# ITIL®

# Maximize the synergies between ITIL® and DevOps

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AXELOS GLOBAL BEST PRACTICE

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# Contents

# 1    Executive summary

This white paper describes the synergies between ITIL® best practices and DevOps (development and operations) practices. ITIL focuses on the lifecycle of services, from inception to retirement, and provides best-practice guidance for IT service management (ITSM). The ITIL service lifecycle includes the development and operation of services. DevOps is a movement, inspired by lean methodology and agile development practices, which aims to achieve seamless workflow for product synchronization between all possible organizational functions – especially development and operations groups. A DevOps approach tries to reconcile the different priorities and processes of these groups, all for the purpose of facilitating greater business agility and delivering more value to the end user. In some organizations, this work is performed by virtual teams from different groups. ITIL describes rapid application development in the service design book as using agile software development.

Most IT organizations are struggling to remove silos that hamper their ability to work collaboratively. Failure to collaborate interferes with the effective use of an organization's capabilities and resources, leading to inflexibility and inefficiency in the delivery and support of services. When that happens, the reputation of IT can suffer. Most companies – also not-for-profit organizations – are entirely dependent on the internet for their core businesses and the speed to innovation there is staggering. That means the ability of a business to react to market dynamics is based to a large degree on the agility and flexibility of their IT department.

Since so many organizations rely on ITIL as the foundation of their service management processes, understanding the synergies between ITIL and DevOps is essential to improving organizational performance and business outcomes. As many recent examples have shown, IT organizations that fail to confront and reconcile the widening gap between their development and operations teams stand to lose their footing in today's competitive business environment.

# 2    Introduction

To get a complete perspective of the depth of best practices that ITIL addresses, organizations should understand the key frameworks and standards that apply to ITSM. These include, for example, the following: ITIL, ISO/IEC 20000, ISO/IEC 27001, CMMI®, COBIT®, PRINCE2®, PMBOK®, M_o_R®, eSCM-SP™, eTOM® and Six Sigma™. For best-practice guidance, DevOps processes can turn to ITIL as the foundation architecture, referencing other standards and frameworks as needed to solve particular business issues.

These proven practices also can be combined with organizational-specific practices for competitive advantages and improvement of the practices themselves. ITIL, because it is a non-proprietary and non-prescriptive approach, helps with the construction of enterprise-specific frameworks. ITIL guidance enables you to modify your own processes and address the DevOps gaps based on IT service management best practices. (See Figure 1.)
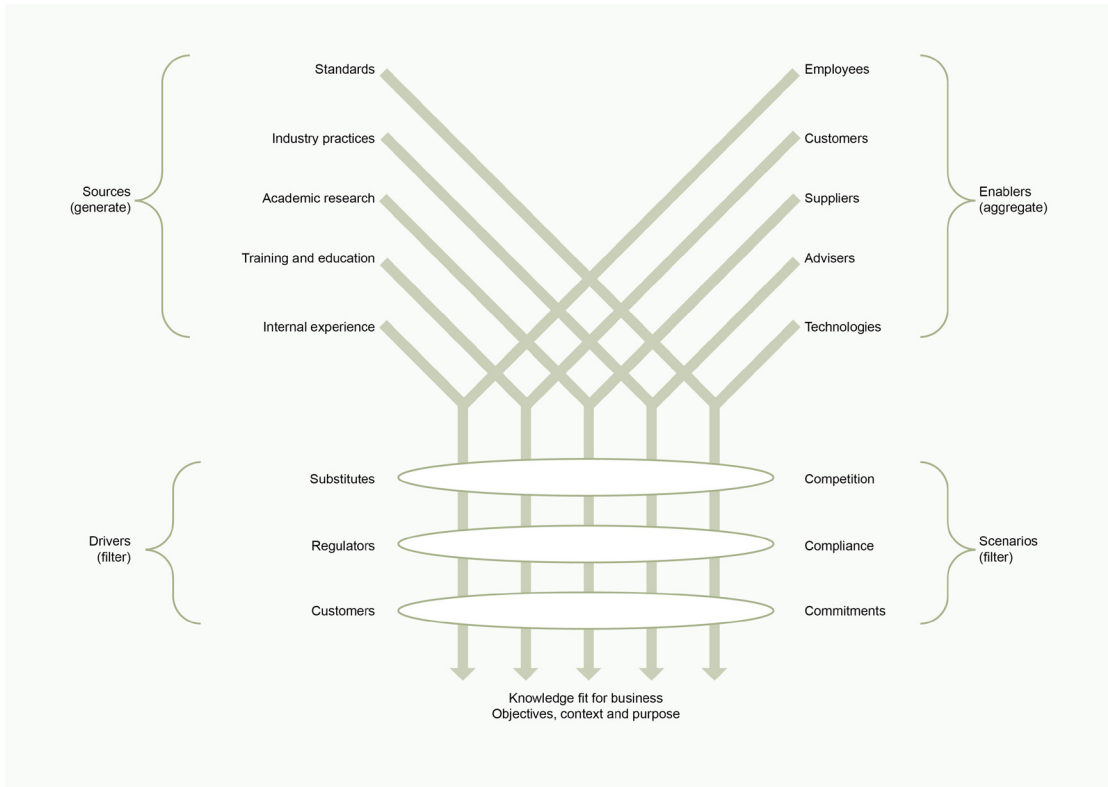
**Figure 1     Source of best practices**

ITIL describes the application management process in the service operation publication as having the following activities – requirements, design, build, deploy, operate and optimize (Figure 2). ITIL is interested in the overall management of applications within the application management function. Alignment between development and operations of the applications needs to be accomplished. Applications development should be involved in all stages of the ITIL service lifecycle at various levels of engagement. The ITIL application management lifecycle does not replace any software development lifecycle but is meant to show collaboration between application management and operation management.
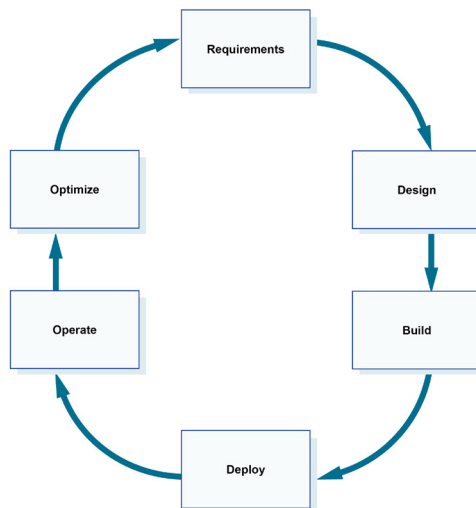


**Figure 2     Application management lifecycle**

It is important to remember the ITIL service lifecycle stages are dynamic. This dynamic nature can be applied for decision support. For example, although you may be focused on one stage of the lifecycle in your job function, you may have to make decisions related to another stage – such as a developer working with the release and deployment process in service transition having to make service design decisions before building the release. The requirements stage is active during service design stage of the lifecycle. The design stage translates requirements into specifications for the application, environment and operational model. In the build stage the application is coded or acquired; and with the operational model are made ready for deployment. Build and deploy are a part of the release and deployment process in the service transition stage of the lifecycle. Release includes build and test; deployment includes installation and training for the application. Early life support (ELS) helps with deployment to operation success. When the service or application is in operation value can be realized and the service can be monitored for continual improvement of optimization. The key performance indicators (KPIs) obtained including user satisfaction can direct further development improvements and provide a DevOps practice with factual information for development and operation coordination and collaboration.

DevOps uses agile and lean methodologies to improve or expedite solutions through development to operations stages for value realization. Agile methods depend on interactions and collaboration among people, processes and technology. The specific process areas of configuration management, change management and release and deployment are very important in an agile environment. Just as in ITIL, the process integrations help foster agility. The success of agile methods (particularly when addressing the DevOps gap), while sometimes measured by the increased volume of deliveries, is best measured by customer satisfaction, given the continual delivery of needed solution and services.

Continual delivery of developed service solutions needs to be in synchronization with the ability of the consumer to absorb the benefit. Services that are delivered too slowly cannot meet the needs of the consumer and services delivered too fast cannot be utilized. Service solutions should also leverage the consumer's service value chain and be continuously integrated to avoid the necessity for the creation of manual procedures where once automation existed.

A DevOps strategy that facilitates aforementioned continual delivery and continuous integration should leverage technology that has integrated and automated application-release capabilities. This technology should provide the following major capabilities based on ITIL best practices:

- a real-time, end-to-end, actionable view with comprehensive visibility of releases as they progress through their individual processes
- control over environment configurations to eliminate inconsistencies, unauthorized changes and misconfigurations
- integration of automation and human-oriented workflows
- diagnostics and root-cause analysis
- seamless integration with change management to track changes during a release.

# 3     ITIL architecture

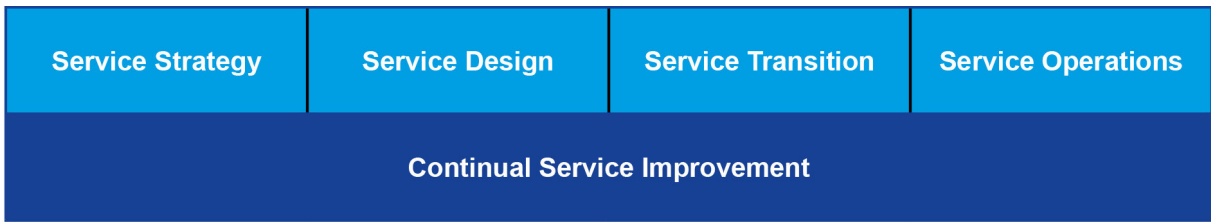| Service Strategy | Service Design | Service Transition | Service Operations |
|---|---|---|---|
| Continual Service Improvement | | | |

**Figure 3     Simple ITIL foundation architecture**

This section reviews ITIL architecture and how it applies to DevOps. ITIL consists of five service lifecycle stages, and key processes described in five core publications (see Figures 3,4 and 5):

● service strategy
● service design
● service transition
● service operation
● continual service improvement.

Continual service improvement is integral in all other lifecycle phases, each stage of the lifecycle is dynamic and supports the other stages. ITIL focuses on utilizing people, processes, products and partners for the effective, efficient, and economic delivery and support of services. Each publication focuses on particular process areas to support the decisions that must be made within that stage of the service lifecycle. The entire service lifecycle is relevant for DevOps because it focuses on service delivery and defining the overall service relationship between the customer and supplier.
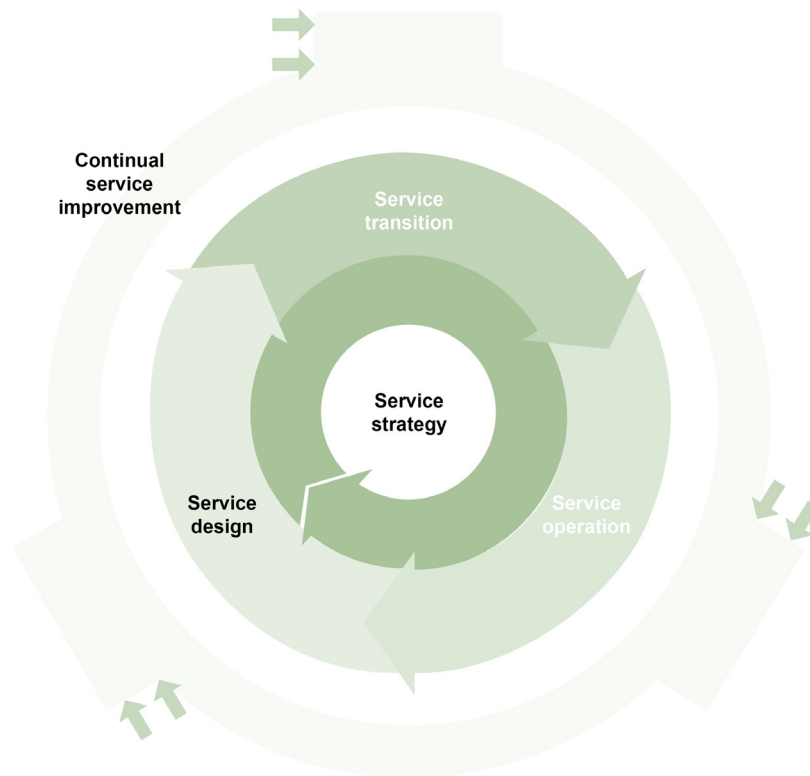


Figure 4     ITIL service lifecycle approach

**SERVICE STRATEGY**
- Strategy management for IT services
- Service portfolio management
- Financial management for IT services
- Demand management
- Business relationship management

**SERVICE DESIGN**
- Design coordination
- Service catalogue management
- Service level management
- Availability management
- Capacity management
- IT service continuity management
- Information security management
- Supplier management

**SERVICE TRANSITION**
- Transition planning and support
- Change management
- Service asset and configuration management
- Release and deployment management
- Service validation and testing
- Change evaluation
- Knowledge management

**SERVICE OPERATION**
- Event management
- Incident management
- Request fulfilment
- Problem management
- Access management

**CONTINUAL SERVICE IMPROVEMENT**
- Seven-Step Improvement Process

Figure 5    ITIL service lifecycle processes

## 3.1 SERVICE STRATEGY

The definition of service management is "a set of specialized organizational capabilities for providing value to customers in the form of services". Services are supported by service assets which are organizational capabilities and resources. Suppliers and customers have service assets. The relationship between the customer and the supplier is defined how the service asset work in an exchange fashion to deliver the service. For example, a customer has an asset such as a person that needs to use a supplier IT infrastructure asset. Figure 6, illustrates that the practice of service management is simply to provide service assets to customers and to eliminate any constraints in the use of the service for maximum performance to support business outcomes. DevOps, in this case, becomes an enabler for increasing the maturity of the service management practice within a supplier's organization by removing constraints to service delivery performance and can be thought of as an organizational strategy for this purpose.
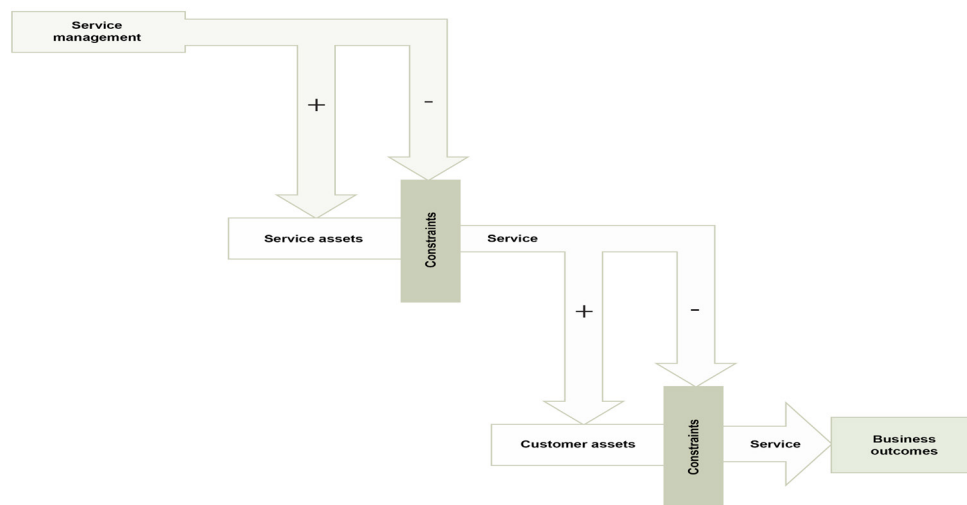


Figure 6　ITIL service lifecycle approach

The service structures in the value network  play a key role in service management and the stages of organizational development. IT service management is actually a value network within an organization and has patterns of collaborative exchanges. This exchange of information in an agile, collaborative manner between development and operations is in line with the spirit of DevOps.

The stages of organizational development are: network, direction, delegation, coordination and collaboration – and they are related to a management style. Network organizations, for example, often have no specific structure, specific governance or defined processes. Collaborative groups, at the other end of the spectrum, have service governance and many defined processes and are highly skilled in teamwork. DevOps functions best in a collaborative structure because of the increased responsiveness to changing customer needs.

All the stages of the ITIL service lifecycle must support the service strategy. Activities, resources and capabilities needed for DevOps must support the overall business strategy. For example, if you develop any application, a DevOps approach supports service performance and the way you go to market with the services that you deliver. This helps the organization run the business better by becoming more efficient and effective with usage of service resources focused on providing value to the end consumer. This can also help the organization grow their business in the markets that they serve or new markets because of the cost savings from the efficiencies gained which can be reinvested into new services. The key DevOps concept that supports this is the improvement in the relationship between development and operations.[1]

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1 The ITIL glossary defines "value network" as "a complex set of relationships between two or more groups or organizations. Value is generated through exchange of knowledge, information, goods or services". ITIL® Glossary and Abbreviations: English (London: AXELOS, 2011), http://www.itil-officialsite.com/InternationalActivities/ITILGlossaries_2.aspx

## 3.2 SERVICE DESIGN

ITIL positions the application management development function within operations as a function that works across the service lifecycle, collaborating with other functions throughout the process – which is very much in the spirit of DevOps. For example, in service design, this collaboration involves helping with build-or-buy decisions. If the decision is to build the solution, the service assets (including people) must work collaboratively as members of the service design team to coordinate efforts and produce a service design plan (SDP) or service requirements plan. The SDP describes application-related outcomes and the business relevance as well as the underpinning activities and capabilities needed.

The SDP can become a critical document for decision support with DevOps activities because it basically describes the scope of the developed application. Not setting user application capability expectations can result in incidents related to non-features of the application resulting in reactive development efforts with little or no supplier value. These requests should be treated as requests to inspire strategic thinking on the overall value of request to customer and supplier, appropriate cost model for financial recovery, development strategy and many other concerns for overall value creation and realization. DevOps practices enforce working in a service oriented fashion instead of a misguided reactive siloed fashion, ITIL as a foundation can help with this focus.

## 3.3 SERVICE TRANSITION

Service transition enables a key capability needed within a DevOps environment: collaboration. The primary purpose of service transition is risk management and knowledge management. The specific process areas that enable service transition are transition planning and support, change management, knowledge management, asset and configuration management, change evaluation, service validation and testing. Service transition supports the service strategy organizational structure and development phases. Also crucial to service transition is building the appropriate service to support business outcomes. Development should ensure that any application updates delivered will provide value to the business customer and the service provider. (See the ITIL publications for more information about value creation and value realization.)

Application management works with the service transition release and deployment process areas to build, test and implement the new service and to be available for early life support (ELS), helping IT achieve expectations and reduce incidents related to the service. The overall planning and coordination of services is accomplished through transition planning and support, configuration, change, release and deployment management.

Service transition can be reactive or proactive. Reactive service transition can implement a change to prevent an immediate risk. Proactive service transition focuses more on trends and future business needs. Both are relevant in a DevOps environment. Understanding the relationship of service transition policies and processes to reactive and proactive behavior can enhance service agility and DevOps. Being proactive is helpful but usually not enough, since proactive behavior can still impact quality of service, the service experience and service relationship. Sometimes IT organizations adopt a DevOps approach because they need to improve overall customer satisfaction. IT must also ensure that the organization is service focused to mitigate service risk. The next step in maturity for an organization that adopts a DevOps approach and ITIL is to focus on service alignment.

In the service transition stage, application management and operations management meet. Service transition best practices help enable agility and, therefore, help enable DevOps as a practice. The practice of DevOps supports the organizations overall practice of ITSM. Organizational maturity, especially as it relates to people roles and responsibilities in service transition is the organizational challenge that must be met for DevOps to become a reality for improved value.

## 3.4 SERVICE OPERATION

A key principle in ITIL service operations is managing stability versus responsiveness. Operations want stability; development wants to be responsive to customer needs. Business and IT requirements are constantly changing, requiring agility in producing application functionality while at the same time maintaining IT stability for application performance. ITIL's service lifecycle approach helps organizations agree to desired changes, take advantage of the existing infrastructure and understand what it takes to deliver the changes for value realization in operations.

Service operation process areas can provide valuable input into DevOps. When events, incidents, problems, requests and system access tickets are created, as well as the key performance indicators created, these processes can give direction to further continuous service improvement for DevOps. Integration of service operation and DevOps can help improve overall customer satisfaction and service usability. Service automation of these ITIL process areas coordinated with DevOps, especially event and incident management, will help improve overall service delivery performance.

IT organizations sometimes need to transform their services and applications quickly to meet customers' needs or risk becoming optional and having more services outsourced. Adopting a DevOps approach and ITIL service operation best practices helps organizations be more responsive to business needs without affecting operational stability. While at the same time support the organizational service strategy.

## 3.5 CONTINUAL SERVICE IMPROVEMENT

Every approach can always be improved to increase overall performance and business value. DevOps methodology is intended, among other things, to apply the principles of continuous delivery and continuous integration to improve the performance of application development efforts. ITIL's seven-step improvement process (Figure 7) can help facilitate this improvement. This process, and its relationship to DevOps, are described as follows:

- Identify the strategy for improvement.
  - A DevOps approach should support a business outcome.
  - Strategy as well as tactical and operations goals need to be understood.
- Define what you will measure.
  - Conduct a gap analysis for achieving DevOps integration with ITSM.
  - An example key measurement in DevOps could be the following: customer satisfaction and end-user performance as related to number, quality and frequency of releases.
  - Critical success factors (CSF) and key performance indicators (KPI) must be defined for DevOps.
- Gather the data.
  - DevOps should focus on gathering data from service transition and service operation.
- Process the data.
  - DevOps CSF and KPI data are processed and turned into information.
- Analyze the data.
  - Understand trends.
  - Transform information into knowledge for decision support to realize improvement.
  - Understand user and supplier perspectives.
- Present and use the data.
  - Understand the business improvements of implementing a DevOps approach.
  - Create plan for improvement.
- Implement improvements.
  - Implement lean and agile improvements.
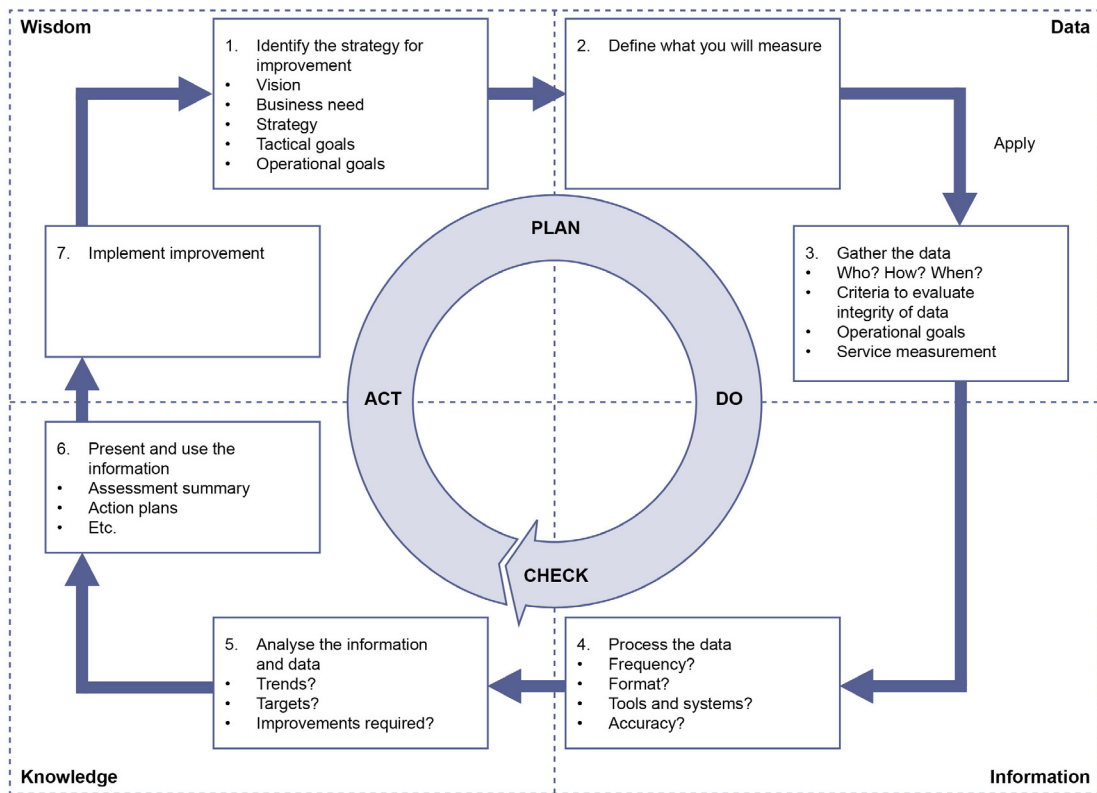  - Improve and correct the DevOps approach.

Figure 7    Seven-step improvement process

As an organization matures, its focus should be on business outcomes which are defined in the seven-step process. Adopting ITIL best practices will help organizations that are utilizing a DevOps approach become more service aligned with application releases.

The ultimate goal for application development is to take a business service management (BSM) approach. BSM simplifies and automates IT processes and prioritizes and orchestrates work according to business needs. Adopting a DevOps way of thinking helps achieve higher levels of BSM and provides greater service value (see Table 1).

| Level | Maturity level | BSM value maturity Level |
|---|---|---|
| 5 | Business management | Applications are developed based on consumerization, i.e., marketing and demand strategy. Application usage (utility) and warranty are controlled better in the design stage to reduce incidents, defects, and problems. No training is needed for people experienced in a vertical discipline. Application updates are controlled by the end user. IT pushes and pulls knowledge from stakeholders into the system for organizational decision support. Applications support service financial management cost and price expectations. |
| 4 | Service aligned | Applications are service oriented across various process areas. Applications are aligned to an application and service portfolio to support investment decisions. Services are understood and service decisions can be made based on information and knowledge. Application updates are coordinated by IT to avoid service interruptions. |
| 3 | Proactive | Applications are coordinated with related processes. Applications supply information, and knowledge is related to data sources, such as trends. The applications are IT oriented by the stakeholder process. Application updates are coordinated by IT to avoid service interruptions. |
| 2 | Reactive | Applications present data that must be interpreted by the end user to determine information and knowledge for IT decisions, which may not support overall business decisions. Application updates are pushed by IT, and early life support is provided for disruptions. Change, release, and deployment management are not coordinated, and application changes cause disruptions. |
| 1 | Undefined | Applications are delivered from an IT perspective. Extensive end-user training is needed to translate a job process to technology usage. Applications are not integrated: integration is manual. Multiple and separate data sources support applications. Application updates are pushed by IT and may cause business interruptions. |

Table 1    Example of application maturity

ITIL's balanced approach to focusing on people, processes, partners and products for efficiency and service effectiveness will help an organization create a holistic approach to DevOps. The people in the IT organization might need to change the way DevOps is adopted and provide improved maturity to the DevOps strategy. Process relationships between development and operations might need to be improved. Partners should be considered in the overall value network. Products should support processes with improved capabilities for automation of the synergies between development and operations.

ITIL provides architecture for ITSM and includes guidance for organizational functions and roles, processes and activities within processes. ITIL also includes suggestions for technology capabilities that support processes and organizational roles. DevOps should leverage these ITIL capabilities for organizational coordination, collaboration and decision support.

# 4      Adopting DevOps

Service handovers should be collaborative and more iterative in order to quickly respond to customers. IT's efforts should be continual to support the end user's consumption of IT in the manner that meets the end user's expectations and provides the greatest value to the business. An environment lacking collaboration has few or no formal processes (as discussed earlier in "Service strategy" and illustrated in Figure 8). Collaboration between development and operations must exist for this to work (see Figure 9).

In most organizations, the development and operations handoff is defined in some way, but support for an ongoing, agile, two-way relationship is not defined. Failure to improve these processes can result in incidents and problems with deployments because of product changes. The concept of early life support, as defined by ITIL, helps bridge the capability gap between the supporting relationships of development and operations to achieve consumer value realization. Agile methods define an ongoing collaborative relationship at the earlier stage of the handover for a quick fix or turnaround of a consumer service for value or, in ITIL terms, for overall service utility. DevOps with ITIL best practices supports agile development and consumer value.
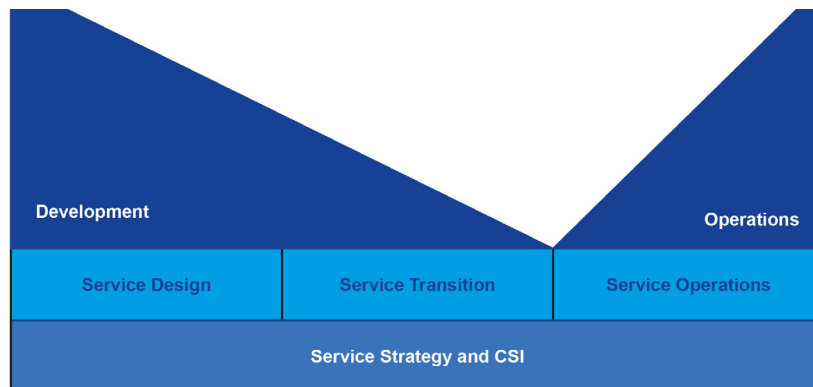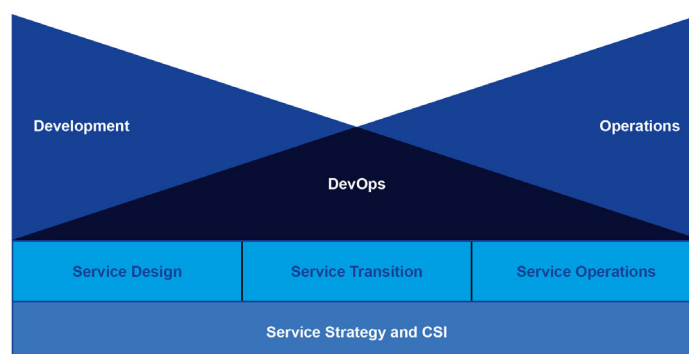


Figure 8    Development and operations



Figure 9    DevOps industry architecture

## 4.1 ITIL AND DEVOPS – A POWERFUL COMBINATION

Both ITIL and a DevOps approach are intended to support the delivery of quality services to consumers. A DevOps approach should not be implemented without reference to ITIL best practices and maturity improvements should be coordinated and collaborative to realize value. Organizations need to understand that services are defined relationships between the customer and the supplier of the service. A mature DevOps and ITIL approach helps improve the relationship between IT and its customers. Each discipline working together helps with continual service improvement and organizational performance.

DevOps and infrastructure as code (IaC) can be supported with the asset and configuration management process in the service transition lifecycle phase. Tools such as the configuration management database (CMDB), which maps the IT infrastructure, can help influence and support DevOps application designs. The infrastructure architecture knowledge can help with DevOps decisions related to designing and implementing the most efficient, agile and effective DevOps-style release processes. This knowledge can support infrastructure as a service (IaaS) cloud development and deployment of DevOps capabilities as a service (SaaS) solution.

Service design processes should be coordinated with DevOps-oriented release management processes. This effort includes design coordination, change management, release and deployment and service validation and testing (SVT). It also includes service design and transition policies, such as the creation of service design packages (SDP) and early life support (ELS). This coordination and collaboration during service transition helps ensure value realization and an enhanced user experience and engagement for developed products or services.

Service operation processes help ensure overall support for developed solutions. Since ITIL is dynamic in its relationship with other service lifecycle stages, feedback to service transition will occur — including feedback to DevOps for continual service improvement.

# 5    Conclusion

ITIL and other best practices can help you increase the value of your DevOps initiatives and avoid DevOps becoming siloed within your organization. Lean methodology, foundation to DevOps and agile development, says that increasing the delivery volume of application updates to your users is not enough. Users don't want just a lot of updates; they want updates that are responsive to their needs and increase the value of the production application or service. Application updates should enhance the user experience, increase service utility and add value to the service provider. Organizations are adopting DevOps to improve the delivery and the delivered value of application solutions to the end consumer while lowering the organizational stresses involved in that delivery or a reduction in the IT friction.

ITIL establishes the best practices for IT service management that have been adopted by organizations all over the world to help improve performance focused on needed service outcomes. The combination of the two disciplines will help you improve your service relationships and service outcomes as well as help you provide agile service delivery.

For more information about ITIL, visit www.bmc.com/solutions/itil/itil.html. For more information about DevOps, visit https://communities.bmc.com/communities/community/bsm_initiatives/devops.

## About the author

Anthony Orr is director in the Office of the CTO and a member of the Thought Leadership Council at BMC Software. Anthony has worked for BMC for more than 15 years in various managerial, consulting, marketing and technical positions. He is an author of the ITIL v3 2011 publication update, ITIL MALC exam book and a senior examiner with responsibilities for the ITIL v3 certification examinations. Anthony is currently a board member of itSMF Houston Local Interest Group (LIG). He participates regularly as a speaker and expert panel member for itSMF events globally. Anthony has more than 30 years of IT experience and has held various roles in other companies prior to joining BMC including roles in development and operations. In his roles, he has been responsible for strategy, architecture, implementation and management of numerous service management disciplines and processes. Anthony is a frequent speaker on best practices at industry events and BMC customer forums. He has authored numerous white papers, pamphlets, podcasts, videos and blog posts on service management topics.

## About BMC

BMC helps leading companies around the world put technology at the forefront of meaningful business change, improving the delivery and consumption of digital services. From mainframe to cloud to mobile, BMC delivers innovative IT management solutions that have enabled more than 20,000 customers to leverage complex technology into extraordinary business performance—increasing their agility and exceeding their expectations.

Today, flawless interconnected digital experiences will define business relevancy and success. BMC is committed to helping companies explore and profit from the New IT, a vanguard operating model that responds to complex business and customer needs with digital transformation, combining traditional technology with groundbreaking capabilities.

## About AXELOS

AXELOS are a joint venture company, created by the Cabinet Office on behalf of Her Majesty's Government in the United Kingdom and Capita plc to run the global best practice portfolio, including the ITIL and PRINCE2® professional standards.

The goals of AXELOS are many and varied, each one aimed at helping businesses and individuals reach success, empowering them to truly stand out in a competitive market.

- We continually promote and advocate quality training.
- We strive to encourage growth, development and progress.
- We always look for innovative new solutions to improve best practice standards and processes across the board.

The result is improved skills that are relevant to the industry as a whole, and enhanced employability for all, benefiting the global economy. The benefit to you and your business in particular: better trained employees, streamlined operations, and the peace of mind of knowing that you are working with an industry-leading organization, which provides products and services with a long-standing reputation for setting the industry benchmark.

# Acknowledgments

# Trade marks and statements