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CMMI® for Services

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Services make up 80 percent of the world economy and comprise more than half of U.S. Department of Defense acquisitions. The primary purpose of the CMMI for Services (CMMI-SVC) model, which is the basis of this book, is to guide service providers as they improve the way they do their work—their processes. Improved processes result in improved service performance, customer satisfaction, and profitability. When organizations using CMMI-SVC make improvements in their performance, they can ultimately contribute to the health of the world economy.

CMMI (Capability Maturity Model Integration) models are collections of effective practices that help organizations to improve their processes. The CMMI-SVC model, like all of the CMMI Product Suite, was developed by a team from industry, government, and the Software Engineering Institute (SEI). Hundreds of reviewers suggest new content and changes for the model. Adopters pilot model content and give further feedback. A network of hundreds of SEI Partners and thousands of users apply the model to their work and report their experience and results, further improving model content. In this way, the CMMI-SVC model represents the ongoing consensus of thousands of practitioners about how to provide superior service.

1. There are CMMI models that focus on the development of products and services (CMMI for Development) and on the acquisition of products and services (CMMI for Acquisition). See the CMMI website for more information about these members of the CMMI Product Suite (www.sei.cmu.edu/cmmi/).
Purpose

This book provides guidance on how all types of service provider organizations can establish, manage, and improve services that meet the needs of their customers and end users.

This guidance includes the following:

- Delivering services that meet the terms of service agreements
- Managing the organization's capacity to provide services and ensure the availability of services
- Addressing service incidents effectively
- Establishing standard services and service levels that meet the strategic needs of the organization as well as the needs of customers and end users
- Ensuring the continuity of services in the face of disaster

By integrating these and other practices, CMMI-SVC helps service providers to establish, deliver, and manage services.

Organization of This Book

This book is organized into three main parts:

- Part One: About CMMI for Services
- Part Two: Generic Goals and Generic Practices, and the Process Areas
- Part Three: The Appendices and Glossary

Part One: About CMMI for Services, consists of six chapters.

- Chapter 1, Introduction, offers a broad view of CMMI and the Services constellation, concepts of process improvement, the history of models used for process improvement, and key concepts of CMMI for Services.
- Chapter 2, Process Area Components, describes the components of the CMMI-SVC process areas.
- Chapter 3, How to Start Using CMMI, describes the important roles needed for implementing a CMMI-based process improvement program, explains how appraisals can be used, identifies training that can help, and provides tips for getting started using CMMI.

---

2. A constellation is a collection of CMMI components that are used to construct models, training materials, and appraisal related documents for an area of interest (e.g., development, acquisition, services).
• Chapter 4, Achieving Process Improvement that Lasts, explains how selected practices in all CMMI models enable the organization to make improvement part of how it does business, including descriptions of generic goals, generic practices, maturity levels, capability levels, and equivalent staging.

• Chapter 5, Relationships Among Process Areas, describes how process areas interrelate and provides insight into the interactions among the CMMI-SVC process areas.

• Chapter 6, Essays About CMMI for Services, consists of invited essays from contributing authors. The essays cover the use of CMMI-SVC, unusual applications, and use of CMMI-SVC in new domains.

Part Two: Generic Goals and Generic Practices, and the Process Areas, contains all of the CMMI-SVC required and expected components. It also contains related informative components, including subpractices, notes, examples, and example work products.

Part Two contains 25 sections. The first section contains the generic goals and practices. The remaining 24 sections each represent one of the CMMI-SVC process areas. Process areas contain effective practices covering topics ranging from configuration management to service delivery.

To make these process areas easy to find, they are organized alphabetically by process area acronym. Most CMMI users quickly learn the process area acronyms and abandon their longer names for their shorter abbreviations. An example in which the order of the process areas by full process area title versus abbreviation is different is that Supplier Agreement Management (SAM) appears before Service Delivery (SD). Each section contains goals, practices, and examples in a format that enables you to locate information quickly.

Part Three: The Appendices and Glossary, consists of four sections.

• Appendix A, References, contains references you can use to locate documented sources of information such as reports, process improvement models, industry standards, and books that are related to CMMI-SVC.

• Appendix B, Acronyms, defines the acronyms used in the model.

• Appendix C, CMMI for Service Project Participants, contains lists of team members who participated in the development of CMMI-SVC, V1.3.

• Appendix D, Glossary, defines many of the terms used in CMMI.

---

3. A process area is a cluster of related practices in an area that, when implemented collectively, satisfies a set of goals considered important for making improvement in that area. This concept is covered in detail in Chapter 2.
Finally, the Book Contributors section provides information about the book's authors and those who contributed essays for Chapter 6.

**Extras in This Book**

Readers who are familiar with the model and with prior CMMI books will find these changes and extras in this book on CMMI-SVC.

- We extensively revised Part One to add more material on service concepts, including a discussion of lifecycles in service environments.
- We also clarified and shortened the material on generic goals and practices, and updated the material on getting started and sustaining improvement.
- In Part Two, we added margin notes to all the process areas. These notes describe why the practices in a process area are valuable and rephrase what the process area is about in plainer language than the formal model language.
- We also added author notes in Part Two to amplify service concepts or to explain how to apply core model concepts in a service context.
- Finally, we included invited essays in Chapter 6 that consist of essays from partners, experienced users, experts in service management, and new users with advice for other new adopters.

**How to Use This Book**

Whether you are new to process improvement, new to CMMI, or already familiar with CMMI, Part One can help you understand why CMMI-SVC is the model to use for improving your service processes.

**Readers New to Process Improvement**

If you are new to process improvement or new to the Capability Maturity Model (CMM) concept, we suggest that you read Chapter 1 first. Chapter 1 contains an overview of process improvement that explains what CMMI is all about.

Next, skim Part Two, including generic goals and practices and specific goals and practices, to get a feel for the scope of the best practices contained in the model. Pay close attention to the purpose and introductory notes at the beginning of each process area.
In Part Three, look through the references in Appendix A and select additional sources you think would be beneficial to read before moving forward with using CMMI-SVC. Read through the acronyms and glossary to become familiar with the language of CMMI. Then, go back and read the details of Part Two.

**Readers Experienced with Process Improvement**

If you are new to CMMI but have experience with other process improvement models, such as Information Technology Infrastructure Library (ITIL) or International Organization for Standardization (ISO) 9000, you will recognize similarities in their structure and content [ISO 2008c].

We recommend that you read Part One to understand how CMMI is different from other process improvement models. If you have experience with other models, you might want to select which sections to read first. Read Part Two looking for practices you recognize from other models that you have used, and note variations. You might notice a different level of detail in CMMI than in the models you are accustomed to using.

Next, review the glossary to understand how some terminology can differ from that used in the process improvement models you know. Many concepts are the same, but they might be called something different.

**Readers Familiar with CMMI**

If you have reviewed or used a CMMI model before, you will quickly recognize the CMMI concepts discussed and many of the practices presented.

Review the process areas specific to CMMI-SVC first:

- Capacity and Availability Management (CAM)
- Incident Resolution and Prevention (IRP)
- Service Continuity (SCON)
- Service Delivery (SD)
- Service System Development (SSD)
- Service System Transition (SST)
- Strategic Service Management (STSM)
Then go back and review the other process areas you are already familiar with and see the guidance for applying these practices to a service environment.

**User Feedback and Questions**

Your suggestions for improving CMMI are welcome. For information on how to provide feedback, see the CMMI website at www.sei.cmu.edu/cmmi/tools/cr/. If you have questions about CMMI, send e-mail to cmmi-comments@sei.cmu.edu.
ACKNOWLEDGMENTS

This book wouldn’t have been possible without the work of people from organizations dedicated to CMMI-based process improvement. The CMMI-SVC model, which was created by the CMMI Product Team, is contained in the book. Other helpful information was added by Eileen Forrester, Brandon Buteau, and Sandy Shrum.

The CMMI-SVC Model Development Team included members from different organizations and backgrounds. Ultimately, without the work of those involved in the CMMI project since it began in 1998, this book would not exist.

The CMMI-SVC Model Development Team developed what is now CMMI-SVC, V1.2, from the input of lots of users and reviewers. That team consisted of the following members: Drew Allison, Roger Bate, Rhonda Brown, Brandon Buteau, Eileen Clark, Eileen Forrester, Craig Hollenbach, Mike Konrad, Frank Niessink, Mary Lynn Penn, Roy Porter, Rich Raphael, Pamela Schoppert, Sandy Shrum, Jerry Simpson, and Jeff Zeidler. The team for CMMI-SVC V1.3 included Drew Allison, Brandon Buteau, Eileen Forrester, Christian Hertneck, and Pam Schoppert.

We would also like to acknowledge those who directly contributed to this book.

We want to thank Anita Carleton for her support and for her leadership of the Software Engineering Process Management Program (which includes CMMI) at the SEI.
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From Eileen Forrester

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My friends and colleagues Julia Allen, Mike Bridges, Audrey Dorofee, Suzanne Garcia Miller, and Ray Obenza have offered support and, when necessary, distraction throughout this work.

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From Brandon Buteau

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I would not have the skills today that made it possible for me to contribute to the CMMI-SVC model or this book without the early guidance of my parents. My father taught me the value of disciplined reasoning, and my mother taught me the value of subtleties in the meanings of words. The result has been my lifelong appreciation of good arguments and good definitions.

Finally, my wife Betsey has been a complete jewel throughout all my work on the model and the book, and has gradually progressed from being a cheerful supporter and patient sounding board to an enthusiastic advocate of CMMI-SVC practices in her own professional field. I cannot thank her enough.

From Sandy Shrum

Working simultaneously on three CMMI books has tested my limits in many ways. Those that have helped me along the journey provided both professional and personal support.

Many thanks to Rhonda Brown and Mike Konrad for their partnership during CMMI model development. They are peerless as team members and friends. Our joint management of the CMMI Core Model Team was not only effective, but enjoyable.

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Finally, thanks to the coauthors of all three CMMI books: Brandon Buteau, Mary Beth Chrissis, Eileen Forrester, Brian Gallagher, Mike Konrad, Mike Phillips, and Karen Richter. They are all terrific to work with. Without their understanding, excellent coordination, and hard work, I would never have been able to participate.
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The service industry is a significant driver for worldwide economic growth. Guidance on developing and improving mature service practices is a key contributor to improved performance, customer satisfaction, and profitability. The CMMI for Services (CMMI-SVC) model is designed to begin meeting that need.

All CMMI-SVC model practices focus on the activities of the service provider. Seven process areas focus on practices specific to services, addressing capacity and availability management, service continuity, service delivery, incident resolution and prevention, service transition, service system development, and strategic service management processes. The remaining 17 process areas focus on practices that any organization should master to meet its business objectives.

**Do You Need CMMI?**

CMMI is being adopted by organizations all over the world. These organizations are large and small, government and private industry, and represent industries ranging from financial to health care, manufacturing to software, education to business services. What do all of these organizations have in common?

**Do You Have These Common Problems?**

Many organizations accept common problems as “normal” and they don’t try to address them or eliminate them. What about your organization? Are you settling for less? Take a look through the following list and see if you have accepted problems that you can solve by adopting CMMI.
• Plans are made, but not necessarily followed.
• Work is not tracked against the plan; plans are not adjusted.
• Expectations and service levels are not consistent; changes to them are not managed.
• Estimates are way off; over-commitment is common.
• When overruns become apparent, a crisis atmosphere develops.
• Most problems are discovered in operations or, worse yet, by the customer.
• Success depends on heroic efforts by competent staff members.
• Repeatability of effective behaviors is questionable.

Even if you’ve accepted that your organization could use something to reduce or eliminate these problems, some service providers reject the idea of using process improvement to address or resolve them. Some mythology has grown up around the idea of using process improvement. You may have heard some of these fallacies.

• I don’t need process improvement; I have good people (or advanced technology, or an experienced manager).
• Process improvement interferes with creativity and introduces bureaucracy.
• Process improvement is useful only in large organizations and costs too much.
• Process improvement hinders agility in fast-moving markets.¹

These common misconceptions serve only as excuses for organizations not willing to make the changes needed to move ahead, address their problems, and improve their bottom line.

Another way to look at whether your organization could benefit from CMMI is to think about whether it is often operating in crisis mode. Crisis mode is characterized by the following:

• Staff members working harder and longer
• Staff members moving from team to team
• Service teams lowering expectations to meet delivery deadlines
• Service teams adding more people to meet expectations or deadlines
• Everyone cutting corners
• A hero saving the day

¹ See the report “CMMI or Agile: Why Not Embrace Both!” for a discussion of how CMMI and Agile can work together effectively [Anderson 2008].
How Does CMMI Help You to Solve These Problems?

In its research to help organizations to develop and maintain quality products and services, the Software Engineering Institute (SEI) has found several dimensions that an organization can focus on to improve its business. Figure 1.1 illustrates the three critical dimensions that organizations typically focus on: people, procedures and methods, and tools and equipment.

What holds everything together? It is the processes used in your organization. Processes allow you to align the way you do business. They allow you to address scalability and provide a way to incorporate knowledge of how to do things better. Processes allow you to leverage your resources and to examine business trends.

This is not to say that people and technology are not important. We are living in a world where technology is changing at an incredible speed. Similarly, people typically work for many companies throughout their careers. We live in a dynamic world. A focus on process provides the infrastructure and stability necessary to deal with an ever-changing world and to maximize the productivity of people and the use of technology to be competitive.

Manufacturing has long recognized the importance of process effectiveness and efficiency. Today, many organizations in manufacturing and service industries recognize the importance of quality processes. Process helps an organization’s workforce to meet business objectives by helping them to work smarter, not harder, and with

![FIGURE 1.1](image-url)
improved consistency. Effective processes also provide a vehicle for introducing and using new technology in a way that best meets the business objectives of the organization.

The advantage of a process focus is that it complements the emphasis the organization places on both its people and its technology.

- A well-defined process can provide the means to work smarter, not harder. That means using the experience and training of your workforce effectively. It also means shifting the “blame” for problems from people to processes, making the problems easier to address and solve.
- An appropriate process roadmap can help your organization use technology to its best advantage. Technology alone does not guarantee its effective use.
- A disciplined process enables an organization to discover which procedures and methods are most effective and to improve them as results are measured.

CMMI is a suite of products used for process improvement. These products include models, appraisal methods, and training courses.

- The models are descriptions of best practices that can help you achieve your business goals related to cost, schedule, service levels, quality, and so forth. CMMI best practices describe what to do, but not how to do it or who should do it.
- The appraisal methods evaluate an organization's processes using a CMMI model as a yardstick. SCAMPI (Standard CMMI Appraisal Method for Process Improvement) is the group of SEI appraisal methods used with CMMI models. SCAMPI uses a formalized appraisal process, involves senior management as a sponsor, focuses the appraisal on the sponsor's business objectives, and observes strict confidentiality and nonattribution of data.
- Training courses support knowledge about the use of CMMI models and appraisal methods.

The SEI has taken the process management premise that the quality of a product (including service) is highly influenced by the quality of the process used to develop and maintain it, and defined CMMs that embody this premise. The belief in this premise is seen worldwide in quality movements, as evidenced by the International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) body of standards.
How Can CMMI Benefit You?

Today, CMMI is an application of the principles introduced almost a century ago to achieve an enduring cycle of process improvement. The value of this process improvement approach has been confirmed over time. Organizations have experienced increased productivity and quality, improved cycle time, and more accurate and predictable schedules and budgets [Gibson 2006].

The benefits of CMMI have been published for years and will continue to be published in the future. (See the SEI website for more information about performance results.)

The cost of CMMI adoption is highly variable depending on many factors (e.g., organization size, culture, structure, current processes). Regardless of the investment, history demonstrates a respectable return on investment (ROI).

Example returns on investment at various organizations using CMMI-DEV include those shown in Table 1.1.

Since the CMMI-SVC model was first released only two short years ago (2009), data on the results of its use are not yet available. We will be collecting ROI data as organizations adopt the CMMI-SVC model and experience the benefits.

See the CMMI website (www.sei.cmu.edu/cmmi/) for the latest information about CMMI adoption, including presentations by those who have adopted CMMI and want to share how they did it.

A Capability Maturity Model (CMM), including CMMI, is a simplified representation of the world. CMMs contain the essential elements of effective processes. These elements are based on the concepts developed by Crosby, Deming, Juran, and Humphrey.

In the 1930s, Walter Shewhart began work in process improvement with his principles of statistical quality control [Shewhart 1931]. These principles were refined by W. Edwards Deming [Deming 1986], Phillip Crosby [Crosby 1979], and Joseph Juran [Juran 1988].

<table>
<thead>
<tr>
<th>ROI</th>
<th>Focus of Process Improvement Program</th>
<th>Organization</th>
</tr>
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<tbody>
<tr>
<td>5:1</td>
<td>Quality activities</td>
<td>Accenture</td>
</tr>
<tr>
<td>13:1</td>
<td>Defects avoided per hour spent in training and defect prevention</td>
<td>Northrop Grumman</td>
</tr>
<tr>
<td>2:1</td>
<td>Overall process improvement over three years</td>
<td>Siemens Information Systems Ltd., India</td>
</tr>
</tbody>
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Watts Humphrey, Ron Radice, and others extended these principles further and began applying them to software in their work at IBM and the SEI [Humphrey 1989]. Humphrey’s book, *Managing the Software Process*, provides a description of the basic principles and concepts on which many of the CMMs are based.

The SEI has taken the process management premise, “the quality of a system or product is highly influenced by the quality of the process used to develop and maintain it,” and defined CMMs that embody this premise. The belief in this premise is seen worldwide in quality movements, as evidenced by the ISO/IEC body of standards.

CMMs focus on improving processes in an organization. They contain the essential elements of effective processes for one or more disciplines and describe an evolutionary improvement path from ad hoc, immature processes to disciplined, mature processes with improved quality and effectiveness.

Like other CMMs, CMMI models provide guidance to use when developing processes. CMMI models are not processes or process descriptions. The actual processes used in an organization depend on many factors, including application domains and organization structure and size. In particular, the process areas of a CMMI model typically do not map one to one with the processes used in your organization.

The SEI created the first CMM designed for software organizations and published it in a book, *The Capability Maturity Model: Guidelines for Improving the Software Process* [SEI 1995].

Today, CMMI is an application of the principles introduced almost a century ago to this never-ending cycle of process improvement. The value of this process improvement approach has been confirmed over time. Organizations have experienced increased productivity and quality, improved cycle time, and more accurate and predictable schedules and budgets [Gibson 2006].

### Evolution of CMMI

The CMM Integration project was formed to sort out the problem of using multiple CMMs. The combination of selected models into a single improvement framework was intended for use by organizations in their pursuit of enterprise-wide process improvement.

Developing a set of integrated models involved more than simply combining existing model materials. Using processes that promote consensus, the CMMI Product Team built a framework that accommodates multiple constellations.
The first model to be developed was the CMMI for Development model (then simply called “CMMI”). Figure 1.2 illustrates the models that led to CMMI Version 1.3.

Initially, CMMI was one model that combined three source models: the Capability Maturity Model for Software (SW-CMM) V2.0 draft C, the Systems Engineering Capability Model (SECM) [EIA 2002a], and the Integrated Product Development Capability Maturity Model (IPD-CMM) V0.98.

These three source models were selected because of their successful adoption or promising approach to improving processes in an organization.

The first CMMI model (V1.02) was designed for use by development organizations in their pursuit of enterprise-wide process improvement. It was released in 2000. Two years later Version 1.1 was released, and four years after that, Version 1.2 was released.

2. EIA 731 SECM is the Electronic Industries Alliance standard 731, or the Systems Engineering Capability Model. INCOSE SECAM is the International Council on Systems Engineering Systems Engineering Capability Assessment Model [EIA 2002a].
By the time Version 1.2 was released, two other CMMI models were being planned. Because of this planned expansion, the name of the first CMMI model had to change to become CMMI for Development and the concept of constellations was created.

The CMMI for Acquisition model was released in 2007. Since it built on the CMMI for Development Version 1.2 model, it also was named Version 1.2. Two years later the CMMI for Services model was released. It built on the other two models and also was named Version 1.2.

In 2008, plans were drawn to begin developing Version 1.3, which would ensure consistency among all three models and improve high maturity material. Version 1.3 of CMMI for Acquisition [Gallagher 2011, SEI 2010b], CMMI for Development [Chrissis 2011, SEI 2010a], and CMMI for Services [Forrester 2011, SEI 2010c] were released in November 2010.

CMMI Framework

The CMMI Framework provides the structure needed to produce CMMI models, training, and appraisal components. To allow the use of multiple models within the CMMI Framework, model components are classified as either common to all CMMI models or applicable to a specific model. The common material is called the “CMMI Model Foundation” or “CMF.”

The components of the CMF are part of every model generated from the CMMI Framework. Those components are combined with material applicable to an area of interest (e.g., acquisition, development, services) to produce a model.

A “constellation” is defined as a collection of CMMI components that are used to construct models, training materials, and appraisal related documents for an area of interest (e.g., services, development, acquisition). The model for the Services constellation is called “CMMI for Services” or “CMMI-SVC.”

CMMI for Services

CMMI-SVC draws on concepts and practices from CMMI and other service-focused standards and models, including the following:

- Information Technology Infrastructure Library (ITIL)
- ISO/IEC 20000: Information Technology—Service Management
- Control Objectives for Information and related Technology (CobiT)
- Information Technology Services Capability Maturity Model (ITSCMM)
Familiarity with these and other service-oriented standards and models is not required to comprehend CMMI-SVC, and this model is not structured in a way that is intended to conform to any of them. However, knowledge of other standards and models can provide a richer understanding of CMMI-SVC.

The CMMI-SVC model covers the activities required to establish, deliver, and manage services. As defined in the CMMI context, a service is an intangible, nonstorable product. The CMMI-SVC model has been developed to be compatible with this broad definition.

CMMI-SVC goals and practices are therefore potentially relevant to any organization concerned with the delivery of services, including enterprises in sectors such as defense, information technology (IT), health care, finance, and transportation. Early users of CMMI-SVC include organizations that deliver services as varied as training, logistics, maintenance, refugee services, lawn care, book shelving, research, consulting, auditing, independent verification and validation, human resources, financial management, health care, and IT services.

The CMMI-SVC model contains practices that cover work management, process management, service establishment, service delivery and support, and supporting processes. The CMMI-SVC model shares a great deal of material with CMMI models in other constellations. Therefore, those who are familiar with another CMMI constellation will find much of the CMMI-SVC content familiar.

When using this model, use professional judgment and common sense to interpret it for your organization. That is, although the process areas described in this model depict behaviors considered best practices for most service providers, all process areas and practices should be interpreted using an in-depth knowledge of CMMI-SVC, organizational constraints, and the business environment.

Organizations interested in evaluating and improving their processes to develop systems for delivering services can use the CMMI-DEV model. This approach is especially recommended for organizations that are already using CMMI-DEV or that must develop and maintain complex systems for delivering services. However, the CMMI-SVC model provides an alternative, streamlined approach to evaluating and improving the development of service systems that can be more appropriate in certain contexts.

**Important CMMI-SVC Concepts**

The following concepts are particularly significant in the CMMI-SVC model. Although all are defined in the glossary, they each employ words that can cover a range of possible meanings to those from different
backgrounds, and so they merit additional discussion to ensure that model material that includes these concepts is not misinterpreted.

**Service**

The most important of these terms is the word *service* itself, which the glossary defines as a product that is intangible and nonstorable. While this definition accurately captures the intended scope of meaning for the word *service*, it does not highlight some of the possible subtleties or misunderstandings of this concept in the CMMI context.

The first point to highlight is that a service is a kind of *product*, given this definition. Many people routinely think of products and services as two mutually exclusive categories. In CMMI models, however, products and services are not disjoint categories: A *service* is considered to be a special variety of *product*. Any reference to *products* can be assumed to refer to *services* as well. If you find a need to refer to a category of products that are not services in a CMMI context, you may find it helpful to use the term *goods*, as in the commonly used and understood phrase “goods and services.” (For historical reasons, portions of CMMI models still use the phrase “products and services” on occasion. However, this usage is always intended to explicitly remind the reader that services are included in the discussion.)

A second possible point of confusion is between *services* and *processes*, especially because both terms refer to entities that are by nature intangible and nonstorable, and because both concepts are intrinsically linked. However, in CMMI models, processes are *activities*, while services are a useful *result* of performing those activities. For example, an organization that provides training services performs training processes (activities) that are intended to leave the recipients of the training in a more knowledgeable state. This useful state of affairs (i.e., being more knowledgeable) is the *service* that the training provider delivers or attempts to deliver. If the training processes are performed but the recipients fail to become more knowledgeable (perhaps because the training is poorly designed, or the recipients don’t have some necessary preliminary knowledge), then the service—the useful result—has not actually been delivered. Services are the results of processes (performed as part of a collection of resources), not the processes themselves.

A final possible point of confusion over the meaning of the word *service* will be apparent to those with a background in information technology, especially those familiar with disciplines such as service-oriented architecture (SOA) or software as a service (SaaS). In a software context, services are typically thought of as methods, components, or building blocks of a larger automated system, rather than
as the results produced by that system. In CMMI models, services are useful intangible and nonstorable results delivered through the operation of a service system, which may or may not have any automated components. To completely resolve this possible confusion, an understanding of the service system concept is necessary.

**Service System**

A service is delivered through the operation of a service system, which the glossary defines as an integrated and interdependent combination of component resources that satisfies service requirements. The use of the word system in service system may suggest to some that service systems are a variety of information technology, and that they must have hardware, software, and other conventional IT components. This interpretation is much too restrictive. While it is possible for some components of a service system to be implemented with information technology, it is also possible to have a service system that uses little or no information technology at all. Even organizations that deliver managed IT services have service systems that encompass more than merely IT components.

In this context, the word system should be interpreted in the broader sense of “a regularly interacting or interdependent group of items forming a unified whole,” a typical dictionary definition. Also, systems created by people usually have an intended unifying purpose, as well as a capability to operate or behave in intended ways. Consider a package delivery system, a health care system, or an education system as examples of service systems with a wide variety of integrated and interdependent component resources.

Some may still have trouble with this interpretation because they may feel that the way they deliver services is not systematic, does not involve identifiable “components,” or is too small or difficult to view through the lens of a systems perspective. While this difficulty may in some cases be true for service provider organizations with relatively immature practices, part of the difficulty may also be traced to an overly narrow interpretation of the word resources in the definition of service system.

The full extent of a service system encompasses everything required for service delivery, including work products, processes, tools, facilities, consumable items, and human resources. Some of these resources may belong to customers or suppliers, and some may be transient (in the sense that they are only part of the service system for a limited time). But all of these resources become part of a service system if they are needed in some way to enable service delivery.
Because of this broad range of included resource types and the relationships among them, a service system can be something large and complex, with extensive facilities and tangible components (e.g., a service system for health care or for transportation). Alternatively, a service system could be something consisting primarily of people and processes (e.g., for an independent verification and validation service). Since every service provider organization using the CMMI-SVC model must have at a minimum both people and process resources, they should be able to apply the service system concept successfully.

Service providers who are not used to thinking of their methods, tools, and personnel for service delivery from a broad systems perspective may need to expend some effort to reframe their concept of service delivery to accommodate this perspective. The benefits of doing so are great, however, because critical and otherwise unnoticed resources and dependencies among resources will become visible for the first time. This insight will enable the service provider organization to effectively improve its operations over time without being caught by surprises or wasting resources on incompletely addressing a problem.

SERVICES AND SERVICE SYSTEMS IN CMMI FOR SERVICES VERSUS SOA AND SAAS

If you know something about SOA or SaaS, you might be a bit nonplussed by the preceding briefly stated distinction between the various meanings of the term service, followed by a forward reference to a discussion of the term service system, where neither SOA nor SaaS is mentioned at all. Here’s some additional clarification. (If you’re not interested in SOA or SaaS, you can skip over this discussion.)

Although there are a variety of interpretations of SOA and SaaS, they all tend to focus on information systems of one form or another and how they are designed to deliver value. SOA emphasizes certain characteristics of the architecture of these systems (e.g., the alignment of components with business functions), whereas SaaS considers different aspects of system architecture while emphasizing the flexibility of how software capabilities are delivered to end users. Because CMMI for Services, SOA, and SaaS practitioners all use the terms service and system somewhat differently, and because it’s quite possible for CMMI for Services, SOA, and SaaS to all be employed in a single context, some confusion is likely if you are not sensitive to those differences.

In the CMMI for Services perspective, a service is the result of a process, and a system (i.e., a service system) refers to all the resources required to deliver services. When done properly, the operation of a service system causes service delivery. Service systems may incorporate subsystems that are themselves information technology systems, but these IT systems might represent only a small fraction of a total service system infrastructure.
In the SOA perspective, a service is an IT system component that provides a distinct and loosely coupled function accessible through a standard, contractually governed interface. At the top level, the structure of these services is expected to correlate well with the structure of business functions that an organization performs, and SOA designs often involve analyses of one or more enterprise architectures to establish needed commonalities. No matter what level of abstraction, the term service in SOA is most likely to be applied to actions, methods, functions, and “things that are done” rather than to their results; and the term system typically refers to something that at its core is an IT system of some kind.

In the SaaS perspective, software is delivered as a service (e.g., a subscription service) without the need for the customer to pay for the full cost up front. The term service in SaaS therefore seems closer to the CMMI for Services usage than the SOA usage, but it’s important to be clear. A SaaS service is not a software component that is made available (as in SOA), but rather is the on-demand availability of that component (and others) along with capabilities such as dynamic updates, tailorability, and load balancing. SaaS services are delivered via an IT system, but this may be only a portion of a larger service system that supplies other services such as help desk support or network management.

**Service Agreement**

A service agreement is the foundation of the joint understanding between a service provider and a customer of what to expect from their mutual relationship. The glossary defines a service agreement as a binding, written record of a promised exchange of value between a service provider and a customer. Service agreements can appear in a wide variety of forms, ranging from simple posted menus of services and their prices, to tickets or signs with fine print that refer to terms and conditions described elsewhere, to complex multipart documents that are included as part of legal contracts. Whatever they may contain, it is essential that service agreements be recorded in a form that both the service provider and the customer can access and understand so that misunderstandings are minimized.

The “promised exchange of value” implies that each party to the agreement commits to providing the other party or parties with something they need or want. A common situation is for the service provider to deliver needed services and for the customer to pay money in return, but many other types of arrangements are possible. For example, an operating level agreement (OLA) between organizations in the same enterprise may require only that the customer organization
notify the service provider organization when certain services are needed. Service agreements for public services provided by governments, municipal agencies, and nonprofit organizations may simply document what services are available, and identify what steps end users must follow to get those services. In some cases, the only thing the service provider needs or wants from the customer or end user is specific information required to enable service delivery.

See the glossary for additional discussion of the terms service agreement, service level agreement, customer, and end user.

Service Request

Even given a service agreement, customers and end users must be able to notify the service provider of their needs for specific instances of service delivery. In the CMMI-SVC model, these notifications are called “service requests,” and they can be communicated in every conceivable way, including face-to-face encounters, phone calls, all varieties of written media, and even nonverbal signals (e.g., pressing a button to call a bus to a bus stop).

However it is communicated, a service request identifies one or more desired services that the request originator expects to fall within the scope of an existing service agreement. These requests are often generated over time by customers and end users as their needs develop. In this sense, service requests are expected intentional actions that are an essential part of service delivery; they are the primary triggering events that cause service delivery to occur. (Of course, it is possible for the originator of a request to be mistaken about whether the request is actually within the scope of agreed services.)

Sometimes specific service requests may be incorporated directly into the service agreements themselves. This incorporation of service requests in the service agreement is often the case for services that are to be performed repeatedly or continuously over time (e.g., a cleaning service with a specific expected cleaning schedule or a network management service that must provide 99.9 percent network availability for the life of the service agreement). Even in these situations, ad hoc service requests may also be generated when needed and the service provider should be prepared to deliver services in response to both types of requests.

Service Incident

Even with the best planning, monitoring, and delivery of services, unintended events may occur that are unwanted. Some instances of service delivery may have lower than expected or lower than acceptable degrees of performance or quality, or may be completely
unsuccessful. The CMMI-SVC model refers to these difficulties as “service incidents.” The glossary defines a service incident as an indication of an actual or potential interference with a service. The single word *incident* is used in place of *service incident* when the context makes the meaning clear.

Like requests, incidents require some recognition and response by the service provider; but unlike requests, incidents are *unintended* events, although some types of incidents may be anticipated. Whether or not they are anticipated, incidents must be resolved in some way by the service provider. In some service types and service provider organizations, service requests and incidents are both managed and resolved through common processes, personnel, and tools. The CMMI-SVC model is compatible with this kind of approach, but does not require it, as it is not appropriate for all types of services.

The use of the word *potential* in the definition of service incident is deliberate and significant; it means that incidents do not always have to involve actual interference with or failure of service delivery. Indications that a service *may* have been insufficient or unsuccessful are also incidents, as are indications that it may be insufficient or unsuccessful in the future. (Customer complaints are an almost universal example of this type of incident because they are always indications that service delivery may have been inadequate.) This aspect of incidents is often overlooked, but it is important: Failure to address and resolve potential interference with services is likely to lead eventually to actual interference, and possibly to a failure to satisfy service agreements.

**Project, Work Group, and Work**

CMMI models must often refer to the organizational entities that are at the foundation of process improvement efforts. These entities are focal points in the organization for creating value, managing work, tailoring processes, and conducting appraisals. In CMMI-SVC, these entities are called “work groups,” while in CMMI-DEV and CMMI-ACQ these entities are called “projects.” The glossary defines both terms and their relationship to each other, but it does not explain why two different terms are needed.

Those with prior experience using CMMI-DEV or CMMI-ACQ models, or who routinely think of their work as part of a project-style work arrangement, may wonder why the term *project* is not sufficient by itself. The CMMI glossary defines a “project” as a managed set of interrelated activities and resources, including people, that delivers one or more products or services to a customer or end user. The definition
notes explain that a project has an intended beginning (i.e., project startup) and end, and that it typically operates according to a plan. These are characteristics of a project according to many definitions, so why is there an issue? Why might there be a difficulty with applying terms like project planning or project management in some service provider organizations?

One simple reason is that projects have an intended end as well as an intended beginning; such efforts are focused on accomplishing an objective by a certain time. While some services follow this same pattern, many are delivered over time without an expected end (e.g., typical municipal services, or services from businesses that intend to offer them indefinitely). Service providers in these contexts are naturally reluctant to describe their service delivery work as a project under this definition.

In prior (V1.2) CMMI models, the definition of “project” was deliberately changed to eliminate this limitation (i.e., that projects have a definite or intended end), in part to allow the term to be applied easily to the full range of service types. However, the change raised more questions and objections than it resolved when interpreted by many users (even in some service contexts), and so the limited meaning has been restored in V1.3: Projects now must have an intended end.

For organizations that do not structure their people and other resources into projects with intended ends, or that only do so for a portion of their work, the original problem remains. All of the common CMMI practices are useful whether or not your work is planned to have an intended end, but what can we call a fundamental organizational entity that implements those practices if it is not a project? How can we refer to and apply the practices of process areas such as project planning when we are not discussing a project?

The CMMI V1.3 solution is to introduce some new terms that take advantage of two distinct senses of meaning for the English word project: as a collection of resources (including people), and as a collection of activities performed by people. CMMI-DEV and CMMI-ACQ continue to use the term project for both senses, because this reflects the typical nature of development and acquisition efforts; CMMI-SVC replaces “project” with “work group” (when it refers strictly to a collection of resources including people) or with “work” (when it refers to a collection of activities, or a collection of activities and associated resources). The glossary defines a “work group” as a managed set of people and other resources that delivers one or more products or services to a customer or end user. The definition is
silent on the expected lifetime of a work group. Therefore, a project (in the first sense) may be considered a type of work group, one whose work is planned to have an intended end.

Service provider organizations may therefore structure themselves into work groups (without time limits) or projects (with time limits) depending on the nature of the work, and many organizations will do both in different contexts. For example, development of a service system may be performed by a project, whereas service delivery may be performed by a work group.

The glossary also notes that a work group may contain work groups, may span organizational boundaries, and may appear at any level of an organization. It is possible for a work group to be defined by nothing more than those in an organization with a particular common purpose (e.g., all those who perform a particular task), whether or not that group is represented somewhere on an organization chart.

In the end, of course, organizations will use whatever terminology is comfortable, familiar, and useful to them, and the CMMI-SVC model does not require this approach to change. However, all CMMI models need a convenient way to refer clearly to the fundamental groupings of resources that organize work to achieve significant objectives. In contrast to other CMMI models, the CMMI-SVC model uses the term work group rather than project for this limited purpose, and uses the term work for other senses of the word project including combined senses. For example, a “project plan” is called a “work plan” in CMMI-SVC. (In a few cases, the word project is retained in the CMMI-SVC model when it explicitly refers to a true project.)

Consistent with this usage, the titles of some important core process areas are different in CMMI-SVC compared to CMMI-DEV and CMMI-ACQ: Work Planning, Work Monitoring and Control, Integrated Work Management, and Quantitative Work Management (cf. Project Planning, Project Monitoring and Control, Integrated Project Management, and Quantitative Project Management). Despite these differences in terminology in different constellations, Integrated Work Management and Integrated Project Management cover essentially the same material and are considered to be the same core process area in all three CMMI constellations; the same is true for other equivalent process area pairings.

**Stakeholder, Customer, and End User**

In the model glossary, a stakeholder is defined as a group or individual who is affected by or is in some way accountable for the outcome of an undertaking. Stakeholders include any and all parties with a
legitimate interest in the results of service delivery, such as service provider executives, staff members, customers, end users, suppliers, partners, and oversight groups. Remember that any given reference to stakeholders in the model covers all these types of stakeholders, and not just the ones that might be most obvious in the particular context.

The model defines a customer as the party (individual, project, or organization) responsible for accepting the product or for authorizing payment. A customer must also be external to the project that develops (delivers) a product (service), although both the customer and the project may be part of the same larger organization.

While this concept seems clear enough, the glossary includes some ambiguous language about how the term customer can include “other relevant stakeholders” in some contexts, such as customer requirements. While this caveat reflects an accepted legacy usage of the term from earlier versions of CMMI models, it could be potentially confusing in a service context, where the distinction between customers and other stakeholders (especially end users) can be especially significant.

The CMMI for Services model addresses this concern in two ways. First, it avoids the term customer requirements except in those contexts where it refers to the requirements of customers in the narrow sense (those who accept a product or authorize payment). Second, the model relies upon material in the glossary that distinguishes between customers and end users, and that defines the term end user itself. Specifically, the model defines an end user as a party (individual, project, or organization) that ultimately uses a delivered product or receives the benefit of a delivered service. While end users and customers therefore cover distinct roles in service establishment and delivery, both can often be represented by a single party.

For example, a private individual who receives financial services from a bank is probably both the customer and the end user of those services. However, in health care services, the customers often include organizations such as employers and government agencies that negotiate (or dictate) health care plan coverage for the ultimate health care beneficiaries, who are the end users of those services. (Many of these end users may be customers as well, if they have a responsibility to pay for all or part of some services.)

To summarize: It’s important to keep in mind the actual scope of the terms stakeholder, customer, and end user as you review and apply the CMMI for Services model in your unique service context so that you don’t overlook or confuse crucial interactions and interfaces in your service system.
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