A model for the implementation of the ISO 10008 standard in a university course

by

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Abstract

This study illustrates a model for the implementation of a “Business-To-Consumer Electronic Commerce Transaction (B2C ECT)” system in a university course following the ISO 10008:2013 standard. Furthermore, this model includes four subsystems based on ISO 10001:2007 for a code of conduct, ISO 10002:2014 for complaints handling system, ISO 10004:2013 for monitoring and measuring customer satisfaction and ISO/IEC 27001:2013 for information security. The scope of the B2C ECT system in the course considered products delivered by a course website and email.

The methodology considered the creation of flowcharts, forms and examples of the processes required for ISO 10008 B2C ECT system and its subsystems in the course to facilitate its implementation.

The created model can be self-implemented by a professor or implemented with the help of consultants or researchers. A professor can choose to implement the entire model with its subsystems or only some of them. Another option is that professors can adapt the model according to their needs. For example, they can cover products delivered only through a course website.

Moreover, this research presents the first case study in the implementation of ISO 10008. It considers the application of the developed model for the course material delivered through the course site using the Moodle platform in an undergraduate engineering course in a university in western Canada.

The implementation of the B2C ECT system in this undergraduate engineering course seems to have contributed to increase student satisfaction with the course website. Before the implementation of the B2C ECT system, on a 1 to 5 scale, student satisfaction with the course website had a median of 3.87, while after the implementation, it was 4.19. Furthermore, around 65% of students expressed that the course quality and satisfaction improved with actions taken because of the implementation of surveys and redesign of the course website.

Preface

This thesis is a part of a larger research project conducted by Dr. Stanislav Karapetrovic, which received research ethics approval from the University of Alberta, Research Ethics Board 2, Project called "Implementation of ISO 10008 in Engineering Courses", No. Pro00054469, May 12th, 2015.

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List of Symbols

 : Begin / End of the process.

 : Activity.

 : Many activities or another process.

 : Decision.

 : Document or record.

: Reference to another page or a part of a process.

 : Existing processes with electronic transactions from the original management system depicted in Chapter 3 for the application of ISO 10008.

 : New processes depicted in Chapter 3 for the application of ISO 10008.

 : New processes or subsystems depicted in Chapter 4, considering the application of ISO 10008 and also other ISO 10000 standards and ISO/IEC 27001.

Glossary of abbreviations and terminology

Availability: *"property of being accessible and usable upon demand by an authorized entity"* (ISO, 2014b, definition 2.9).

B2C ECT: *"Business-to-consumer electronic commerce transaction. Set of interactions between an organization and a consumer for the provision of a product facilitated online"* (ISO, 2013a, definition 3.1). *"A B2C ECT involves internet interactions between the organization and the consumer, when accessed by the consumer through any device with wired or wireless connectivity (e.g. personal computers, e-tablets, personal digital assistants and internet-enabled cell phones. For the purposes of this International Standard, a B2C ETC can also involve other data-based telecommunications networks (e.g. short-text messaging) and various interfaces, including websites, social media web pages and e-mails."* (ISO, 2013a)

B2C ECT code: *"promise or set of promises made by organizations to consumers and related provisions in support of B2C ETCs"* (ISO, 2013a, definition 3.5).

B2C ECT provider: *"person or organization that supplies a B2C ECT process or activity and that is external to the organization operating the B2C ECT system"* (ISO, 2013a, definition 3.6).

B/WF course: blended or web-facilitated course.

Code of conduct: *"A customer satisfaction code of conduct consists of promises and related provisions that address issues such a product delivery, product returns, handling of personal information of customers, advertising and stipulations concerning particular attributes of a product or its performance…"* (ISO, 2007).

Complaint: *"expression of dissatisfaction made to an organization, related to its products, or the complaints-handling process itself, where a response or resolution is explicitly or implicitly expected"* (ISO, 2014a, definition 3.2).

Competence: *"ability to apply knowledge and skills to achieve intended results"* (ISO, 2012b)

Confidentiality*: "property that information is not made available or disclosed to unauthorized individuals, entities, or processes"* (ISO, 2014b, definition 2.12).

Consequence (C): "*outcome of an event affecting objectives"* (ISO, 2011, definition 3.1; ISO, 2014b, definition 2.14). The possible values are: low, medium and high (ISO, 2011, p. 17).

Consumer: "*individual member of the general public, purchasing or using products for personal, family or household purposes*" (ISO, 2013a, definition 3.3).

Content: *"…refers to the wording, images and related mechanisms associated with communicating information about the organization, its products and the B2C ECT system"* (ISO, 2013a, note of Clause 5.3.2).

Course site: website used in a Blended or Web-Facilitated course.

Customer: *"organization or person that receives a product"* (example: consumer, client, end-user, retailer, beneficiary, purchaser) (ISO, 2012a, definition 3.2).

Feedback: *"opinions, comments and expressions of interest in the products or the complaints-handling process"* (ISO, 2014a, definition 3.6).

Form: "*document used to record data required by the quality management system", "a form becomes a record when data are entered"* (ISO, 2001, definition 3.2). In this study the form is used by the B2C ECT system instead of "the quality management system".

Governance of information security: *"system by which an organization's information security activities are directed and controlled"* (ISO, 2014b, definition 2.28)

IEC: The International Electrotechnical Commission.

Information security (IS): *"preservation of confidentiality, integrity and availability of information"* (ISO, 2014b, definition 2.33).

Integrity: *"property of accuracy and completeness"* (ISO, 2014b, definition 2.40).

IMS: Integrated Management System.

ISO: International Organization for Standardization.

Level of risk (L*C): *"magnitude of a risk expressed in terms of the combination of consequences and their likelihood"* (ISO, 2011, definition 3.6; ISO, 2014b, definition 2.44). With the values of low, medium and high (ISO, 2011, p. 53), determined according to Table B.4.

Likelihood (L): *"chance of something happening"* (ISO, 2011, definition 3.7; ISO, 2014b, definition 2.45).

Moodle: Modular Object-Oriented Dynamic Learning Environment.

MS: Management System**.** It is *"the methodology utilized by an organization to make decisions and manage its resources"* (ISO, 2008).

MSs: Management Systems**.**

MSS: Management System Standard. It is a *"…set of structured requirements that provides an organization with the capability to meet the specific purpose of the standard, such as the establishment of quality, environmental, or health and safety management systems. These standards have different objectives and they affect multiple stakeholders."* (ISO, 2008, pp. 39).

MSSs: Management System Standards.

Nonconformity: *"non-fulfilment of a requirement"* (ISO, 2014b, definition 2.53).

Policy: *"intentions and direction of an organization as formally expressed by its top management"* (ISO, 2014b, definition 2.60).

Product: *"result of a process"* (ISO, 2013a, definition 3.4).

Record: *"document stating results achieved or providing evidence of activities performed"* (ISO, 2005, definition 3.76)

Resources: *"…include the provision of competent and available personnel, training, procedures, documentation, specialist support, materials and equipment, facilities, computer hardware and software and finances"* ISO (2013a),

Risk: *"effect of uncertainty on objectives"* (ISO, 2011, definition 3.9; ISO, 2014b, definition 2.68).

Risk treatment: *"process to modify risk*" (ISO, 2011, definition 3.17; ISO, 2014b, definition 2.79).

Training: *"process to provide and develop knowledge, skills and behaviours to meet requirements"* (ISO, 1999).

Chapter 1. Introduction

1.1. Overview

The education in the universities has changed regarding the inclusion of technology and the Internet in teaching or learning processes (Dominici & Palumbo, 2013). Nowadays, many universities use a "computer-based learning platform" to complement their traditional courses, such as "Moodle", "Edmodo", "ConnectEdu" and "Blackboard" (Liberona & Fuenzalida, 2014). Therefore, universities and professors have to deal with electronic transactions to deliver course material or the course itself.

On the other hand, universities want to provide a quality service to students, community and other stakeholders. Professors also want to teach well and they are evaluated by students and their departments or universities. Therefore, topics such as quality (Ferreira-Rebelo et al., 2014; Karapetrovic, 2002; Sawani et al., 2014), customer satisfaction (Karapetrovic, 2010; Karapetrovic & Doucette, 2009; Wu et al., 2010) and information security (Kritzinger & Solms, 2009; Rehman et al., 2013) are discussed in higher education. The incorporation of standardized management systems following international standards would help professors and universities deal with these topics (See e.g. Karapetrovic, 2002; Karapetrovic, 2010; Karapetrovic & Doucette, 2009).

ISO 10008:2013 is a Quality Management System (QMS) standard for customer satisfaction in Business-To-Consumer Electronic Commerce Transactions (B2C ECT). It "…*provides guidance to organizations for planning, designing, developing, implementing, maintaining and improving an effective and efficient system concerning business-to-consumer electronic commerce transactions."* (ISO, 2013a).

Because of the release of ISO 10008 and the needs in higher education regarding quality, customer satisfaction, new teaching methods with electronic transactions and information security, the writer of this thesis was motivated to undertake an investigation in modeling and implementing a B2C ECT system following the ISO 10008 standard in a university course. Furthermore, the modeling of subsystems was based on three standards for customer satisfaction (ISO 10001 for a code of conduct, ISO 10002 for a complying handling system and ISO 10004 for monitoring and measuring customer satisfaction) and a standard for information security (ISO/IEC 27001).

1.2. Statement of purpose

In this research, a generic model to apply the ISO 10008 standard for customer satisfaction in electronic commerce transactions in a higher education environment was developed. Concrete tools, such as flowcharts, forms and examples are provided to facilitate the application of this recent international standard in a university course with electronic delivery of course material. Furthermore, the model incorporated subsystems based on ISO 10001:2007, ISO 10002:2014, ISO 10004:2013 and ISO/IEC 27001:2013.

The created model with three of these subsystems (based on ISO 10002, ISO 10004 and ISO/IEC 27001) was applied in a web-facilitated undergraduate engineering course in a Canadian university.

1.3. Objectives of the proposed research

This research has the following objectives:

- Provide a model with concrete tools, such as flowcharts, forms and examples, to facilitate the application of the ISO 10008 standard in a university course with electronic delivery of course material.

- Create an integrated model to apply subsystems based on ISO 10001:2007 for product guarantees, ISO 10002:2014 for complaints handling system, ISO 10004:2013 for monitoring and measuring customer satisfaction and ISO/IEC 27001:2013 for information security.

- This research is part of a larger investigation called “Implementation of ISO 10008 in Engineering Courses” conducted by Dr. Stanislav Karapetrovic in University of Alberta and approved in May 2015 by the Research Ethics Board 2. Therefore, the following objective from that research is adopted here: *“…examination of the applicability of the ISO 10008 standard and the concept of the augmentative integration of standardized management systems.”* (Karapetrovic, 2015).

- Implement the created model based on ISO 10008:2013 in a web-facilitated course of an undergraduate engineering course in a western Canadian university, considering electronic transactions through a course site developed in Moodle platform and its subsystems based on ISO 10002:2014, ISO 10004:2013 and ISO/IEC 27001:2014.

- Study the levels of student satisfaction with the course site and investigate whether the implementation of these standards increases student satisfaction.

1.4. Methodology

The methodology used in this research consists of:

- Reviewing the ISO 10008:2013 standard, for developing items (e.g. forms and flowcharts) for each clause or guideline embedded in the standard.
- Defining the university course management system.
- Analyzing and identifying where ISO 10008:2013 would be applied in a university course management system.
- Reviewing ISO 10001:2007, ISO 10002:2014, ISO 10004:2013 and ISO/IEC 27001:2013, for modeling subsystems to comply with the respective guidelines of ISO 10008.
- Establishing the B2C ECT system in a university course management system
- Developing flowcharts, forms and examples of processes required for planning, designing, developing, implementing, maintaining and improving a B2C ECT system under 10008:2013 in a university course.
- Developing flowcharts, forms and examples of processes required for the four subsystems based on ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001.
- Verifying the integration between the B2C ECT system and its subsystems based on ISO 10008, ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001.
- Implementing the created model of the B2C ECT system and three subsystems in an undergraduate engineering course using the Moodle platform at a western Canadian university.

1.5. Organization of the thesis

Chapter 2 covers the literature review, exposing the ISO 10008 standard for customer satisfaction in a B2C ECT system. It shows definitions of teaching methods with electronic transactions, such as blended and web-facilitated courses. Furthermore, studies on the ISO 10000 family of standards (ISO 10001, 10002, 10004) and ISO/IEC 27001 are illustrated. Moreover, customer satisfaction in educational environment and electronic commerce is addressed. Also, literature on integrated management systems is depicted, considering the concept of integrative augmentation. Finally, this chapter presents the motivations and objectives of the research.

Chapter 3 describes how to apply the requirements of the ISO 10008 standard in a university course, modeling the B2C ECT system through developing flowcharts and forms to facilitate its implementation. It starts by defining the scope of the B2C ECT system followed by the development of the processes included in the model to comply with the requirements of ISO 10008. In this chapter, the model uses all clauses except Clauses 7.1.2, 7.1.4, 7.1.5, 7.2.2 and 8.3, which are covered in the next chapter. Furthermore, specific examples of how to use the developed forms in the course are shown in this chapter.

Chapter 4 presents the model of processes or subsystems developed by following other standards, using a similar methodology as presented in Chapter 3. Four subsystems have been developed with the following standards: ISO 10001 (Clause 7.1.2), ISO 10002 (Clause 7.1.4 and 7.1.5), ISO 10004 (Clause 8.3) and ISO/IEC 27001 (Clause 7.2.2 of ISO 10008). These standardized management subsystems have been integrated with the B2C ECT system developed based on ISO 10008.

Chapter 5 shows the implementation of the B2C ECT system following ISO 10008 in conjunction with ISO 10002, ISO 10004 and ISO/IEC 27001 in a web-facilitated engineering course in a university in western Canada, using the Moodle system. This chapter shows the results of surveys regarding implementation of these standards and gives information about student satisfaction with the course material delivered on the course site during the term.

Finally, Chapter 6 points out all the findings of this study, presenting the main contributions, lessons learned, limitations and the scope for further research.

Chapter 2. Literature review

2.1. Introduction

The literature review considers five main topics regarding teaching and learning methods in education, customer satisfaction in electronic commerce and higher education, ISO 10000 augmenting standards, ISO/IEC 27001 for information security and integrated management systems.

First, since this thesis develops a model to be implemented in a university course with electronic transactions, the literature review considers the definition of teaching and learning methods in Section 2.2.

Second, as a result of ISO 10008 being a standard focused on customer satisfaction in electronic commerce, this thesis incorporates a review of the literature on customer satisfaction for both e-commerce and higher education in Section 2.3 called “Customer satisfaction in electronic commerce and higher education”.

Third, due to the fact that the research is based on the ISO 10008 standard, it is an important topic covered in Section 2.4 “Augmenting standards”. Since ISO 10008:2013 has been published recently, it was not possible to find investigations about the implementation of this standard. However, the literature review on this topic is based on the standard itself in Sub Section 2.4.1.

Fourth, the ISO 10008 standard has requirements regarding a code of conduct, complaint handling system, monitoring and measuring customer satisfaction and information security. Since other standards cover these topics, they have been studied under Section 2.4 (ISO 10001, ISO 10002 and ISO 10004) and Section 2.5 called ISO/IEC 27001 for information security.

Finally, Section 2.6 presents the topic of integrated management systems (IMS), which has been studied because this research models and implements several Management System Standards (MSSs) used for subsystems that should be integrated.

2.2. Teaching and learning methods

Nowadays, there are different kinds of environment to teach or learn. Years ago only the traditional teaching in a classroom was used. However, the introduction of the new technology and the Internet has motivated new forms for teaching and learning (Dominici & Palumbo, 2013). The growth in technology has permitted that the education field uses electronic services to improve education methods (Kritzinger & Solms, 2009). Different definitions of learning are shown derived from the usage of electronic methods in teaching or learning process:

- **"Classroom learning":** the traditional form to learn, considering the direct contact of a professor with students in a classroom *"…with face-to-face interaction in a live synchronous environment."* (Wu et al., 2010).
- **"Web-facilitated learning":** includes the traditional form to learn in a classroom, with a website to deliver course material. It does not reduce attendance hours in the classroom (Dziuban et al., 2004).
- **"Blended learning":** applies a combination of classroom learning with e-learning, obtaining the best advantages of both type of learning (Dziuban et al*.,* 2004; Tang, 2014; Wu et al*.,* 2010). Dziuban et al*. (*2004) pointed out that blended learning implies the reduction of attendance hours in the classroom. Blended learning is also known as "Mixed learning" or "Hybrid learning" (Sun, 2014; Tang, 2014).
- **"E-learning":** considers *"online or electronic learning environments"* (Wu et al*.,* 2010).
- **"M-learning":** includes the use of *"mobile and wireless technologies for e- learning"* (Kumaran, 2015), *"such as smartphones…"* (Wu & Chao, 2008). It is also called *"Mobile e-learning"* (Wu & Chao, 2008).

Four out of five categories of teaching or learning previously defined include electronic transactions between teachers and students. Therefore, these types of courses can be considered as an electronic commerce system and the ISO 10008 standard could be applied (see Section 2.4.1).

There is only a slight difference among these types of teaching. For example, a web-facilitated course could be considered part of a blended course, which can also be said for m-learning regarding e-learning. Allen et al. (2007) did a categorization of courses into four groups, using the criteria of the percentage of the content of the course that is provided in the website. Allen et al. (2007) define as a *"traditional course"* where there is no online material, while with a range of 1-29% of material delivered electronically they calls it a *"web facilitated course",* 30-79% for a *"blended course"* and more than 80% is considered an *"online course".*

The digital technology was applied in schools in New Zealand (e.g. games or webpages to learn different topics such as *"Angry Birds game for learning in a fine arts…", "a Webquest on ecology" and "Pinterest"* (Wright, 2015). *S*tudents could understand the topics better due to use of these kinds of technology (Wright, 2015). Also, students showed a better capacity to take attention and resolve situations, increase their ability of team-work and share their experiences (Wright, 2015). Similar results were obtained by Wu et al. (2010), while they also posited that the learning environment affects the students' behavior and performance. However, Larson and Chung-Hsien (2009) concluded that the kind of learning (traditional, blended or online) does not have a relevant impact on *"student performance".*

Larson and Chung-Hsien (2009) pointed out that in courses which incorporate technology, factors such as *"student satisfaction", "learning effectiveness"* and "*faculty satisfaction"* have a better result than the traditional courses.

For the incorporation of technologies in courses, students should improve their *"computer self-efficacy"* and then universities should provide incentives and supports to them (Wu et al., 2010).

The incorporation of technology in courses could increase the tasks performed by teachers or professors (Sun, 2014; Wright, 2015). However, teachers seem to be willing to make the effort since there are relevant learning benefits to students, such as more *"motivated, learning more easily, concentrated more…"* (Wright, 2015). Furthermore, the technology adds value to the teaching process (Mahdizadeh et al., 2008).

The teachers' approach and their perceptions about the use of websites or computer influences whether they use them in the teaching process or not (Mahdizadeh et al., 2008). Moreover, Mahdizadeh et al. (2008) found that the *"information and communication technology"* (ICT) used by teachers was mainly *"for communication"* and provide information, using the basic functions of e-learning tools such as presenting course material and literature through PowerPoint slides, email and the course website.

Regarding the course website use, Selim (2003) (cited by Mahdizadeh et al., 2008) concluded that it is influenced by the *"course website usefulness"* and *"course website ease of use"*, which depend on the student perception.

Dominici and Palumbo (2013) believe that e-learning environment give the chance to students to choose the product that they need without *"…geographical, physical, or financial limitations".*

2.2.1. Blended teaching/learning

The blended learning appears as the most prominent kind of teaching in education (Gould 2003, cited by Sun, 2014; Wu et al*.,* 2010), offering a transformation in education (Dziuban et al, 2004). Furthermore, Dziuban et al. (2004) believe that *"blended learning in higher education is an evolving phenomenon that offers promise for addressing challenges such as access, cost, efficiency and timely degree completion".* A short definition of a blended learning is as *"combining online and face-to-face instruction"* (Young 2002, cited by Sun, 2014).

There are several examples of application of blended learning in education. An example of blended learning is the education system in Ontario in Canada, where the ministry of education has made *"blended learning available for all Ontario students from kindergarten to grade 12"* (Ministry of Education, 2013). Studies about the implementation of blended teaching or learning in higher education institutions were developed in the Technical University of Madrid, Spain (Alonso et al., 2011); University of Rijeka, Croatia (Bozic et al. 2009, cited by Pavani & Temporão, 2014); Pontifícia Universidade Católica do Rio de Janeiro, Brazil (Pavani & Temporão, 2014); University of Central Florida, United States (Dziuban et al., 2004), Changchun Institute of Technology (College English teaching), China (Sun, 2014) and University of Kosovska Mitrovica, Serbia, (Vitoševic et al., 2014).

Motivations to change from traditional teaching to blended teaching in higher education include high "fail" (Pavani & Temporão, 2014) and *"dropout"* rates (Alonso et al., 2011; Pavani & Temporão, 2014). Another reason was that students would be the main actor in the learning process (Pavani &

Temporão, 2014). A study at the University of Central Florida revealed that blended courses have a higher *"success rate (those students achieving an A, B, or C)"* in comparison with e-learning courses and similar and in some cases a little better than traditional courses (Dziuban et al*.,* 2004).

Examples of communication channels or tools used in blended teaching include "audios", "videos", "email", "chats", "forums", "mailing lists", "wiki", "online quizzes and assignments" (Pavani & Temporão, 2014; Sun, 2014; Wu et al., 2010). These offer communication at the same time or at different times, giving more flexibility at the teaching process (Wu et al., 2010).

Illustrations of new content created for the blended course in a University of Brazil are: "Interactive book", "class notes", "learning objects" (e.g. videos and animations) and problems to practice (Pavani & Temporão, 2014). When students were asked about recommendations for the course, they suggested incorporating more examples and videos, also a "Frequently Asked Questions" (FAQs) on the main topics of the course (Pavani & Temporão, 2014). Tools to increase interaction should be used in blended courses, as well as the publicity of these tools (Wu et al., 2010). Therefore, the incorporation of forums or chat can help with the interaction between students and professor.

In a study of Moodle based on blended learning in college English in China, Sun (2014) concluded that blended learning can improve the enthusiasm and initiative of students by learning in comparison with traditional courses. Furthermore the team work ability is increased in blended courses (Sun, 2014). These findings for blended courses pointed out by Sun (2014) are aligned with the statements concluded by Wright (2015) regarding the use of technology in the learning or teaching process.

Although many benefits of blended teaching have been shown from the literature review, there are difficulties as well. In the words of Tang (2014), *"…It requires more commitment of learners, more devotion and knowledge of teachers and more integration of traditional courses and modern technologies."* Bonk et al. (2002) (cited by Wu et al., 2010) pointed out that students can have difficulties with blended courses due to lacking of access to computer and Internet, also by their skills and opinions about the use of technology. However, thirteen years have passed since that statement, and nowadays students are more acquainted with the use of computer and Internet.

2.2.2. Computer-based Learning Platform: Moodle

Nowadays, many universities use *"computer-based learning platform"* to deliver their courses, such as *"Moodle", "Edmodo", "ConnectEdu"* and *"Blackboard"* (Liberona & Fuenzalida, 2014). Because the Moodle platform is used in the application of ISO 10008 in this study, the literature review on Moodle is presented in this section.

According to Liberona and Fuenzalida (2014), *"The vast majority of universities in the western world have integrated an online learning platform in their campus, to help teachers and to go with the times, the most used technology is a learning management system being Moodle the most used LMS platform in the world …"* This platform is used for both web-facilitated courses and blended courses.

Moodle, an acronym for "*Modular Object-Oriented Dynamic Learning Environment"* (Moodleroom, 2015; Tang, 2014; Xiang-Feng, 2014), is a computer-based learning platform (Moodle, 2015a; Moodleroom, 2015; Sun, 2014; Tang, 2014, Xiang-Feng, 2014). Moodle is a free or open (without licensing fees) software (Moodle, 2015a; Moodleroom, 2015; Sun, 2014; Tang, 2014). It was elaborated to generate online courses in a personalized website (Moodle, 2015a; Moodleroom, 2015).

Moodle was created more than 10 years ago by Marin Dougiamas, an Australian teacher (Moodleroom, 2015; Tang, 2014). It is used by more than *"65 million users"* around the world, including both educational institutions and companies (Moodle, 2015a).

Diverse studies have been published regarding the use of Moodle in higher education in many countries (see, e.g. Barge & Londhle, 2014; Borondo et al., 2014; Liberona & Fuenzalida, 2014; Amandu et al., 2013; Reis et al., 2015; Raman et al., 2014; Silveira-Sonego et al., 2014; Sun, 2014; Tang, 2014; Ulbricht et al*.,* 2012; Wahab et al*.,* 2013).

Identified features of Moodle are that it is *"flexible", "social constructivism"* (different people can program modules, which are shared), *"easy to use", "friendly",* that it has a *"modular design",* that it is available in different languages and also it is *"customizable", "secure"* and *"private"* (Moodle, 2015a; Sun, 2014; Xiang-Feng, 2014).

Moodle has a series of activities or resources available to be incorporated in a course, such as: *"online calendar", "online news and announcement", "assignment submission", "discussion forums", "files download", "chat", "online quiz", "wiki", "feedback", "glossaries"* (Sun, 2014). Furthermore, professors can use the following Moodle features: "*manage user roles and permissions", "in-line marking", "track progress"* and *"detailed reporting and logs"* (Moodle, 2015b).

The Moodle program permits the creation of a blended or e-learning course (Moodle, 2015), as well as a web-facilitated course. Furthermore, there is an extension of Moodle called "*Moodlbile"*, which is intended for m-learning (Alier et al. 2007, cited by Kumaran, 2015).

For the implementation of a course in Moodle it is necessary to train professors in the operating Moodle modules, as well as to prepare of teaching content before lectures (Sun, 2014).

Since Moodle is a program which can be developed with new modules or features, modules to facilitate the accessibility to person with visual impairment were developed in a university in Brazil (Ulbritcht et al*.,* 2012).

2.3. Customer satisfaction in electronic commerce and higher education

This research is focused on the implementation of the ISO 10008 standard for customer satisfaction in a Business-To-Consumer Electronic Commerce Transaction (B2C ECT) system. For this reason, the next sections are focused on consumer satisfaction in electronic commerce and student satisfaction in higher education.

2.3.1. Consumer satisfaction in electronic commerce

As ISO 10008 is a standard used for customer satisfaction in electronic transactions between a business and a consumer, the next paragraphs discuss the related terms of *"electronic commerce", "consumer"* and *"customer satisfaction"*, as well as their applications in education.

The concept of *"electronic commerce"* or *"e-commerce"* appeared around 1960s (Wang, 2013) or in 1970s (Gelard & Negahdari, 2011). Electronic commerce refers to businesses which involve electronic transactions in their processes, using technology and the Internet (Gelard & Negahdari, 2011). The intensification of *"use of web technologies"* has modified how the companies offer or sell their products (Dominici & Palumbo, 2013; Wang, 2013). The education institutions have not been the exception of this change (Dominici & Palumbo, 2013).

A consumer is considered a customer who is buying or consuming products (ISO, 2012a; ISO, 2013a). A consumer is an individual person, unlike the customer that could also be an organization (ISO, 2012a; ISO, 2013a)

The level of progress of electronic commerce business can be assessed by consumer satisfaction as a relevant indicator (Yang et al*.,* 2013). Consumer satisfaction in e-commerce is linked to customer experience in *"online shopping"* (Yang et al*.,* 2013). Wang (2013) uses the terminology of *"university e-commerce teaching"* or *"e-commerce courses",* when he refers to courses with electronic transactions or the use of electronic and information technology.

Factors which affect consumer satisfaction in electronic commerce are: *"merchandising"* (Gelard & Negahdari, 2011), *"financial security"* (Gelard & Negahdari, 2011; Yang et al*.,* 2013), "*service ability"* (Gelard & Negahdari, 2011), *"site design"* (Gelard & Negahdari, 2011; Yang et al*.,* 2013), *"company"* (Gelard & Negahdari, 2011) and *"website economy"* (Yang et al*.,* 2013). Consumers of e-commerce give importance to factors such as *"the price, discount, product information, payment security and privacy issues"* (Yang et al., 2013). Only a part of these factors could be applicable to this research, since the application of ISO 10008 in a university course will not include payments. Therefore, factors such as price, discount, merchandising and financial security are not applicable.

2.3.2. Student satisfaction in higher education

Customer satisfaction in higher education, where the teaching process includes technology and internet (web-facilitated, blended, e-learning and m-learning), intersects with consumer satisfaction in electronic commerce, since electronic transactions are involved.

Examples of customers of universities are *"Industry, community, alumni, professional organizations, accreditation boards, students"* (Karapetrovic, 2002). Several investigations have considered the *"students taking courses"* as the main customers of the system, if the product is the course by itself (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010; Karapetrovic & Doucette, 2009; Karapetrovic, 2014). This research considers the customer or the consumer as the students similarly.

Therefore, *"the concept of student satisfaction is derived from that of customer satisfaction"* (Dominici & Palumbo, 2013).

Because students' satisfaction is a relevant outcome of education (Sander & Chan 1996, cited by Dominici & Palumbo, 2013), universities should measure student satisfaction constantly (Dominici & Palumbo, 2013).

Dominici and Palumbo (2013) noticed that student satisfaction is not necessarily directly connected to the quality of learning, since students' requirements may be not the best for the quality learning.

Regarding the satisfaction with the learning process, authors point out that it increases in blended or e-learning courses (Larson & Chung-Hsien, 2009). On the contrary, El-Gayar and Dennis (2005) observed that there is not a significant difference in student satisfaction between traditional courses and other courses using technologies.

Wu et al. (2010) identified three factors which influence student satisfaction with blended e-learning systems: *"learners' cognitive beliefs", "technological environment"* and *"social environment".* Furthermore, Wu et al. (2010) pointed out that to satisfy the student's requirements it is necessary to deliver *"…useful information with synchronous and asynchronous learning…".* Moreover, if students have a good perception of the blended course, then they would have a better satisfaction (Wu et al., 2010).

In e-learning courses, a *"user-friendly"* platform is a necessary requirement, which does not increase student satisfaction, but *"its absence causes great dissatisfaction"* (Dominici & Palumbo, 2013). Important factors to increase student satisfaction in e-learning environments are *"…flexibility of the time and hours, mandatory quizzes and exercises and the presence of a download area…" (*Dominici & Palumbo, 2013). This research evaluates student satisfaction with products delivered in a course site (website), which include files to download anytime.

2.4. Augmenting standards

ISO has developed a series of standards for being used in different organizations around the world. The most popular standards are about quality management, environmental management, country codes, social responsibility, energy management, risk management, food safety management, information security management and sustainable events (ISO, 2015a).

A classification of standards into *"assimilating", "ascending", "supporting"* and *"augmenting"* is found in Karapetrovic (2007, 2008, 2010 and 2014), Karapetrovic and Doucette (2009), Karapetrovic et al. (2006 and 2012).

The augmenting standards are subsets of supporting standards, which focus on a single component or subsystem of an overall management system with a narrow scope, permitting to augment the overall performance of the system (Karapetrovic, 2007, 2008, 2010 and 2014). An augmenting standard can be applied by itself or as a subsystem of another general management system or integrated with other similar augmenting standards (Karapetrovic, 2007, 2008, 2010 and 2014). Another

characteristic of these standards is that they are auditable (Karapetrovic, 2007, 2008, 2010 and 2014). Examples of augmenting standards are: ISO 10002 (complaint handling system), ISO 10012 (Measurement management systems) and ISO 19011 (Guidelines for auditing management systems).

The augmenting standards could be the future of standardization in quality management, since these standards are narrower and can report benefits of implementation in a short time (Dee et al., 2004; Karapetrovic, 2007, 2008 and 2014, Karapetrovic & Spasojevic-Brkic, 2014; Karapetrovic et al., 2010; Karapetrovic et al*.,* 2006 and 2012). Furthermore, the implementation or registration of standards such as ISO 9001 or ISO 14001 is reaching a certain limit (Franceschine et al. 2004, cited by Simon et al., 2012a).

One of the advantages of augmenting standards is that they can be rapidly and easily established, obtaining immediate significance for customers, in comparison with the (e.g. ISO 9001) assimilating standards, which include more requirements (Karapetrovic, 2014; Karapetrovic & Doucette, 2009).

Karapetrovic et al. (2006 and 2012) found that the customer service area was the highest preference for the creation of new standards, through a survey performed in Spain in 2006 in 529 companies.

In an empirical study applied in Serbia in 39 companies previously registered to ISO 9001 (quality management system) and ISO 14001 (environment management system), Karapetrovic and Spasojevic-Brkic (2014) concluded that around 30% of the companies seem to be *"unaware"* of augmenting standards.

Since 2004, ISO has published several standards related to quality management, whose main aim is to increase the customer satisfaction (Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010; Karapetrovic et al*.,* 2012; Karapetrovic & Spasojevic-Brkic, 2014; Simon et al*.,* 2012a). In 2004, the first edition of ISO 10002 was published, followed in 2007 for ISO 10001 and ISO 10003 (Karapetrovic & Spasojevic-Brkic, 2014; Simon et al*.,* 2012a). Three years later, in 2010, the ISO/TS 10004 standard was published (Simon et al*.,* 2012a), which has been updated by ISO 10004:2012. The ISO 10008 standard drafted for B2C ECT systems was published in 2013. Currently, ISO 10002 has a new version published in 2014.

The triad of standards ISO 10001, ISO 10002 and ISO 10003, called "Customer Satisfaction Complaints Systems-CSCS", focus on prevention and resolution of complaints, preventing customer dissatisfaction (Dee et al*.,* 2004; Hughes & Karapetrovic, 2006).

The current versions of the ISO 10001, ISO 10002, ISO 10003, ISO 10004 and ISO 10008 standards belong to *"the group of customer-satisfaction augmentative standards",* also known as "ISO 10000 series" or "ISO 10000 family" (Karapetrovic, 2010; Karapetrovic & Spasojevic-Brkic, 2014; Nowicki et al*.,* 2014). Studies reflect that the ISO 10000 family standards are not widely known in detail by the companies yet (Nowicki et al., 2014; Karapetrovic et al*.,* 2006 and 2012; Karapetrovic & Spasojevic-Brkic, 2014).

2.4.1. ISO 10008 for business-to-consumer electronic commerce transactions

ISO 10008 *"provides guidance to organizations for planning, designing, developing, implementing, maintaining and improving an effective and efficient system concerning business-to-consumer electronic commerce transactions."* (ISO, 2013a). In a survey in Serbia, 38% of the companies did not know about the ISO 10008 standard. In addition, not a single company had implemented this augmentative standard (Karapetrovic & Spasojevic-Brkic, 2014).

ISO 10008 has three main objectives regarding: *"enhancing consumers' confidence"* in the B2C ECT system, improving *"the ability of organization to satisfy consumers" and "reducing complaints and disputes"* (ISO, 2013a). These objectives are linked to the goals of universities and professors. This standard would be a good tool to increase customer satisfaction in higher education.

Although the intention of the ISO 10008 standard is to be applied in organizations which use electronic methods (ISO, 2013a), this standard also can be used in organizations where not all their processes are based on electronic transactions, but some of them require online interactions (ISO, 2013a). Karapetrovic (2010) points out that ISO 10008 can be used in an electronic course delivery system, being integrated with ISO 10001 and ISO 10002.

The ISO 10008 standard is based on sixteen guiding principles, which are essential to develop the B2C ECT system (ISO, 2013a). The "improvement" principle refers to have the permanent goal to perfect the B2C ECT system (ISO, 2013a). This principle should be promoted in the organization. Another principle is "accessibility", which states that the B2C ECT system and its information should be available and *"easy to find, understand and use"* (ISO, 2013a).

ISO 10008 makes reference to several other standards, with the purpose to complement its guidelines given. For example, the notes of Clause 7.1.4 "Complaints handling and external dispute resolution" mention ISO 10002 and ISO 10003. The international standards mentioned in ISO 10008 and their characteristics are described in Table A.1.

Clause 5.3 of ISO 10008 identifies two categories of processes: "Single-phase processes" and "Multi-phase processes" (ISO, 2013a). Furthermore, three phases are identified: "Pre-transaction phase", "In-transaction phase" and "Post- transaction phase" (ISO, 2013a).

Each phase includes processes which can be applied in the course. For example, the "Pre-transaction phase" includes three processes called "Content creation" (Clause 6.1.2), "Content Delivery" (Clause 6.1.3) and "Content governance" (Clause 6.1.4). These are linked with the information necessary to be published in a course site. On the contrary, there are also processes which would not apply in a course, such as "Final quote" (Clause 6.2.4), "Payment selection support" (Clause 6.2.5), "Payment authorization" (Clause 6.2.6) and "Order confirmation" (Clause 6.2.7).

The literature review of ISO 10008 standard shows that there are a few papers that mention this standard, but the author of this thesis has not been able to find any study focused on the designing and

implementation of this standard. Therefore, this thesis seems to be the first study on the designing and application of ISO 10008:2013.

2.4.2. ISO 10001 for codes of conduct

Dee et al. (2004) consider that, with codes of conduct and a complaint handling system in place, organizations can show that they understand and consider customer requirements.

Karapetrovic and Doucette (2009) concluded that the implementation of ISO 10001 enables to have a structured approach to quality assurance and improvement. Khan and Karapetrovic (2015) determined that ISO 10001 is a useful and comprehensible method for codes of conduct. Also, this standard is flexible for different applications (Khan & Karapetrovic, 2015).

There are examples of models and application of ISO 10001 in different fields such as health care, telecommunications and education (see, e.g. Dimkow & Ivanova, 2012, Honarkhah, 2010; Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009; Khan & Karapetrovic, 2015).

Around 21% of 176 Catalonian companies answered *"do not know"* whether they will implement this standard in the future and 31% were *"not familiar with"* ISO 10001 (Karapetrovic et al., 2006 and 2010). From 122 companies in the Basque country, around 70% were *"not familiar with"* ISO 10001 either (Karapetrovic et al., 2010). In another similar study applied in Serbia, Karapetrovic and Spasojevic-Brkic (2014) found that around 33% of the companies were unaware of the ISO 10001 standard and around 14% answered *"do not know"* whether they would implement this standard. In addition, 5% had implemented ISO 10001.

Several articles have presented cases of application of ISO 10001 and 10002 in higher education, specifically in classroom lectures in a university in western Canada, considering the overall products delivered in the course (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009). In this research, the application of these standards will focus on the course material delivered through electronic transactions, such as the course website and email.

Honarkhah (2010) adopted three kinds of codes to be implemented in engineering courses: *"Review Code", "Response Code*" and *"Schedule Code",* which were presented previously by Karapetrovic and Doucette (2009). The main objective was to increase student satisfaction regarding delivery of engineering courses (Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009).

The three previous mentioned codes were used as a template in five courses, giving the option to professors of adopting, adapting, or creating a new code (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010). Most professors adopted the code(s) with slight modifications in the promise and the compensation (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010). The *"Response Code"* had the highest median of awareness and usefulness for students (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010).

Table 2.1 shows the promises in the codes of conduct found in the literature review regarding education, which are analyzed to understand their relationship with electronic transactions.

Table 2.1 Analysis of conduct codes in engineering courses elaborated in previous studies.

Code	Promises	Associated directly with the B2C ECT?
"Review Code"	Check the quizzes during the first class following the quiz and check the assignment during the second class following the assignment due date (Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009).	No
"Response Code"	Answer inquiries through email within 24 hours (Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009).	Yes
"Schedule Code"	Ensure the lectures were taught according to the schedule or closing the gaps (Honarkhah & Karapetrovic, 2010; Karapetrovic 2014; Karapetrovic & Doucette, 2009).	No
"Evaluation Code"	Post on the course site (website) the marking criteria for course materials (marking scheme and evaluation components) to the students before the due date of the activity (Honarkhah, 2010)	Yes

The *"Response Code"* is directly linked with electronic transactions, since it delivers answers through email. Therefore, it is a good example to be applied in a B2C ECT system in a course. Although the *"Review Code"* and the *"Schedule Code"* are not directly associated with electronic transactions, with some modifications regarding the publication of the marks and the current schedule on the course website, they could be applied.

Furthermore, flowcharts and forms were used to facilitate the implementation of ISO 10001 and ISO 10002, considering clauses of these international standards (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010). Similar work is developed in this research, but considering the ISO 10008 standard, and also ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001.

Although the shown studies did not measure directly student satisfaction, the authors pointed out those students were satisfied, since they recommended the application of ISO 10001 and ISO 10002 in other courses (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010).

2.4.3. ISO 10002 for a complaint handling system

Organizations can design, implement, audit and improve their complaint handling system based on the useful ISO 10002 (Ang & Buttle, 2006). A complaint handling system can provide benefits for customers and also for organizations (Ang & Buttle, 2006). Furthermore, Karapetrovic and Doucette (2009) concluded that the implementation of the ISO 10002 for complaints handling enables to have a *"structured approach"* to *"quality assurance and improvement".*

In an empirical study undertaken in Spain, from 176 Catalonian companies, around 15% answered *"do not know"* whether they would implement this standard in the future and a 25% were *"not familiar with"* ISO 10002 (Karapetrovic et al*.,* 2006 and 2010). Moreover, from 122 companies in the

Basque country, around 90% of the companies were *"not familiar with"* ISO 10002 either (Karapetrovic *et al.,* 2010). In another similar study in Serbia, Karapetrovic and Spasojevic-Brkic (2014) found that around 30% of the companies were unaware about the ISO 10002 standard and around 20% answered *"do not know"* whether they would applied this standard. In addition, 13% had implemented ISO 10002.

According to Ang and Buttle (2012), at the moment of implementation of the ISO 10002 standard, the most relevant factors are "*visibility and accessibility of the complaints-handling policy and process, easy-to-use process for all complainants; and responsiveness of the complaints-handling process".*

The existence of complaints has been always a probability in any kind of business, as different factors in the processes can fail (Ang & Buttle, 2012; Dimkow & Ivanova, 2012; Hughes & Karapetrovic, 2006). Furthermore, a complaint can be viewed in a positive view, since it is a feedback which could be an opportunity to improve the system and obtain the needed products (Ang & Buttle, 2012; Dimkow & Ivanova, 2012; Hughes & Karapetrovic, 2006; Nyer, 2000).

Ang and Buttle (2012) pointed out that the major benefits of implementing a complaint handling process are a *"higher level of customer advocacy", "customer satisfaction" and "improvements in the efficiency and effectiveness of customer-facing processes*". This supports the statement pointed out by the ISO 10002 standard that this kind of system can enhance customer satisfaction (ISO, 2014a). However, this study did not prove that ISO 10002 can improve the reputation of the organization (Ang & Buttle, 2012). Nyer (2000) concluded that *"… encouraging dissatisfied consumers to express their feelings and opinions may cause increased levels of satisfaction and product evaluation"*.

There are examples of models and application of ISO 10002 in different fields such as health care, electricity, telecommunication and education (see, e.g. Dimkow & Ivanova, 2012; Fernandez et al., 2010; Honarkhah, 2010; Honarkhah & Karapetrovic, 2010; Hughes & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009).

According to ISO (2013a), any positive or negative statement from a consumer or other stakeholders is considered a feedback. Moreover, the feedback handling system can be joined in the complaints handling system or be based on it (ISO, 2013a).

Although ISO 10002 is for complaints, studies incorporated other kinds of customer feedback such as suggestions, compliments and comments, establishing a general feedback system based on ISO 10002 (e.g., Fernandez et al*.,* 2010; Honarkhah, 2010).

ISO 10002:2004 was used in engineering courses in a university in western Canada to collect unsolicited student feedbacks about the course, including complaints provided through e-mail, phone, in person or anonymously (written comments) (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009). The student's perception of the awareness and usefulness of the feedback handling system was 67% in the first survey and 92% in the second and final survey (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010).

2.4.4. ISO 10004 for monitoring and measuring customer satisfaction

Karapetrovic and Spasojevic-Brkic (2014) found that around 22% of the companies were unaware about ISO 10004 standard and around 8% answered *"do not know"* if they would implement this standard. In addition, 13% had implemented ISO 10004.

According to Karapetrovic and Doucette (2009), ISO 10004 is applicable in systems of higher education, to develop and use surveys of students or other customers, which permit to obtain feedback. Student feedback is important for the motivation of teachers to continue the use of digital technologies (Wright, 2015).

The first study on the applicability of ISO/TS 10004 developed in the health care field was found in 2010 (Khan et al*.,* 2010). The study did a breakdown of all clauses of ISO/TS 10004, analyzing them for the health care system, using the tool *"SIPOC (Supplier-Input-Process-Output-Customer)"* to identify the system (Integrated health care), and following a flowchart where they defined customer expectations, identified indicators, collected customer satisfaction data, among other activities (Khan et al*.,* 2010). The study proposed a methodology to apply ISO/TS 10004 in health care, which was not applied at that moment (Khan et al*.,* 2010).

2.5. ISO/IEC 27001 for Information Security

Information security (IS) is a topic broadly studied (see, e.g. AbuSaad et al., 2011; Beckers et al., 2012; Burd et al., 2005; Chang & Ho, 2006; Dionysiou et al., 2012; Elachgar & Regragui, 2012; Elachgar et al., 2012; Gillies, 2011; Kolokotronis et al., 2002; Kritzinger & Solms, 2009; Alwi & Fan, 2010; Rehman et al., 2013; Singh et al., 2013; Talib et al., 2012; Van Wessel et al., 2011).

Information security has evolved with the time, from *"the first wave"* until *"the fourth wave"* (Elachgar & Regragui, 2012; Elachgar et al*.,* 2012). The first stage or *"wave"* of information security focused on technical problems (Elachgar & Regragui, 2012; Elachgar et al*.,* 2012). The *"second wave"* was the incorporation of management issues (policy and procedures in the second wave) (Elachgar & Regragui, 2012; Elachgar et al*.,* 2012). The implementation of international standards was the "third wave" (Elachgar & Regragui, 2012; Elachgar et al*.,* 2012). The *"fourth wave"* covers the development of the *"Governance of Information Security"* (Elachgar & Regragui, 2012; Elachgar et al*.,* 2012).

Nowadays, information security is an important issue for any company or organization (AbuSaad et al*.,* 2011; Elachgar & Regragui, 2012), since information can be considered a commodity (Elachgar & Regragui, 2012; Elachgar et al*.,* 2012) or an asset (ISO, 2014b). Therefore, companies should protect their information assets (Elachgar & Regragui, 2012; ISO, 2014b).

Organizational assets are an important concept in ISO 27001. They should be identified through an *"inventory of assets"* (ISO, 2013b). In accordance with ISO/IEC 27005, *"an asset is anything that has value to the organization and which therefore requires protection"* (ISO, 2011). Assets can be categorized

in *"the primary assets"* and *"the supporting assets"* (ISO, 2011). Examples of information assets are the processes and activities of the organization, *"information",* human resources, *"organization's structure",* infrastructure (equipment, *"software", "hardware"* and network*)* and *"site"* (ISO, 2011). The information asset should consider *"…financial information, intellectual property and employee details, or information entrusted to them by customers or third parties."* (ISO, 2014b). Examples of assets in a university course are: lecture slides, assignments and marks published on the course site.

The ISO/IEC 27001 standard gives the requirements for information security management systems (ISO, 2013b; ISO, 2015c). The first edition of ISO/IEC 27001 was published in 2005, and the second edition (current version) was published in 2013. This standard is based on the *"PDCA cycle" ("Plan-Do-Check-Act")* (AbuSaad et al*.,* 2011).

The current report of management system standard certifications published by ISO reveals that *22,293* organizations certified ISO/IEC 27001 during 2013 in *"105 countries and economies",* increasing 14% regarding the previous year (ISO, 2015c). The family of ISO/IEC 27000 about information security has been studied in several researches (see, e.g. AbuSaad et al*.*, 2011; Anttila et al., 2012; Beckers et al*.,* 2012; Dionysiou et al*.*, 2012; Gillies, 2011; Karapetrovic et al*.,* 2010; Talib et al*.,* 2012; Van Wessel et al*.*, 2011).

According to ISO/IEC 27000, *"an Information Security Management System (ISMS) consists of the policies, procedures, guidelines and associated resources and activities, collectively managed by an organization, in the pursuit of protecting its information assets."* (ISO, 2014b).

In a study developed in Spain, from 176 Catalonian companies, around 15% answered *"do not know"* and 30% were *"not familiar with"* ISO/IEC 27001; while 122 companies from the Basque country, around 95% of the companies were *"not familiar with"* ISO/IEC 27001 either (Karapetrovic et al., 2010).

Difficulties faced by the companies in the implementation of ISO/IEC 27001 are: "*identifying organization's assets", the "weak team experience", "resistant to change",* and *"unclear understanding of standard"* (AbuSaad et al., 2011).

Identified motivations to implement ISO/IEC 27001 are: to improve *"the security level"* in the organization and the obtainment of *"competitive advantages"* (AbuSaad et al., 2011), the first one is in accordance with a survey performed this year to 245 companies around the world (IT governance, 2015).

Regarding the benefits, ISO/IEC 27001 grants *"formality and visibility"* of the IS in the company (AbuSaad et al., 2011), increase of *"the organization' confidence"* about IS (AbuSaad et al., 2011) and improvement of information security across the whole organization (IT governance, 2015).

Finally, important factors for the successful implementation are: *"coherent planning", "sufficient budget"* and the "*employee's positive attitude"* (AbuSaad et al., 2011), as well as the awareness of employees about information security and their competence (IT governance, 2015).

2.5.1. Information security in education

Several studies have been developed regarding the security of information in education (see, e.g. Burd et al., 2005; Doherty et al., 2009; Kritzinger & Solms, 2009; Alwi & Fan, 2010; Rehman et al., 2013; Yeo et al., 2007). Furthermore, there are specific researches about ISO/IEC 27001 in teaching (see, e.g. Talib et al., 2012).

Academic institutions are vulnerable their information systems for being attacked, due to their diversity of users, including public and private data (Rehman et al., 2013). Furthermore, academic institutions depend on digital information for both academic and administrative processes (Rehman et al., 2013). Common incidents in this field are: *"…information theft, data tampering, viruses, worms and terrorist activity…"*, as well as copyright violation and file sharing (Burd et al., 2005). The majority of incidents (60%) are provoked by internal users such as displeased employees, *"…malicious students, and faculty."* (Inside UVA 2001, cited by Burd et al., 2005).

Rehman et al. (2013) point out that is incorrect to rest the responsibility for all activities to ensure information security in academic institutions in a centralized IT security department or specialist group, since each user has duties to achieve information security (Rehman et al., 2013). It means that professors, staff, students, researchers and teaching assistant should follow the policies and procedures regarding information security.

Best practices for academic institutions are: "*centralized anti-malware tool", "data protection", "use of domain emails", "user account monitoring", "logging", "control use of administrative privileges", "patch management", "network access control", "patch management"* and *"incident response management"* (Rehman et al., 2013).

Universities are exposed to several risks for using *"networks"* such as *"peer to peer networking", "instant messaging"* and *"e-learning"* (Burd et al., 2005). In particular, online courses have the risk of that malicious people or other universities steal their course material (Burd et al., 2005).

There are studies which propose a framework or strategies to implement an information security management system in universities (Burd et al. 2005; Rehman et al., 2013). However, the writer of this thesis did not find studies about how to implement ISO/IEC 27001 at a level of a university course.

Information security has *"technical"* and *"non-technical"* issues; therefore both should be treated to protect the information (Kritzinger & Solms, 2009). The *"non-technical side"* is linked to the behavior of people involved in the system (Kritzinger & Solms, 2009). In a course system, where the organization is the professor by himself/herself, the *"non-technical"* issues should play an important factor to implement information security.

2.6. Integrated management systems

Recently, the organizations have seen the necessity to implement multiple Management Systems Standards (MSS) to address the needs of different interested parties (ISO, 2008). On the other hand, the

development of standards has increased considerably (ISO, 2008), for example, ISO/IEC 27001 for information security and ISO 28000 for supply chain security (Asif et al., 2010; Casadesús et al., 2009; Ferreira-Rebelo et al., 2014; ISO, 2008; Karapetrovic, 2008; Karapetrovic & Jonker, 2003; Karapetrovic et al., 2006; Ramos, 2010; Simon et al., 2012a; Simon et al., 2012b). Organizations face the issues of maximizing the use of their resources and not multiplying efforts to maintain more than one MSS. Therefore, the integration of the MSs is a solution (Asif et al., 2009; Karapetrovic, 2007 and 2008; Karapetrovic & Willborn, 1998; Ramos, 2010).

The concept of integration is related to combining the MSs in an overall integrated management system (ISO, 2008). The result of the integration process is *"…to move the organization in the direction of a single management system that meets the requirements of multiple management system standards*." (ISO, 2008, pp. 64). An IMS considers the integration of some or all parts of a business in a unique management system (Ferreira-Rebelo et al., 2014). Another definition of the integration is *"the complete harmony and alignment of strategy and operations of an organization"* (Asif et al., 2009).

Moreover, authors pointed out those companies prefer to integrate their systems than manage them separately (Casadesús et al., 2009; Simon et al., 2012a). Furthermore, integration appears as the natural action, since the MSSs have analogous structure and concepts, producing synergy and savings in operations (Karapetrovic & Jonker, 2003).

Reasons to maintain the separation of the systems were encountered in an empirical study. The most relevant reason was that different departments are in charge of their implementation, lack of interest in the integration and lack of resources (Karapetrovic et al., 2006 and 2010).

In several articles, Dr. Karapetrovic (2007, 2008, 2014) points out the definition of two kinds of integration: *"the traditional integration"* and *"the integrative augmentation".* The first one considers the integration of at least two overall and standardized management systems (e.g. ISO 9001 and ISO 14001) (Karapetrovic 2014; Karapetrovic & Willborn, 1998). In other words, this kind of integration focuses on assimilating standards, as the traditional integration by definition is *"cross- functional"* (Karapetrovic, 2007, 2008 and 2014).

The concept of integrative augmentation considers the application and integration of augmenting standard(s) in a MS, and this incorporation could be sequential or parallel (Karapetrovic, 2007 and 2008).

The integration of the systems can be both *"horizontally"* and "*vertically"* (Asif et al., 2009; Karapetrovic, 2007 and 2008). According to Karapetrovic, the horizontal integration brings more advantages, *"where systems are used to augment each other and thus are combined much more naturally"* (Karapetrovic, 2014).

The augmenting systems can be considered subsystems of an overall system (Karapetrovic, 2007 and 2008). This is the case of this research, since augmenting standards such as ISO 10001, ISO 10002 and ISO 10004 will be used to create subsystems of the B2C ECT system based on the ISO 10008 standard.

Integrative augmentation is not difficult to implement (Karapetrovic, 2007 and 2008). It should be a good choice for companies (Karapetrovic, 2007 and 2008). Furthermore, the structure and the content of the systems should be united in their integration (Karapetrovic, 2007 and 2008).

Examples of augmentative integration among ISO 10001, ISO 10002 and ISO 19011 are presented in higher education (see, e.g. Honarkhah, 2010; Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009). Also, there is an example in another field such as health care (Khan & Karapetrovic, 2015).

2.6.1. Benefits and difficulties of integration or IMS

Authors point out that the integration of MSs brings benefits to the organization (Karapetrovic & Willborn, 1998; Simon et al., 2012a and 2012b). Simon et al. (2012a) explain that there are "internal and external benefits", for example an internal benefit is the *"increase of organizational efficiency"* and an external benefit is linked to improving the image of the company.

Casadesús et al. (2009) verified through an empirical study that the companies which implemented and integrated a second standard perceive better benefits that companies that only have implemented one standard. The same author could not confirm the idea of the existence of the synergy of the implementation of a second standard (Casadesús et al*.,* 2009). Table 2.2 depicts the integration benefits from different authors.

Table 2.2 Integration benefits

Benefit	Authors
Operational improvements, with more efficiency of the processes.	Asif et al., 2009 and 2010; Ferreira-Rebelo et al., 2014; Karapetrovic & Jonker (2003); Karapetrovic & Willborn, 1998; Simon et al., 2012a and 2012b.
An effective communication, eliminating barriers among different departments.	Asif et al., 2010; Karapetrovic &Willborn, 1998; Ramos, 2010; Simon et al., 2012a and 2012b.
Improve motivation of the employees and decrease conflicts among them.	Asif et al., 2009 and 2010; Ferreira-Rebelo et al., 2014; Karapetrovic & Willborn, 1998; Simon et al., 2012a and 2012b.
Optimization of resources used for auditing due to their integration.	Asif et al., 2009 and 2010; Ferreira-Rebelo et al., 2014; Karapetrovic & Willborn, 1998; Simon et al., 2012a and 2012b.
Improvements in the external image of the company	Ferreira-Rebelo et al., 2014; Karapetrovic &Willborn, 1998; Simon et al., 2012a and 2012b
Costs reduction or savings	Asif et al., 2009 and 2010; Karapetrovic & Willborn, 1998
A better relationship with stakeholders, increasing their implication and satisfaction.	Asif et al., 2009 and 2010; Ferreira-Rebelo et al., 2014; Simon et al., 2012a and 2012b.
Organizational culture improvement, incorporating the continual improvement focus, common attitudes and values	Ferreira-Rebelo et al., 2014; Simon et al., 2012a and 2012b.
Simplification of work, reducing documents and records.	Asif et al., 2010; Simon et al., 2012a
Facility to include new systems due to commonalities	Ramos, 2010; Simon et al., 2012a and 2012b.

Integration benefits reported through case studies, in the "The integrated use of management system standards" book, are: "*eliminating redundancy", "Establishing consistency", "optimizing processes and resources", "Improving decision making", "Reducing maintenance"* and "*Consolidating assessments"* (ISO, 2008, pp. 5-6).

Asif et al. (2010) concluded that the benefits depend on perceptions of the manager about the implementation of an IMS, whether they consider it based on an operational or strategic level. Table 2.3 shows difficulties of integration obtained from different authors:

Table 2.3 Integration difficulties

Difficulties	Authors
Lack of resources (including human resources)	Durdevic et al., 2013; Ferreira-Rebelo et al., 2014; Karapetrovic et al., 2006; Simon et al., 2012a and 2012b.
Inter-functional conflicts or lack of department collaboration	Karapetrovic & Willborn, 1998; Karapetrovic et al., 2006; Simon et al., 2012a and 2012b.
Insufficiently harmonized standards or difference in models	Durdevic et al., 2013; Karapetrovic & Willborn, 1998; Karapetrovic et al., 2006; Simon et al., 2012a and 2012b.
Lack of government support	Karapetrovic et al., 2006; Simon et al., 2012a and 2012b.
Lack of employee motivation or resistance to change	Ferreira-Rebelo et al., 2014; Karapetrovic et al., 2006; Simon et al., 2012a and 2012b.
Different objectives or stakeholders of the standards	Ramos, 2010.

2.6.2. Tools and models used for integration

The tools and models are linked to the process to undertake the implementation of the integration. Also, these are the strategies of integration or the implementation approach (Asif et al*.,* 2009).

Asif et al. (2010) identify two main archetypes of integration strategies: *"systems approach"* and "*techno-centric approach"*, concluding that the first provides more benefits.

Karapetrovic et al. (2006 and 2010) identified four tools used for integration: "*Process map",* "*analysis of common elements of standards", "organization's own model"* and *"PDCA"* ("Plan-Do-Check-Act"). Asif et al. (2009) proposed a model based on *"PDCA".*

In an empirical study of 298 companies undertaken in Spain, the authors found that the most used tool was the "*analysis of common elements of standards"* with 93%, followed by the use of "*Process map"* with 88% (Karapetrovic et al*.,* 2010). In a previous study, these percentages were 93% and 92% respectively (Karapetrovic et al*.,* 2006). These tools are used for the integration in this study, specifically in Chapter 4.

2.7. Motivation for the proposed research

The motivation for undertaking this research is associated with the release of international standards from the ISO 10000 family for customer satisfaction and ISO//IEC 27001 for information security and their applicability in higher education.

The primary motivation is linked to the release of the ISO 10008 standard in 2013. This standard provides guidelines for business-to-consumer electronic commerce transactions. From the literature review presented in this chapter, the author of this thesis could conclude that the research about ISO 10008 has not been explored yet. The few papers, which have mentioned this standard, are linked to a search for whether this standard is known to companies or not. The author of this work was not able to find any study focused on modeling and implementation of this standard. Therefore, this research would be the first study on the applicability of ISO 10008:2013 in a university course.

Second, there is a possibility to study and analyze the application of ISO 10008 in higher education at the level of a course using this standard, which is intended for organizations with electronic transactions in their processes, in other words for e-commerce companies. Therefore, a motivation is to study how this standard can be applied in courses where not all processes are undertaken with electronic transactions, or how this standard can be adapted to courses in academic institutions, excluding inapplicable processes mentioned in ISO 10008 such as payment or final quote.

Third, academic institutions have to increase student satisfaction; therefore the group of ISO 10000 standards intended for customer satisfaction is a good tool to achieve that goal. The literature review found studies of the application of ISO 10001 and ISO 10002 in engineering courses, therefore a motivation is to continue with the research in this field.

Fourth, there is a chance to investigate the concept of the augmentative integration of standardized management systems among ISO 10008 and ISO 10001, ISO 10002 and ISO 10004 focused on the course material delivered electronically.

Fifth, academic institutions have incorporated technologies and the Internet in their courses, confronting new and different threats to their information security. Therefore, the implementation of ISO/IEC 27001 for information security would be useful. Furthermore, the author of this work did not find studies about how to implement ISO/IEC 27001 at the courses level; therefore there is room to research this gap.

Finally, there is a chance to undertake empirical research on whether these standards drafted to increase customer satisfaction are able to achieve such a goal in a web-facilitated course considering electronic transactions.

Chapter 3. Model for a B2C ECT system in a university course based on ISO 10008

3.1. Introduction

This chapter presents a model created to implement ISO 10008 in a university course in higher education. The developed model includes flowcharts and forms to facilitate the implementation of this standard in the chosen system, as well as detailed examples of how to use the created forms.

In this model, the flowcharts describe in detail each process included in the ISO 10008 Business to Consumer Electronic Commerce Transactions (B2C ECT) system in a university course (see Figure 3.2). These flowcharts show how the guidelines of ISO 10008 have been interpreted in the chosen system to comply with this standard through specific activities. Therefore, flowcharts are a tool to facilitate the implementation of ISO 10008 for student satisfaction, focusing on the course material delivered in a course site or email.

The developed forms have a similar purpose to the flowcharts, since they are a complement to undertake the activities defined in flowcharts. The forms have been created based on the guidelines of ISO 10008 and its subsystems standards (ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001), establishing fields to help professors meet the guidelines or requirements. Furthermore, the use of forms permits having a record of the implementation of this MSS. Appendix B depicts fourteen forms created in the research.

The created model can be self-implemented by a professor or implemented with the help of a consultant or researcher(s).

3.2. Defining the university course management system

The implementation of ISO 10008 requires to be applied in a management system (MS). This section presents a university course MS and its main components first. Then, Section 3.3.1 establishes the B2C ECT system as a subsystem of the university course MS.

The “university course” refers to a professor, who is teaching in a classroom and is also using a website and/or email to deliver course products to students. Therefore, this “university course” could be a “Blended or Web-Facilitated Course” (Allen et al., 2007). Figure 3.1 illustrates the university course MS, including ten processes, products (e.g. lectures, exams and responses to questions from students), consumers (students) and other stakeholders (e.g. department and university).

This system assumes that the midterm and final exams are done in a classroom in a traditional way. The Teaching Classes process refers to the class performed in a classroom or laboratory. The products identified in Figure 3.1 are examples, since a university course could have more or different

products according to the plan of each professor or university, as well as referring to other stakeholders and processes.

Figure 3.1 depicts three processes drawn with green color, because these involve electronic transactions. Therefore, only these processes will be a part of the B2C ECT system (see Section 3.3.1). Furthermore, red arrows represent an optional interaction between these processes, depending on whether the “evaluation activities” contain electronic transactions or not, in other words whether the professor uses online quizzes or other online activities with the evaluation.

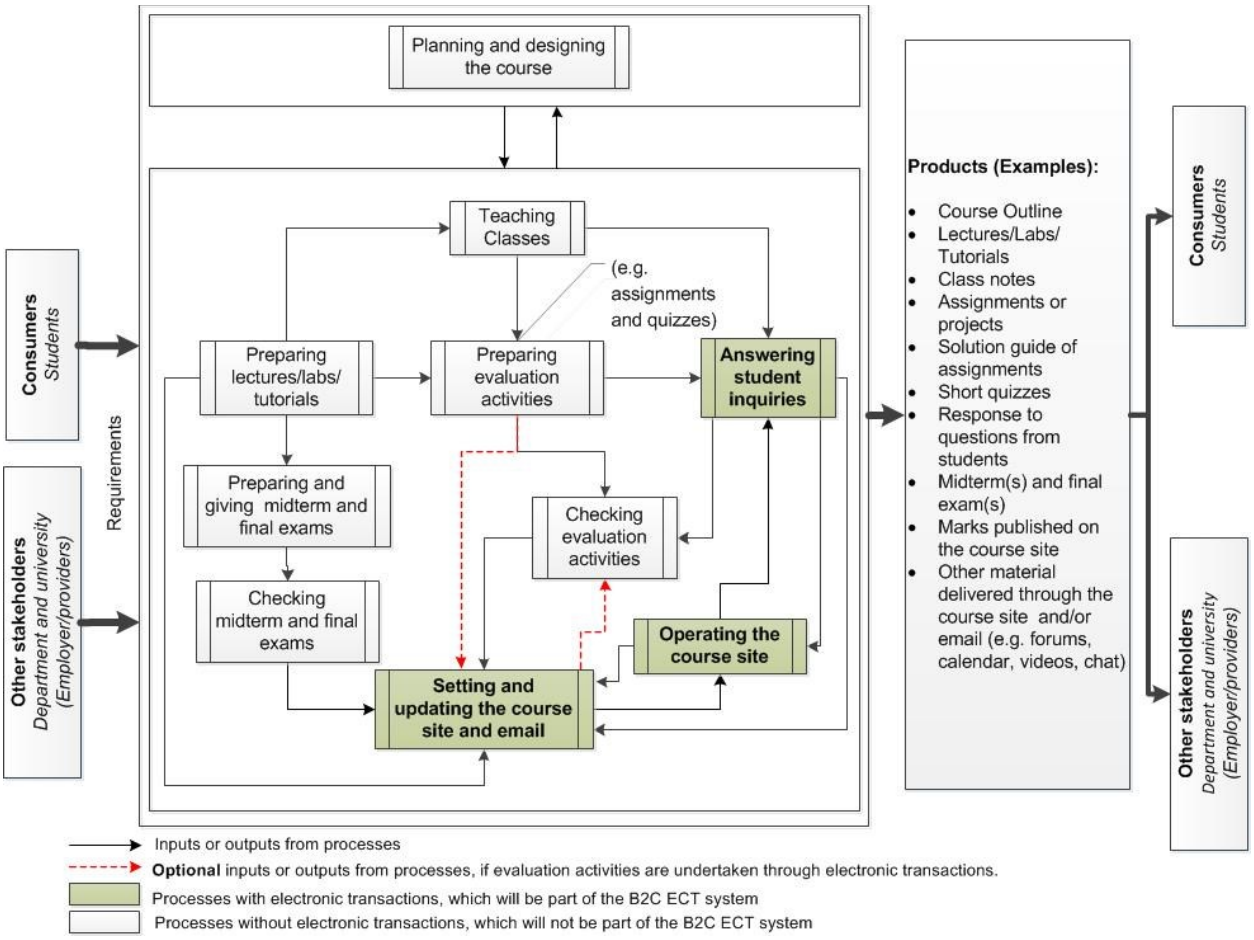

Figure 3.1 University Course Management System

3.3. Modeling the ISO 10008 standard in the B2C ECT system in a university course

This section explains how to apply the guidelines of ISO 10008:2013 in a university course, modeling through developing flowcharts, forms (Appendix B) and examples shown in the following subsections.

3.3.1. Establishing the B2C ECT system in a university course

Table 3.1 links the ISO 10008 concepts with the university course MS. It also represents the scope of the B2C ECT system applied in this research.

Table 3.1 ISO 10008 terms applied to the university course MS

Term (ISO 10008)	System (university course MS)
"B2C ECT" (Clause 3.1)	Part of a university course, which includes processes with electronic transactions to deliver course material through a website and/or email.
"Organization" (Clause 3.2)	Professor, teaching assistant(s) and other persons such as a researcher or research assistant, who are delivering a university course. In some cases, the organization could be the professor by herself or himself.
"Consumer" (Clause 3.3)	Students enrolled in the university course.
"Product" (Clause 3.4)	**Course Material delivered through a website and/or email.** For example: • Course outline • Lecture slides • Papers • Class notes • Assignments/projects/short quizzes. • Solution guides to assignments/projects/short quizzes • Responses to questions from students • Marks published on the course site • Glossary of the topics covered in the university course • Forums • Calendar • Videos • Chat • Sample midterm / final exam(s)
"B2C ECT Providers" (Clause 3.6)	• Information Technology department (e.g. Internet, network, account) • Technical support for the computer-based learning platform • Providers of equipment (computers and software used by professor/TA (e.g. Microsoft Office, Adobe Acrobat, Moodle)) • Providers of training in standards (e.g. ISO 10008, ISO/IEC 27001) and the computer-based learning platform (e.g. Moodle) • Library

3.3.1.1. Framework and Processes

Following Clause 5.1 of ISO 10008, the framework considered in this research consists of following phases: planning and design, development and implementation, maintenance and improvement in a university course (Figure 3.2). Based on the MS presented in Figure 3.1, the guidelines of the ISO 10008 standard and also the guidelines or requirements of ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001 to develop subsystems, Figure 3.2 shows the proposed framework for the B2C ECT system. Since ISO 10008 focuses on electronic transactions, the B2C ECT system concentrates on three processes previously mentioned in Figure 3.1 labelled in green color.

The new processes developed in the research that are labelled with red and green color are described in detail in Chapter 3, while the processes labelled in yellow color are further depicted in Chapter 4, since these processes have been developed as subsystems following other ISO 10000 customer satisfaction standards and the ISO/IEC 27001 standard for information security.

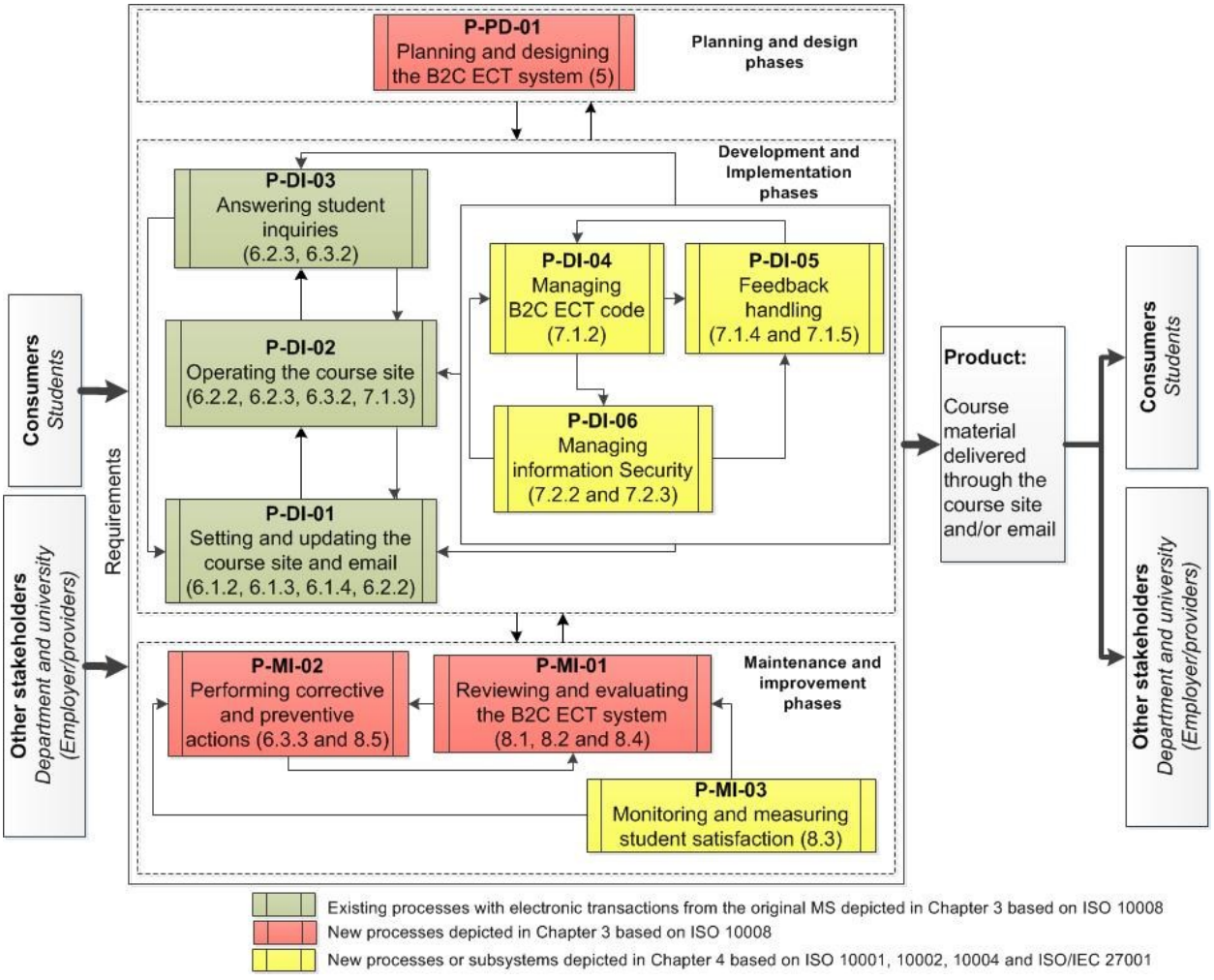

Figure 3.2 The B2C ECT System in a University Course

The processes shown in Figure 3.2 were identified with a unique code, starting with the letter “P” which stands for “Process”, followed by two letters in accordance with the associated phase of the B2C ECT system (e.g. “PD” for the “Planning and Design” phases) and ending with the correlative process number. Table B.1 in Appendix B contains these codes. Moreover, the numbers in brackets included in the processes represent the clauses of ISO 10008, indicating that these guidelines are covered in the designated processes. This is the manner of mapping of the MSS requirements against the B2C ECT system used in this research.

The planning and design phases of the B2C ECT system in a university course includes Clause 5 of ISO 10008, which is considered in the process labelled as P-PD-01.

The development and implementation phases of the B2C ECT system is carried out through Clauses 6 and 7 of ISO 10008, executing processes regarding: “Content creation” (Clause 6.1.2), “Content delivery” (Clause 6.1.3), “Content governance” (Clause 6.1.3), “Initial selection support” (Clause 6.2.2), “Consumer identification” (Clause 6.2.3), “Delivery” (Clause 6.3.2), “Consumer interaction” (Clauses 7.1.2 to 7.1.5) and “Consumer data management” (Clauses 7.2.2 and 7.2.3). These clauses are included in six processes defined in Figure 3.2. Three of them (P-DI-01, P-DI-02, P-DI-03) were previously identified in the university course MS (Figure 3.1), while the other three (P-DI-04, P-DI-05, P-DI-06) are new processes included to comply with ISO 10008.

The maintenance and improvement phases of the B2C ECT system have three processes: Reviewing and Evaluating the B2C ECT System (P-MI-01), incorporating Clauses 8.1, 8.2 and 8.4, Performing Corrective and Preventive Actions labelled as P-MI-02 (Clauses 6.3.3 and 8.5) and Monitoring and Measuring Student Satisfaction (Clause 8.3) called P-MI-03.

From the analysis of each process for the B2C ECT system presented in Clause 5.3.1 of ISO 10008, it was determined which processes should be applied in the university course MS. Five processes mentioned in the ISO 10008 standard were excluded. Since the scope of the system considers that students are already registered in the course, students do not need a final quote, or make a payment to the professor. They do not have the opportunity to return and exchange the product either. Therefore, the excluded processes are:

- “Final quote” (Clause 6.2.4), “Payment selection support” (Clause 6.2.5), “Payment authorization” (Clause 6.2.6) and “Order confirmation” (Clause 6.2.7), from the “In-transaction phase” (ISO, 2013a).
- “Return and exchange” (Clause 6.3.4), from the “Post-transaction phase” (ISO, 2013a).

ISO (2013a) defines three phases inside of a single-phase processes, called “Pre-transaction phase” (Clauses 6.1.2 to 6.1.3), “In-transaction phase” (Clauses 6.2.2 to 6.2.7) and “Post-transaction phase” (Clauses 6.3.2 to 6.3.3). The “Pre-transaction phase” is covered in the P-DI-01 process. The “In-transaction phase” is incorporated into the P-DI-02 and P-DI-03 processes. Finally, the “Post-transaction phase” is encompassed in three processes: P-DI-02, P-DI-03 and P-MI-02. Therefore, the “In-transaction”

and “post-transaction” phases share the P-DI-02 and P-DI-03 processes, since both include the “Initial selection support” (Clause 6.2.2) and “Delivery” (Clause 6.3.2) when students visit the course site to obtain the course material, or ask a question by email.

Furthermore, ISO 10008 identifies “Multi-phase processes”, which has two main processes called “Consumer interaction” (Clauses 7.1.2 to 7.1.5) and “Consumer data management” (Clauses 7.2.2 and 7.3.3) (ISO, 2013a). The first one is incorporated in the processes labelled as P-DI-02, P-DI-04 and P-DI-05. The second one is included in the Managing Information Security process (P-DI-06).

3.3.2. Planning and Designing of the B2C ECT System in a university Course

The P-PD-01 process contains the “Framework” (Clause 5.1), “Objectives” (Clause 5.2), “Processes” (Clause 5.3), “Resources” (Clause 5.4) and “Connectivity” (Clause 5.5) of ISO 10008.

The professor is considered as the “Top management” of the B2C ECT system. However, if this model is implemented by researchers, they could also be “Top management”. Therefore, the professor or researchers should gather and assess the needs and expectation of students, as well as academic regulations (Clause 5.1), establishing objectives and indicators for the B2C ECT system (Clause 5.2).

Furthermore, the professor determines processes and the resources needed to carry out the system to achieve the goals (Clause 5.4). Moreover, in this process is recommended to establish an “Internal and external communication plan” (Clause 5.4.4).

The activities to achieve the guidelines established in the clauses mentioned previously are defined in the flowchart in Figure 3.3.

The P-PD-01 process includes the use of four different forms, which were created to ease the incorporation of guidelines of Clause 5 of ISO 10008. The aim of the first form labelled as F-G-01 is to gather relevant information for planning (Appendix B.1). The F-G-02 form is for establishing the objectives and indicators of the B2C ECT system (Appendix B.2). The F-G-03 form is intended to determine the resources needed (Appendix B.3). The F-G-04 form is to create a communicational plan of the B2C ECT system in a university course (Appendix B.4).

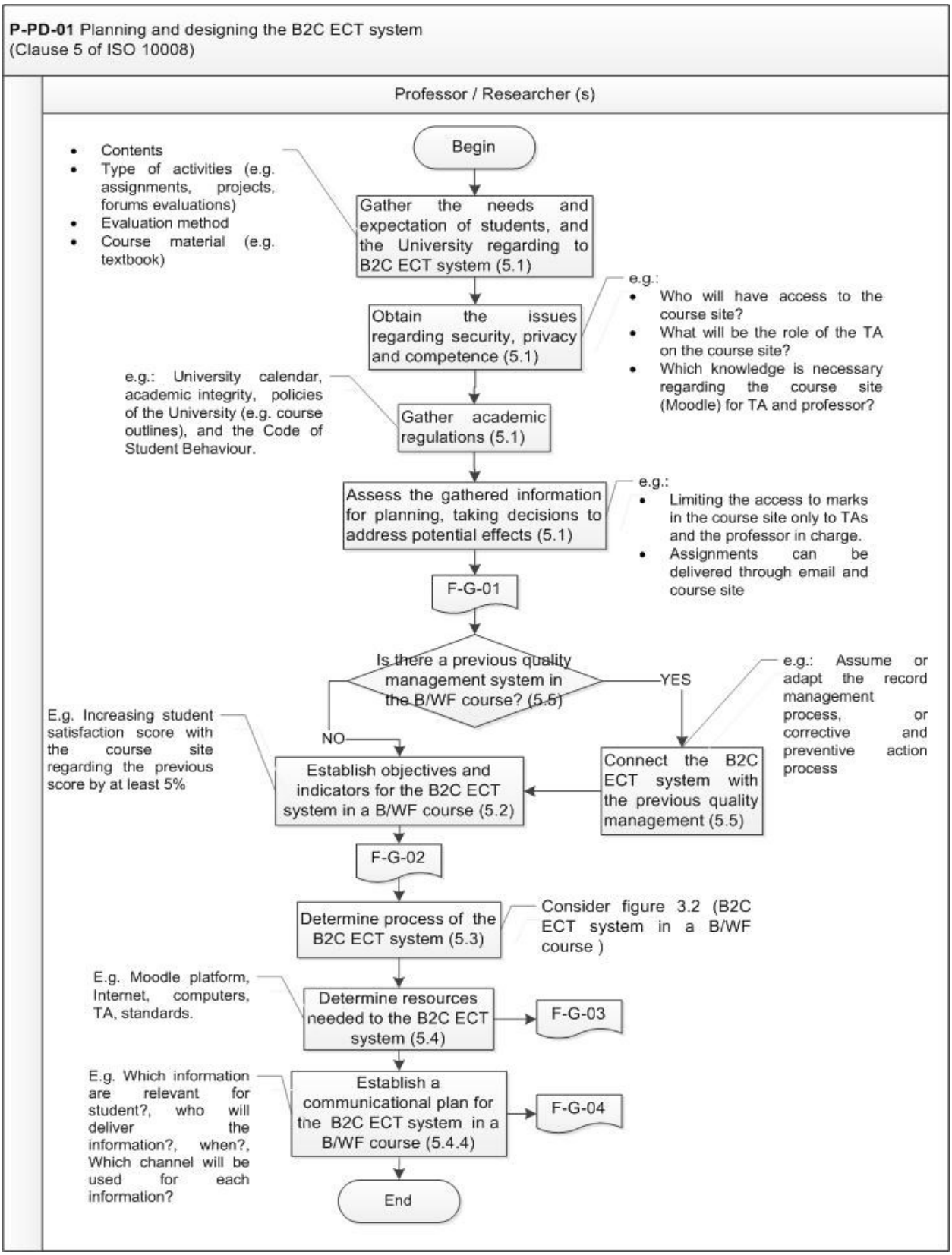

Figure 3.3 Planning and Designing the B2C ECT System (P-PD-01)

3.3.2.1. Information for planning and designing the B2C ECT system

The F-G-01 form considers four topics to gather information about the B2C ECT system in a university course based on Clause 5.1 of ISO 10008, regarding the needs and expectation of student and university, issues about the B2C ECT system (e.g. security and privacy) and relevant regulations and laws associated with the system (Table 3.2).

Table 3.2 Examples of information for planning and designing the B2C ECT system

Topic	Information for planning and designing	Actions
The needs and expectation of students, department and university	Students want to access the lectures slides before each class on the course site	Publishing lectures slides on the course site, at least one week before each class, in a PDF file. Creating a lecture section.
	What type of activities will be included on the course site?	• Assignments can be delivered through email and course site. • Including online quizzes on readings. • Student can contribute to glossary for the course.
	Students expect to have clear criteria for online evaluations	• Creating rubrics or marking schemes to use in online evaluations • Publishing rubrics or schemes
Obtain and assess the issues regarding security, privacy and competence.	Security and privacy of the published marks on the course site	Limiting the access to marks on the course site only to TAs and the professor teaching the university course.
	TA competence	Training TAs in managing the course site (computer-based learning platform), internal procedures and standards.
Academic regulations and associated laws	University calendar	Considering the calendar to establish deadlines for the evaluations and course activities, as well as holidays. Since this information is a part of the calendar and course outline published on the course site.
	Academic integrity and code of student behaviour	Advise the students of the main academic integrity regulations in the course outline and publications on the course site.
	The university policy for the course outlines	Incorporate all items defined in the university policy for the course outline, which is a product of the B2C ECT system in a university course.
	Ethical guidelines of the university for research	Consider privacy and security for students, records and limits to carry out activities in the course.
	Intellectual property law	Accomplish the regulation regarding intellectual property and copyright law in the projects or assignments delivered by students. Also in the information published by the professor on the course site (e.g. videos, links to webpages).
	Copyright law	

3.3.2.2. Objectives and resources

A B2C ETC system should define “objectives” and “indicators”, which should be aligned with the objectives of the university course (ISO, 2013a). Both objectives and indicators should be “SMART” (Specific, Measurable, Achievable, Relevant and Time-bound) (Shahin & Mahbod, 2007). The form labelled as F-G-02 has been created (Appendix B.2) based on the guidelines of Clause 5.2 of ISO 10008. Its aim is to help the professor in the objectives and indicators definition of the B2C ECT system.

Due to the objectives needing a continual revision, the form incorporates “Version Number” and “Revision Date” in order to maintain records of the changes in the term and also to provide for the change control of the form in the header. These have been incorporated in every form created for this thesis.

To determine the objectives and link them to stakeholders, F-G-02 incorporates three fields:

- **Objective:** statement or description of the objective**.**
- **Category:** links the objective with the category. The defined categories are: product, participation, satisfaction, security and continual improvement. An objective can be categorized in more than one group.
- **Target stakeholder:** links the objective with the stakeholder. Stakeholders can be students, professor, teaching assistants, the department or the university.

Examples of objectives are presented in Table 3.3, while indicators are given in Table 3.4. The aim is to give ideas on how to formulate objectives and indicators for the B2C ECT system in a university course. Furthermore, other examples of indicators are shown in Tables 4.4, 4.9, 4.12 and 4.20.

Table 3.3 Examples of objectives

Objective	Category	Target Stakeholder
Publishing the lecture slides on the course site previous to the class at least at 95% of the time	Product/Security (availability)	Students
Answering at least 90% of emails within the promised time	Product	Students
Publishing 100% of the assignments on the course site at the promised time	Product/Security (availability)	Students
Publishing the marks on the course site at the promised time, at least at 80% of the time	Product/Security (availability)	Students
Achieving at least 50% of student’s participation on the forums during the term	Participation	Professor
Increasing student satisfaction score with the course site regarding the previous score by at least 5%	Satisfaction	Professor / students
Implementing at least 70% of the identified improvements in the B2C ECT system during the term	Continual improvement	Professor

Table 3.3 Examples of objectives (continued)

Objective	Category	Target Stakeholder
Resolving at least 80% of the received complaints during the term	Continual improvement /Satisfaction	Students
Maintaining the operational course site during the term	Security (availability)	Professor / students
Answering at least 90% of the received feedbacks during the term within 48 hours	Continual improvement /Satisfaction	Students

The F-G-02 form incorporates six fields to facilitate the indicators definition, establishing formula, goal, justification of the goal, person responsible and frequency to measure these indicators:

Indicator: name of the indicator, which should be descriptive of what it is measuring.
Formula/description: when the indicator is quantitative, then a formula should be defined to be measured (e.g. (number of answers within 48 hours in the term/ number of received inquiries in the term)*100).When the indicator is qualitative, then a description is necessary (e.g. student engagement in activities on the course site such as forum during the term). The formula should consider any time limit (e.g. duration of the term).
Goal: it is the specific number, range or characteristic that represents the desired outcome of the indicator (e.g.>= 80%)
Justification of the goal: it is an explanation about the established number or description for the goal (e.g.it was set at 80, due to the risk regarding having problems with the operability of the course site or issues with access to the Internet).
Person responsible to measure: the person in charge, which is responsible to measure the indicator. In this system could be the professor, teaching assistant or researchers.
Frequency: it is the periodicity to measure the indicator, e.g. weekly, monthly, after a specific event.

Table 3.4 Examples of indicators

Indicator	Formula	Goal	Justification of the goal	Person responsible to measure	Frequency
Percentage of lecture slides published on the course site which are downloadable by students	(Numbers of lectures published on the course site during the term which are downloadable by students/ Number of lectures in the term) *100	>=95 %	It was set at 95%, due to the risk regarding having problems with the operability of the course site or issues with access to the Internet.	Professor	Weekly
Percentage of emails answered in the promised time	(Number of emails answered within the promised time in the term t/ Number of received emails in term t) *100	>=90 %	It was set at 90%, due to the risk regarding issues with access to the Internet, or lack of time of the professor in certain busy periods, or a huge number of emails received in a short time. Furthermore, for the first time of the implementation of this kind of a promise, the professor should set process to answer on time and there is a probability that some mistakes would be performed.	Professor	Weekly
Percentage of the marks published on the course site at the promised time	(Number of marks published on the course site at the promised time in the term t/ Number of marks in term t) *100	>=80 %	It was set in at least 80%, due to risk regarding issues with access to the Internet, or lack of time of the professor or teaching assistants in certain busy periods.	Teaching Assistant	After each score
Percentage of students´ participating on forums	(Number of students who have participated in forums during the term t/ Number of students in the term t) *100	>= 50%	If the forum activity is not mandatory for the students. Then a participation of half of students is a good number. This activity has the purpose of delivering more discussion about topics of the course, giving the chance to increase the student's understanding.	Professor	Monthly
Percentage of implemented improvements in the B2C ECT system	(Number of implemented improvements in the B2C ECT system in the term t/ Number of detected improvements in the B2C ECT system in the term t) *100	>= 70%	A 70% of implemented improvement has been set due to risk regarding the resources needed for their implementation could be not available, since these could be provided for the University, then the professor does not have total control.	Professor	Monthly

ISO (2013a) points out that the resources required for each phase of the B2C ECT system should be determined. The referred phases are planning, designing, implementation, maintaining and improvement system (ISO, 2013a).

The professor, teaching assistant(s) and/or researcher(s) included in the B2C ECT system for a university course should be trained in topics such as: customer satisfaction, considering the ISO 10000 family of standards (ISO 10001, ISO 10002, ISO 10004 and ISO 10008), information security (ISO/IEC 27001), how to manage the course site (a computer-based learning platform such as Moodle, regarding activities such as: “forum”, “assignments”, “chat”, “feedback”, “marks”, “calendar”), software (e.g. Word, Excel, video editors, Adobe Acrobat), developed procedures and other specific requirements for each course. To achieve the necessary competence, training could be done through the following proposed activities:

- Self-training or taking courses on the international standards needed.
- The professor teaching the university course or researchers could train other providers (e.g. TA) regarding internal procedures, standards, or software.
- Taking courses on the computer-based learning platform (e.g. Moodle) at a university or through online resources (e.g. videos on YouTube).

ISO 10008 refers to providers as an external person or organization (ISO, 2013a). The providers of a university course were identified in Table 3.1. This system does not have financial intermediaries, since the system does not consider online payments.

The form called F-G-03 (Appendix B.3) has been developed to help identify the resources needed and providers of the B2C ECT system based on Clause 5.2 of ISO 10008. Five categories of resources have been identified: human resources, monetary resources, training, infrastructure and others. Furthermore, F-G-03 includes the phase in which each resource should be required (P: planning, D: designing, I: implementation, M&I: maintaining and improvement) and the role of each provider in the B2C ECT system. Tables 3.5 and 3.6 present examples of the resources needed and providers to the B2C ECT system in a university course.

Table 3.5 Example of resources needed

Resources		Phase[1]			
		P	D	I	M&I
Human Resources	Professor	X	X	X	X
	Teaching assistant(s)			X	X
	Researchers	X	X	X	X
Monetary Resources	Salary of teaching assistant(s)			X	X
	Money to buy compensations (e.g. cinema ticket, chocolates, snacks)			X	
	Money to pay for the standards (ISO 10008, ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001)	X			
Training	Standard courses (e.g. ISO 10008, ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001)	X			
	Computer-based learning platform courses (e.g. Moodle courses with free cost in the university or online courses)	X	X		
	Training procedures			X	
Infrastructure	Computers	X	X	X	X
	The Internet	X	X	X	X
	The course site (computer-based learning platform)	X	X	X	X
	Printer	X	X	X	X
Others	ISO 10001, ISO 10002, ISO 10004, ISO 10008, and ISO/IEC 27001 (standards document)	X	X	X	X
	Emails			X	X
	Software (e.g. Word, Excel, Adobe Acrobat)				
	Office material (e.g. papers, stapler)	X	X	X	X

1: P: planning, D: designing, I: implementation, M&I: maintaining and improvement.

Table 3.6 Example of B2C ECT providers and roles

Provider	Activities and roles
Information technology Department	• Provide access to the computer-based learning platform to create the course site • Provide the Internet and computer maintenance • Access to some software needed, email and username to the network of the university
Technical support for the computer-based learning platform.	• Answer any question regarding the computer-based learning platforms, which could be managed by the technical support team. • Training on how to manage the computer-based learning platform, how to create some activities such as: forum, glossary, calendar, marks, feedback, chat, exams online and assignments online
Providers of equipment	Stores, where the professor buys some equipment needed, such as computers and software
Providers of training	Offer the training in different topics needed. In some cases, it can be the technical support for the computer-based learning platform, or a consultant for standards
Library	Provide access to the library website to access to many bibliographies needed for the course

Procedures should be developed for each phase of the B2C ECT system, which must consider applicable statutory and regulatory requirements (ISO, 2013a). For this research, included flowcharts are considered as the procedures for the system. However, each course or professor could need other procedures to be developed, or in some case these flowcharts could be modified according to the needs.

3.3.2.3. Communication plan

Clause 5.4.4 recommends having an "Internal and external communication plan" (ISO, 2013a). It could be developed to include topics such as: promises, feedbacks, code performance, changes on products and regular communications between professor and students. Moreover, it should consider the students, the department, the university and providers as external stakeholders. The teaching assistants or researchers should be considered as internal stakeholders when applicable.

This plan should include all relevant information to communicate topics such as the course outline, exams, assignments, lectures, marks, code's performance, feedbacks, surveys and information security procedures.

The F-G-04 form includes the identification of objectives, constraints, assumptions, risks, target audiences, communication channels, tools and formats, frequency and the person responsible for the communication. Tables 3.7 to 3.9show examples of a communication plan for the B2C ECT system.

Table 3.7 Example of objectives for a communication plan.

Objective	Target
Having an effective communication regarding the information delivered on the course E-Class site.	Professor, teaching assistants and students
Reducing duplication of effort, avoiding misunderstanding in the information delivered through the course site	Professor, teaching assistants and researchers

Table 3.8 Example of issues for a communication plan.

Issues	
Constraints	The university course has different communication channels such as: classroom, the course site and email. Therefore, messages are delivered using several channels.
Assumptions	• Good communication and relationships among the professor, teaching assistant(s) and/or researchers. • Students visit the course site constantly, then they can access to announcements. • Students review their university email address. • The course site and email are operating. • All students, the professor and teaching assistant(s) have access to the Internet.
Risks	• Students do not read an important message, due to the fact that they do not check the course site or their email. • There is not consistency in a message in different communication channels, provoking misunderstandings among students. • Different messages are delivered to students by the professor and teaching assistants, due to the lack of communication between them.

Table 3.9 Example of a communication plan.

Message	Stakeholder Name	Person responsible	Channel(s)	Tools and formats	Frequency
Announcement about midterm and exams	• Students • Teaching assistant	Professor	The course site and/or Email	Message through a forum and/or email	Before the midterm and exam (preferably one week in advance)
Response to questions from students directed to the professor	• Students • Teaching assistant (for general answers)				When the question is answered
Response to questions from students directed to the teaching assistant	• Students • Professor (for answers not provided by the TA)	Teaching assistant or Professor	Email	Message through email	
Lecture files	Students	Professor	The course site	PDF file	One week in advance of each lecture
Course Outline file	• Students • Teaching assistant				On the day of the first class and update when there is some change during the term.
Course Outline tab				"Tab display" of the course site	
Assignment(s)	Students	Teaching Assistant(s)		PDF file	Two weeks before the due date.
Solution guide to assignment					On the day of due to for each assignment, after the time of submission
Assignment marks	• Students • The professor			Excel file or database of the course site	One week after the due date.
Midterm/exam marks	• Students • The professor	Professor		Excel file or database of course site	One week after of the midterm or exam.

3.3.2.4. Connectivity

Clause 5.5 "Connectivity" notes that the B2C ECT system should incorporate the elements established on "the quality management system (QMS) of the organization" when it is in place (ISO, 2013a). Therefore, if ISO 10008 is implemented in a university course, which already had applied a QMS, elements such as corrective actions, document and record control, policy, customer satisfaction measurement should be assumed or adapted to the new B2C ECT system. If there is no connectivity between the QMS and the B2C ECT system, these can provoke more bureaucracy, more efforts and misunderstandings of the

procedures in place. For instance, if the QMS has its record management process, which establishes that records must be kept at least for five years, but the new B2C ECT system establishes that its records will be kept for only two years, then both systems do not have congruence. This clause is addressed in the P-PD-01 process, by including a list of activities that establish the relationship between the B2C ECT system and the QMS (Figure 3.4 middle).

3.3.3. Development and implementation of the B2C ECT system in a university course

The development and implementation phase of the B2C ECT system has six processes, three of them (P-DI-01, P-DI-02, P-DI-03) are explained in Chapter 3, while the other three (P-DI-04, P-DI-05, P-DI-06) are shown in Chapter 4.

3.3.3.1. Setting and Updating the Course Site and Email

The "Pre-transaction phase" in the ISO 10008 standard (Clause 6.1) covers three sub-processes to be implemented before having contact with the student ("Content creation" (Clause 6.1.2), "Content delivery" (Clause 6.1.3) and "Content governance" (Clause 6.1.4) (ISO, 2013a)). These sub-processes have been developed in the Setting and Updating the Course Site and Email process (P-DI-01) depicted in Figure 3.4. The P-DI-01 process includes a form labelled F-SP-01 (Appendix B.5), which were created following the guidelines of Clauses 6.1.2, 6.1.3 and 6.1.4 in order to ease the work of the professor in complying with ISO 10008. F-SP-01 contains four relevant sections as explained later.

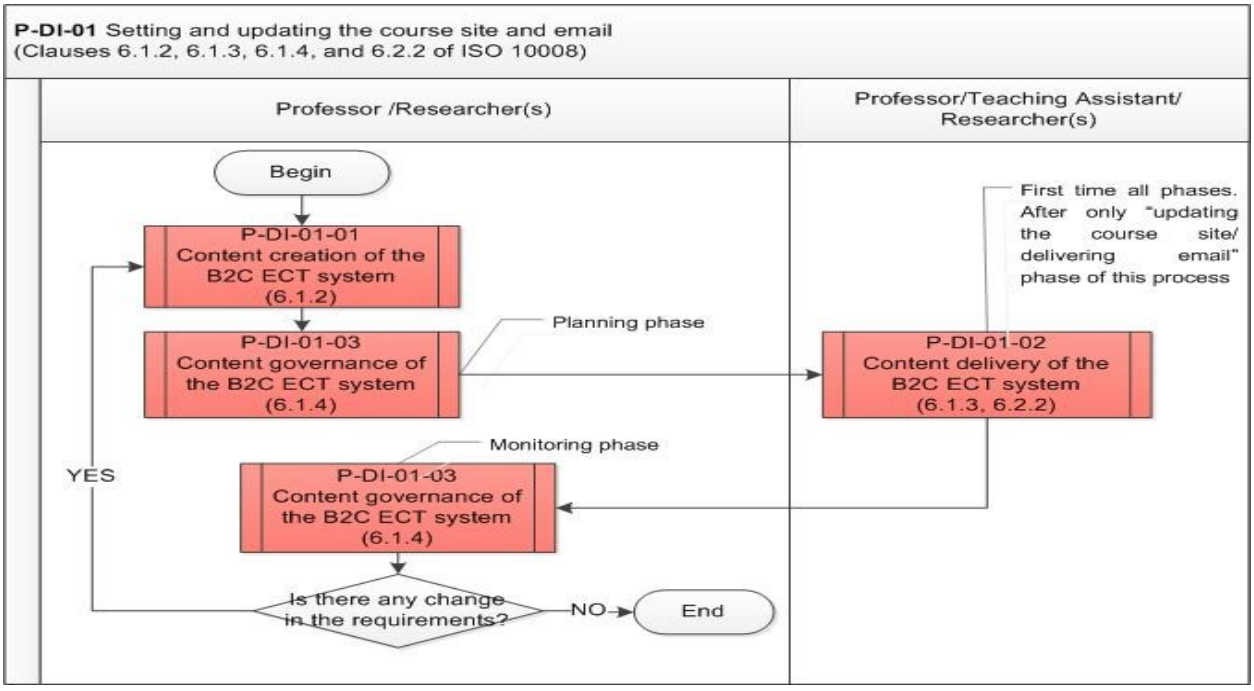

Figure 3.4 Setting and Updating the Course Site and Email (P-DI-01)

The “Content creation of the B2C ECT system” sub-process (P-DI-01-01) identifies the essential information for planning the course site and email delivery (Figure 3.5). In this sub-process, the professor should consider the requirements from all stakeholders of the B2C ECT system, such as students, teaching assistant(s), the department, the university, government (laws and regulations, e.g. intellectual property law, copyright law) and providers and his/her own requirements.

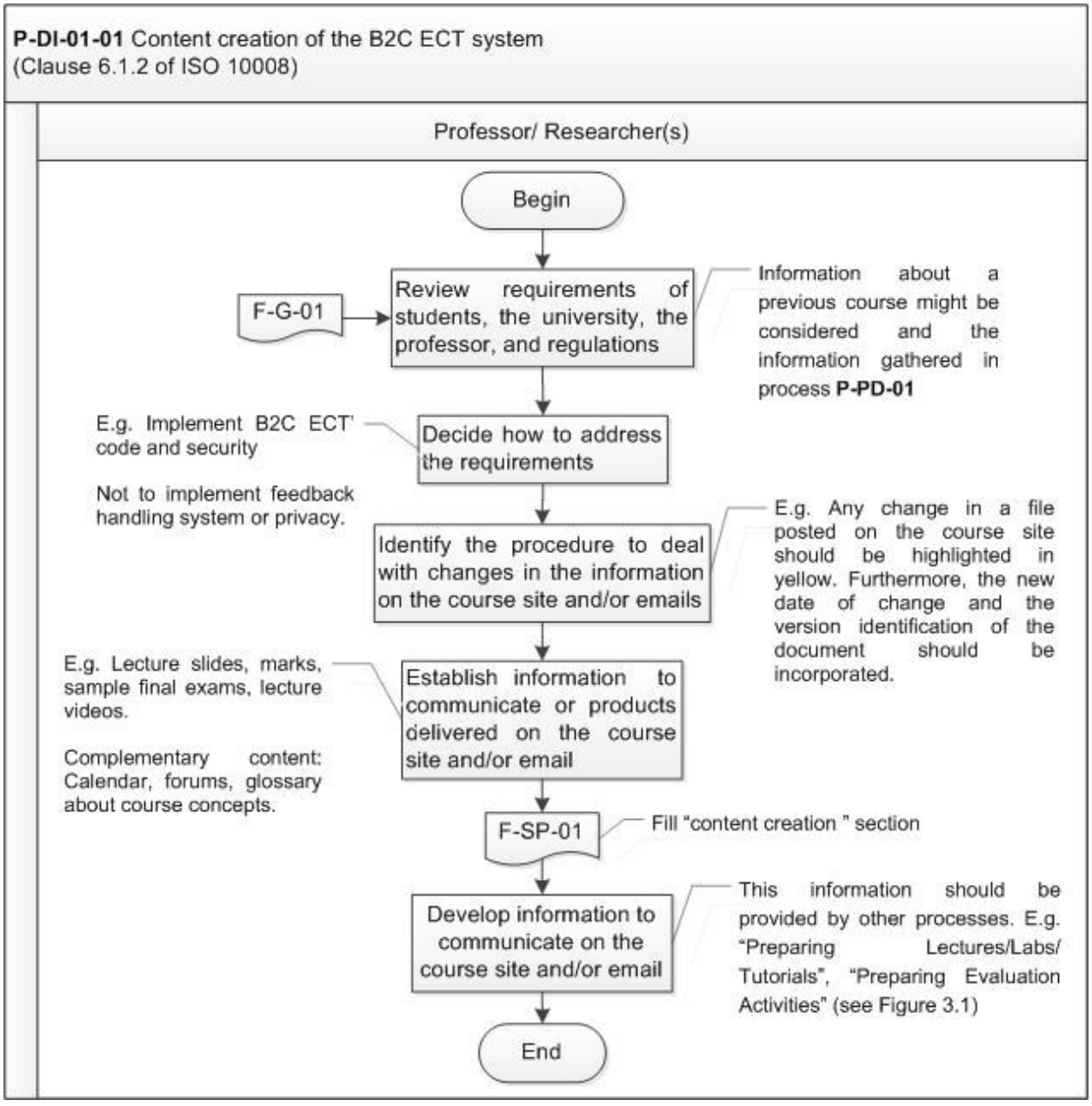

Figure 3.5 Content Creation of the B2C ECT System (P-DI-01-01)

The first and second sections of the F-SP-01 form refer to issues of content creation (Clause 6.1.2). The first section is about specific elements of ISO 10008. Since the B2C ECT system model offers the possibility that each professor selects the elements of this standard to be implemented (Table 3.10), as such decisions have an impact on the content of the course site and emails.

Table 3.10 Example of selecting elements of ISO 10008 to be implemented

Objectives and indicators of the B2C ECT system	Yes	No
B2C ECT code (ISO 10001)	Yes	No
Student support (in order to assist students in using the course site)	Yes	No
Feedback Handling process (ISO 10002) (including complaints)	Yes	No
Determine the satisfaction of students with the system (ISO 10004)	Yes	No
Information Security (ISO 27001)	Yes	No
Review of the B2C ECT system	Yes	No
The privacy policy (based on the University's policy)	Yes	No
Display days and hours of operation and contact information	Yes	No

The second section of F-SP-01 starts with the identification of products delivered electronically (Table 3.11, e.g. lectures slides). Moreover, it includes the option to choose between several complementary content items based on the resources available in a computer-based learning platform as Moodle and other general content items for a course (Table 3.12). Furthermore, this section incorporates the identification of an approach to deal with changes in the information (Table 3.13).

Table 3.11 Example of B2C ECT products

Products	**Delivery Methods**
Lecture slides, assignments, assignment solution guide, supporting material, sample exams, class notes, published marks, lecture videos	Course site
Course outline, answers to students	Email and course site

Table 3.12 Example of identifying complementary content

Complementary content		
"Calendar" with a plan of lectures, as well as assignment and other course deadlines	Yes	No
"Grade report" with the current weight of each component	Yes	No
"Glossary" with important concepts and acronyms of the course	Yes	No
"Quiz" used to take online short quizzes, midterms or exams to students	Yes	No
"Sample Exam" used to give examples of exams to students	Yes	No
"Assignment", giving the instructions of assignments, as well as students submission through the course site.	Yes	No
"Tutorials", section to show videos or instructions to use different sections or resources on the course site, or other topics.	Yes	No
"Product catalog", which explains the content, deadline and other characteristics of products and tools provided through the course site	Yes	No

Table 3.13 Example of the approach to changes in the information

Delivery methods	Actions
Course site	Any change in a file posted on the course site should be highlighted in yellow. Furthermore, the new date of change and the version identification of the document should be incorporated.
	If a student drops the course, then the professor must deny her/his access to the course site.
Course site or email	A new email or announcement should be delivered emphasizing the changes of the message, when these occur.

The P-DI-01-02 refers to the formats which will be used for electronic transactions in the course, the communication channels which will be incorporated and the resources needed for the course site and email delivery.

Clause 6.1.3 implies that the information should be accessed by the majority of the students (ISO, 2013a). Therefore an idea to improve accessibility is to record lectures given in the classroom and publish them on the course site to help students with special needs, part time, international or ill students. A good practice is the creation of some modules to facilitate the accessibility to persons with visual impairment developed in a university of Brazil (Ulbritcht et al., 2012).

The professor should identify communication channels (e.g. the course website, email, messages by phone, social webpages) with their students and be aware about the impact of them in student satisfaction. The system developed in this thesis includes two communication channels with electronic transactions: the course website and email.

Figure 3.6 illustrates the P-DI-01-02 sub-process, which was created following the guidelines of Clauses 6.1.3 and 6.2.2 of ISO 10008 and the use of a computer-based learning platform as Moodle.

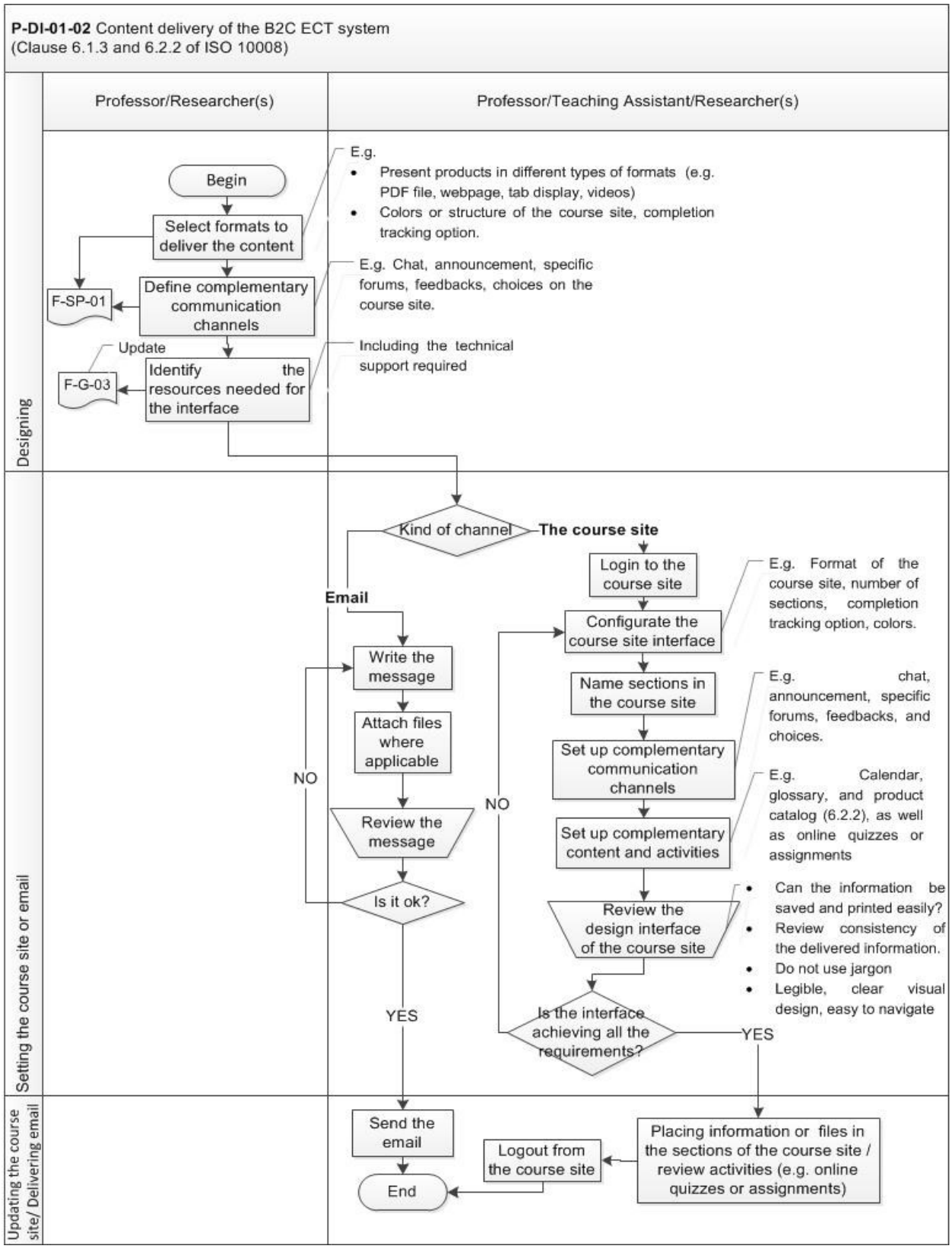

Figure 3.6 Content Delivery of the B2C ECT System (P-DI-01-02)

The third section of F-SP-01 encloses issues of the content delivery, giving choices of formats (Table 3.14) and communication channels on the course site based on the resources available in a computer-based learning platform as Moodle (Table 3.15).

Table 3.14 Example of formats to deliver the content.

Present products or information (e.g. outline, lecture slides and assignments) in different kinds of format (e.g. PDF file, "Page", "Tab display", videos)	Yes	No
Set the contact information at the beginning of the course site	Yes	No
Choose or change the color or other characteristics regarding format on the course site	Yes	No
Have the option of tracking completion on the course site	Yes	No

Table 3.15 Example of complementary channels.

Complementary communication channels		
"Announcement" (forum) on the course site, publishing news to all students, sending an email too.	Yes	No
"Specific forums", refer to forums on the course site regarding specific topics (e.g. midterm, Chapter 1, assignments).	Yes	No
"Feedback" on the course site**,** obtaining the opinion from students during the term to improve the course.	Yes	No
"Choices" on the course site (kind of survey), for asking a single question and offer a selection of possible responses to student about their preferences in any specific subject. For example, a schedule of the TA office hours, choose a team or subject.	Yes	No
"Chat" on the course site**,** enables participants to have text-based, real-time synchronous discussions. It would be another channel of communication with students, available in specific periods to answer questions to students as "office hours".	Yes	No

The P-DI-01-03 sub-process includes how to manage a continually updated of the information. It includes appointing persons responsible and establishing guidance for them. Furthermore, .the P-DI-01-03 sub-process includes the determination of guidelines for record management and control of changes in the content of the course site or information sent by email.

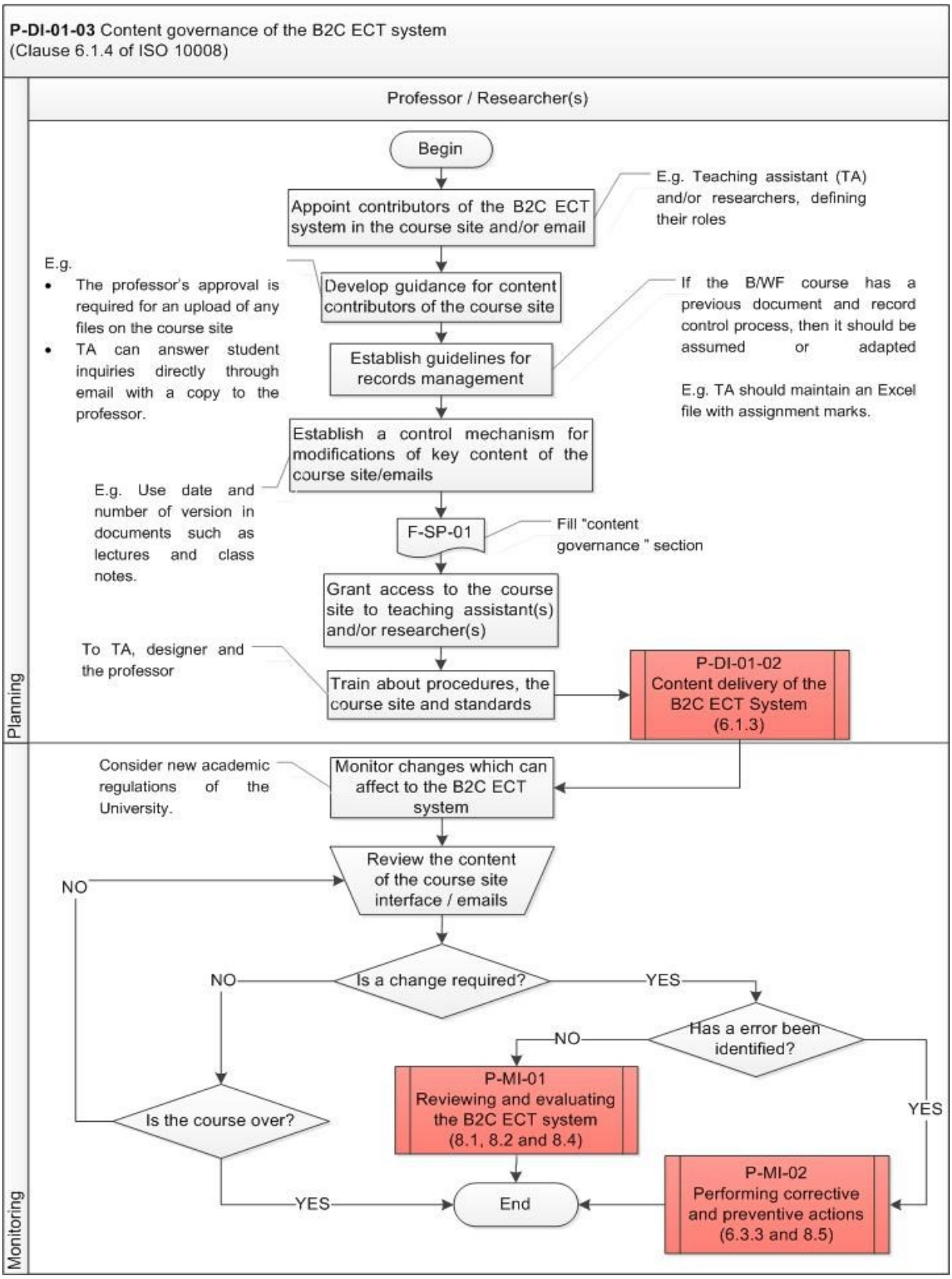

Figure 3.7 Content Governance of the B2C ECT System (P-DI-01-03)

The last section of F-SP-01 form includes queries about content governance (Clause 6.1.4), with the aim to appoint the person responsible for managing the course site and or email (Table 3.16). This determines guidelines for contributors of the course site or emails (Table 3.17) and records management (Table 3.18), as well as establishing a control mechanism for modifications of key content (Table 3.19).

Proposed tools for appointing the person responsible to update the information are included in the communication plan made through the F-G-04 form (see the field "person responsible" in Table 3.9) and the section "content governance" in the F-SP-01form (see Table 3.16).

Table 3.16 Example of appointing the contributors.

Name	Role	Main responsibilities or task (content contributions)
Teaching assistant	Editor of the course site, with access to all information.	• Uploading files about assignment (e.g. assignment and assignment solutions) • Publishing marks regarding assignments and short quizzes • Managing forums about assignments. • Answering the course chat during office hours.
Professor	Administrator of the course site, full access to the information.	• Planning and designing the course site and the B2C ECT system. • Checking all published information on the course site. • Checking the consistency of the delivered information. • Uploading lectures, class notes, sample exams and online learning tools files. • Managing announcements to students.
Researcher	Designer, with limited access to the information (e.g. not have access to marks or students list).	• Publishing information about the specific subsystems such as survey reports and feedback forms. • Setting up new activities in the course, such as: calendar, feedback, surveys, tracking of the activities, forum, chat and format of the course site (interface).

The consistency in the provision of information to students across the university course is very relevant. Therefore, the professor should establish guidance for content contributors, in this case for the teaching assistant and/or researchers whatever is the case.

Table 3.17 Example of determining guidelines for content contributors.

Actions	Guidelines
Uploading of any files on the course site	Professor's approval is required
Performing changes in the design of the course site.	
Answering student inquiries through email by teaching assistants	Email answer to students with copy to the professor
Performing assigned tasks	• Follow the assigned tasks (see Table 3.16) and any instructions given through email • Consider the deadlines promised to deliver the information on the course site

Guidelines for records management can be established through F-SP-01 form (see Table 3.18). Furthermore, the Managing Information Security process (P-DI-05) identifies the information asset inventory for the B2C ECT system in a university course, which considers storage, retention and disposition of the information (Table 4.23). In the case that the university course already has an implemented QMS, which includes a document and record control process, then the B2C ECT system should assume or adapt the process already in place.

Table 3.18 Example of establishing guidelines for records management.

Person responsible	Actions
Teaching assistants	Maintaining the records of the marks published on the course site (e.g. data about marks of each assignment and their changes). Before uploading the score for each item, an email with the score in an Excel file should be sent to the professor, who keeps these records.
Professor and Teaching assistants	Maintain each version of the documents published on the course site in hidden mode. Only the last version should be shown to students. However, the former files should not be deleted to track the changes of the documents.

The professor should constantly check any change which affects the contents of the university course and undertake the modifications necessary to the system. Furthermore, surveys might be developed to ask students about the interface on the course site.

Table 3.19 Example of control mechanism for modifications.

Change	Actions
Publishing any product on the course site	Professor's approval needed previously
Modification in a published file	The changes are identified through a yellow font and also with the date and number of the version.

The F-SP-01 form is an optional tool to be applied by the professor. In other words, the professor could take decisions regarding content creation, content delivery and content governance without using the proposed form. However, the professor should consider such issues required by ISO 10008.

The initial selection support process (Clause 6.2.2) has as the main aim the provision of the necessary information for purchasing products (ISO, 2013a). Some of these guidelines are not applicable to the B2C ECT system in a university course, since it does not sell a tangible product. The applicable guidelines could be: *"identify the exact product or products that the consumer has an initial interest in purchasing…"* (Letter (a) of Clause 6.2.2) and "…expected delivery;" (letter (c) of Clause 6.2.2).

To achieve these requirements, a product catalog might provide a good alternative solution. The professor should develop a catalog, showing each product included on the course site. This catalog should include information such as product names, characteristics or descriptions, photos to show what

the products available on the course site look like and the provision date. It could be developed on the course site in a Moodle “Page” resource, Moodle “Tab display” resource, PDF file, power point file or video. In order to help in obtaining the information necessary for the product catalog, the F-SP-02 form was created (Appendix B.6). Furthermore, Table 3.20 shows an example of such information.

Table 3.20 Example of the required information for a product catalog.

#	Product (Name)	Description	Format	Section on the course site	Provision date
1	Course Outline	The course outline contains general information, schedule, evaluations and rules in the course. Every student should read this information, since it is the general plan of the course.	• PDF file on the course site • A “Tab display” on the course site	Course Outline	On the day of the first class and update when there is some change during the term.
2	Lecture Slides	Lecture slides have the content of each lecture in the course.	PDF file	Lectures	Since first Class, publishing two lectures in advance
3	Assignment	Assignment contains the text of each problem to solve in the assignment.	PDF file	Assignments	Two weeks before due to

The professor should create the product catalog on the course site through the P-DI-01 process, specifically, in the P-DI-01-02 sub-process (Figure 3.6). Then students could review the product catalog any time, obtaining the initial selection support through the Operating the Course Site process.

3.3.3.2. Operating the Course Site

The Operating the Course Site process labelled as P-DI-02 includes the guidelines of Clauses 6.2.2 (“Selection support”, see Section 3.3.1.1), 6.2.3 (“Consumer identification”), 6.3.2 (“Delivery”) and 7.1.3 (“Consumer support”) of ISO 10008. Therefore, a flowchart was developed identifying or adding these clauses in the regular process, in which students have a unique role when interacting with the course site.

Clause 6.2.3 refers to soliciting information when a consumer purchases a product through an electronic transaction. In this system, there is no purchase of material products. However, there is a series of electronic transactions through the course page and email. Therefore, the consumer identification is applicable when students access the course site through the P-DI-02 process. Also, in the P-DI-03 process when students use their email address or the course site to send questions.

If a professor creates his/her own website or course site, which is open only to the students, then the site should have a login to access it. In the case that the professor adopts an implemented computer-

based learning platform in the university, the “Consumer identification” activities would be managed by a provider such as the Information Technology Department.

In any case, a student should have a unique identification. Data for identification should include first name, last name, student number and email address. The collection of this information should include mandatory (e.g. student email address) and optional fields (e.g. student photo), which the students must be informed about. The collected information should comply with the privacy and security policies (see Section 4.5). Therefore, students should be informed about the use of their personal data (e.g. the professor can explain that the student list with names and emails is available on the course site, that any student, teaching assistant or professor registered on the site can see this information and that students can configure their profile on the course site to protect some information (e.g. email address)). Also, when their “consent” is required it should be solicited plainly (Clauses 4.10 and 6.2.3, ISO 10008).

Clause 6.3.2 “Delivery” requires the protection of the product while it is delivered. Since in this case, the products are information, then special care should be given to the files format. For protecting the products delivered through the course site or email such as files of the lectures, course outline, assignments or projects, solution guide to assignments, the PDF format or the PPSX format (power point show) should be used to avoid student alterations of the published information.

Since the university course MS includes electronic transaction and also face to face transaction, a combination of the delivery methods could be used, giving more options to students. Depending of characteristic of each product, for example, lectures can be delivered through the course site, but also in printed version delivered in the classroom. Also, marks can be reported on the course site and also delivered in the classroom. Although the B2C ECT system of this research does not include the actions in the classroom, the professor should keep the concordance between both types of transactions.

Regarding tracking the product deliveries on the course site, a system of tracking could be included. A “completed delivery” would be when students read the file or perform the activity published on the course site. Moodle includes the “completion tracking” feature, where the professor can set up different conditions for the completion of an activity or course completion. Then activities can be marked as “completed” manually by students, or based on the conditions set by the professor. In this system, the tracking of the marks delivery, especially when quizzes, assignments or exams are returned to students, could be crucial. An example of keeping track of the deliveries is found in a blended course in the Pontifícia Universidade Católica do Rio de Janeiro, where the system included functions to manage the course, with professors who *“…can keep track of which and when contents are used by students, the grades and statistical data on assessment, students who are missing activities and aggregated data on forums.”* (Pavani & Temporão, 2014).

To maintain dispatch records, the professor could use reports from the course site regarding publications on the course site, or the “print screen” feature when the information or products were delivered through the course site. When products are delivered through email, the emails themselves should be maintained as dispatch records.

The “Consumer support” clause of ISO 10008 (7.1.3) requires giving assistance to consumer for undertaking electronic transactions. Therefore, the professor or the teaching assistants should assist students to undertake electronic transactions in the B2C ECT system in a university course, for example:

- Creating section on the course site called “Course site support section”, including contact data for and links to the course site team support of the university and videos. These links and videos can be regarding instructions on how to use the course site, how to send assignments through the course site, how to participate in forums, how to have contact with the professor or TAs through the course site, as well as how to send feedbacks, review their marks and configure their profile on the course site (security and others). If this support resource is available in the university, then the professor only should adopt it.
- Posting flowcharts with some basic procedures related to sending feedback and submitting assignments or projects.
- Explaining in the classroom the main available sections or tools on the course site.
- Answering email with any technical question regarding the course site.
- Assisting during office hours to give face support if it is necessary.

Furthermore, when the professor is using a computer-based learning platform implemented at the university, students normally have access to technical support from the information technology department as well. Therefore, this resource could be used in the B2C ECT system in a university course.

Figure 3.8 illustrates the Operating the Course Site process, including the clauses of ISO 10008 previously mentioned.

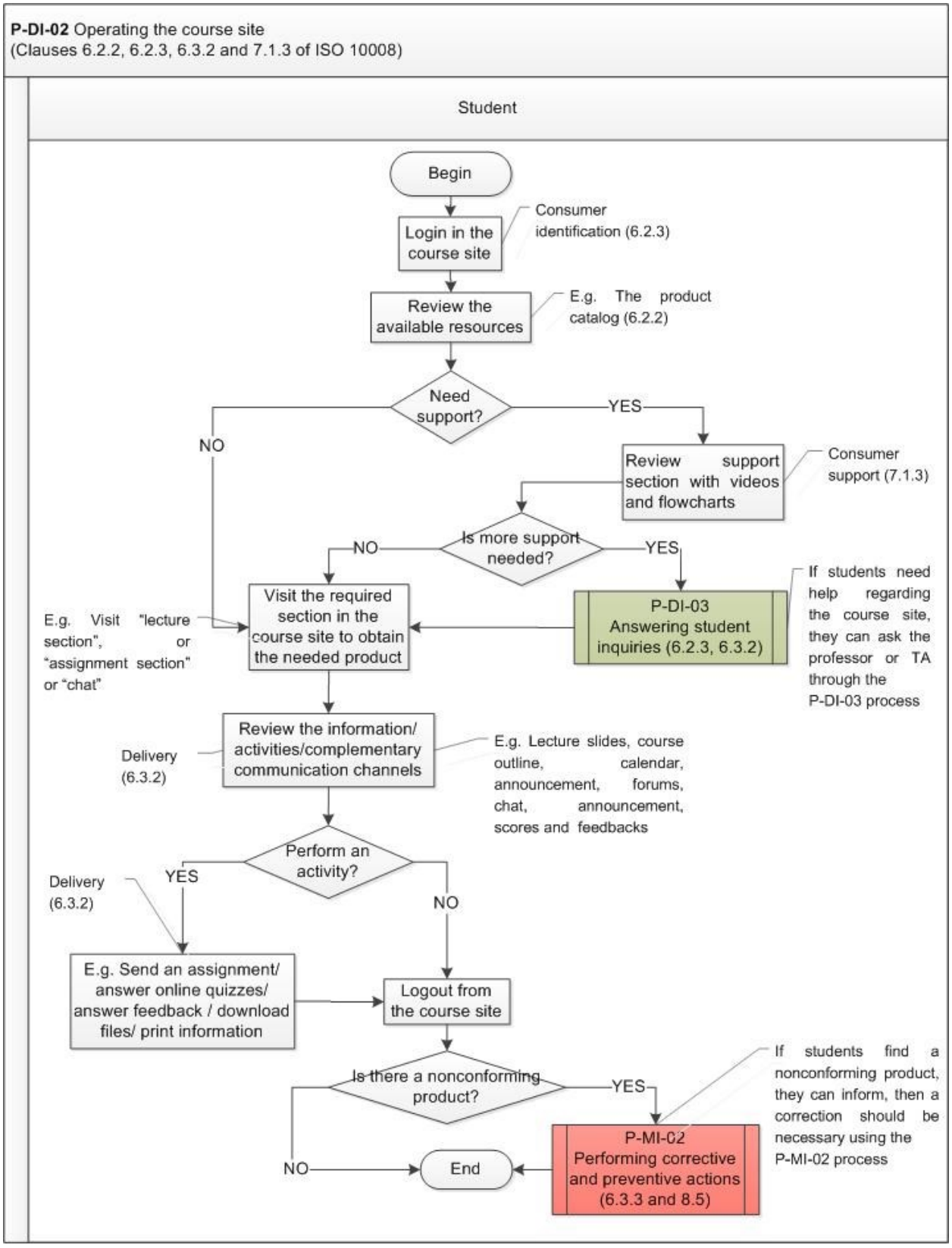

Figure 3.8 Operating the Course Site (P-DI-02)

3.3.3.3. Answering Student Inquiries

The Answering Student Inquiries process labelled as P-DI-03 includes activities of processes of the “In-transaction” and “Post-transaction” phases from ISO 10008. It encompasses Clause 6.2.3 “Consumer identification” and Clause 6.3.2 “Delivery” (see Section 3.3.1.2 in this thesis). The P-DI-03 process proposes the use of three channels to answer questions from students: email (opened all the time), course site forum (when the forum topic is open) and course site chat (during chat hours). The professor could use one or more of these channels of communication. The flowchart of P-DI-03 was developed considering the common activities to answer questions by email or on the course site, identifying the previously mentioned clauses of ISO 10008.

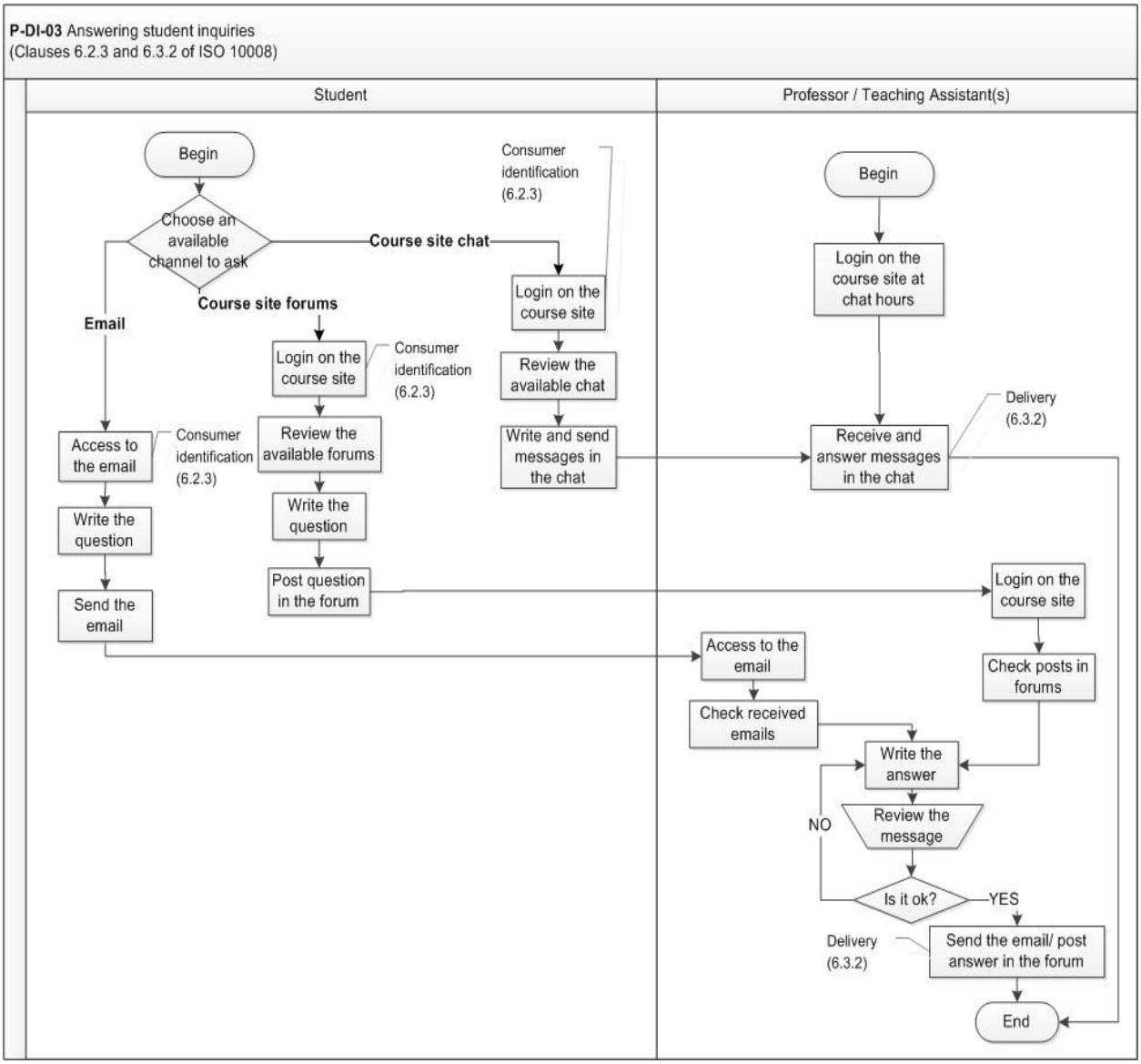

Figure 3.9 Answering Student Inquiries (P-DI-03)

3.3.4. Maintenance and improvement of the B2C ECT system in a university course

The maintenance and improvement phase of the B2C ECT system has three processes: Reviewing and Evaluating the B2C ECT System (P-MI-01), Performing Corrective and Preventive Actions (P-MI-02) and Monitoring and Measuring Student Satisfaction (P-MI-03). The first two processes are explained in Chapter 3, while the last one is shown in Chapter 4.

3.3.4.1. Reviewing and Evaluating the B2C ECT System

The P-MI-01 process covers Clauses 8.1 “Collection of information”, 8.2 “Evaluation of performance of the B2C ECT system” and 8.4 “Review of the B2C ECT system” of ISO 10008.

An evaluation of performance of the B2C ECT system is required in ISO 10008. It considers carrying out “Internal audits”. However, since the B2C ECT system in this research considers a unique professor involved in the organization, the evaluation is proposed to be undertaken in conjunction with the review of the system.

The professor or researchers should plan the schedule for reviewing and evaluating the B2C ECT system. It is recommended to incorporate at least two reviews in a term, one in the middle of the term and one at the end. The review in the middle of the term allows taking actions to improve the B2C ECT system in the B/W course during the term, while the last review permits to take decisions or improvements for the course in next terms. Each review can consider different topics to be appraised. Examples of the information collected (Clause 8.1) could be:

- Changes in academic regulations, internal procedures of the university (e.g. change of the current computer-based learning platform used in the university), or laws such as intellectual property and copyright
- Modification to the course material delivered through the course site and/or email (e.g. send lectures slides by email and course site)
- Events which could modify the schedule in the course, for example: natural disasters, weather conditions, unexpected diseases affecting the professor or TA
- Incorporation of new requirements or products in the B2C ECT system, for instance, incorporating videos of the lectures, or chat in office hours
- Results of surveys of the B2C ECT system in the university course, considering graphs and the median of answers
- Analysis of student feedbacks received during the term related to electronic transactions, considering the statistic about closed and open feedbacks and type of feedbacks, as well as evaluating student satisfactions from received feedbacks
- Analysis of the professor´s performance promises or the B2C ECT code performance, considering student satisfaction and unmet promises
- Evaluation of objectives and indicators defined for the B2C ECT system in the university course

- Evaluation of communication plan for the B2C ECT system in the university course

Examples of decisions from the review can be to:

- Change the interface of the course site
- Increase the usage of forums
- Incorporate a new product, e.g. class notes, solved problems and lecture videos.
- Eliminate a product, e.g. calendar
- Decrease or increase the communication channels (e.g. incorporate a chat on the course site, or eliminate a specific forum).

A form labelled as F-MI-02 (Appendix B.8) was created to record the decisions taken in reviews. Due to the fact that this gives chances for improvements, the P-MI-01 process is connected with the P-MI-02 process. Figure 3.10 shows the flowchart for P-MI-01, which was developed following the guidelines for Clauses 8.1, 8.2 and 8.3 of ISO 10008 to help the professor to perform this process.

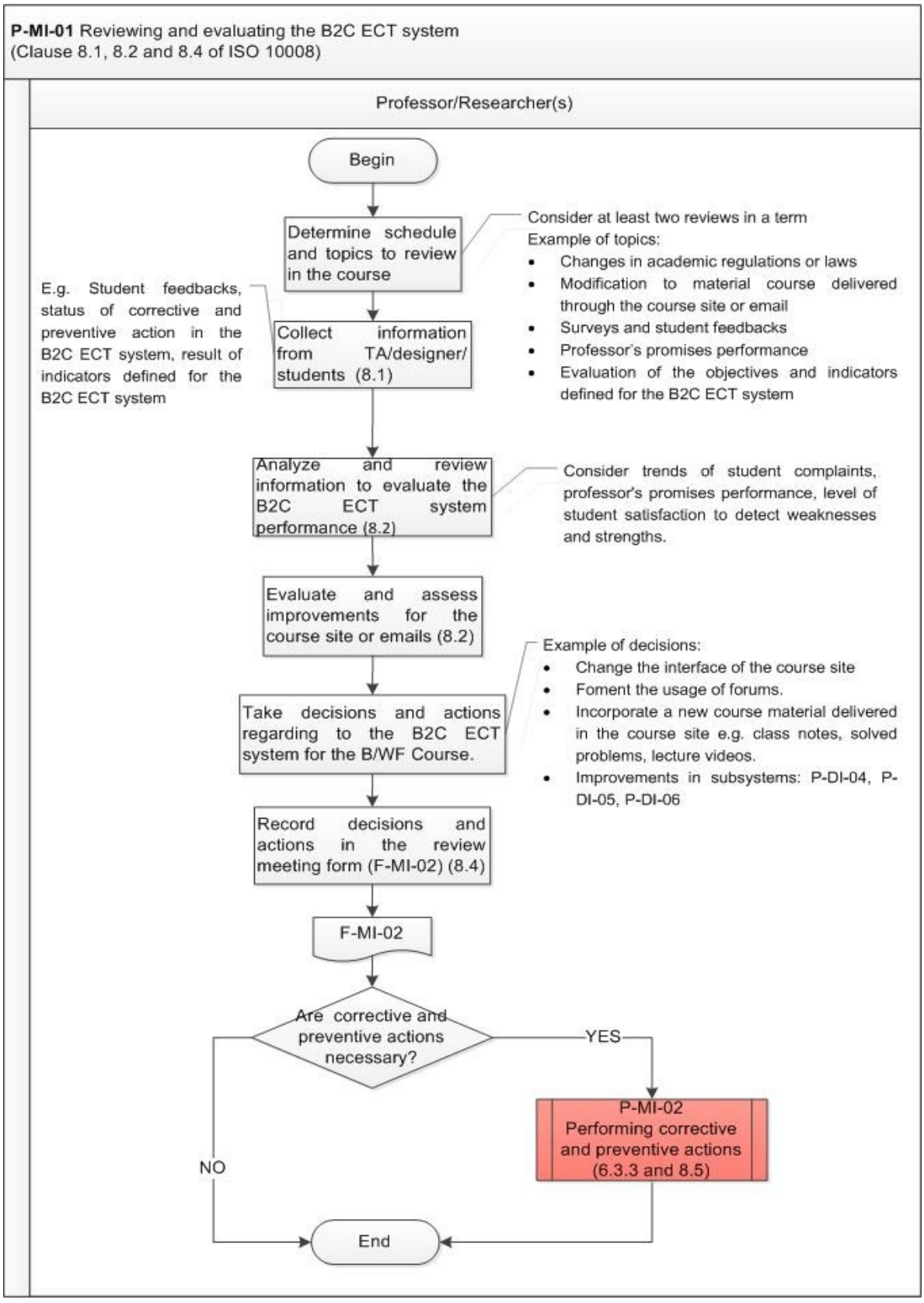

Figure 3.10 Reviewing and Evaluating the B2C ECT System (P-MI-01)

3.3.4.2. Performing Corrective and Preventive Actions

The professor should try to improve the course constantly with the aim to increase student satisfaction (ISO, 2013a). Therefore the use of the Performing Corrective and Preventive Actions process labelled as P-MI-02 is the proposed tool for a continual improvement.

Each time that a nonconforming product or nonconformity is identified, the professor or TA or researchers should take action to avoid its use and carry out a "Correction" (Clause 6.3.3). Examples of nonconforming products in the B2C ECT system in a university course are illustrated in Table 3.21:

Table 3.21 Example of nonconforming product.

Product(s)	Nonconforming product
Course outline / Lecture slides / Class notes/ Assignments or projects / Other online products (e.g. glossary, forums, calendar, videos, FAQ and chat)	• Typos • Wrong information, for example wrong definitions in a lecture slide, or wrong calculations in exercises of a class notes, wrong dates for exams or assignments in the course outline. • Not legible (e.g. due to letter size or type of file) • Missing information or incomplete information. • Incomprehensible assignments or projects
Solution guide to assignments	• Incomprehensible solution guide • Not detailed solution guide • Delivered after the Midterm(s) or Final exam
Response to questions from students	• Incomplete response • Answer out of time • Wrong response
Marks published on the course site	• Missed marks • Wrong score published (wrong calculations, or typing problem)
Sample exams	• Including questions whose topics have not been covered during the course. • Typos • Including wrong answer of the questions.

Opportunities to improve are also considered in the Performing Corrective and Preventive Actions process. This process considers that any issue with the B2C ECT system could be detected by students, teaching assistant, researcher (s), even by the professor.

Figure 3.11 depicts a flowchart for P-MI-02 following Clauses 6.3.3 and 8.5 of ISO 10008 as well as Clause 10 "Improvement" of ISO 9001:2015 (ISO, 2015d). It is a general flowchart to be applied in the course for any issues.

F-MI-03 form was created to record the corrective and preventive actions and facilitate the process for a continual improvement of the system. This form covers the identification of the situation, cause analysis, action plan and the following of the action plan, until the action is closed (see Appendix B.9 and Figure 3.14). Furthermore, this form can be published on the course site to inform the students about the actions taken in the B2C ECT system for a continual improvement.

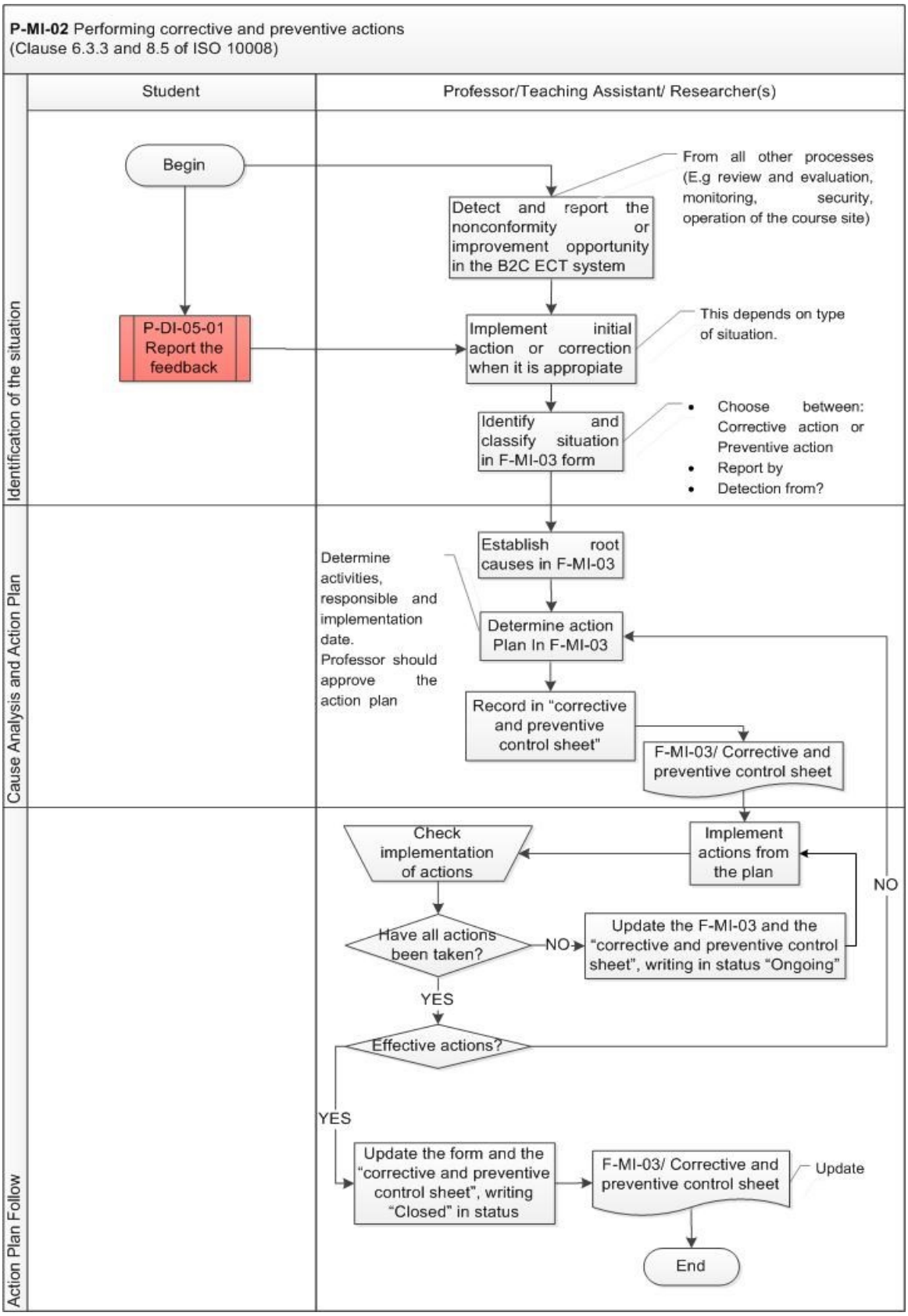

Figure 3.11 Performing Corrective and Preventive Action (P-MI-02)

Furthermore, the use of an Excel file called “Corrective and preventive control sheet” is proposed in Figure 3.12. This has the aim of controlling and monitoring the overall status of corrective and preventive actions during the term. Moreover, it can be utilized to keep an historical record for future courses as lessons learned.

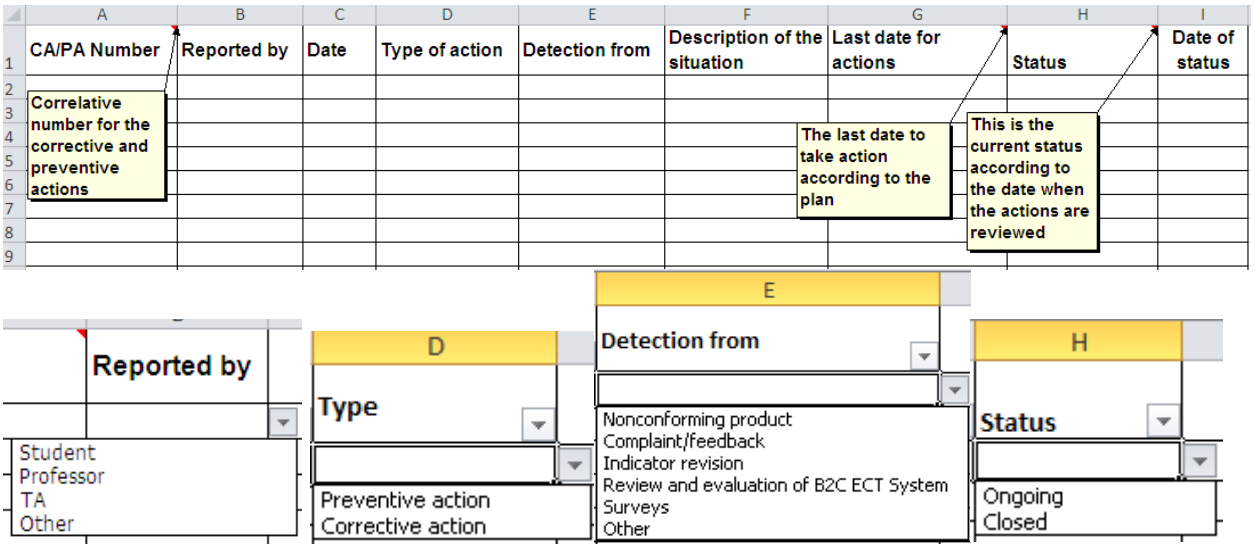

Figure 3.12 Corrective and preventive control sheet

For a better explanation on how the P-MI-02 process can be applied in the B2C ECT system in a university course, Figure 3.13 shows a flowchart with an example of nonconformity in a published mark on the course site and Figure 3.14 illustrates the F-MI-03 record for this case.

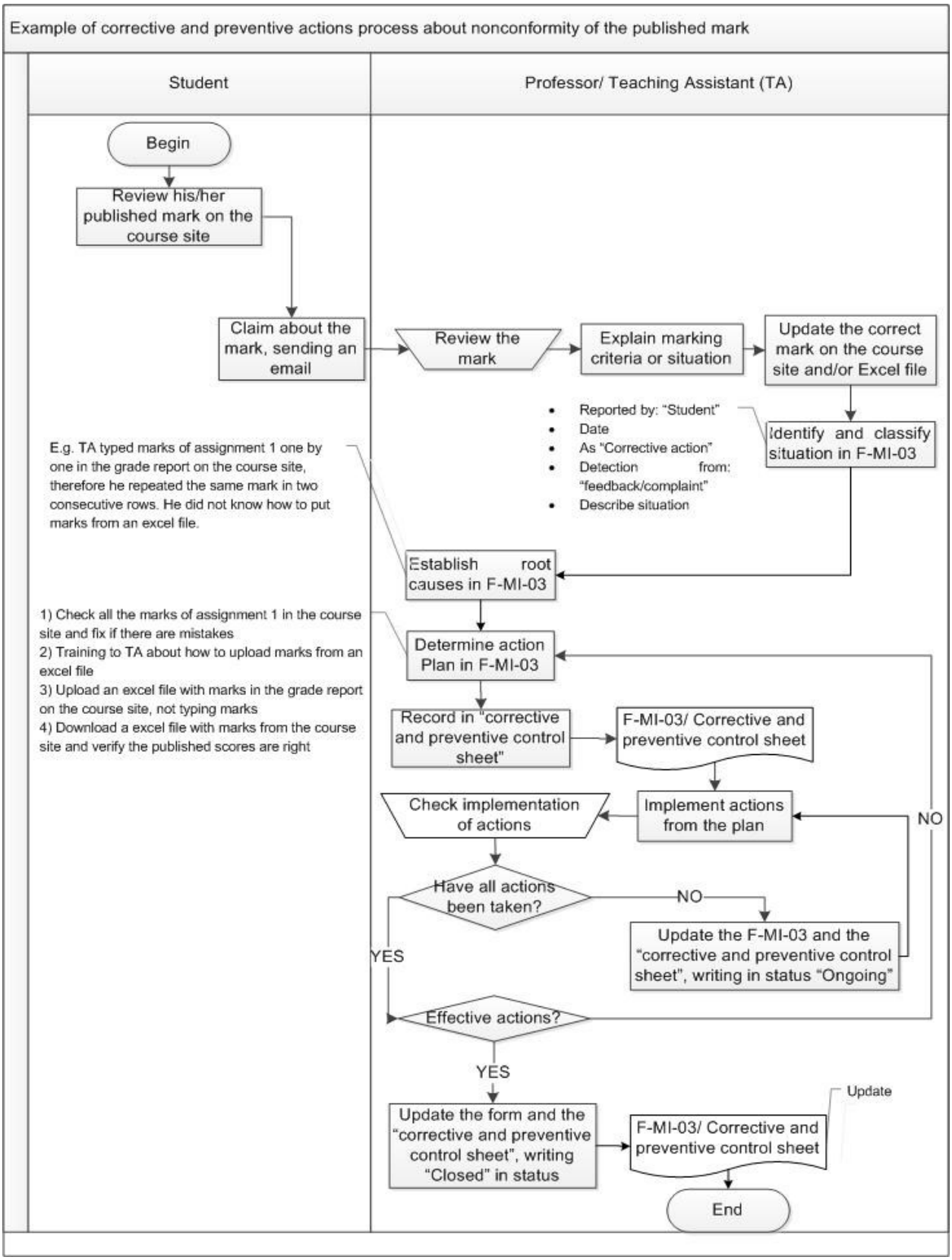

Figure 3.13 Example of the P-MI-02 process about nonconformity of the published mark

Corrective and preventive actions Form							
Code	F-MI-03	Clause	6.3.3 and 8.5	Version	0	Approval Date	15-05-2015

1. **General data:**

Course	XX	Term/Year	Fall 2015	CA/PA Number	01

2. **Identification of the situation**

Report by	Student		Date	01-02-2015
Type of action				
Corrective action	X	Preventive action		
Detection from				
Nonconforming product		Review and evaluation of the B2C ECT system		
Complaint/feedback	X	Surveys		
Indicator revision		Other		
Description of the situation				
Student complains that his mark for assignment 1 published in the course site is wrong, since his received mark on the assignment is higher. Student brought his assignment 1 for proving that.				

3. **Cause analysis and action plan**

Correction or Initial action
TA updated the correct mark in the course site.
Cause Analysis or investigation
TA typed assignment 1 marks one by one in the grade report on the course site, therefore he repeated the same mark in two consecutive rows. He did not know how to upload an excel file to update marks.

Action Plan			
#	Activity	Responsible	Implementation date
1	Check all the marks of assignment 1 in the course site and fix if there are mistakes.	TA	01-02-2015
2	Training to TA about how to upload an excel file to update marks	Professor	04-02-2015
3	Upload an excel file with marks in the grade report on the course site, not typing marks.	TA	When marks of assignments are published
4	Download a excel file with marks from the course site and verify the published marks are right.	TA	When marks of assignments are published s

4. **Action plan follow**

#	Date	Status (Ongoing / Closed)	Comments
1	08-02-2015	Ongoing	TA checked all marks published in the course site for assignment 1, verifying there are right. Furthermore, professor trained to TA about how to put grades froma an excel file.
2	30-04-2015	Closed	The next marks for the following four assignments were update through an excel file. Students did not report more mistakes in the assignment marks.

Figure 3.14 Example of the F-MI-03 form regarding nonconformity of the published mark

3.4. Summary

Chapter 3 presents a part of the model of the B2C ECT system in a university course, considering guidelines of the ISO 10008 standard. The model used concrete tools, such as flowcharts, forms and examples, to facilitate the application of the ISO 10008 standard. Forms are complementing the processes described in flowcharts and also permit to keep records of the activities implemented.

The developed B2C ECT system consists of ten processes (Figure 3.2). For each one, a flowchart, forms and examples were developed to facilitate the implementation of ISO 10008. Chapter 3 presents the following six processes, with ISO 10008 clauses identified below:

- Planning and Designing the B2C ECT system (Figure 3.3), with four associated forms (F-G-01 to F-G-04). This process follows Clause 5.
- Setting and Updating the Course Site and Email, with the flowchart presented in Figure 3.4. It includes three sub-processes presented in Figures 3.5 to 3.7 linked to the pre-transaction phase (content creation, content delivery and content governance), following Clauses 6.1.2, 6.1.3, 6.1.4 and 6.2.2.
- Operating of the Course Site (Figure 3.8), including Clauses 6.2.2, 6.2.3, 6.3.2 and 7.1.3
- Answering Student Inquiries (Figure 3.9), considering Clauses 6.2.3 and 6.3.2
- Reviewing and Evaluating the B2C ECT System (Figure 3.10), following Clauses 8.1, 8.2 and 8.4
- Performing Corrective and Preventive Actions (Figure 3.11) associated to the maintenance and improvement and correction clauses of the ISO 10008 standard (Clauses 6.3.3 and 8.5).

Since the scope of the B2C ECT system for a university course developed in this research does not consider payments, the following processes of the ISO 10008 standard have been excluded: “Final quote” (Clause 6.2.4), “Payment selection support” (Clause 6.2.5), “Payment authorization” (Clause 6.2.6), “Order confirmation” (Clause 6.2.7) and “Return and exchange” (Clause 6.3.4).

Chapter 4. Subsystems based on ISO 10001, 10002, 10004 and ISO/IEC 27001

4.1. Introduction

This chapter presents four subsystems of the model to implement the ISO 10008 standard in a university course. Subsystems are used for the B2C ECT codes, feedback handling, monitoring and measuring student satisfaction, and information security.

These subsystems have been developed based on the guidelines of ISO 10008, as well as other standards of the ISO 10000 series and ISO/IEC 27001, which focus on those specific systems.

Clause 7.1.2 of ISO 10008: 2013 was considered to develop the B2C ECT code, as well as the ISO 10001:2007 standard. The Feedback Handling process was created based on Clauses 7.1.4 and 7.1.5 of ISO 10008 and ISO 10002:2014 standard.

ISO 10004:2012 and Clause 8.3 of the ISO 10008 standard were used to create the subsystem for monitoring and measuring student satisfaction. Finally, to achieve the security and privacy guidelines of the ISO 10008 standard (Clauses 7.2.2 and 7.2.3), requirements of ISO/IEC 27001:2013 were considered.

Each subsystem was integrated with the B2C ECT system in a university course. For instance, the P-MI-01 and P-MI-02 processes were included in the Managing Information Security process. A professor can choose to implement all of these subsystems or only some of them.

4.2. B2C ECT Codes in a university course based on ISO 10001

Clause 7.1.2 of ISO 10008 refers to the B2C ECT code. It is modeling as a subsystem considering the ISO 10001 standard. Some examples of promises of codes of conduct for a B2C ECT system in a university course, considering the course material delivered by a course site and email are given in Table 4.1.

Table 4.1 Examples of promises of B2C ECT codes

Regarding	Examples of promises
Products	Correct any reported typographical error from lecture slides or assignments published on the course site (modified promise from Karapetrovic, 2015).
	Publish at least one example of each topic from the lecture slides on the course site.
	Include the current topics in the subjects of the course, making reference to the latest papers and books in the lecture slides published on the course site.
	Provide audio records for each lecture on the course site on the day of the lecture.
	Publish the marking criteria for assignments or projects on the course site (modified promise from Honarkhah, 2010)
Privacy of personal information	The professor and teaching assistant(s) do not misuse the personal information of students, taking special care of the email address, student number, marks and possible misconduct situations.
Information Security	Track assignment submissions of students, identifying the used medium (email, the course site, box, or classroom).
Product delivery procedures	Publish marks from the exams on the course site within a week (modified promise from Karapetrovic & Doucette, 2009)
	Post an online quiz as an example for the exam on the course site three weeks in advance of the exam date.
	Answer questions asked in forums of the course site within 24 hours (modified promise from Karapetrovic & Doucette, 2009)
	Publish lecture slides on the course site at least one week before each class, which can be printed.
	Post the assignment solution guide on the course site on the day of the due date.

The Managing B2C ECT Code process labelled as P-DI-04 has three main parts: defining and preparing (see Figure 4.1), implementing, maintaining and improving the B2C ECT code (Figure 4.2). The P-DI-04 process includes the use of one form labelled as F-MI-01. It was created to ease the implementation of guidelines of Clause 7.1.2 of ISO 10008 and ISO 10001. Furthermore, P-DI-04 considers the update of other three forms used in the Planning and Designing of the B2C ECT System process (F-G-02 for the objectives and indicators, F-G-03 for the resources needed and F-G-04 for communication plan), integrating this subsystem with the overall B2C ECT system.

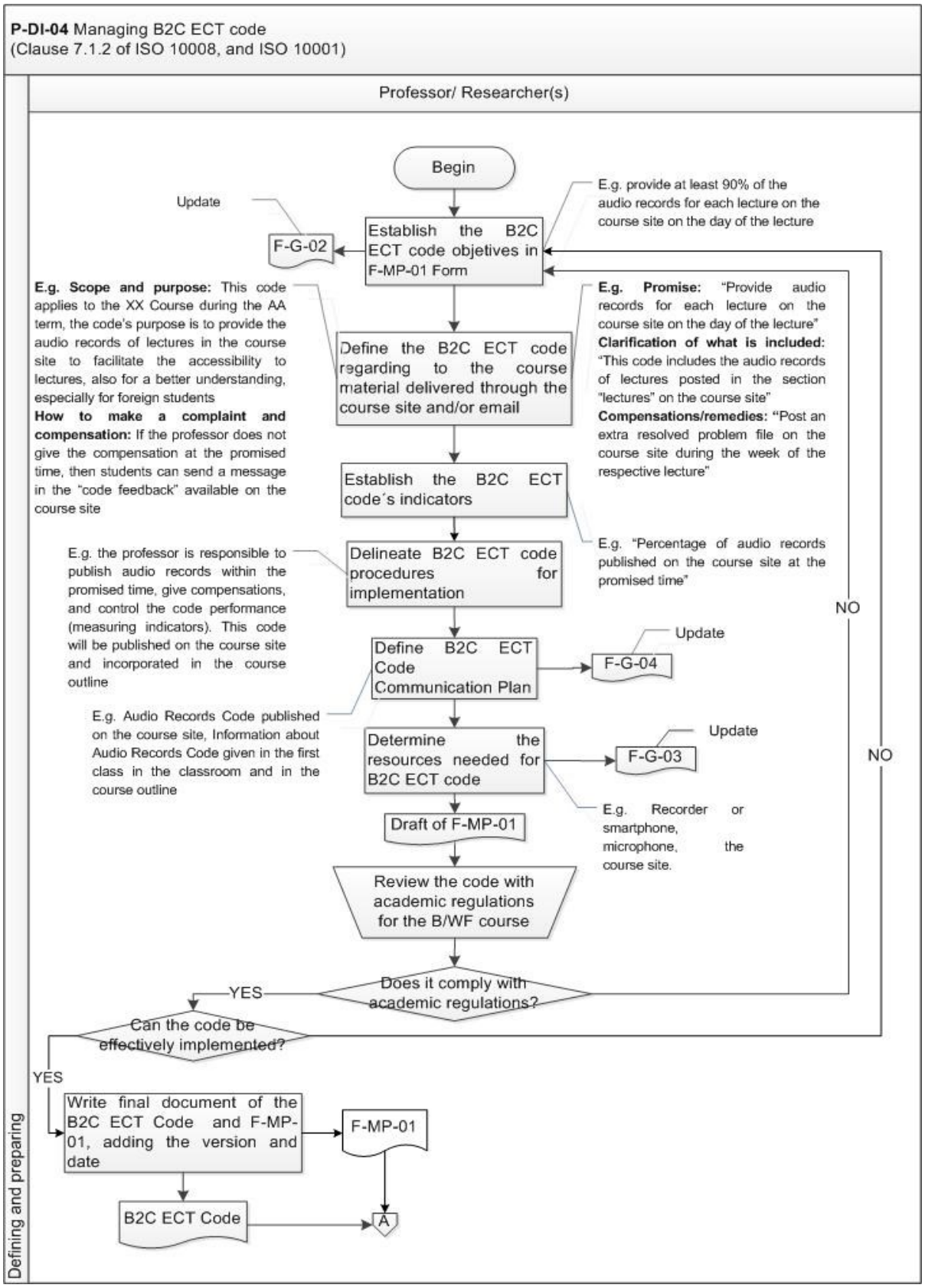

Figure 4.1 Defining and preparing phase of Managing B2C ECT Code (P-DI-04)

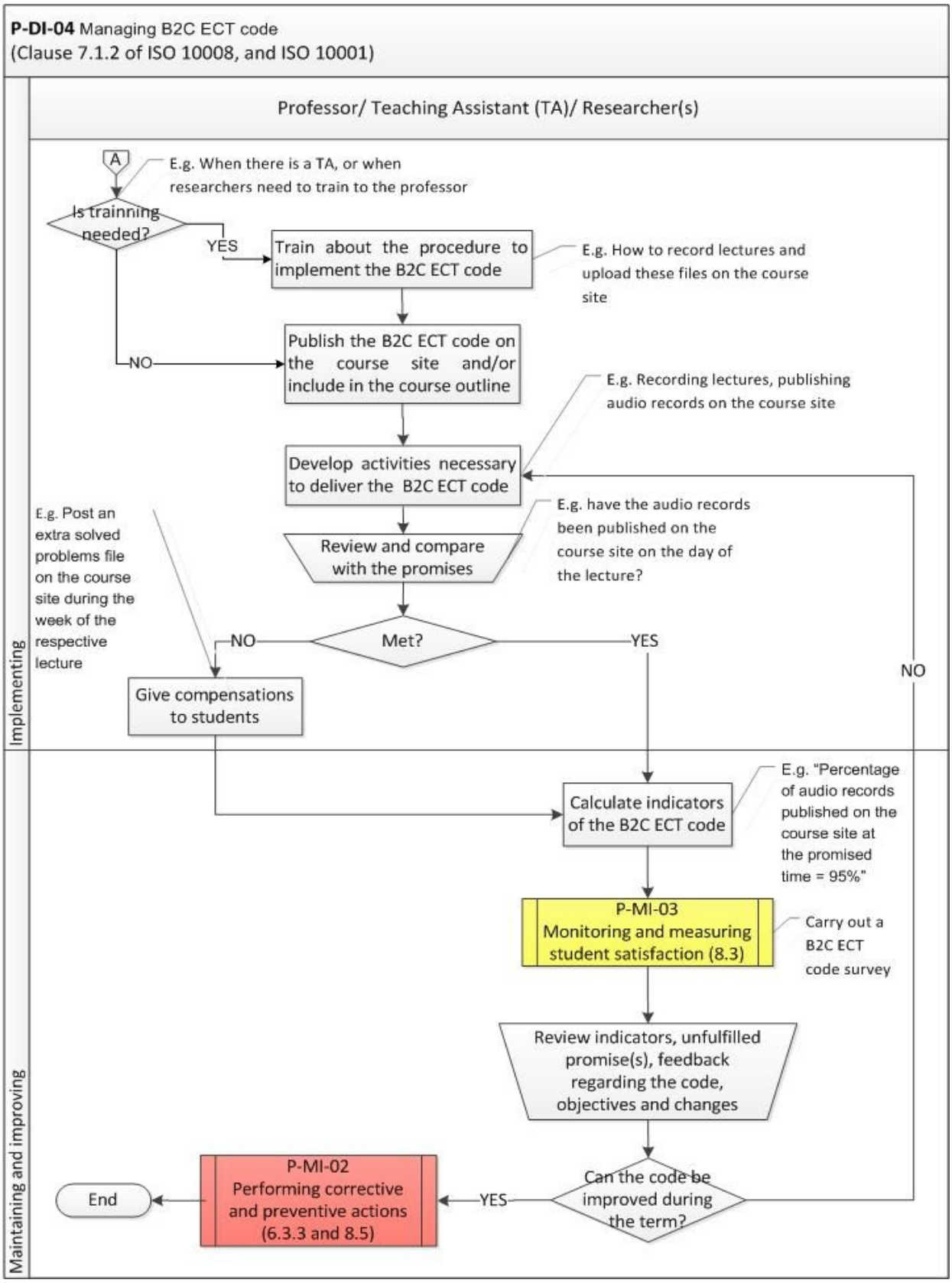

Figure 4.2 Maintaining and improving phase of Managing B2C ECT Code (P-DI-04)

F-MP-01 form is presented in Appendix B.10. It has seven sections, the first one is called general data and the second section is for objectives. The next section includes the code itself considering the scope and purpose, promise, clarification of what is included, limitations, compensations, key terms, how to make a complaint and compensation. The fourth section is about defining indicators and the next section is for establishing the code´s procedures. The sixth section regards the communication plan. The last section covers the resources needed.

Tables 4.2 to 4.6 exemplify the components for a B2C ECT code, which are embodied in the F-MP-01 form. The code developed in these tables is called "Audio Record code". The B2C ECT code objective for this is to p*rovide at least 90% of the audio records for each lecture on the course site on the day of the lecture.*

Table 4.2 Example of the Audio Record Code (B2C ECT Code)

Scope and purpose	This code applies to the XX Course during the AA term. The code's purpose is to provide the audio records of lectures on the course site to facilitate the accessibility to lectures, also for a better understanding, especially for foreign students.
Promise	Provide audio records for each lecture on the course site on the day of the lecture.
Clarification of what is included	This code includes the audio records of lectures posted in the section "lectures" on the course site.
Limitation to the promise	• The code considers lectures 1 to 20. • The application of this promise assumes the operability of the course site. Therefore, if the course site presents issues, this code is not applicable.
Compensations	Post an extra solved problems file on the course site during the week of the respective lecture.
Key Terms	**Audio record:** contains the record of a lecture in the classroom taught by the professor. **Solved problems file:** it is a PDF file, which contains examples of exercises covered in the same lecture.
How to make a complaint and compensation	If the professor does not give the compensation at the promised time, then students can send a message in the "Code feedback" available in the "Codes" section on the course site.

Table 4.3 Example of Audio Record Code (B2C ECT Code)'s procedures

Person responsible	Actions
Professor	Publishing the audio records within the promised time
	Giving compensations
	Control the code performance (measuring indicators).
	Including the "Audio Record Code" in the course outline.
	Publishing the Audio Record Code on the course site in a PDF file and a "Tab display"

Table 4.4 Example of indicators for the Audio Record Code (B2C ECT Code)

Indicator	Formula	Goal	Justification of the goal	Person responsible to measure	Frequency
Percentage of audio records published on the course site at the promised time	(Number of audio records published within the day of lecture on the course site during the term/ Number of lectures in the term) *100	>=90%	It was set at 90%, due to the risk regarding having problems with the operability of the course site, issues with access to the Internet or with the recorder or microphone.	Professor	After each lecture
Percentage of compensations given according to unmet promise during the term	(Number of solved problems file published on the course site during the term / number of unmet promise during the term)*100	=100%	It is the ideal goal or maximum value.	Professor	Monthly

Table 4.5 Example of communication plan for Audio Record Code (B2C ECT Code)

Message	Stakeholder Name	Person responsible	Channel(s)	Tools and formats	Frequency
Audio records Code	Students	Professor	The course site	In a tab PDF file in section "Codes"	At the beginning of the course and update.
Information about audio records Code			Classroom	Speaking	First lecture
			The course outline	PDF file	At the beginning of the course and update.
Audio records files	Students and Teaching assistant(s)		The course site in "Lectures" section	MP3 file	After each lecture on the day

Table 4.6 Example of the resources needed for the Audio Record Code (B2C ECT Code)

Human Resources	Hours of the professor to record and publish audios and provide compensations (solved problems)
Monetary Resources	Not needed, because the promise does not imply the purchase of any product such as chocolates. Furthermore, payments are not necessary, since the professor is undertaking the activities established in the process.
Hours of training	Training on Moodle platform
Infrastructure	Recorder or Smartphone, microphone, computer, the Internet, course site, software (Word and Adobe Acrobat)

4.3. B2C ECT Feedback Handling in a university Course based on ISO 10002

Clause 7.1.4 of the ISO 10008 points out the need to deal with complaints due to the dissatisfaction of the consumers (ISO, 2013a). In this research, the Feedback Handling is modeling as a subsystem of the B2C ECT system, considering the ISO 10002 standard.

In the B2C ECT system in a university course, conflicts between students and professor could be solved outside of the university course considering university policies or procedures. This situation represents an external dispute resolution. For instance, a student considers that her/his evaluation has not been fair and not solved by the professor. Another example occurs when a student is under suspicion of cheating or plagiarism. The external resolution is not included in the Feedback Handling process used in this research.

The implementation of student feedbacks about the teaching and learning processes was developed by previous researchers (Honarkhah, 2010; Karapetrovic & Doucette, 2009). Three channels were considered to receive feedbacks: email, in person and surveys. In this research, one new channel is added: feedback on the course site.

The Feedback Handling process labelled as P-DI-05 presents four available channels for the students: email, feedback on the course site, paper feedback and surveys (through open questions). This process provides channels with electronic transactions (email, feedback on the course site and online surveys) and also without electronic transaction as paper feedback or paper surveys, giving major coverage or options to the professor, since he or she could adopt all or some of these channels to be implemented.

The feedbacks considered in the B2C ECT system in a university course can be related to the course site, course material provided through email or the website, as well as the implemented B2C ECT codes, feedback handling, surveys and information security subsystems.

The P-DI-05 process has three main phases: planning, designing and implementing the feedback handling subsystem. Furthermore, the implementation phase considers a sub-process called “Report the feedback” (P-DI-05-01). It describes in detail how students can report a feedback according to the four available channels. Furthermore, the P-DI-05 process includes the use of two forms (labelled as F-MP-02 and F-MP-03) and an excel file called “Feedback control sheet” to comply with the guidelines of ISO 10002, Clauses 7.1.4 and 7.1.5 of ISO 10008.

The F-MP-02 form is used for the planning and design phases. It is presented in Appendix B.11. This form contains five main sections: definition of a policy statement, objectives, indicators, the resources needed and feedback handling procedures. An example of the feedback handling policy is:

- *The professor of the XX course is committed to provide a system to receive comments, complaints, compliments or suggestions regarding the course site, course material delivered through the course site or email and subsystems: B2C ECT code, feedback, surveys and information security. The professor will assess the received feedbacks, giving an answer to students and taking actions to*

improve the course. Finally, the confidentiality and privacy about the feedbacks and personal data of the students are a special concern for the professor and everyone with access to that information.

Tables 4.7 to 4.10 exemplify the components for a feedback handling subsystem based on guidelines of ISO 10002, which were embodied in F-MP-02 form.

Table 4.7 Example of the resources needed for a feedback handling

Human Resources	Professor Hours to assess and solve feedbacks. Teaching assistant or researchers hours to monitor and follow feedbacks.
Monetary Resources	Not needed
Hours of training	• Training of the professor, teaching assistant and/or researchers in the computer-based learning platform as Moodle. • Training to the teaching assistant and/or researchers about Feedback Handling process.
Infrastructure	Computer, the Internet, course site, software (Power Point, Word and Adobe Acrobat).
Others	Boxes

Table 4.8 Example of feedback handling objectives

Objective	**Target**
Resolving at least 80% of the received feedbacks of the B2C ECT system during the term	Students
Answering within 48 hours at least 90% of the received feedbacks during the term	
Assess 100% of received feedbacks during the term and propose actions when it is required.	Students and Professor

Table 4.9 illustrates indicators for feedback of the B2C ECT system, which were created based on suggestions of the standard ISO 10008 and ISO 10002 (ISO, 2013a, p. 5; ISO, 2014a, p. 23).

Table 4.9 Example of feedback handling indicators

Indicator	Formula	Goal	Justification of the goal	Person responsible to measure	Frequency
Percentage of solved feedbacks of the B2C ECT system	(Number of solved feedbacks of the B2C ECT system in the term/ Number of feedbacks of the B2C ECT system in the term) *100	>= 80%	It has been set at 80%, due to risks regarding the lack of time of the professor in certain busy periods, or the chance to receive complaints at the end of the term, without enough time to solve them within the period.	Teaching assistant/ Researcher	Monthly
Percentage of the received feedbacks by email answered within 48 hours during the term.	(Numbers of the received feedbacks by email answered within 48 hours in the term / Number of received feedbacks by email in the term) *100	>= 90%	It was set at 90%, due to risks regarding the lack of time of the professor in certain busy periods, or a huge number of received feedbacks in a short time. Furthermore, for the first time of the implementation of this kind of promise, the professor should set a process to answer on time and there is a probability that some mistakes could be performed.		Weekly
Percentage of assessed feedbacks of the B2C ECT system during the term	(Number of assessed feedbacks of the B2C ECT system in the term/ Number of feedbacks of the B2C ECT system in the term) *100	100%	Maximum value of the indicator, since there are not identified risks about this task.		Monthly
Distribution of received feedbacks by channels	(Number of received feedback by each channel/Total received feedbacks)*100	Not applicable	There is not goal associated for the first measurement, since this indicator could be used as information for future decisions taking. For example, to foment the use of feedback on the course site		

A section in F-MP-02 was created to help establish the feedback handling procedures. It provides different choices to set up the feedback handling subsystem, for example, channels to receive a feedback, classification and channels to communicate information about the feedback handling subsystem (See Table 4.10).

Table 4.10 Example of establish the feedback handling procedures

Channels to receive a feedback		
"Anonymous Feedback" on the course site	Yes	No
"Not Anonymous Feedback" on the course site	Yes	No
Both "Anonymous and not anonymous Feedback" on the course site	Yes	No
Email	Yes	No
Surveys (through open questions)	Yes	No
Paper feedback through a box in the classroom	Yes	No
Classification of a feedback		
Option to classify feedbacks into a comment, complaint, compliment, or suggestion	Yes	No
Channel for broadcasting the feedback handling subsystem to students		
Course site	Yes	No
Email	Yes	No
Course outline	Yes	No
Classroom	Yes	No

The professor can offer several channels to provide feedbacks, blending electronic channels with the traditional channels. Moreover, giving the option of having anonymous feedback may make students feel less intimidated to provide it. Therefore, F-MP-02 offers options to the professor about what channels to use to receive feedbacks that students want to adopt.

The professor should consider classifying a feedback (e.g. comment, complaint, compliment and suggestion), because this classification will determine the type of actions to follow in the process. For example, the professor can thank for a compliment or take a corrective action for a complaint (see Figure 4.5 on p. 76).

Finally, the channels proposed to broadcast the feedback handling subsystem information are: on the course site (e.g. announcements, highlighting the feedback handling Section, publishing flowchart(s)), emails, in the course outline and giving information in the classroom.

The F-MP-03 form to report a feedback on a course site has been created. It is presented in Appendix B.12. This includes a message with the description of the Feedback Handling subsystem. Moreover, the form has the option to categorize the feedback in a comment, complaint, compliment, or a suggestion. Students can choose more than one option. An open space is provided to leave the feedback and finally a completion message is included: *Thanks for your feedback. We will consider your feedback to improve the XX course in this term or in the future, as appropriate*.

Moreover, with the aim to control and monitor the status of the feedbacks during term and collect information (Clause 8.1 of collection of information of ISO 10008 and ISO 10002 and Clause 7.9 of closing complaint ISO 10002), the use of an excel file called "Feedback control sheet" is proposed in Figure 4.3.

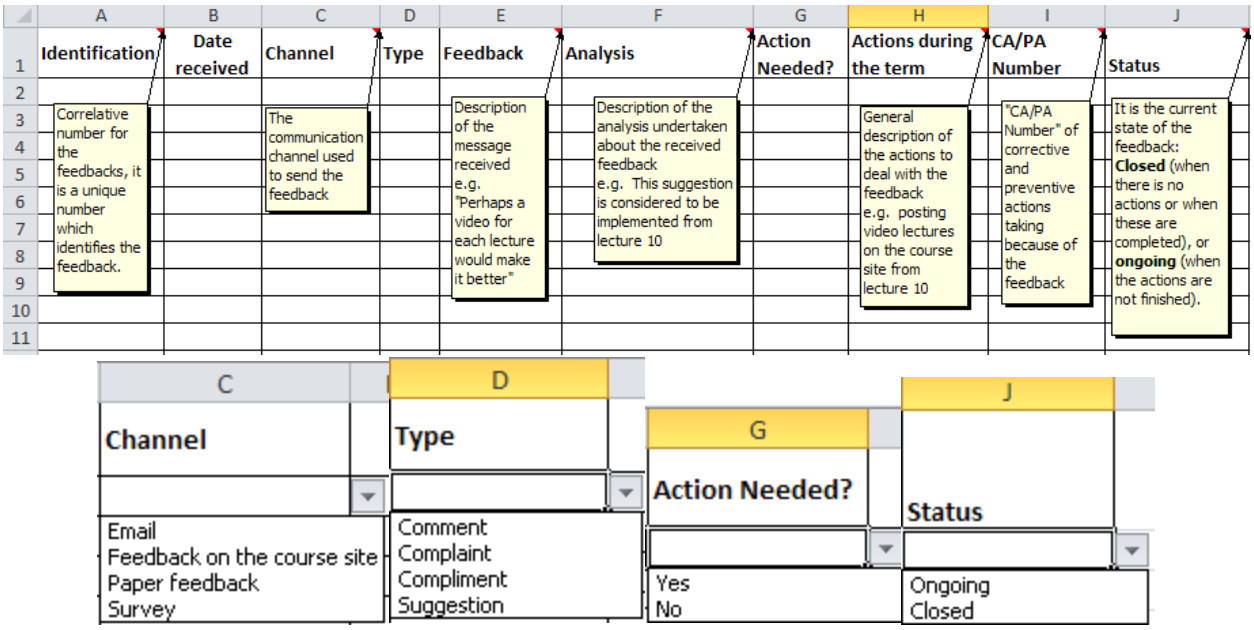

Figure 4.3 Feedback control sheet

Figure 4.4 depicts the flowchart for “Planning and designing” phase of the Feedback Handling process, considering the use of the F-MP-02 and F-MP-03 forms previously described. It includes the creation of the Feedback control sheet presented in Figure 4.3. Furthermore, this process is connected to the P-DI-01-02 sub-process earlier illustrated in Figure 3.6. This sub-process is used to set the “Feedback” resource on the course site, or to broadcast the feedback handling subsystem.

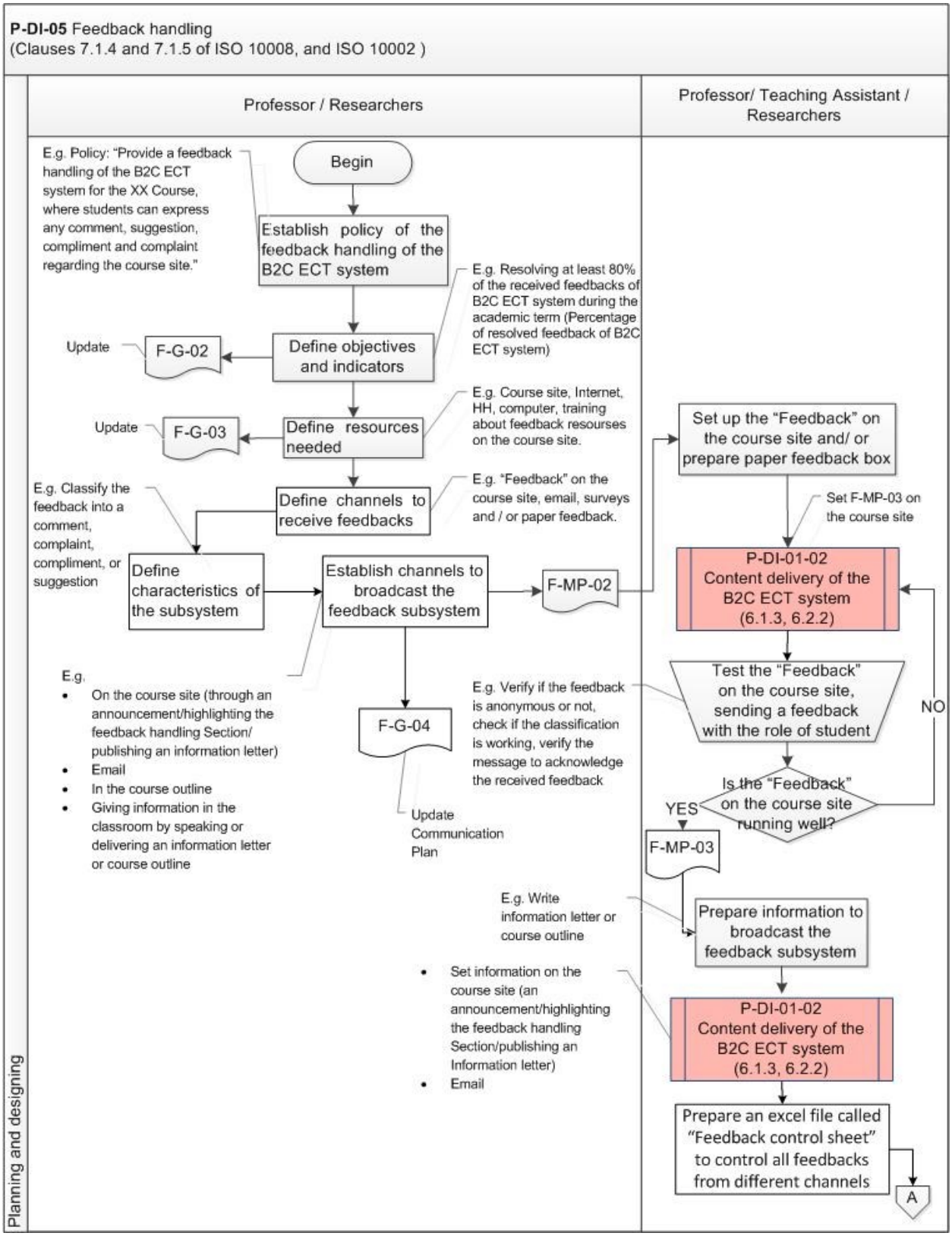

Figure 4.4 Planning and design phase of Feedback Handling (P-DI-05)

Figure 4.5 illustrates the flowchart for the implementation phase of the P-DI-05 process. It is linked to the Report the Feedback sub-process (Figure 4.6) and integrated to the Performing Corrective and Preventive Actions process previously described in Figure 3.11 of Chapter 3.

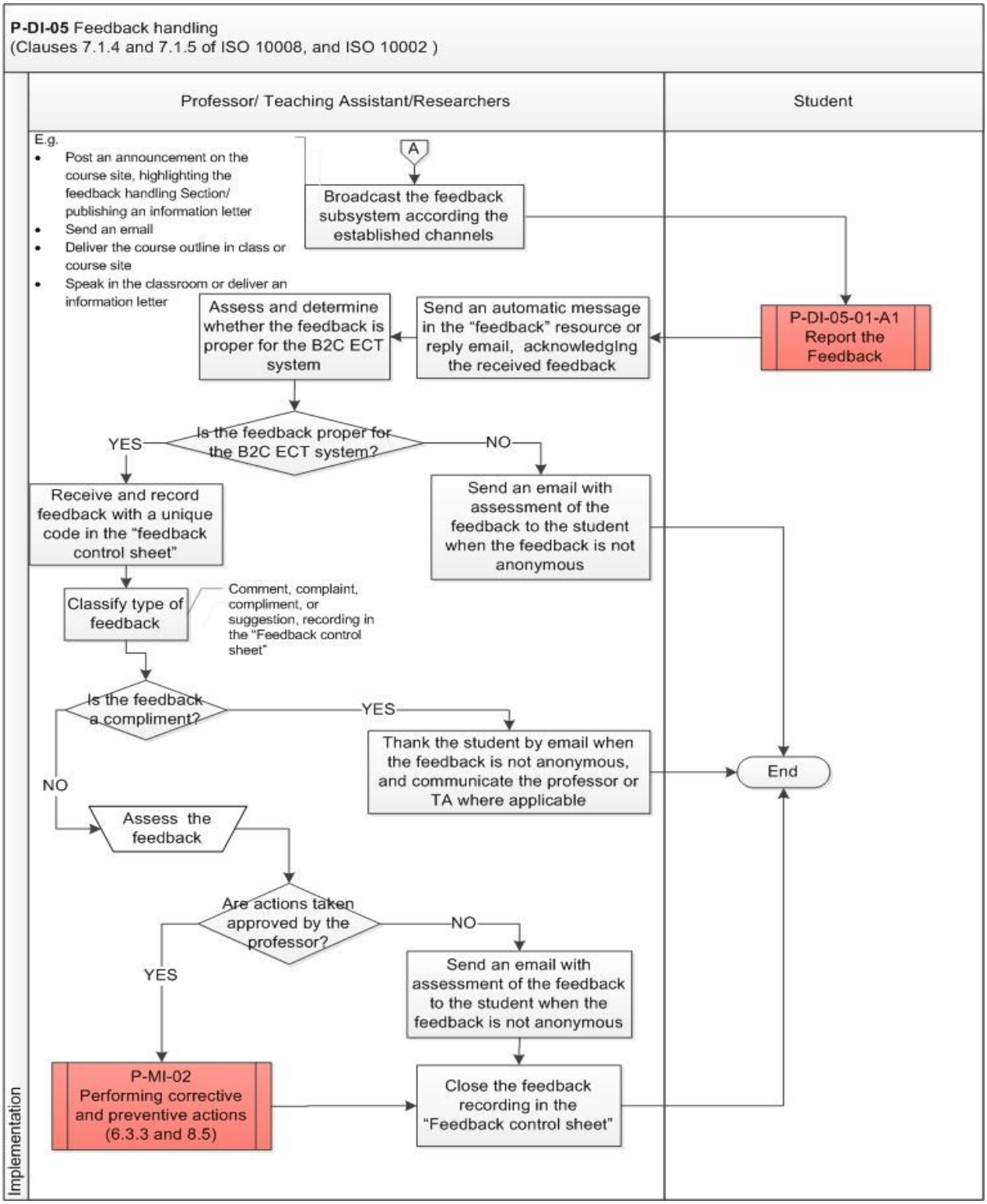

Figure 4.5 Implementation phase of Feedback Handling (P-DI-05)

Finally, Figure 4.6 shows a flowchart for the sub-process labelled as P-DI-05-01 called Report the Feedback, which is a part of the previous flowchart about implementation of Feedback Handling process. Also, it is integrated with the P-MI-03 process, since a channel to obtain feedback is received through surveys. It is shown in a separate flowchart to better explain the interactions that students perform in order to deliver a feedback according to the different options for communication channels. Furthermore, this flowchart can be published on the course site to explain it to students, considering only student activities in the process.

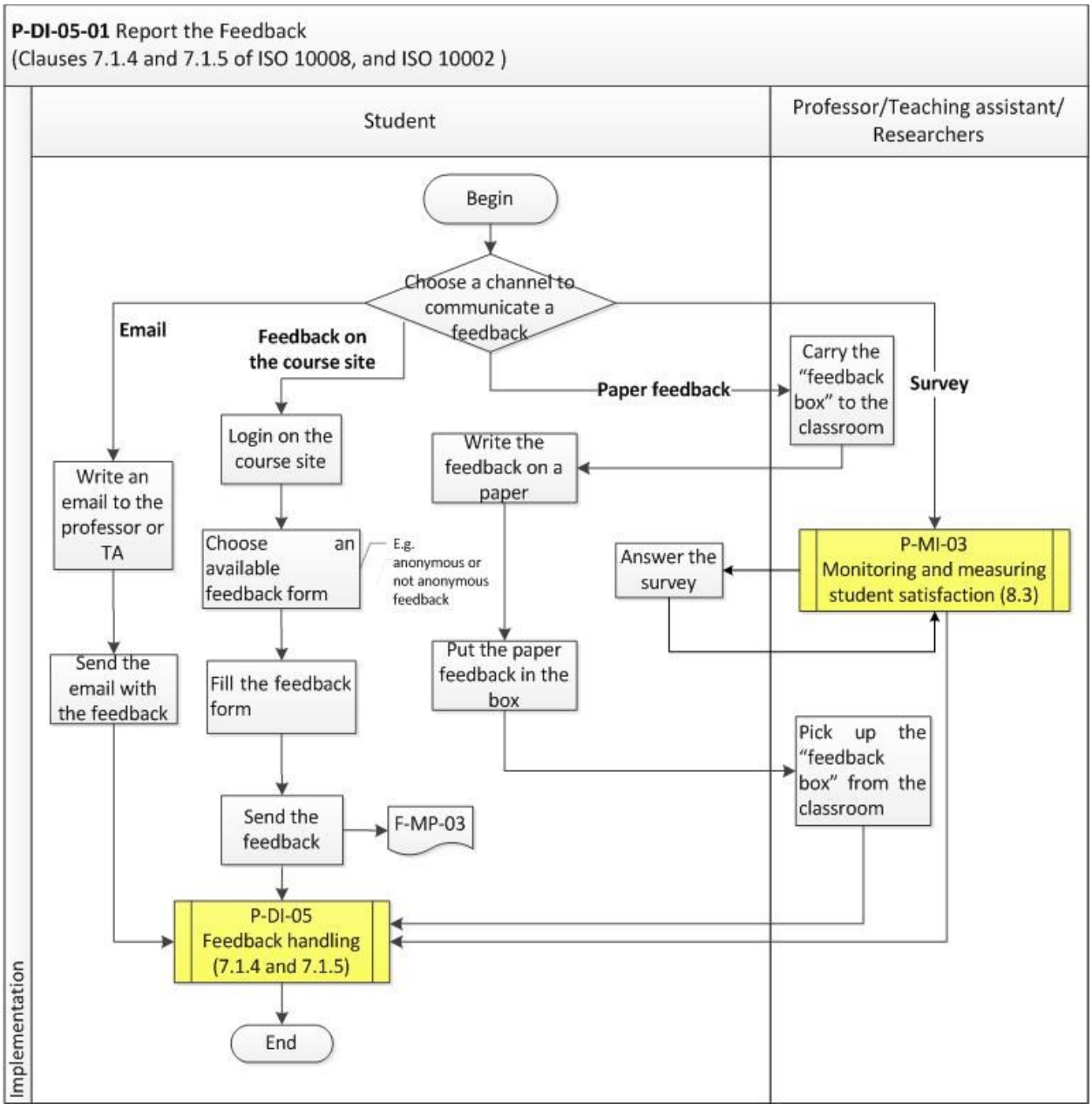

Figure 4.6 Report the Feedback (P-DI-05-01)

4.4. Monitoring student satisfaction with the B2C ECT system based on ISO 10004

In this research, the P-MI-04 process is modeled as a subsystem of the B2C ECT system, considering the ISO 10004 standard and Clause 8.3 of ISO 10008.

Some techniques to monitor and measure consumer satisfaction are surveys and "simulation of a contact of a consumer with the organization" (ISO, 2013a) or "mystery shopper" (e.g. Douglas and Douglas, 2006). Douglas and Douglas (2006) show how to use a "mystery student" to appraise performance in higher education institutions in the United Kingdom. In this research, the "mystery shopper" technique is not used and only surveys are implemented.

Furthermore, feedbacks should be considered as another source of information to determine student satisfaction. In this model, feedbacks are considered in the Reviewing and Evaluating the B2C ECT System process, where feedbacks are assessed to take actions to improve the B2C ECT system (see Section 3.3.4.1).

Regarding the kind of surveys to implement in a university course, quantitative surveys are recommended, with self-completion questionnaires distributed in the classroom and/or published on the course site (online surveys). The quantitative survey is suggested to measure student satisfaction because, according to ISO (2012a):*"Quantitative surveys are those that are designed to measure the degree of customer satisfaction…".*

The P-MI-04 process includes the use of one form labelled as F-MI-01 (Appendix B.7). It has been created to ease the incorporation of guidelines of ISO 10004 in this process. This form is used in the planning phase and a part of the operation phase of P-MI-04.Moreover, PMI-04 considers the update of two other forms used in the P-PD-01 process (F-G-02 for objectives and indicators and F-G-03 for the resources needed), as well as the use of information from two additional forms (F-MP-02 for feedback handling and F-G-01 for gathering and assessing information), integrating this subsystem with the overall B2C ECT system.

The F-MI-01 form contains six sections. The first section is for establishing the purpose, objectives and indicators of the monitoring and measuring student satisfaction to comply Clause 6.1 of ISO 10004. The second section is to determine the scope and frequency of measurements (Clause 6.2 of ISO 10004). The third section considers methods and responsibilities (Clause 6.3 of ISO 10004). The next section covers the resources needed for this subsystem. The fifth section is for student expectations to comply Clause 7.2 of ISO 10004. The last section is for gathering student satisfaction data Clause 7.3 of ISO 10004.

Tables 4.11 to 4.17 exemplify components for monitoring and measuring student satisfaction, which are embodied in the F-MI-01 form and applied to the B2C ECT system in a university course. Table 4.11 defines the general purpose for the subsystem and three objectives regarding student satisfaction with the course site and the operation of the process itself.

Table 4.11 Example of purpose and objectives of monitoring and measuring student satisfaction

Purpose
Measuring student satisfaction with the B2C ECT system, considering the course material delivered through the course site and email. Obtaining student's expectation and monitoring trends in student satisfaction during the term.
Objectives
• Increase student satisfaction with the course site regarding previous measurement • Measure student satisfaction with the B2C ECT system in the XX Course at least three times during the term • Inform to student about the result of surveys by publishing of surveys reports on the course site.

Table 4.12 presents indicators for monitoring and measuring student satisfaction. The first indicator has been created based on the suggestion from the ISO 10008 standard, *"grading or ranking from surveys measuring the satisfaction of consumers"* (ISO, 2013a, p. 5). The next two indicators are related to the measuring of the implementation of the Monitoring and Measuring Student Satisfaction process itself.

Table 4.12 Example of indicators of the monitoring and measuring student satisfaction process

Indicator	**Formula**			**Goal**	**Justification of the goal**	**Person responsible to measure**	**Frequency**
Comparison of median of student satisfaction regarding the course site during term.	**Median**	*Initial Survey*		Increase of student satisfaction	The goal is increase student satisfaction regarding the course site during term.	Professor / Researcher	1st measurement: After the application of the midterm survey 2nd measurement: After the application of the final survey.
		Midterm Survey					
		Final Survey					
	Increase of student satisfaction						
	Median from the ***Midterm Survey*** > Median from the ***Initial Survey***		Yes /No				
	Median from the ***Final Survey*** > Median from the ***Initial Survey***		Yes /No				
Percentage of the applied surveys in term	(Numbers of applied surveys[1] in term t/ 3) *100 1: it does not refer to the number of answers by survey.			100%	Maximum value of the indicator	Professor / Researcher	At the end of term
Percentage of survey reports published on the course site	(Number of survey reports published on the course site in the term/ Number of applied surveys in the term) *100						

Table 4.13 displays the scope of the planned measurement. It includes determining student's expectations and perceptions. Furthermore, this table shows the frequency of these surveys.

Table 4.13 Example of scope and frequency to measure student satisfaction

Scope (what)	Type of data	Frequency (when)
Student expectations regarding: • Site format • Communication channels available. • Course material available on the course site.	Surveys of students registered in the course	At the beginning of the term
Student evaluation of: • Site format • Communication channels available • Course material available on the course site, • Ease of use of the course site		At the middle of the term
Obtain the overall student's perception about: • Implemented B2C ECT system.		At the end of the term
Obtain student satisfaction with: • Course site • Email		At the beginning, middle and the end of the term
Obtain student satisfaction from feedbacks	Feedbacks from students	During the term

Implementation methods for measuring student satisfaction are depicted in Table 4.14. It includes the source of measurements, considering an internal source when it is undertaken by the professor or someone considered part of the university course. An external source takes place when the measurement is performed by an external person or organization (e.g. the department or the university). Furthermore, Table 4.14 shows the method, person responsible and who receive the information for measuring student satisfaction

Table 4.14 Example of implementation methods for measuring student satisfaction

Source (external/internal)	Method (How)	Person responsible	Whom receive the information
Initial Survey (Internal)	Self-completion questionnaires published on the course site (online surveys)	Professor	Professor
Midterm Survey (Internal)			
Final Survey (Internal)			
Feedbacks (internal)	Information from feedbacks received during term		Professor/ Teaching assistant

Table 4.15 illustrates an example of the resources needed for monitoring and measuring student satisfaction. It considers the application of online surveys.

Table 4.15 Example of the resources needed for measuring student satisfaction

Human Resources	Professor and teaching assistant
Monetary Resources and others	Not needed
Hours of training	Training of the professor/ teaching assistant on the course site, regarding the resource "feedback" in Moodle or another computer-based learning platform to set up the surveys or other online survey programs
Infrastructure	Computer, software, the Internet, the course site

Table 4.16 displays student expectations, considering the information gathered in the Planning and Designing the B2C ECT System process. Expectations are categorized as stated, implied, academic regulation and other requirements.

Table 4.16 Example of determining student expectations

Expectations	
Stated student requirements	• Receive the content necessary to learn about the course, both in the classroom and on the course site or email. • Have fair evaluations, which would be published on the course site.
Implied student requirements	• Have all covered topics before a due assignment or exams, which should accessible on the course site. • Have access to lectures before each class on the course site. • Have easy access to course material on the course site. • Receive answers to inquiries in a short time on the course site and by email.
Academic regulation requirements	• Has a course outline available on the course site during all term.
Other student requirements	• Have extra course materials such as glossary, calculation sheet and solved problems. • Have the published marks on the course site

The information contained in Table 4.17 about student satisfaction data is based on the student expectations of Table 4.16. These expectations are categorized according to product, delivery or organizational characteristics which have an impact on student satisfaction. Finally, these characteristics are ranked according to their relative importance for students. The author of this thesis ranked them in the example based on experience as a student.

Table 4.17 Example of gathering student satisfaction data

Characteristics related to student satisfaction		**Rank**
Product characteristics	Have the lecture slides available on the course site	1
	Do not have typo in the course materials delivered electronically on the course site and email	4
	Have an easy access to the course material on the course site	6
Delivery characteristics	Have access to lecture slides before each class on the course site	3
	Have published marks on the course site	5
Organizational characteristics	Have access to clarify doubts with the professor and /or TA	2

The P-MI-03 process has three main phases: planning (Figure 4.7), operation (Figures 4.7 and 4.8) and maintenance and improvement (Figure 4.7).

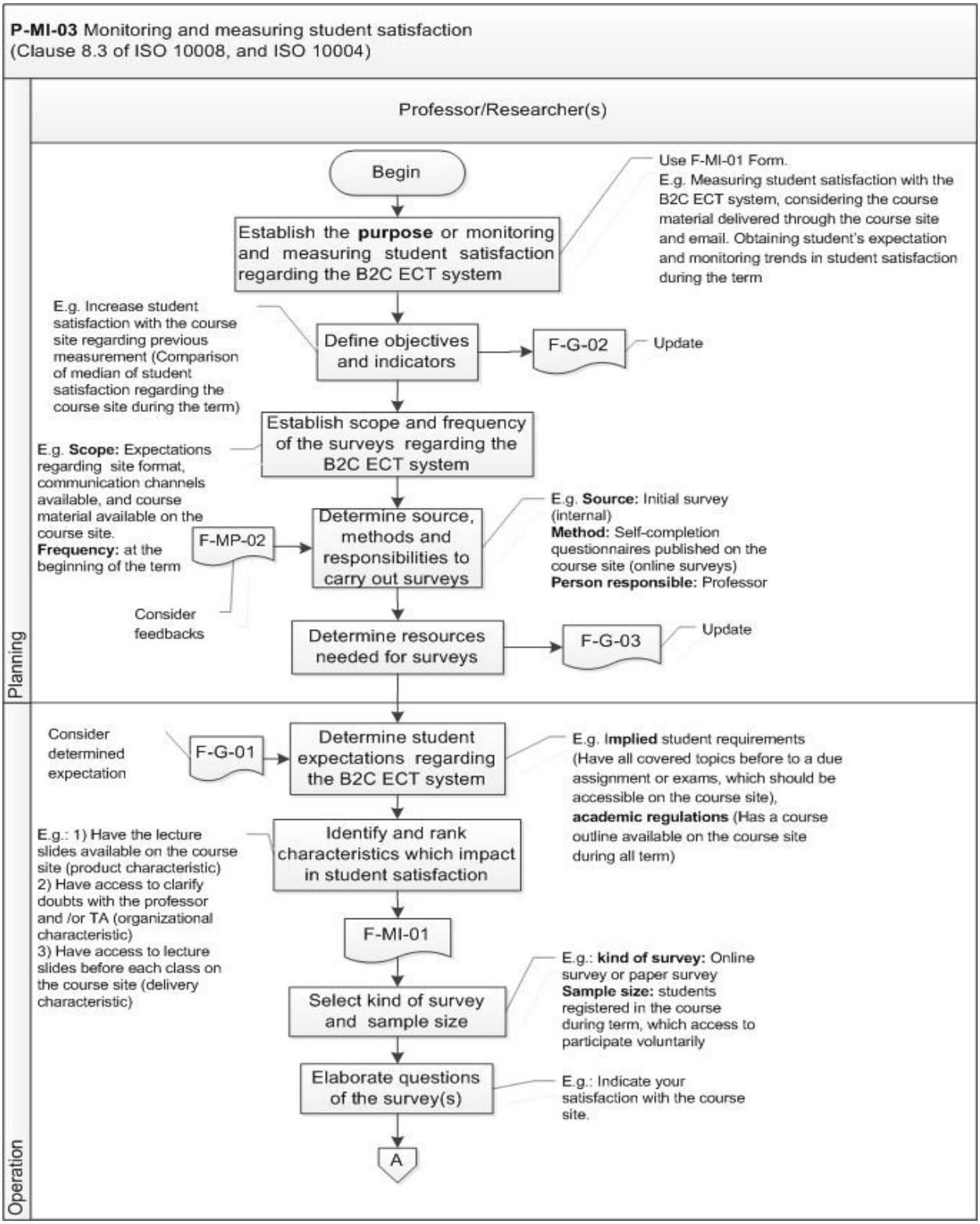

Figure 4.7 Planning and operation phases of Monitoring and Measuring Student Satisfaction (P-MI-03)

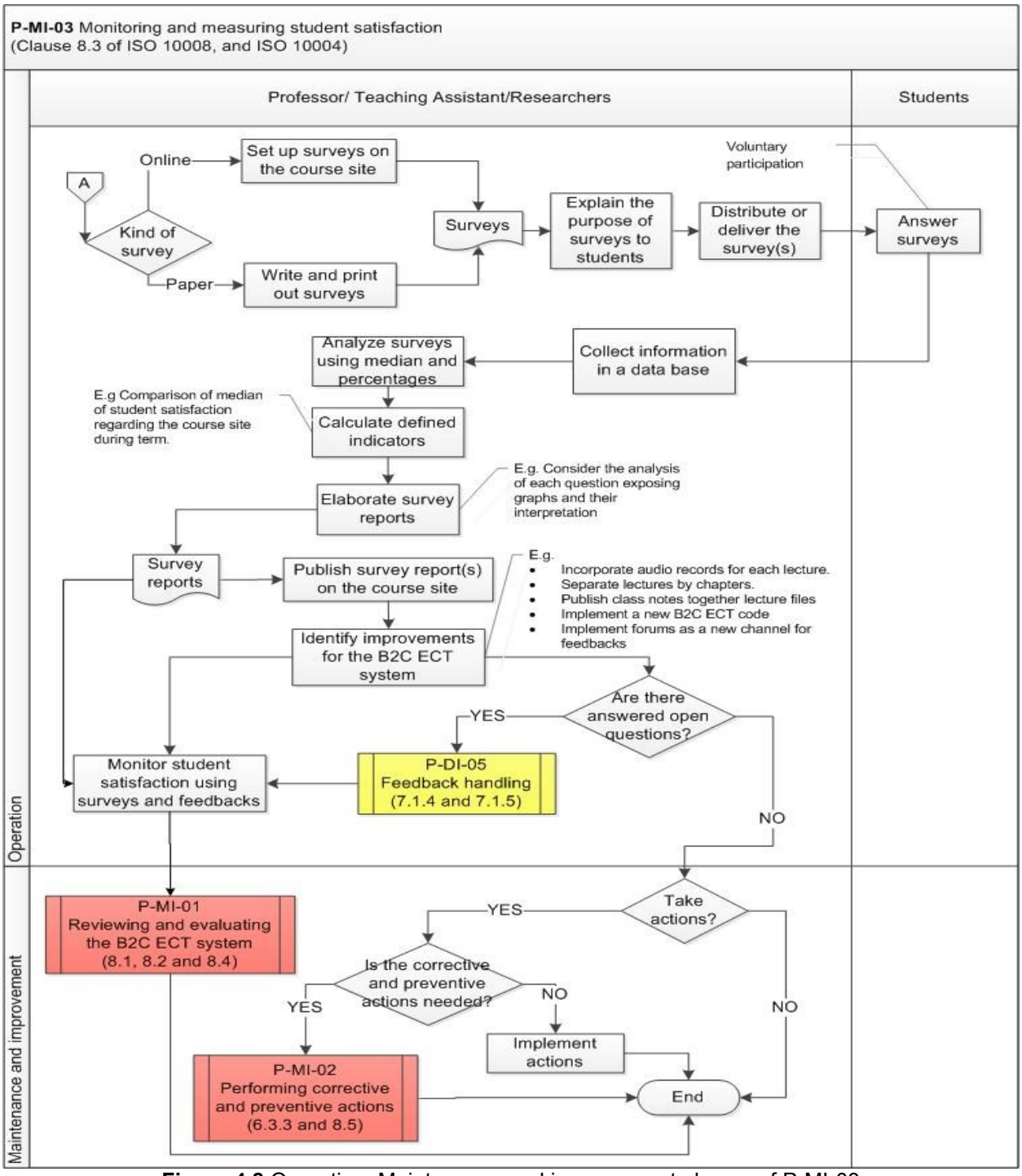

Figure 4.8 Operation, Maintenance and improvement phases of P-MI-03

The surveys with specific questions can be seen in Appendix C (Form C.1 to C.3). Some general recommendations about survey questions are presented in Table B.3. The purpose of the surveys (e.g. measure student satisfaction or obtain expectations) should be considered to choose questions presented in that table.

4.5. B2C ECT Information security in a university course based on ISO/IEC 27001

In this research, the "Security" and "Privacy" guidelines of ISO 10008 are modeling as a subsystem of the overall B2C ECT system, considering the ISO/IEC 27001:2013 standard and Clauses 7.2.2 and 7.2.3 of ISO 10008. This subsystem is developed in the Managing Information Security process (P-DI-05).

Clause 7.2.2 of ISO 10008 considers the security about *"…control of recording, transmission and retention of consumer data."* (ISO, 2013a). Transmission considers the payment process involved in the system. However, this B2C ECT system in a university course does not encompass this kind of process.

According to ISO (2013a), *"Privacy refers to the way in which an organization collects and uses personal information of the consumer*".

The flowchart of P-DI-05 (Figure 4.9) includes requirements of ISO/IEC 27001 which have been considered relevant for this research such as definition of the scope (Clause 4.3), policy and objectives (Clauses 5.1 and 6.2), identification of the information assets (Control A.8.1.1), risk assessment and treatment (Clauses 6.1.2 and 6.1.3).

The requirements about the "Performance evaluation" (Clause 9) and "Improvement" (Clause 10) of ISO/IEC 27001 have been connected with guidelines of Clause 8 "Maintenance and improvement" of ISO 10008. Table 4.18 illustrates the association between processes of the modeled B2C ECT system and clauses of standards previously mentioned, which were integrated to the Managing Information Security process (P-DI-05) (see Figure 4.9).

Table 4.18 Connections among the B2C ECT system processes and ISO 10008 and ISO 27001 clauses

Process	ISO 10008	ISO/IEC 27001
Reviewing and Evaluating the B2C ECT System (P-MI-01)	Clause 8.1 "Collection of information" Clause 8.2 "Evaluation of performance of the B2C ECT system" Clause 8.4 "Review of the B2C ECT system"	Clause 9.2 "Internal audit" Clause 9.3 "Management review"
Performing Corrective and Preventive Actions (P-MI-02)	Clause 6.3.3 "Correction" Clause 8.5 "Continual improvement"	Clause 10.1 "Nonconformity and corrective action" Clause 10.2 "Continual improvement"

The determination of the resources needed to security issues should be incorporated in the Planning and Designing the B2C ECT System process (P-PD-01) in the F-G-03 form. As well as any communication regarding security should be included in the communication plan (F-G-04) described in Chapter 3, integrating this subsystem with the overall B2C ECT system.

Regarding the security in the documented information, the guidelines for records management to the B2C ECT System in a university course are applicable (Table 3.18) and the information asset inventory in Table 4.23.

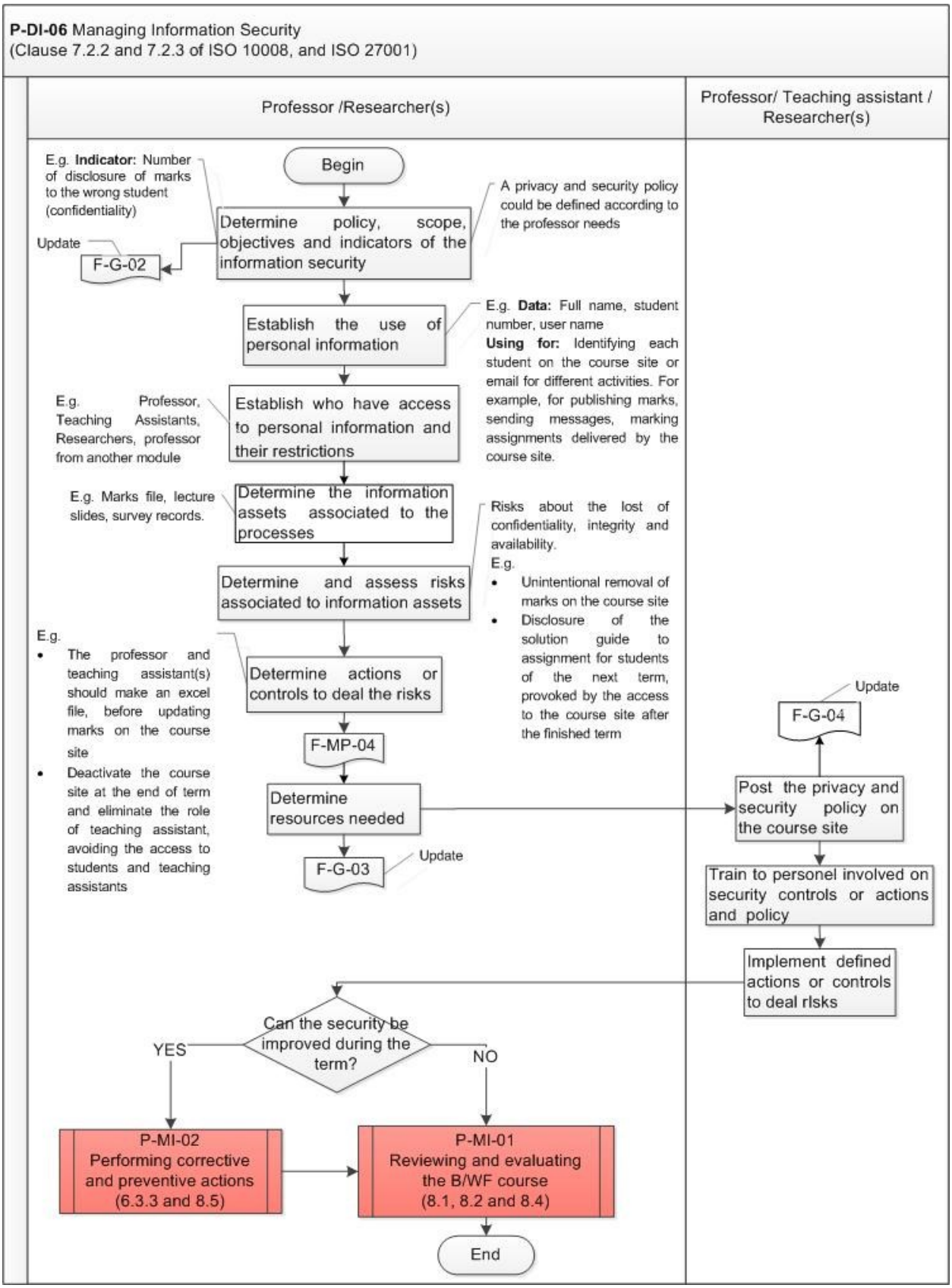

Figure 4.9 Managing Information Security (P-DI-05)

The P-DI-05 process includes the use of one form labelled as F-MP-04 (Appendix B.13). It was created to help the professor to perform the “Security” and “Privacy” requirements. This form is composed of six main sections.

The first section of the F-MP-04 contains the definition of the scope, policy and objectives (Table 4.19). In this model, the privacy and security policies have been developed in conjunction as a unique policy which should consider university regulations. This policy should be communicated to professor, teaching assistants and researchers who manage relevant information or data.

Table 4.19 Example of scope, policy and objectives of information security

Scope
The information security management system for the university course is limited to the processes which involve electronic transactions such as the course material delivered through the course site and email, as well as to the activities under control of the professor and teaching assistant(s). Therefore, the processes undertaken in the classroom are not considered.
Privacy and Security Policy
The security and privacy regarding the information of the course material delivered through the course site and email is essential. The professor and teaching assistant(s) are committed to maintain the confidentiality, integrity and availability of the information of the course site and/or emails. The personal data of students is considered private information. All information generated during the course, where students are identified is considered as personal information, especially, marks and report of misconduct.
Objectives
• Maintaining the operation of the course site during the term to permit the availability of course materials published on the site. • Publishing lecture slides on the course site before the class at least at 95% of the time to permit the availability of lecture slides • Avoiding the typos in the lecture slides delivered through the course site to maintain the integrity of the information provided in the lecture slides. • Preserving the integrity, availability and confidentiality of the marks published on the course site.

The second section of the F-MP-04 form covers indicators for information security (Table 4.20), which were created based on suggestions of the ISO 10008 standard, such as “the number of deliveries completed on time in relation to the total” and “the number of internal site/platform system failures” (ISO, 2013a, p. 5). Furthermore, the indicators were elaborated to comply with the characteristics of the information security MS from the ISO/IEC 27001 standard such as “Availability”, “Confidentiality” and “Integrity” (definitions of these terms are available in the glossary at the beginning of the thesis).

Table 4.20 Example of information security indicators

Indicator	Formula	Goal	Justification of the goal	Person responsible to measure	Frequency
Instances of course site failures in the term (availability)	Number of instances of the course site failures in the term	<= 5	It was set to <=5, due to risks regarding issues such as: the Internet, the server, the operability of the course site.	Professor	Monthly
Percentage of lecture slides published on the course site before the class (availability)	(Numbers of the lecture slides published on the course site before the class in the term/ Number of lecture slides in the term) *100	>=95%	It was set at 95%, due to the risk regarding having problems with the operability of the course site or issues with access to the Internet.		Weekly
Percentage of lecture slides published on the course site with typos in the term (integrity)	(Number of lecture slides published on the course site with typos in the term/ Number of lecture slides published on the course site in the term) *100	<= 10%	It was set to <=10%, due to risks regarding issues such as: the Internet, the server, the operability of the course site.		Monthly
Percentage of the published marks on the course site without mistakes (integrity)	(Numbers of the published marks on the course site without mistakes in the term/ Number of published marks on the course site in the term) *100	=100%	The ideal goal has been set up, due to the importance of marks for students		After each midterm /exam
Number of disclosure of marks to the wrong student (confidentiality)	Number of disclosure of marks to the wrong student	0			After each release of marks

The third section of the F-MP-04 form is for establishing the use of personal information in the B2C ECT system in a university Course (Table 4.21). This section was developed based on Clause 7.2.3 of ISO 10008.

Table 4.21 Example of the use of personal information

Data	Using for
Full name, student number, user name	Identifying each student on the course site or email for different activities. For example, for publishing marks, sending messages, marking assignments delivered by the course site.
Email address	For sending relevant messages about the course or receiving assignments delivered by email
Information about the use of the course site	Tracking delivered products, improve the course site changing format or available resources. This information is only for internal use.
Any other information sent through email or course site	Answering a question, or doing other activities on the course site such as forums and chat.

The fourth section of the F-MP-04 form was developed based on guidelines for "Privacy" of ISO 10008. In this part, the professor can define who have access to the personal information and whether they are internal to the university course (e.g. teaching assistant) or external (provider or third party). Also, the professor should establish restrictions for the use of personal information (Table 4.22).

Table 4.22 Example of who have access to personal information and their restrictions

<table>
<tr><th>Who</th><th>Internal/ External</th><th>What information</th><th>Restrictions</th></tr>
<tr><td>Professor</td><td rowspan="2">Internal</td><td rowspan="3">All information from the course site. If there are anonymous activities, then nobody can know who deliver the information.</td><td rowspan="2">• Have only formal communications with students.
• The Professor or TA should not divulge or comment personal information to an external person.</td></tr>
<tr><td>Teaching Assistant</td></tr>
<tr><td>Professor from another module</td><td>External</td><td>• Access to information to see the content of the course, such as lectures and notes.
• Not have communication with students.</td></tr>
<tr><td>Other students of the course</td><td>Internal</td><td>Published information on the course site.
Student can edit their personal information to show to other students (e.g. not show email address, or photo).</td><td>• Students should not divulge or comment personal information to another person does not link to the course.</td></tr>
<tr><td colspan="4">General recommendations or restrictions</td></tr>
<tr><td colspan="4">• Sending emails to students for personal purpose is forbidden.
• The disclosure of marks is forbidden.
• The disclosure of misconduct situations in the course is forbidden.</td></tr>
</table>

The fifth section of F-MP-05 form includes the information asset inventory based on Control A.8.1.1 and Clause 7.5.3 "Control of documented information" of ISO/IEC 27001. The inventory has six fields:

process, information asset, media, storage, retention and disposition. Examples of each field are shown in Tables 4.23.

Table 4.23 Example of information asset inventory

Process	Information Asset	Media	Storage	Retention	Disposition
Setting and updating the course site and email	Marks published on the course site	Electronic (Database on the course site)	Grade resource/ the course site	During term	Deactivate the course site for students and TA
• Checking midterms/exams • Checking evaluation activities	Score files	Electronic (Excel file)	"Marks/XX course_ AA term" folder in the professor computer	5 years	Delete
Preparing lectures / labs / tutorials	Lecture slides	Electronic (PDF file)	"Lectures/XX course_ AA term" folder in the professor computer		
Setting and updating the course site and email			Lecture section/ the course site	During term	Deactivate the course site for students and TA
	Sample Midterm		Exams section/ the course site	5 years	Delete
Preparing and giving Midterm(s) and Final exam(s)			"Midterm/XX course_ AA term" folder in the professor computer		
Planning and designing the course	Course Outline		"XX course_ AA term" folder in the professor computer		
Setting and updating the course site and email		Electronic (PDF file and Tab)	General information section/ the course site	During term	Deactivate the course site for students and TA
	Sample exam	Electronic (Activity on the course site)	Exams section/ the course site		
Answering student inquiries	Answers to students	Electronic (Emails)	In the email of the professor and TA		Delete
Preparing evaluation activities	Assignments	Electronic (PDF file)	"Assignments/XX course_ AA term" folder in the professor or TA computer	5 years	
Setting and updating the course site and email			Assignments section/ the course site	During term	Deactivate the course site for students and TA

Table 4.23 Example of information asset inventory (continued)

Process	Information Asset	Media	Storage	Retention	Disposition
Preparing evaluation activities	Solution guide to assignment	Electronic (PDF file)	"Assignments/XX course_ AA term" folder in the professor or TA computer	5 years	Delete
Setting and updating the course site and email			Assignments section/ the course site	During term	Deactivate the course site for students and TA
	Announcement Forum	Electronic (Activity on the course site)	At the beginning of the course site		
• Setting and updating the course site and email • Operating the course site	Users	Electronic (Database on the course site)	Users resource/ the course site		

The last section of F-MP-05 form includes the assessment and treatment of risks (Table 4.24), which considers six fields: risk, information asset, likelihood, consequence, level of risk and risk treatment. Definitions of these terms were shown previously in the Glossary. This section facilitates to comply with requirements of Clauses 8.2 and 8.3 of ISO/IEC 27001.

Table 4.24 Example of assessment and treatment risks of the B2C ECT system

Risk	Information Asset	Likelihood	Consequence	Level of risk	Risk Treatment
Unintentional removal of marks on the course site	Marks published on the course site	Possible	Medium	Medium	The professor and teaching assistant(s) should make an excel file, before updating marks on the course site Training on grade resource of the course site to the professor and teaching assistant(s)
Publish marks on the course site with mistakes					The professor and TA should check published marks compared with the original marks
Publish lecture slides with typos	Lecture slides	Unlikely	Low	Low	The professor should check carefully lecture slides before publishing on the course site.

Table 4.24 Example of assessment and treatment of risks of the B2C ECT system (continued)

Risk	Information Asset	Likelihood	Consequence	Level of risk	Risk Treatment
Disclosure of the solution guide to assignment for students of the next term, provoked by the access to the course site after the finished term	Solution guide to assignment	Possible	High	High	Deactivate the course site at the end of the term and eliminate the role of teaching assistant, avoiding the access to students and teaching assistant(s).
Lack of protection of personal data of students, provoked by the access to the participant list.	Users (data base)	Unlikely	Medium	Low	Blocking students from seeing the course participant list.
Failures of the course site during term due to problems with the Internet or network in the university	All course material delivered on the course site.	Possible	High	High	Have good communication with the support team in the university, who manage the repository of the course site
Receive attacks to the course site from hackers					

4.6. Summary

Chapter 4 has presented four subsystems for the B2C ECT system, considering the requirements of the following standards: ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001. These subsystems were integrated with the B2C ECT system developed based on the ISO 10008 standard in a university course for higher education.

The subsystems were developed in four processes. For each one, a flowchart, forms and examples were developed. The identification of the clauses of ISO 10008 included in each subsystem and other standards used are shown below:

- The Managing B2C ECT Code process (Figures 4.1 and 4.2) covers Clause 7.1.2 of ISO 10008 and guidelines of ISO 10001.
- The Feedback Handling process (Figure 4.3 to 4.6) follows Clauses 7.1.4 and 7.1.5 of ISO 10008 as well as guidelines of ISO 10002. The guidelines of Clause 7.1.4 regarding external dispute resolutions were excluded from the scope of this research.
- The Monitoring and Measuring Student Satisfaction process (Figures 4.7 and 4.8) includes Clause 8.3 of ISO 10008 and ISO 10004.
- The Managing Information Security process (Figure 4.9) covers Clauses 7.3.2 and 7.3.3 of ISO 10008 as well as requirements of the ISO/IEC 27001 standard.

The tools used for integration were the “Process map” (see flowcharts) and “Analysis of common elements of standards” (see table 4.18). For instance, the Performing Corrective and Preventive Actions process was integrated in different processes or subsystems such as: P-DI-04 for B2C ECT Code, P-DI-05 for feedbacks and P-DI-06 for security. Another example is that the Feedback Handling process was integrated with the Monitoring and Measuring Student Satisfaction process (ISO 10004), since answers to open questions of the surveys were considered a feedback.

These four developed subsystems can be implemented by themselves, as well as in conjunction with the B2C ECT system in a university course presented in Figure 3.2. For example, the information security subsystem could be implemented alone, since a professor could identify security risks (e.g. disclosure of the solution guide for an assignment to students of the next term), and implement actions to decrease or avoid such identified risks (e.g. deactivate the course site at the end of the term).

These subsystems can be adapted by a professor. For instance, the B2C ECT code could focus only on emails without considering promises related to the course site. The feedback subsystem could also include only emails as a communication channel to receive feedbacks instead of the four presented in this thesis.

Chapter 5. Implementation of ISO 10008 in an engineering course using Moodle

5.1. Introduction

An application of the ISO 10008 standard in one undergraduate engineering course in a university in western Canada is investigated. The course is considered to be a web-facilitated course, since the professor teaches in a regular classroom and delivers course materials on a website.

The course will be called “A1 Course” in this thesis as a generic name. The website will be called the “course E-Class site” because the university uses the name “E-Class” for sites based on the Moodle platform.

The overall number of participants in this study was 110, which includes all students enrolled in the A1 Course for the Spring/Summer term 2015. Their participation was indirect, since they received improvements on the course E-class site. The students who participated directly in this research were the ones who answered surveys during the term (47 for the initial survey, 44 for the midterm survey and 39 for the final survey).

The main goal of this part of the research is to study how ISO 10008 can be used to address electronic delivery of an engineering course material through a course site. Another goal is to verify that the implementation of this standard drafted for customer satisfaction can help achieve an increase in student satisfaction, regarding the course material delivered by the course site.

A further goal is the implementation of subsystems following two other standards for customer satisfaction (ISO 10002:2014, establishing a feedback handling system and ISO 10004:2013, for monitoring and measuring student satisfaction) and one standard for information security (ISO/IEC 27001: 2013).

The application of ISO 10008 in the A1 Course was based on the model presented in Chapters 3 and 4, with modifications explained in Section 5.2.1.

This part of the research was included in a major investigation called “Implementation of ISO 10008 in Engineering Courses” conducted by Dr. Stanislav Karapetrovic and approved in May 2015 by the Research Ethics Board 2.

Sections 5.2 to 5.4 explain how the modeled B2C ECT system with three of its subsystems was implemented in the A1 Course. These sections show the topics considered in each phase of the modeled B2C ECT system developed in Chapters 3 and 4. Section 5.2 presents the processes included in the planning and design phases, Section 5.3 is for development and implementation phases and Section 5.4 shows the processes for maintenance and improvement phases. Finally, Section 5.5 displays the summary of Chapter 5.

5.2. Planning and design phases of the B2C ECT system in the A1 Course

This section contains actions taken to follow the modeled B2C ECT system described in Sections 3.3.1 and 3.3.2, considering the Planning and Designing the B2C ECT System process.

5.2.1. Establishing the B2C ECT system in the A1 Course

The model for the B2C ECT system presented in Chapters 3 and 4 was implemented according to the professor's requirements. Researchers in conjunction with the professor teaching the A1 Course established the boundaries of the B2C ECT system.

The application of the ISO 10008 standard in this case study focused on the electronic delivery of the course material on the course site. In this case, the course site uses the Moodle platform. It is called E-Class at the University. Therefore, the research scope for the application of ISO 10008 in the engineering course includes *course material delivered through the course E-Class site* as the main product and excludes electronic transactions through email.

Table 5.1 shows the terms defined in the ISO 10008 standard that were linked to the A1 Course to define the elements of the B2C ECT system implemented.

Table 5.1 ISO 10008 terms applied to the A1 Course

<table>
<tr><th>Term (ISO 10008)</th><th colspan="2">System (A1 Course)</th></tr>
<tr><td>B2C ECT
(Clause 3.1)</td><td colspan="2">E-class site of a web-facilitated course at a western Canadian university</td></tr>
<tr><td>Organization
(Clause 3.2)</td><td colspan="2">• Professor teaching the A1 Course
• Researcher assistant's supervisor
• Research assistant (designer)</td></tr>
<tr><td>Consumer
(Clause 3.3)</td><td colspan="2">Students enrolled in the A1 Course during Spring/Summer 2015</td></tr>
<tr><td rowspan="2">Product
(Clause 3.4)</td><td colspan="2">Course material delivered through the course E-Class site</td></tr>
<tr><td>Existing prior to the study:
• Course outline
• Lecture slides
• Assignments
• Quiz Solutions
• Sample midterm/exam
• Marks published on E-Class site</td><td>Added during the study:
• Current schedule
• Assignment Status
• Calendar
• Online learning tools
• Result of surveys.</td></tr>
</table>

The framework for the B2C ECT system proposed in Figure 3.2 in Chapter 3 was implemented partially in the A1 Course. The Answering Student Inquires and Managing B2C ECT Code processes were not included, because these processes were not within the scope of the B2C ECT system applied in the A1 Course. Furthermore, Clause 6.2.2 of ISO 10008 regarding the "Initial selection support" was excluded from the Operating the Course Site and Setting and Updating the Course Site and Email processes, since the product catalog (see Table 3.20) was not considered in this implementation. The privacy and security policy (Clauses 7.2.2 and 7.2.3) was not written and the guidelines of Clause 7.2.3 "Privacy" were not

applied. Therefore, the related activities of the Managing Information Security process were not undertaken.

The application of other processes omitted particular activities due to the exclusion of the email as a delivery channel and the professor's requirements. For instance, the Feedback Handling process (P-DI-05) considered the implementation of only two communication channels (paper feedback and surveys) instead of the four presented in the model.

Figure 5.1 shows the B2C ECT system implemented for the A1 Course, identifying with a color code the changes regarding the modeled B2C ECT system presented in Chapter 3.

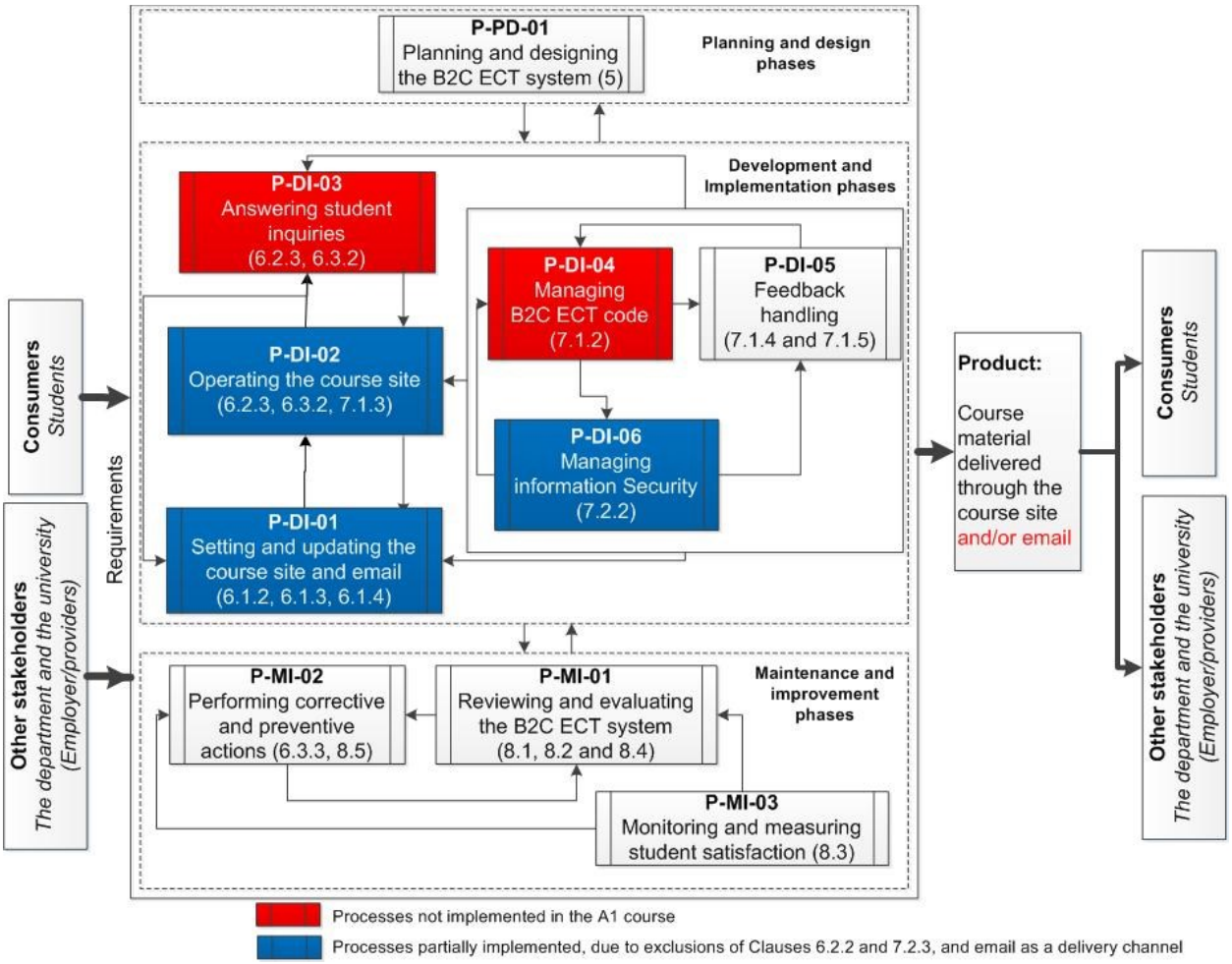

Figure 5.1 The B2C ECT System in the A1 Course

5.2.2. Planning and designing the B2C ECT system process

This followed the flowchart defined in Chapter 3 (Figure 3.3) and previous agreements with the professor teaching the A1 Course. The four forms proposed for this process were used (Record C.1 to C.4).

The A1 Course did not have a previous Quality Management System (QMS). Therefore, the B2C ECT system was not connected to any previous QMS.

The F-G-01 form was used to obtain information and define actions for the B2C ECT system in the A1 course. Examples of the actions are: “not include forums and glossary on the course E-Class site”, “ask students about the usefulness of the following resources: calendar, current schedule, assignment status, online learning tools, result of surveys and feedback forms” (Record C.1).

The objectives and indicators were established with the F-G-02 form (Record C.2). Seven objectives and their respective indicators were defined or adopted from examples of Section 3.3.3.2. These objectives were linked to the following categories: “Product”, “Security”, “Continual improvement” and “Satisfaction”. An example of an adopted objective is “Publishing 100% of the lecture slides on the course E-Class site previous to the class”. On the other hand, an example of a new objective is “Implementing on the course E-class site 100% of the new products (resources) considered useful by students in the Initial survey“. Section 5.4.1 shows the result of the measurement of the defined indicators and their respective objectives.

The resources needed were defined using the F-G-03 form (Record C.3). The human resources needed were the professor and researchers. Monetary resources were not required, since the activities were performed by the professor or researchers and compensations for promises of the B2C ECT code were not implemented. Regarding the training resources, the self-training on the ISO 10008, ISO 10002, ISO 10004 and ISO/IEC 27001 standards was necessary for the research assistant (designer) and self-training in Moodle for the designer and the professor. The infrastructure resources required were the internet, computers, the course E-Class site and printer.

The Communication Plan for the B2C ECT system form (F-G-04) was used to delimit which information should be delivered by the course E-Class site. The people responsible to deliver information were the professor, the Researcher assistant's supervisor and research assistant (designer). For instance, the designer was in charge to upload files on the course E-class site regarding the research such as the information letter of ISO 10008 study and survey reports. The designer updated the current schedule and assignment status after each lecture. On the other hand, the professor was responsible to upload PDF files of course outline, lecture slides, assignments and quiz solutions (Record C.4).

5.3. Development and implementation phases of the B2C ECT system in the A1 Course

Four out of the six processes from the developed and implementation phases in Figure 3.1 of the modeled B2C ECT system were included in the application in the A1 Course (see Figure 5.1): Setting and Updating the Course Site and Email (P-DI-01), Operating the Course Site (P-DI-02), Feedback Handling

(P-DI-05) and Managing Information Security (P-DI-06).The implementation of these processes is explained in the following sections.

5.3.1.Setting and updating the course site process

The P-DI-01 process followed the activities described in Figures 3.4 to 3.7, deleting the parts where the email was considered. The research assistant used the F-SP-01 form to follow this process (Record C.5). Elements of ISO 10008 to be applied in the A1 course were chosen, for example including a section for student support and displaying the office hours and contact information for the professor. As a complementary communication channel, the Moodle “announcement” forum was chosen.

The professor granted access to researcher to the course E-Class site. Researchers had the Moodle “Designer” role with a restricted access to marks, announcement forum and list of students. Furthermore, the tasks of each one were defined in the F-SP-01 form (Record C.5). For instance, the research assistant had the task of setting up new products or changes on the course E-Class site (interface).

The course E-Class site had three major settings. The first one was undertaken by the professor teaching the A1 Course before the start of this study. The second setting was performed after the application of the first survey and the last one after the midterm survey. These surveys were carried out in order to obtain student expectations and requirements regarding the course E-Class site.

The status of the course E-Class site after the first setting or at the beginning of this study was:

- The course E-Class site was configured with the Moodle “Topic Format” and the Moodle course layout called “show all sections in one page”, considering 10 “topics” (each topic has a header) called “Topic 1”, “Topic 2” consecutively,
- The course E-Class site had files of the course outline (a PDF file placed at the top of the course site), lecture slides (PDF file placed in different “topics”), assignment (PDF file placed below of the course outline file) , quiz solutions and sample midterm/exam
- The forum “announcement” below the course outline and assignment files.
- The course E-Class site was configured for not using the “completion tracking” feature provided by Moodle. It was not modified during the study, although it was proposed to comply with guidelines of Clause 6.3.2 “Delivery” of ISO 10008.

The changes incorporated on the course E-Class site in the second setting were:

- "Topic format" was kept during the research. However, the different topics were used to create sections, naming the sections with an appropriate name, e.g. "lecture", "assignments", "quizzes" and "exam"
- Files previously uploaded by the professor were placed in corresponding sections
- The contact information (full name, email address and office address) about the professor and their teaching assistants was incorporated at the top of the course E-Class site. Furthermore, the logo of the department and information about office hours were included
- The course outline was provided in a Moodle "Tab display" resource
- Six new products were added:
    - The "current schedule" in a Moodle "page" resource
    - The "assignment status" in a Moodle "page" resource
    - Five PowerPoint files for the "learning online tools"
    - The "survey reports" in PDF files in a new section called "ISO 10008 study"
    - The Moodle "Calendar" resource, including the milestones established in the course outline such as due dates of assignments, Midterm and exam
- Incorporation of the direct link to the professor's email address (see Record C.8)

The changes incorporated on the course E-Class site in the second setting were:

- Creation of a new section called "E-Class support" to accomplish Clause 7.1.3 of the ISO 10008.
- Incorporation of labels in the "lectures" section to separate the lectures by chapters of the reference book (see Record C.12)

The regular settings or updates of the course E-Class site were undertaken by the professor and the designer. For example, the professor uploaded files about lectures slides, assignments, quizzes, solved problems and sample midterm/exam.

5.3.2. Operating the Course Site Process

The P-DI-02 followed the activities described in Figures 3.8, deleting the parts that were connected to the P-DI-03 process. This was not included in the B2C ECT system in the A1 Course. Therefore, the activity "contact with the E-Class Team Support or the professor" replaces the P-DI-02 process in Figure 3.8. This process describes the interaction of students with the course E-Class site to obtain the course material. Furthermore, activities linked to the "Product catalog" and the "Completion tracking" features were not implemented.

5.3.3. Feedback Handling Process

The F-MP-02 form was used to determine the feedback handling subsystem, defining the policy statement, objectives, indicators and resources (Record C.6). The flowchart defined in Chapter 4 (Figures 4.4 to 4.6) was followed with the omission of some modifications. Due to the feedback system considered only anonymous feedback, therefore the communication with the student regarding his/her feedback was not included.

The implementation of the Feedback Handling process has considered two channels to receive feedbacks: paper feedback through a box in the classroom and answered open questions from surveys (see Figure 4.3). The process considers classifying the feedback into a comment, complaint, compliment, or suggestion.

The feedback handling subsystem was communicated to students in the classroom, giving to them the information letter of the study "Implementation of ISO 10008 in Engineering Courses". As well as the letter was posted on the course E-Class site in a section called "ISO 10008 study".

The system for the paper feedback consisted in locating two boxes close to the exit doors in the classroom. Then every Thursday, the research assistant carried the boxes to the class to receive feedback regarding the course E-Class site. The boxes were put in the classroom, from May 28th, 2015 until July 23rd, 2015, a total of eight times. However, the students did not use this communication channel to provide feedback during term.

Regarding the answered open questions in the surveys, 44 feedbacks were received from three surveys during the term (22 from the initial survey, 15 from the midterm survey and 7 from the final survey). 73% of the feedbacks were "suggestion", 16% "comment", 11% "compliment" and there were not feedbacks categorized as "complaint". At the end of the term, 93% of the feedbacks were closed and 7% of feedbacks had pending actions, due to extra solved problems for the final exam were not uploaded on the course site.

To monitor and control the feedbacks during the term, the "Feedback control sheet" proposed in Chapter 4 was managed by the research assistant (Table C.1). Figure 5.2 illustrate excerpts from this control sheet. The indicators defined for the Feedback Handling process were calculated (percentage of feedbacks analyzed during the A1 Course and percentage of closed feedbacks (see Table 5.3)) with the information obtained from this control sheet. Furthermore, this data provided information to obtain graphs for the Reviewing and Evaluating the B2C ECT System process (see Figure 5.5).

A	B	C	D	E	F	G	H	I	J
entification	Date received	Channel	Type	Feedback	Analysis	Action Needed?	Actions during the term	CA/PA Number	Status
01	26-05-2015	Survey	Suggestion	"More learning resources related to a lecture like link to public courses"	The professor cannot control the quality of the content published in other public courses. Therefore, this suggestion will not be implemented.	No	Not applicable		Closed
02	26-05-2015	Survey	Suggestion	"Direct link to email profs."	This suggestion is considered to be implemented	Yes	Included the direct link	01	Closed
03	26-05-2015	Survey	Suggestion	"Online learning tools"	It had been considered to be implemented according to the result of the initial survey	Yes	Included the online learning tools section		Closed

Figure 5.2 Extract of "Feedback control sheet" in the A1 Course

A received feedback from the first survey was *"Direct link to email profs.",* this suggestion was implemented through a link in the email address of the professor to send an email directly. Another implemented suggestion from the midterm survey was *"Divide lectures into groups-based on concepts, or chapters"*.

On the other hand, examples of feedbacks that were not applied in the A1 course, because they were out of the scope, are: *"More lectures/courses with eclass live"* and *"A "live chat" option to interact w profs when they are "online" could be useful for quick questions instead of sending an email"*.

5.3.4. Managing Information Security process

The P-DI-06 process followed the activities described in Figures 4.9. The F-MP-05 form was used to undertake the process (Record C.7), defining the scope, objectives and indicators for security, as well as the information asset inventory and the assessment and treatment of risks.

The scope of the information security subsystem of this implementation encompassed the information assets linked to the course E-Class site, in other words, the course material delivered through the course site.

Three objectives have been defined with their respective indicators (Record C.7), which are related to the "Availability" of the information. The first objective is about publishing the lecture slides previous to the class, this way students can access them to prepare the class. The second objective is linked to the assignments and the third objective with implementing new products on the course E-class site for the students. These objectives are shown in Table 5.3 (the first three objectives).

The information asset inventory identified fifteen assets (Record C.7), defining their process (e.g. Setting and Updating the Course Site and Email), information asset name (e.g. lecture slides), media (e.g. Electronic (PDF file)), storage (e.g. lecture section/the course E-Class site), retention (e.g. during the term) and disposition (e.g. deactivate the course E-Class site) for each one. Some of the identified information assets are: lecture slides, course outline, current schedule, users and published marks on the

course E-Class site. This information is used to perform the assessment and treatment of risks and also for the record management.

Concerning the assessment and treatment of risks, five risks were analyzed, identifying their respective treatments (Table 5.2). Two risks are concerned with the access of the researchers to sensitive student information, such as marks and personal data. Three risks are associated with disclosing of the solution guide to assignment or quiz solutions for students of the next term, provoked by the access to the course E-Class site after the finished term.

Table 5.2 Assessment and treatment of risks of the B2C ECT system in the A1 Course

Risk	Information Asset	Likelihood	Impact	Severity	Treatment
Disclosure of the solution guide to assignment or quiz solution for students of the next term, provoked by the access to the course site after the finished term	Solution guide to assignment	Possible	High	High	Deactivate the course site at the end of term and eliminate the role on the course site of teaching assistants and researchers, avoiding the access to the material after term.
	Quiz Solution				
Lack of protection of personal data of students or marks, provoked by the access of the researchers to the participant list or grades	Users (data base)	Unlikely	Medium	Low	• Grant access to researchers as "designer" without access to participant list and marks. • Restrict the possibility to change the "designer" role on the course E-Class site
	Marks published on the course site				
Use or alterations of the lectures or online learning tools	Lecture slides Online learning tools				Publish the lecture slide in PDF file and the online learning tools in PPSX file.

5.1.1. Performing Corrective and Preventive Actions process

The activities of this process were described in the flowchart of Figure 3.11. The corrective and preventive actions were managed by the research assistant. Furthermore, when the actions were proposed by the research assistant, the approval of the professor was required.

During the term, five corrective and preventive actions were identified, using the F-MI-03 form to record them (Records C.8 to C.12), 80% were preventive actions, which were identified from students through the open question in the surveys.

During the term, one correction was undertaken, since the professor teaching the A1 Course decided to change the due date for an assignment. Therefore, he sent an email to the students with the new due date and the explanation of the change. The change of that date implied the implementation of a

corrective action to update the “Calendar”, the “Course outline tab” and the “Current schedule” with the new deadline (Record C.11).

To monitor and control the status of these corrective and preventive actions during term, the “Corrective and preventive actions control sheet” was used. An extract of the data base in Excel program is shown in Figure 5.3. A complete record of the status of the corrective and preventive actions in the middle of July is shown in Table C.2.

	A	B	C	D	E	F	G	H	I
1	**CA/PA Number**	**Reported by**	**Date**	**Type of action**	**Detection from**	**Description of the situation**	**Last date for actions**	**Status**	**Date of status**
2	01	Student from Initial Survey	26/05/2015	Preventive action	Surveys	Include the direct link to professor’s email on the E-class site.	15/06/15	Closed	15/06/15
3	02	Student from Initial Survey	26/05/2015	Preventive action	Surveys	Include more practice problems with solutions in the E-Class site.	31/07/2015	Ongoing	13/07/15

Figure 5.3 Extract of “Corrective and preventive actions control sheet” in the A1 Course

Figure 5.6 in Section 5.2.1 is an example of the continuous control of the status of the corrective and preventive actions during the term, which displays that at July 16th. 60% of the actions were closed and the other 40% ongoing.

The corrective and preventive actions taken provoked changes to the course E-Class site shown in Section 5.3.1. Figure 5.4 shows an example of the records of a corrective and preventive action undertaken in the A1 Course using the F-MI-03 form.

Corrective and preventive actions Form							
Code	F-MI-03	**Clause**	6.3.3 and 8.5	**Version**	0	**Approval Date**	15-05-2015

1. General data:

Course	A1	**Term/Year**	Spring-Summer 2015	**CA/PA Number**	01

2. Identification of the situation

Reported by	Student from Initial survey		**Date**	26-05-2015
Type of action				
Corrective action		Preventive action		X
Detection from				
Nonconforming product		Reviewing and evaluating the B2C ECT system		
Complaint/feedback		Surveys		X
Indicator revision		Other		
Description of the situation				
Include the direct link to professor's email on the course E-class site.				

3. Cause analysis and action plan

Correction or Initial action
Not applicable
Cause Analysis or investigation
In the E-class site has not been shown the link for the professor's email. It was not considered how something useful for students.

Action Plan			
#	**Activity**	**Person responsible**	**Implementation date**
1	Set up the direct link to professor's email hidden to students	Designer	12-06-2015
2	Check and approve the modification	Professor	15-06-2015
3	Show the update on the E-Class site	Designer	15-06-2015

4. Action plan follow

#	**Date**	**Status (Ongoing / Closed)**	**Comments**
1	15-06-2015	Closed	The direct link to professor's email has been published at the top of the E-Class site, with other professor's information.

Figure 5.4 Example of corrective and preventive action form (F-MI-03) in the A1 Course

5.2. Maintenance and improvement phases of the B2C ECT system in A1 Course

The maintenance and improvement phases for the B2C ECT system in the A1 Course included the three processes or subsystems previously defined in Chapter 3 (see Figure 3.2 or Figure 5.1), which are explained in the following three subsections.

5.2.1. Reviewing and Evaluating the B2C ECT system process

The P-MI-01 process was undertaken based on the flowchart described in Figure 3.10, although the F-MI-02 form intended for recording the decisions taken was not used in this implementation. Reviews were undertaken, considering the information of the system, such as: result of surveys (Section 5.4.4), status of

feedbacks (Figure 5.5), status of the corrective and preventive actions (Figure 5.6), , guidelines of the ISO 10008 standard and the measurement of the indicators. Table 5.3 shows the final results of measurement of the indicators:

Table 5.3 Results of measurement of the defined indicators for the B2C ECT system

Objective	Indicator			Result	
Publishing 100% of the lecture slides on the course E-Class site previous to the class	Percentage of lecture slides published on the course E-Class site previous to the class			(25/25) *100= **100%, achieved goal**	
Publishing 100% of the assignments on the course E-Class site	Percentage of assignments published on the course E-Class site			(6/6) *100= **100%, achieved goal**	
Implement on the course site 100% of the new products (resources) considered useful by students in the Initial survey.	Percentage of new products implemented on the course E-Class site, which were considered useful by students in the initial survey			(5/5) *100 = **100%, achieved goal** New products: Assignment status, current schedule, calendar, online learning tools and result of surveys.	
Analyze 100% of the received feedbacks in the A1 Course during Spring-Summer 2015.	Percentage of feedbacks analyzed in the A1 Course in the term			(44/44)= 100% **100%, achieved goal**	
Close at least 80% of the feedbacks by implementing the determined actions during the A1 Course in the Spring-Summer 2015.	Percentage of closed feedbacks			(41/44) = 93%**, achieved goal**	
Measure student satisfaction with the B2C ECT system in the A1 Course at least three times during term	Percentage of the applied surveys related to planned surveys in the A1 Course during Spring-Summer 2015			(3/3)= 100%**, achieved goal**	
Increase student satisfaction with the course E-Class site regarding previous measurement	Comparison of student satisfaction regarding the course site during the term			Increase of student satisfaction**, achieved goal**	
	Median	Initial Survey	3.86	Median from the ***Midterm Survey***> Median from the ***Initial Survey***	Yes
		Midterm Survey	4.14	Median from the ***Final Survey*** **>** Median from the ***Initial Survey***	Yes
		Final Survey	4.19		

Figures 5.5 and 5.6 show the information collected regarding feedbacks, corrective and preventive actions in the A1 Course at July 16th 2015.

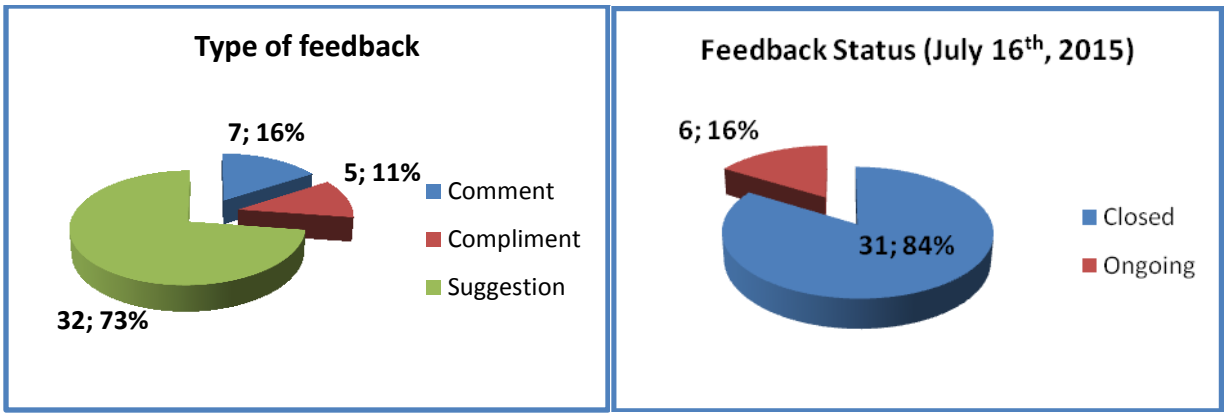

Figure 5.5 Status of received feedbacks in the A1 Course at July 16th 2015

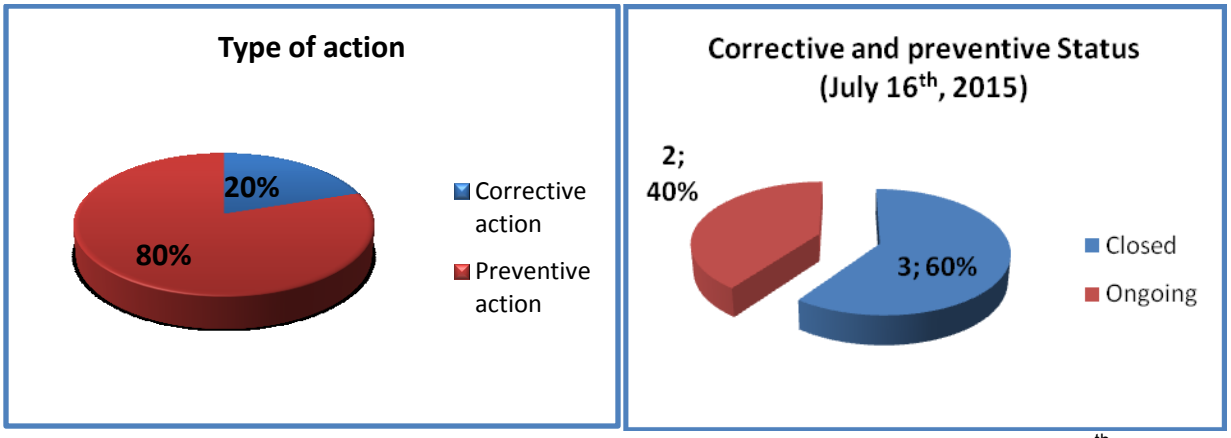

Figure 5.6 Status of corrective and preventive actions in the A1 Course at July 16th 2015

The research assistant generated proposals of changes on the course E-class site based on the review of the information collected. The following bullets present the proposals. The first two were implemented in the A1 Course.

- Creation of a new section called "E-Class support" to comply with Clause 7.1.3 of the ISO 10008
- Incorporation of labels in the "lectures" section to separate the lectures by chapters of the reference book (implementing the suggestion received from a survey)
- Incorporate an online sample exam, responding to a suggestion from a survey
- Change the format of the course E-Class site from the "Topic Format" to "Collapsed topic" (options of format provided by Moodle), since the course E-Class site had a very long vertical extension. The use of the Moodle "Collapsed topic" format gives the option to students to show the information by section improving the access to the course material needed.

5.2.2. Monitoring and measuring student satisfaction process

This process followed the flowchart illustrated in Figures 4.7 and 4.8, deleting the activities linked to online surveys, since this implementation considered only paper surveys. The F-MI-01 form was used to plan the P-MI-03 process. It covers the purpose and objectives of the process, indicators and resources, the scope, frequency, methods of the surveys and general student expectations (Record C.13).

Two indicators were defined in this process, the first one linked to the satisfaction of students with the course E-Class site and the second one regarding achieving the plan for this process. These are the last two indicators illustrated in Table 5.3.

In order to measure and monitor student satisfaction, three surveys were designed within the context of a major investigation called “Implementation of ISO 10008 in Engineering Courses”. The questions were adapted to be included in this implementation. The surveys used self-completion questionnaires distributed in the classroom. These were applied at the beginning, in the middle and at the end of the term.

The applied surveys were answered by students enrolled in the A1 Course during the Spring-Summer term, who accepted to participate voluntarily. The following subsections show the methodology used in the surveys, the result of each survey and a comparison of results.

5.2.2.1. Survey methodology

Before carrying out the surveys, the study was explained in detail to the students present in the classroom, giving them a hard copy of the Information Letter of the study “Implementation of ISO 10008 in Engineering Courses” (Record C.18). The researchers emphasized to students that their participation in the study was totally voluntary and their marks would not be affected whether they decide to participate or not.

The surveys were anonymous. Therefore, students did not need to write any personal information on them. Furthermore, in each survey, there was a checklist with two boxes: one to confirm consent to participate in the study and another confirming the understanding that after submission, there was no option to withdraw the survey, since it was anonymous. The answered survey was considered to contain valid data only if both boxes were checked off.

The application of the surveys in paper in the classroom was selected instead of an online survey on the course E-Class site, since the second option would probably have a lower response rate.

The median measurement was used to analyze the results of surveys, which is a method of direct analysis, which objective is to identify the middle response (ISO, 2012a, p. 24 of ISO 10004). The median was calculated using the following formula from a webpage of the University of Alberta:

“$$Median = L + I * \left(\frac{N/2 - F}{f} \right)$$”

"Where:
L = lower limit of the interval containing the median
I = width of the interval containing the median
N = total number of respondents
F = cumulative frequency corresponding to the lower limit
f = number of cases in the interval containing the median." (University of Alberta, 2015)

5.2.2.2. Initial survey

The initial survey had three questions (Form C.1). The first one was related to the usefulness of the resources to be implemented on the course E-Class site. The second was an open question about suggestions or comments to improve the current course E-class site. The last question surveyed student satisfaction with the course E-class site.

This survey was answered by 57 students in the end of May 2015. However, only 47 students wrote the checklist for giving their consent and understanding about withdrawal. Therefore, the valid number of responses was 47.

Regarding the first question, five out of the six presented resources have shown a favorable response (over 50% answered "Yes" or considered that the resource is useful). Only the "Feedback Form" resource was considered by 63% as not useful. On the contrary, 100% of students responded that "Assignment section" would be useful, followed by 98% for the "Current Schedule", 87% for the "Calendar", 81% for the "Online learning tools" and 51% for the "Result of Surveys". These results were used in setting up the course E-Class site, modifying it by including the "current schedule", the "online learning tools" and the "assignment" sections, Moodle "Calendar" resource and the "ISO 10008 study" section. More details about the implemented changes were shown in Section 5.3.1.

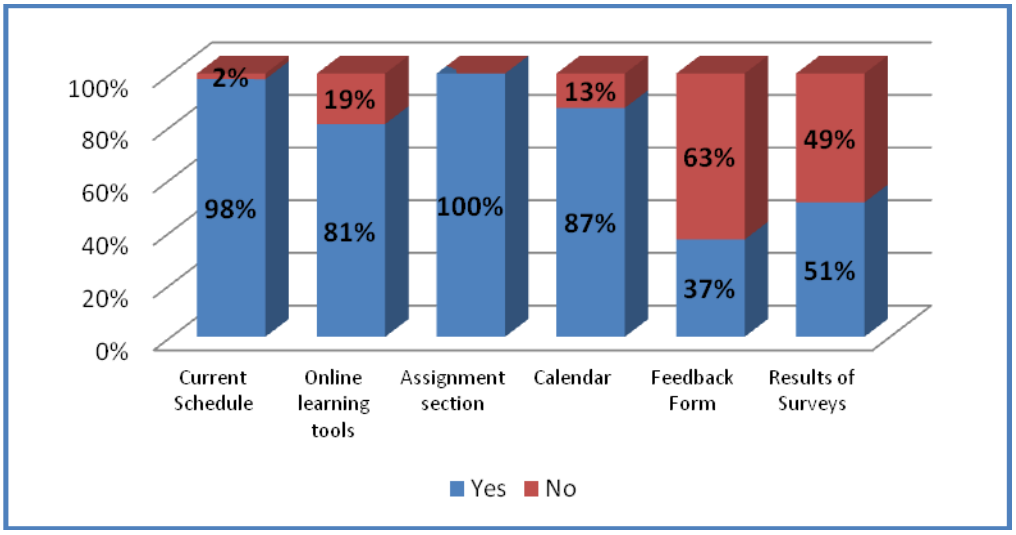

Figure 5.7 Usefulness of course E-Class resources (initial survey)

For the second question, 22 students provided an answer. Suggestions mentioned multiple times were: having extra problems with solutions, learning resources, examples of the exams and mobile

compatibility. Each one of these answers was incorporated into the Feedback Handling process. Therefore these answers were analyzed and treated as a feedback (Table C.2).

On the last question, 74% of the students answered “satisfied” or “very satisfied”, (median = **3.86**) on a 1 to 5 scale (Figure 5.8). It should be noted that this first measurement was done without any intervention on the Course E-Class site, due to the implementation of the ISO 10008 standard. This measure can be considered as the baseline.

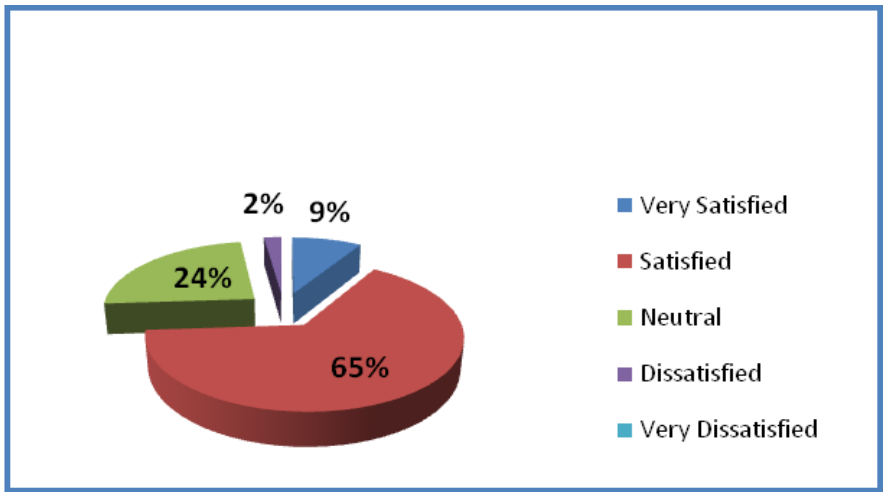

Figure 5.8 Satisfaction with the current course E-Class site (initial survey)

5.2.2.3. Midterm survey

The midterm survey had five questions (Form C.2). The first one was related to usefulness of resources available in E-Class, while the second question enquired the frequency of the use of resources available in E-Class. The third question asked about the usefulness and awareness of survey results (reports) posted in E-Class. The fourth question was the same question presented in the initial survey about student satisfaction and the last question was similar to the second question in the initial survey to obtain suggestions.

This survey was answered by 55 students of the A1 Course in the last week of the June 2015. However, 44 surveys were considered as valid data. Regarding the first question, 44 responses were obtained for course outline, current schedule, lectures slides, quizzes, assignment and exams, 42 responses for the calendar and 40 responses for the online learning tools (Figure 5.9).

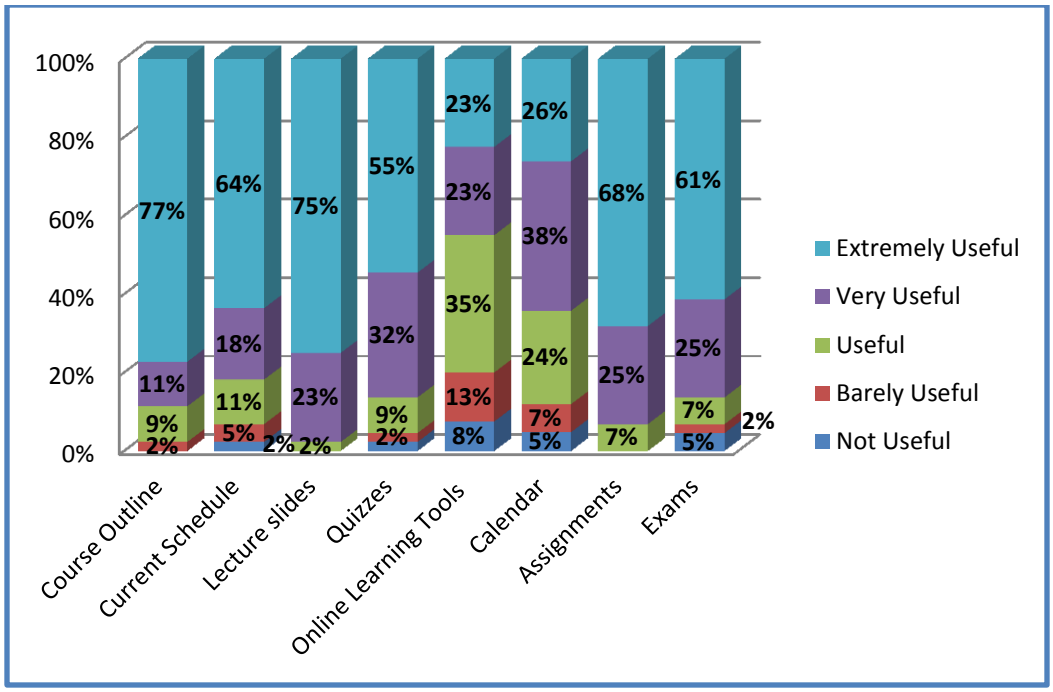

Figure 5.9 Usefulness of course E-Class resources (midterm survey)

Based on the median (see Table 5.5), the “Course outline” (4.68) and the “Lectures slides” (4.67) were considered the most useful resources delivered on the course E-Class site, followed by “Assignments” (4.63), “Current schedule” (4.61), “Exams” (4.59) and “Quizzes” (4.54). On the contrary, the “Online learning tools” (3.36) and the “Calendar” (3.88) had the lowest median of usefulness. It must be taken into account that the “Online learning tools” had been published on the course E-Class site just in the previous week before the application of the midterm survey. According to the answer obtained, the researchers decided to keep all the resources available on the course E-Class site.

For the second question regarding the frequency of using the available resources, 44 responses were obtained for course outline, current schedule, lectures slides, quizzes and assignment, 43 responses for the calendar and exams and 42 responses for the online learning tools. Figure 5.10 shows that the lectures slides resource appears to be the most used resource available with 50% of responses of “daily or more”, followed by assignment (34%) and exams (33%). In contrast, students manifested that they “never” had used “Online learning tools” (50%) and the “Calendar” (30%).

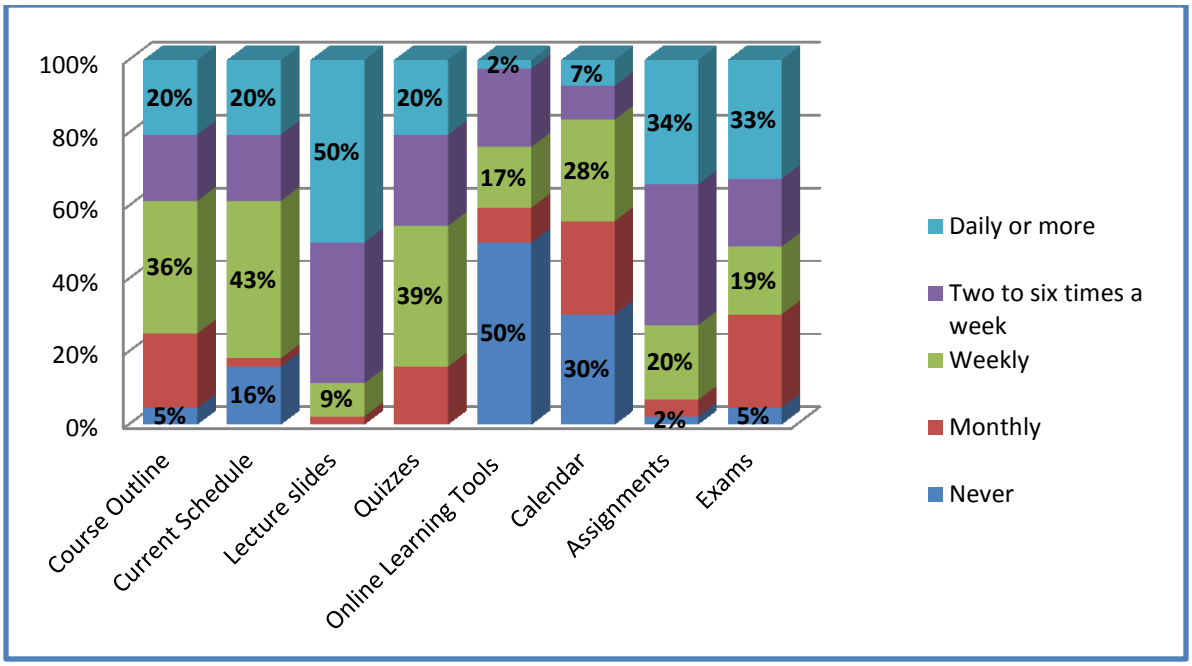

Figure 5.10 Frequency of the use of resources available (midterm survey)

For the third question, the median for the usefulness of the survey results was 3.13 on a 1 to 5 scale, while 58% of students acknowledged being aware of the survey results.

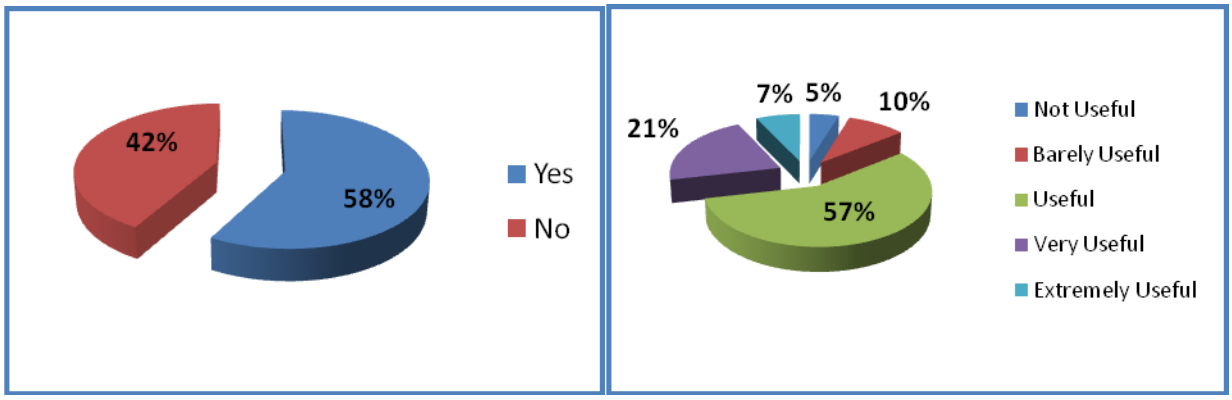

Figure 5.11 Awareness & Usefulness of survey results (midterm survey)

Related to the satisfaction with the current course E-Class site, 86% of students answered “satisfied” or “very satisfied” (from 44 responses), (median = 4.14), while the initial survey was 3.86. Therefore, student satisfaction seems to have slightly increased as measured by the median, with the improvements implemented on the course E-Class site, due to the implementation of the ISO 10008 standard.

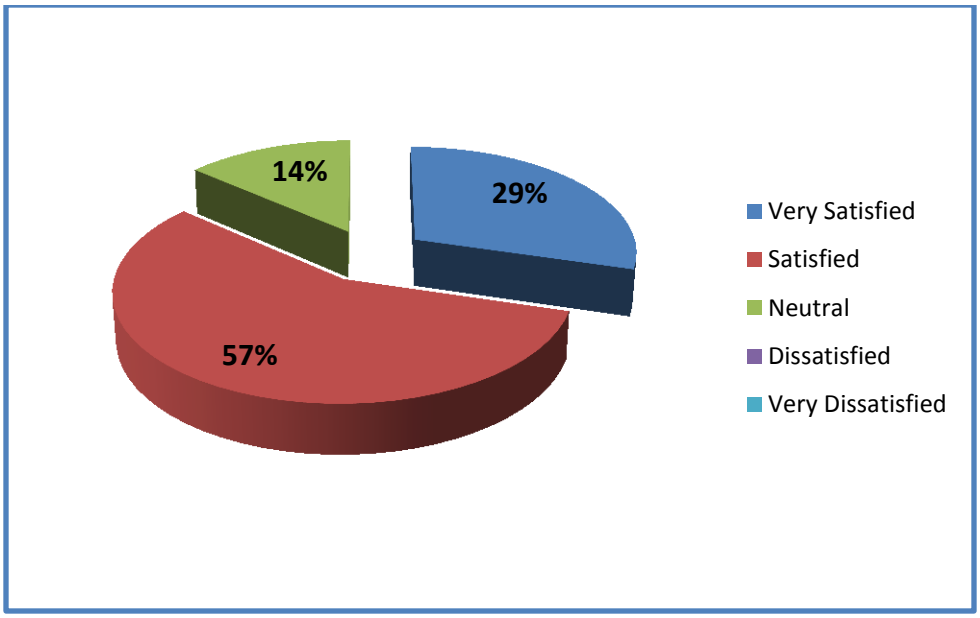

Figure 5.12 Satisfaction with the current course E-Class site (midterm survey)

For the last question, 15 students provided an answer. Some suggestions were: "*Divide lectures into groups-based on concepts or chapters" and "Perhaps a video for each lecture would make it".*

5.2.2.4. Final survey

The final survey was answered by 39 students in the third week of July. It had four questions (Form C.3, Appendix C). The first question about the usefulness of resources was similar to the first question in the midterm survey. The second one asked for the level of agreement with the proposed statements related to the implementation of the B2C ECT system and its subsystems in the course. The third question was the same than the previous question with respect to student satisfaction. The final question was also asked in the midterm survey to obtain suggestions to improve the course E-class site and surveys.

On the first question, 64% of the students considered "extremely useful" the lecture slides, followed by exams (62%) and course outline (62%). In contrast, 10% of the students manifested the online learning tools and calendar as "not useful" (Figure 5.13).

Based on the median (Table 5.5), the lecture slides (4.61), course outline (4.59) and exams (4.59) were considered the most useful resources delivered on the course site, followed by assignments, quizzes and the current schedule. On the contrary, the online learning tools (3.18) and calendar (3.71) had the lowest median for the usefulness. Similar results were noted in the midterm survey on the same question (Table 5.5).

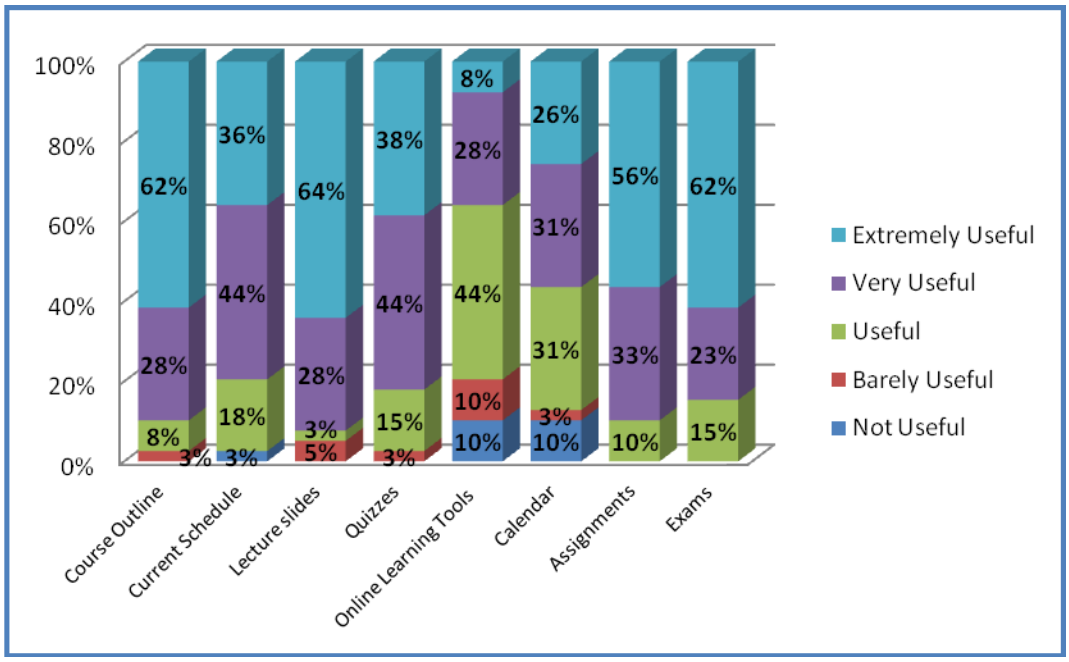

Figure 5.13 Usefulness of course E-Class resources (final survey)

On the second question, 38 responses were obtained, except for the second last statement ("Surveys and redesign of the course E-Class site improved my course satisfaction") with 37 and the last one ("Surveys and redesign of the course E-Class site improved the quality of the course") with 36 responses.

89.5% of the students answered "agree" or "strongly agree" regarding the course E-class site meeting their needs, while 2.6% responded "disagree". The median was 4.21, being the highest median among all the statements for question 2 (Figure 5.14). 78.9% of students answered "agree" or "strongly agree" regarding the procedures for Handling Student Feedback (HSF), with a median of 4.08.

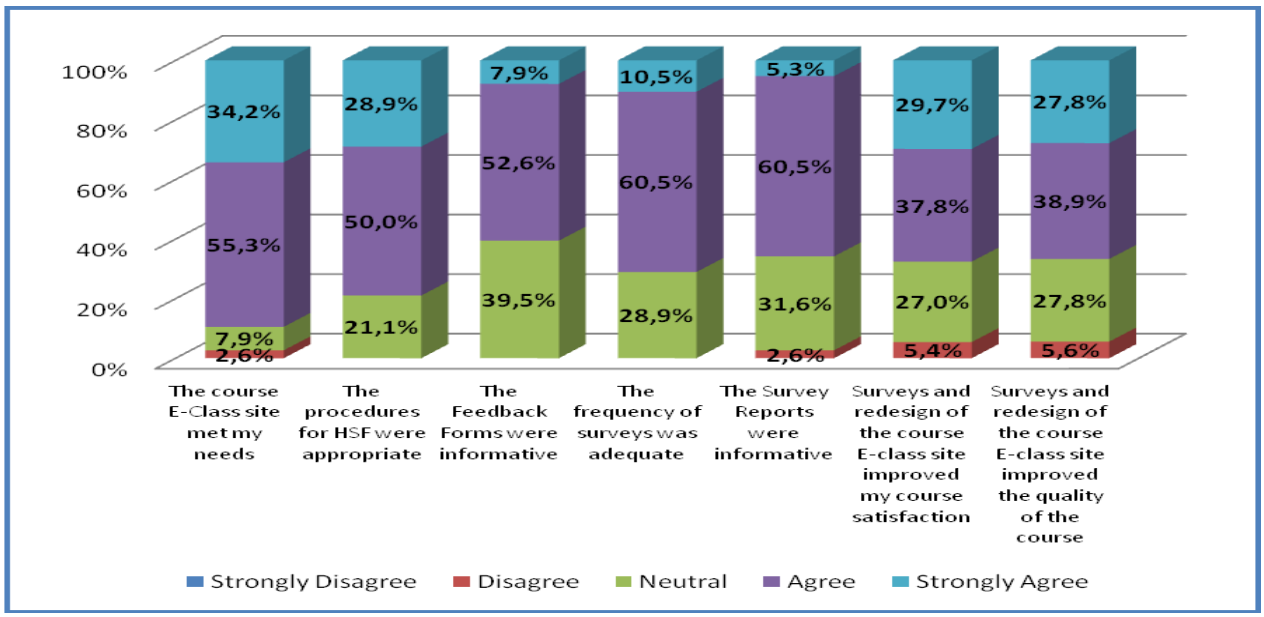

Figure 5.14 Percentage of agreement with the statements (final survey)

The statement “The feedback forms were informative” obtained the lowest median. An explanation for that could be that this feedback form was not published on the course E-Class site in the A1 Course. However, 60.5% of students agreed that these were informative, which is an unexpected answer.

Related to the frequency of surveys, 28.9% of responses were “neutral”, while 71% of students answered “agree” or “strongly agree”. Regarding whether the survey reports were informative 65.5% answered “agree” or “strongly agree” with a median of 3.76.

67.5% of students agreed regarding surveys and redesign of the course E-class site improved their course satisfaction, with a median of 3.96 (on a 1 to 5 scale), while 5.4% of student disagreed with that statement.

66.7% of students agreed regarding surveys and redesign of the course E-class site improved the quality of the course, with a median of 3.93, while 5.6% of student disagreed with that statement.

Table 5.4 Median of agreement with the statements (final survey)

Statement	Median
The course E-Class site met my needs	4.21
The procedures for handling student feedback were appropriate	4.08
The Feedback Forms were informative	3.70
The frequency of surveys was adequate	3.85
The Survey Reports were informative	3.76
Surveys and redesign of the course E-class site improved my course satisfaction	3.96
Surveys and redesign of the course E-class site improved the quality of the course	3.93

Regarding the satisfaction with the current course E-Class site, 96% of students answered “satisfied” or “very satisfied” (from 24 responses). The median was **4.19,** while the initial survey was 3.86. Therefore, student satisfaction seems to have slightly increased as measured by the median, with the improvements implemented on the course E-Class site, due to the implementation of the ISO 10008 standard.

For the last question, 7 students provided an answer. These were classified into four suggestions, one compliment and two comments. A suggestion was to shut down the course E-Class site during the exams to avoid any problems regarding cheating and another suggestion was to implement the Moodle app.

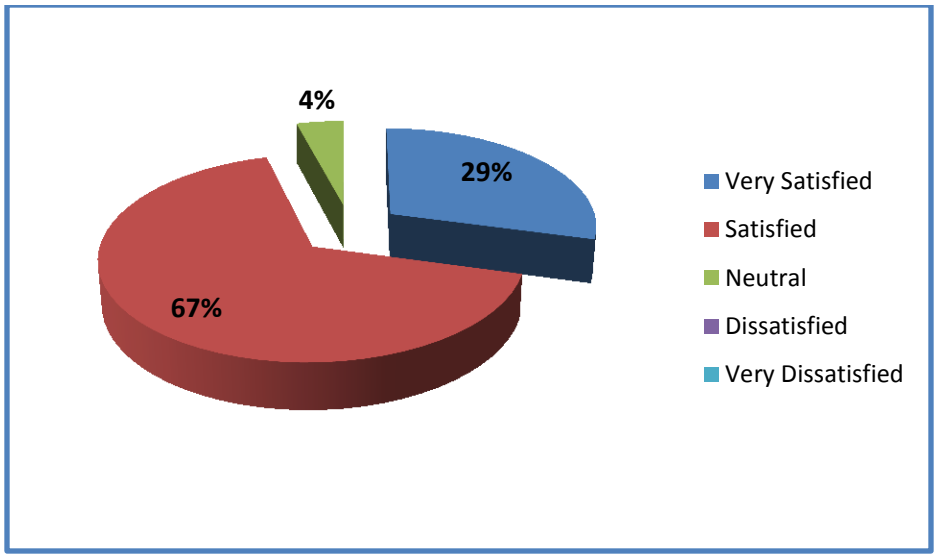

Figure 5.15 Satisfaction regarding the current course E-Class site (final survey)

5.2.2.5. Comparison of answers during the surveys

Figure 5.16 shows the median of student satisfaction regarding the course E-Class site in the first (May), midterm (June) and final (July) surveys. During the term student satisfaction increased from a median of 3.87 to 4.19 on a 1 to 5 scale. Furthermore, 74% of the students expressed to be “satisfied” or “very satisfied” with the current E-Class site in the first survey, 87% in the second survey and 96% in the final survey (see Figure 5.17).

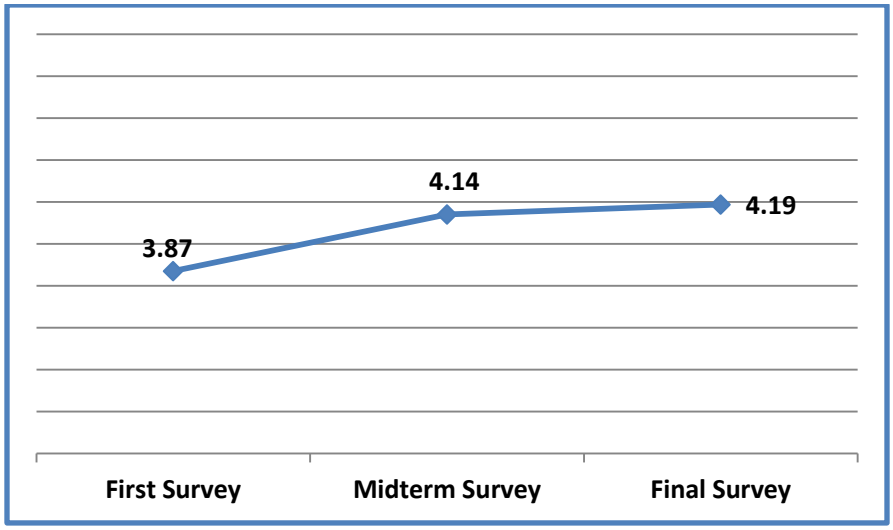

Figure 5.16 Comparison of the median of student satisfaction with the course E-Class site

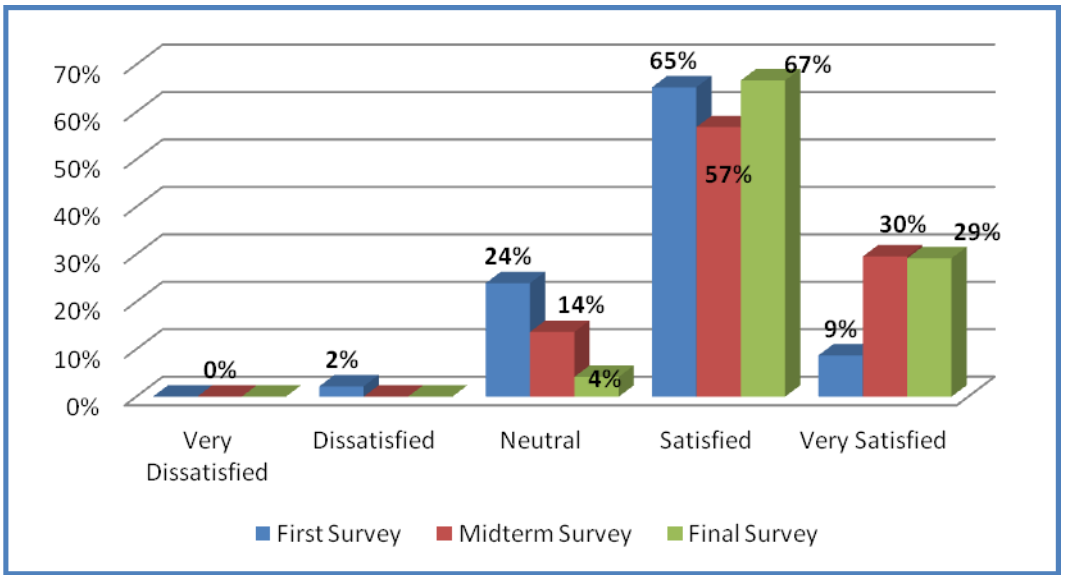

Figure 5.17 Comparison of student satisfaction with the course E-Class site

The median of the usefulness of resources available on the E-Class site was lower in the final survey than in the midterm survey for each resource, except for the exams that remained the same (Table 5.5). This result could be explained due to the students being more familiar with these tools at the moment of the application of the final survey. Therefore, the resources could have been more familiar to them.

Considering the answer of midterm and final survey, it can be concluded that the lectures slides, course outline and exams were considered to be the most useful resources for students delivered on the course site, since these resources are directly linked with their performance in the course. The online learning tools or calendar are resources not mandatory for quizzes or exams, they do not influence directly the student's marks.

Table 5.5 Median of usefulness of resources on E-Class (midterm and final surveys)

Resource available on E-Class	The median of usefulness	
	Midterm survey	Final Survey
Course Outline	4.68	4.59
Current Schedule	4.61	4.18
Lecture Slides	4.67	4.61
Quizzes	4.54	4.24
Online Learning Tools	3.36	3.18
Calendar	3.88	3.71
Assignments	4.63	4.56
Exams	4.59	4.59

Each one of the received answers on open questions in all three surveys has been incorporated as a feedback in the P-DI-05 process. Therefore, each answer was classified as a comment, suggestion, complaint or compliment. After that, these feedbacks were analyzed to improve the system (Table C.2).

5.3. Summary

Chapter 5 presented the implementation of the ISO 10008 standard in one undergraduate engineering course at a university in western Canada, considering the implementation and integration of three subsystems based on ISO 10002, ISO 10004 and ISO/IEC 27001. Therefore, a B2C ECT system has been implemented in a web-facilitated course using the Moodle platform for the course site.

In order to determine the student requirements, an initial survey was undertaken, which was answered by 47 students. The course site was modified considering ISO 10008 and the students and professor requirements. A midterm survey was carried out to gather new requirements and the satisfaction with the resources available, obtaining 44 responses. At the end of the term, a final survey was taken with 39 responses.

A question regarding the satisfaction with the current course E-Class site was included in each survey, obtaining an increase in student satisfaction during the term (from a median of 3.87 to 4.19 on a 1 to 5 scale). Therefore, student satisfaction seems to have slightly increased as measured by the median, with the improvements implemented on the course E-Class site, due to the implementation of the ISO 10008 standard and its subsystems.

Furthermore, around 65% of students expressed that the course quality and satisfaction improved with actions taken because of the implementation of surveys and redesign of the course E-class site.

Chapter 6. Conclusions

6.1. Research findings and contributions

This research has contributed a model to implement the ISO 10008 standard in a university course, considering products delivered by the course site and email. This model includes tools as flowcharts, forms and concrete examples of the application of clauses of ISO 10008. These tools facilitate the implementation of the B2C ECT system and its subsystems.

The created model can be self-implemented by a professor or implemented with the help of consultants or researchers. This is the first research that presents a model for the application of ISO 10008 in higher education.

This thesis explained how the ISO 10008 standard could be adapted to courses imparted in universities. The model for the B2C ECT system excluded processes of ISO 10008 linked to product payments and exchanges, because these transactions are outside the scope of the university course. Professors from different universities can use the created model for the B2C ECT system, adapting it and implementing the complete model or a part of it.

Furthermore, integrative augmentation between the B2C ECT system based on ISO 10008 and its subsystems following ISO 10001, ISO 10002 and ISO 10004 was performed in this research. Specifically, through a case study, the applicability of ISO 10008 and the subsystems of ISO 10002, ISO 10004 and ISO/IEC 27001 was researched in an engineering course using the Moodle platform.

The model developed in Chapters 3 and 4 was followed in the implementation in an engineering course (Chapter 5), omitting particular activities or processes. These omissions were provoked by the exclusion of the B2C ECT Code subsystem (ISO 10001), Clauses 6.2.2 “Initial selection support”, Clause 7.2.3 “Privacy” of ISO 10008 and by not considering email in the scope of the implementation.

The application of ISO 10001 and ISO 10002 in engineering courses was studied previously (Honarkhah, 2010; Honarkhah & Karapetrovic, 2010; Karapetrovic, 2010 and 2014; Karapetrovic & Doucette, 2009). However, this research focused on course material delivered electronically and the integration of ISO 10001, 10002 with the B2C ECT system, instead of the application on the overall course.

ISO 10001, drafted for codes of conduct, was used for achieving Clause 7.1.2 “B2C ECT code” of ISO 10008. The ISO 10002 standard intended for a complaint handling system, was used to comply Clauses 7.1.4 “Complaint handling” and 7.1.5 “Feedback handling” of ISO 10008.

The Feedback Handling process was integrated with the Monitoring and Measuring Student Satisfaction process (ISO 10004), since answers to open questions of the surveys were considered a feedback.

The implementation of the Feedback Handling process in the engineering course considered two channels to receive feedbacks: paper feedback through a box in the classroom and surveys through answered open questions. In this research, the students did not provide feedback through the boxes.

Regarding the answered open questions in the surveys, 44 feedbacks were received from three surveys during the term. 73% of the feedbacks were classified as “suggestion”, 16% as “comment” and 11% as “compliment”.

The implementation of the B2C ECT system in an undergraduate engineering course seems to have contributed to increase student satisfaction with the course E-Class site. Before the implementation of the B2C ECT system, on a 1 to 5 scale, student satisfaction with the course E-class site had a median of 3.87, while after the implementation, it was 4.19. Furthermore, around 65% of students expressed that the course quality and satisfaction improved with actions taken because of the implementation of surveys and redesign of the course E-class site.

A suggestion obtained from the implementation of surveys was to have more examples and solutions on the course site. That suggestion is in accordance with student requirements presented in a research in a university in Brazil (Pavani & Temporão, 2014). Another suggestion from surveys was the publication of “class notes” on the course site. It should be noted that the class notes resource was implemented in the research of Pavani and Temporão, which was considered the most useful for the blended course included in that investigation (Pavani & Temporão, 2014).

The lectures slides, course outline and exams were considered by students to be the most useful resources delivered on the course site. It could be explained because these resources are directly linked with their performance in the course. However, the online learning tools or calendar are resources not mandatory for quizzes or exams, they do not influence directly the student’s marks.

According to students’ feedback delivered through surveys, the implementation of the B2C ECT course system was useful and students suggested the application of this study in other similar courses imparted at the University.

6.2. Lessons learned and considerations

The ISO 10008 standard is considered an augmenting standard, which is not intended to be certifiable as ISO 9001 or ISO 14001. However, it can be concluded from the application of ISO 10008 that it is a complete standard. ISO 10008 refers to twelve other standards to complement its clauses or requirements. Subsystems of the B2C ECT system can be generated by the implementation of these standards.

The viability of the implementation of the model created for the implementation of the ISO 10008 and its four subsystems (ISO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001) in a university course depend on the professor, since their commitment is essential for the success of its implementation.

Because the model consists of many forms and flowcharts, the professor can see it as bureaucratic.

The boxes in the classroom for the Feedback Handling process implemented in the engineering course could not have been sufficiently effective, since students did not provide feedback through them. Therefore, the implementation of feedback on the course site could be more appropriate and effective for the B2C ECT system.

The implementation of some activities proposed in the model of the B2C ECT course system can bring some new risks or threats regarding information security. Therefore, professors should be willing to deal with risks and implement actions to prevent future problems. For instance, if the professor implements the Moodle "Assignment" activity, where students can deliver their assignments through the course site, new risks would appear regarding the student's competence to use the Moodle "Assignment" activity.

6.3. Limitations of the research

The limitations identified in this research were:

- The scope of this study was limited to course material delivered through a course site and email. This research did not consider other channels of communication such as social networking (e.g. Facebook) or instant messages (e.g. WhatsApp). Furthermore, the scope did not cover e-learning courses.
- There was a spatial limitation regarding the implementation, since the model was implemented only in a university in western Canada. Furthermore, it was implemented only in one course.
- Not all the modeled subsystems were implemented, since the subsystem based on ISO 10001 for codes of conduct was not implemented and the Feedback Handling system (ISO 10002) was implemented with restricted channels of communication.
- The researchers were not responsible for teaching the A1 Course. Thus, the implementation of the model was limited to avoid an impact in increasing the professor workload.
- The results could not be compared with similar studies, since this is the first study in modeling and implementation of ISO 10008 in higher education.

6.4. Scope for further research

Since the research regarding ISO 10008 is incipient, as well as its integrative augmentation with other standards, several other investigations could be conducted. Some suggestions for future research are presented in the following bullets:

- Implementing the model of ISO 10008 and all its subsystems with ISO 10001, 10002, 10004 and 27001 in more web-facilitated courses at the same University, comparing results regarding student satisfaction with the system.
- Implementing the created model for blended courses or web-facilitated courses in other universities around the world.
- Researching the resistance or availability of faculty to implement this model in their courses.
- Analyzing whether the implementation of these standards helps to improve the teaching or learning processes and quality of the courses.
- Measuring the perception of the professors and students through surveys after the implementation of these standards.
- Enlarging the model incorporating the ISO 19011 standard for auditing system, ISO 10003 for external dispute resolution and ISO/IEC 27002 for information security controls, integrating these subsystems with the B2C ECT system.
- Increasing the model considering a broader system. In other words, the system could consider several courses in a department of a university and then the continual improvement could be implemented at the level of all courses of a department. In this case, the top management of the system could be the head of department.
- Extending the model to e-learning and m-learning courses.
- Enlarging the model to consider all aspects of a university course, considering the products delivered electronically and in the classroom.
- The model can be extended to consider more channels of communication, such as social networking sites (e.g. Facebook) or the use of instant messages (e.g. WhatsApp, Viber).

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Appendix A: Literature review

Table A.1 lists the standards mentioned in ISO 10008 to complement its guidelines. The standard classification used (type of standard) is based on the definitions in several articles by Karapetrovic (2007, 2008 and 2014), Karapetrovic and Doucette (2009) and Karapetrovic et al. (2006 and 2012). Such definitions were shown in Section 2.4.

Table A. 1 Standards included in ISO 10008:2013

Standard	Type of standard	Certifiable?	Auditing?	Description
ISO 9000	Supporting	No	No	Provides the fundamentals and vocabulary for quality management Systems
ISO 9001	Assimilating	Yes	Yes	Provide requirements for quality management Systems
ISO 9241-151	Supporting	No	No	Guidance on World Wide Web user interfaces
ISO 10001	Augmenting	No	Yes	Standard for developing codes of conduct for organizations to enhance customer satisfaction.
ISO 10002	Augmenting	No	Yes	Standard for setting up a complaints handling system
ISO 10003	Augmenting	No	Yes	Provides guidance on the process of external dispute resolution, when the organization could not solve complaints in an internal way.
ISO 10004	Augmenting	No	Yes	Provides Guidelines for monitoring and measuring customer satisfaction to identify improvement opportunities.
ISO 10013	Supporting	No	No	Guidelines for quality management system documentation
ISO 10015	Supporting	No	No	Guidelines for Training
ISO 19011	Augmenting	No	Yes	Provides guidance on auditing of both quality and environmental systems
ISO/IEC 27001	Assimilating	Yes	Yes	Provide requirements for an information security management system
ISO/IEC 27002	Supporting	No	Yes	Code of practice for information security controls

Appendix B: Form templates

Appendix B presents nine forms created to help with the implementation of the guidelines of ISO 10008, which are mentioned in the processes developed in Chapter 3.

Furthermore, other five forms are presented, which have been developed to facilitate the implementation of the subsystem developed according to SO 10001, ISO 10002, ISO 10004 and ISO/IEC 27001 shown in Chapter 4.

Each form has a header which includes the name of the form, a code, associated clause of the ISO 10008 standard, the version and an approval date of the document. The code was assigned according to Table B.1 presented at the end of this appendix.

Finally, Table B.2 shows the codes for the processes of Chapters 3 and 4.

Form B.1 F-G-01 Gathering and Assessing Information for the B2C ECT System Form

Gathering and Assessing Information for the B2C ECT System Form							
Code	F-G-01	**Clause**	5.1	**Version**	0	**Date**	19-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **Gathering and assessing information:**

Topic	Information for planning and designing	Actions
The needs and expectation of students, department and university		
Obtain and assess the issues regarding security, privacy and competence.		
Academic regulations and associated laws		

Form B.2 F-G-02 Objectives and Indicators of the B2C ECT System Form

Objectives and Indicators of the B2C ECT System Form							
Code	F-G-02	**Clause**	5.2	**Version**	0	**Approval Date**	07-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **Objectives**

Objective	Category[1]	Target Stakeholder[2]

1: The field "Category" refers to: product, satisfaction, participation, information security and continual improvement.

2: Target stakeholder: students, professor, teaching assistant and the university.

3. **Performance Indicators**

Indicator	Formula /description	Goal	Justification of the goal	Person responsible to measure	Frequency

Form B.3 F-G-03 Resources Needed in the B2C ECT System Form

Resources Needed in the B2C ECT System Form							
Code	F-G-03	**Clause**	5.4	**Version**	0	**Approval Date**	14-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **Resources needed**

Identify the resources needed marking with X the phase(s) in which the resource is needed:

Resources		**Phase**[1]			
		P	D	I	M&I
Human Resources					
Monetary Resources					
Training					
Infrastructure					
Others					

1: P: Planning, D: Designing, I: Implementation, M&I: Maintaining and Improvement.

3. **Providers**

Identify the external providers of the university course:

Provider	**Which provide and roles**

Form B.4 F-G-04 Communication Plan for the B2C ECT System Form

Communication Plan for the B2C ECT System Form							
Code	F-G-04	**Clause**	5.4.4	**Version**	0	**Approval Date**	12-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **Objectives**

Objective	Target

3. **Communication constraints, assumptions and risks**

Issues	
Constraints	
Assumptions	
Risks	

4. **Target Audiences, tools, channels and frequency**

Message	Stakeholder Name	Person responsible	Channel(s)	Tools and formats	Frequency

Form B.5 F-SP-01 Pre-transaction Phase in the B2C ECT System Form

Pre-transaction Phase in the B2C ECT System Form							
Code	F-SP-01	**Clause**	6.1.2, 6.1.3 and 6.1.4	**Version**	0	**Date**	16-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **ISO 10008:**

Select elements of the ISO 10008 standard to be implemented in the course

Objectives and indicators of the B2C ECT system	Yes	No
B2C ECT code (ISO 10001)	Yes	No
Student support (in order to assist students in using the course site)	Yes	No
Feedback Handling process (ISO 10002) (including complaints)	Yes	No
Determine the satisfaction of students with the system (ISO 1"0004)	Yes	No
Consumer data management (ISO 27001)	Yes	No
Review of the B2C ECT system	Yes	No
The privacy policy (based on the University's policy)	Yes	No
Display office hours and contact information	Yes	No

3. **Content creation:**

1. Identify the products provided through electronic transactions.

Products	**Delivery methods**

2. Select the resources or activities to be implemented on the course site.

Complementary content		
"Calendar" with a plan of lectures, as well as assignment and other course deadlines.	Yes	No
"Grade report" with the current weight of each component.	Yes	No
"Glossary" with important concepts and acronyms of the course	Yes	No
"Quiz" used to take online short quizzes, midterms or exams to students	Yes	No
"Sample Exam" used to give examples of exams to students	Yes	No
"Assignment", giving the instructions of assignments, as well as students submission through the course site.	Yes	No
"Tutorials", section to show videos or instructions to use different sections or resources on the course site, or other topics.	Yes	No
"Product catalog", which explains the content, deadline and other characteristics of products and tools provided through the course site	Yes	No

3. Identify the approach to deal with changes in the information.

Delivery Methods	Actions

4. <u>Content delivery:</u>

1. Select formats to deliver the content

Present products or information (e.g. outline, lecture slides and assignments) in different kinds of format (e.g. PDF file, "Page, "Tab display", videos)	Yes	No
Set the contact information at the beginning of the course site	Yes	No
Choose or change the color or other characteristics regarding format on the course site	Yes	No
Have the option of completion tracking on the course site	Yes	No

2. Select the complementary channels

Complementary communication channels		
"Announcement" (forum) on the course site, publishing news to all students, sending an email too.	Yes	No
"Specific forums", refers to forums on the course site regarding specific topics, e.g. midterm, Chapter 1, assignments.	Yes	No
"Feedback" on the course site**,** obtaining the opinion from students during term to improve the course.	Yes	No
"Choices" on the course site (kind of survey), for asking a single question and offer a selection of possible responses to student about their preferences in any specific subject. For example, a schedule of the TA office hours, choose a team or subject.	Yes	No
"Chat" on the course site**,** enables participants to have text-based, real-time synchronous discussions. It would be another channel of communication with students, available in specific periods to answer questions to students as "office hours".	Yes	No

5. <u>Content governance:</u>

1. Appoint person(s) responsible for managing tasks in the B2C ECT System.

Name	Role	Main responsibilities or task (content contributions)

2. Determine guidelines for content contributors.

Actions	Guidelines

3. Establish guidelines for records management.

Person responsible	Actions

4. Establish a control mechanism for modifications of key content

Change	Actions

Form B.6 F-SP-02 Product Catalog Form

Product Catalog Form							
Code	F-SP-02	**Clause**	6.2.2	**Version**	0	**Approval Date**	18-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **Product Identification**[1]

#	Product (Name)	Description	Format	Section on the course site	Provision date
1					
2					
3					
4					
5					
6					
7					

1: This information is for elaborating a catalog on the course site, including photos of the products.

Form B.7 F-MI-01 Monitoring and Measuring Student Satisfaction Form

Monitoring and Measuring Student Satisfaction Form							
Code	F-MI-01	**Clause**	8.3	**Version**	0	**Approval Date**	15-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **Planning**[1]

Purpose
Objectives

Performance indicators:

Indicator	Formula /description	Goal	Justification of the goal	Person responsible to measure	Frequency

1: This part should be included in the F-G-02 form.

3. **Determining scope and frequency**

Scope (what) [2]	Type of data	Frequency (when)

2: The scope could consider if it is for obtaining student's expectations, student's perceptions or both.

4. **Determining implementation methods and responsibilities for measuring student satisfaction**

Source (external/internal) [3]	Method (How)	Person responsible	Whom receive the information

3: Examples of sources are surveys, feedbacks and report from the University.

5. Resources needed[4]

Human Resources	
Monetary Resources	
Hours of training	
Infrastructure	
Others	

4: This part should be included in the F-G-03 form.

6. Determining student expectations

Expectations	
Stated student requirements	
Implied student requirements	
Academic regulation requirements	
Other student requirements	

7. Gathering student satisfaction data

Characteristics related to student satisfaction		**Rank**
Product characteristics		
Delivery characteristics		
Organizational characteristics		

Form B.8 F-MI-02 Reviewing and Evaluating the B2C ECT System Meeting Form

Reviewing and Evaluating the B2C ECT System Meeting Form							
Code	F-MI-02	**Clause**	8.4	**Version**	0	**Approval Date**	07-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Date of Review Meeting**	
Participants			
Name			**Signature**

2. **Agenda**

Indicate with a check mark the topics included in the agenda

Changes in academic regulations or laws	
Practices of other courses or Universities	
Modification to course material delivered through the course site and/or email	
Status of corrective and preventive actions	
Surveys and feedbacks	
University course code's performance	
Objectives and indicators	
Communication Plan	
Follow-up actions from previous reviews	
Others	
Write other topics included:	

3. **Agreements and Decision making**

Topic 1
Topic 2
Topic 3

Form B.9 F-MI-03 Corrective and Preventive Actions Form

Corrective and Preventive Actions Form							
Code	F-MI-03	**Clause**	6.3.3 and 8.5	**Version**	0	**Approval Date**	15-05-2015

1. **General data:**

Course		**Term/Year**		**CA/PA Number**	

2. **Identification of the situation**

Reported by		**Date**	
Type of situation			
Corrective action		Preventive action	
Detection from			
Nonconforming product		Reviewing and evaluating the B2C ECT system	
Complaint/feedback		Surveys	
Indicator revision		Other	
Description of the situation			

3. **Cause analysis and action plan**

Correction or Initial action
Cause Analysis or investigation

Action Plan			
#	**Activity**	**Person responsible**	**Implementation date**
1			
2			

4. **Action plan follow**

#	**Date**	**Status (Ongoing / Closed)**	**Comments**
1			
2			

Form B.10 F-MP-01 Defining and Preparing the B2C ECT Code Form

Defining and Preparing the B2C ECT Code Form							
Code	F-MP-01	**Clause**	7.1.2	**Version**	0	**Approval Date**	07-05-2015

1. **General data:**

Course		**Term / Year**			
Name code		**Version Number**		**Revision Date**	

2. **B2C ECT Code objectives**[1]

1: This part should be included in the F-G-02 form.

3. **Code**

Scope and purpose	
Promise	
Clarification of what is included	
Limitation to the promise	
Compensations/ Remedies	
Key Terms	
How to make a complaint and compensation	

4. **Performance Indicators**[2]

Indicator	**Formula**	**Goal**	**Justification of the goal**	**Person responsible to measure**	**Frequency**

2: This part should be included in the F-G-02 form.

5. **Code procedures**

Establish some tasks or activities necessaries to the implementation, maintenance and improvement of this code. Consider issues regarding communication, training, met promise, give compensation, managing records and report code performance, among others.

Person responsible	**Actions**

6. Communication plan[3]

Message	Stakeholder Name	Person responsible	Channel(s)	Tools and formats	Frequency

3: This part should be included in the F-G-04 form.

7. Resources needed[4]

Human Resources	
Monetary Resources	
Hours of training	
Infrastructure	
Others	

4: This part should be included in the F-G-03 form.

Form B.11 F-MP-02 Planning and designing of Feedback Handling Form

Planning and designing of Feedback Handling Form							
Code	F-MP-02	**Clause**	7.1.4 and 7.1.5	**Version**	0	**Approval Date**	21-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **Feedback Handling Policy statement**

3. **Feedback Handling objectives**[1]

Objective	**Target**

1: This part should be included in the F-G-02 form.

4. **Performance Indicators**[2]

Indicator	**Formula**	**Goal**	**Justification for the goal**	**Person responsible to measure**	**Frequency**

2: This part should be included in the F-G-02 form.

5. **Resources needed**[3]

Human Resources	
Monetary Resources	
Hours of training	
Infrastructure	
Others	

3: This part should be included in the F-G-03 form.

6. Feedback Handling Procedures

Establish some guidelines to establish the Feedback Handling system.

Channels to receive a feedback		
"Anonymous Feedback" on the course site	Yes	No
"Not Anonymous Feedback" on the course site	Yes	No
Both "Anonymous and not anonymous Feedback" on the course site	Yes	No
Email	Yes	No
Surveys (through open questions)	Yes	No
Paper feedback through a box in the classroom	Yes	No
Classification of a feedback		
Option to classify feedbacks into a comment, complaint, compliment, or suggestion	Yes	No
Channel for broadcasting the feedback handling subsystem to students		
Course site	Yes	No
Email	Yes	No
Course outline	Yes	No
Classroom	Yes	No

Form B.12 F-MP-03 Feedback report on the course site Form

Feedback report on the course site Form							
Code	F-MP-03	**Clause**	7.1.4 and 7.1.5	**Version**	0	**Approval Date**	8-06-2015

Description[1]:

This space is available for the students on the XX Course. Your comments, complaints, compliments and suggestions regarding the course site, any material delivered through the course site or email as well as about the B2C ECT code, Feedback Handling subsystem, monitoring and student satisfaction and information security subsystem, will be greatly appreciated.

Questions:

There are required fields in this form marked*.

Please, categorize your feedback (you can choose more than one option) *

- ☐ Comment
- ☐ Complaint
- ☐ Compliment
- ☐ Suggestion

Please, write here your feedback*

Completion message

Thanks for your feedback. We will consider your feedback to improve the XX course in this term or in the future, as appropriate.

1: This form is a reference to implement on the course site.

Form B.13 F-MP-04 Privacy and Information Security in the B2C ECT System Form

Privacy and Information security in the B2C ECT System Form							
Code	F-MP-04	**Clause**	7.2.2 and 7.2.3	**Version**	0	**Date**	07-05-2015

1. **General data:**

Course		**Term / Year**	
Version Number		**Revision Date**	

2. **Scope, policy and objectives of information security**

Scope
Privacy and Information Security Policy
Objectives

3. **Indicators of information security**

Indicator	**Formula /description**	**Goal**	**Justification of the goal**	**Person responsible to measure**	**Frequency**

4. **Use of personal information**

Data	**Using for**

5. **Who has access to personal information and restrictions**

Who	**Internal /External**	**What information**	**Restrictions**
General recommendations or restrictions			

6. Information asset inventory

Process	Information Asset	Media[1]	Storage	Retention	Disposition

1: e.g. paper, electronic.

7. Risk assessment and treatment

Risk	Information Asset	Likelihood[1]	Consequence[2]	Level of risk[3]	Risk treatment

1: likely, moderate, unlikely. 2: high, moderate, low. 3: high, medium, low.

Table B. 1 Nomenclature codes of forms (F).

Code[1]	From Clause	Topic in ISO 10008
F-G-##	Clause 5	General of Business to consumer electronic commerce transaction system
F-SP-##	Clause 6	Single-Phase
F-MP-##	Clause 7	Multi-phase processes
F-MI-##	Clause 8	Maintenance and improvement

Table B. 2 Nomenclature codes for processes (P).

Code of process[1]	Code of sub-process[1]	Phases
P-PD-##	**P-PD-##-##**	Planning and designing
P-DI-##	**P-DI-##-##**	Development and implementation
P-MI-##	**P-MI-##-##**	Maintenance and improvement

1: "##" represents a correlative number.

Table B. 3 General recommendation of survey questions.

Survey	Ask about
First Survey	• Some extra course material to include on the course site. E.g. calendar, current schedule, assignment state, glossary, sample exam (Karapetrovic, 2015). • Ask about student preference about electronic communication: e.g. only email, anonymous forum, non-anonymous forum (Karapetrovic, 2015). Other alternatives of communication channels on the course site. E.g. chat, forum by topic, feedback online, alive class. • Preference regarding the format of the course site (e.g. color, sections, presents the information in a "Tab display" or "Page"). • Any suggestion about the course site or promises for code of conducts (include an open question) (Karapetrovic, 2015).
Midterm Survey	• The usefulness of resources available on the course site (Karapetrovic, 2015). • Usage of course material and elements incorporated on the course site (Karapetrovic, 2015; Pavani & Temporão, 2014). • The awareness and usefulness of systems in place such as: Feedback Handling system, conduct code and surveys (Karapetrovic, 2015). • Any suggestion about the course site (include open question) (Karapetrovic, 2015).
Final Survey	• The usefulness of resources available on the course site (Karapetrovic, 2015). • Appropriateness of the systems in place such as: Feedback Handling system, conduct code and surveys (Karapetrovic, 2015). • Modifications on the course site improved the quality and satisfaction of the course (Karapetrovic, 2015). • Preference regarding the number of midterm/exam in term. • Any suggestion about the course site (include an open question) (Karapetrovic, 2015).
Every survey	• The satisfaction with the course site during term (Karapetrovic, 2015).
Short survey	• Preference regarding the format of the course site, showing some alternatives (Karapetrovic, 2015). • Preference regarding the type of questions in the midterm/exam or choose topics for assignments or projects. • Relevant topics for sending emails to students (Karapetrovic, 2015).

Table B. 4 Level of risk defined for the B2C ECT system in a university course (ISO, 2011)

Likelihood (L)	Impact (I)	Level of risk (L*I)
Unlikely	Low	**Low**
Unlikely	Medium	**Low**
Unlikely	High	**Medium**
Possible	Low	**Low**
Possible	Medium	**Medium**
Possible	High	**High**
Likely	Low	**Medium**
Likely	Medium	**High**
Likely	High	**High**

Appendix C: implementation records

Appendix C presents the implementation records of ISO 10008 standard and its subsystems based on ISO 10002, ISO 10004 and ISO/IEC 27001 in an engineering course, which was presented in Chapter 5. The forms used for the records were presented in Appendix B.

Record C.1 F-G-01 Gathering and Assessing Information for the B2C ECT System in the A1 Course

Gathering and Assessing Information for the B2C ECT System Form							
Code	F-G-01	**Clause**	5.1	**Version**	0	**Date**	19-05-2015

1. **General data:**

Course	A1 Course		**Term / Year**	Spring/Summer 2015
Version Number	01	**Revision Date**	24-05-2015	

2. **Gathering and assessing information:**

Topic	**Information for planning and designing**	**Actions**
The needs and expectation of students, department and university	Have access to lectures before each class	Maintain the publication of the lectures on the course E-Class site before each class, in a PDF file.
	The Kind of activities to include on the course E-Class site (products)	Maintain the current products: course outline, lecture slides, assignments, quiz solutions, sample midterm/exam, marks published on the course E-class site. Not include forums and glossary on the course E-Class site. Ask students about the usefulness of the following resources: calendar, current schedule, assignment status, online learning tools, result of surveys and feedback forms.
Obtain and assess the issues regarding security, privacy and competence.	Security and privacy on published marks on the course E-Class site	Grant the role of "Designer" to researchers, limiting the access to marks, student information and submissions on the course E-Class site, forbidding switching their roles.
Academic regulations and associated laws	Have a course outline	Publish the course outline on the course E-Class site at the beginning of term
	University calendar	Consider the calendar to establish deadlines of the evaluations in the course outline Consider holidays (e.g. Canada day) to establish the schedule in the course outline.

Record C.2 F-G-02- Objectives and Indicators of the B2C ECT System in the A1 Course

Objectives and Indicators of the B2C ECT system Form							
Code	F-G-02	**Clause**	5.2	**Version**	0	**Approval Date**	07-05-2015

1. **General data:**

Course	A1 Course		**Term / Year**	Spring/Summer 2015
Version Number	01	**Revision Date**	24-05-2015	

2. **Objectives**

Objective	**Category**[1]	**Target Stakeholder**[2]
Publishing 100% of the lecture slides on the course E-Class site previous to the class	Product/Security (availability)	Students
Publishing 100% of the assignments on the course E-Class site		
Implementing on the course E-class site 100% of the new products (resources) considered useful by students in the Initial survey.	Continual improvement/Product /Security (availability)	Professor (top management)
Analyzing 100% of the received feedbacks during the A1 Course in the Spring-Summer 2015.	Continual improvement	Professor / Students/Researchers
Closing at least 80% of the feedbacks by implementing the determined actions during the A1 Course in the Spring-Summer 2015.		
Measuring student satisfaction with the B2C ECT system in the A1 Course at least three times during term	Satisfaction	Researchers
Increasing student satisfaction with the course E-Class site regarding previous measurement		Professor / Students

3. **Performance Indicators**

Indicator	**Formula**	**Goal**	**Justification of the goal**	**Person responsible to measure**	**Frequency**
Percentage of lecture slides published on the course E-Class site before the class	(Numbers of the lecture slides published on the course E-Class site before the class in the Spring-Summer 2015 / Numbers of lecture slides in the Spring-Summer 2015) *100	=100 %	It is the maximum value possible, it is achievable.	Designer	On the day of each class (twice to week)
Percentage of assignments published on the course E-Class site	(Numbers of the assignments published on the course E-Class site in the Spring-Summer 2015/ Number of assignments in the Spring-Summer 2015) *100	= 100 %			Due date of the assignments.

Indicator	Formula	Goal	Justification of the goal	Person responsible to measure	Frequency
Percentage of new products implemented on the course E-Class site, which were considered useful by students in the initial survey.	(Number of new products implemented on the course E-Class site, which were considered useful by students in the initial survey in the Spring-Summer 2015/ Number of new products considered useful by students in the initial survey in the Spring-Summer 2015) *100	= 100%	It is the maximum value possible, it is achievable.	Designer	One month after the application of the initial survey
Percentage of feedbacks analyzed in the A1 Course in term	(Number of feedbacks analyzed in the A1 Course in Spring-Summer 2015/ Number of feedbacks in the A1 Course in Spring-Summer 2015) *100	= 100%			One week after the application of surveys
Percentage of closed feedbacks	(Number of closed feedbacks in the Spring-Summer 2015/ Number of feedbacks in the Spring-Summer 2015) *100	>= 80%	80%, due to risks regarding the chance to receive feedbacks at the end of term		Monthly
Percentage of the applied surveys related to planned surveys in the A1 Course during Spring/Summer 2015	(Numbers of applied surveys[1] in the A1 Course during Spring-Summer 2015/ Number of planned surveys in the A1 Course during Spring-Summer 2015) *100 1: it does not refer to the number of answers by survey.	100%	It is the maximum value possible, it is achievable.		At the end of the research
Comparison of student satisfaction regarding the course site during the term.	**Median** *Initial Survey* **Median** *Midterm Survey* **Median** *Final Survey*	Increase of student satisfaction	The goal is increase student satisfaction regarding the course site during the term.		1st measurement: After the application of the midterm survey 2nd measurement: After the application of the final survey.
	Increase of student satisfaction Median from the ***Midterm Survey*** > Median from the ***Initial Survey***				
	Median from the ***Final Survey*** **>** Median from the ***Initial Survey***				

Record C.3 F-G-03 Resources Needed in the B2C ECT System in the A1 Course

Resources Needed in the B2C ECT System Form							
Code	F-G-03	**Clause**	5.4	**Version**	0	**Approval Date**	14-05-2015

1. General data:

Course	A1 Course		**Term / Year**	Spring/Summer 2015
Version Number	01	**Revision Date**	24-05-2015	

2. Resources needed

Identify the resources needed marking with X the phase(s) in which the resource is needed:

Resources		**Phase**[1]			
		P	D	I	M&I
Human Resources	Professor	X	X	X	X
	Designer (Research assistant)	X	X	X	X
	The researcher	X	X	X	X
Monetary Resources	Not applicable				
Training	Self-training in standards of ISO 10008, ISO 10002, ISO 10004 and ISO 27001 for the research assistant	X	X	X	X
	Self-Training in Moodle program or in the E-class site. For the research assistant and the professor	X	X		
	Self-training in the processes (flowcharts)		X		
Infrastructure	Computers provided by the University	X	X	X	X
	The Internet provided by the University	X	X	X	X
	The course E-Class site provided by the University	X	X	X	X
	Printer provided by the University (surveys)				
Others	The ISO 10008 and ISO 27001 (documents) provided by the university	X	X	X	X
	The ISO 10002 and 10004 (documents) provided by the university	X	X	X	X
	Software (e.g. Word, Excel, Adobe Acrobat, Power Point)	X	X	X	X
	Office material for the surveys (e.g. papers, stapler, boxes) provided by the university			X	

1: P: planning, D: designing, I: implementation, M&I: maintaining and improvement.

3. Providers

Identify the external providers of the university course:

Provider	**Which provide and roles**
Technical support for the course E-class site (IST E-Class Support)	Answer any question regarding E-Class, which is managed for them.

Record C.4 F-G-04 Communication Plan for the B2C ECT System in the A1 Course

Communication Plan for the B2C ECT System Form							
Code	F-G-04	**Clause**	5.4.4	**Version**	0	**Approval Date**	12-05-2015

1. **General data:**

Course	A1 Course		**Term / Year**	Spring/Summer 2015
Version Number	01	**Revision Date**	26-05-2015	

2. **Objective**

Objective	Target
Having an effective communication regarding the information delivered on the course E-Class site.	Professor and students
Reducing duplication of effort, avoiding misunderstanding in the information delivered through the course site	Professor and researchers

3. **Communication constraints, assumptions and risks**

Issues	
Constraints	• The A1 Course has different communication channels such as: classroom, the course E-Class site and email. Therefore, some messages are delivered in more than one channel.
Assumptions	• There are a good communication and relationship between the professor and researchers. • Students review the course E-Class site constantly. • The course E-class site is operating. • All students, the professor and researchers have access to the Internet.
Risks	• Students do not read an important message or course material, because they do not review the course E-Class site. • Do not have a consistency in a message, in different communication channels, provoking misunderstanding among students.

4. **Target Audiences, tools, channels and frequency**

Message	Stakeholder Name	Person responsible	Channel(s)	Tools and formats	Frequency
Announcement about midterm and exams	Students	Professor	Course E-Class site	Pdf file	Before the midterm and exam (preferably one week before)
Lecture slides files					Before each lecture
Outline file					On the day of the first class
Outline tab		Designer		Tab resource	After the application of the Initial survey
Assignment(s)		Professor		Pdf file	Before due date.
Quiz Solutions					After each quiz
The current schedule		Designer		Page resource	After each lecture

Message	Stakeholder Name	Person responsible	Channel(s)	Tools and formats	Frequency
Assignment Status	Students	Designer	Course E-Class site	Page resource	After each lecture
Survey reports	Students Professor			PDF file	After the application of each survey
Calendar	Students			Calendar resource	After the application of the Initial survey and update when it is necessary.
Online learning tools				PPSX file (power point)	After the application of the Initial survey
Sample final exam (online)				Quiz activity	At least two weeks before the exam
The information letter of ISO 10008 study		Researcher (Investigator's Supervisor)	The classroom	• Speech • Hard copy of the informati on letter	Once to present the research
The information letter of ISO 10008 study		Designer	Course E-Class site	PDF file	On the day that the research is presented in the classroom (May 26th, 2015)
The information letter of ISO 10008 study		Professor	Email	Email	Once to present the research
Initial Survey		Researchers	Classroom	• Speech • Hard copy of initial Survey	May 26th, 2015
Midterm Survey					June 23th, 2015
Final Survey					July 21th, 2015
Marks published on the course E-Class site		Professor	The Course E-Class site	• Grade report available in E-Class site	After each assignment, quizzes and exams

Record C.5 F-SP-01 Pre-transaction phase in the B2C ECT system

Pre-transaction phase in the B2C ECT system Form							
Code	F-SP-01	**Clause**	6.1.2, 6.1.3 and 6.1.4	**Version**	0	**Date**	16-05-2015

1. **General data:**

Course	A1 Course	**Term / Year**	Spring/Summer 2015
Version Number	01	**Revision Date**	26-05-2015

2. **ISO 10008:**

Select elements of the ISO 10008 standard to be implemented in the course

Objectives and indicators of the B2C ECT system	Yes	No
B2C ECT code (ISO 10001)	Yes	No
Student support (in order to assist students in using the course site)	Yes	No
Feedback Handling process (ISO 10002) (including complaints)	Yes	No
Determine the satisfaction of students with the system (ISO 1"0004)	Yes	No
Information Security (ISO 27001)	Yes	No
Review of the B2C ECT system	Yes	No
The privacy policy (based on the University's policy)	Yes	No
Display office hours and contact information	Yes	No

3. **Content creation:**

1. Identify the products provided through electronic transactions.

Products	Delivery Methods
Existing prior to the study: Course outline, lecture slides, assignments, quiz solutions, sample midterm/exam and marks published on the course E-Class site	Course site
Added during the study: calendar, current schedule, assignment status, online learning tools and survey reports	

2. Select the resources or activities to be implemented on the course site.

Complementary content		
"Calendar" with a plan of lectures, as well as assignment and other course deadlines.	Yes	No
"Grade report" with the current weight of each component.	Yes	No
"Glossary" with important concepts and acronyms of the course	Yes	No
"Quiz" used to take online short quizzes, midterms or exams to students	Yes	No
"Sample Exam" used to give examples of exams to students	Yes	No
"Assignment", giving the instructions of assignments, as well as students submission through the course site.	Yes	No
"Tutorials", section to show videos or instructions to use different sections or resources on the course site, or other topics.	Yes	No
"Product catalog", which explains the content, deadline and other characteristics of products and tools provided through the course site	Yes	No

3. Identify the approach to deal with changes in the information.

Delivery Methods	Action
Course site	Any change in a file posted on the course E-Class site should be updated with a new file, advertising the changes and the date.

4. Content delivery:

1. Select some formats to deliver the content

Present products or information (e.g. outline, lecture slides and assignments) in different kinds of format (e.g. PDF file, "Page", "Tab display", videos)	Yes	No
Set the contact information at the beginning of the course site	Yes	No
Choose or change the color or other characteristics regarding format on the course site	Yes	No
Have the option of completion tracking on the course site	Yes	No

2. Select the complementary channels

Complementary communication channels		
"Announcement" (forum) on the course site, publishing news to all students, sending an email too.	Yes	No
"Specific forums", refers to forums on the course site regarding specific topics, e.g. midterm, Chapter 1, assignments.	Yes	No
"Feedback" on the course site**,** obtaining the opinion from students during term to improve the course.	Yes	No
"Choices" on the course site (kind of survey),for asking a single question and offer a selection of possible responses to student about their preferences in any specific subject. For example, a schedule of the TA office hours, choose a team or subject.	Yes	No
"Chat" on the course site**,** enables participants to have text-based, real-time synchronous discussions. It would be another channel of communication with students, available in specific periods to answer questions to students as "office hours".	Yes	No

5. Content governance:

1. Appoint person(s) responsible for managing tasks in the B2C ECT System.

Name	Role	Main responsibilities or task (content contributions)
Professor	Administrator of the course E-Class site, full access to the information.	• Participate in planning and designing the course E-Class site, giving the approval for any change. • Check all published information on the course E-Class site. • Check the consistency of the delivered information. • Upload the course material established in the communication plan. • Manage announcements to students.
Research assistant' supervisor	Designer, with limited access to the information (e.g. not have access to marks, student information and announcement forum).	• Participate in planning and designing the course E-Class site. • Check the new resources published on the course E-Class site due to the implementation of the ISO 10008 standard and its subsystems.
Designer (Research Assistant)	Designer, with limited access to the information (e.g. not have access to marks, student information and announcement forum).	• Provide ideas for planning and designing the course E-Class site. • Publish information about the specific subsystems such as survey reports. • Set up new products or changes on the course E-Class site (interface). • Update the current schedule and assignment status.

2. Determine guidelines for content contributors.

Actions	Guidelines
Uploading of any files on the course site	Professor's approval is required
Performing changes in the design of the course site.	
Performing assigned tasks	The designer should follow the assigned tasks and any instructions gave through email

3. Establish guidelines for records management.

Person responsible	Actions
Professor and designer	Maintain each version of the documents published on the course site in hidden mode. Only the last version should be shown to students. However, the former files should not be deleted to track the changes of the documents.

4. Establish a control mechanism for modifications of key content

Change	Actions
Publishing any product on the course site	Professor's approval needed previously

Record C.6 F-MP-02- Planning and Designing of Feedback Handling

Planning and Designing of Feedback Handling Form							
Code	F-MP-02	**Clause**	7.1.4 and 7.1.5	**Version**	0	**Approval Date**	21-05-2015

1. General data:

Course	A1 Course		**Term / Year**	Spring/Summer 2015
Version Number	01	**Revision Date**	26-05-2015	

2. Feedback Handling Policy statement

Provide a Feedback Handling of the B2C ECT system for the A1 Course, where students can express any comment, suggestion, compliment and complaint regarding the course E-class site, where students can deliver feedbacks anonymously.

3. Feedback Handling objectives[1]

Objective	Target
Analyze 100% of the received feedbacks during the A1 Course in the Spring-Summer 2015	Students/ Researchers/ Professor
Close at least 80% of the feedbacks by implementing the determined actions during the A1 Course in the Spring-Summer 2015	

1: This part should be included in the F-G-02 form.

4. Performance Indicators[2]

Indicator	Formula	Goal	Justification for the goal	Person responsible to measure	Frequency
Percentage of feedbacks analyzed during the A1 Course	(Number of feedbacks analyzed in the spring/summer 2015/ Number of feedbacks in the spring/summer 2015) *100	= 100%	This is the maximum value for the goal	Designer	One week after the application of surveys
Percentage of closed feedbacks	(Number of closed feedbacks in term t/ Number of feedbacks in term t) *100	>= 80%	Some feedback could be received at the end of the term	Designer	Monthly

2: This part should be included in the F-G-02 form.

5. Resources needed[3]

Human Resources	The Designer (research assistant)
Monetary Resources	Not needed
Hours of training	Self-training in the process
Infrastructure	A computer provided by the university
Others	2 boxes, software Excel

3: This part should be included in the F-G-03 form.

6. Feedback Handling Procedures

Establish some guidelines to establish the Feedback Handling system.

Channels to receive a feedback		
"Anonymous Feedback" on the course site	Yes	No
"Not Anonymous Feedback" on the course site	Yes	No
Both "Anonymous and not anonymous Feedback" on the course site	Yes	No
Email	Yes	No
Surveys (through open questions)	Yes	No
Paper feedback through a box in the classroom	Yes	No
Classification of a feedback		
Option to classify feedbacks into a comment, complaint, compliment, or suggestion	Yes	No
Channel for broadcasting the feedback handling subsystem to students		
Course site	Yes	No
Email	Yes	No
Course outline	Yes	No
Classroom	Yes	No

Record C.7 F-MP-04 Privacy and Information Security in the B2C ECT system

Privacy and InformationSecurity in the B2C ECT system Form							
Code	F-MP-05	**Clause**	7.2.2 and 7.2.3	**Version**	0	**Date**	07-05-2015

1. **General data:**

Course	A1 Course		**Term / Year**	Spring/Summer 2015
Version Number	01	**Revision Date**	15-06-2015	

2. **Scope, policy and objectives of information security**

Scope
The information security management system for the A1 Course is limited to the processes which involve electronic transactions. Then, it considers the course material delivered through the course E-Class site.
Privacy and Information Security Policy
Not included in the scope
Objectives
• Publishing 100% of the lecture slides on the course E-Class site previous to the class (availability) • Publishing 100% of the assignments on the course E-Class site (availability) • Implement on the course site 100% of the new products (resources) considered useful by students in the initial survey.

3. **Indicators of information security**

Indicator	**Formula /description**	**Goal**	**Person responsible to measure**	**Frequency**
Percentage of lecture slides published on the course E-Class site before the class	(Numbers of the lecture slides published on the course E-Class site before the class in the spring/summer 2015/ Numbers of lecture slides in the spring/summer 2015) *100	=100%	Designer	On the day of each class (twice to week)
Percentage of assignments published on the course E-Class site	(Numbers of the assignments published on the course E-Class site in the spring/summer 2015/ Number of assignments in the spring/summer 2015) *100			Due date of the assignments.
Percentage of new products implemented on the course E-Class site, which were considered useful by students in the initial survey.	(Number of new products implemented on the course E-Class site, which were considered useful by students in the initial survey in the spring/summer 2015/ Number of new products considered useful by students in the initial survey in the spring/summer 2015) *100			One month after the application of the initial survey

4. Use of personal information

Data	Using for
	Not included in the scope

5. Who has access to personal information and restrictions

Who	Internal/External	What information	Restrictions
		Not included in the scope	
General recommendations or restrictions			

6. Information asset inventory

Process	Information Asset	Media	Storage	Retention	Disposition
Setting and updating the course site and email	Lecture slides	Electronic (PDF file)	Lecture section/ the course E-Class site	During term	Deactivate ("hide") the course E-Class site for students, TA and researchers
	Sample Midterm		Exams section/ the course E-Class site		
	Sample exam				
	Course Outline	Electronic (PDF file) Electronic (Tab)	At the top of the course E-Class site		
	Announcement Forum	Electronic (Activity on the course site)			
	Assignments	Electronic (PDF file)	Assignments section/ the course E-Class site		
	Solution guide to assignment				
	Quiz solutions		Quizzes section/ the course E-Class site		
	Survey Reports (result of surveys)		ISO 10008 study section/ the course E-Class site		
	Current Schedule	Electronic (Page)	Current Schedule section/ the course E-Class site		
	Assignment Status		Assignment section/ the course E-Class site		
	Online Learning Tools	Electronic (PPSX file, PowerPoint)	Current Schedule section/ the course E-Class site		
	Calendar	Electronic (Resource on the course site)	At the beginning of the course E-Class site		

Process	Information Asset	Media	Storage	Retention	Disposition
	Published marks	Electronic (database on the course E-Class site)	Grade resource/ the course E-Class site		
• Setting and updating the course site and email • Operating the course site	Users	Electronic (Database on the course site)	Users resource/ the course E-Class site		

7. <u>Risk assessment and treatment</u>

Risk	Information Asset	Likelihood	Impact	Severity	Treatment
Disclosure of the solution guide to assignment for students of the next term, provoked by the access to the course site after the finished term	Solution guide to assignment	Possible	High	High	Deactivate the course site at the end of term and eliminate the role of teaching assistant and researchers, avoiding the access to the material after term.
Disclosure of the quiz solution for students of the next term, provoked by the access to the course site after the finished term	Quiz Solution				
Lack of protection of personal data of students, provoked by the access of the researchers to the participant list	Users (data base)	Unlikely	Medium	Low	• Grant access to researchers as designer without access to participant list • Restrict the possibility to change the "designer" role on the course E-Class site
Lack of protection of marks, provoked by the access of the researchers to the grades	Marks published on the course site				
Use or alterations of the lectures or online learning tools	• Lecture slides • Online learning tools				Publish the lecture slide in PDF file and the online learning tools in PPSX file.

Record C.8 F-MI-03 Corrective and preventive actions _ CA/PA number 01

Corrective and preventive actions Form							
Code	F-MI-03	**Clause**	6.3.3 and 8.5	**Version**	0	**Approval Date**	15-05-2015

1. **General data:**

Course	A1	**Term/Year**	Spring-Summer 2015	**CA/PA Number**	01

2. **Identification of the situation**

Reported by	Student from Initial survey	**Date**	26-05-2015
Type of action			
Corrective action		Preventive action	X
Detection from			
Nonconforming product		Reviewing and evaluating the B2C ECT system	
Complaint/feedback		Surveys	X
Indicator revision		Other	
Description of the situation			
Include the direct link to professor's email on the course E-class site.			

3. **Cause analysis and action plan**

Correction or Initial action
Not applicable
Cause Analysis or investigation
In the E-class site has not been shown the link for the professor's email. It was not considered how something useful for students.

Action Plan			
#	**Activity**	**Person responsible**	**Implementation date**
1	Set up the direct link to professor's email hidden to students	Designer	12-06-2015
2	Check and approve the modification	Professor	15-06-2015
3	Show the update on the E-Class site	Designer	15-06-2015

4. **Action plan follow**

#	Date	Status (Ongoing / Closed)	Comments
1	15-06-2015	Closed	The direct link to professor's email has been published at the top of the E-Class site, with other professor's information.

Record C.9 F-MI-03 Corrective and preventive actions _ CA/PA number 02

Corrective and preventive actions Form							
Code	F-MI-03	**Clause**	6.3.3 and 8.5	**Version**	0	**Approval Date**	15-05-2015

1. **General data:**

Course	A1	**Term/Year**	Spring-Summer 2015	**CA/PA Number**	02

2. **Identification of the situation**

Reported by	Student from Initial survey	**Date**	26-05-2015
Type of action			
Corrective action		Preventive action	X
Detection from			
Nonconforming product		Reviewing and evaluating the B2C ECT system	
Complaint/feedback		Surveys	X
Indicator revision		Other	
Description of the situation			
Include more practice problems with solutions in the E-Class site.			

3. **Cause analysis and action plan**

Correction or Initial action
Not applicable
Cause Analysis or investigation
In the E-class site has not been more practice problems with solutions at the moment of the initial survey, since it was to plan before the first midterm.

Action Plan			
#	**Activity**	**Person responsible**	**Implementation date**
1	Publish a file with problems and solutions for the Midterm	Professor	16-06-2015
2	Publish a file with problems and solutions for the Final exam	Professor	31-07-2015

4. **Action plan follow**

#	Date	Status (Ongoing / Closed)	Comments
1	15-07-2015	Ongoing	Included the "extra problems and solutions" pdf file on 16-06-2015
2			

Record C.10 F-MI-03 Corrective and preventive actions _ CA/PA number 03

Corrective and preventive actions Form							
Code	F-MI-03	**Clause**	6.3.3 and 8.5	**Version**	0	**Approval Date**	15-05-2015

1. **General data:**

Course	A1	**Term/Year**	Spring-Summer 2015	**CA/PA Number**	03

2. **Identification of the situation**

Reported by	Student from Initial and Midterm survey	**Date**	26-05-2015 and update 23-06-2015
Type of action			
Corrective action		Preventive action	X
Detection from			
Nonconforming product		Reviewing and evaluating the B2C ECT system	
Complaint/feedback		Surveys	X
Indicator revision		Other	
Description of the situation			
Include practice for exams/ past exams in the E-Class site.			

3. **Cause analysis and action plan**

Correction or Initial action
Not applicable
Cause Analysis or investigation
In the E-class site has not been published the sample midterm at the moment of the initial survey, since it was to plan before the first midterm. Furthermore, when the Midterm survey was undertaken, the sample exam has not been published, since it is planned for July.

Action Plan			
#	**Activity**	**Person responsible**	**Implementation date**
1	Publish the sample Midterm	Professor	10-06-2015
2	Set up an online sample final exam	Designer	09-07-2015
3	Check and approve the online sample final exam	Professor	13-07-2015
4	Show the online sample final exam on the E-Class site	Designer	14-07-2015

4. **Action plan follow**

#	**Date**	**Status (Ongoing / Closed)**	**Comments**
1	30-07-2015	Closed	The sample midterm was published on 10-06-2015 The designer configured the online sample final exam in E-Class, the professor checked and decided not include the online sample. While the sample final exam in a PDF file was published on 29-07-2015.

Record C.11 F-MI-03 Corrective and preventive actions _ CA/PA number 04

Corrective and preventive actions Form							
Code	F-MI-03	**Clause**	6.3.3 and 8.5	**Version**	0	**Approval Date**	15-05-2015

1. **General data:**

Course	A1	**Term/Year**	Spring-Summer 2015	**CA/PA Number**	04

2. **Identification of the situation**

Reported by	The professor		**Date**	23-06-2015
Type of action				
Corrective action	X	Preventive action		
Detection from				
Nonconforming product		Reviewing and evaluating the B2C ECT system		
Complaint/feedback		Surveys		
Indicator revision		Other		X
Description of the situation				
The schedule has been changed, since a new due date for assignment 3. Therefore, It is necessary to modify the information in the calendar, course outline and current schedule to maintain the coherence in the information published on the E-Class site.				

3. **Cause analysis and action plan**

Correction or Initial action
The professor post an announcement in the E-Class site and send an email with the new due date for assignment 3
Cause Analysis or investigation
An extension of the due date for assignment #3 was granted by the professor, since July 1 will be a holiday.

Action Plan			
#	**Activity**	**Person responsible**	**Implementation date**
1	Update the calendar, course outline tab, current schedule with the new due date for assignment # 3.	Designer	23-06-2015

4. **Action plan follow**

#	**Date**	**Status (Ongoing / Closed)**	**Comments**
1	23-06-2015	Closed	All sections or resources with the due date for assignment #3 has been modified, except the original course outline file in pdf.

Record C.12 F-MI-03 Corrective and preventive actions _ CA/PA number 05

Corrective and preventive actions Form							
Code	F-MI-03	**Clause**	6.3.3 and 8.5	**Version**	0	**Approval Date**	15-05-2015

1. **General data:**

Course	A1	**Term/Year**	Spring-Summer 2015	**CA/PA Number**	05

2. **Identification of the situation**

Reported by	Student from Midterm Survey	**Date**	23-06-2015
Type of action			
Corrective action		Preventive action	X
Detection from			
Nonconforming product		Reviewing and evaluating the B2C ECT system	
Complaint/feedback		Surveys	X
Indicator revision		Other	
Description of the situation			
"Divide lectures into groups-based on concepts, or chapters"			

3. **Cause analysis and action plan**

Correction or Initial action
N/A
Cause Analysis or investigation
The division of lectures had not been considered how a student requirement.

Action Plan			
#	**Activity**	**Person responsible**	**Implementation date**
1	Include labels to separate by chapter in the lecture slide files on the E-Class site	Designer	10-07-2015
2	Check and approve the modification	The professor	13-07-2015
3	Show the update on the E-Class site	Designer	13-07-2015

4. **Action plan follow**

#	**Date**	**Status (Ongoing / Closed)**	**Comments**
1	13-07-2015	Closed	The lecture slides have been separated by chapter. Also in the current schedule, each topic has been linked with its the lecture slide.

Record C.13 F-MI-01 Monitoring and measuring student satisfaction

Monitoring and measuring student satisfaction Form							
Code	F-MI-01	**Clause**	8.3	**Version**	0	**Approval Date**	15-05-2015

1. **General data:**

Course	A1 Course	**Term / Year**	Spring/Summer 2015
Version Number	01	**Revision Date**	01-05-2015

2. **Planning**[1]

Purpose and objectives of monitoring and measuring student satisfaction
Monitoring and measuring student satisfaction with the A1 Course regarding the new course material delivered through the course E-Class site, implemented due to the ISO 10008 study. Obtaining student's expectation and monitoring trends in student satisfaction during the term.

Performance indicators:

<table>
<tr><th>Indicator</th><th colspan="3">Formula</th><th>Goal</th><th>Justification of the goal</th><th>Person responsible to measure</th><th>Frequency</th></tr>
<tr><td rowspan="6">Comparison of median of student satisfaction regarding the course site during the term.</td><td rowspan="3">Median</td><td>Initial Survey</td><td></td><td rowspan="6">Increase of student satisfaction</td><td rowspan="6">The goal is increase student satisfaction regarding the course site during the term.</td><td rowspan="7">Researcher (Designer)</td><td rowspan="6">1st measurement: After the application of the midterm survey
2nd measurement: After the application of the final survey.</td></tr>
<tr><td>Midterm Survey</td><td></td></tr>
<tr><td>Final Survey</td><td></td></tr>
<tr><td colspan="3">Increase of student satisfaction</td></tr>
<tr><td colspan="2">Median from the Midterm Survey>Median from the Initial Survey</td><td>Yes/No</td></tr>
<tr><td colspan="2">Median from the Final Survey >Median from the Initial Survey</td><td>Yes/No</td></tr>
<tr><td>Percentage of the applied surveys in the term</td><td colspan="3">(Numbers of applied surveys[1] in term t/ 3) *100

1: it does not refer to the number of answers by survey.</td><td>100%</td><td>Maximum value of the indicator</td><td>At the end of the research</td></tr>
</table>

3. Determining scope and frequency

Scope (what) [2]	Type of data	Frequency (when)
Expectations regarding: • New course material on the course site. • As well as	Answer from students registered in the A1 Course during the Spring-Summer 2015, which access to participate voluntarily	At the beginning of the term
Evaluation of: • The current course material available		At the middle of the term
Obtain the overall student's perception about the new course material available on the course site, the course site and implemented subsystems.		At the end of the term
Current student satisfaction with the course site.		At the beginning, middle and the end of the term

2: The scope could consider if it is for obtaining student's expectations, student's perceptions or both.

4. Determining implementation methods and responsibilities for measuring student satisfaction

Source (external/internal)	Method (How)	Person responsible	Whom receive the information
Initial Survey (Internal)	Self-completion questionnaires distributed in the classroom, using the median method to analyze answers.	Researcher (Investigator's Supervisor)	Researchers
Midterm Survey (Internal)			
Final Survey (Internal)			

5. Resources needed

Human Resources	The researcher and the research assistant (designer)
Monetary Resources	Not needed
Hours of training	Not needed
Infrastructure	Computer, software, printer
Others	Papers

6. Determining student expectations

Expectations	
Stated student requirements	• Receive the content necessary to learn about the course. • Have fair evaluations • Have a good connection to the Internet to access to the course site
Implied student requirements	• Have access to lectures before each class • Have easy access to course material
Academic regulation requirements	• Have a course outline
Other student requirements	• Have extra course materials such as Calendar, solved problems.

7. Gathering student satisfaction data

Characteristics related to student satisfaction		Rank
Product characteristics	Have the lecture slides available on the course site	1
	Have extra course materials	5
	Have an easy access to the course material on the course site	2
Delivery characteristics	Have access to lectures before each class	3
	Have a good connection to the Internet to access to the course site	4
Organizational characteristics	Have access to clarify doubts about the course E-Class site to the professor or support team	6

Form C. 1 Initial survey

ISO 10008 Initial Survey (May 26, 2015)

In order to analyze and improve the use of a system following ISO 10008 and other customer satisfaction standards in the course, this survey is designed to obtain feedback from you regarding the system and its components. Participation is voluntary and anonymous. Please do not write your name, student number, or any personally-identifiable information on the sheet. You can place the completed survey in one of the two designated boxes by the exit doors of the classroom. The results will be summarized and presented on the course E-Class site. Your responses to the open-ended questions may be quoted and included in the summary posted on the course E-Class site, as well as in conference and/or journal papers, thesis, and other publications.

□ Please indicate with a checkmark here to confirm your consent to participate in this survey

□ Please indicate with a checkmark here to confirm your understanding that the data you provide in this survey cannot be withdrawn from the study after your submission of the survey

1. Will it be useful to you if the following resources are available on the course E-Class site?

Current schedule with the coverage of topics updated after each lecture	**Yes**	**No**
Online learning tools with step-by-step instructions for problem solutions	**Yes**	**No**
Assignments section with the coverage of topics needed for each problem	**Yes**	**No**
Calendar with a plan of lectures, as well as assignment and other course deadlines	**Yes**	**No**
Feedback forms with information on the colleagues' ISO 10008 study feedback and related actions	**Yes**	**No**
Results of the ISO 10008 study surveys conducted in the course	**Yes**	**No**

2. Please suggest any other content that you would like to have available on the course E-Class site:

3. Please indicate your satisfaction with the current course E-Class site: **1 2 3 4 5**

   1 – "Very dissatisfied"; 2 – "Dissatisfied"; 3 – "Neutral"; 4 – "Satisfied"; 5 – "Very Satisfied"

Form C. 2 Midterm survey

ISO 10008 Midterm Survey (June 23, 2015)

In order to analyze and improve the use of a system following ISO 10008 and other customer satisfaction standards in the course, this survey is designed to obtain feedback from you regarding the system and its components. Participation is voluntary and anonymous. Please do not write your name, student number, or any personally-identifiable information on the sheet. You can place the completed survey in one of the two designated boxes by the exit doors of the classroom. The results will be summarized and presented on the course E-Class site. Your responses to the open-ended questions may be quoted and included in the summary posted on the course E-Class site, as well as in conference and/or journal papers, thesis, and other publications.

□ Please indicate with a checkmark here to confirm your consent to participate in this survey

□ Please indicate with a checkmark here to confirm your understanding that the data you provide in this survey cannot be withdrawn from the study after your submission of the survey

1. Please indicate the usefulness of the following resources available on the course E-Class site:

Course Outline	1	2	3	4	5	Online Learning Tools	1	2	3	4	5
Current Schedule	1	2	3	4	5	Calendar	1	2	3	4	5
Lectures	1	2	3	4	5	Assignments	1	2	3	4	5
Quizzes	1	2	3	4	5	Exams	1	2	3	4	5

1 – “Not Useful”; 2 – “Barely Useful”; 3 – “Useful”; 4 – “Very Useful”; 5 – “Extremely Useful”

2. Please indicate how often you use the following resources on the course E-Class site:

Course Outline	1	2	3	4	5	Online Learning Tools	1	2	3	4	5
Current Schedule	1	2	3	4	5	Calendar	1	2	3	4	5
Lectures	1	2	3	4	5	Assignments	1	2	3	4	5
Quizzes	1	2	3	4	5	Exams	1	2	3	4	5

1 – “Never”; 2 – “Monthly”; 3 – “Weekly”; 4 – “Two to six times a week”; 5 – “Daily or more”

3. Please indicate your awareness and your opinion regarding the usefulness of the following:

Component	Aware?		Usefulness
Results of Surveys	Yes	No	1 2 3 4 5

1–“Not Useful”; 2 – “Barely Useful”; 3 – “Useful”; 4 – “Very Useful”; 5 – “Extremely Useful”

4. Please indicate your satisfaction with the current course E-Class site: 1 2 3 4 5

1 – “Very dissatisfied”; 2 – “Dissatisfied”; 3 – “Neutral”; 4 – “Satisfied”; 5 – “Very Satisfied”

5. Please list any suggestions for improvement of the current course E-Class site.

Form C. 3 Final survey

ISO 10008 Final Survey (July 21, 2015)

In order to analyze and improve the use of a system following ISO 10008 and other customer satisfaction standards in the course, this survey is designed to obtain feedback from you regarding the system and its components. Participation is voluntary and anonymous. Please do not write your name, student number, or any personally-identifiable information on the sheet. You can place the completed survey in one of the two designated boxes by the exit doors of the classroom. The results will be summarized and presented on the course E-Class site. Your responses to the open-ended questions may be quoted and included in the summary posted on the course E-Class site, as well as in conferences and/or journal papers, thesis, and other publications.

□ Please indicate with a checkmark here to confirm your consent to participate in this survey

□ Please indicate with a checkmark here to confirm your understanding that the data you provide in this survey cannot be withdrawn from the study after your submission of the survey

1. Please indicate the usefulness of the following resources available on the course E-Class site:

Course Outline	1	2	3	4	5	Online Learning Tools	1	2	3	4	5
Current Schedule	1	2	3	4	5	Calendar	1	2	3	4	5
Lectures	1	2	3	4	5	Assignments	1	2	3	4	5
Quizzes	1	2	3	4	5	Exams	1	2	3	4	5

1 – “Not Useful”; 2 – “Barely Useful”; 3 – “Useful”; 4 – “Very Useful”; 5 – “Extremely Useful”

2. Please indicate your agreement or disagreement with the following statements:

The course E-Class site met my needs	SD	D	N	A	SA
The procedures for handling student feedback were appropriate	SD	D	N	A	SA
The Feedback Forms were informative	SD	D	N	A	SA
The frequency of surveys was adequate	SD	D	N	A	SA
The Survey Reports were informative	SD	D	N	A	SA
Surveys and redesign of the course E-class site improved my course satisfaction	SD	D	N	A	SA
Surveys and redesign of the course E-class site improved the quality of the course	SD	D	N	A	SA

SD – “Strongly Disagree”; D – “Disagree”; N – “Neutral”; A – “Agree”; SA – “Strongly Agree”

3. Please indicate your satisfaction with the current course E-Class site: 1 2 3 4 5
1 – “Very dissatisfied”; 2 – “Dissatisfied”; 3 – “Neutral”; 4 – “Satisfied”; 5 – “Very Satisfied”

4. Please list any suggestions for improvement of the current course E-Class site, and surveys.

Table C. 1 Feedback control for the A1 Course record (July 16th 2015)

Identification	Date received	Channel	Type	Feedback	Analysis	Action?	Actions during term	CA/PA Number	Status
01	26-05-2015	Survey	Suggestion	*"More learning resources related to a lecture like link to public courses"*	The professor cannot control the quality of the content published in other public courses. Therefore, this suggestion will not be implemented.	No	Not applicable (N/A)		Closed
02	26-05-2015	Survey	Suggestion	*"Direct link to email profs."*	This suggestion is considered to be implemented	Yes	Included the direct link	01	Closed
03	26-05-2015	Survey	Suggestion	*"Online learning tools"*	It had been considered to be implemented according to the result of the initial survey	Yes	Included the online learning tools section		Closed
04	26-05-2015	Survey	Comment	*"N/A"*	N/A	No	N/A		Closed
05	26-05-2015	Survey	Compliment	*"That's good enough"*	N/A	No	N/A		Closed
06	26-05-2015	Survey	Suggestion	*"extra practice problems other than assignments"*	This suggestion is considered to be implemented	Yes	Included the "extra problems and solutions" pdf file	02	Ongoing
07	26-05-2015	Survey	Suggestion	*"More lectures/courses with eclass live"*	It will not be included in this term, since this kind of communication channel was not included in this course	No	N/A		Closed
08	26-05-2015	Survey	Suggestion	*"-Solutions to problem sets and examples"*	This suggestion is considered to be implemented	Yes	Included the "extra problems and solutions" pdf file	02	Ongoing

Identification	Date received	Channel	Type	Feedback	Analysis	Action?	Actions during term	CA/PA Number	Status
09	26-05-2015	Survey	Suggestion	*"Some previous taken courses sometimes show up on the webpage"*	It refers to all courses of the E-class site, each professor should shut down his/her course and therefore this suggestion is out of our action boundaries.	No	N/A		Closed
10	26-05-2015	Survey	Suggestion	*"A "live chat" option to interact w profs when they are "online" could be useful for quick questions instead of sending an email"*	It will not be included in this term, since this kind of communication channel was not included in this course	No	N/A		Closed
11	26-05-2015	Survey	Suggestion	*"-previous Midterms/Finals"*	This suggestion is considered to be implemented	Yes	Included the "sample midterm" file and the online sample Final Exam	03	Ongoing
12	26-05-2015	Survey	Suggestion	*"Upgrade Mobile compatibility"*	It refers to the E-class site managed by the university. Therefore, this suggestion is out of our action boundaries.	No	N/A		Closed
13	26-05-2015	Survey	Suggestion	*"exam bank? Has old/past exams for practice"*	This suggestion is considered to be implemented partially. It means one sample by exams is considered to update on the course site.	Yes	Included the "sample midterm" file and the online sample Final Exam	03	Ongoing

Identification	Date received	Channel	Type	Feedback	Analysis	Action?	Actions during term	CA/PA Number	Status
14	26-05-2015	Survey	Suggestion	*"Emphasis should be put on "Online learning tools", would be incredibly useful"*	It had been considered to be implemented according to the result of the initial survey	Yes	Included the online learning tools section		Closed
15	26-05-2015	Survey	Suggestion	*"textbook with questions should be added to eclass"*	The textbook has copyright, therefore it cannot be published in E-Class site	No	N/A		Closed
16	26-05-2015	Survey	Suggestion	*" A place to store assignments for the class"*	The outline course establishes that electronic submissions for assignment are not accepted. Then this suggestion will not be considered in this term.	No	N/A		Closed
17	26-05-2015	Survey	Compliment	*"that looks great"*	N/A	No	N/A		Closed
18	26-05-2015	Survey	Suggestion	*"Updated grade section integrate lecture/lab component for each class Dont have them separate"*	The researcher does not have access to grade section.	No	N/A		Closed
19	26-05-2015	Survey	Suggestion	*"E-class needs to be an app for android or apple app store so that it can be accessed easier. Eclass grades need to be updated more frequently (i.e. before the end of term)*	The app suggestions refers to the E-class site managed by the university, therefore this suggestion is out of our action boundaries.	No	N/A		Closed

Identification	Date received	Channel	Type	Feedback	Analysis	Action?	Actions during term	CA/PA Number	Status
20	26-05-2015	Survey	Suggestion	*"-Online lecture notes with solutions and unit solutions"*	Lecture notes are not planned in this term.	No	N/A		Closed
21	26-05-2015	Survey	Compliment	*"Everything is good"*	N/A	No	N/A		Closed
22	26-05-2015	Survey	Suggestion	*"Extra practice problems with solutions (for problems not covered in class)"*	This suggestion is considered to be implemented	Yes	Included the "extra problems and solutions" pdf file	02	Ongoing
23	23-06-2015	Survey	Comment	*"More"*	N/A	No	N/A		Closed
24	23-06-2015	Survey	Comment	*"None"*	N/A	No	N/A		Closed
25	23-06-2015	Survey	Compliment	*"Everything perfect"*	N/A	No	N/A		Closed
26	23-06-2015	Survey	Suggestion	*"Divide lectures into groups-based on concepts, or chapters"*	This suggestion is considered to be implemented	Yes	Include labels to separate by chapter	05	Closed
27	23-06-2015	Survey	Comment	*"None for now"*	N/A	No	N/A		Closed
28	23-06-2015	Survey	Suggestion	*"Include important dates as a reminder (deadlines for registration, paying tuition, etc)"*	These deadlines are not controlled by the professor: Therefore this suggestion is out of our action boundaries.	No	N/A		Closed
29	23-06-2015	Survey	Suggestion	*"Nothing other than more practice for exams"*	This suggestion is considered to be implemented	Yes	Included the "sample midterm" file and the online sample Final Exam	03	Ongoing

Identification	Date received	Channel	Type	Feedback	Analysis	Action?	Actions during term	CA/PA Number	Status
30	23-06-2015	Survey	Suggestion	*"Make all the other courses do what you do"*	Implement the research ISO 10008 in other courses for the next term	No	N/A		Closed
31	23-06-2015	Survey	Comment	*"I have no comparins about eclass"*	N/A	No	N/A		Closed
32	23-06-2015	Survey	Suggestion	*"One of my friends had their cellular phone refreshing the eclass site automatically during an exam and was harshly penalized as a result, ruining his university experience for a crime he did not commit. Please, just shut down/lock the eclass site for that class during the exam for that class to avoid such issues."*	An option to deal with this situation should be: Shut down the course E-Class site during the final exam (Put option "Hidden" in the configuration of the course site). However, the professor thinks there is a risk to shut down the E-Class, therefore he does not want to do this activity.	No	N/A		Closed
33	23-06-2015	Survey	Suggestion	*"Remove finished course"*	It refers to all courses of the E-class site, each professor should shut down his/her course and therefore this suggestion is out of our action boundaries.	No	N/A		Closed
34	23-06-2015	Survey	Suggestion	*"Perhaps a video for each lecture would make it better"*	Videos for the lecture are not considered in this term	No	N/A		Closed
35	23-06-2015	Survey	Suggestion	*"Calendar might not be efficient enough"*	The aim of the calendar is to highlight the internal milestones for the course	No	N/A		Closed

Identification	Date received	Channel	Type	Feedback	Analysis	Action?	Actions during term	CA/PA Number	Status
36	23-06-2015	Survey	Suggestion	*"Please put eclass in app store"*	It refers to the E-class site managed by the university. Therefore this suggestion is out of our action boundaries.	No	N/A		Closed
37	23-06-2015	Survey	Suggestion	*"I like all of the changes I have seen; wish you all would help excel out with his mate 202 eclass!"*	Implement the research ISO 10008 in other courses for the next term	No	N/A		Closed

Table C. 2 Corrective and preventive actions control for the A1 Course record (July 16th 2015)

CA/PA Number	Reported by	Date	Type of action	Detection from	Description of the situation	Last date for actions	Status	Date of status
01	Student (from Initial Survey)	26/05/2015	Preventive action	Surveys	Include the direct link to professor's email on the E-class site.	15/06/15	Closed	15/06/15
02	Student (from Initial Survey)	26/05/2015	Preventive action	Surveys	Include more practice problems with solutions in the E-Class site.	31/07/2015	Ongoing	13/07/15
03	Student (from Initial and Midterm survey)	26/05/2015	Preventive action	Surveys	Include practice for exams/ past exams in the E-Class site.	14/07/15	Ongoing	16/07/15
04	Professor	23/06/2015	Corrective action	Other	The schedule has been changed, since a new due date for assignment 3. Therefore, It is necessary to modify the information in the calendar, course outline and current schedule to maintain the coherence in the information published on the E-Class site.	23/06/2015	Closed	23/06/2015
05	Student (from Midterm Survey)	23/06/2015	Preventive action	Surveys	"Divide lectures into groups-based on concepts, or chapters"	13/07/15	Closed	16/07/15