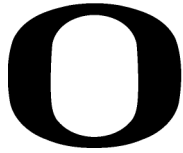


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Effective Implementation of ITIL/ISO 20000 Problem Management

CAPSTONE REPORT

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Abstract

Significant documentation indicates that individuals and organizations that are responsible for the quality operation of information technologies do so through the use of well defined, established processes. Problem Management has been found to be an effective practice to improve IT service quality when implemented correctly. Challenges can be overcome by noting lessons learned from experienced Problem Management practitioners and scholars through a literature review of works published between 2005 and 2019.

Keywords: problem management, ITSM, ITIL, ISO 20000, service management

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Introduction to the Annotated Bibliography

Problem Description

Information Technology (IT) organizations enable users to successfully execute their job responsibilities by providing technology tools and services (Ferreira, Nery, & Pinheiro, 2016). Information Technology organizations may also be responsible for delivering and maintaining high-quality services to provide value to third parties (Park & Kim, 2012). A formal discipline called Information Technology Service Management (ITSM) has been created for the purpose of maintaining high service quality levels for IT (Ferreira, Nery, & Pinheiro, 2016).

When incidents occur, these services fail to provide value to the business, regardless of whether the services are provided internally or externally (Park & Kim, 2012); for the purposes of this research paper, an incident will be defined as “an unplanned interruption to an IT service or reduction in the quality of an IT service” (Axelos, 2011, p. 29). Examples of incidents include a computer not booting up, a web service occasionally crashing and occasional data corruption in a server (BS, 2008). These unplanned service disruptions or incidents can be recurring (Ferreira, Nery, & Pinheiro, 2016); examples of recurring incidents are many computers periodically failing to boot up, a web server crashing every time user connections hit 60%, or frequent data corruption on many servers (BS, 2008). The root cause of recurring incidents is known in the IT industry as a problem (Axelos, 2011).

A set of standards have been established for the delivery of high quality IT service management (Cots, Casadesus, & Marimon, 2016). The ISO 20000 international standard for service management “defines the requirements for a service provider to deliver managed services” (ISO, n.d., p. 1). The Information Technology Infrastructure Library (ITIL) is directly inherited from ISO 20000 (Cots et al., 2016). The Information Technology Infrastructure Library describes itself as “a set of best-practice publications for IT service management” (Axelos, 2011,

p. 33) and has defined Problem Management as a process for preventing future incidents (Jäntti & Kinnunen, 2006). Components of ITIL's Problem Management include:

- problem detection; the major problem detection processes are defined as “raising problems reactively following an incident and finding problems proactively in the environment” (Hall, 2014, p. 128);
- problem logging: “Every problem detected or proposed, whether reactive or proactive, should be logged, before any decisions are made about what to do about it” (Hall, 2014, p. 137);
- problem categorization, which Hall (2014) describes as following the same process as incident categorization to enable the true nature of the problem to be readily traced later, provide meaningful information to management, and promote the ability to match problems and incidents;
- problem prioritization, which “drives the selection of which problems to investigate” (Hall, 2014, p. 141);
- workarounds, defined as “reducing or eliminating the impact of an incident or problem for which a full resolution is not yet available” (Axelos, 2011, p. 67);
- problem resolution, defined as “Action taken to repair the root cause of an incident or problem, or to implement a workaround” (Axelos, 2011, p. 48); and
- problem closure; Hall (2014) notes “problems are closed when the cause is fixed, implying that the risk has been identified and eliminated” (p. 159).

The main benefit of executing ITIL's Problem Management process is the reduction of incidents (Ferreira, Nery, & Pinheiro, 2016). Additional benefits include higher availability of IT services, higher productivity of IT staff by reducing unplanned labor, and reduced expenditures on workarounds (Cabinet Office, 2011).

Even though the Problem Management process is well defined, implementation and execution still may come with challenges (Jäntti & Kinnunen, 2006). These challenges include team members not understanding how to combine ITIL and existing organizational processes (Jäntti & Kinnunen, 2006), leading to frustration and lack of unity inside the organization (Müller & Lichtenberg, 2018). Another major challenge is the lack of service level agreements for problems, which means there is no target time period for resolving problems and can potentially cause those problems to not be resolved in a timely manner (Jäntti & Kinnunen, 2006). The storage of information needed for Problem Management data in disparate locations can also result in additional time identifying root cause if “bug fixes, quick deliveries, release notes, user instructions are stored in separate locations and are not linked to the support tool” (Jäntti & Kinnunen, 2006, p. 46). Finally, once an organization is executing Problem Management, it may be difficult to determine how mature the Problem Management process definition and execution are without sending a survey to members of the community (Lee & Wella, 2019).

Purpose

The purpose of this annotated bibliography is to provide literature that highlights the benefits organizations can realize by adhering to the ITIL/ISO 20000 Problem Management process, the challenges associated with implementing the ITIL Problem Management process, and best practices to overcome these challenges as presented by those who have experience with or have studied the process.

Research Questions

Main question. What are the challenges an organization faces when implementing the ITIL/ISO 20000 Problem Management process for IT services and what are the best practices to overcome those challenges?

Sub-questions.

- What are the benefits of executing the ITIL/ISO 20000 Problem Management process?
- What modifications can be made to the ITIL/ISO 20000 Problem Management process to make it execute more successfully?

Audience

The study targets current Problem Management process practitioners who are interested in improving their process execution by taking into account lessons learned by those who have studied or executed the Problem Management process in real world environments. These stakeholders include IT directors, IT service delivery managers, IT operations managers, IT consultants, and IT engineering directors.

The results of this study will help stakeholders understand practical challenges with Problem Management implementation and execution and best practices and tools to address these challenges, as well as provide information on changes they may need to make to deviate from the defined ITIL framework in order to accommodate unique organizational factors.

The audience for this study also includes IT service management (ITSM) leaders and professionals responsible for service operation and service quality who are interested in implementing the ITIL Problem Management process in their organizations to improve service quality and reduce costs. Incident Management is defined as “The process responsible for managing the lifecycle of all incidents. Incident management ensures that normal service operation is restored as quickly as possible and the business impact is minimized.” (Axelos,

2011, p. 29). While Incident Management and Problem Management are distinct processes, they are closely related (Cabinet Office, 2011), and as a result, people actively executing Incident Management may be interested in extending their service management capabilities to include Problem Management.

Additional stakeholders may be individuals or organizations who are responsible for IT operations but have not yet adopted a formal ITSM strategy or framework; these stakeholders will benefit by gaining a stronger understanding of what is involved in the Problem Management process.

Search Report

Search strategy. I selected scholarly sources within the University of Oregon (UO) Libraries online collection first and then performed a secondary search through the online bookstores Amazon.com and Powell's Books for published works that focus on one of the following topics: *Problem Management*, *ITIL*, ISO 20000, or *ITSM*. I did not automatically discard sources referencing *Problem Management* outside of the technology field; however, I only used these sources if they relate to the research question and focus of the study. I reviewed literature to ensure that references to *Problem Management* or *problems* are referring to the ITIL definitions, even if a source did not refer specifically to the ITIL framework. I selected literature that was peer-reviewed; published by Axelos, the publisher of the ITIL framework; or published through a formal publishing organization.

Key terms. Key terms that I used in this research are listed below:

- Problem Management,
- ITIL AND Problem Management,
- ITSM AND Problem Management,
- ISO 20000,

- Problem Management challenges,
- Problem Management challenges limitations,
- Problem Management implementation, and
- ITIL Service Operation.

Search engines and databases. I used the University of Oregon Libraries databases as the primary sources of information. I used the LibrarySearch search engine and the Business Source Complete database.

I made an additional search for books and literature through Amazon.com and Powells.com, the online marketplace for Powell's Books, both major book retailers. I used these retailers to supplement the University of Oregon Libraries for materials that target Problem Management and ITIL practitioners. Finally, I searched through Nike's Enterprise Service Management documentation library for appropriate sources.

Documentation approach. I created a Microsoft Excel spreadsheet specifically for tracking sources identified as relevant to this study. I used this spreadsheet to categorize each source based on the information contained within and provide a basic description of why the source was or was not relevant. I evaluated sources that were related to Problem Management but did not specifically contain content about the ITIL/ISO 20000 standard to determine if I could extract any useful information from the source. If I deemed a source to be not relevant but found that the source contained many key words related to the study, I still tracked the source to prevent reevaluation if it appeared in future searches.

I saved Adobe portable document format (PDF) copies of the actual sources in a centralized directory. Many sources were not immediately available online; in these cases I made requests to have the sources pulled and scanned. I named all sources based on the article or book title and linked the sources in the master spreadsheet.

Reference Evaluation Criteria

I evaluated references using the five characteristics described in the Evaluating Information Sources guide by University of Florida's Center for Public Issues Education (CPIE) (2014). I used the criteria to limit the literature in this study in the following ways:

- *Authority*: I reviewed literature from three broad sources, in descending order of importance: (a) Axelos/Cabinet Office, the organization that developed the ITIL framework; (b) peer-reviewed journals, and (c) published works by those respected in the Service Management community.
- *Timeliness*: I limited all sources to those published in 2005 or later because the ISO 20000 standard upon which the ITIL v2 standard is based was published in this year (Ferreira, Nery, & Pinheiro, 2016). The ITIL Problem Management process was unchanged between ITIL v2 and ITIL v3 (Fumagalli, Farina, Macchi, Mancini, & Sala, 2012). The release of ITIL 4 is occurring between 2019 and 2020 (Axelos, n.d.a) and will not be fully available before the completion of this study. While the *ITIL Foundation: ITIL 4 Edition* covers Problem Management, only an overview of this process is provided (Axelos, 2019), with detailed process documentation planned to be available at a future date (Axelos, n.d.a).
- *Quality*: I selected literature with no grammar, spelling, or punctuation errors; I made exceptions for authors for whom English was not their native language.
- *Relevancy*: I selected works that were focused directly on ITSM, ITIL, ISO 20000 or similar standards.
- *[Lack of] Bias*: I selected source material from peer-reviewed, scholarly journals; from books published by established authorities; or from Axelos, publishers of the ITIL framework.

Annotated Bibliography

Introduction

The annotated bibliography below includes 15 references that explore the challenges, benefits, and best practices when implementing and executing ITIL/ISO 20000 Problem Management in an organization. This annotated bibliography is intended to provide IT professionals and IT organizations with information about the practical aspects of executing Problem Management. References are grouped into three individual categories: (a) benefits of implementing Problem Management, (b) challenges of implementing Problem Management, and (c) best practices in implementing Problem Management.

Each annotated bibliography has three parts: (a) full citation, (b) abstract or book introduction, and (c) summary. Abstracts and book introductions provided are written by the authors of the published works. The summary of each work feature ideas from the author of that work, with an emphasis on information related to this study. The summaries below provide detail about how the implementation and operation of Problem Management comes with benefits and challenges. Despite these challenges, significant documentation exists on how to mitigate many of those challenges. Suggested mitigations are provided by those that have implemented or studied ITSM processes and Problem Management. Information technology organizations that wish to execute a high performing Problem Management process may incorporate these best practices and have a greater chance of success.

Benefits of Implementing Problem Management

B.S, T. (2008). Chapter 5: Problem management. In *Practical IT service management: A concise guide for busy executives*. Ely, Cambridgeshire, England: IT Governance Publishing.

Abstract: *Practical IT Service Management* is a concise guide to implementing a professional, technical service management structure in your organisation, based on the international best

practice framework ITIL® (Information Technology Infrastructure Library®). This framework is globally the most widely accepted approach to technical service management, and is developed based on input from several public and private sector organisations. This book explains the fundamentals of the latest ITIL 2011 version and its implementation in an easy, self-study approach for all technical and business staff in your organisation. The entire book is written in a question and answer format for easy comprehension and speedy reading. Each chapter covers just one specific area of ITIL, and each topic is explained concisely, with very few answers extending beyond one page. Practical and real-life examples are used throughout. *Practical IT Service Management* is designed to be a stepping stone to the official books on ITIL published by the The Stationery Office (TSO).

Summary: The author states that the book is intended to provide information about ITIL processes without having to read all five ITIL manuals or take an ITIL certification class. The book covers the majority of ITIL processes and is primarily written in a question and answer format. The chapter titled *Problem Management* focuses on the ITIL Problem Management process and provides information about what the process is and how it works in nonprofessional terms. The author identifies the perceived benefits of the Problem Management process, including reduced time to resolve incidents, reduced IT overhead, and the identification of incident workarounds. The author provides example scenarios to help the reader understand the difference between incidents and problems. This book is important for this study because it highlights that understanding the Problem Management process can be achieved by reading only a few pages, especially as it relates to real world use.

Cots, S., & Casadesús, M. (2015). Exploring the service management standard ISO 20000. *Total Quality Management & Business Excellence*, 26(5-6), 515-533.

doi:10.1080/14783363.2013.856544

Abstract: This paper explores the benefits organizations perceive that they have attained by their ISO 20000 service management system standard certification. The paper proposes a classification of benefits and tests the relationship between that classification and general satisfaction with the standard. The study is based on 105 responses to ISO-20000-certified organisations survey in Spain. After a descriptive analysis of the sample, a structural equation model is designed to test the hypotheses presented. According to the model, ISO 20000 benefits can be divided into those which are internal and those which are external. The variables that best define each type are identified. Moreover, those benefits are shown to be related to general satisfaction with ISO 20000 certification. The findings can be extended to other IT service management standards such as ITIL.

Summary: This literature review focuses on the value an organization gains when following the ISO 20000 management standard when operating IT services. Significant scholarly documentation exists to prove value in following a management standard versus using a wholly in-house process. The authors found through their literature review that the main benefit of following the ISO management standard is that an organization's implementation of that standard can be audited by third parties and the organization can receive certification that it demonstrates high service quality as a result. One notable finding is that studies have shown that the ISO 20000 standard can be applied not only to IT but to other fields as well. There are many frameworks available for ITSM; however, the authors note that ITIL is represented in the literature as the most important due to having wide adoption throughout the IT industry.

ITIL differs from ISO 20000 as it encourages organizations to follow its guiding principles and adapt the framework as needed. Due to these allowed customizations, ITIL is not technically a standard and organizations cannot become ITIL certified. Even though organizations cannot be certified, individuals can become ITIL certified and the authors assert

that the importance of this framework is highlighted by the large number of users that are ITIL certified. Many completed studies contain elements of ITIL and ISO 20000 at the same time due to the fact that they are so similar in nature and that ITIL is directly based on ISO 20000.

This article is important for this study because: (a) it establishes the importance for a quality-focused organization to follow a management standard practice, and (b) the authors identify ITIL as the most important management standard practice.

Cots, S., Casadesus, M., & Marimon, F. (2016). Benefits of ISO 20000 IT service management certification. *Information Systems and E-Business Management*, 14(1), 1-18.

doi:10.1007/s10257-014-0271-2

Abstract: This paper is the first exploratory and quantitative study on a global scale of the current and future impact of ISO 20000, a standard that is forecast to play an important role in the information technology service management field. For the analysis of the current situation, this article first describes this standard and other related standards. This is followed by a diffusion analysis using worldwide certification data. It also analyses geographical distribution by continents and countries and examines its evolution over time through comparison with other management-system standards. The analysis extends to the relationships existing between countries, and a clear correlation is detected between different countries regarding the number of certifications and certification intensity. Regarding future forecasts, a logistic curve is used to detect the theoretical saturation point, which is earlier than previously thought. Therefore, and comparing it with an updated forecast for other parallel standards (viz: ISO 9001, ISO 14001 and ISO 27001), the analysis presents a new scenario in the field of management-system standardisation.

Summary: Value through technology generally comes from the services that are built with it, not the technology itself (Cots, Casadesus, & Marimon 2016). The main difference between ISO

20000 and ITIL is that “ITIL can be implemented partially or at different levels” (Cots, Casadesus, & Marimon 2016, p. 2) and still provide value, meaning Problem Management can be implemented without a full implementation of all the processes outlined by ITIL. The authors state that research indicates that at the point of their writing, the majority of previous research focused on the benefits of ITSM and associated processes, but very little focused on the ISO 20000 certification itself. Regardless of certification, both are found to have internal benefits and improve service quality, regardless of certification.

For ISO 20000, it took an average of 8.29 months for the organizations in the study to fully implement the standard. The authors identify several benefits when gaining full ISO 20000 certifications such as being able to market being ISO 20000 certified, improved reputation, and the perceived competitive advantage (Cots, Casadesus, & Marimon, 2016); however, the authors believe those advantages may be negated as time passes and the novelty of being ISO 20000 certified fades, as this has happened with previous certifications. The authors note that these same external benefits do not exist for those organizations that implement the ITIL framework as there is no organizational certification that exists for ITIL.

This article is important for this study because it highlights the perceived value of providing high quality technology services and how this high level of quality can be achieved from implementing ISO 20000 and ITIL. This article also highlights that it is possible for an organization to gain benefits when implementing only parts of the ITIL framework such as the processes defined in the *IT Service Operation* manual, which include Incident Management and Problem Management.

Ferreira C., Nery A., & Pinheiro, P. (2016). A multi-criteria model in information technology infrastructure problems. *Procedia Computer Science*, 91, 642-651. doi:10.1007/s10257-014-0271-2 10.1016/j.procs.2016.07.161

Abstract: Technology has become a vital component for organizations. Therefore, it is necessary to ensure quality and efficient IT solutions in order to meet the expectations of the business areas. In this scenario, we have realized the need to align the technology areas of management practices with organizational strategies and thus ensure the availability of solutions. This paper aims to propose a model to optimize the decision-making of the problem management process based on the best practices proposed by the ITIL (IT Infrastructure Library), using the concepts of a multi-criteria methodology. The model suggests the prioritization of problems that cause a most negative impact on the business of an organization, in order to reduce or prevent damage.

Summary: The authors assert that contemporary IT is moving to more service-based models and that service quality can be improved through ITSM frameworks such as ITIL. The authors state that ITIL processes can be more effective if processes are altered to match the reality of the implementing organization versus following strict guidelines laid out in the framework.

“There is not a model that fully meets the critical success factors for the management of technology services. There is a need to combine the practices suggested in accordance with the reality of each company in order to meet a demand for IT solutions that require processes increasingly integrated and efficient.” (Ferreira, Nery, & Pinheiro, 2016, p. 643)

The authors believe that end users of systems only gain value from the ITIL framework once Service Operation processes are implemented, which includes Problem Management. Problem Management attempts to improve service quality by preventing future incidents from recurring and also minimize the impact of existing incidents by identifying root causes and resolving them quicker. Five key areas are listed that highlight where problem identification can be performed:

(a) the service desk, (b) event management, (c) incident management, (d) proactive Problem Management, and (e) supplier or contractor (Ferreira, Nery, & Pinheiro, 2016).

The authors found that while the *IT Service Operation* manual suggests that using impact and urgency should be the only two factors taken into account when prioritizing problems that are discovered, problem prioritization was actually more effective when adding additional criteria into the prioritization model such as the number of helpdesk complaints and the criticality of the application. These additional factors were weighted and fed into a decision-making system that resulted in a prioritization that the authors claim was objective and more assertive than when the problems were manually prioritized by a committee using the *IT Service Operation* manual's suggested impact and urgency. This article is important for this study because it highlights how making modifications to the Problem Management process can make it more effective and provide more value to the business.

Park, J., & Kim, H. (2012). Building up an IT service management system through the ISO 20000 Certification. *International Journal of Knowledge Content Development & Technology*, 2(2), 31-45. doi:10.5865/IJKCT.2012.2.2.031

Abstract: This study prepared a foundation to provide high-quality services in a stable and effective way to meet the customer expectations, by building up and establishing an ISO 20000 certified IT service management system and protecting the information assets from various threats through effective system operation that meets the requirements of international standards, in order to ensure the reliability and stability of NDSL public services provided by KISTI Information Service Center and to enhance the customer satisfaction.

Summary: The authors of this article are associated with the National Discovery for Science Leaders (NDSL), an organization that relies on high availability services to provide value to its stakeholders in the scientific community. As part of ensuring that NDSL systems meet their goal

of providing high quality services, they planned at the time of publication to implement a service management system using the ISO 20000 standard. The authors outline how they planned to implement the ISO 20000 standard in their organization and describe how the various ISO 20000 processes correspond with their organizational processes. The NDSL process mapping illustrates how the Incident Management outputs are primary inputs for Problem Management when the cause of an incident is unknown. Problem Management depends on Change Management, as problems are generally resolved through change.

NDSL's primary driver for using the ISO 20000 framework versus other ITSM frameworks is their hope to obtain certification of their implementation, as doing so has yielded positive results for other organization. The authors conclude that ISO 20000 is largely similar to that of ITIL and is also considered best practice for ITSM, but note that ISO 20000 certification is a lengthy process that requires extensive process documentation and at least two on-site examinations.

This article is important for this study because it highlights how Problem Management is highly connected to the Incident Management and Change Management processes, which demonstrates how these processes should be implemented together.

Perry, D., Olson, B., Blessner, P., & Blackburn, T. (2016). Evaluating the systems engineering problem management process for industrial manufacturing problems. *Systems Engineering, 19*(2), 133-145. doi:10.1002/sys.21340

Abstract: Problems are ever-present in nearly all engineered systems. A Systems Engineering Problem Management Process (SEPMP) has been proposed, and this research presents empirical evidence to support its validity. In order to evaluate the SEPMP, which uses a risk management style matrix to monitor problem timeliness and impact, it is necessary to determine the importance of communicating these components of the SEPMP model. A correlation and

regression analysis is employed using existing empirical problem data and an analysis including communication of impact and timeliness components as independent variables. The dependent variable is the effectiveness of problem management, modeled as a measurement of the problem timeliness, implemented process improvements, training completed, and process delay as a result of the problem. Communication of timeliness and communication of impact are demonstrated to be significantly predictive of effective problem management. Finally, a plan for continued research is presented, including suggested future analyses to include additional empirical research and case studies of the implementation of a comprehensive problem management process, all of which may encourage acceptance of the SEPMP as a standard system engineering tool.

Summary: When looking at Problem Management as a discipline there are several different models, including ITIL. The authors complete a literature review and determine that most existing studies focus on a specific Problem Management framework versus Problem Management as a whole. This article focuses on Problem Management as it relates to system engineering as a whole, not specifically to IT. The authors state that much of the existing literature on Problem Management suggests a specific framework provides benefits without empirical evidence to show that it is effective. The purpose of their study was to determine if Problem Management as a discipline is an effective means of reducing risk by using an industrial manufacturer as a case study. The authors complete a regression analysis of the individual components of the Problem Management process and determine communication of impact and timely communications are the two primary factors that drive the success of Problem Management.

This article is important for this study because concludes through a scientific study that impact communication and timely communications are critical success factors to successful Problem Management execution.

Challenges of Implementing Problem Management

Jääntti, M., & Kinnunen, K. (2006). Improving the software problem management process: A case study. *Software Process Improvement, Proceedings, 4257*, 40-49.

doi:10.1007/11908562_5

Abstract: This paper describes the results of a case study focusing on improving the software problem management process in TietoEnator Oyj. The research question is what kind of challenges are related to the software problem management process. As main findings, we show a list of challenges identified during the study. Those challenges include the increasing number of open and duplicate problems in the problem database, difficulties in combining existing problem management concepts with ITIL-based concepts, a lack of performance metrics such as incident turnaround times, and a lack of knowledge base. The main contribution of this study is to help IT organizations to identify the challenges and problems that are related to ITIL-based problem management.

Summary: The authors attribute the rise in popularity of implementing the ITIL framework to its wide recognition as the best practice framework for ITSM and organizations' belief that service quality and customer satisfaction will be improved as a result of its implementation and application.

As part of a study, that authors observed execution of the Problem Management process during a three-month period at a large IT service contracting company that was called TietoEnator Oyj at the time of the study. The authors identified several challenges related to the Problem Management process as part of this study, which included “dealing with duplicate

incidents, mapping ITIL concepts and existing business concepts, a lack of performance metrics, unnecessary datafields [*sic*] in problem records, and availability problems of the online support site” (Jäntti & Kinnunen, 2006, p. 41). The authors discovered these issues through direct observation, interviews with Problem Managers, discussions related to Problem Management with third parties, and review of the tool used for incident/problem tracking.

TietoEnator Oyj’s implementation of ITIL Problem Management displayed strengths in areas such as clearly defined roles and responsibilities related to Problem Management and Incident Management. Additional strengths included leveraging an online portal where users could identify existing problems and workarounds if available. Execution of ITIL processes were found to be more successful as a result of ITIL training, even if that training was high-level ITIL awareness training for workers. Despite these strengths, the authors also identified ten different challenges when implementing ITIL, including difficulty in mapping ITIL concepts to existing business concepts, managing duplicate incident and problem records, and lack of service level agreements for problems, resulting in no required timeline for problem resolution. Some of the challenges found in the Problem Management process elicited suggested remediations to minimize or eliminate those challenges. Many of the challenges identified were with the tool used for Problem Management execution versus the process itself and could be resolved by eliminating fields or altering the workflow to match the organization’s processes.

This article is important for this study because it provides a detailed list of challenges that may be found in the real world and provides suggestions of how they may be overcome.

Müller, S., & De Lichtenberg, C. (2018). The culture of ITIL: Values and implementation challenges. *Information Systems Management*, 35(1), 49-61.

doi:10.1080/10580530.2017.1416946

Abstract: The article reports on Information Technology Infrastructure Library (ITIL) implementation in Maersk Oil. We analyze the values embedded in ITIL, compare them to Maersk Oil's organizational culture, identify implementation challenges, and discuss how to manage these. The contribution of the article is as follows: (1) it identifies the values underlying ITIL, (2) discusses how to overcome cultural incongruence through business process implementation, and (3) highlights implications for managers trying to improve processes through the use of quality management standards and process models.

Summary: The authors assert that standardizations and frameworks that are used to enforce best practices do not always take into account real world scenarios, and as a result implementing these frameworks can be a challenge. The challenges can be magnified if the organization has a culture that does not align with that of the framework. The authors report difficulties that were identified when implementing the ITIL framework in an IT organization that did not share similar values with those required for successful implementation and execution of the framework. The authors analyzed ITIL and Maersk Oil's Information Solutions division using the competing values framework and found there were differences in flexibility as it relates to following formal processes. The primary difference was members of Maersk Oil value autonomy when managing their IT services and ITIL values standardization of approach. The authors suggest that focusing on sharing the vision for the IT organization with stakeholders will make implementation of ITIL processes more effective, especially if leaders connect process improvements to existing corporate goals.

This article is important for this study because it identifies that lack of buy-in by key stakeholders is a common challenge when implementing ITIL. The authors suggest that ITIL implementations will be more successful when gaining organizational buy-in by highlighting the improved service quality vision instead of focusing on the specific ITIL processes.

Best Practices in Implementing Problem Management

Cabinet Office (2011). *ITIL service operation: 2011*. Belfast UK: TSO (The Stationary office)

Book Introduction: ITIL is part of a suite of best-practice publications for IT service management (ITSM). ITIL provides guidance to service providers on the provision of quality IT services, and on the processes, functions and other capabilities needed to support them. ITIL is used by many hundreds of organizations around the world and offers best-practice guidance applicable to all types of organizations that provide services. ITIL is not a standard that has to be followed; it is a guidance that should be read and understood and used to create value for the service provider and its customers. Organizations are encouraged to adopt ITIL best practices and to adapt them to work in their specific environments in ways that meet their needs.

ITIL is the most widely recognized framework for ITISM in the world. In the 20 years since it has been created ITIL has evolved and changed its breadth and depth as technologies and business practices have developed. ISO/IEC 20000 provides a formal and universal standard for organizations seeking to have their service management capabilities audited and certified. While ISO/IEC 20000 is a standard to be achieved and maintained, ITIL offers a body of knowledge useful for achieving the standard.

IT Service Operation provides best-practice guidance for the service operation stage of the ITIL service lifecycle. Although this publication can be read in isolation, it is recommended that it is used in conjunction with the other core ITIL publications.

Summary: This book is the official ITIL documentation related to IT service operation that was created and published by the Cabinet Office, which has become Axelos since the time of publication (Axelos, n.d.b). The *ITIL Service Operation* manual describes the role of each of the five components of the ITIL service lifecycle: (a) ITIL Service Strategy, (b) ITIL Service Design, (c) ITIL Service Transition, (d) ITIL Service Operation, and (e) ITIL Continual Service

Improvement. In addition to this general manual of the *ITIL Service Operation*, Axelos publishes separate books for each of the five components of the ITIL service lifecycle. The *ITIL Service Operation* describes processes such as Incident Management and Problem Management.

The purpose of Problem Management is “to manage the lifecycle of all problems from first identification through further investigation, documentation and eventual removal” (Cabinet Office, 2011, p. 97). The objective of Problem Management is to eliminate future incidents and minimize the impact of incidents that cannot be prevented, with the benefits of providing an organization with higher service quality and reduced expenses. In addition to describing the overall Problem Management process, eleven distinct problem analysis techniques are described to aid with root cause analysis along with which methods are best suited for a given situation. The book introduces the concept of a known error database, which describes how problems with an identified root cause and documented workaround should be logged to speed resolution of future incidents.

The book lists Problem Management process inputs and outputs, as well as how the process interfaces with other ITIL service lifecycle stages, demonstrating that while Problem Management is fully in the service operation stage, benefits of the process may be realized in all five stages of the ITIL service lifecycle. The book provides lists the critical success factors (CSFs) of problem management which are: (a) minimize the impact to the business of incidents that cannot be prevented (b) maintain quality of IT services through elimination of recurring incidents, and (c) provide overall quality and professionalism of problem handling activities to maintain business confidence in IT capabilities. These CSFs are driven by key performance indicators (KPIs) such as the percentage of incidents closed by the service desk without escalation, average incident resolution time for incidents linked to a problem, and the number of known errors added to the knowledge base. These KPIs allow for an organization to determine if

their implementation of Problem Management is successful, or at least if it is trending as successful.

Finally, the book provides a detailed list of challenges and risks, with the most critical challenges identified as successfully implementing the Incident Management process, having staff skilled at root cause analysis, and having well defined operational level agreements to ensure problems are resolved in a timely manner. This book is important for this study because it serves as the documentation that defines all ITIL Service operation processes and is the foundation on which all other ITIL related documentation is based. This book also describes challenges, benefits, and best practices related to Problem Management.

Fumagalli, Farina, Macchi, Mancini, & Sala. (2012). Reference process for problem management maturity assessment in the telecommunication sector. *IFAC Proceedings Volumes*, 45(31), 163-168. doi:10.3182/20121122-2-ES-4026.00015

Abstract: Previous empirical research suggests that maturity of maintenance processes in the utility sector is generally high. The research presented in this paper considers this information as a starting point to deepen the analysis in maintenance engineering. The paper specifically focuses on the telecommunication sector, providing an analysis of problem management process and maintenance engineering practices therein. The outcome of the research is a method for maturity assessment of the problem management process. The method is based on a reference process comprising different practices. The method has been implemented in a questionnaire to be delivered through surveys in future researches of the Observatory on Technologies and Services for Maintenance of the School of Management of Politecnico di Milano (www.tesem.net).

Summary: Similar to other IT service providers, the telecommunications industry aims to achieve high quality services not only because their customers expect 100 percent availability, but also because government regulations require it. The utility sector is considered to have one of

the most mature service quality related processes for these very reasons and ITIL itself originates from the telecommunications industry.

The authors conducted a study to identify best practices in Incident Management and Problem Management at 108 Italian telecommunications companies. After analyzing how these telecommunications companies execute Problem Management, the authors assert they have identified an enhanced version of the ITIL Problem Management Process that works best for the telecommunications industry. Key differences in the approach include: (a) automatically creating a workaround record at the same time a known error is identified, (b) automatically creating a change record upon identifying root cause, (c) constantly monitoring the infrastructure for events, and (d) reporting on the links between incidents, symptoms and root causes. The authors conclude that companies in the telecommunications industry are proficient in the Problem Management process and believe this proficiency results in higher service quality. This article is important for this study because it highlights how Problem Management may need to be altered for an organization or industry to perform at its best levels.

Hall, M. (2014). *Problem management: An implementation guide for the real world*. Wiltshire, England: BCS, The Chartered Institute for IT.

Book Introduction – What This Book is About: This book is specifically about implementing and then running a successful and effective problem management function. It is based on real-world experiences in implementing problem management in large and small organisations. It also looks at the organisational issues of running problem management, such as stakeholder management, to realise real value for the organisation. In other words, it is about handling problems in volume as opposed to solving individual problems.

The book aims to fill the gap between theoretical knowledge (perhaps obtained by studying and sitting exams for ITIL® Foundation or Expert) and turning that knowledge

into an effective operation. The practical guidance, templates, advice and suggestions included in this book are intended to be used and tailored to your situation.

To cater to as wide an audience as possible, the book does not assume any more knowledge of problem management than is mentioned in ITIL. Having said that, if you are unfamiliar with ITIL, don't be too concerned, because everything I cover is either self-evident or explained in the book. For those with extensive problem management knowledge, I offer apologies in advance for places where I spell out what seems obvious. However, very little in this book is going over ground already comprehensively covered in the ITIL publications.

Summary: The author determined that a sizeable amount of documentation exists about the ITIL Problem Management process, but asserts that very little documentation exists specifically about (a) implementing ITIL Problem Management in an organization and (b) how to make it effective in organizations that are already performing ITIL Problem Management. When implementing ITIL Problem Management, the author advises that it is best to assume that not everyone is interested in resolving problems; those who are not interested may perceive their jobs as threatened, enjoy the thrill of being heroes, may not want the root causes of problems to be revealed, or may have other reasons.

The author advises that the most important step an organization can take during Problem Management implementation is to provide training not only to technical staff, but also to the business and senior leadership so that everyone has a common understanding of the benefits and function of Problem Management. A universal agreement on metrics and KPIs is important so the organization has a common understanding of what constitutes success. The author states that making it clear that the goal of Problem Management is to focus on what caused an incident and

not who caused an incident will create trust in the process as people will be less likely to focus on assigning blame for the root causes of incidents.

As part executing the Problem Management process, the author recommends that configuration systems such as the ITIL Configuration Management Database (CMDB) will yield much greater success than operating without a configuration system. Another best practice is not listing human error or failed changes as a root cause, as neither is truly useful and failed changes can be attributed to as much 80 percent of all problems. Ideally, problems should never be closed out without knowing the root cause, as risk will still remain until the root cause is known.

In addition to following best practices, the author notes that a good tool will aid in the execution of the Problem Management process. The author explains that the best tools for Problem Management execution will store data for all ITIL processes, including Incident Management and Knowledge Management, provide the ability to execute ITIL processes and allow for easy customization of the processes so that the processes can best fit the needs of the organization. To aid in reporting, the author notes that an ideal tool supports tracking and reporting of KPIs and metrics directly in the system. The author notes that suggested Problem Management metrics are included in the ITIL documentation, but the author suggests that service availability should be the primary KPI as ensuring service availability is the purpose of Problem Management. This book is important for this study because it directly addresses the primary and secondary research questions posed in this study.

Jamjoom, H., Qu, H., Bucu, M. J., Hernandez, M., Saha, D., & Naghshineh, M. (2009).

Crowdsourcing and service delivery. *IBM Journal of Research & Development*, 53(6),

12:1-12:10. doi:10.1147/JRD.2009.5429040

Abstract: Today, service delivery organizations operate in a highly dynamic, complex, competitive, and globally distributed environment. There is constant pressure to reduce costs and

improve performance and quality. Success demands the ability to continuously learn and adapt. Standardization is recognized as essential to reducing variation and, therefore, costs, as well as managing quality. Public frameworks and standards, such as ITIL (Information Technology Infrastructure Library), provide best-practice guidance and a common vocabulary for managing IT (information technology) services. In this paper, we explore the role that social networking and “crowdsourcing” can play in socializing and developing best practices for a service delivery organization. We draw on our experience developing and deploying a social networking application, called Cyano, which is being used by approximately 13,000 IT professionals to capture and maintain day-to-day activities, processes, and artifacts used for problem and change management of several hundred outsourced infrastructures. Cyano is a new breed of social networking enterprise applications, in which crowdsourcing is leveraged to enrich and maintain IT processes and social networks are not created by explicit membership, but rather are implicitly discovered by the type of activities and infrastructure elements that various users support. In this paper, we focus on 1) the architecture of Cyano for supporting social tagging and linkage across different layers of management applications, 2) process customization and governance, and 3) an automated recommendation system that has been well received by thousands of IT professionals. We also highlight research challenges in this space.

Summary: The authors of this paper state that ITIL is the unilaterally agreed upon standard for ITSM and is regarded in the IT industry as best-practice for delivering high quality services primarily through high standards and consistency. The authors built and analyzed a social networking application where ITSM professionals can share best practices on how to improve service quality by resolving problems or initiate change on outsourced technologies. This knowledge sharing allows for quicker resolution of problems where the root cause may not be internally known but is known by others that are familiar with the same technology.

Additionally, even when the root cause is known, crowdsourcing allows for the identification of a more ideal solution as many experts contribute to problem resolution.

This article is important for this study because it highlights how problems can be resolved quicker through the use of information sharing on technologies that are well known to others.

Jääntti, M., & Cater-Steel, A. (2017). Proactive management of IT operations to improve IT services. *Journal of Information Systems & Technology Management*, 14(2), 191-218.
doi: 10.4301/S1807-17752017000200004

Abstract: IT Service Operations is a high priority improvement target for IT service providers because it is critical for business operations and involves daily interaction with customers, thus directly effecting customer satisfaction. An action research project involving three organizations explored current IT service operation activities and challenges and initiated projects to improve service operation at each organization. The findings indicate that the major challenges include reactive rather than proactive approach to IT operations management, measurement and reporting, classification of incidents, management of customer feedback, and interfaces between IT service operation processes. Recommendations are formulated to help IT service managers and theoretical contributions are provided.

Summary: The authors note that after an IT service provider experiences rapid growth it can be accustomed to reactively addressing IT service disruptions as they occur. However, in order to successfully scale this support, the authors assert that proactive steps may be required to reduce the load on resources and improve service quality for the end users. The authors reviewed past literature and directly observed three IT service provider organizations in an effort to understand how to improve service quality by taking a more proactive support approach through the use of Problem Management and continuous improvement.

The authors identified several challenges with the execution of Problem Management within the organizations they studied. Not having a designated Problem Manager resulted in a lack of prioritization and accountability of the Problem Management process. Relating similar incident records to problem records was much more difficult in practice than expected due to a need for ITSM tooling improvements to enable users to more effectively link incidents to problem records. A lack of understanding of ITSM concepts by the service operations staff and lack of a documented procedure on how to use the ITSM tool made it difficult for Incidents and Problems to be categorized appropriately. As is the case with the implementation of all ITIL processes, the authors noted the biggest challenge was often gaining organizational acceptance for new processes.

Based upon the results of the study, authors made suggestions that they believe will result in improved Problem Management execution and in turn, higher service quality. The suggestions included establishing a formal role of problem manager or problem management process owner, ensuring direct and effective communication between all IT support teams and the technology staff, and finding better ways to enhance the interface between Incident Management and Problem Management through strong relationships. Additional suggestions include creating formal definitions for problem records and procedures. This article is important for this study because it provides specific suggestions on how to best implement Problem Management in an organization based on empirical data.

Lee, M., & Wella, W. (2019). ITIL 2011: The maturity of IT service operation in Universitas Multimedia Nusantara, Indonesia. *International Journal of New Media Technology*, 5(2), 90-94. doi:10.31937/ijnmt.v5i2.914

Abstract: Information Technology governance (IT Governance) in the world of education is quite widely used including in Indonesia itself, for example at some educational institutes. The

ITIL framework, used as a tool for evaluation, audit and also as a reference implementation. To help improve the Universitas Multimedia Nusantara (UMN) IT service in the service operation section, it is necessary to know the maturity level of the service, which is then done through the measurement of maturity level in the service operation section. In addition, the measurement results obtained can be used to produce the right recommendations with the problems found in the service. Measurements are made on the domain service operation which is the focus of UMN's IT department services. Service Operation has 5 indicators: incident management, problem management, access management, event management, and request fulfillment. In this research, the framework used in ITIL Version 2011. The result of this measurement has been found: incident management, problem management, event management, and request fulfillment get the result of measurement at level 1 and access management up to level 2. The result of the measurement and recommendation given is expected to be input material and become development material that can be used by the IT department of Universitas Multimedia Nusantara.

Summary: The authors state that in order to improve service quality, it is important to know how to measure an organization's implementation maturity level of ITIL Service Operation processes. The authors outline a way of determining process maturity by conducting an audit that includes sending questionnaires to process practitioners and reviewing response data.

The questionnaire sent to respondents was based on the ITIL v3 Maturity Model as well as the Self-Assessment Service Manual. After aggregating responses, the authors provided specific recommendations to the organization's IT manager by completing a gap analysis between the survey responses and attributes associated with the organization's stated, desired maturity level. Gaps were found in all ITIL Service Operation processes, with the organization desiring to be at a high maturity level for most processes but still in a very immature state,

indicating the need for the additional steps provided in the *ITIL Self-Assessment Service Manual* to reach the desired level.

This article is important for this study because it highlights how an organization can use objective criteria based on the ITIL Maturity Model as well as the Self-Assessment Service Manual to determine how mature their implementation of the Problem Management process is.

Van Hove, S., & Mills, Kathy S. (2013). *It's all about relationships : What ITIL doesn't tell you.*

Ely, Cambridgeshire: IT Governance Publishing.

Abstract: As the ITIL framework matures and expands the definition of the processes and functions in a best practice organization, the process owners and managers, as well as the leadership, have to shift their discussions and perspectives. In early adopt and adapt initiatives, it was common practice to look at a single process and work towards the implementation and operationalization of that specific process. Typically, as the focus turned to the next process, the connection between the first process and the new one often was minimally defined or, even worse, the new process was designed to correct the “mistakes” of the preceding process. Slowly, our thinking has evolved.

However, with the complexity and number of processes in the current framework, as well as the challenge of implementing change without detrimentally affecting the operational environment, we may be perpetuating the mistakes of old. Today’s discussions and plans for improvements are fast and furious, if only to keep up with business demands and technology changes. Enough time to truly understand and manage the relationships between the processes and functions is not typically available or planned. This is a risk that organizational leadership should dedicate serious thought to, and create an environment where the individual process, as well as the community of processes, are assessed, managed, and improved.

Summary: The authors of this book have gained wisdom from gaining advanced ITIL certifications and leading the implementation of the ITIL framework in various organizations. As a result of this experience, they have learned that in order to gain maximum value from the ITIL framework the relationships between its processes must be well defined. The goal of this book is to supplement official ITIL documentation and provide insight into the various inputs and outputs of each ITIL processes and how to best transfer data between those processes using a Service Management System.

The authors provide their own list of ITIL process inputs and outputs that includes all Service Strategy, Service Design, Service Transition, Service Operation, and Continual Service Improvement processes, including Problem Management. This book provides clear roles and responsibilities of members of the Service Desk, Technical Management, and IT Operations Management teams as they relate to Problem Management; this information enables each of those teams to understand the actions for which they are responsible in a high functioning Problem Management process.

The authors provide specific interfaces of the Problem Management process as it relates to other ITIL processes such as Incident Management and Access Management. These inputs and outputs indicate that there is a role for Problem Management in other areas of the ITIL service lifecycle, including defining how to document known errors ahead of a release, quantifying negative customer sentiment when a user experiences an incident caused by a problem, and defining proper infrastructure capacity from problem information. This book is important for this study because it indicates that successful Problem Management implementations have many more inputs and outputs than those provided by the *ITIL Service Operation* manual.

Conclusion

Modern organizations depend on technology to deliver value to people through services (Cots & Casadesús, 2015; Cots et al., 2016; Ferreira et al., 2016). It is critical that these services perform at their highest levels or else they may threaten an organization's existence (Ferreira et al., 2016; Jäntti & Cater-Steel, 2017). Leaders of technology organizations believe that the reliability of these services can be maintained or improved through the successful implementation of the ITIL/ISO 20000 Problem Management process (Cots et al., 2016, Fumagalli et al., 2012; Park & Kim, 2012).

The articles included in this annotated bibliography highlight how the execution of Problem Management in the real world comes with challenges as well as benefits. Findings from scholars and experienced Problem Management process practitioners can assist those who are interested in successfully implementing ITIL/ISO 20000 to address these challenges.

ISO 20000, ITIL, Service Operations, and Problem Management Background

The ISO 20000 international standard for service management “defines the requirements for a service provider to deliver managed services” (ISO, n.d., p. 1). The Information Technology Infrastructure Library (ITIL) is directly inherited from ISO 20000 (Cots et al., 2016). “ITIL provides guidance to service providers on the provision of quality IT services, and on the processes, functions and other capabilities to support them” (Cabinet Office, 2011, p. 3). Significant scholarly documentation exists to prove value in following a service management standard such as ITIL or ISO 20000 versus using wholly in-house processes (Cots & Casadesús, 2015). Many completed studies contain elements of ITIL and ISO 20000 at the same time due to the fact that they are so similar in nature and that ITIL is directly based on ISO 20000 (Cots & Casadesús, 2015).

There are five components of the ITIL service lifecycle: (a) ITIL Service Strategy, (b) ITIL Service Design, (c) ITIL Service Transition, (d) ITIL Service Operation, and (e) ITIL Continual Service Improvement (Cabinet Office, 2011). ITIL differs from ISO 20000 as it encourages organizations to follow its guiding principles and adapt the framework as needed (Cots & Casadesús, 2015). Cots et al. (2016) note that “ITIL can be implemented partially or at different levels” (p. 2) and still provide value.

The ITIL Service Operation includes processes such as Incident Management, Change Management, and Problem Management (Cabinet Office, 2011). Ferreira et al. (2016) assert that end users of systems only gain value from the ITIL framework once Service Operation processes are implemented, including Problem Management. The Information Technology Infrastructure Library defines Problem Management as a process for preventing future incidents (Jäntti & Kinnunen, 2006) that cause unplanned interruptions to IT services or reductions in the quality of IT services (Axelos, 2011). Problem Management is highly connected to the Incident Management and Change Management processes.

Benefits of Implementing Problem Management

The objective of Problem Management is to eliminate future incidents and minimize the impact of incidents that cannot be prevented, with the benefits of providing an organization with higher service quality and reduced expenses (Cabinet Office, 2011). Ferreira et al. (2016) note that Problem Management can improve service quality by identifying root causes and resolving them more quickly. In addition to reduced time to resolve incidents, the perceived benefits of the Problem Management process include reduced IT overhead and the identification of incident workarounds (BS, 2008). Problem Management provides benefits to an organization outside of Service Operation through tasks such as documenting known errors ahead of a release, quantifying negative customer sentiment when a user experiences an incident caused by a

problem, and defining proper infrastructure capacity from problem information (Van Hove & Mills, 2013).

It is important to note that much of the existing literature on Problem Management suggests a specific framework provides benefits without empirical evidence to show that the framework is actually effective (Perry et al., 2016). Despite this, 108 Italian telecommunications companies that are considered to deliver high service quality believe they do so through the successful execution of Problem Management (Fumagalli et al., 2012). The success of Problem Management in an organization can ultimately be determined through the percentage of time a service is functioning, as ensuring service availability is the purpose of Problem Management (Hall, 2014).

Challenges of Implementing Problem Management

After observing Problem Management execution at a major IT service vendor, Jäntti and Kinnunen (2006) identified specific challenges, including “dealing with duplicate incidents, mapping ITIL concepts and existing business concepts, a lack of performance metrics, unnecessary datafields [*sic*] in problem records, and availability problems of the online support site” (p. 41). Additional challenges when executing Problem Management may include difficulty mapping ITIL concepts to existing business concepts and managing duplicate incidents and problem records (Jäntti & Kinnunen, 2006). Relating similar incident records to problem records can be much more difficult in practice than expected due to a need for ITSM tooling improvements to enable users to more effectively link incidents to problem records (Jäntti & Cater-Steel, 2017).

Not having a designated Problem Manager may result in a lack of prioritization and accountability of the Problem Management process (Jäntti & Cater-Steel, 2017). Additional challenges when executing Problem Management as an organization include the establishment of

a successful Incident Management process (Cabinet Office, 2011), having staff skilled at root cause analysis (Cabinet Office, 2011), and having well defined operational level agreements to ensure problems are resolved in a timely manner (Cabinet Office, 2011; Jäntti & Kinnunen, 2006).

Standardizations and frameworks such as ITIL and ISO 20000 that are used to enforce best practices do not always take into account real world scenarios, and as a result implementing these frameworks can be challenging (Müller & Lichtenberg, 2018). Organizations that value autonomy when managing their IT services may have trouble implementing the ITIL framework unless they secure organizational buy-in by highlighting an improved service quality vision versus focusing on specific ITIL processes (Jäntti & Cater-Steel, 2017; Müller & Lichtenberg, 2018).

In addition to organizational challenges, individuals may resist the implementation of Problem Management as some may perceive their jobs as being threatened as part of problem reduction, enjoy the thrill of being heroes, or may not want the root causes of problems to be revealed (Hall, 2014). Leaders can help with the adoption of Problem Management by linking process improvements to existing corporate goals (Müller & Lichtenberg, 2018).

Best Practices in Implementing Problem Management

ITIL processes can be more effective if processes are altered to match the reality of the implementing organization versus following strict guidelines laid out in the framework (Ferreira et al., 2016). An example of a process change that may make Problem Management more successful is deviating from the ITIL problem prioritization model by adding additional criteria such as the number of helpdesk complaints and the criticality of the application (Ferreira et al., 2016). Periodically performing a comparison of an organization's ITIL process execution against the ITIL Maturity Model and making changes as recommended in the *ITIL Self-Assessment*

Service Manual will help the organization reach a more mature execution of those processes (Lee & Wella, 2019).

Effective communication of impact and timely communications are two primary factors that drive the success of Problem Management (Perry et al. 2016). Execution of ITIL processes are more successful as a result of ITIL training, even if that training is only high-level ITIL awareness training for workers (Hall, 2014; Jäntti & Kinnunen, 2006). A universal agreement on metrics and KPIs is important so the organization has a common understanding of what constitutes success (Hall, 2014). It is important for an organization to establish the formal role of problem manager or problem management process owner to enable prioritization and accountability of the Problem Management process (Jäntti & Cater-Steel, 2017).

When resolving problems, Hall (2014) recommends not listing human error or failed changes as root causes for problems, as neither is truly useful and failed changes can be attributed to as much 80 percent of all problems (Hall, 2014). It is possible that problem managers can share information via social networking to achieve quicker resolution of problems where the root cause may not be internally known but is known by others who are familiar with the same technology (Jamjoom et al., 2009).

The best tools for Problem Management execution will store data for all ITIL processes, including Incident Management and Knowledge Management, provide the ability to execute ITIL processes and allow for easy customization of the processes so that the processes can best fit the needs of the organization (Hall, 2014). Jäntti and Cater-Steel (2017) highlighted the need for documented procedures on how to use an ITSM tool, as the lack of documented procedures made it difficult for incidents and problems to be properly categorized.

Final Thoughts

As ITIL 4 is released to experts in the field of service management, analysis of this version of the Problem Management process will begin. Similar to the release of the ITIL v2, ITIL v3, and ISO 20000 frameworks in the past, it may take years before substantial research on ITIL 4 is completed. The benefits, challenges, and best practices associated with the implementation and execution of a formal Problem Management process have shown little deviation in the evolution of the ITIL and ISO 20000 frameworks; the core lessons from this study are therefore anticipated to have continued relevancy through the analysis and application of the latest and future versions of these frameworks.

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