

IT Service Management Knowledge Ecosystem – Literature Review and a Conceptual Model

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Abstract

Information Technology Service Management (ITSM) is a customer-centric approach to manage IT Services in order to provide value to the business. The ITSM Knowledge ecosystem comprises multiple knowledge areas including process frameworks, technology tools and skills. Organisations struggle to comprehend the ecosystem due to the dynamic nature and volume of the business technology environment. A Systematic Literature Review was conducted to understand the state of the current research in ITSM knowledge ecosystem. The review indicated that the focus of the existing research is skewed towards process frameworks knowledge area and neglects tools and training. The approach proposed in the extant research fails to provide a holistic view of the ecosystem. To overcome the limitations a conceptual model is proposed based on Knowledge Commons theory.

Keywords ITSM, IT Service Management, ITSM Knowledge Ecosystem, ITIL, Knowledge Commons

1 Introduction

Information Technology Service Management (ITSM) is a customer centric approach to manage IT Services in order to provide value to the business (Taylor 2007). The ITSM knowledge ecosystem comprises multiple knowledge areas including process frameworks, technology tools and skills/training. There are many stakeholders who engage in complex interactions utilising different knowledge areas. Table 1 shows the typical knowledge life cycle stages, the knowledge areas and examples of key stakeholders within the ITSM knowledge ecosystem.

Knowledge area	Knowledge Lifecycle Stage		
	Generation	Dissemination	Consumption
Process frameworks	Library developers	Professional bodies, symposia, social media, networks	Organisations, consultants, auditors
Tools	Vendors, library	Marketing	Organisations
Training/Skills	Higher education institutions, training providers, skills framework	Higher education institutions, HR trainers, job advertisers	Individuals, training providers, Hiring Managers

Table 1 Key stakeholders within the ITSM knowledge ecosystem

In ITSM practice, there are many complementary process frameworks including, but not limited to, COBIT®, ISO/IEC 20000, Lean Six Sigma, Project Management Body of Knowledge (PMBOK®), PRINCE2®, Agile, SCRUM, TOGAF®, DevOps, CMMI® and ITIL®. Organisations often leverage more than one framework to meet their business objectives (Cater-Steel et al. 2006).

Some process frameworks have an extensive range of technology tools to support their implementation. The tools play a pivotal role in automating the process steps, integrating with other processes and providing a user interface for process execution and control.

Likewise, the process frameworks typically offer relevant skill certifications for practitioners. The certification schemes differ between process frameworks. The process frameworks, tools and skills maintain symbiotic relationships within the ITSM ecosystem.

1.1 Research problem

In a dynamic business technology environment, organisations need to continually look out for a complementary mix of process frameworks, supporting tools and updated skills for their employees. However, the existence of multiple process frameworks causes confusion, inefficiency and ineffectiveness (Heston and Phifer 2011). To address these issues, the research problem “*Within the ITSM Knowledge ecosystem, no single platform that provides a holistic, contemporary view of all knowledge areas exists*” is considered.

The research will design and evaluate a Self-Managing ITSM Knowledge Repository (SIKR). SIKR will be a useful resource for organisations during strategic planning as it provides a comprehensive view of complementary frameworks, tools and competencies. Evaluating the use of multiple frameworks within organisations is outside the scope of the research.

2 Literature Review

The research follows the Design Science Research (DSR) methodology (Hevner 2004). As part of the DSR methodology, a Systematic Literature Review (SLR) is conducted to understand the current state of research knowledge. The SLR addresses the following questions:

- How is the research coverage of knowledge areas distributed?
- What are the primary techniques used to harmonise multiple process frameworks?
- Are these techniques suitable for modelling ITSM knowledge ecosystem holistically?

SLR is a structured and rigorous approach to conduct a literature review (Kitchenham et al. 2009). This research uses the SLR strategy to define the search approach, inclusion and exclusion criteria, data collection and analysis. Among the ITSM process frameworks, ITIL is the most widely adopted framework (Marrone et al. 2014). As ITIL framework spans across the entire ITSM Lifecycle, “ITIL” is used as the bridging keyword in the literature search. To cover additional relevant research papers, the

search terms “ITSM” and “IT Service Management” are included. Table 2 shows the summary of the literature review strategy.

Criteria	Search terms
Search keyword combinations	(ITIL AND COBIT) OR (ITIL AND “Six Sigma”) OR (ITIL AND Lean) OR (ITIL AND CMMI) OR (ITIL AND Agile) OR (ITIL AND DevOps) OR (ITSM OR IT Service Management)
Databases	Google Scholar, ACM Digital Library, Applied Science and Technology Source Ultimate, Business Source Ultimate, IEEE Xplore - IET
Language	English
Article type	Academic journals, Conference papers
Options	Scholarly (Peer reviewed) Publications, Full Text, References available, conference papers
Date Range	Jan 2000 to June 2018
Inclusion Criteria	Papers on process frameworks with specific focus on integration/harmonisation of multiple process frameworks
Exclusion Criteria	Papers outside identified process frameworks; focused on only one framework; those do not include any analysis of the overlap/integration between the process frameworks

Table 2 Literature review strategy

The search found 654 papers that satisfied the search criteria. The paper title and abstracts were screened reducing the set to 67 papers that discussed multiple process frameworks. Duplicate papers and papers that discussed only one framework were rejected. These 67 papers were studied to select 41 papers to be included in literature review based on inclusion criteria outlined in Table 2. The shortlisted literature comprises 15 journal articles and 26 conference papers as listed in Appendix A. To analyse the results the codification approach presented in Table 3 was followed.

Code	Description	Value
Knowledge area	The predominant knowledge area discussed in the research	Process, skills, tools
Process framework coverage	The process frameworks discussed in the research	ITIL, COBIT, CMMI, ISO, DevOps, Lean, Agile, Six Sigma, PMBOK
Process integration approach	Approach to describe the relationships between process frameworks	Mapping, combination, ontology

Table 3 Codification approach

3 Results and Discussion

The knowledge areas were classified as process frameworks, tools and skills. The result indicates that 38 out of 41 included articles addressed the process framework area. The process framework research is focussed on developing a conceptual process model, a map or ontology. Only three papers discussed the issue of skills and no research was found in the tools category. The integration approaches can be broadly classified into mapping and structured ontology. Mapping is a technique of describing the relationship between related processes. Mapping was used by 23 papers to understand the relationship between process frameworks. The structured ontology provides a more formal approach to define the relationship between two entities. Pardo et al. (2013; 2012; 2014) proposed techniques for ontology mapping. The ontology-based approach would suit for process harmonisation of two to three frameworks. Since the ontological model is based on reductionist approach, it cannot harmonise large number of process frameworks due to the inability in managing large amounts of information (Mejia et al. 2016). The summary of findings to research questions is provided in Table 4.

Research question	Findings
How is the research coverage of knowledge areas distributed?	92.7% Process Frameworks, 7.3% Skills, 0% Tools

What are the primary techniques used to integrate multiple process frameworks?	Mapping, Ontology
Are these techniques suitable for modelling ITSM knowledge ecosystem holistically?	The techniques are not suitable for holistic modelling

Table 4 Literature review summary

4 Conceptual Model

The limitations identified through the SLR include the inadequate coverage of tools and skills and inability of mapping/ontological approaches to provide a holistic view of the ITSM knowledge ecosystem. To address these limitations a fundamentally different approach is proposed based on Knowledge Commons theory (Hess and Ostrom 2007).

The term "Commons" is defined as "a general term that refers to resource shared by a group of people" (Hess and Ostrom 2007). The Commons economic theory is applied in the study of shared natural resources such as water resources, forests, fisheries, wildlife, knowledge management, and Free/open-source software (FOSS) (Macbeth and Pitt 2015). Institutional Analysis Development (IAD) Framework was proposed by Ostrom (1999) to systematically analyse the Commons. Frischmann et al. (2014) argued that the IAD framework needs to be tailored to suit knowledge commons. Drawing inspiration from IAD, this research proposes an alternative conceptual model of Knowledge Commons shown in Figure 1. The conceptual model consists of technical layer, community layer and usage layer. The technical layer is a platform for storing the knowledge artefacts. A practitioner community will contribute to the knowledge creation and governance of the repository. The usage layer will include knowledge consumers.

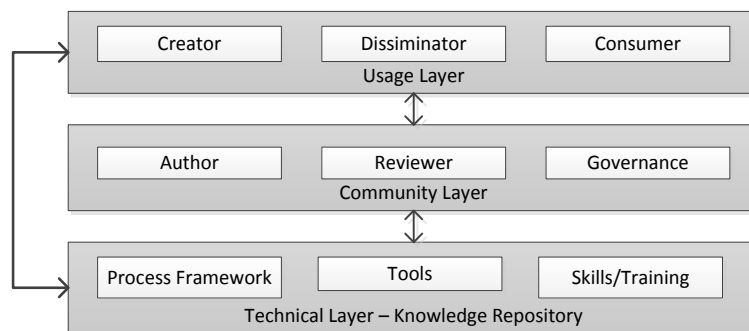


Figure 1 ITSM Knowledge Commons Conceptual Model

5 Conclusion and Future Research Directions

The literature review indicates that the existing research approaches fail to provide a holistic view of the ITSM Knowledge ecosystem. To overcome the limitations of the current research, a conceptual model based on Knowledge Commons is proposed. The conceptual model's practical and theoretical implications will be explored in the research. Based on the conceptual model, the research will develop a Self-managing ITSM Knowledge Repository (SIKR) using DSR methodology. The suitability and tailoring of DSR will be addressed by the research. In addition, the research will contribute to existing ITSM literature and position the results in current debate on ITSM. The research will be relevant to ITSM practitioners as SIKR is expected to provide a reliable knowledge platform.

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7 Appendix A: Analysed Research Papers in SLR

Authors	Coverage	Knowledge area	Approach
(Berrahal and Marghoubi 2016)	Lean, ITIL	Process	Mapping
(Bahn et al. 2016)	Agile, DevOps	Skills	Curriculum
(Cater-Steel and Toleman 2007)	ITIL, ISO/IEC 20000	Skills	Review of skills
(Cater-Steel et al. 2006)	ITIL, COBIT, CMMI, ISO 9001	Process	Survey
(Ehsan et al. 2010)	PMBOK, CMMI, ITIL	Process	Mapping
(Ekanata and Girsang 2017)	COBIT, ITIL	Process	Mapping
(Evelina et al. 2010)	ITIL, COBIT, CMMI, ISO 9000	Process	Mapping
(Heschl 2008)	COBIT, ITIL	Process	Mapping
(Heston and Phifer 2011)	ISO 9001:2000; Lean Six Sigma; CMMI; ITIL; ISO 27001	Process	Combine
(Huang et al. 2009)	COBIT, ITIL, ISO/IEC 27002	Process	Mapping
(Jeners et al. 2012)	CMMI, ITIL, COBIT	Process	Model- metrics
(Jeners et al. 2013)	ITIL, COBIT, CMMI	Process	Integration
(Karkoskova and Feuerlicht 2015)	ITIL, COBIT, MBI	Process	Mapping
(Kundu et al. 2011)	CMMI, Lean	Process	Mapping
(Kusumah et al. 2014)	COBIT, ITIL	Process	Mapping
(Latif et al. 2010)	ITIL, CMMI, PRINCE2, PMBOK, COBIT	Process	Mapping
(Lin et al. 2009)	CMMI, Six Sigma	Process	Combined
(Lino and da Silva 2008)	Lean, ITIL	Process	Unclassified
(McCarthy et al. 2015)	DevOps, ITIL	Process	Architecture
(Mejia et al. 2016)	ITIL, COBIT, CMMI, Six sigma	Process	Mapping
(Năstase et al. 2009)	COBIT, ITIL, ISO/IEC 27002	Process	Mapping
(Oktadini and Surendro 2014)	ITIL, Six Sigma	Process	Mapping
(Pardo et al. 2012)	ITIL, ISO, CMMI, COBIT	Process	Ontology
(Pardo et al. 2013)	CMMI, ITIL, COBIT, SWEBOK	Process	Ontology
(Pardo et al. 2014)	CMMI, ISO, ITIL, COBIT, RiskIT	Process	Mapping
(Parvizi et al. 2013)	ITIL, COBIT	Process	Unclassified
(Pillai et al. 2014)	ITIL, Lean Six Sigma	Process	Action research
(Pinheiro and Misaghi 2014)	Lean, ITIL, CMMI, COBIT	Process	Mapping
(Pirta and Grabis 2015)	ITIL, COBIT, ValIT	Process	Combine
(Pricope and Lichter 2011)	Generic	Process	Architecture
(Ramachandran 2013)	CMMI, ITIL, PMPOK, Six Sigma	Skills	Mapping
(Sahibudin et al. 2008)	ITIL, COBIT, ISO/IEC 27002	Process	Mapping
(Sánchez Peña et al. 2013)	ITIL, COBIT, EFQM	Process	Mapping
(Sheikhpour and Modiri 2012)	COBIT, ISO/IEC 27001	Process	Mapping
(Stroud 2010)	COBIT, ITIL	Process	Mapping
(Tajammul and Parveen 2017)	ISO27001, PRINCE2, COBIT, OPM3, CMMI, ITIL	Process	Mapping
(Tshinu et al. 2008)	ITIL, COBIT, CMMI	Process	Combine
(Verlaine et al. 2016)	ITIL, Agile (SCRUM)	Process	Mapping
(Veronica and Suryawan 2017)	ITIL, COBIT	Process	Literature Review
(Von Solms 2005)	COBIT/ISO17799	Process	Mapping
(Wickboldt et al. 2011)	ITIL, PMBOK, COBIT, M_o_R	Process	Combine

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