

An IT Infrastructure Library (ITIL) Maturity Strategy for Private Cloud Sourcing Models: A Literature Review and Research Methodology Formation

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ABSTRACT

ITIL adoption has started to wane over the last few years due to the overall cost of implementation and difficulties with integrating the ITIL methodology with the current corporate Information Technology (IT) strategic plan. This becomes even more apparent as IT departments move away from the traditional service delivery models to private cloud sourcing strategies. The purpose of this research is to establish a roadmap, as part of the ITIL maturity plan, for the first phase of ITIL implementation for organizations moving towards these new service-sourcing models. This work provides IT organizational leaders with a methodical approach to ITIL implementation that supports a migration strategy to a private cloud sourcing model as part of their 3 to 5 year IT strategic plan. The initial phase of this research, which is detailed in this paper, is a comprehensive literature review with insight from ITIL practitioners and industry surveys. From this research, several conclusions are expected. The most valuable conclusion that can be drawn will be an established strategy for ITIL implementation that will ensure long term success for those seeking to use private cloud sourcing.

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1. INTRODUCTION

The case has been made for an Information Technology (IT) organization to go beyond just managing IT assets but responding to business needs and market conditions in a proactive effective manner [1] [2] [3]. This was based on the growing needs to address the complexity of IT systems and the variability in these large data center operations [4] [5]. The introduction of cloud computing, an adaptive infrastructure management methodology [6], has made virtualization of core technologies possible. Cloud computing, both private and public infrastructures, is defined as delivering services over the internet (or intranet) and managing both the hardware and software systems that provide those services [7]. With Chief Technology Officers (CTO's) aiming to migrate towards virtualized environments to reduce operating costs and environmental footprints, introducing automation and standardization into management practices is critical to an organization's success in order to lower the total cost of ownership (TCO) [4] [6]. As Douglas King, an IBM Vice President and Executive in Global Technology Services noted, this evolution will require the planning of both the right people and right processes [4].

IT Service Management (ITSM) is a methodology to address that need. It is a paradigm shift where an IT organization redirects its focus from a technology centric management structure to a client based IT service provider targeted towards service performance [3] [5] [8] [9]. Essentially ITSM is a consolidation of process centric thinking with business management acumen. Several frameworks have been introduced under the ITSM umbrella either granted by a governing body, De Jure Standards (literally "by right"), or

derived through the industry best practice, De Facto standards [3]. De Jure standards are conceived by agencies, government or commercial that has the authority to issue standards within its particular domain [3]. Examples of these standards include ISO 20000, CMMI for Services v1.3, and eTOM. These models, while informative and useful, have not been widely adopted by the industry. The de facto standard of IT Infrastructure Library (ITIL) v2 and its modernized successor ITIL v3, has become the most widely accepted approach to ITSM because it offers the best blend of “best practices” for managing IT services. It is an intertwining union of life cycle processes from concept origination to operational implementation and maintenance that manages and delivers IT services to the business that does not constrain solutions or limit implementation [3] [10]. ITIL is responsible for involving humans in the management of IT infrastructure while making the overall IT operations seem seamless to their customers, the interfacing business units.

In the late 2000's, ITIL adoption was increasing at a phenomenal pace. In 2008, the IT Governance Institute estimated ITIL had an adoption rate of 24%, the highest of any other ITSM framework (both de jure and de facto). In 2010, a Danish survey revealed that 46% of private organizations and 88% of municipalities and government organizations used ITIL [10]. As of late, ITIL adoption has been waning due to several factors. A survey conducted by Dimension Data concluded that there are three main factors contributing to the decline of ITIL adoption in some American and global IT firms. Those factors include costs associated with training, certification and implementation, and a lack of internal resources to evaluate implementation readiness [11]. Some additional concerns highlighted by ITIL expert and author Linh Ho include overall process selection, the complexity of implementing the entire version 3 framework, and difficulties with integrating the ITIL methodology with the current corporate IT strategic plan. This becomes even more apparent when IT departments move away from the traditional service delivery models to private cloud sourcing strategies because of the unorthodox epitomes that accompany this type of service provisioning and rapid resource utilization scaling.

What is lacking in the current body of knowledge is a definitive framework or guidelines for companies to use when selecting and implementing a service-oriented IT management infrastructure as well as recommendations for specific types of business structure and models [12]. Organizations need to strike a balance between agility and stability in order to seize technology cost reduction opportunities [3] [13]. The purpose of this research is to establish the foundation for a framework of ITIL processes that would support a private cloud environment. This paper is intended for practitioners and researchers that want to continue to expand on the body of academic research available on ITIL and ITSM.

2. LITERATURE REVIEW

The literature review to support this research was broken into three main components. The first was ITSM and ITIL, what it is, its history and evolution. This body of work established the rationale for this particular research topic. The second component centered around ITIL's application, benefits, success factors, maturity strategies and implementation. This array of surveys, case studies, and Delphi studies form the basis of data used within the research method to create a proposed process mapping. The final component involved cloud computing and technologies, and nontraditional approaches to IT development and data center management. This component of the literature scopes the research to a well-defined case scenario for application. There is not a significant body of knowledge available in reference to implementing an ITIL recommended process methodology approach targeted towards a particular IT environment. Most research centers around success factors for ITIL or a generic review of ITSM and ITIL concepts. This research narrowed the body of knowledge to focus on the relevant articles steered towards this subject area.

2.1 The Evolution of ITSM and ITIL

[14] Winniford et al. established a good foundation within the research to institute a working definition of ITSM and reveal relevant ITSM frameworks and concepts currently present within the industry. This survey uncovered the most prevalent frameworks and emphasized the need for the use of a common language across the industry. It provided a breadth of knowledge on ITSM but provided little depth into the subject matter.

In [12], authors conducted the most relevant research in this field of ITIL and its application in IT environments. An important note they emphasized was that ITIL itself is not a prescriptive framework [12]. Instead the specific business strategy and benefits sought should guide how the IT organization should tailor the sequence of processes selected and implemented to ensure it meets the organization's needs [12]. In most cases, ITIL is viewed in the broad sense as a solution that is applicable to any organization, therefore it can be concluded that ITIL would be hard to define because it takes a one-size fits all approach. This specific research lacks providing a clear direction on conditions required for tailoring the ITIL processes for a narrower scope in regards to business strategy or specific IT sourcing models. However in [13], the author's research eludes to the first major pillar of this research, that by narrowing the scope of an ITIL

implementation, a recipe can be established that provides that right blend of necessary processes to address the organization's needs. A key contribution from this research to the current body of knowledge will include an ITIL framework tailored to a private cloud computing environment.

The authors of [8] were also fundamental contributors to the current body of knowledge by indicating that in ITSM and ITIL structures, there is an absence of recommendations for specified types of businesses [8]. They further elaborated indicating that this lack of guidance leaves companies in a lurch when selecting principles of service-oriented IT management that is relevant to their IT organization [8]. While Hochstein and Brenner further provided justification for this particular research, no recommendations or guidelines were presented in their literature. To solidify the need for this research, [5] accentuated that there are few resources that help IT managers gain a quick understanding of the individual ITIL process areas that support a particular knowledge base. Because of this, IT managers are unsure how to implement ITIL and struggle on how to fit the ITIL methodology into the current organizational practices [5]. This denotes that since there is no set guidance on how ITIL v3 should be implemented, most IT managers do not understand how to approach the challenge. Because of this simple fact, most IT managers take an ad hoc approach. Though this research identified a clear gap in the current body of knowledge, it did not provide a potential solution to address the problem or potential approaches to broach the issue.

2.2 ITIL Adoption, Application, and Implementation

In [15], the authors presented research that indicated that through the ad hoc approach most managers currently utilize, they may not be adopting the most applicable and effective processes for their organization either because they perceive them as less important or simply don't recognize them during their early stages of implementation planning. This would suggest that most IT executives and managers hand pick the processes that they want to implement [15]. Therefore most companies do not fully adopt all the ITIL processes, (as highlighted in Iden and Langelan's research), not because of lack of need but because of lack of understanding. This particular notion is subjective in nature, and is solely based on the personal views of the researchers. They could not provide any definitive data that actually supports these beliefs even though they are shared among many within the industry.

Marrone and Kolbe also added a great amount of research to this body of knowledge. Through their survey they were able to show that there is a relationship between the number of ITIL processes implemented and the perceived maturity of the organization. This formed the second major pillar of this research because it confirmed that the selected ITIL process and the number of processes implemented are more important than how mature the particular process itself is. Marrone and Kolbe implied that based on the Law of Diminishing returns, continued improvement on a particular project/process would start to yield a decline in effectiveness after a particular level is reached. This resulted in few additional benefits being achieved after a certain level of standardization has been reached [15]. Through their research, a set of conclusive data was presented to support their hypothesis. The only criticism that can be made on their research centers around, the lack of guidelines given to the survey participants on classifying the various levels of maturity pertaining to their particular ITIL implementation. However, this is a flaw in most information systems research because of the human dependence laced within this research context.

2.3 Maturity Models

Capability Maturity Model Integration (CMMI), ITIL, and control objects for information and related technology (CoBIT) are the most widely known and adopted maturity models currently. These three frameworks address disciplines in software engineering, IT Management, and IT governance, respectively, thus their individual concepts do not overlap [16]. Instead of having redundancy between the maturity frameworks, they can become very complementary to each other [16].

As part of the composition of ITIL version 2, a process maturity framework was delivered across the ten service management processes. This included five distinctive levels of maturity that are comparable to the CMMI maturity levels. Reference Table 1 for ITIL v2 and CMMI Five Level Maturity Model. The ITIL v2 maturity model measured the overall maturity of an organization rather than the maturity of each individual process or service [17]. With the evolution of ITIL v3, this maturity approach was abandoned which makes many practitioners weary of its effectiveness and its flexibility with the increased number of processes [16][17].

Table 1. ITIL v2 PMF vs CMMI Five Level Maturity Model

Level	ITIL v2 PMF	CMMI Five Level Maturity Model
1	Initial	Initial
2	Repeatable	Repeatable
3	Defined	Defined
4	Managed	Quantitative
5	Optimized	Optimized

Because these maturity levels, while informative, lack a comprehensive roadmap for implementation, most practitioners do not find them useful when planning their organization's ITIL implementation approach.

2.4 Cloud Computing

The most widely cited article, A View of Cloud Computing, defines cloud computing in laymen terms and provides boundaries by which this research was scoped. Breiter and Behrendt illustrated the overlapping characteristics of the ITSM life cycle with the cloud computing life cycle showing the key interfaces between them. This research demonstrated a key business relationship between cloud computing and the corresponding non-technical management structure. In most research, the business relationship between cloud computing and a management structure is ignored. To tie all the research together, Douglas J. King in an interview articulated how the cloud computing model could leverage many concepts from ITSM and ITIL for better operations management in a virtualized environment. These three pieces of research are more prescriptive and narrative based research centered around literature reviews and industry experience rather than analysis on specific data sets. Therefore there is some subjectivity that must be considered.

This brief literature review suggests that the private cloud computing model could greatly benefit from an ITIL management approach. In Section 3, we introduce our research methodology describe the expected end results, and, finally, Section 4, discusses the main conclusions from this research.

3. PROPOSED RESEARCH METHOD

Because information systems research involves the study of experiences, values, perceptions, and responses [16], there is a layer of human interdependence. Therefore there was only a handful of research approaches that seemed applicable. This was taken into account as the overall design of the research was conceived.

3.1. Research Design

The Research outline is presented below.

- 1. Selection Criteria:** A comprehensive literature review to establish the process selection criteria for determining the most relevant processes needed to support a private cloud computing environment will be conducted.
- 2. Framework Formation:** Using these criteria, this research will establish a defined list of ITIL processes that should be implemented as the first phase of implementation.
- 3. Data Acquisition:** Data will be collected over the course of three months through electronic surveys conducted at American IT conferences. The participants of this survey will include a range of large (10,000+ employees) to small IT firms (< 250+ employees) that manage private cloud computing environments. The data collected from the survey will provide information on demographics centering around the IT organization (examples: size, location, industry), technical capabilities (examples: cloud sourcing strategy, data center management, virtualization), and IT management approaches and practices (examples: ITIL process areas implemented, perceived maturity of the organization).
- 4. Data Validation:** The formulated framework will then be validated against the data collected from the survey. Using statistical analysis, our research will show the correlation between the formulated processes captured within the framework with the operational maturity of the various organizations.

3.2. Expected Result

Upon completion, this research will provide

1. A set of validated data based on literature review and surveys of key players in the industry.
2. A set of common IT management best-practices formulated into a framework for easy implementation.
3. A proposed methodology to integrate these best practices with private cloud computing environments.

This framework can be used as a roadmap for adopters that will improve implementation efficiency and lay the foundation for long-term benefits.





4. CONCLUSION

The initial phase of this research was discussed briefly with an introduction to the comprehensive literature review followed by a high level review of the research method and overall approach. This research will serve as a guide to IT managers and executives that want to implement the ITIL methodology using the private cloud computing model. The main purpose is to provide a definitive list of processes that should be employed during the first phase of implementation that can best be applied to private cloud environments. This will reduce the overall cost of implementation and increase the effectiveness of the implemented processes.

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