Information Technology Service Management (ITSM) in Education

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Abstract

Information Technology Service Management (ITSM) is a strategy that serves IT operations-related activities and the interactions of IT technical personnel with business processes. ITSM is a relatively new discipline. Nowadays, it is growing and is increasingly being by many industries because of changing business trends, such as outsourcing and demand for the accordance of computer resources and business perspectives. ITSM is essential in a business organization because it accounts for 70 - 90 % of the total cost of IT ownership. However, most IT, MIS, Computer Science, or Business schools ignore ITSM courses. There has been little academic contribution to this subject. Therefore, this paper provides a background on ITSM and the concepts it contributes to education.

Keywords: Information technology service management (ITSM), education, curriculum, service, management

Introduction

Research in the field of Information Technology Service Management (ITSM) has been developed in recent years, in terms of both theoretical and practical knowledge, as can be reviewed in Iden and Eikebrokk's survey paper work [1]. Iden and Eikebrokk, 2013, identified 37 relevant studies: 21 journal articles and 16 conference articles. These studies were classified into the following categories: antecedents to implementation (14 articles), implementation (16 articles), and consequences (12 articles). Within the antecedent category, the most popular research question was related to factors affecting successful implementation. Five studies dealt with motives. Within the implementation category, most articles investigated strategies for implementation, including methodological issues. Within the consequences category, most articles dealt with the outcomes and benefits of implementation. The other articles studied ITSM's effects on IT governance, as well as IT and business. There is an article concerning performance measurement. We can conclude that the implementation of ITSM has been the subject most often studied.

ITSM is a relatively new discipline, so it is not surprising that there is very little academic literature on ITSM education in general. Although ITSM has been included in the curricula of a few countries (e.g. Australia and the Netherlands) for many years, it has been largely ignored by most universities in Asia, Australia, the USA, and the rest of Europe [2]. Most universities overlook ITSM. There is a big gap between what the industry requires and what academia provides [3,4]. Management of IT operations is important because it accounts for 70 - 90 % of the total cost of IT ownership [5,6], but many IT, MIS, Computer Science, or Business schools focus on computer programming, analysis and design, and generic IT management [7-9]. Attempts to incorporate ITSM related content into IS or IT course curricula are hard to find [3]. There were only 15 programs in Australia, Europe, Africa, Mexico, and New Zealand [4], and only 2 undergraduate and 1 graduate ITSM program in the USA [10].

It has been noted that the growth of ITSM and the adoption of ITSM by industry has been almost exponential over the last decade [4,11,12]. Business trends, such as outsourcing and regulatory changes, have forced businesses to increasingly focus on IT Support Services. Most organizations around the world are demanding more efficient services from Information Systems (IS) and Information Technology (IT) in order to provide high quality services to their internal and external customers. IS or IT departments are expected to respond to new business opportunities quickly, and satisfy external customers, internal staff, and management through online systems. This level of service can be achieved with effective communication between IT and the lines of business [7]. Executive management is also demanding that computing resources can be viewed from a business perspective [13].

Business, IT, and MIS schools are best able to address this shift to a business view of IT Support Services. This reason makes the industry require universities to include ITSM in their IT or MIS courses [3,4]. Universities have a function in this education process. However, there has been little academic contribution to this subject. Academics have rarely adopted ITSM standards in either research or education about them [2-4,7-9]. IT Service management standards, such as the IT Infrastructure Library (ITIL), and nowadays, ISO/IEC 20000, provide guidance and tools for the effective management and control of IT service management.

What is ITSM?

Briefly defined, ITSM is defined as "a strategy that focuses on defining, managing and delivering IT services and addressing the need for IT to become more customer-focused by offering information systems under contract to customers and managing IT performance as a service" [7]. ITSM seeks to align IT operations-related activities and the interactions of IT technical personnel with business processes [14].

Figure 1 shows the relationship among ISO 9001:2000, ISO/IEC 27001, and ISO/IEC 20000 standards. While ISO 9001 defines requirements which assure the efficiency and effectiveness of the product/service, focusing on customer's satisfaction, ISO 27001 is the standard for information security. Its requirements assure reliability, availability and integrity of the client's data. ISO/IEC 20000 is an international standard that sets service management requirements for IT organizations. It is a global standard that brings together these several streams under a common set of principles from ISO 9001. It can be generally called ITSM [15]. Its objective is to "provide a common pattern of reference to any company which offer IT services to internal or external clients" [16].
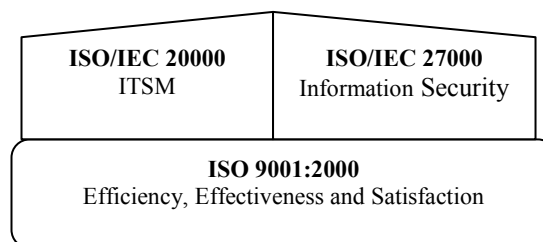

Figure 1 Relationship between ISO 9001, ISO 27001 and ISO 20000.

The ITSM movement is currently widespread around the world. This concept grew out of older frameworks, such as Britain's IT Infrastructure Library (ITIL) and the USA's service level management (SLM). ITSM is sometimes confused with other these. It is also related to terms such as Business Service Management (BSM), the Control Objectives for Information and related Technology (CobiT), and IT governance [17]. In implementing service management, most companies establish the processes in accordance to the ISO/IEC 20000-1 requirements [15], as shown in **Figure 2** below.
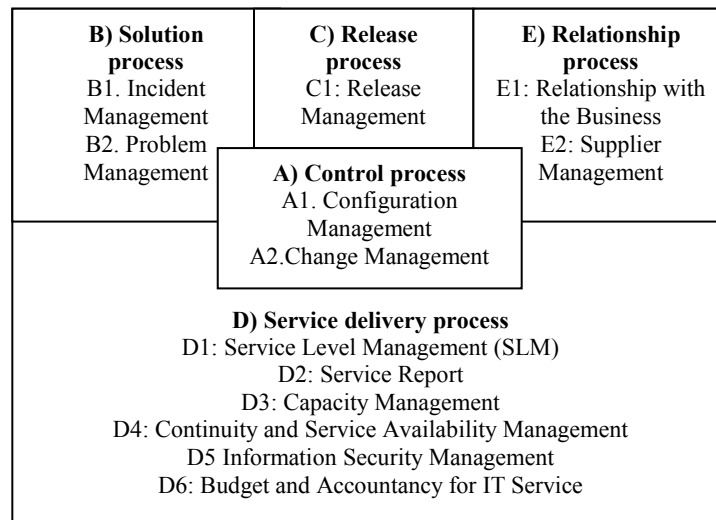
B) Solution process	C) Release process	E) Relationship process
B1. Incident Management	C1: Release Management	E1: Relationship with the Business
B2. Problem Management		E2: Supplier Management

A) Control process
A1. Configuration Management
A2.Change Management

D) Service delivery process
D1: Service Level Management (SLM)
D2: Service Report
D3: Capacity Management
D4: Continuity and Service Availability Management
D5 Information Security Management
D6: Budget and Accountancy for IT Service

Figure 2 Service management process (ISO/IEC 20000-1) ITSM - Part 1: Service.

The primary objective of service management is to ensure that IT services are aligned to business needs and are actively supporting them. The service management process consists of 5 main processes: control, solution, release, service delivery, and relationship process.

A) Control process
Control process consists of 2 sub processes: configuration and change management.

A1: Configuration management
To manage, control and monitor the Configuration Items (CI) existing in the Data Base Configuration Management (DBCM). A CI is any component or element existing in the infrastructure necessary for a service supply.

A2: Change management
To manage changes, and to make sure they are quick, easy, consistent, and authorized. Its objective is to successfully complete all the adjustments and changes in the IT infrastructure in a systematic way, leveling the risks, ensuring quality, and impacting at the lowest possible levels

B) Solution process
Solution process consists of 2 sub processes: incident and problem management.

B1: Incident management
To manage the incidents in the infrastructure, to resolve incidents, and to reestablish service supply to the client as quickly as possible, minimizing the impact of the incident on the business. An incident is classified as any event which is not part of the standard functioning of a service, and which causes an interruption in the service, or a reduction in its quality.

B2: Problem management

To manage the problems, to seek to identify the root causes, to propose solutions to the problems, to eliminate repetitive problems, to accelerate the solution time, and to generate a solutions bank. Its objectives include: increasing the IT infrastructure quality by investigating the causes of the incidents or potential incidents, removing them in a permanent way, and proactively preventing new incidents.

C) Release process

The main function of the release process is release management.

C1: Release management

To manage the distributions and the release control of the both the software and hardware, as well as updates.

D) Service delivery process

The main function of service delivery processes consists of 6 sub processes: service level management (SLM), service report, capacity management, continuity and service availability management, and information security management, as well as budget and accountancy for IT service.

D1: Service level management (SLM)

To make the agreements between the clients and the IT organization, to take pertinent actions for its implementations, and to seek solutions which assure compliance in the established levels.

D2: Service report

To monitor achieved service levels and compare them with agreed service level targets. This information is sent to customers and all other relevant parties, as a basis for measures to improve service quality.

D3: Capacity management

To manage, monitor and evaluate the services development; also, to plan new businesses. The capacity management identifies and specifies the demand and the client's needs, trying to translate them into constantly monitored resources.

D4: Continuity and service availability management

To manage disasters and to keep plans for contingency, as well as for disaster recovery, business survival, risks, and vulnerabilities. It deals with unexpected interruptions in IT services, preparing and planning recovery and restoration measures, and of the IT services.

D5: Information security management

To detect and fight attacks or intrusions, and to minimize the damage incurred by security breaches. It designs appropriate technical and organizational measures in order to ensure the confidentiality, integrity, security, and availability of an organization's assets, information, data, and services.

D6: Budget and accountancy for IT service

To manages the financial data, effective costs, resources allocation, and ROI (Return On Investment). It performs the correct budgetary provision of the IT services, considering costs and possible investments benefits, especially in decision making regarding environment changes.

E) Relationship process

Solution process consists of 2 sub processes: relationship with the business management and supplier management.

E1: The relationship with the business management

To provide and maintain the positive link or relationship between the service provider and customers and to establish relationships with potential new customers, as well as to record and assess customer complaints in order to correct them.

E2: Supplier management

To ensure that all contracts with suppliers support the needs of the business, and to ensure that all suppliers meet their contractual commitments.

All of processes are according to the ISO/IEC 20000-1 requirements. Therefore, when organizations would like to adopt or adapt ITSM, they must follow all of the processes above. ITSM is generally concerned with the back office or operational concerns of information technology, and not with technology development. ITSM may be seen as analogous to an Enterprise Resource Planning (ERP) discipline for IT. While some companies still use the ITIL as their foundation, some companies have their own frameworks, and are supported by their own proprietary software; for example, IBM's Process Reference Model for IT (PRM-IT), Hewlett Packard's ITSM Reference Model, and Microsoft's Operating Framework (MOF) [18].

Context of ITSM in education

Kemppainen, 2007, proposed a context of IT service management education, as shown in **Figure 3** below [19]. The context of IT service management education consists of 5 aspects: teacher, facility, student, organization support, and curriculum.
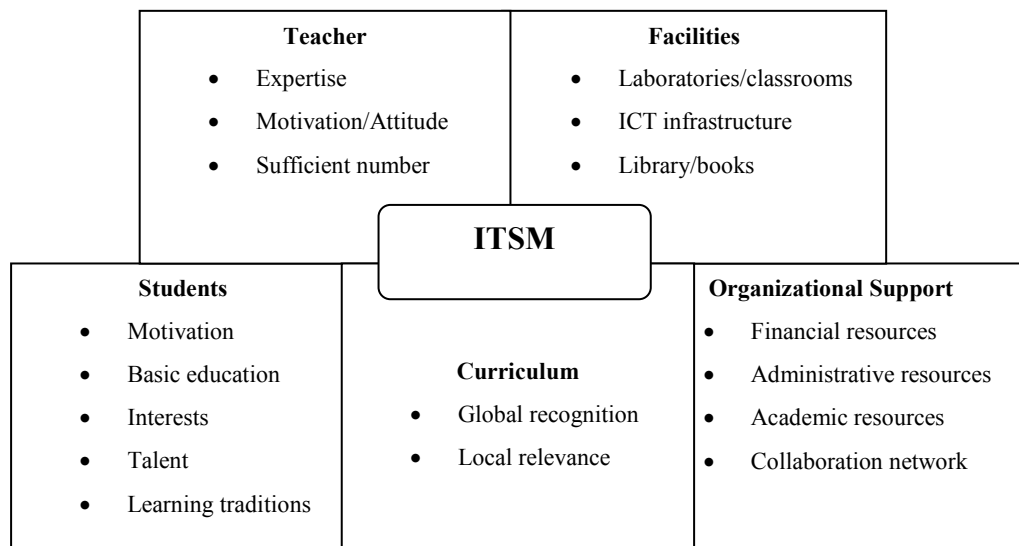

Figure 3 The context of IT service management in education.

Firstly, a teacher is presented as a contextual factor of ITSM. The teacher must gain enough understanding about the issue, and consider the students' backgrounds, in order to facilitate students in a particular context. He also has to adapt the content of education to reflect not only the local job markets, but also general professional qualifications [19]. Bentley, 2006 recommended that teachers who have not had exposure to a framework such as ITSM, gain knowledge of it, but integrate it into their teaching. His recommendation requires an immense number of hours, and knowledge is gained through the reading of

white papers, by undertaking professional courses, and by attending industry seminars or service management conferences, and by supervising research students and student papers. Further increases in knowledge could be gained from outside study programs, placements in industry for academics, and the obtaining of grants for research in service management [20].

An important aspect to be considered next is facilities. Facilities, such as a laboratories, simulation equipment, or libraries/books are strongly required. Jarman, 2011, stated that a significant challenge is the lack of textbooks [21]. For the initial Service Operations unit, a text by [22] was rarely difficult to understand. However, issues with texts have been rectified with a range of cut-down versions being produced by Van Haren publishing, e.g. [23].

In most developing countries, "the crucial perspective for the relevance of IT education indicated that having inadequate ICT infrastructure that facilitates the learning process is an important problem because the successful transfer of ICT from a context to another requires simultaneous transfer of knowledge and skills" [24]. The ICT infrastructure in education can serve as real-life learning. The skills of students that do not have sufficient ICT infrastructures in place for practicing are not good. Development of local expertise requires a heavy emphasis on practical training [19,25].

The next aspect is the student. Students should have a good enough basic education and have an interest in ITSM. Steel and Toleman, 2007, said that universities should be motivating graduate students for a career, not just a job, and prepare students for the ITIL/ITSM certificate [11].

Another aspect is organization support. Cater *et al.* offered the following advice on the issues concerning organization support [3]:

- Take steps to encourage and fund industry certification of lecturers.
- Engage local enterprise to access guest speakers and provide opportunities for case studies and research projects.
- Build a network with other academics interested in ITSM, for example, the AIS Special Interest Group on Services (AIS, 2009) and the itSMF Germany working group "ITSM in Universities".

Finally, one of the most important aspects is curriculum. Development of IT students' expertise requires adequate ICT facilities, but the effects of organizational support, human capacity, and the relevance of the curriculum are crucial factors in ITSM education [19]. Steel and Toleman, 2007, stated that prior to including ITSM in the curriculum, academic staff are advised to evaluate their existing curriculum, undertake industry research to determine the skills in demand, and then, having identified gaps, changes can be designed and implemented, and regularly evaluated and reviewed. After we fulfill the demand and gaps, it is a process of integrating ITSM into the curriculum [10,11]. As noted by other authors [26] one of the challenges for academics is acquiring enough knowledge and experience to be able to design the content effectively. There are 2 options, i.e. self study and training courses, but neither of these options are simple solutions. Most authors [3,19,20,21] suggested that, typically, academics design and teach units based on self study, together with prior experience and available textbooks. With no texts available, and limited prior experience, the self study approach is very time consuming. The continual upgrading of standards, such as ITIL and ISO/IEC 20000, make it difficult to keep the course materials and academic skills of the lecturers up to date.

Integration of ITSM to curriculum

The first thing that universities should do is to integrate the concepts of ITSM into several basic courses, in which students are given a broader understanding of IT service management, along with other related frameworks such as CobiT, ISO/IEC 17799, CMMI courses, by using of scenario-based tasks, case studies, comparisons, comprehension, application, and analysis [3,27]. The objectives of these units are to cover aspects of IT management. The original content follows the service operations and covers nearly all the content. In lectures, more examples and discussion are added, and the structure of the processes emphasized over other service operations concepts.

The operational activities are discussed, and then the service operation processes are taught [3]. An example of a weekly structure for 2011 is shown below. This structure is used to provide a framework to

assist students in remembering the materials. A visit to the real place of a Help Desk, to discuss how they worked, received positive feedback from the students who attended.

The week lecture/seminar structure

1. Introduction to the Unit/ITSM
2. Service Management as a Practice
3. Common Service Operation Activities
4. Help Desk Management/Help Desk Visit
5. Incident Management
6. Problem Management
7. Access Management/Request Fulfillment/Event Management
8. Implementing ITSM
9. Mobile Technology Management
10. Outsourcing/Service Level Management
11. Asset Lifecycle Management
12. Revision

Student feedback from 2009, in terms of whether they appreciated learning and /or the content, was mixed [3]. Mostly, the working post-grads were very positive, but everyone else was less enthused. Therefore, in 2010, a tutorial assignment was set for the students to research.

Steel, 2010, stated that a key goal of integrating the ITSM courses was to re-orient students' conceptions of IT services provision in organizations, in order to enable them to function productively in service-oriented workplaces [3]. Learning and engagement in a real workplace gives them an experiential approach, and motivates the participation of industry professionals. Like the Bentley study [20], it was recommended to take students on a site visit to an IS department in a real workplace before introducing ITSM. In other ways, university should invite guest speakers from industry. Industry workers can provide real-world insights [11]. Feedback from students clearly indicated that they value the content of the course and are motivated to succeed, recognizing that ITSM skills are essential to be productive in their professional work environment.

For example, in the Bachelor of Business (Computer Systems Management) degree in Victoria University, Australia, the curriculum consists of 24 subjects, organized into a structure that comprises 8 common core subjects, 8 specialization/support subjects, and 8 elective subjects [20]. The 8 common core business subjects, which all business students undertake, provides a common business grounding, including Information Systems for Business, Accounting for Decision Making, Business Law, Microeconomic and Macroeconomic Principles, Business Statistics, Introduction to Marketing, and Management and Organization Behavior. Six specialization subjects for the Computer Systems Management Specialization include Introduction to Programming, Introduction to Business Systems Development, Systems Analysis and Design, Database Systems, Computer Systems, and Managing Network Integration. Two support subjects from these 3, to complete the Computer Systems Management specialization, include Managing the Computing Environment (with a strong ITSM component), Managing Systems Development, and Contemporary Developments in IS. There are 8 elective subjects. Most of the degree students complete the following electives: Computing Practice (with an ITSM component), Managing IT Service Support (with a very strong ITSM Service Support component), Computer Project (including possible ITSM based projects), and Work Integrated Learning Studies, 2 subjects over 1 year (including possible ITSM in practice). We found that Victoria University strongly emphasized ITSM.

Benefit and challenges of ITSM in education

An important benefit of ITSM in education is that students should have a broader understanding of the importance of ITSM. When they graduate and work in a real organization, they can understand the essential role of information systems, and invest and manage the infrastructure and service in response,

according to the organization goal. These benefits support a positive response and foster a good manner, in terms of relating their skills to business demands suitably.

The challenges are the availability of staff with appropriate expertise, the provision of funds and time for training in ITSM; the continual upgrading of standards such as ITIL and ISO/IEC 20000 making it difficult to keep the course materials and academic skills up to date; the identification of a suitable text book and development of teaching materials, and changing the existing curriculum and squeezing the new course into an existing crowded curriculum, as well as the cost of the foundation exam. In addition to the concepts of applying a complex IT infrastructure to organizations, it may be difficult to effectively transfer knowledge to students who have not experienced ITSM first hand. Additional costs and training of academic expert staff would be required [10,11].

Summary and conclusion

The growth of ITSM, and in particular, the adoption of ITSM by industry is increasing. Therefore, universities should include ITSM in their IT or MIS courses. The current effective guidance and tools for ITSM are ISO/IEC 20000 or ITIL. The contexts of IT service management education that should be considered are: teacher, facility, student, organization support, and curriculum. The key success factors of integrating the ITSM courses are that students should have experience in a real workplace, and motivate the participation of industry professionals. It is an important function for universities to include ITSM concepts in programs to ensure graduates are prepared for the real workplace.

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