Application of IT Management Frameworks in Higher Education Institutions

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Abstract. IT Management best-practice process frameworks for IT Service Management and IT Governance have been applied by many organizations to structure and improve operational IT management and IT governance. It further facilitates customer centric, cost efficient and compliant IT Service provisioning. IT Management has undergone various evolutionary stages and changes over recent years due to the evolving maturity of best-practice recommendations and evolving IT requirements. This paper refers to the current practices and standards in the areas of IT Service Management and IT Governance. A case study identifies and outlines implications for the Higher Education sector. The practical adoption of these frameworks in higher education institutions suggests that the domain has advanced and matured in recent years. However further research and adjustments are required to further facilitate the adoption of the core ITSM and IT Governance principles.

Keywords: IT Service Management, IT Governance, ITIL, CobiT.

1 Introduction

Service Science for IT and related technologies holds high importance in the current business world with organizations recognizing IT not only as a cost center but also as a crucial factor in enabling the success of an organization through IT Alignment. This manifests itself in areas such as IT Governance and IT Service Management (ITSM) [1] [2]. Organizations aim to improve the IT Services delivery by adopting IT service management processes and transforming their organization from a provider of IT focused functions into a customer-centric organization meeting customer requirements [3]. Such an IT context requires the organization to effectively identify required IT Services, plan the development of new services, support operational services and continuously redefine service provisioning. Thus IT Management should cover the entire lifecycle of IT Services. ITSM and IT Governance aid in this scenario by offering frameworks that act as models for organizations in implementing the best practices and improvising their service offerings. ITSM aligns the business and IT of an organization by directing IT efforts to achieve business demands and achieving customer satisfaction by ensuring the quality of the services. The alignment of IT usage and business needs in an organization in an appropriate manner can be achieved with

the help of IT governance frameworks and principles [4]. IT governance defines the structure of relationships and processes to develop, direct and control the entirety of the IT resources in order to achieve the goals of an of an organization. IT governance thus aims to ensure control over the implementation of IT strategy thereby ensuring the proper alignment of the IT and the Business functions.
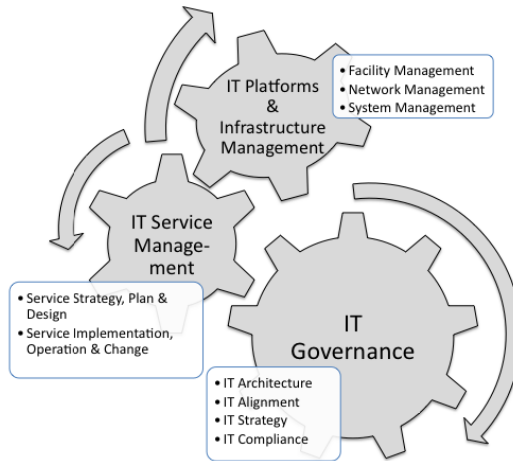
Fig. 1. IT Management Domains

IT Governance is a subset domain of Corporate Governance focused on IT business alignment, performance, risk and compliance. The rising interest in IT Governance is partly due to compliance requirements and legislation such as the Sarbanes-Oxley Corporate Governance legislation that force organizations to comply with a more or less well defined set of rules and regulations as well as the acknowledgment that a large number of IT initiatives fail to deliver the desired results and lack business alignment. Given the implicit requirements to embed IT Governance in the Corporate Governance framework it becomes clear that this topic is relevant to most organizations. As explained by R. Nolan *"a board needs to understand the overall architecture of its company's IT applications portfolio … The board must ensure that management knows what information resources are out there, what condition they are in, and what role they play in generating revenue"* [5]. IT Governance envisages a system where the various stakeholders (e.g. management, IT department, internal customers) become part of the decision making process to prevent IT from independently making poor decisions (e.g. that a system does not behave or perform as expected).

IT Service Management (ITSM) is a discipline for managing IT Services that is centered on the customer's perspective of the contribution of IT to the business (i.e. the role of IT Services to support and facilitate the business) and, in contrast to IT Governance, is mainly concerned with the operational aspects of IT Services. ITSM stands in deliberate contrast to technology-centered approaches (Facility, Network, System and Application Management) that nevertheless provide the basis for meaningful and effective ITSM and IT Governance [6].

IT Service Management and IT Governance has been high on the agenda for many organizations over recent years [2]. Various best-practice frameworks and standards have been adopted by many organizations including higher-education in an effort to improve the quality and effectiveness of the IT Services and the efficiency of IT Service delivery, to develop a customer oriented approach to IT Service provision and to provide a meaningful basis for required IT Governance mechanisms.

This paper is organized into four sections. The first section provides an introduction to ITSM and IT Governance and a motivation for the current the research. The second section highlights the relevant best practice frameworks and standards, their adoption in research and industry and analysis of the frameworks. The third section consists of a synthesis of conclusions drawn from the research and analyses possibilities on improving and adopting these frameworks for the future. The final section provides the conclusions and future outlook.

2   IT Management Frameworks and Standards

"To the majority of computer scientists, whether in academia or industry, the term 'services' is associated with Web services and service-oriented architectures. However, there is a broader story to be told of the remarkable growth of the service sector, which has come to dominate economic activity in most advanced economies over the last 50 years. The opportunity to innovate in services, to realize business and societal value from knowledge about service, to research, develop, and deliver new information services and business services, has never been greater. The challenges are both the multidisciplinary nature of service innovation, which combines business, technology, social-organizational, and demand innovation as well as the lack of formal representations of service systems" [7].

Sporer & Riecken refer to the relevance of service thinking and the adoption of IT service concepts such as Service-Oriented Architectures [7]. There are several standards, and best practice frameworks to define, plan, operate and manage IT Services that aim to embed the concept of service thinking into an organization [2]. The most relevant and widely used best practice frameworks and standards in the context of IT Management are ITIL, ISO 20000, CobiT and ISO/IC 27002 [2-4]. CobiT focuses on how to deliver information to satisfy business needs, ITIL is concentrated on the delivery of IT Services (i.e. a specific business need), ISO 20000 provides a standard broadly based on ITIL for IT Service Management and ISO/IEC 27002 provides a standard for information security.

IT Infrastructure Library (ITIL) is a widely cited and adopted de-facto standard that often provides the basis of IT Service delivery and support processes in industry. It is widely accepted across the world in public and private sectors as a reference framework and practical basis for IT Service Management [2]. It was first introduced and distributed by the Office of Government Commerce (OGC) in the UK in the 1980s in the light of growing IT complexity and costs to facilitate structured IT service delivery. ITIL aims to provide process definitions and descriptions for the entire IT function and service delivery of any given organization with a focus on IT service

management. The early versions where predominantly concerned with operational support processes whereas the current version of ITIL aims to cover all stages of IT Services. The current version ITILv3 and its subsequent refinement ITIL2011 is based on a lifecycle model that consists of five key stages (and each stage is published as a separate ITIL book): Service Strategy, Service Design, Service Transition, Service Operation and Continual Service Improvement. The objective of ITIL processes is to define, evaluate and improve the quality of services and service delivery. It thus helps to make the services available to the customers to support the business function, thereby improving and providing high quality service management.
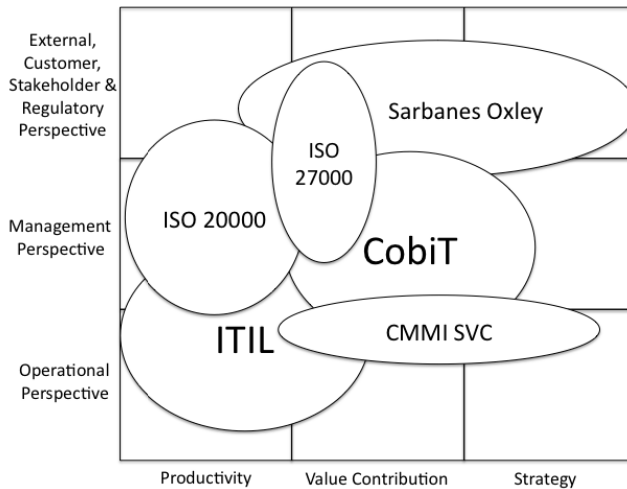

Fig. 2. IT Management Reference Models & Frameworks

Control Objectives of Information and related Technology (COBIT) is a set of best practices for Information Technology management created by the Information Systems Audit and Control Association (ISACA) and the IT Governance Institute (ITGI). COBIT is the internationally accepted framework for IT Governance and Control [4]. It was first introduced in 1992, the current version CobiTv5.

COBIT aims to provide a comprehensive approach to all IT Governance activities. It facilitates a better understanding of the IT systems and a control and security framework to protect the company's assets. COBIT is a widely recognized and accepted IT governance framework [4]. It defines management domains that consist of key IT Governance processes or control objectives, which are broken into detailed IT controls. The management domains roughly represent the lifecycle of the overall IT Governance process: Plan and Organize, Acquire and Implement, Deliver and Support, and Monitor and Evaluate. For each of the processes COBIT defines performance goals and metrics, Key Performance Indicators (KPIs) and maturity levels in assisting benchmarking and decision making for process improvements. It provides additional guidance for organizations such as RACI charts identifying who is Responsible, Accountable, Consulted and or Informed for specific IT processes.

ISO/IEC 27002 is an Information Security Management System (ISMS) standard and is often referred to as a basis or a code of practice for Information Security Management [8]. It lists security control objectives and recommends a range of specific security controls. The ISO 27000 family can be treated more as information security norm rather than a comprehensive IT Governance tool. ISO/IEC 27002 ensures overall security at all levels in an organization. This standard can further be supplemented by national guidelines or recommendations such as the BSI Grundschutz Katalog (Baseline Security Catalogue published by the German Federal Agency for Security in Information Technology), a comprehensive baseline security standard that is evolving towards ISO 27000.
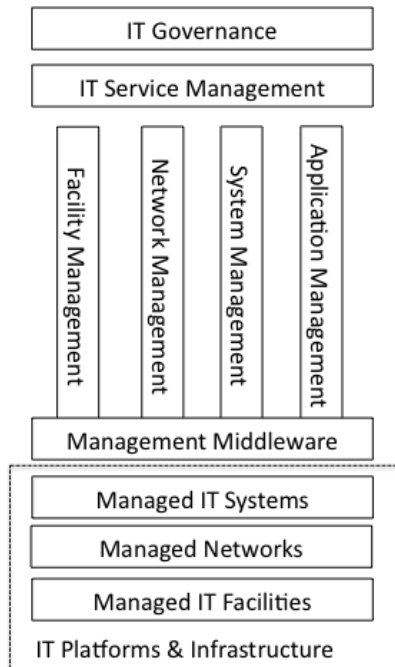
Fig. 3. IT Management Layers

The different management domains can be grouped into a layered model. The Managed IT Platforms and Infrastructure (e.g. comparable to Managed Objects in the context of SNMP) act as the basis for the management of the entire IT infrastructure that provides the basis for IT Service delivery. The aim of a management platform is to integrate the various areas (i.e. Facility, Network, System and Applications Management) of IT infrastructure management that forms the basis for the IT Service Management.

From a commercial perspective, many organizations have adopted ITIL as a basis for their consultancy, service or software offerings. Furthermore there are additional frameworks such as Hewlett Packard's IT Service Management Reference Model

(ITSM), Microsoft Operations Framework (MOF) and IBM's Systems Management Solution Lifecycle (SMSL). However, after originally specifying proprietary models, the vendors now position and align their frameworks upon the ITIL best practice framework, given its widespread acceptance and adoption in the market [9].

3   IT Management in Higher Education

In recent years, the demand and complexity of IT Services in Higher Education has been growing continuously whilst budgets for IT operations and research infrastructure are becoming ever more difficult to sustain. Furthermore, institutions need to consider how to incorporate continuously changing governance structures and how requirements can be aligned with IT Governance especially in the context of ad hoc and unplanned IT engagement [10].

However, according to the market research organization Gartner interest and adoption of COBIT in Higher-Education is rather limited, given its main adoption as an industry audit and benchmarking framework (e. g. to facilitate IT compliance requirements) and thus its commercial, non-academic background. This explains Gartner's Benefit Rating of *Moderate*, Maturity status of *Emerging* and a market penetration of less than 1% of target audience [11]. Typically CobiT is used as an extension or add-on to existing ITIL activities. Given the fact that ITIL itself is gaining wider attention a limited growth in CobiT interest and adoption can be expected. According to Gartner, current interest and adoption of ITIL is somewhat more widespread, with a market penetration of 5% to 20%, a benefit rating of Moderate and a Maturity status of Adolescent [11]. This confirms a somewhat limited acceptance of IT Management best practice frameworks at the moment and the initial adoption of ITIL to improve the IT Service provision for the customers as the crucial starting motivation.
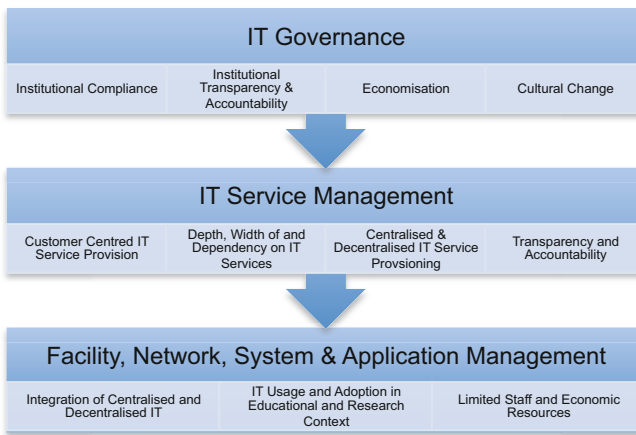
Opportunities	Threats
Aligned and robust IT Services, facilitates Portfolio Management for IT Services	Complicated Processes & administrative overhead
Defined responsibilities, performance incentives for IT Staff	Staffing requirements & resistance (e.g. to change)
Customer centred IT, measurable & repeatable processes	Dependency upon ITIL Services, Tools and Frameworks
Transparent IT Operating Model, facilitates cost management & efficient IT resources utilisation	IT Governance, ITSM or organisational Discontinuity

Fig. 4. Opportunities & Threats for ITSM in Higher Education Institutions

To assess the impact of ITSM, the implications of traditional versus modern IT Service provision have been distilled and a comparison of opportunities and threats analysis has been conducted as part of the research (e.g. interviews and questionnaires

with IT Services stakeholders). The results are illustrated in Figure 4. This could further be extended by a SWOT analysis, a planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a business decision, strategy or project [12]. It involves specifying the objective of the project (provision of IT Services that meet quality criteria and requirements) and identifying the internal and external factors that are favorable and unfavorable to achieve that objective. It is interesting to note that costing aspects and the notion of change feature prominently in the various categories.

Breiter [13] and Wild [14] further identify distinct requirements for IT Service Management in the Context of Higher Education organizations. An analysis of the requirements in the context of Higher Education organizations highlights the changing nature of IT Service provisioning. The key requirements have been mapped to the areas IT Governance, ITSM and Facility, Network and System Management in Figure 5.

Fig. 5. IT Management Levels

The results of the analysis of the author's organization, derived from the opportunities and threats of ITSM, together with studies on the implementation of IT governance and ITSM suggest that there are a number of benefits from the adoption of frameworks such as ITIL or CobiT [13-17].

Furthermore, the appropriate IT Governance processes need to be identified and selected. In the case study at the author's institution, a set of interviews has been conducted prior to the analysis of IT goals with the main aim to identify driving IT goals to identify a base of core IT Governance challenges. Subsequent interviews after the analysis of the IT goals, mainly with IT orientated staff, were performed to complete the identification of IT goals.

It became evident that employees with different roles have widely differing interpretations and classifications regarding the governance of IT processes and the IT function. It further became clear that the relevance of some IT functions by general IT users, IT employees and the IT Officer of the Faculty varied widely, in some cases

even contradicting each other (e.g. general IT staff stated that an organizational framework providing a defined Service Level Process as outlined by DS1 is of limited use whereas the IT Officer identified it as a core Process). That represents an interesting observation that IT processes are generally considered and evaluated from different perspectives: the evaluation of the IT process from the perspective of the executing co-workers and the management point of view that emphasizes the planning and structuring aspects of a process. Thus the definition of Critical Success Factors together with metrics in the form of Key Performance Indicators (e.g. number of raised incidents, average workaround time for incidents) can provide a starting point for the different stakeholders.

According to the results of an employee survey Service Level Agreements and Operating Level Agreements are of limited importance for general IT stakeholders. The background for this assessment is the operational ad-hoc practice of providing services to customers (students) and the varying and unspecific definition of performance to be provided with this service. The view of the employee is further enforced by the fact that a supply agreement in a public institution like a university is difficult to implement, especially since the agreement is not contractually or legally binding. However for the IT officer and general IT management, the introduction of SLAs and OLAs are important, since a continuous availability of IT services according to requirements and the definition of service levels will ultimately ensure the end-user satisfaction and success of the institution.

While the higher education sector generally has to cope with low staffing levels, this should not become a deterrent in adopting industry best-practices. It is further agreed upon that it is important to evaluate the strengths and weaknesses as a basis fort he selection process (e.g. selection of ITIL processes). Given the typically decentralized nature and the running of similar, overlapping IT Services (e.g. multiple learning and teaching management platforms) leads to duplication of ICT staff without necessarily increasing the quality of the IT Services. Thus a consolidation of IT Services may lead to the availability of additional staffing resources. This generally requires a sound communication between central IT and distributed IT staff to enable acceptance of IT standards. Furthermore improved communication between IT (IT Governance and ITSM) and management (Corporate Governance) will strengthen the position of the IT department as a service provider, rather than a technology provider adding costs to the organisation.

Both CobiT and ITIL are relevant best-practice frameworks and overlap in a number of core areas and processes. One important difference between COBIT and ITIL is the availability associated with the approaches (e.g. with regard to cost of documentation). The core COBIT specification and related documentation is available freely, e.g. from the Information Systems Audit and Control Association (ISACA) website. On the other hand ITIL specifications and a large body of additional documentation can become costly for an organisation (e.g. is not freely available).

Another challenge can be found in the effective planning, communication and management of IT Services from the provider and the customers. The difference of perceptions (e.g. with regards to the quality of an IT Service) across an institution of higher education may thus lead to difficulties in managing the relation of students and staff. In a Higher-Education context, student dissatisfaction with IT Services (e.g. at

the faculty level) is reflected in general in internal surveys and national surveys that provide the basis for rankings (e.g. CHE ranking in Germany). A consolidation of services (e.g. university wide teaching and learning platform, centralised service desk) facilitates the maintenance of standards and perceptions across an organisation.

4   Conclusions and Outlook

The changing nature of IT Service provisioning in the context of higher education together with ever increasing dependency on IT necessitates the adoption of best practice and research frameworks to ensure alignment, quality and cost efficiency. Thus, "Best Practice" reference models such as ITIL or CobiT and related standards can provide a basis for implementation.

Future work must further concentrate on the mapping of IT Management theory and practice. The realities of higher education organizations for the provision of IT Services using and integrated management architecture and process model remain challenging. However the study has demonstrated that the adoption and integration of management tools with "Best-Practice" Frameworks have the potential to facilitate and enhance IT Management.

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