



**CMMI for Services (CMMI-SVC)  
Cost-Effective Approaches to Early Use**

Presentation for DC/MD ASQ Software SIG, SSQ, and IEEE CS  
May 13 2009

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- Part I: Provide an overview of the CMMI-SVC and rationale for its use
- Part II: Discuss a case study on potential application to services provided by the U.S. Army Communications Electronics Command (CECOM) Life Cycle Management Center (LCMC) Software Engineering Center
- Part III: Describe approaches to using the CMMI-SVC and provide cost-effective approaches to getting a “quick win” from use of the CMMI-SVC

## Acknowledgements:

- This presentation includes data, wording, and ideas contributed by
  - Participants in the SEI CMMI-SVC Workshop 6-7 August 2008, including U.S. Army CECOM LCMC SEC personnel Jerry Kastning, Patti Watkins, Nancy Lee Kelly
  - Members of the CMMI-SVC team, including Craig Hollenbach and Brandon Buteau of Northrop Grumman and Eileen Forrester of the SEI
- The views presented herein are those of the speaker, are not intended to reflect the official views of the DOD or any component thereof, and to the extent they do so, do so only by happenstance.

# Part I: Overview and Rationale for CMMI-SVC

## ... Purpose, stakeholders, & history

- Purpose
  - To extend the CMMI framework to cover the provision of services
- Key stakeholders
  - CMMI Steering Group (SG), DoD, NDIA, Systems Engineering Division, industry, SEI, SEI partners
- Project history
  - In 2004, SG accepted a Northrop Grumman proposal to sponsor a Services CMMI; team began work in August 2005.
  - In September 2006, the team produced a full review draft. SG asked the team to suspend work while the CMMI-ACQ was developing.
  - In January 2007, the SG allowed the team to seek expert review of the draft.
  - In April 2007, the SG asked the team to stop work on the resulting CRs.
  - In February 2008, the team was given authority to proceed again.
  - CMMI-SVC was released early 26 Feb 2009

# Why is the CMMI-SVC needed?

- A variety of potential stakeholders approached the SEI asking for help with services. Demand for process improvement in services is likely to grow: services constitute more than 80% of the US and global economy.
- Services constitute more than 54% of what the DoD acquires. In FY2006, DoD spent \$146 billion on services. GAO reports a 72% increase in DoD service contracts between 1996 and 2005.\*
- Many organizations are cobbling together their own ITIL + CMMI solutions, reinventing the wheel over and over, and that wheel is not designed for services other than IT.
- Customers are requesting that their service providers demonstrate a CMMI rating or capability profile, but attempts to use CMMI-DEV in a service setting can distort the integrity of appraisal results.
- Service providers deserve a consistent benchmark as a basis for process improvement that is appropriate to the work they do and is based on a proven approach.

\* FY 2006 data is from "DoD throws light on how it buys services [GCN 2006]." GAO data is from GAO report GAO-07-20.

# How are services different?

Services form a distinct category of products:

- A service is an intangible, non-storable product.
- What makes a service intangible or non-storable?
  - Customer desires a situation or state (e.g., to have high network availability) rather than a tangible artifact
  - Product delivery may require a continuing application of labor (e.g., operation of a facility)

Services imply customer-provider relationships governed by service agreements:

- Service and goods may be delivered as part of a single agreement (e.g., training that includes hardcopy materials).

Services are delivered through the operation of a service system.

- Service System encompasses everything required for service delivery, including work products, processes, facilities, tools, consumables, and human resources.

Services have a different lifecycle and business rhythm than development.

- Portions may not be delivered to the customer/end-user as part of service delivery.
- Portions may remain owned by the customer or end-user or another provider before service delivery begins and after service delivery ends.

# How can services differ from one another?

Services can exhibit great variability regarding:

- Services requested (both number and type)
- Incidents encountered
- Resources needed (e.g., for a single request or over time)
- Disruptions encountered (e.g., discontinuities, including upgrades)
- Quality of the services provided

Mature service providers use a common service management approach that support their various services:

- Service levels and service level agreements
- Catalogs of standard services and service levels
- Disciplined service system development and deployment

# Service System Definitions



A **service system** is an integrated and interdependent combination of service system components that satisfies stakeholder requirements.

A service system **component** is a process, work product, provider resource, supplier resource, or customer resource required for the service provider to deliver services. Service system components may include things owned by the customer.

A service system **consumable** is a component usable by the service provider that ceases to be available or becomes permanently changed by its use during the delivery of a service.

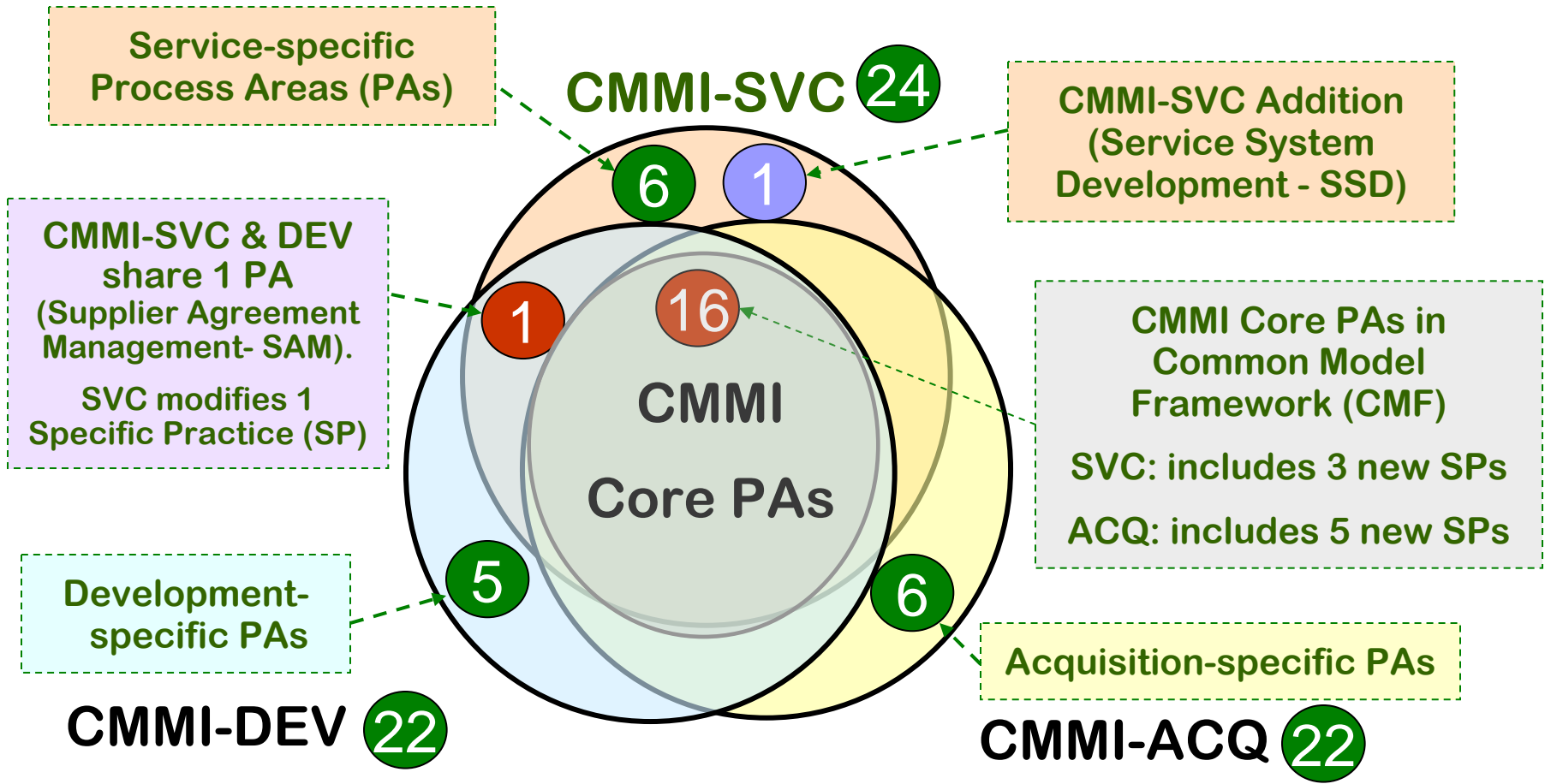
The **people** who perform tasks as part of the service system, including provider staff and end users, enable the system to operate and thereby deliver services.



# CMMI-DEV, CMMI-SVC, CMMI-ACQ

... the big picture

**CMMI-SVC = 16 CMF PAs + 6 + 1 PA Addition + 1 shared PA**



**CMMI-DEV: 16 CMF PAs + 5 + 1 shared**

**CMMI-ACQ: 16 CMF PAs + 6**

## Process Management

- Organizational Innovation and Deployment (OID)
- Organizational Process Definition (OPD)
- Organizational Process Focus (OPF)
- Organizational Process Performance (OPP)
- Organizational Training (OT)

## Service Support

- Causal Analysis and Resolution (CAR)
- Configuration Management (CM)
- Decision Analysis and Resolution (DAR)
- Measurement and Analysis (MA)
- Process and Product Quality Assurance (PPQA)
- ❖ Note: REQM is moved to Project Management

## *Service Establishment and Delivery*

- *Incident Resolution and Prevention (IRP)*
- *Service Delivery (SD)*
- *Service System Development (SSD)*
- *Service System Transition (SST)*
- *Strategic Service Management (STSM)*

## Project Management

- *Capacity and Availability Management (CAM)*
- Integrated Project Management (IPM)
- Project Monitoring and Control (PMC)
- Project Planning (PP)
- ❖ Requirements Management (REQM)
- Risk Management (RSKM)
- Quantitative Project Management (QPM)
- Supplier Agreement Management (SAM)
- *Service Continuity (SCON)*

Deliver services in accordance with service agreements

- SG1: Establish Service Agreements
  - SP1.1: Analyze Existing Agreements and Service Data
  - SP1.2: Establish the Service Agreement
- SG2: Prepare for Service Delivery
  - SP2.1: Establish the Service Delivery Approach
  - SP2.2: Prepare for Service system Operations
  - SP2.3: Establish a Request Management System
- SG3: Deliver Services
  - SP3.1: Receive and Process Service Requests
  - SP3.2: Operate the Service System
  - SP3.3: Maintain the Service System

Ensure effective service system performance and ensure that resources are provided and used effectively to support service requirements

- SG1: Prepare for Capacity and Availability Management
  - SP1.1: Establish a Capacity and Availability Management Strategy
  - SP1.2: Select Measures and Analytic Techniques
  - SP1.3: Establish Service System Representations
- SG2: Monitor and Analyze Capacity and Availability
  - SP2.1: Monitor and Analyze Capacity
  - SP2.2: Monitor and Analyze Availability
  - SP2.3: Report Capacity and Availability Management Data

# Incident Resolution and Prevention (IRP)

## SVC Establishment & Delivery (ML3)

Ensure timely and effective resolution of service incidents and prevention of service incidents as appropriate

- SG1: Prepare for Incident Resolution and Prevention
  - SP1.1: Establish an Approach to Incident Resolution and Prevention
  - SP1.2: Establish an Incident Management System
- SG2: Identify, Control, and Address Incidents
  - SP2.1: Identify and Record Incidents
  - SP2.2: Analyze Incident Data
  - SP2.3: Apply Workarounds to Selected Incidents
  - SP2.4: Address Underlying Causes of Incidents
  - SP2.5: Monitor the Status of Incidents to Closure
  - SP2.6: Communicate the Status of Incidents
- SG3: Define Approaches to Address Selected Incidents
  - SP3.1: Analyze Selected Incident Data
  - SP3.2: Plan Actions to Address Underlying Causes of Selected Incidents
  - SP3.3: Establish Workarounds for Selected Incidents

Note: “Incident” has variety of definitions in different contexts

Establish and maintain plans to ensure continuity of services during and following any significant disruption of normal operations

- SG1: Identify Essential Service Dependencies
  - SP1.1: Identify and Prioritize Essential Functions
  - SP1.2: Identify and Prioritize Essential Resources
  - SP1.3: Identify Internal and External Dependencies
- SG2: Prepare for Service Continuity
  - SP2.1: Establish Service Continuity Plans
  - SP2.2: Establish Service Continuity Training
  - SP2.3: Provide and Evaluate Service Continuity Training
- SG3: Verify and Validate the Service Continuity Plan
  - SP3.1: Prepare for the Verification and Validation of the Service Continuity Plan
  - SP3.2: Verify and Validate the Service Continuity Plan
  - SP3.3: Analyze Results of Verification and Validation

Note: Not for “normal incidents” but significant disruptions

# Service System Transition (SST)

## SVC Establishment & Delivery (ML3)

Deploy new or significantly changed service system components while managing their effect on ongoing service delivery

- SG1: Prepare for the Service System Transition
  - SP1.1: Analyze Service System Transition Needs
  - SP1.2: Develop Service System Transition Plans
  - SP1.3: Prepare Stakeholders for Changes
- SG2: Deploy the Service System
  - SP2.1: Deploy Service System Components
  - SP2.2: Assess and Control the Impacts of the Transition

### Notes:

- Can include deploying something new, replacing something, or retiring
- People (end users and others) are part of the service system and must be accounted for in a transition

Establish and maintain standard services in concert with strategic plans and needs

- SG1: Establish Strategic Needs and Plans for Standard Services
  - SP1.1: Gather and Analyze Relevant Data
  - SP 1.2 Establish Plans for Standard Services
- SG2: Establish Standard Services
  - SP2.1: Establish Properties of Standard Services and Service Levels
  - SP2.2: Establish Descriptions of Standard Services

### Notes:

- Service catalog is common term, but not only option
- Outcome is the collection of standard services, including service levels
- Internal and external audiences are important
- Still considering how much service improvement to include here

# Service System Development (SSD) Addition

## SVC Establishment & Delivery (ML3)

Analyze, design, develop, integrate, verify, & validate service systems, including service system components to satisfy existing or anticipated service agreements

- SG1: Develop & Analyze Stakeholder Requirements
  - SP1.1: Develop Stakeholder Requirements
  - SP1.2: Develop Service System Requirements
  - SP1.3: Analyze and Validate Requirements
- SG2: Develop Service Systems
  - SP2.1: Select Service System Solutions
  - SP2.2: Develop the Design
  - SP2.3: Ensure Interface Compatibility
  - SP2.4: Implement the Service System Design
  - SP2.5: Integrate Service System Components
- SG3: Verify and Validate Service Systems
  - SP3.1: Prepare for Verification and Validation
  - SP3.2: Perform Peer Reviews
  - SP3.3: Verify the Service System Components
  - SP3.4: Validate the Service System

### Notes:

- System components include people and consumables
- Engineering PAs in CMMI-DEV are recommended for improving the product development process, large complex systems, and those familiar with CMMI-DEV.
- Using SSD may be preferred by service provider organizations that are new to the CMMI Framework—especially those with simple services.
- Organizations that use the CMMI-DEV for service system development may refer to SSD for guidance on applying development practices to service system parts like people, processes, and consumables.

# What's Different in the Common Model Framework?

- IPM: - Adds SP "Establish Integrated Teams". Removes IPPD additions.
  - Provides definition of project: " a group of people & resources committed to planning, monitoring, & executing defined processes in a shared endeavor to achieve a set of objectives derived from the goals of the business & (current or future) customers. Obtaining business value from the practices in this & related PAs requires ... correctly identifying which endeavors are 'projects.' "
- OPD: Adds SP "Establish Rules and Guidelines for Integrated Teams"
- OPF: In SG2, "process improvements" is replaced with "process actions". In SG3, "lessons learned" is replaced with "experiences"
- PP: Adds interpretations for a service provider organization and adds SP "Establish the Project Strategy"
- PMC: Adds interpretations for a service provider organization

Material summarized from [www.sei.cmu.edu/cmami/models/SVC-v12-comparetoDEV.html](http://www.sei.cmu.edu/cmami/models/SVC-v12-comparetoDEV.html)

## What's Different in the CMF? -2

- REQM: Adds notes about the service agreement relation to requirements and to interpret the concept of bi-directional traceability.
- SAM: - Adds interpretation for service providers.
  - Deemphasizes formal agreements with the supplier vs. agreements.
  - Rewords 2 SPs to remove “custom-made products” and ensure transition of products “as appropriate”
- PPQA: Wording of goals and practices and informative material is changed to use Work Products (WPs), instead of “WPs and services”
- CAR: Focuses on defects and problems

- Background:
  - Northrop Grumman supports SEC's current Process Improvement project
  - SEC and Northrop personnel participated in Aug'08 SEI CMMI-SVC Workshop
  - Northrop Grumman conducted a Case Study of potential application of the CMMI-SVC to Defense Systems and SEC services in August-Sept 2008
- Services considered:
  - Matrix support ("staff augmentation") and consulting services
  - Infrastructure, network services, and data management
  - Test services
  - Field Support
  - Sustainment Services

# SEC Products and Services Span Battlespace & Business Information Systems Mission Areas

## **PRODUCTS**

- Producing and Releasing New Software
- Developing Custom Web Sites
- Developing Training Products for Software
- Producing Technical Documentation for Software and Systems
- Producing Technical Data for Software and Systems

## **SERVICES**

- Helping Other Organizations Acquire Software Products through Matrix Support
- Making Software Work Where it is Being Used, or Field Support
- Providing Software and Systems Testing
- Providing Training Services for Software
- Maintaining a Library for Storage, Retrieval, and Configuration Management of Software and Software Documentation
- Copying, Distributing, and Installing Software
- Designing and Managing Hosted Web Applications
- Providing Software and System-Related Consultative Services
- Providing Software and System Quality-Related Services
- Providing Management Services for Other Organizations
- Serving on System and System-Related Working Groups and Boards
- Providing Computing Resources
- Managing Technical Data for Software and Systems
- Performing Causal and Risk Analysis
- Software Assurance Enterprise Service

Source: Public information web page [http://www.sec.army.mil/secweb/prods\\_servs/prods\\_servs.html](http://www.sec.army.mil/secweb/prods_servs/prods_servs.html)








# Key Concerns for Defense Systems

## Characteristics of Defense Systems:

- Life and mission-critical services (Field support, information assurance, interoperability test, data management, technical consulting and oversight)
- Large scale systems, massive amounts of data, complex logistics
- Changing requirements, technologies and threats
- Limited resources and funding

## Needs:

### CMMI-SVC Unique Process Areas

- |   |   |
|---|---|
| <p><b>Service Delivery</b> </p>                        | <ul style="list-style-type: none"> <li>• Reliable delivery of services, per service agreements                     <ul style="list-style-type: none"> <li>– Service delivery approach for steady-state or volatile workload</li> <li>– Service requests managed/prioritized to meet customer needs</li> </ul> </li> </ul> |
| <p><b>Incident Resolution and Prevention</b> </p>      | <ul style="list-style-type: none"> <li>• Prompt, effective response and prevent future incidents</li> </ul>   |
| <p><b>Capacity &amp; Availability Management</b> </p> | <ul style="list-style-type: none"> <li>• Effective provision of human, electronic, and consumable resources, based on planning and monitoring capacity</li> </ul>   |
| <p><b>Service System Development</b> </p>            | <ul style="list-style-type: none"> <li>• Development of software and tools to satisfy service needs</li> </ul>  |
| <p><b>Strategic Service Management</b> </p>          | <ul style="list-style-type: none"> <li>• Establishment and management of services in concert with strategic plans and needs</li> </ul>  |
| <p><b>Service System Transition</b> </p>             | <ul style="list-style-type: none"> <li>• Seamless transition of new and revised service systems</li> </ul>  |
| <p><b>Service Continuity</b> </p>                    | <ul style="list-style-type: none"> <li>• Continuity of service and operations</li> </ul>  |

- Matrix support (“staff augmentation”) and consulting services
  - CMMI-DEV: Staff participates in project activities under customer process
  - CMMI-SVC:
    - Ensure staff skills/training for anticipated and actual tasking
    - Manage performance; seek opportunities to expand and improve services
- Infrastructure, network services, and data management
  - CMMI-DEV: Use for development of complex systems
  - CMMI-SVC:
    - Use Service System Development (SSD) for developing new or revised software and tools where service provider continues to own and operate the system and provide the services
    - Establish Service Level Agreement and deliver service to meet it
    - Establish Help Desk and tracking capability to ensure effective prioritization and response to incidents and defects, and to address underlying causes
    - Ensure services needs are met without interruption
    - Plan system upgrades and migration

- Test services
  - CMMI-DEV:
    - Use VER & VAL to plan, develop procedures\*, and perform testing appropriate to system characteristics and type of testing (e.g., routine or custom environment, reuse/COTS, integration or system test, operational exercise, acceptance test)
      - Plan early involvement, review requirements, and develop test plans and procedures
      - Conduct stakeholder reviews and Peer Reviews of test plans
      - Conduct formal or informal Peer Reviews of test procedures
  - \* For development of test tools or simulation software, use full CMMI-DEV
  - CMMI-SVC:
    - Ensure test facilities are available when needed
    - Ensure test services are provided per service level agreements
    - Manage performance; seek opportunities to expand and improve services

- Field Support:
  - CMMI-SVC (CMMI-DEV Not Applicable)
    - Ensure prompt incident handling; confirm problem, identify underlying causes, and provide work-around; work with sustainment services providers to prevent future incidents
    - Ensure readiness, plan and manage logistics,
    - Use Lessons Learned and measures to improve services
- Sustainment Services:
  - CMMI-DEV: Use all PAs and treat sustainment as continued evolution
    - Participate in reviews during development, if possible, or review delivered materials as preparation for sustainment
  - CMMI-SVC:
    - Ensure change requests are prioritized & tracked to closure
    - Plan and monitor provision of resources, ensure timely resolution of problems, prevent future incidents
    - Ensure smooth transition of new and revised systems



**Traditional**

- Adopt CMMI-SVC for projects and activities
  - Define processes based on CMMI-SVC, prepare for CMMI-SVC SCAMPI
- Use CMMI-SVC to perform gap analysis
  - Identify needed activities, plans, processes, facilities, competencies/skills



**Quick Wins**

1. Use Strategic Service Management PA to establish and support a holistic view of strategic services
  - Develop and manage services in concert with strategic plans & needs
  - Establish meaningful measures to monitor and improve services
2. Selective application
3. Focus on “points of pain” where CMMI-SVC can help address problems, improve service, or reduce risk
  - Implement “critical few” value-added processes
4. Augment your CMMI-DEV process with CMMI-SVC PAs
5. Use CMMI-SVC changes to PAs in the Common Model Framework (CMF) to provide service-oriented tailoring of CMMI-DEV process
6. Use elements of CMMI-SVC in Lean Six Sigma projects

## Strategic Planning & Service Management

- Support Executive planning (CIO, CTO, CFO)
- Take a strategic, holistic view of individual services and all services.
  - Develop a services catalog
  - Establish standard services and service levels
  - Address long-term customer satisfaction
- Leverage existing processes from CMMI-DEV Process Improvement
  - Use organization's process where it adds value for consulting services.
- Use the guidance in the CMMI-SVC (service-specific PAs and CMF)
  - Describe critical attributes of each service, such as features and benefits, available service levels and categories, current and intended users
  - Describe service levels in terms of provider and user responsibilities, availability, response times, key metrics, etc.

- Identify services you perform currently and potential future services
  - Examples: lab facilities, database, supply chain, financial reports, health care, career path planning, education/training, consulting services, etc.
- Identify characteristics of those services
  - Examples: time-sensitive, resource-intensive/constrained, etc.
- Identify needs
  - Where could improvements (in time, service, etc.) benefit business needs?
  - Where could cost savings be realized?
  - Sources: Gap analysis, Lessons Learned/Experiences, customer satisfaction results, measurements, QA findings, benchmarks
- Identify organizational goals
  - Examples: Business advantage, maintain/grow business, maintain services with fewer resources, enhance operational effectiveness, streamline
  - Obtain management agreement on goals and priorities

# Quick Win 3:

## Focus on “Points of Pain” that Service PAs Address

What risks do the services PA mitigate?

... What benefits do the Services PA provide?

*Approach: Highlight pain issues, risk concerns and benefits.  
Ask questions that stimulate appropriate thought.*

- Capacity and Availability Management (CAM):
  - Are you confident you have capacity to deliver on commitments you made?
  - Are you confident that you have the resources needed to deliver the services to which you are making a commitment?
  - How do you know when you are in trouble? What information do you have about your baseline, status, and needs to make informed decisions? Do you have capacity and availability measures? What analytic techniques do you use?
- Service Delivery (SD):
  - Are your requirements stated/articulated clearly?
  - Are services delivered in accordance with service agreements?
  - Are you planning for and managing Service Requests?
  - Do you have logistics under control, e.g., travel arrangements, training, equipment, materials, clearances, approvals, licenses?

- Incident Resolution & Prevention (IRP):
  - Have service incidents significantly impacted your business?
    - Are you in control of your service related incidents?
    - Do you have processes/procedures to smoothly address and rectify incidents?
    - Are you addressing the root cause in incidents?
  - Do you have poor customer satisfaction?
    - Do you understand the impact that incidents have on the organization?
    - How do you handle incidents that disrupt your business?
    - Do you have a process for smoothly handling incidents? How many complaints are you getting? Are you experiencing the same problems repetitively? Are you reducing the numbers of incidents you are getting?
- Service Continuity (SCON):
  - Do you know your service risks?
  - Are you sure that you can support the business if the computer facility should be inaccessible to operational staff?

- Service System Development (SSD): An alternate to the CMMI-DEV for development of systems that the service provider will utilize to provide services.
  - Are you confident that your services activities are performing as needed?
  - Is the process of getting what you need managed well?
- Strategic Services Management (STSM):
  - Are your services growing? Is your customer base growing? In what direction is the market place going?
  - Do you have a services strategic plan? Are you looking long term? Do you know what value the service is delivering? “Value is a negotiated convention”. Are you keeping up with your service business needs?
- Service System transition (SST):
  - Are you aware of the receivers’ environmental issues, integration issues, business cycles, and training needs?
  - Are you testing your service before delivery to minimize transition impacts?
  - Are you simulating delivered services appropriately?

4-Augment your process, 5-Use CMF PA changes, 6-Lean Six Sigma

4. Augment your CMMI-DEV-based process with CMMI-SVC PAs
  - Define (with the customer) and gain agreement on specific services and their levels of performance (SD)
  - Define the system needed to provide those services and transition it into use (SSD, SST)
  - Determine and monitor the resources necessary to meet the service agreement (CAM)
  - Address failure modes of the specific services (IRP)
  - Plan how to address potential major breaks in service (SCON)
  - Define standard types of services to use in various situations (STSM), e.g., different contract types, business domains, quality objectives
5. Use CMMI-SVC changes to PAs in the Common Model Framework (CMF) to provide service-oriented tailoring of CMMI-DEV process
6. Use elements of CMMI-SVC in Lean Six Sigma projects

# Q & A

For more information:

<http://www.sei.cmu.edu/cmml/models/CMMI-Service-status.html>

***NORTHROP GRUMMAN***

**DEFINING THE FUTURE**