



ACTIVATE BUSINESS WITH THE POWER OF IT.™



Gleaning Wisdom from Data

The role of service knowledge management
in IT decision-making and ITIL® V3

By BMC Software and Enterprise Management Associates

Table of Contents

- Executive Summary** 1

- Knowledge Management Overview** 2
 - > The Data, Information, Knowledge, and Wisdom (DIKW) Model 2

- Service Knowledge Management and ITIL V3** 2
 - > The Service Knowledge Management System (SKMS) 2

- Leveraging Service Knowledge Management** 3
 - > Asset Management 4
 - > Incident Management and Problem Management 4
 - > Change Management 4
 - > Performance Management 4

- The Data Foundation** 5
 - > IT Environment Data 5
 - > Business Data 5

- Available Technologies Deliver Compelling Results** 5
 - > Two Real-World Examples 5

- Choosing the Right Service Knowledge Management System** 6
 - > Built on a Well-architected CMDB 6
 - > Convert Data to Knowledge 6
 - > Provide Role-based Portals 7
 - > Permit Easy, Controlled Knowledge Aggregation 7
 - > Integration with Business Service Management (BSM) Solutions 8

- Conclusion** 8

Executive Summary

Consider this scenario:

The executive in charge of online sales in a large retail chain has on his desk a dashboard that is driven by a knowledge management system. The dashboard has a number of visual indicators that give him a real-time snapshot of the health of the business. One of these indicators is a meter that shows the hourly rate of sales on the retailer's Web site.

When the rate dips below a certain threshold, the meter turns red, alerting the executive. Because he can turn to other indicators and tools on the dashboard to get more information on the nature of the problem, he can act quickly and decisively.

Sound futuristic? It's not. This is an actual example of how organizations are leveraging knowledge management today to take decision-making to a whole new level. There is a wealth of data residing on today's IT infrastructures, data that goes well beyond performance and availability information. This includes data about IT assets, employees, business services, business processes, customers, marketing, sales, and business partners. This data provides a valuable source of information to support decision-making.

The information is especially valuable in IT service management. Using available technology, IT can create a *service knowledge management system* that:

- > Gathers *data* from a variety of sources
- > Integrates the data to transform it into meaningful *information*
- > Analyzes the information to transform it into *knowledge*
- > Presents that knowledge in a way that is meaningful to the user, based on the user's role, enabling the user to make informed decisions based on *wisdom*

Service knowledge management permits IT managers to make business sense of the data residing on the IT infrastructure. By basing decisions on more complete information, they can improve service while lowering costs, and maintain and demonstrate regulatory compliance. They can also make better day-to-day decisions that reduce re-work because the job is done right the first time.

The use of service knowledge management to enhance IT service management is a central element in the IT Infrastructure Library® (ITIL®). According to ITIL Version 3 (V3)¹, effective service knowledge management provides a valuable resource for people in all roles and across all stages of the service lifecycle. It provides an effective way for people to share data, information, and knowledge about all facets of an IT service.

This paper:

- > Discusses the concept and principles of knowledge management and, in particular, service knowledge management
- > Describes the components of the service knowledge management system (SKMS) presented in ITIL V3
- > Presents examples of how service knowledge management can be used to support decision-making in IT
- > Examines the criteria for an effective service knowledge management system and discusses how today's IT infrastructures and service management solutions can provide the data and technology necessary to create such a system

Knowledge Management Overview

Knowledge management is not a new concept. It was introduced nearly two decades ago as a discipline that seeks to understand the way in which knowledge is created, used, and shared within organizations.

Knowledge management has been applied in a number of ways. For example, consulting companies maintain a knowledge base of their consultants that indicates the consultants' areas of expertise, skills, past experience, and locations. The consulting companies use this knowledge base as a decision-making tool to determine which consultants to assign to which consulting projects. In this way, the companies can build optimum teams for projects.

Note: Knowledge management plays an important role in the service knowledge management system (SKMS), which is defined in ITIL as, "A set of tools and databases that are used to manage knowledge and information. The SKMS includes the configuration management system, as well as other tools and databases. The SKMS stores, manages, updates, and presents all information that an IT service provider needs to manage the full lifecycle of IT services."²

The Data, Information, Knowledge, and Wisdom (DIKW) Model

Knowledge management can be viewed in terms of the hierarchical DIKW (data, information, knowledge, and wisdom) model of decision-making. (See Figure 1). The introduction of the DIKW model, often referred to as the "Knowledge Hierarchy" or "Knowledge Pyramid," is attributed to Dr. Russell Ackoff, a recognized pioneer in the field of operations research, systems thinking, and management science.

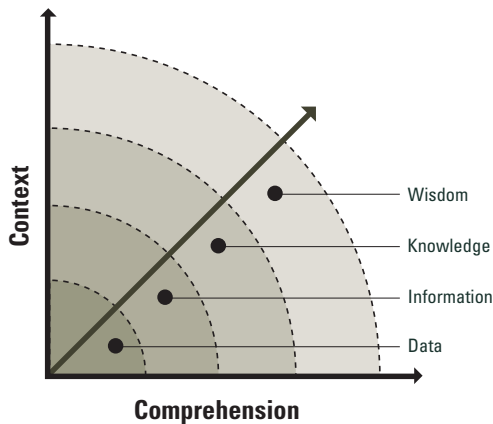


Figure 1. The DIKW model of service knowledge management

The DIKW model consists of four levels:

- > *Data*. The data level is the most basic level. It is factual and comes in the form of raw observations and measurements.
- > *Information*. The information level puts the data into context, defines it within a structure, and analyzes the relationships and connections across the data. This level answers the questions: *Who? What? Where? When?*
- > *Knowledge*. The knowledge level transforms information into knowledge, giving information meaning by interpreting it based on context. This level puts information into a structure that can be understood and processed. It answers questions related to *how*, for example: *How is the business impacted? How are suppliers affected?*
- > *Wisdom*. At the wisdom level, personal interpretation is applied to determine the *why*; that is, *why* an indication is important.

Service Knowledge Management and ITIL V3

According to ITIL V3³, knowledge management is a key factor in effective service management. As discussed in ITIL, the ability to deliver a quality service or process rests, to a significant extent, on the ability to respond to circumstances. That requires that the respondents have knowledge of the situation they are in. They must understand the situation, the available options, and the potential consequences and benefits of their actions.

The Service Knowledge Management System (SKMS)

As discussed earlier, ITIL recommends the creation of a single system for service knowledge management, referred to as the Service Knowledge Management System (SKMS)⁴, as shown in Figure 2.

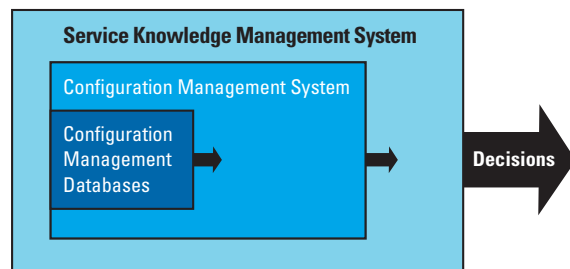


Figure 2. Service Knowledge Management System

The service knowledge management system includes a configuration management system (CMS), which is a central logical repository that provides access to the configuration data. Although the CMS is depicted in Figure 2 as being separate from the configuration management database (CMDB), it is important to note that a

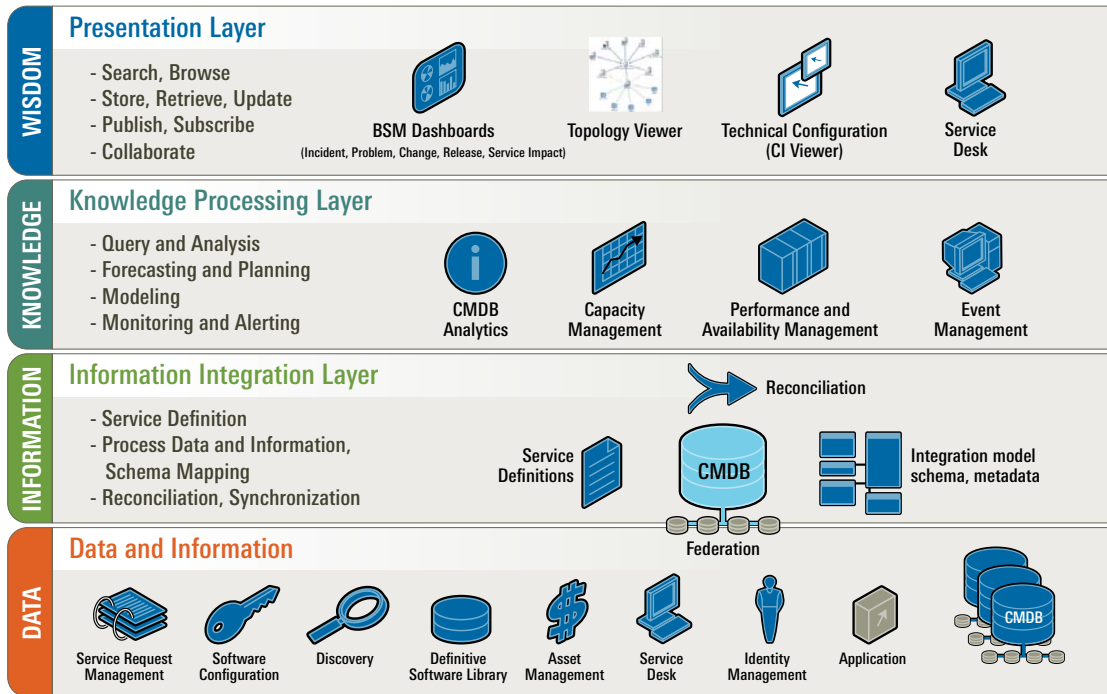


Figure 3. The four layers of the CMS

well-architected CMDB implements much of the functionality of the CMS, as well as that of the underlying CMDB.

The service knowledge management system is broader than the CMS and encompasses a wider base of knowledge. In addition to configuration data, the service knowledge management system also encompasses business data (such as information on staff experience); marketing and sales data; supplier and partner requirements, abilities, and expectations; and current and anticipated user skill levels.

This business data provides a valuable supplement to configuration data. The supplemental information, when combined with configuration data, provides a larger, more meaningful view of the environment. With that view, a

manager can make better-informed decisions, such as determining which actions to take to address problems or make improvements.

Leveraging Service Knowledge Management

Knowledge management provides a valuable tool for decision-making in a wide variety of areas across the enterprise. The example of the retail executive with a dashboard on his desk illustrates how knowledge management supports business managers in making informed decisions.

Knowledge management, specifically service knowledge management, provides a powerful decision-making tool for IT. Figure 4 shows an example of how the DIKW model can be applied to IT service knowledge management; in this

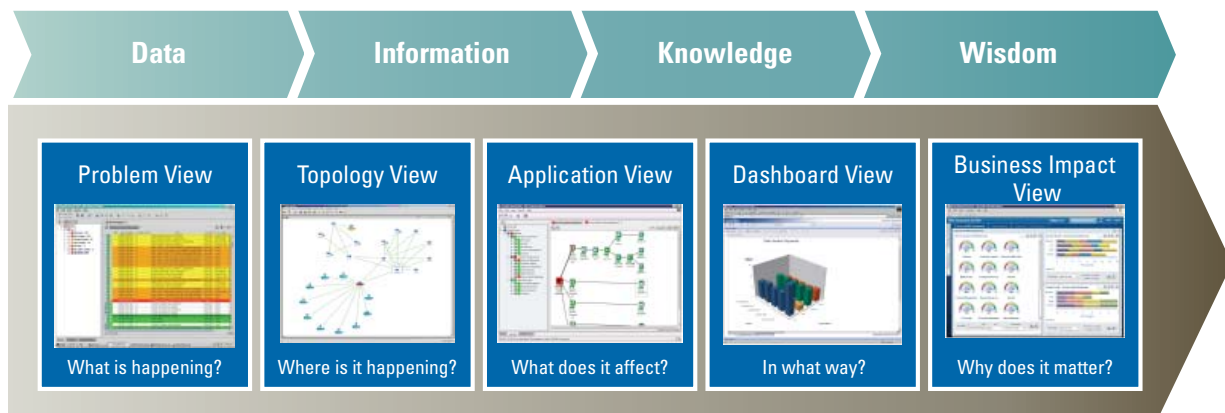


Figure 4. Applying the DIKW model to IT

case, to the service desk. Here, a service desk agent is alerted to an event and consults the business impact view to determine the business impact of the incident at hand. The agent sees that users are unable to access a particular application of the enterprise resource planning (ERP) system, which has a high business impact. She immediately drills down into the application view to see how the application is affecting the ERP system, and finds that this application receives data from suppliers that updates the just-in-time inventory system. She then consults the topology view and sees that the server that hosts the application is down. If necessary, she can drill down even further to gather specifics about the failure. Armed with this information, she can make an informed decision about how to best marshal IT resources to resolve the incident.

The power of service knowledge management is by no means limited to the service desk. In fact, some groups within IT may find it beneficial to create focused knowledge databases specifically for their use. These targeted knowledge bases would be part of the overall knowledge management system.

Here are some additional examples of the power of service knowledge management in IT:

Asset Management

The IT department of a company needs to acquire several new personal computers. The manager accesses the company's service knowledge management system through a role-based portal. Upon examining the prices for various computers, the manager finds that Brand A has the lowest purchase price. When looking at the maintenance history of Brand A, however, the manager sees it has a history of problems that has driven up its total cost of ownership (TCO). He then investigates Brand B. He finds that although it has a higher purchase price, Brand B has much higher reliability than Brand A, resulting in a lower TCO. Based on this knowledge, the manager opts for Brand B.

Incident Management and Problem Management

The incident and problem management team sees on the service knowledge management dashboard that there is a spike in calls to the help desk. The team uses its role-based service knowledge management portal to dig into the causes of the spike, and observes that most of the calls are related to a specific enterprise application, one that is critical to the business. The team opens a problem ticket and quickly routes it to the application development support group. There, a support specialist, using his service knowledge management dashboard, observes that a new version of that application has recently been installed and

that the version changed some user interface functions. Digging further, he sees that most of the calls are due to users not being familiar with the new interface. Because of the application's importance to the business, he requests that all users of that application be trained immediately on the new interface. After the training sessions have been completed, the service desk manager measures a significant reduction in help desk calls for the application.

Change Management

A major new update is required in an enterprise resource planning (ERP) application running on a server in the data center. The change manager consults his service knowledge management portal to determine which people on the operations staff have the right skills to handle the situation. He checks the availability of the candidates and assembles the change team.

The team uses its role-based service knowledge management portal to make sure that the server is capable of accommodating the change. The team finds that the server does have the prerequisite hardware and operating software. The team then uses the portal to determine the optimum time to implement the change. The portal shows that application availability is critical during weekdays, so the only time available for an update is on weekends. Once the team has readied its solution, the change manager approves the scheduled change and notifies all affected parties. Through their service knowledge management portals, other IT organizations see the pending change and trigger the necessary actions. For example, the service desk broadcasts the impending change and its implications to all affected customers and users.

Through the knowledge provided by the service knowledge management system, IT is able to greatly reduce the risk normally associated with change.

Performance Management

The CIO notices on her dashboard that a particular business process has slowed considerably and no longer meets the relevant service level agreement. She alerts the IT operations manager to the problem. The manager uses his service knowledge management portal to dig into the process and sees that a manual procedure has been added to meet regulatory compliance. The manager looks at the service catalog and sees that a service has already been developed that automates this required procedure. He issues a change request to substitute the automated service for the manual procedure in the business process that has slowed. This change corrects the performance issue.

The Data Foundation

Data is the foundation of service knowledge management. The more data to which the service knowledge management system has access, the greater the range of knowledge it can glean from it. Today, organizations have a wealth of data stored across their IT infrastructures.

IT Environment Data

First, there is a vast amount of data that describes the configuration and relationships of the technology, processes, and people that make up the IT environment. This includes:

- > *Technology data.* Includes asset data, such as costs; locations; hardware and software configurations; related contracts; software licenses; maintenance and support histories; physical and logical topologies; and availability, performance, and capacity data.
- > *Process data.* Includes service models that map assets to services; business process models that map services to business processes; and IT service management process workflows.
- > *People data.* Includes asset-to-user mapping and user information, such as roles and responsibilities. It also includes IT staff member data, such as asset-to-support mapping (indicating which IT staff people support which assets), which is useful for incident escalation.
- > *Provider data.* Includes which service providers are involved, and when and under what conditions they engage.

The problem is that the data is scattered across literally hundreds of authoritative sources across the enterprise, such as asset databases, HR databases, service management solution databases, user identity databases, network directories, and user accounts on various systems. What is required is a way for the service knowledge management system to access that data. Access should not require moving or replicating all data to a central repository, nor should it require the direct connection of the service knowledge management system directly to all the data sources. In addition, access should not require the responsible groups to give up control of their data. For example, HR must retain control of HR data.

Business Data

In addition to configuration data, there is a wealth of stored business data. This may include sales and marketing data, employee skills data, financial data, data on business partners, manufacturing data ... the list is long and varied.

Business data provides a valuable supplement to IT environment data. The service knowledge management

system can combine business data with configuration data to give IT managers a far more comprehensive view of the environment. For example, business data provides essential business trend information. By integrating business data with IT environment data, the service knowledge management system enables IT managers to make better-informed decisions.

Available Technologies Deliver Compelling Results

Service knowledge management is evolving rapidly and remains an open book that can include a wide range of advanced analytic technologies. These include data mining, online analytical processing (OLAP), advanced correlative algorithms, and self-learning capabilities (heuristics).

The use of advanced analytic technologies in conjunction with the configuration management system (CMS)⁸ is a frontier with huge upside potential. Many technologies are already being utilized across the broader CMS system to ensure that the right information is made available and shared. Examples are many and varied. Heuristics systems “learn” which variables have the most impact — on a day-to-day or hour-to-hour basis — for a desired business outcome. Advanced analytic systems permit IT to strike a balance between transaction response time and the cost of delivering the transaction service. “If/then” analytics, combined with model-based methods, give IT greater insight in capacity planning, or, when aligned with related capabilities (such as project and service portfolio management), in financial planning and analysis.

Most IT organizations with which Enterprise Management Associates (EMA) consults are working with EMA to deploy more advanced analytic tools to leverage their investments in their CMDBs. EMA has worked with a number of IT environments in creating and deploying analytic systems with well-defined portal access. These are being developed with clear objectives to leverage the CMDB investment through more effective business alignment. The results are compelling.

Two Real-World Examples

In one case, a large European utility based in Germany has applied a combination of technologies for analytics and advanced policy creation to support services throughout their lifecycle and asset management. The company’s objective is to balance networked services and company resources with customer needs, costs, business relevance, and value. The result is an enforceable, closed-loop approach to delivering VPN and VoIP services across Europe, as well as within the company. The system alerts the IT organiza-

tion to changes in conditions and circumstances that warrant attention. IT, in turn, notifies designated business executives of the alerts, and provides supporting contextual information that permits the executives to take appropriate actions and make needed adjustments.

In another example, a European services provider is leveraging advanced analytics in support of knowledge management for evaluating policies, operational teams, geographies, changing customer service demands, and other aspects that are core to improving the group's efficiency. Interestingly enough, some of this data is being shared directly between the service provider and its customers to help evolve and refine their joint business objectives together.

Choosing the Right Service Knowledge Management System

Service knowledge management systems are available today that meet a variety of requirements. Because of the importance of service knowledge management to overall service management, it is important to exercise great care in selecting a system. This section presents some important criteria that can be used to evaluate service knowledge management solutions.

Built on a Well-architected CMDB

A CMDB provides an effective and efficient way of making IT environment data available to the service knowledge management system. The CMDB provides a point of inte-

gration for the various IT management silos by consolidating the many silos of IT data scattered across the enterprise into a single, holistic view.

A well-architected CMDB, one that is built on a federated architecture, can incorporate the wealth of IT environment data stored across the IT infrastructure, without having to move all the data to the CMDB itself. As Figure 5 illustrates, a federated CMDB provides a function similar to that of a library index catalog. Federation permits current owners of authoritative data sources to retain control, while still making the data available to the service knowledge management system.

Convert Data to Knowledge

Merely presenting huge quantities of data to users is insufficient to support intelligent decision-making. Instead, the service knowledge management system should aggregate, consolidate, and analyze the data. It should convert the data to knowledge that helps users make informed business decisions, and present the knowledge in a meaningful way.

The following is an example of how a targeted impact analysis, made possible by a service knowledge management system, can be of substantial value.

A performance slowdown occurs in a server. Merely presenting the server's performance and availability data to an IT operations manager is insufficient to allow that manager to make an intelligent decision as to the optimum action. Instead, the service knowledge management system

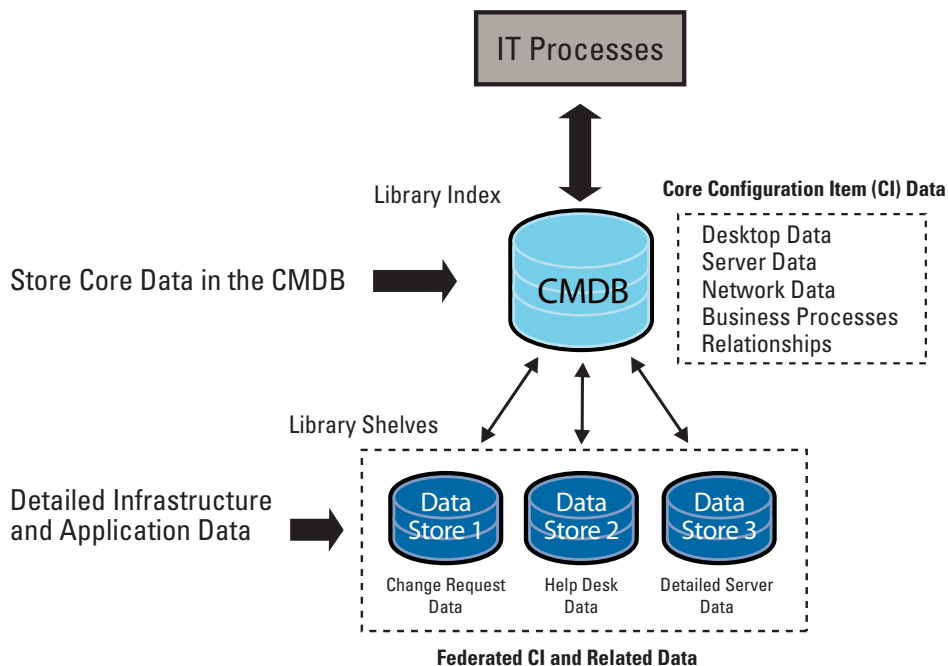


Figure 5. Federated CMDB

should convert the data into knowledge that permits the manager to quickly answer a number of questions, such as:

- > What applications are involved?
- > What other IT infrastructure elements depend on this server? What are the service implications?
- > Which users are affected?
- > What are the business implications?
- > What is the business priority?
- > Who in IT is responsible for addressing the problem?

Armed with this information, the manager can make a quick but intelligent decision as to the optimum course of action.

Provide Role-based Portals

According to ITIL V3[®], the purpose of service knowledge management is to ensure that the right information is delivered to the right person at the right time to enable an informed decision. As shown in Figure 6, different users have different knowledge needs depending on their roles.

The person in charge of IT governance, for example, needs a portal that shows such factors as the state of regulatory compliance in various areas. A security manager needs a portal that shows when and where security breaches are occurring, how often they are occurring, and their level of severity. A quality assurance manager needs a portal that shows how well (or poorly) software is performing, by providing such information as performance and availability figures, as well as the number of reported software incidents. The service desk manager needs a portal that indicates how well (or poorly) the service desk is performing by providing such information as the service desk call load, first-call resolution rates, and resolution times. A CIO needs summary information that shows how well IT services are aligned with business expectations, such as an indication of how well IT is meeting its service level agreements (SLAs).

Role	View
Governance	Regulatory compliance
Security	Security breaches, when and where they occur, and severity
Quality assurance	Performance, availability, and number of related incidents
Service desk	Service desk performance and incident resolution times
CIO	IT/business alignment and SLAs

Figure 6. Role-based views

To meet the needs of different managers, the service knowledge management system should provide personalized portals to users based on their roles and responsibilities. Role-based portals enable users to quickly and easily get the knowledge they need. The system should allow users to easily personalize their portals to present all the knowledge they need and only the knowledge they need, and to present the knowledge in the form most meaningful to them, such as with gauges, graphs, or tables. In addition, the portals must provide real-time knowledge, as well as historical knowledge.

Permit Easy, Controlled Knowledge Aggregation

The IT environment is dynamic, with new and enhanced services continually being added and new technologies continually emerging. As a result, the collective knowledge is continually growing and changing.

The IT organization has a wealth of collective knowledge stored in the heads of its IT staff members. To permit IT to leverage this valuable knowledge asset, the service knowledge management system must facilitate the entry of domain knowledge to augment the knowledge gleaned from data. This permits the IT staff to keep the knowledge base vibrant through a controlled authoring process that requires the refinement and approval of content before adding it to the knowledge base. A controlled process ensures the accuracy and consistency of knowledge.

Authoring facilities are important for information collection and refinement. Editing tools and authoring templates help speed the addition and refinement of content to ensure information consistency and usability. It's important to automate the authoring process workflow, such as by routing information for approvals before adding it to the knowledge base. Automation helps ensure consistency in authoring. In addition, automatic notification to approvers of new content that requires their attention helps ensure timely approval cycles.

Automatic harvesting of information further facilitates knowledge collection. For example, the service knowledge management system can harvest information on support interaction with users through the automatic collection of that information from help desk trouble tickets.

It is important to note that in some cases, knowledge aggregation involves not only technology, but also behavioral change. Some domain experts may be reluctant to share their knowledge for fear that will lessen their value to the organization, and hence their job security. It's important

to address this reluctance by identifying objections, discussing them openly, and countering them. One good approach is to motivate people to embrace knowledge-sharing by pointing out the benefits they will realize. For example, by sharing their knowledge, experts increase their potential for job mobility. They can free up some of their time to pursue additional areas, including areas of greater strategic importance. In this way, they are increasing, rather than decreasing, their value to the company and, hence, increasing their job security.

Integration with Business Service Management Solutions

The service knowledge management system is an important tool to help manage IT from the perspective of the business, an approach known as Business Service Management (BSM). BSM combines best-practice IT processes — such as ITIL and automated technology management — with a shared view of how IT services support basic business priorities, such as growing revenue, reducing cost, and lowering risk. Integration of the service knowledge management system with BSM solutions, such as solutions for IT service support, service assurance, and service automation, not only permits managers to access actionable knowledge, but also to act quickly and effectively on that knowledge.

The CMDB provides an integration point. It maintains a single source of accurate information, ensuring that the service knowledge management system and all BSM applications are working with consistent and up-to-date data.

Conclusion

Because of the large and growing complexity of the IT infrastructure, managers need more than just reams of technical data. They need that data distilled, integrated with business data, transformed into knowledge, and presented to them in a way that is meaningful to them. They can then leverage this knowledge to make better-informed business decisions.

The importance of service knowledge management in IT service management is underscored by ITIL V3 and the service knowledge management system. Technology is available today to implement an effective service knowledge management system. By implementing such a system, IT managers can meet the pressing demands of upper management to improve services, reduce costs, and maintain regulatory compliance.

For more information on BMC Software solutions based on ITIL best practices, visit www.bmc.com/bsm.

End Notes

- 1 ITIL V3, Service Transition, Section 4.7, Service Knowledge Management.
- 2 ITIL® Glossary V3, 1.24, 11 May 2007, http://www.best-management-practice.com/gempdf/ITIL_Glossary_V3_1_24.pdf. See Service Knowledge Management System.
- 3 ITIL V3, Service Transition, Section 4.7, Service Knowledge Management.
- 4 Ibid, Section 4.7.
- 5 ITIL defines a CMS as “a set of tools and databases that are used to manage an IT service provider’s configuration data. The CMS also includes information about incidents, problems, known errors, changes, and releases; and may contain data about employees, suppliers, locations, business units, customers, and users. The CMS includes tools for collecting, storing, managing, updating, and presenting data about all configuration items and their relationships.” ITIL® Glossary V3, 1.24, 11 May 2007, http://www.best-management-practice.com/gempdf/ITIL_Glossary_V3_1_24.pdf. See Configuration Management System.
- 6 ITIL V3, Service Transition, Section 4.7, Service Knowledge Management.



ACTIVATE BUSINESS WITH THE POWER OF I.T.™

About BMC Software

BMC Software delivers the solutions IT needs to increase business value through better management of technology and IT processes. Our industry-leading Business Service Management solutions help you reduce cost, lower risk of business disruption, and benefit from an IT infrastructure built to support business growth and flexibility. Only BMC provides best-practice IT processes, automated technology management, and award-winning BMC Atrium technologies that offer a shared view into how IT services support business priorities. Known for enterprise solutions that span mainframe, distributed systems, and end-user devices, BMC also delivers solutions that address the unique challenges of the mid-sized business. Founded in 1980, BMC has offices worldwide and fiscal 2007 revenues of \$1.58 billion. Activate your business with the power of IT. www.bmc.com.

About Enterprise Management Associates (EMA)

Enterprise Management Associates (EMA) is a leading independent industry analyst and consulting firm that is 100 percent dedicated to the IT management market. For more than ten years, EMA has been providing its clients with objective insight into the real-world business value of IT management technologies. Learn more about research services, the free online IT Management Solutions Center, and IT consulting offerings at www.enterprisemanagement.com.

About the Authors

Dennis Drogseth, vice president of EMA, joined EMA in 1998. He brings 24 years of experience in various aspects of marketing and business planning for systems and network solutions. Drogseth directs a team of analysts that focus on the development of the networked services management practice areas that span performance availability and service management across enterprise and telecommunication markets. Accounting, billing, QoS, outsourcing, and other disciplines related to these markets are also addressed by his team. He also spent 14 years with IBM in marketing and communications.

Ken Turbitt, global best practices director for BMC Software, assists corporations in aligning with the best practices for IT. He participated in the ITIL V3 quality reviews and provided input to several of the authors. He has held an International Standards Examination Board credential, has had an ITIL Manager qualification for more than 13 years, and has been a Gartner-qualified TCO consultant for more than ten years.

To learn more about how BMC can help activate your business, visit www.bmc.com or call (800) 841-2031.

BMC, BMC Software, and the BMC Software logo are the exclusive properties of BMC Software, Inc., are registered with the U.S. Patent and Trademark Office, and may be registered or pending registration in other countries. All other BMC trademarks, service marks, and logos may be registered or pending registration in the U.S. or in other countries. ITIL® is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office, and is used here by BMC Software, Inc., under license from and with the permission of OGC. All other trademarks or registered trademarks are the property of their respective owners. © 2008 Copyright BMC Software, Inc. All rights reserved.

