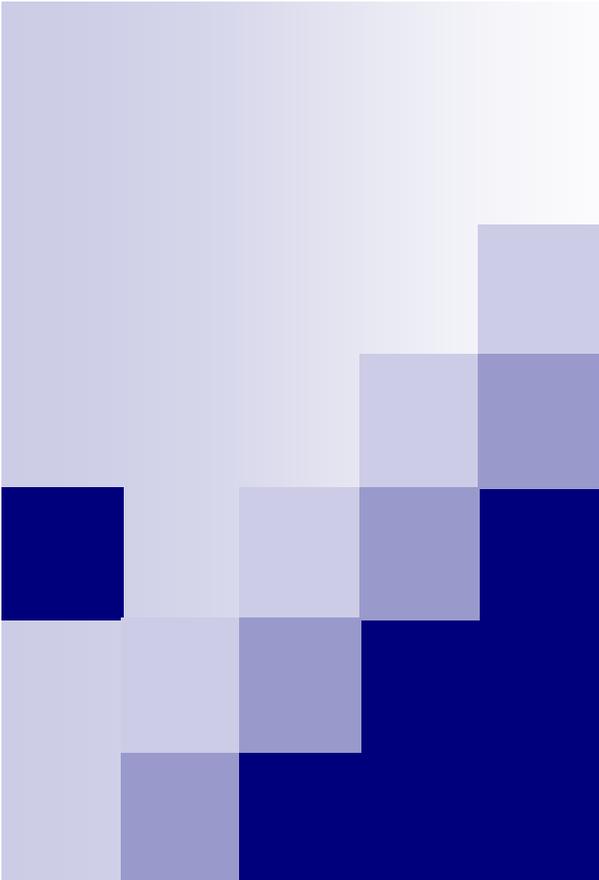
Abstract Example

Project tenet-based refinements

- The various levels give project managers pre-tailored process definitions from which to choose
 - Individual projects could further define criteria for when certain artifacts/processes may or may not be applicable, although organizational guidance in this area would be preferred

LOE	SRS	WBS	Test Docs	Design Docs	Estimates/ Actuals
< 5 days	Informal, either verbal or email	No	No	No	No
< 1 month	Yes, an abbreviated or consolidated work product is required	Yes, an abbreviated or consolidated work product is required	Yes, an abbreviated or consolidated work product is required	As required. Good comments in code may be enough	No
< 6 months	Yes	Yes	Yes	As needed	As needed
> 6 months	Yes	Yes	Yes	Yes	Yes
Maintenance	As needed	As needed	As needed. Yes, for major releases.	As needed	As needed

Abstract Example

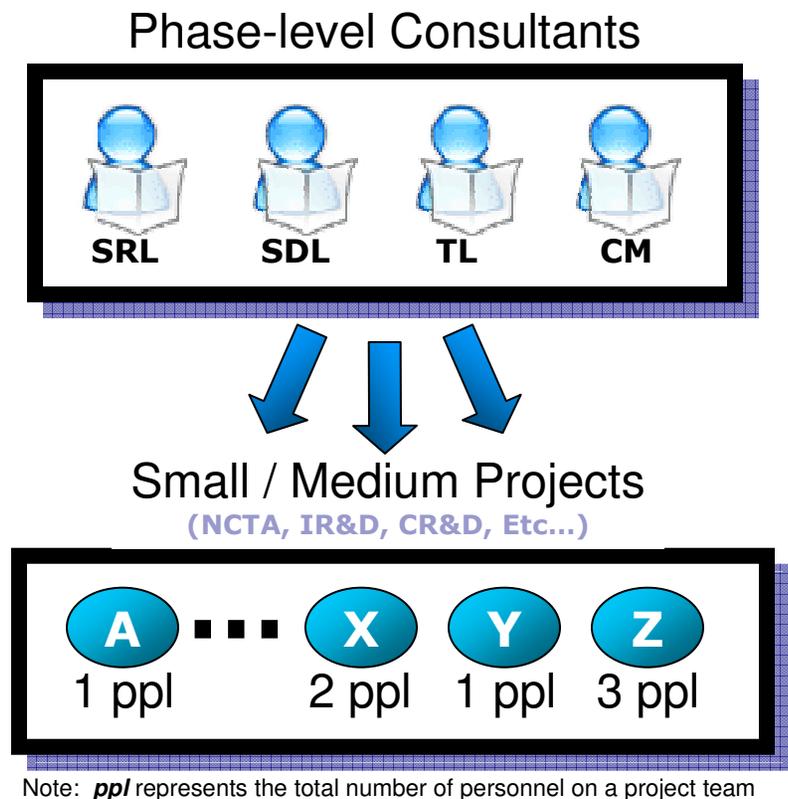


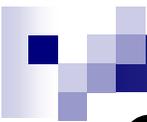
A few extra notes

Here are some expanded notes
on things identified earlier in the
brief

Proposed top-hat role consultation

- Organizationally funded/staffed phase-level experts which provide tenet-based oversight across multiple small/medium sized projects
 - Operate as a consultant rather than a project manager
 - Support cross-project awareness and communication
 - Helps facilitate assessment processes
 - Also provides Standards Compliance review for expert area
 - Organizations primary agent for identifying
 - Technology leveraging and product synergy opportunities
 - Tool support needs
 - Areas needing more training (*technology and/or process related*)
 - Facilitates wider adoption of organizational processes to projects that would not otherwise be able to adopt due to lack of resources



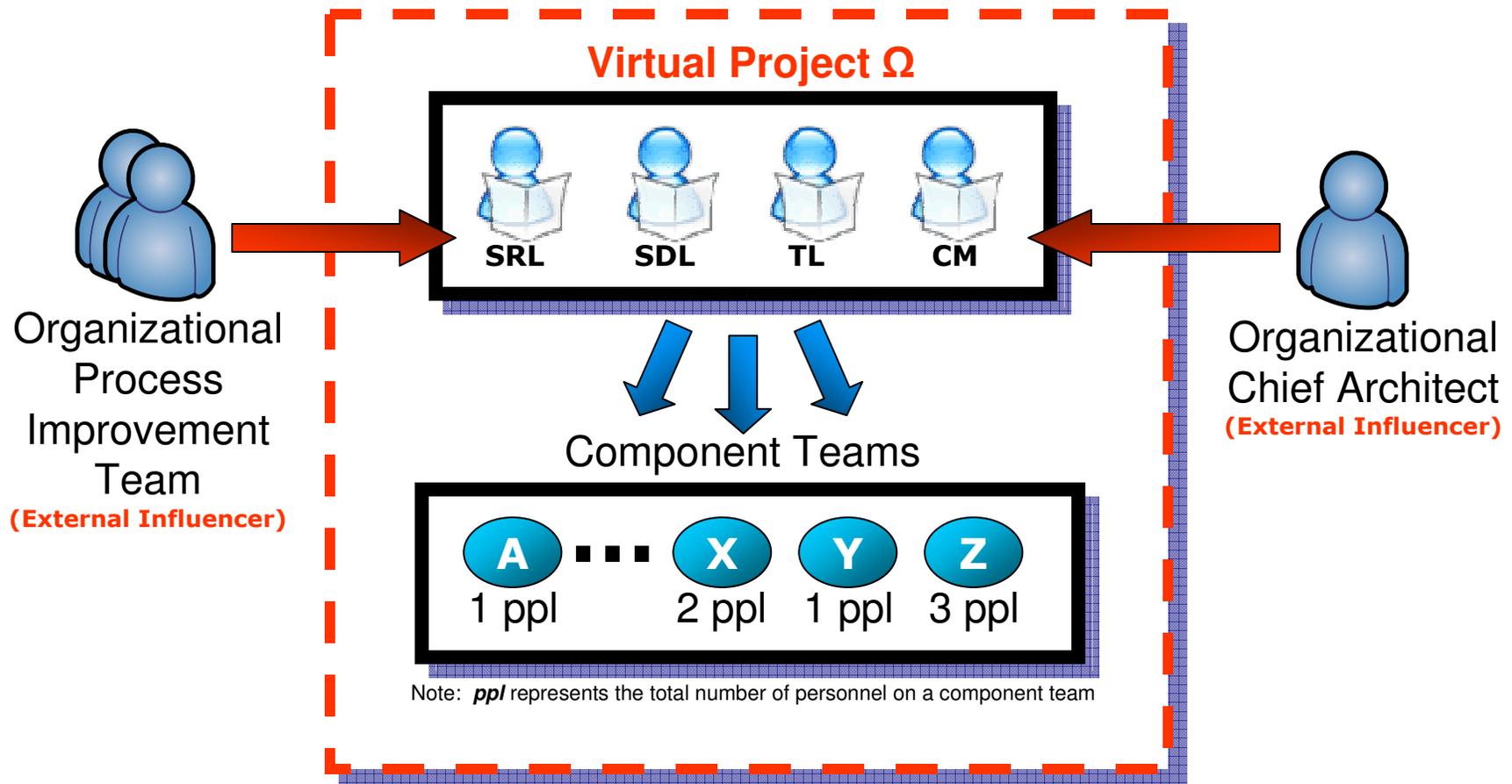


Consultation???

- The success of the initial implementation of role consultation is predicated on the adoption of a looser tenet-based Organizational Standard Process Definition
 - Consultants are not intended to facilitate alignment of small projects to large project processes, rather, they are there to ensure that key aspects of the software development lifecycles are not sacrificed solely due to lack of resources
- The consultants provide each project both advice/guidance and real hands-on assistance in their niche area
 - The consultants work in a manner defined by the project manager/sponsor and are NOT there to back people into processMax or any other single tool or approach
 - Given the breadth of their experiences gained working across multiple projects they are encouraged to share ideas and provide advice to project managers
 - Over time, common threads will likely become clear and these consultants will be able to advise the organization on where investments would provide the most assistance
- Consultants represent a pair of free-hands and a fresh perspective for project managers
- Consultants work both as a consultant team and independently
 - Ex. Designers and testers must be aware of requirements, etc...

Not really a big departure

- This approach is not as radical as it appears on the surface. Think of this as a virtual project with components that; at the outset; do not need to interoperate

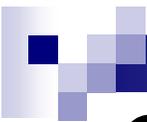




Chief Architect???

- If small projects are to be truly successful in the future there has to be more focus on building working and product synergy within the organization and its products
- Someone needs to identify a vision both conceptually and technically
- Someone needs to foster cross-project collaboration
- Someone who understands the value of having a solid architecture and looks great
- Someone who embraces concepts such as human systems design, multi-presence approaches, and understands the value component and product interconnectivity and reuse
- Someone who is VERY technical and someone who can evangelize technical evolution and technology adoption across the organization
- This person needs to help get those professional endorphins flowing
- I believe this is something that has been missing for a long time

As a side note: **This person should never be distracted by administrative or funding related matters. That is a pitfall that many *lead* positions fall into. This must be a position that is totally focused on product evolution and development, which other management and BD teams can turn into money. I am not saying that administrative and funding issues are not important, rather, I am suggesting I need to limit the non-technical distractions for this position**



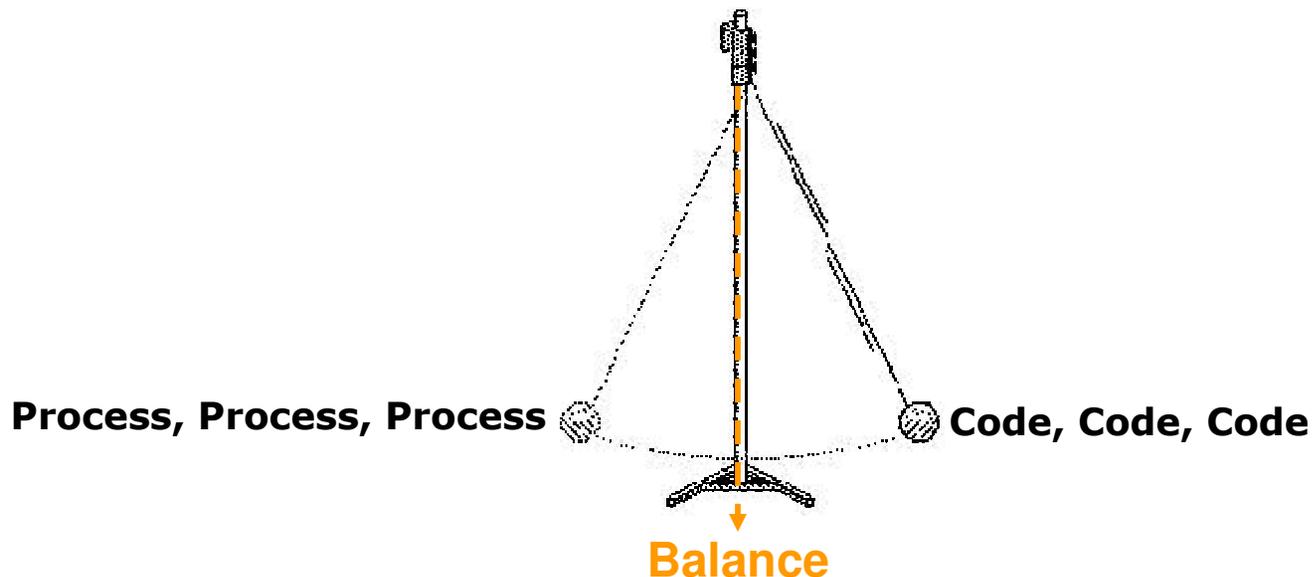
Characteristics of a consultant

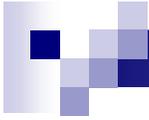
- The organization should try facilitate a role that can operate within the following boundaries
 - Identify personnel that are both technically adept and have a talent/passion for the role they support. Teams need to see the consultants as credible
 - While the consultants would also provide some StC oversight, they are only doing so from the tenet approach. It is important that they are observed as an empowerment agent (project/component team member) and not process police
 - The consultants should have at least one small development assignment a year that they; as a group; produce to demonstrate best practices, patterns, new approaches, new tools, etc... This also keeps them close to the technology they need to support
 - Model Driven Architecture in action
 - User-centered design approaches
 - Test Driven Development (TDD) approaches
 - Automated Test facilitation
 - Automated product compilation and integration
 - SDK-focused component development
 - Etc...

Note: Everyone has had enough crammed down their throat (Some may be perception, but it still feels real to them), I want to get projects to adopt things... at least in part... because they can see the value...

Characteristics of a consultant (Cont)

- These folks need to speak to the selfish nature of developers and engineers who want to write code, see results, and NOT do a lot of paperwork or be mired in ostensibly useless processes
 - To that end, the consultants should cheerlead approaches that speak to this attitude while remaining true to the tenets of the organizations process definition
- Everyone has been forced to be process focused... so much so that I are no longer giving the technical areas the attention they deserve. This team will help balance this universe which will likely help with process adoption curves for new projects.





Questions?

Joe Smelser
joe@smelser.net