ITIL: IT Infrastructure Library: Operational Excellence Framework

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Abstract
Contemporary information technology (IT) operations generally require the management of numerous systems composed of infrastructure elements, software applications, client-side devices, and external vendor-hosted applications. Effectively managing the processes, functions, inputs, outputs, and transitions between systems requires a consistent, repeatable, best-practice framework that organizations may adapt in total or in part. The Information Technology Infrastructure Library (ITIL) is suitable for addressing the modern management dilemmas within the IT field. The ITIL framework contains generalized models that may be adapted to fit any IT environment regardless of industry or internal structure. This entry decrees the imperative for IT organizational adoption of a best-practice framework, namely, the ITIL framework, to enable business-driven IT operation. Illustrative examples of specific components within the ITIL framework will be applied in an effort to highlight realistic benefits of leveraging ITIL. The five core service lifecycles within ITIL will be explored and justified through explanation and illustrative examples.

INTRODUCTION

The Information Technology Infrastructure Library (ITIL) framework is a widely recognized and scalable model for addressing the numerous challenges associated with the management of complex information technology (IT) operations. While a variety of IT Service Management models may be leveraged for addressing IT operational problems, the ITIL model is comprehensive in coverage of the IT operational landscape.

The ITIL framework is composed of five stages as part of the lifecycle and these stages are known as Service Strategy, Service Design, Service Transition, Service Operation, and Continual Service Improvement (CSI). Each stage is composed of multiple processes that contain inputs, outputs, roles for process management, functions, challenges, critical success factors, and a variety of best-practice discussions.

This entry will present a persuasive argument for leveraging one or more of the five stages and one or more process within a stage for the purpose of improving IT operations. Selected processes and lifecycle stage references will be included, though not exhaustive of the scope of ITIL process coverage. The term businesses will be used as a representation of any organization regardless of industry or scope of services.

THE ARGUMENT FOR OPERATIONAL EXCELLENCE USING ITIL

IT Driven by the Business

The degree to which IT organizations enable a business to reach its strategic and organizational goals is the foundation for the justification of existence. IT organizations work in the foreboding shadow of outsourcing all or parts of the supported IT services as external pressures from globalization, rapidly changing market structures, and the age of do more with less strain operations and budgets.

Upper-level executives have many choices in the marketplace for outsourcing IT components in the modern landscape of IT service providers, in part from the extensive marketing in place that transmits a message of low-cost, high-reliability, exemplary services. When examining IT from a cost perspective, and if a relatively low knowledge of how IT systems function is apparent, upper-level executives may be easily tempted to seek the acquisition of outsourcing systems. This scenario is plausible when coupled with executive IT leaders who fail to communicate or deliver on the value of their organizations’ IT services. Further, the absence of a reliable framework for IT operational excellence creates a reactive environment that is subjected to the personal leadership style of executive IT personnel.

IT organizations must take the actions necessary to integrate fully from a focus and priority perspective with the business, ensuring that all decisions are taken
with business context in mind. This is the heart of a business-driven approach—the ultimate expression of a service mindset. IT organizations driven by the business may be exemplified through a multitude of best practices and in part by:

- Provisioning IT services based on the mission and strategic goals of an organization
- Ensuring that IT operations and their management align with core values
- Validating that autonomous, lower-level IT units coordinate initiatives with executive-level goals
- Maintain agility and scalability within the IT service portfolio for the addition of new services and systems
- Practicing proactive operational measures as opposed to reactive, short-duration operations known as fire-fighting
- Protecting an appropriately balanced governance structure to ensure that flexibility is equally yoked with control
- Conserving IT capital for strategic imperatives as opposed to allotting funding primarily to operations
- Purgung systems that have lost the minimum acceptable level of business value to the organization
- Guarding IT talent through leadership, professional organization engagement, training, and financial incentives
- Leading the IT human resources through a culture of reward and recognition as opposed to allowing non-IT leaders to assume the role in an ad-hoc manner

Numerous examples, buzz phrases, and leadership methods exist on implementing or maintaining an IT organization that is aligned and driven by the business at executive or intermediate levels. Given the diversity in approaches, adopting a common framework that is ethical, repeatable, and practical is important when creating common standards across IT organizations. The ITIL framework is capable of providing guidance toward business alignment at strategic levels through the Service Strategy stage processes, key performance indicators, demand management practices, and financial management.

**IT Driven by the Customer**

The customer is not always right, but the customer is always the customer. Businesses exist for the purpose of creating a value and accepting the risk that customers are unable to achieve on their own. Higher education organizations, as an example, offer an assortment of degrees as a core business offering that allow a customer (student) to select a degree (product) for the purpose of qualified entry into the workforce (value). IT services, with the exception of fully online degree programs, act primarily as a supporting and enabling function to the customer as opposed to the business service itself. Therefore, all IT services must be aligned with business imperatives that produce and support activities that create customer value.

When IT is driven by the customer, gauging customer satisfaction is required through a variety of measures. The end and chief result among those measures is the ability to determine if IT services are providing value to the customer or functions that support customers.

> “Companies that sell products or services requiring technical support realize the importance of assessing customer satisfaction with the support service as only a small percentage (5%) report that they are not measuring any satisfaction indicators.”

The importance of IT driven by the customer is linked to revenue. Customer service indicators have a direct correlation with the likelihood of the continued customer base size and forecast the growth or decline of the customer base. In some organizations, customer service ratings are tied to compensation and incentives. IT organizations in general leverage one to many IT services that support all or portions of the organization and the related customer service metrics.

To support the business and promote operational excellence, IT organizations should leverage a variety of ITIL-aligned customer service metrics found through the Service Operations stage. The customer service metrics presented are not based on ITIL; rather, they are aligned with ITIL and could come from a variety of sources. Customer-driven IT service metrics may include:

- **First Call Resolution.** The rate at which issues are resolved on the first contact to the service center.
- **Average Incident Response Time.** The average time for the service center to respond to customer support incidents where a technology component is not functioning correctly.
- **Average Support Request Response Time.** The average time for the service center to respond to customer support requests. Examples may include requests for a new printer, monitor, account change, or similar demand on IT services.
- **Percentage System Availability.** The rate at which key business systems are available to customers, excluding legitimate maintenance periods.
- **Percentage Satisfaction of Systems.** The generalized satisfaction and experience by customers of IT systems based on qualitative psychological perception.

Numerous customer satisfaction metrics exist and should be adjusted to meet the needs of the IT industry. The practicality of ITIL is related to providing a
standard baseline of processes and metrics that may be transformed to fit the model of the organization. ITIL offers universal terms that are comprehensive in application to all IT components and may be effectively used for customer-driven IT initiatives.

**IT Driven by Excellence**

The core purpose of ITIL is to drive operational excellence through the leveraging of best-practice frameworks that are meant for IT service management. Modern IT services are generally complex in architecture, integration, infrastructure, and dependencies. This requires deep knowledge and specialized training to support such services.

IT professionals frequently receive specialized training to support a variety of services in the organization. However, it is not common for IT professionals to receive training on managing IT service operations using a framework while leveraging a variety of metrics to gauge performance. Professional IT positions generally require a Baccalaureate degree from an accredited institution. Common majors for computing and information system professionals include computer science, software engineering, engineering, management of information systems, mathematics, and information science. IT degrees provide adequate preparation to analyze, design, implement, and support IT services. Unfortunately, these degrees normally do not contain a course (s) that provide a robust survey of best-practice frameworks that may be leveraged for IT operations such as ITIL, International Organization for Standardization (ISO) 2001, Microsoft Operations Framework (MOF), or Control Objectives for Information and Related Technology (COBIT). This dilemma is producing an IT workforce that is not adequately prepared for delivering operational excellence.

Professional adults are motivated through excellence among other incentives. "The vast majority of poor performance is not due to poor skills or lack of knowledge; it’s a result of other causes such as process problem, motivation, incentive issues, resources, or unclear standards."^4^ ITIL is valuable in addressing performance issues through providing clear processes that may be modified while providing foundational standards that may be adapted for any business environment. A common framework of practices unites all areas of IT service management toward the goal of delivering value and thus increases the likelihood for high-performance, resulting in rewards and recognition for IT professionals. Further, ITIL drives excellence through providing information resources for managing risk, knowledge, strategy, and optimizing costs. These factors create cultures of excellence and minimize the likelihood of outsourcing all or some of the organization’s IT service assets. Essentially, ITIL has the potential to not only excel the business as it relates to IT services, but also provide employment security for the professionals working within the framework.

**SERVICE STRATEGY**

**Service Strategy Overview**

IT Service Management leverages the unique capabilities of the IT organization in an effort to provide value through services. Changing those capabilities normally begins at the executive level of the organization. The Service Strategy stage focuses on the broad, enterprise-wide actions and outputs that generate these changes.

Roles within the IT organization that generally leverage the Service Strategy processes and practices include chief information officer, chief technology officers, vice-presidents for IT, directors, and senior-level IT managers. These roles are tasked with providing organizational change and interfacing with customers of the business through managing demand for IT services. Processes within Service Strategy offer insights into strategic IT management that are not found through a Master of Business Administration (MBA) program or other graduate education programs. IT roles responsible for strategy rely on their years of experience from lower levels in the organization once in their strategic role. This may not provide the most effective strategic manager as their previous roles in the IT organization did not require the extent of strategic planning, execution, validation, and measurement.

ITIL Service Strategy is an IT executive’s micro-MBA program that can serve as a great jumpstart to strategic management within IT. ITIL Service Strategy training typically lasts for 24–40 hours of instruction and is completed within a week. This compression allows an executive-level IT role to receive directed education that may be immediately applied to daily work routines without delay while supplementing other executive education and experience-related competencies under development. This is an attractive offer given that IT executives generally do not have excess time due to the often fast-paced nature of their role. ITIL Service Strategy provides a much needed boost to an IT executive’s overall portfolio of knowledge and competency-based education.

The ITIL Service Strategy stage contains numerous core processes and related considerations as shown in Table 1.^5^

**Service Portfolio Management**

The sum of all services offered through an IT organization that are being planned for delivery, now being
offered, or retired from service comprises the service portfolio. The right composition of IT services that create value for the cost investment into the IT organization is the primary duty of service portfolio management. The analyses of all IT services in the organization, when executed with a consistent method through ITIL, produce service definitions, service costs, illustration of alignment to business goals, and financial analysis creating data for common metrics such as return on investment (ROI). Objectives of service portfolio management include, but are not limited to:

- Analysis of services that should remain in operation without adjustment, be changed, or be transferred to a legacy service (retirement of service)
- Governance of which services are offered through an executive decision structure with specific financial investment return thresholds
- Providing an easy-to-understand and consolidated outline of IT services so that customers and employees of the organization are able to clearly discern what services are available
- Implementation of the organization’s risk tolerance levels through risk analysis against IT services offered or being considered
- Calculation of ROI on select IT services

At the core, the purpose of this process is to monitor the changing environment of the organization and adjust the portfolio of IT services with respect to financial factors, volatility of the service, risk tolerance, and strategic imperatives. A financial portfolio of stocks, bonds, mutual funds, or other investment instruments are managed under similar influences. IT executives are wise in managing IT services and demands with the same tenacity and scrutiny of financial investment managers monitoring an investment portfolio. Most IT executives are likely conducting service portfolio management, yet they are not doing so with ascendency toward a framework that provides a consistent decision-making structure with the tools and processes for generating excellence. Adopting service portfolio management provides a clear existing state measurement of IT services and long-term strategy planning and positioning to support impending business imperatives.

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### Table 1 Service strategy select processes and considerations

<table>
<thead>
<tr>
<th>Process Area</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy Management for IT Services</td>
<td>• What business outcomes must be supported</td>
</tr>
<tr>
<td></td>
<td>• What markets are served by the organization</td>
</tr>
<tr>
<td></td>
<td>• What constraints are now impacting the IT organization</td>
</tr>
<tr>
<td></td>
<td>• Who are the internal and external customers/stakeholders</td>
</tr>
<tr>
<td>Service Portfolio Management</td>
<td>• When should the service portfolio be reviewed</td>
</tr>
<tr>
<td></td>
<td>• Who maintains the existing business relationships for each IT service offered</td>
</tr>
<tr>
<td></td>
<td>• What inputs feed changes to the service portfolio</td>
</tr>
<tr>
<td></td>
<td>• How is business value calculated for each service</td>
</tr>
<tr>
<td></td>
<td>• Are all services accurately defined and displayed to customers</td>
</tr>
<tr>
<td>Financial Management for IT Services</td>
<td>• What is the existing IT cost model</td>
</tr>
<tr>
<td></td>
<td>• Who determines the approval of IT budgeting and policies</td>
</tr>
<tr>
<td></td>
<td>• What charging policies exist for the IT organization</td>
</tr>
<tr>
<td></td>
<td>• When are financial compliance issues reviewed for validation</td>
</tr>
<tr>
<td>Demand Management</td>
<td>• How are IT contracts managed and cost forecasting conducted</td>
</tr>
<tr>
<td></td>
<td>• How are demands for new services estimated</td>
</tr>
<tr>
<td>Business Relationship Management</td>
<td>• Does the appropriate capacity exist for managing the existing services and scaling to select new services</td>
</tr>
<tr>
<td></td>
<td>• Who defines and monitors PBA used for forecasting demand</td>
</tr>
<tr>
<td></td>
<td>• Why are services delivered at their existing capacity</td>
</tr>
<tr>
<td></td>
<td>• How are customer needs identified</td>
</tr>
<tr>
<td></td>
<td>• Who is responsible for establishing and maintaining business relationships between the IT organization and customers</td>
</tr>
<tr>
<td></td>
<td>• What value is provided for IT services from the customer perspective</td>
</tr>
<tr>
<td></td>
<td>• What levels of customer satisfaction with IT services exist</td>
</tr>
</tbody>
</table>

Source: From Joshua. [5]
nature of the technological landscape. Having too little capacity for new or changed services increases risk, limits organizational agility, and may frustrate customers when demands are not realized. This balancing act is the magic wand that executive IT leaders must yield as they walk the tightrope of IT service management.

Demand management may be practiced within any of the ITIL stages. A large demand for support services related to wireless devices would commonly be found within the Service Operations stage. Yet, demand management leverages, at its most basic definition, supply and demand. If the demand for wireless device support is 1000 support requests and the service center has capacity for 200 support requests per day, then demand is not adequately met. In this example, demand management principles transcend across ITIL stages. However, the majority of demand management, given its complexity and financial relationships, is practiced at the executive level within Service Strategy.

Words such as anticipation, patterns, analysis, identification, and utilization are common within the demand management process family. These words imply a proactive manager who monitors, measures, and takes action before realization of the demand. These activities reduce risk and optimize cost structures. Demand management is not a panacea and learning comes through experience after risks are realized in many cases. In any case, proactive identification and survey of the IT landscape allows for an improved potential of meeting business demand for IT services.

Monitoring for repeated patterns of business activity (PBAs) is the primary tool of demand management. PBAs represent the dynamics of the business and include interactions with customers, suppliers, partnerships, and other stakeholders. Once a PBA has been identified, a profile may be drawn and documented. These profiles display patterns that aid the IT executive in making decisions related to budget requests, staffing, project or program management, and reporting.

An example of PBA applied through demand management may come through multiple reports or data sources that trickle in over a three-month period. The first being a balanced scorecard report from the service center indicating the increase of service requests for new or changed mobile devices that contain applications (apps) that provide access to an inventory management system within the IT organization as one of numerous reportable items. A second report contains customer service feedback through a third-party survey vendor containing numerous survey responses indicating a lack of mobile access to the inventory management system. When reading an IT industry-related publication, a featured article references transition statistics related to decreasing access of business data via desktop computers and increasing access requests through mobile apps and devices. The IT executive then reads a business case for a new project request to upgrade the existing inventory management system without adding new features. Finally, a memorandum from the chief executive officer channeled through the vice president for Human Resources states that an initiative is underway for increasing the number of telecommuters who will work from their home or a remote location.

When reviewing the previous example, the reader has the luxury of seeing the facts in a single paragraph that subtly proposes the idea that a mobile app containing inventory management data should be considered as an additional IT service. The project to upgrade the inventory management system would be delayed unless it could directly support the implementation of the mobile app’s new feature. This is a reader luxury. IT executives are bombarded with large quantities of data in a three-month period and could easily overlook the relationships between these data sources. Enter ITIL demand management. Through practicing a periodic approach that reviews the service portfolio of new services and existing services against specific criteria amid established PBAs, there is an opportunity for identification. When using this information with profiles of customers and/or business users, these patterns will be addressed proactively as opposed to reactively.

“Being proactive is about taking responsibility. Between the stimulus and the response is your greatest power—you have the freedom to choose your response.”[6] The core of demand management is not to reduce risk and optimize cost alone. These are symptoms of the true opportunity that demand management presents; proactive identification and the relative freedom of our actions as it relates to IT Service Management.

**SERVICE DESIGN**

**Service Design Overview**

Processes occur within the organization whether designed by IT leaders or not. The question for IT staff is whether they want to be in control or allow the processes to develop from the lower levels of the organization and upward. Processes that occur without careful design tend to be more prone to error, less holistic, and inefficient in nearly every case, reducing the intended value of the IT service.

The Service Design stage captures the new or changed business requirements from the Service Strategy stage. The new or changed service is then analyzed and evaluated with the ultimate intended output of a new service that is ready to begin transition into a live environment. An example of a new or changed service moving through the Service Design stage could come in the form of a significant new feature within a mobile
app based on the previous example. The existing mobile app contained four core features. Through the Service Strategy stage, it was determined that adding a fifth core feature to support inventory management would fit within the overall service portfolio and support the existing PBAs.

A project manager or one in a similar role is notified of the changed service structure through the addition of the fifth core feature. Teams or functional groups would then be gathered to design and build the new feature, most likely under the guidance of a project management framework such as the Project Management Body of Knowledge (PMBOK). These teams would then analyze, design, and build the new feature. During the architecture of the service, the team would address the following Service Design stage processes:

- Where does this service fit within the service catalog?
- What are the appropriate service levels that should be provided when supporting this new service and are the existing support functions capable of supporting the service?
- When should the service be available with respect to dates and times? What are the appropriate time periods for conducting maintenance activities?
- How much capacity or transactions for a specified time period should the service be able to accommodate?
- Who and how will we ensure service continuity in the event of a disaster or system failure?
- What information security practices must be followed and designed into the service to ensure security policy compliance?
- Are there any third-party vendors or suppliers who must be managed as part of the long-term support of the service and who will execute the management?

Once these questions have been identified and included within the design and development of the service, it is ready for moving to the Service Transition stage. It is important to note that other frameworks such as the PMBOK for project management, ISO 27001 for information security, or the open group architecture framework for system architecture may be used in conjunction with ITIL. The ITIL framework provides a holistic view in an effort to ensure that important service considerations are not overlooked while allowing for inclusion of other frameworks to cooperate with ITIL to produce a comprehensive service that creates the intended customer value.

Roles within the IT organization that generally leverage the Service Design processes and practices include directors, project managers, senior-level IT managers, business analysts, systems analysts, developers (programming), system architects, and other analysis- and design-related IT roles.

The Service Catalog

The ITIL-based service catalog is one of the most customer-visible components of any process within the ITIL stages. The service catalog presents a consolidated view of all IT services available to customers presently or available through imminent deployment. Within the catalog, every service contains detailed information that describes the service, prices, how to request the service, how to request support for the service, support levels available, and practical uses of the service. The service catalog is intended to be available publicly to customers or internally within the IT organization and available through an intranet or private cloud.

An analogy of the service catalog is like a well-designed menu at a premier restaurant. Numerous dishes are available and some dishes contain supplemental items. An entrée of peppered steak includes a baked potato, broccoli, and carrots. The peppered steak entrée contains a thorough description and has a price of $44.95. A statement next to the steak indicates that “45 minutes should be allowed for preparation” and that customers normally enjoy “red wine” as a supplemental item, though it is not included in the peppered steak entrée. Finally, the instruction to “see your service attendant for ordering information and questions” is appended to the end of the entrée description. This menu item description would provide the customer with adequate information to make a basic decision on whether to order the entrée. Unique questions based on the customers dining preferences would be addressed by the service attendant.

An IT service catalog is intended to provide a similar experience for customers as there should be enough information to make basic decisions without the need to contact an IT representative. Some services may have relationships with others and when described on the service catalog, the customer is able to bundle services and see a total expected costs and wait time for delivery of the service. This works to set customer expectations as opposed to having ambiguous service expectations that lead to customer frustration. Without an idea of costs, time to receive service, or fully understanding what will be received there could be some shock on the customer side. In our previous example of the entrée, if the customer had only seen a peppered steak being listed, the person could be frustration when asked to wait for nearly an hour, pay more than what was intended, and then had received broccoli instead of spinach that was hoped for. Table 2 provides a service catalog entry example. This single example would be one of possible
hundreds within a service catalog with robust explanations and examples for customer review.

**Service-Level Management**

The service-level management (SLM) process includes the administration of numerous service-level agreements (SLAs). The SLA is effectively a level of assurance or warranty with regard to the level of service quality delivered by the service provider for each of the services delivered to the business. SLAs serve as a core measurement that may be used by IT organizations for evaluating service goals and making adjustments based on how well the goals are being reached. SLAs provide a metric for having open discussions that lead into continuous improvement activities to improve a service once it is in operation.

The term *agreement* in SLA implies that two parties have reached consensus. This is certainly true in the case of an SLA. The IT organization develops the baseline SLAs either alone or with customers who will use the SLA and then meets with a customer representative to reach consensus. In the case of our new mobile application feature for inventory management, an SLA would be developed by IT representatives that outlined categories of response time for service based on impact and urgency. For example, an issue that impacted fewer customers with high urgency may be considered a medium priority. This priority level provides a four-hour response time from the service center and a two-day resolution time. Response time would require definition and resolution time would require definition as would any terms that describe actions to be taken by IT representatives. Once the priority levels, term definitions, response times, and resolutions times were documented the process would move forward.

A committee, focus group, or executive level process owner would meet to review the proposed SLA and offer feedback. Modifications would be negotiated, and once completed, an executive-level role would approve the SLA for the service. Later in the ITIL lifecycle, the service will be in operations and the metrics developed in the SLA tracked through the service management application. These metrics will be included in service management reporting and reviewed by the parties who agreed to the SLA. The core value provided to customers through this process is not to hold IT organizations accountable, but to identify if the value intended for the business is being reached. If the resolution time for a medium priority issue is three days and reports indicate that it takes four days to resolve the issue, then the underlying impact of not reaching the agreement should be examined. If a customer using the mobile app feature is completing a process that has a short time period for resolution, such as two days, then solving the problem in four days would not be an acceptable target. The SLA would require review and a new agreement reached for establishing a two-day resolution time for that priority. If the IT organization does not have the resources or capacity to hold to that service level, these data provide the justification for requesting additional resources or shifting resources away from other obligations to meet the business requirement.

Without SLAs, IT organizations are unable to quantitatively gauge how well the service is being supported for the purpose of providing the intended value to the business. While hallway discussions, complaint boxes, service center surveys, and other feedback channels may offer insight into service quality, they generally provide qualitative measures alone. It is in the best interest of the IT organization to quantitatively measure as much as possible to provide a holistic viewpoint as opposed to qualitative measures that may only listen to the *loudest voices or angry customers* who could inaccurately represent the service quality as a whole. SLAs eliminate dependency on these reactive measures and promote operational excellence, open discussions, and justification for the acquisition of new or shifted IT resources.

Numerous SLAs could exist in an IT organization depending upon how many critical services and business processes have been identified. Data from these SLAs are generally reported from the service center as captured through service management software. In large enterprises or cases where a significant number of SLAs are present, it is strongly recommended that a service-level manager role be assigned to a senior IT manager role or to a higher level. Clear assignment of this duty provides accountability to periodically monitor the

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**Table 2 Service catalog example**

<table>
<thead>
<tr>
<th>Service</th>
<th>Vendors Available</th>
<th>Minutes</th>
<th>Cost</th>
<th>Ordering Information</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Telephone (Receive and transmit cellular calls with a data plan)</td>
<td>AT&amp;T Wireless</td>
<td>1,000</td>
<td>$199.99 Device $30 Monthly</td>
<td>Fill out the online order form</td>
<td>Monday–Saturday 8 am to 8 pm Eastern time U.S.</td>
</tr>
<tr>
<td></td>
<td>Verizon Wireless</td>
<td>2,000</td>
<td>$299.99 Device $45 Monthly</td>
<td>Fill out the online order form</td>
<td>Monday–Friday 8 am to 5 pm Central time U.S.</td>
</tr>
</tbody>
</table>

*Source: From Joshua.*

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Wireless Unlimited Data

Unlimited Data

Information Support

Ordering

pmCentral time U.S.

pmEastern time U.S.
service portfolio of SLAs for the purpose of identifying patterns of success or weakness. In cases of success, these should be communicated to the business in an effort to show IT organizational value and capability for supporting new services. In cases of weakness, root-cause analysis should be performed with the expectation of performance intervention to improve services to their defined SLAs or modification of the original SLA.

### Availability Management

SLM requires frequent, periodic attention and evaluation at a high rate, as much as weekly in some cases. Availability management is normally included in the planning and design of a new or changed service and then reviewed annually or semiannually, barring critical events or outages that prompt immediate review.

Availability management is primarily concerned with the service being accessible to customers. If the service cannot be accessed, then it is of no use to customers or the business. The most ambitious of all availability goals is the offering of a 24-hour, 7-days a week, 365 days a year (24/7/365) approach. Essentially, this equates to promising customers that the service will always be available with no exception. IT organization providers generally attempt this goal by default without considering realistic targets and appropriate maintenance periods that minimize business impact. Rates of availability then become skewed when maintenances occur and result in less than 100% availability, implying performance problems even in the most mature IT organization.

Business representatives should first be consulted to determine what time periods are appropriate for conducting maintenance activities along with calendar periods where service availability is critical. For example, an electronics retailer would likely desire minimal service unavailability, if any at all, during the major holidays in November and December. The business may also recognize that the weekends are the busiest days of the week, as such, maintenances would not be allowed on weekends and an alternative time chosen where the lowest amount of service traffic is observable. Understanding this information allows the availability manager to develop an agreed service time (AST) metric that includes these periods.

An AST metric is intended to produce an availability percentage. If the service was agreed to be in operation for 5020 hours in a year (AST), the amount of service unavailability would be subtracted from the AST, then divided by the AST and multiplied by 100 to reach the percentage rate. This metric would accurately evaluate the percentage of availability.

Additional metrics may include the reliability measure of mean time between service incidents (MTBSI), the maintainability measure of mean time to restore service (MTRS), and the reliability measure of mean time between service failures (MTBSF).

The MTBSI seeks to determine how reliable the service is to customers. The purpose is to make improvements to specific components of the service that produce incidents or problems. The measure is quantified by using the available time of the service in hours and dividing by the number of breaks in service. The MTBSF is a similar reliability measure that is more robust in that the total downtime in hours is included, thus more preferable for determining availability.

Using measures to identify reliability and maintainability within availability management removes the dependency of reactive approaches and listening only to qualitative feedback sources for determining the availability metrics of an IT service.

### SERVICE TRANSITION

#### Service Transition Overview

A service that has been identified, designed, and developed is now ready for transition into the live service environment. The Service Transition stage contains the most commonly used processes of all the IT stages as they serve to reduce risk of technical failure and increase the likelihood of customer satisfaction with the new or changed service.

All planning, architecture, and development may be undermined through a poorly managed transition into a live environment. Service Transition may be compared to the last segment of a marathon. The race may have been identified through careful planning and analysis well in advance. The runner in the race came healthy, ran with great strides, and used consistent running principles. Yet, when the runner was preparing to cross the finish line, she stopped all of those positive practices and started walking in circles to take a break. As a result, the runners passed her and she did not finish well. Service Transition is dedicated to ensuring that the last mile is run well and that mistakes from the earlier portion of the race are discovered, mitigated, and resolved.

During the transition of the service into the live environment, the questions that would be covered within the Service Transition stage include:
What testing and validation plans have been executed or will be executed for determining if the service meets the agreed level of quality?

Has the change advisory board (CAB) received all necessary information to make an accurate decision?

How will the change be communicated to customers?

How will the change be communicated to support and IT stakeholders?

Is the service center prepared to support the new feature once available?

What technical documentation exists or should exist for support personnel to provide acceptable levels of technical support?

What customer documentation exists or should exist for customers to learn and utilize the feature as needed on their own?

What available release dates will provide the best transition into the live environment with minimal interruption to customers?

Do customers require training to use the tool and how will that training be executed?

These questions are not inclusive of all possible questions and roles that would benefit the team in transitioning the service into the live production environment. Roles within the IT organization that generally leverage the Service Transition processes and practices include project managers, change managers, release and deployment managers (RDMs), quality managers, developers, mid-level IT managers, systems analysts, technical writers, marketing and communication professionals, knowledge managers, IT system trainers, knowledge managers, and other IT service implementation roles.

Returning to our previous example of a mobile application with a fifth core feature, we find a finished feature ready for transition into the live production environment. The project manager contacts the service testing and validation team for final quality control. Once completed with quality control and related corrections, a CAB reviews a request for change (RFC) to deploy the new feature. The CAB analyzes the request containing all of the details provided from the previous ITIL processes used, namely, service testing, and determines if there are any factors that would cause the change to be rejected for further development or quality analysis. If approved, the RDM reviews the change. The RMD then contacts the marketing and communications team, technical documentation team, training team, service center, change deployment team, and other stakeholders interested in the deployment. The RMD negotiates a finalized date for entry into the live environment among the teams and coordinates the change through to successful completion. The teams should have ideally been a part of the release planning throughout the service transition process so that no surprises or frustration at the upcoming event will be experienced. Early on, the testing and validation processes in non-production environments should create awareness of the impending release that brings the service transition stakeholders into the discussion.

At a set number of days following the change, the RMD reconvenes the change implementers and determines if the change was successful. If successful, it is allowed to remain in the live environment. The RMD then finalizes the change-related documentation and closes the RFC or bundle of RFCs used to deploy the fifth core feature.

Change Management

ITIL has received notoriety and attention from the IT world primarily from the change management processes available. Numerous IT service management software companies and consulting firms are quick to highlight their change management features or skills in an effort to attract IT professionals. A brief glance at top IT service management websites will display the strength of their change management suite of tools.[7]

The emphasis on change management originates from the conception that IT organizations lack a framework or coordinated method for managing services. This may create a perception that a lack of control and visibility exists in the operations of the IT organization. Authorized developers, system administrators, webmasters, support personnel, and any variety of IT representatives have the capability of making changes to the configuration of an IT service. The question then becomes “was the change executed and defined in such a way that it would have been approved by a superior in the IT organization?” This does not mean that the issue is founded in trust to execute a task. Rather, the problem lies in taking a holistic, coordinated, risk-minded approach to introducing a change that provides the maximum potential value to customers. To gain this perspective, teams of IT representatives using a standardized approach are required. Change management is seen as the primary process to implement in an effort to stop the bleeding of individual approaches and replace with a team-based holistic approach. The crux of the change debate then centers on the definition of change to avoid certain systems falling within the reach of the CAB.

Change management has not only gained notoriety from the benefits that come from providing this holistic approach to changes, but has also received negative attention as it is frequently recognized as a method of control being placed on lower-level IT representatives by upper-level IT executives or leaders. ITIL defines a change as the addition, modification, or removal of anything that could have an effect on IT services.[8] A definition written with
such generality leaves little room for exclusion from the change management process and may become a source of frustration for certain IT roles that now fall under its governance. Therefore, numerous change management implementations have failed or experienced strong rejection from the IT organization. “Every organization struggles with the question of exactly which activities need to be controlled with a change record. After establishing the highest-level flow, you should try to get agreement about the policy of when a change record is needed. This is the first, and perhaps most important, policy to define.”[9]

Once the selected services and activities that fall within the control of a CAB have been identified, the development of templates, risk matrices, process maps, and key performance indicators are documented within a change management plan. The CAB itself must be named and a voting structure determined for different types of changes to include normal, standard, emergency, or any other definition of change. A change manager must also be named so that deadlocks on the CAB may be broken and authority of change execution granted. A software application is configured using the change management plan and those who are responsible, accountable, consulted, and informed are given various roles and privileges within the software. After executive communication and rollout of the process, the CAB is then able to begin evaluating changes with an open mindset to CSI to address problems with the process or tools.

Unique books on the subject of change management alone have been developed to address the positive potential and variety of negative problems that result from change management implementation. Readers are urged to consider further research into the change management process upon a full survey of ITIL as this is the second most commonly implemented ITIL process, with 57.3% of all ITIL-practicing organizations having implemented this process in 2013.[10]

SERVICE OPERATIONS

Service Operations Overview

A service that has been transitioned into the live environment falls to the service center as the first line of interaction between the customer and the IT organization. The Service Operations stage contains guidance for how to address service requests, incidents, problems, events, and access management. Any customer interaction regarding the service may flow through the service center against the ITIL Service Operations framework serving as a feedback mechanism to internal divisions of the IT organization. At its core, “the support center exists to professionally manage, coordinate and resolve incidents as quickly as possible and to ensure that no request is lost, forgotten, or ignored.”[11]

Roles within the IT organization that generally leverage the Service Operation processes and practices include service desk managers, access managers, technical support consultants, incident managers, problem managers, support engineers, and other IT support-related roles.

Incident Management

An incident may be defined as an unplanned interruption to an IT service or reduction in the quality of an IT service or failure from an IT service that has not yet impacted the live environment.[12] The intention of incident management in the case of an unplanned interruption is to restore service to the customer through resolution or a workaround.

Returning to our mobile application feature that has now been deployed, a customer contacted the service center via telephone to request assistance with an error message that was presented when accessing some portion of the feature. The IT support consultant (ITSC) used a variety of technical tools to reproduce the error as described by the customer to validate the incident. The ITSC would then research the available technical documentation to determine if instructions existed for resolving the issue. If instructions existed, she would employ the instructions and resolve the issue, restoring service to the customer. If instructions did not exist, she would attempt to provide a workaround to the customer. A workaround is intended to restore normal service operation as close as possible to the original service while minimizing the impact to the business. In the mobile application example, a potential workaround may be to use a different path for accessing the same feature or some other alternative that would produce the same or closely similar result as the original service. A common example for explaining incident management relates to a printer that will not print. The customer contacts the ITSC, who attempts to resolve the problem and restore service. When unable, the ITSC maps the customer to another printer down the hall to restoring the service of printing until the failed printer is able to be fully restored.

Table 3 depicts a sample template for incident management fields used when gathering data to assess the incident, develop a workaround, and pass the information to problem management.

Incident management is the most customer-visible process within the IT organization once a service has been released into the live environment. This process directly interacts with customers and either provides a positive experience (restoration or workaround) or a negative experience (no restoration or no workaround).
IT leaders should focus on incident management with careful attention as this process provides a direct reflection on customer satisfaction metrics and the overall image of an IT organization’s ability to support a service.

**PROBLEM MANAGEMENT**

Where incident management is concerned with restoring service or providing a workaround, problem management is exclusively focused upon identifying the rootcause of a problem. Incident management is temporary; problem management is longer term and critical to addressing incident recurrence.

The customer who experienced an error and received a workaround is most likely not the only customer who will experience the same issue. As a result, the underlying problem will continue to aggravate the live production environment causing frustration to other customers and increasing the number of people complaining to the service center. The more significant the issue, the higher the rate of recurrence. Problem management then becomes a crucial process where advanced ITSCs with higher-tier knowledge are able to use ITIL problem management processes and references for identifying the rootcause of the problem and proposing a solution to system administrators, developers, webmasters, or other IT roles responsible for resolving problems. The speed at which root-cause analysis may be conducted becomes critical as it is a feeder process to other ITIL Service Transition processes necessary for moving the change through to production. Customers are impacted negatively each day that passes from the first day the error was observed. In cases where the workaround provided in incident management is poor or unacceptable to customers, immense pressure forms to complete problem resolution.

Once the problem is resolved in a non-live environment, the Service Transition processes repeat through testing, change management, release coordination, communication, and documentation. These processes take time to complete separately from problem management. The severity of the problem has a direct impact on the amount of time and planning that is required to move the problem resolution through Service Transition and back into the live environment. Creating an effective, efficient, and energetic incident-problem-testing-change-release process provides a positive reputation to the IT organization as the ability to support the services is directly visible to the customer. When these processes are not organized, customers may experience:

- Incidents that receive no workaround or an unacceptable workaround
- Problems that go unresolved or do not find rootcause in an acceptable time
- Problems that are not researched consistently, yielding inaccurate information to the testing function for determining if the problem is resolved
- A slow or dysfunctional CAB may bottleneck numerous changes that includes problems and add unnecessary delays to deploying the feature
- A release manager lacks the skills to understand the change and does not coordinate the various IT stakeholders and customers. Once the problem is resolved, customers may never be notified and continue using the same workaround for an extended period
- Technical documents may not be created and cause support representatives to be unaware of how to support the newly changed service related to the error

<table>
<thead>
<tr>
<th>Incident Field</th>
<th>Sample Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the IT service experience the interruption of service</td>
<td>Inventory management consolidation feature</td>
</tr>
<tr>
<td>Date, time, and customer experiencing the interruption</td>
<td>10/21/2013, 8:52 p.m. Central time, Susan Smith—Inventory manager</td>
</tr>
<tr>
<td>Configuration of device used to access the IT service</td>
<td>iPhone 4S, iOS 7.1, Inventory mobile app version 1.2.7.514</td>
</tr>
<tr>
<td>Steps to repeat</td>
<td>1. Open the inventory mobile app.</td>
</tr>
<tr>
<td></td>
<td>2. Press the Consolidation tab.</td>
</tr>
<tr>
<td></td>
<td>3. Select the Alpha-Omega fields.</td>
</tr>
<tr>
<td></td>
<td>4. Press the Run option.</td>
</tr>
<tr>
<td></td>
<td>5. Error 123.XYZ.567 is presented</td>
</tr>
<tr>
<td>Workaround provided</td>
<td>Instructed the customer to use the Management tab followed by the R2D2 option to print a full report.</td>
</tr>
<tr>
<td>Screenshots of the error</td>
<td>Attached to the support record</td>
</tr>
<tr>
<td>Priority rating</td>
<td>High</td>
</tr>
</tbody>
</table>
Service Operations inherit the mistakes and successes of all the previous ITIL processes or lack thereof. Once a service has been transitioned to the live production environment, it is easy for the previous processes to neglect support of the service center and the related Service Operations processes as it would seem that the project or development sprint is over. It is critical for the service center to be in direct contact and receive close support from the previous processes well beyond the initial deployment of the service for success. Service center managers should be in weekly contact with Service Transition process owners to maintain effective service support.

CONTINUAL SERVICE IMPROVEMENT

CSI Overview

There is always room for improvement to any IT service that is leveraged by a business. The CSI stage, as the name implies, focuses on increasing the efficiency and effectiveness of the IT service management processes that are leveraged by the organization.[13] Once a service has transitioned into operations, the typical IT organizational response is to focus on incident and problem management–related activities. Once a process is in place and the roles are identified, the process will carry forward indefinitely in the absence of a major event that prompts investigation.

CSI seeks to find ways to improve a service regardless of how well it is performing using the existing metrics for monitoring the service. IT organizations can never claim that there is an absence of work available when leveraging the CSI stage processes as any process may undergo analysis at any time.

The ITIL CSI stage has strength through assigning process owners to each process leveraged in the Service Strategy, Service Design, Service Transition, and Service Operations stages. These process owners are responsible for executing continuous service improvement on the services related to their process. For example, Susan Smith is assigned as the process owner for the problem management of three features within the mobile application used for inventory management. In the absence of a CSI functional group exercising CSI governance, Susan is responsible for initiating improvement activities. The ITIL CSI stage provides a variety of tools and techniques for executing this responsibility.

Tools and Techniques of CSI

The strength of ITIL CSI, as related to tools and techniques, is the absence of dependency upon a single framework. Rather, any preferred method for conducting continuous improvement may be leveraged as there is no rigidity or requirement to use a specific method. A suggested approach is to harness the best-practice frameworks such as Capability Maturity Model Integration, Control Objectives for Information and related Technology (COBIT), ISO/IEC 20000, or the process maturity framework.[12] ITIL is more focused on the act of ensuring repeated and structured CSI events than the method used to conduct the event itself.

ITIL does provide the Plan-Do-Check-Act cycle along with a variety of process considerations, key performance indicators, challenges, risks, and planning templates for implementing a CSI event. The tools and techniques within CSI are relatively week in comparison to other best-practice framework offerings.

CONCLUSION

The ITIL framework provides a suite of best-practice processes that give IT professionals the guidance needed to create, modify, and sustain the operational excellence required of the modern IT organization. ITIL is not a standard by which an organization receives a certification. IT professionals may seek certification, but the organization is never certified in the way that the ISO suite of certifications offer. This is an added strength of ITIL, in that an IT professional may use a little, a lot, or whatever mix of ITIL-aligned processes that are needed without the often arduous requirements of organization certification. ITIL is essentially the MBA for IT professionals without several years of graduate school and may be applied to what the business needs the most.

While ITIL contains five stages, there are truly four stages that are followed on a routine basis to include Service Strategy, Service Design, Service Transition, and Service Operations. New or changed services follow this general path from Strategy to Operations using various other best-practice frameworks along the way. CSI acts like an umbrella stretched out across the four previous stages seeking to provide continuous operational excellence.

ITIL is an active framework with worldwide usage. Major refreshes of the framework occur every 3–5 years in Her Majesty’s Government of the United Kingdom, which licenses the core material. Given the government adoption of the framework, worldwide process usage, numerous consulting firms leveraging ITIL processes, IT professional job descriptions containing ITIL knowledge requirements, IT service management software application development, professional certifications available, and executive propulsion for IT driven by the business, ITIL will likely remain a strong framework.

From January 1 to July 1, 2013, approximately 148,847 ITIL—Foundation certifications were achieved.
in all seven continents of the world. Of those, 22,199 were ITIL Experts who have received a minimum of 22 credits and passed seven certification examinations with over 168 hours of classroom instruction.\[14\]

REFERENCES