CMMI® for Services: Where "Build Stuff" Happens

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Topics

- Combined approaches
- CMMI-SVC and CMMI-DEV
- Engineering services
- CMMI-SVC and systems of systems

Putting All the Pieces Together

CMMI-SVC is a Perfect Fit

The CMMI Models

The CMMI Product Suite currently has three models relevant to improvement in a particular area of interest.

Development (CMMI-DEV)

- build stuff
- tangible, storable products made to specification in a lifecycle

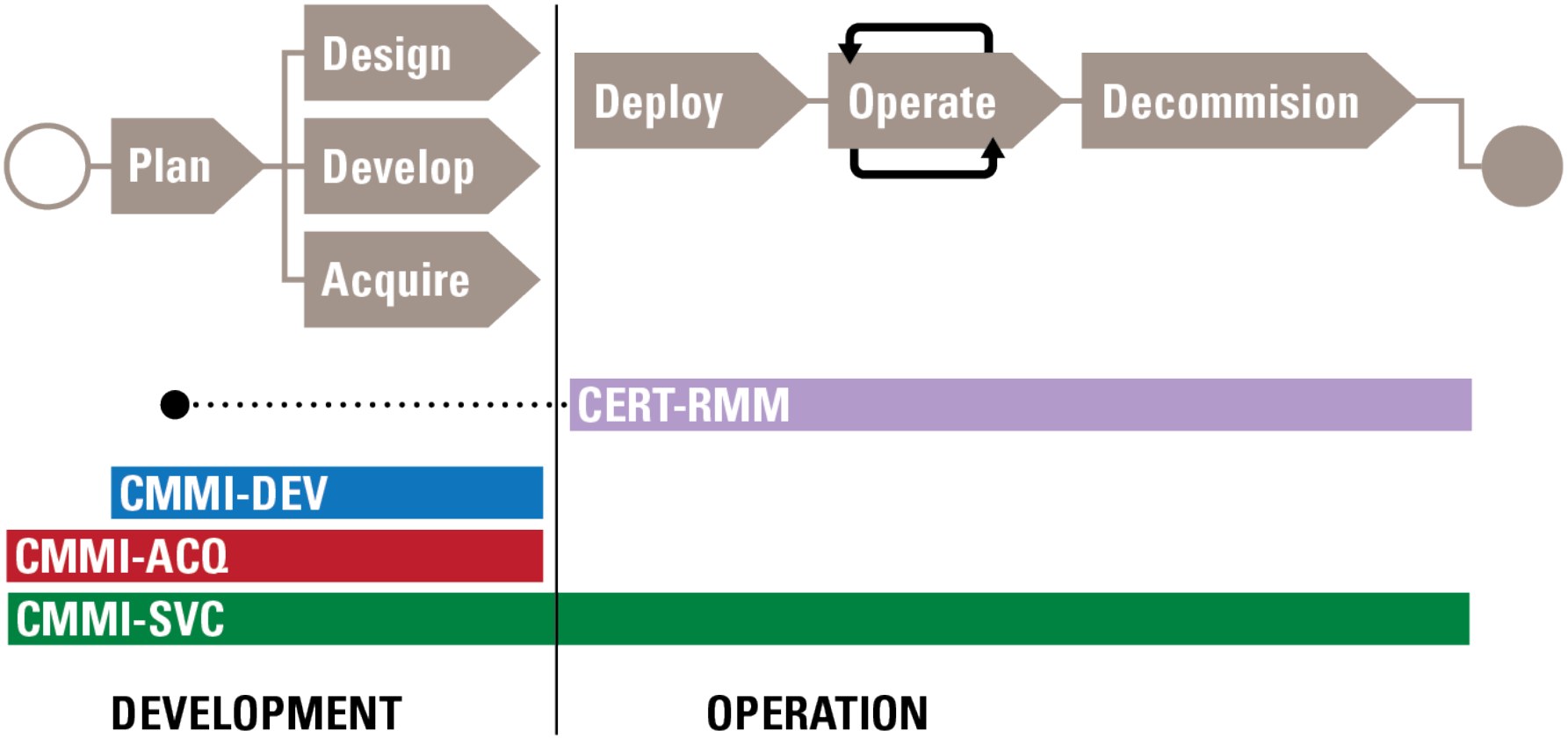
Acquisition (CMMI-ACQ)

- buy stuff
- specify, solicit, select, contract, procure, accept, transition to consumer

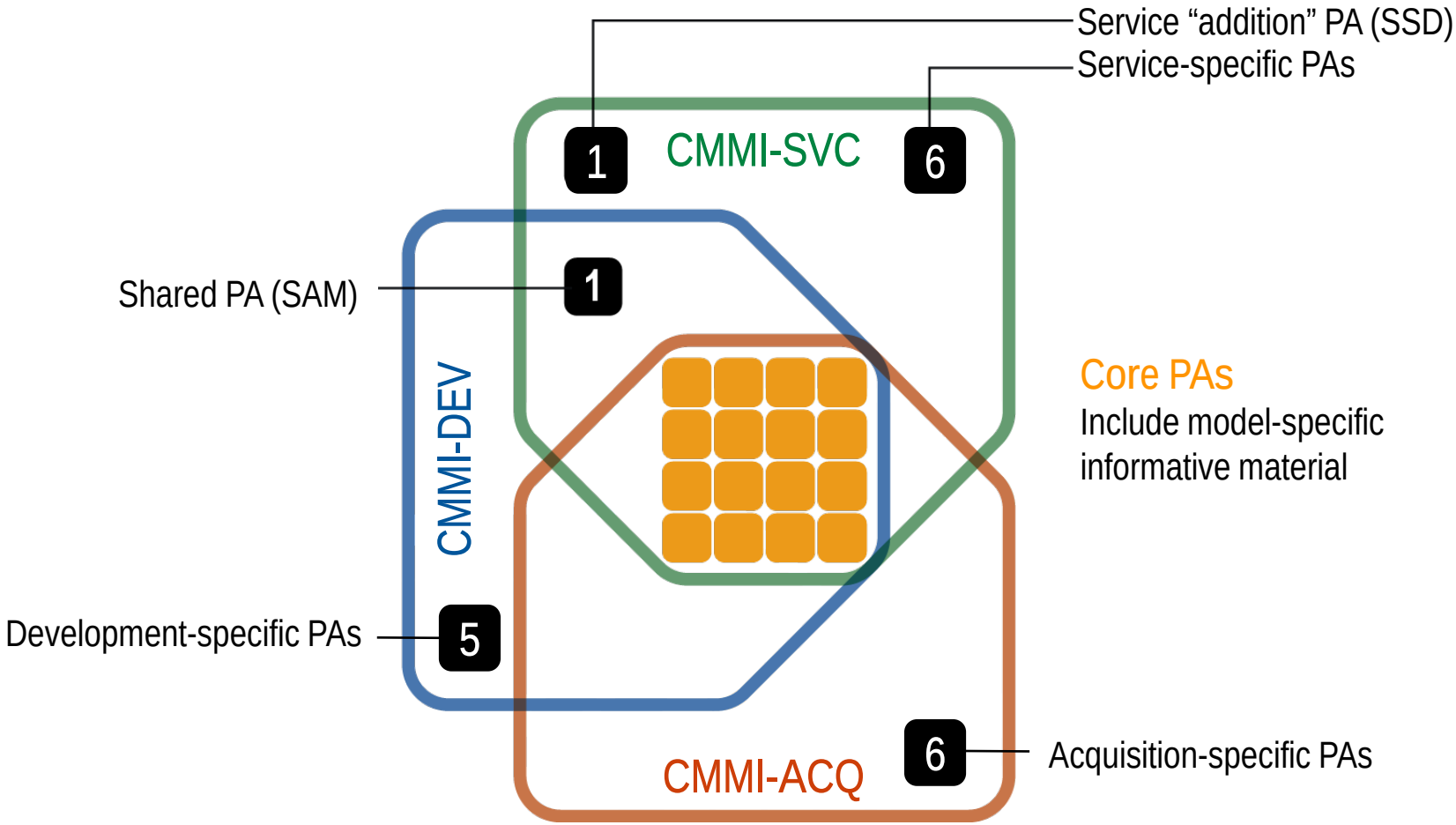
Services (CMMI-SVC)

- do stuff
- intangible, non-storable products delivered via a service system based on explicit or implicit service requests

RMM & CMMI in the life cycle



Relationships Among CMMI Models

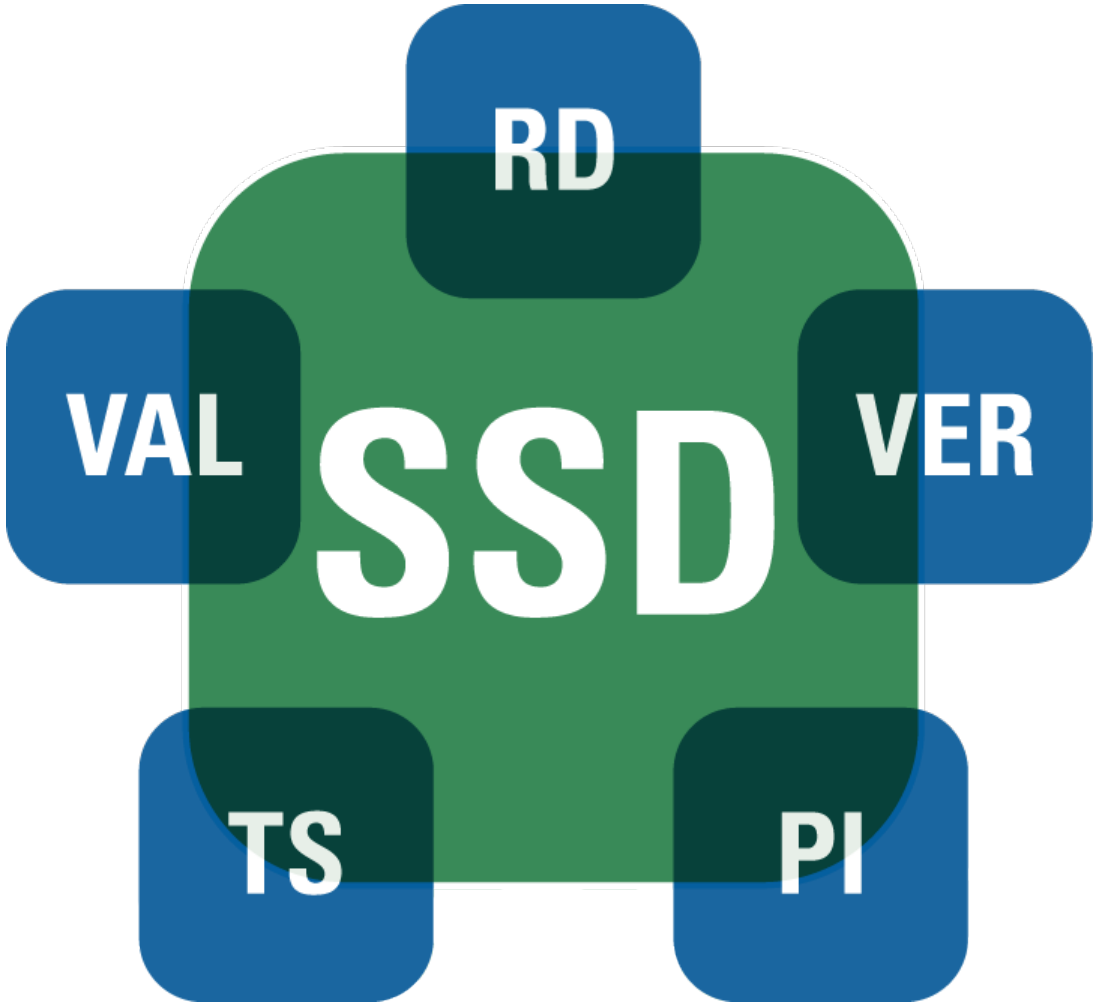


What about Software?

"CEOs don't buy software anymore…they buy service level agreements"

– George Fischer, EVP and Group Executive for CA Technologies, Speaking at NASSCOM and SEPG AP

SSD "Summarizes" CMMI-DEV Engineering PAs



SSD vs. CMMI-DEV Engineering PAs 1 of 4

In SSD (SVC)	In Engineering (DEV)	
SG1 Stakeholder needs, expectations, constraints, and interfaces are collected, analyzed, and transformed into validated service system requirements.	**RD – Requirements Development**	
SP1.1 Collect and transform stakeholder needs, expectations, constraints, and interfaces into prioritized stakeholder requirements.	**RD SG 1** Stakeholder needs, expectations, constraints, and interfaces are collected and translated into customer requirements.	**SP 1.1** Elicit Needs **SP 1.2** Transform Stakeholder Needs into Customer Requirements
SP1.2 Refine and elaborate stakeholder requirements to develop service system requirements.	**RD SG 2** Customer requirements are refined and elaborated to develop product and product component requirements.	**SP 2.1** Establish Product and Product Component Requirements **SP 2.2** Allocate Product Component Requirements **SP 2.3** Identify Interface Requirements
SP1.3 Analyze and validate requirements, and define required service system functionality and quality attributes.	**RD SG 3** The requirements are analyzed and validated.	**SP 3.1** Establish Operational Concepts and Scenarios **SP 3.2** Establish a Definition of Required Functionality and Quality Attributes **SP 3.3** Analyze Requirements **SP 3.4** Analyze Requirements to Achieve Balance **SP 3.5** Validate Requirements

SSD vs. CMMI-DEV Engineering PAs 2 of 4

In SSD (SVC)	In Engineering (DEV)	
SG 2 Service system components are selected, designed, implemented, and integrated.	**TS - Technical Solution** **PI - Product Integration**	
SP 2.1 Select service system solutions from alternative solutions.	**TS SG1** Product or product component solutions are selected from alternative solutions.	**SP 1.1** Develop Alternative Solutions and Selection Criteria **SP 1.2** Select Product Component Solutions
SP 2.2 Develop designs for the service system and service system components.	**TS SG 2** Product or product component designs are developed.	**SP 2.1** Design the Product or Product Component **SP 2.2** Establish a Technical Data Package **SP 2.3** Design Interfaces Using Criteria **SP 2.4** Perform Make, Buy, or Reuse Analyses
SP 2.3 Manage internal and external interface definitions, designs, and changes for service systems.	**PI SG 1** Preparation for product integration is conducted. **PI SG 2** The product-component interfaces, both internal and external, are compatible.	**SP 1.1** Establish an Integration Strategy **SP 1.2** Establish the Product Integration Environment **SP 1.3** Establish Product Integration Procedures and Criteria **SP 2.1** Review Interface Descriptions for Completeness **SP 2.2** Manage Interfaces

SSD vs. CMMI-DEV Engineering PAs 3 of 4

In SSD (SVC)	In Engineering (DEV)	
SP 2.4 Implement the service system design.	**TS SG 3** Product components, and associated support documentation, are implemented from their designs.	**SP 3.1** Implement the Design **SP 3.2** Develop Product Support Documentation
SP 2.5 Assemble and integrate implemented service system components into a verifiable service system.	**PI SG 3** Verified product components are assembled and the integrated, verified, and validated product is delivered.	**SP 3.1** Confirm Readiness of Product Components for Integration **SP 3.2** Assemble Product Components **SP 3.3** Evaluate Assembled Product Components **SP 3.4** Package and Deliver the Product or Product Component

SSD vs. CMMI-DEV Engineering PAs 4 of 4

In SSD (SVC)	In Engineering (DEV)	
SG 3 Selected service system components and services are verified and validated to ensure correct service delivery.	**VER – Verification** **VAL – Validation**	
SP 3.1 Establish and maintain an approach and an environment for verification and validation.	**VER SG 1** Preparation for verification is conducted. **VAL SG 1** Prepare for validation is conducted.	**VER SP 1.1** Select Work Products for Verification **VER SP 1.2** Establish the Verification Environment **VER SP 1.3** Establish Verification Procedures and Criteria **VAL SP 1.1** Select Products for Validation **VAL SP 1.2** Establish the Validation Environment **VAL SP 1.3** Establish Validation Procedures and Criteria
SP 3.2 Perform peer reviews on selected service system components.	**VER SG 2** Peer reviews are performed on selected work products.	**VER SP 2.1** Prepare for Peer Reviews **VER SP 2.2** Conduct Peer Reviews **VER SP 2.3** Analyze Peer Review Data
SP 3.3 Verify selected service system components against their specified requirements.	**VER SG 3** Selected work products are verified against their specified requirements.	**VER SP 3.1** Perform Verification **VER SP 3.2** Analyze Verification Results
SP 3.4 Validate the service system to ensure that it is suitable for use in the intended delivery environment and meets stakeholder expectations.	**VAL SG 2** The product or product components are validated to ensure they are suitable for use in their intended operating environment.	**VAL SP 2.1** Perform Validation **VAL SP 2.2** Analyze Validation Results

Different Names and Abbreviations of Some Core PAs

SVC	DEV
Work Planning (WP)	Project Planning (PP)
Work Monitoring and Control (WPM)	Project Monitoring and Control (PMC)
Integrated Work Management (IWM)	Integrated Project Management (IPM)
Quantitative Work Management (QWM)	Quantitative Project Management (QPM)

Differences in PAs and Categories

CMMI-SVC PAs by Category

Process Management

OPD OPF OPM OPP OT

Project and Work Management

CAM IWM REQM RSKM QWM

SCON SAM WMC WP

Support

CAR CM DAR MA PPQA

Service Establishment and Delivery

IRP SD SSD SSM SST

CMMI-DEV PAs by Category

Process Management

OPD OPF OPM OPP OT

Project Management

IPM REQM RSKM QPM

SAM PMC PP

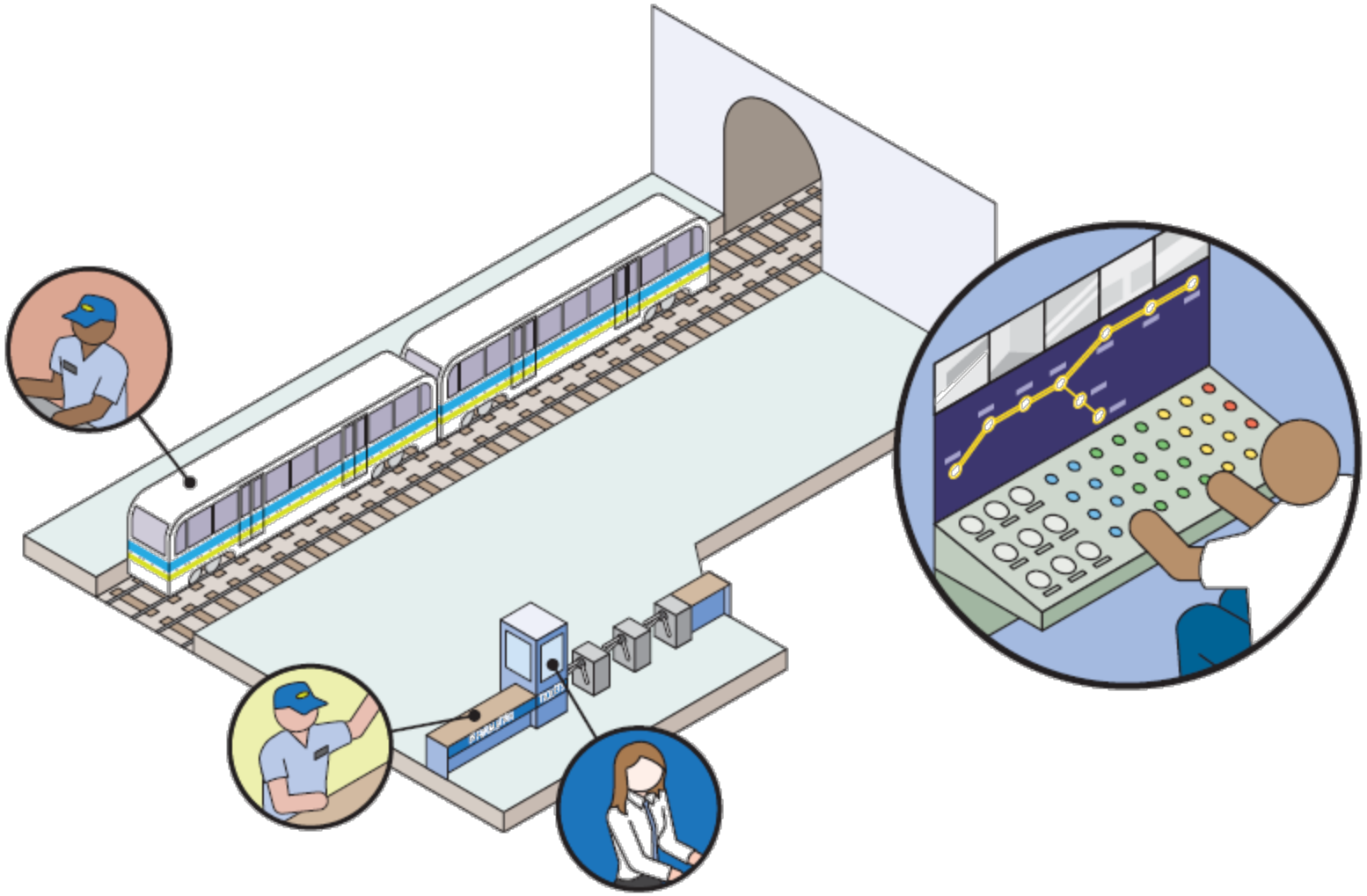
Support

CAR CM DAR MA PPQA

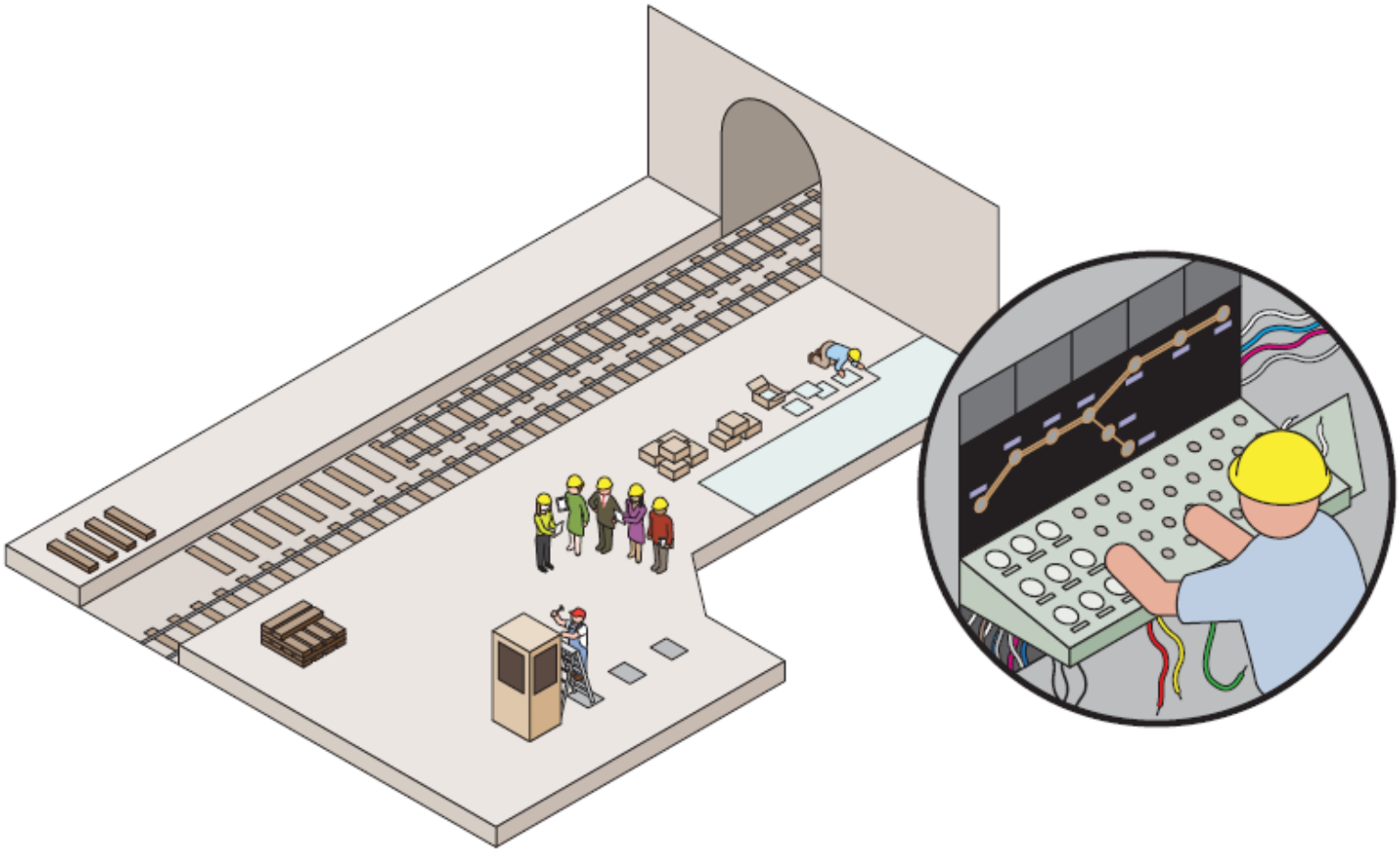
Engineering

PI RD TS VAL VER

One Example Group: Urban Transit Authority



Another Group: Suppliers of Trains, Control Systems, Entry Gates, etc.



Transit Authority vs. Equipment Suppliers: What Do They Have in Common?

Both are trying to deliver value to a customer.

Both need to understand the customer's needs.

Both need to plan a solution to those needs.

Both need to validate and deliver that solution.

Both need good results to stay in business.

Other ideas?

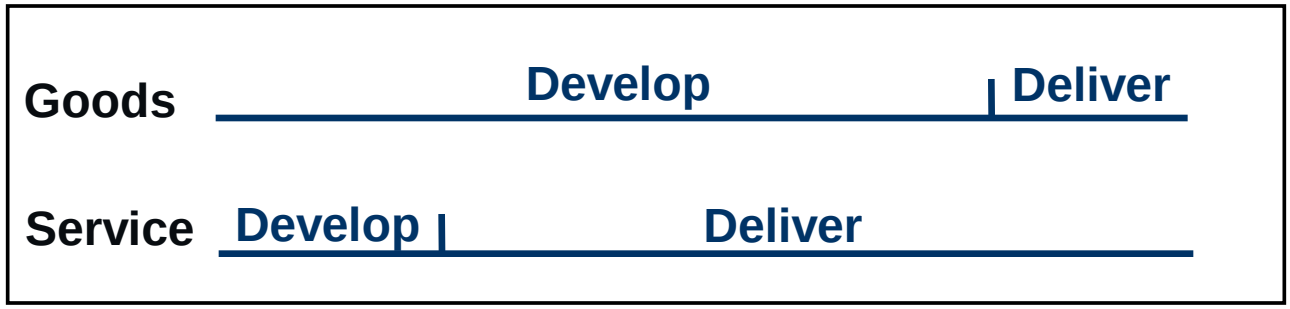
Transit Authority vs. Equipment Suppliers: How Do They Differ?

Transit Authority

- delivered solution is intangible, non-storable
- ongoing relationship based on a service agreement
- services often simultaneously produced and consumed
- more time spent on delivery

Equipment Suppliers

- delivered solution is a tangible, physical
- fixed-term relationship based on a delivery contract
- delivery of product generally takes place after development (and maybe after manufacturing)
- more time spent on development



Differences in Process Improvement Between Services and Development

Services

- Changes are made to the service system, which immediately affects delivery of services to customer.
- Performance of the service system is inseparable from quality of service.
- Feedback from service users to providers is typically direct and rapid.
- Repeated service delivery provides numerous and frequent opportunities to measure.

Development

- Changes are made to development methods and tools, but impacts may not be visible to the customers until later product deliveries.
- The distinction between development process performance and product performance is clear.
- Feedback from product end users to developers is often indirect and slow.
- Longer development cycles provide more limited and less frequent opportunities to measure.

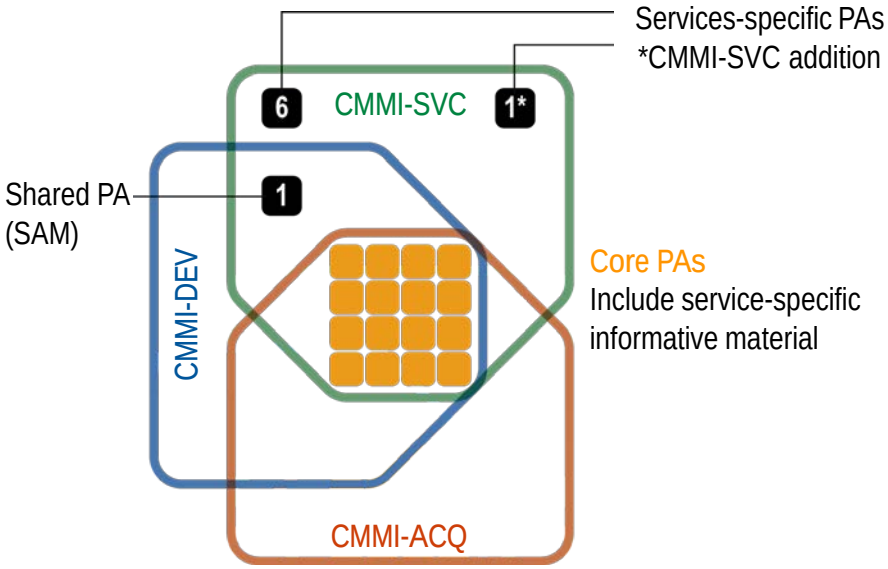
How Might Services PAs Help Development?

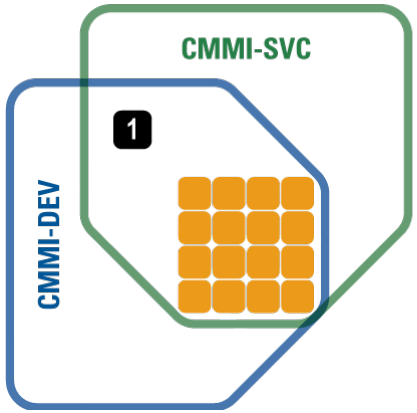
Although they are not included in the CMMI-DEV model, each of the following CMMI-SVC process areas could be used by a development group:

- Capacity and Availability Management
- Service Continuity
- Incident Resolution and Prevention
- Service System Transition
- Strategic Service Management

We have examples of high maturity development organizations doing system of systems engineering who are finding the CMMI-SVC PAs add new capability.

A Look at CMMI-SVC





CAM	Capacity and Availability Management	IRP	Incident Resolution & Prevention
SCON	Service Continuity	SD	Service Delivery
STSM	Strategic Service Management	SST	Service System Transition
SSD	Service System Development		

Define, and Establish, and Deliver Services
SD REQM WP SSD

Monitor and Control Service and Work Products
CAM WMC CM

Ensure Service Mission Success
IRP RSKM SCON SST

Make Work Explicit and Measurable
MA OPP QWM CAR OPM

Manage Decisions, Suppliers, and Standard Services
SAM DAR STSM

Create a Culture to Sustain Service Excellence
PPQA OPD IWM OT OPF

Another look at STSM

Strategic Service Management (STSM):

STSM is about portfolio management or deciding what services you should be providing, making them standard, and letting people know about them.

Why do the practices in STSM? Because you have standard services, developing new services is faster and cheaper. You can increase business capture and market share. You and your customers agree about what you have to offer.

In an engineering services context:

- For a customer-intensive service like this, it's tempting to do anything asked. Using the practices of this PA to get clear about what offerings are in your best interest along with your clients' interests can give you business advantage. Retire and improve services as well as adding to your catalogue.
- Describing your offerings appropriately for your customers may be obvious. Less obvious are the benefits from being disciplined inside your engineering service company about what products you offer and why—good internal descriptions can help to foster that discipline.

You run a service group inside a larger company.

You are thinking of applying the practices of STSM in your organization.

Do you have to wait for “corporate” to build their service catalog before you build one?

1	No
2	Yes
5	Not Sure

Another look at SD

Service Delivery (SD):

SD is about setting up agreements, taking care of service requests, and operating the service system.

Why do the practices in SD? You and your customer have the same expectations, your services are consistent and cost-effective, and customers know how to make requests.

In an engineering services context:

- Service agreements often begin during the proposal period and are refined after a win. They should also be maintained regularly.
- Thinking of “readiness” of your service system as an ongoing quality attribute, not something done just at the beginning of an engagement. This orientation is one of the key differences between service and development, and particularly likely when your service is related to development.
- Request management appears to be one of the strong leverage points for business results in this type of service.

Another look at CAM

Capacity and Availability Management (CAM):

CAM is about making sure you have the resources you need to deliver services and that they are available when needed—at an appropriate cost.

Why do the practices in CAM? Customer satisfaction is increased because of high availability of service. Your costs are managed and the risk of service failure is reduced.

In an engineering services context:

- Like other people-intensive services, treating your people as the key resource that concerns you for capacity and availability will be part of your CAM strategy. In addition to number and availability of staff, skill availability is also crucial.
- Patterns of surge and lag times, and issues like overwork for favorite or productive or skilled staff deserve attention.

Another look at SSD

Service System Development (SSD):

SSD is about making sure you have everything you need to deliver the services, including people, processes, consumables, and equipment.

Why do the practices in SSD? You anticipate service requirements and avoid costly changes. The service system does what is required for both the service provider and customer.

In an engineering services context:

- You probably have a service system that is enterprise wide, or specific to a product line, or in some way larger than one engagement or customer. The practices in this PA should also be used to alter, adjust, or tailor for individual agreements.
- This PA, and its wording that relies heavily on IT and engineering can be difficult or misleading for services that are NOT based in engineering; here's one place in the model where engineering services has an advantage!

When to use Service System Development (SSD)

Engineering PAs in DEV are recommended for improving product development process, large complex systems, and those very familiar with DEV.

Using SSD may be preferred by service provider organizations that are new to CMMI—especially those organizations with simple services.

Even organizations that use the CMMI-DEV model for service system development may refer to the SSD process area for helpful guidance on applying development practices to service system parts like people, processes, and consumables.

Two places in the model to look for help for small, simple services if SSD is too much:

- Goal 2 in Service Delivery
- SP 1.3 in IWM, Establish the Project's Work Environment

SAM is to CMMI-ACQ as ____ is to CMMI-DEV

1	SD
2	CAM
3	SST
4	SSD
5	I don't have a clue

Your service is vehicle maintenance.

Though maintenance is your major service, occasionally you build a small widget and install it on the vehicles you maintain. You are arguing with your process improvement consultant about which model content to apply, partly because you have a SCAMPI appraisal coming, and she wants you to do well. What model content would you apply in your context?

1	SSD can be applied to developing the widget.
2	SSD covers the service system, but engineering PAs should be used for developing the widget.
3	Engineering PAs could be used for widget and service system.
4	What does it matter? Apply whichever practices help us to improve. Ignore the appraisal.
5	This kind of question is what makes me crazy about CMMI.

Another look at SST

Service System Transition (SST):

SST is about getting new systems in place, changing existing systems, or retiring obsolete systems—all while making sure nothing goes terribly wrong with the service.

Why do the practices in SST? Your service delivery doesn't degrade when you make a major change. You minimize customer and user dissatisfaction and transition smoothly into and out of operations.

In an engineering services context:

- Smoothly handling changes in any component: your people, tools, consumables, and more is an essential element of superior service.
- It's not unusual in this service to take over from or hand over to another vendor. You also must end your service gracefully. All of these conditions are aided by the practices in SST.
- For all service types, including stakeholders appropriately during transition is a capability that distinguishes excellent providers from their peers.

Another look at SCON

Service Continuity (SCON):

SCON is about being ready to recover from a disaster and get back to delivering your service.

Why do the practices in SCON? After 9/11 and Katrina, service businesses have proof that those who prepare for disaster are better able to recover and stay in business.

In an engineering services context:

- It may be tempting to think this business is relatively resilient to disastrous disruption. With recent natural disasters, it may look different now. With a community disaster, even if you've considered your essential resources and dependencies, can you withstand a protracted delay in getting back to business?
- With people being the key resource, how can you equip them to be resilient to a range of disasters or significant disruptions?

Another look at IRP

Incident Resolution and Prevention (IRP):

IRP is about handling what goes wrong—and preventing it from going wrong before it occurs if you can.

Why do the practices in IRP? Services can continue, even when something goes wrong, because you know how to work around incidents. You address underlying causes of incidents so that you reduce costs and other adverse impacts.

In an engineering services context:

- Stay clear that “incidents” are disruptions to your engineering service, not bugs or defects you may hired to find or resolve.
- Have a strategy for deciding what to work around and what calls for root cause analysis and prevention.

CMMI-SVC Service PAs in Plain Language

Capacity and Availability Management (CAM):

making sure you have enough of the resources you need to deliver services and that they are available when needed—at an appropriate cost

Incident Resolution and Prevention (IRP):

handling what goes wrong—and preventing it from going wrong ahead of time if you can

Service Continuity Management (SCON):

being ready to recover from a disaster and get back to delivering your service

Service Delivery (SD):

setting up agreements, taking care of service requests, and operating the service system

Service System Development (SSD):

making sure you have everything you need to deliver the service, including people, processes, consumables, and equipment

Service System Transition (SST):

getting new systems in place, changing existing systems, and retiring obsolete systems, all while making sure nothing goes terribly wrong with service

Strategic Service Management (STSM):

deciding what services you should be providing, making them standard, and letting people know about them

Core and Shared PAs in Plain Language – 1 of 3

Causal Analysis and Resolution (CAR):

getting to the sources of important outcomes and taking effective action to correct or repeat them

Configuration Management (CM)

controlling changes to your crucial work products

Decision Analysis and Resolution (DAR):

using a formal decision making process on the decisions that matter most in your business

Integrated Work Management (IWM):

making the most of your participants and defined processes, even when it's complex

Measurement and Analysis (MA):

knowing what to count and measure to manage your service

Organizational Performance Management (OPM):

managing your improvements and innovations using a statistical understanding of your process performance

Organizational Process Definition (OPD):

establishing standard processes and relaying them throughout your organization

Core and Shared PAs in Plain Language – 2 of 3

Organizational Process Focus (OPF):

figuring out your current process strengths and weaknesses, planning what to do to improve, and putting those improvements in place

Organizational Process Performance (OPP):

making sure you understand your process performance and how it affects service quality

Organizational Training (OT):

developing the skills and knowledge your people need to deliver superior service

Process and Product Quality Assurance (PPQA):

checking to see that you are actually doing things the way you say you will in your policies, standards, and procedures

Quantitative Work Management (QWM):

managing service to quantitative process and performance objectives

Requirements Management (REQM):

keeping clear with your customers and other stakeholders about the service you provide, and adjusting when you find inconsistency or mismatched expectations

Supplier Agreement Management (SAM):

getting what you need and what you expect from suppliers who affect your service

Core and Shared PAs in Plain Language – 3 of 3

Risk Management (RSKM):

supporting the success of your service mission by anticipating problems and how you will handle them—before they occur

Work Monitoring and Control (WMC):

making sure what's supposed to be happening in your service work is happening and fixing what isn't going as planned

Work Planning (WP):

estimating costs, effort, and schedules; getting commitment to the work plan; and involving the right people—all while watching your risks and making sure you've got the resources you think you need

CMMI-DEV Engineering PAs in Plain Language

Product Integration (PI):

- putting together all the product components so that the overall product has expected behaviors and characteristics

Requirements Development (RD):

- understanding what stakeholders think they need and documenting that understanding for the people who will be designing solutions

Technical Solution (TS):

- using effective engineering to build solutions that meet end user needs

Validation (VAL):

- making sure that the solution actually meets the needs of users in the service environment

Verification (VER):

- making sure that the solution you ended up with meets your agreement about the needs

Putting All the Pieces Together

CMMI-SVC is a Perfect Fit

What's the Summary?

CMMI-SVC has a PA that "summarizes" the engineering PAs in DEV, for those occasions when more detailed practice information is needed.

CMMI-SVC and CMMI-DEV can be used and appraised together.

Development or engineering tasks can be treated as a service, and managed with the practices in CMMI-SVC.

Advanced development may use all of the CMMI-DEV, and then add CMMI-SVC for additional practices: SCON, SST, CAM.

If we take a life cycle view and consider total cost of ownership, may need multiple models, a mash up or composition from CMMI and other models.

Other ideas?

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