

Presentation of an approach for adapting software production process based ISO/IEC 12207 to ITIL Service

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Abstract

The standard ISO/IEC 12207 is software life cycle standard that not only provides a framework for executable effective method for production and development software, but also can ensure that organizational goals are realized properly. In this paper, ITIL standard shall be used for better process control and management and providing a common language and syntax between stakeholders. In addition, the process of mapping between these two standards shall be considered.

Keywords: *ISO/IEC 12207, Information Technology Infrastructure Library (ITIL).*

1. Introduction

Currently, the competition is a key factor for ensuring the survival of firms in the market. Information and communication technology is an essential element, which will improve competition among companies.

Strategic management as a discipline is the key element allowing companies to achieve their competitive advantages. In many organizations, the role of Information and communication technology in achieving business goals, is often limited to the operational level. However, effective management and improvement of internal processes in development, operation and maintenance of software will help to improve the competition in the information technology market [1].

There are several factors that can impact the software life cycle that make difficult planning and operating processes. Recently, economic strategies and market forces have added new complexities to software life cycle. So, organizations need an explicit framework based on process management principles. In this paper, in order to control the software life cycle, ISO/IEC 12207 and in order to

manage and Provide the same language and syntax, IT Infrastructure Library (ITIL) are recommended.

This paper is organized as follows: Sect. 1, Sect.2 reviews ISO/IEC 12207 standard and it's processes. Section 3 reviews ITIL process. Section 4 presents a mapping between ITIL processes and ISO/IEC 12207. Finally, we will conclude the discussion.

2. ISO/IEC 12207 standard

International Organization for Standardization (ISO) associated with IEC, with foundation the Joint Technical Committee (JTC1), began to develop international standards for production and documentation of software products. ISO/IEC 12207 was published in 1995, Presented recommendations for whole life cycle and Construction of a software product [2].

ISO/IEC 12207 is a central standard for process of software engineering and establishing a common framework for software life cycle processes which are used to provide a common language between buyers, suppliers, developers, maintainers, operators, managers and technicians involved in the development of the Software. This International Standard contains processes, activities and tasks during the software life cycle that is described for access to systems, software products and services, supply, development, operation, maintenance and disposal of software products and software components of a system, whether inside or outside an organization has defined. Also, this standard defines a process for controlling and improving the software life cycle processes to be handled [3], [4].

ISO/IEC 12207 is established to define the software life cycle processes (SLPs) classification. This standard is flexible, modular and compatible with whole software life cycles.

This software life cycle standard is composed of tasks and activities, in other view, it is classified into two sub processes, system context processes (SCPs) and software specific processes (SSPs).

System context processes are divided into four groups of processes:

- **Agreement Processes:** This process includes operational activities to establish and maintain collaboration and agreement between the two organizations
- **Project Processes:** Including processes related to planning, evaluation and control that can be used in the field of management.
- **Technical Processes:** These processes include activities ranging from the definition of system requirements to the disposal of the product when it is withdrawn from service.
- **Organizational Support Processes:** These types of processes have been designed to manage the capability of acquiring and supplying products or services.

Software specific processes are also divided into three groups:

- **Software Implementation Processes:** These processes are defined for producing and implementation of specific elements in the software.
- **Software Support Processes:** These processes provide support activities and implemented processes by defining processes as document management or configuration management.
- **Software Reuse Processes:** These processes are designed to support the ability of organization for reuse of software items all over the software project [5].

ISO/IEC 12207 Processes are shown Table 1.

Table 1: ISO/IEC 12207 Processes [6]

Process Group	Process
6 System Life Cycle Processes	
6.1 Agreement Processes	6.1.1 Acquisition Process 6.1.2 Supply Process
6.2 Organizational Project-Enabling Processes	6.2.1 Life Cycle Model Management Process 6.2.2 Infrastructure Management Process 6.2.3 Project Portfolio Management Process 6.2.4 Human Resource Management Process 6.2.5 Quality Management Process
6.3 Project Processes	6.3.1 Project Planning Process 6.3.2 Project Assessment and Control Process 6.3.3 Decision Management Process 6.3.4 Risk Management Process 6.3.5 Configuration Management Process 6.3.6 Information Management Process 6.3.7 Measurement Process
6.4 Technical Processes	6.4.1 Stakeholder Requirements Definition Process 6.4.2 System Requirements Analysis 6.4.3 System Architectural Design 6.4.4 Implementation Process 6.4.5 System Integration Process 6.4.6 System Qualification Testing Process 6.4.7 Software Installation 6.4.8 Software Acceptance Support 6.4.9 Software Operation Process 6.4.10 Software Maintenance Process 6.4.11 Software Disposal Process

7 Software Life Cycle Processes	
7.1 Software Implementation Processes	7.1.1 Software Implementation Process 7.1.2 Software Requirements Analysis Process 7.1.3 Software Architectural Design Process 7.1.4 Software Detailed Design Process 7.1.5 Software Construction Process 7.1.6 Software Integration Process 7.1.7 Software Qualification Testing Process
7.2 Software Support Processes	7.2.1 Software Documentation Management Process 7.2.2 Software Configuration Management Process 7.2.3 Software Quality Assurance Process 7.2.4 Software Verification Process 7.2.5 Software Validation Process 7.2.6 Software Review Process 7.2.7 Software Audit Process 7.2.8 Software Problem Resolution Process
7.3 Software Reuse Processes	7.3.1 Domain Engineering Process 7.3.2 Reuse Asset Management Process 7.3.3 Reuse Program Management Process

through better design and exploit of the services [10].

3. Information Technology Infrastructure Library (ITIL)

ITIL was developed by the Office of Government Commerce Great Britain, based on the collection of experiences of commercial and governmental experts all over the world. In order to promote a suitable approach by use of information systems for achieving business effectiveness and efficiency [7].

Today, organizations are highly dependent on information technology. One of the key factors for ITIL success, is to have suitable processes, which should not only being implemented, but also should be tracked and maintained [8], [9].

ITIL version 3 has divided its processes and procedures into five sections:

- **Service strategy:** Guidance on how to design, develop and implement Service Management as an organizational capability and a strategic asset provides.
- **Service design:** Guidelines provided for design and development service and management services.
- **Service Transition:** Guidelines provided for development and improvement of existing capabilities to deliver new services and changes in the operating environment.
- **Service Operation:** Include achieving effectiveness and efficiency in the delivery and support services.
- **Continual Service Improvement:** A tool for creating and maintaining value of customers

ITIL processes are shown in Figure 1.

4. Mapping between ITIL processes and ISO/IEC 12207:2008 process

Today, software companies becoming more specialized on various scopes (e.g. some companies to design, analysis, requirements gathering, software testing, etc.) to develop and produce their software products. In other aspects, outsourcing software development and global software development (GCD) has extended, which requires the use of methods and standards for the management and control of software development processes. Lack of integration between process of software engineering and stockholders cause widespread inefficiencies in software operational processes, especially in maintenance phase of a software product [11].

In order to effectively management and control software production process, the process should be clear and visible. Sometimes the process of software production is subtle and different with physical activities, so the only suitable way for project management and people involved in project, is use of a common language in all phases of software production. Besides, this common language minimizes the problems and issues that may be occurred during analysis, design, implementation and maintenance of system. It is essential for organizations to coordinate development processes and software production taken by different standards.

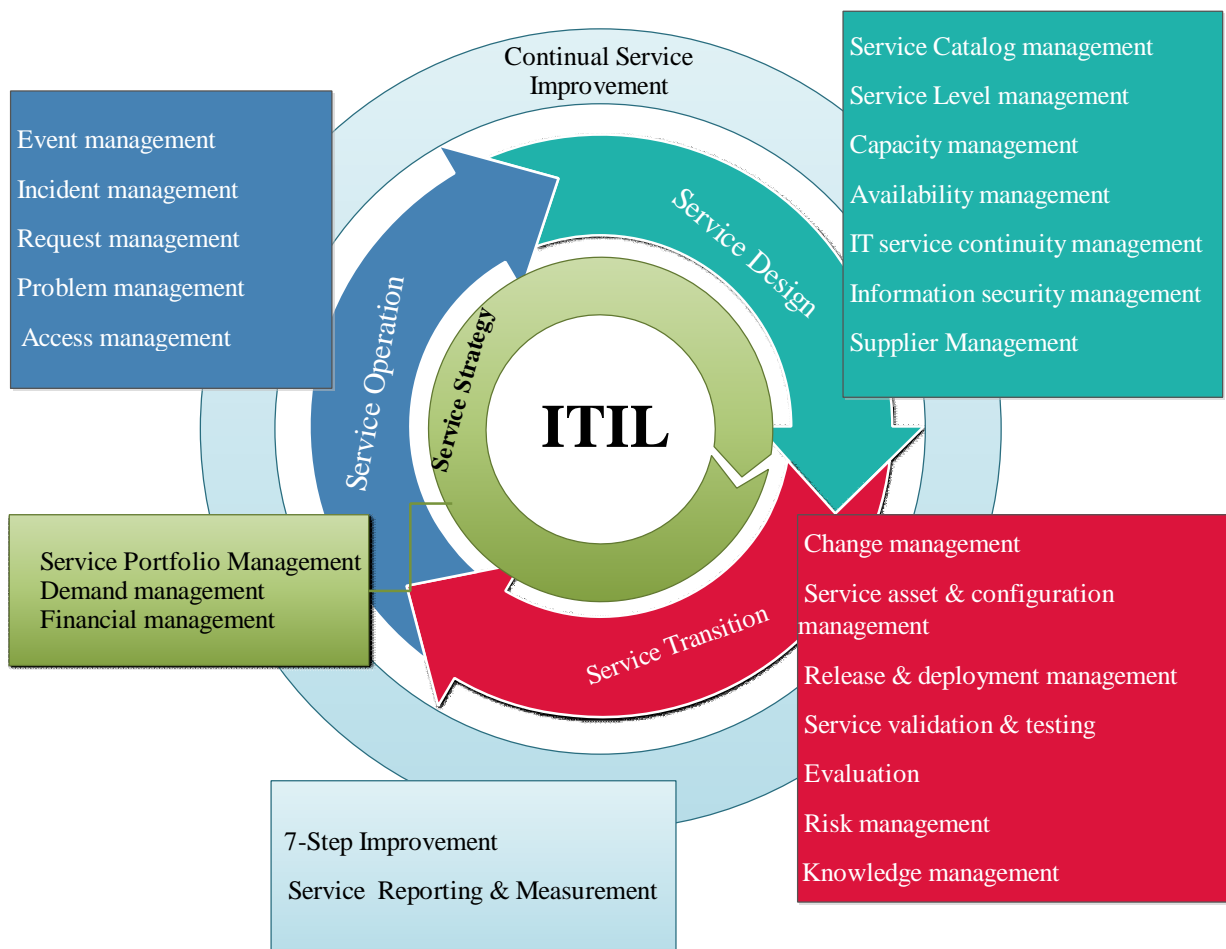


Fig. 1 ITIL processes

For this purpose, we need the same language and common understanding between developers, this common Literature is presented in ITIL framework including ways to solve issues and difficulties in the whole software life cycle and for software process life cycle standard

ISO/IEC 12207 will be used.

In Table 2, the mapping between the ISO/IEC 12207 and ITIL process is shown.

Table 2: the mapping between the ISO/IEC 12207 and ITIL

ITIL Process	ISO/IEC 12207
Service Strategy	
Service Portfolio Management	6.2.3 Project Portfolio Management Process
Demand management	-
Financial management	6.1.2 Supply Process
Service Design	
Service Catalog management	6.1.1 Acquisition Process
	6.1.2 Supply Process
	6.2.4 Human Resource Management Process
	6.4.1 Stakeholder Requirements Definition Process
	6.4.9 Software Operation Process

Service Level management	6.1.1 Acquisition Process 6.1.2 Supply Process 6.4.1 Stakeholder Requirements Definition Process 6.4.2 System Requirements Analysis 7.1.3 Software Architectural Design Process 7.1.4 Software Detailed Design Process
Capacity management	6.2.2 Infrastructure Management Process 6.3.1 Project Planning Process 6.4.9 Software Operation Process
Availability management	6.4.9 Software Operation Process
IT service continuity management	6.2.2 Infrastructure Management Process 6.4.8 Software Acceptance Support 6.4.10 Software Maintenance Process
Information security management	6.3.6 Information Management Process
Supplier Management	6.1.1 Acquisition Process 6.1.2 Supply Process
Service Transition	
Change management	6.3.5 Configuration Management Process 6.4.11 Software Disposal Process
Service asset & configuration management	6.3.5 Configuration Management Process
Release & deployment management	6.4.7 Software Installation 6.4.11 Software Disposal Process
Service validation & testing	6.4.6 System Qualification Testing Process 7.1.7 Software Qualification Testing Process 7.2.4 Software Verification Process 7.2.5 Software Validation Process
Evaluation	7.2.4 Software Verification Process 7.2.5 Software Validation Process
Risk management	6.3.4 Risk Management Process
Knowledge management	6.2.4 Human Resource Management Process
Service Operation	
Event management	6.4.9 Software Operation Process 7.3.2 Reuse Asset Management Process
Incident management	6.3.3 Decision Management Process 6.4.9 Software Operation Process
Request management	6.1.1 Acquisition Process 6.4.1 Stakeholder Requirements Definition Process 6.4.9 Software Operation Process 7.3.2 Reuse Asset Management Process
Problem management	7.2.8 Software Problem Resolution Process 6.4.9 Software Operation Process
Access management	6.4.9 Software Operation Process
Continual Service Improvement	
7-Step Improvement	6.4.11 Software Disposal Process 7.3.2 Reuse Asset Management Process 7.3.3 Reuse Program Management Process
Service Reporting & Measurement	6.3.1 Project Planning Process 6.3.7 Measurement Process

4. Conclusions

In this paper, a method for the production of software products based on mapping and communicating between ITIL process and software engineering process through the standard ISO/IEC 12207 was presented. In general, ITIL is a broad framework for the control and management IEC/ISO 12207 processes and this framework suffers from the lack of accurate process for management of software life cycle singly, therefore the Mapping of these two standards was considered.

In the process of developing of software product, we requires the use of a defined and targeted framework, that specifies categorization and prioritization the steps of Software development from the beginning, that is contract phase, to ending phase, that is software disposal and replacement of other product. In addition to standard benefits, process-oriented benefit of this standard is very significant. Also ITIL is a comprehensive, consistent and coherent standard that is set of best practices for service management processes and promoting a qualitative approach to achieve business effectiveness and efficiency in the production of software products. The use of ITIL in the production of software products leads simplification, Organization and process management, and establishment of common language through reduction of costs and increase of quality. also Companies need to plan, develop, manage and improve their infrastructure, products and services, including marketing strategies for presentation new products and services based on customer needs, unknown or unforeseen, That companies can Efficient use of ITIL to provide most of the needs of a company.

References

- [1] J. G. Guzmán, H. A. Mitre, A. Amescua, and M. Velasco, "Integration of strategic management, process improvement and quantitative measurement for managing the competitiveness of software engineering organizations," *Software Quality Journal*, vol. 18, no. 3, pp. 341–359, 2010.
- [2] O. Marbán, J. Segovia, E. Menasalvas, and C. Fernández-Baizán, "Toward data mining engineering: A software engineering approach," *Information systems*, vol. 34, no. 1, pp. 87–107, 2009.
- [3] B. Jereb, "Software describing attributes," *Computer Standards & Interfaces*, vol. 31, no. 4, pp. 653–660, 2009.
- [4] R. S. Pressman, "A Practitioner's Approach," *European Adaptation*, 2005.
- [5] J. Portillo-Rodriguez, A. Vizcaino, C. Ebert, and M. Piattini, "Tools to support global software development processes: a survey," in *Global Software Engineering (ICGSE)*, 2010 5th IEEE International Conference on, 2010, pp. 13–22.
- [6] "Systems and software engineering – Software life cycle processes - Redline," *ISO/IEC 12207:2008 (E) IEEE Std 12207-2008 - Redline*, pp. 1–195, 2008.
- [7] S. Zhang, Z. Ding, and Y. Zong, "ITIL process integration in the context of organization environment," in *Computer Science and Information Engineering*, 2009 WRI World Congress on, 2008, vol. 7, pp. 682–686.
- [8] T. Lucio-Nieto, R. Colomo-Palacios, P. Soto-Acosta, S. Popa, and A. Amescua-Seco, "Implementing an IT service information management framework: The case of COTEMAR," *International Journal of Information Management*, vol. 32, no. 6, pp. 589–594, Dec. 2012.
- [9] B. Barafort, B. Di Renzo, and O. Merlan, "Benefits resulting from the combined use of ISO/IEC 15504 with the Information Technology Infrastructure Library (ITIL)," *Product Focused Software Process Improvement*, pp. 314–325, 2002.
- [10] A. Nabiollahi, R. A. Alias, and S. Sahibuddin, "A service based framework for integration of ITIL V3 and enterprise architecture," in *Information Technology (ITSim)*, 2010 International Symposium in, 2010, vol. 1, pp. 1–5.
- [11] R. Oberhauser and R. Schmidt, "Improving the Integration of the Software Supply Chain via the Semantic Web," in *Software Engineering Advances*, 2007. ICSEA 2007. International Conference on, 2007, p. 79–79.

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