<University of Milano-Bicocca e-service – Exams Registration and Taxes Payment Processes>

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Govsys - SU

- Final report, version 1.0

Version Management

Version	Document name	Kommentar
P1.0	<file name>	Use P as prefix as long as you work with a draft of the document
1.0	Final Version	Use this version number when you submit your assignment

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Innehåll

Summary

The University of Milano-Bicocca is one of the biggest public higher education institutions in northern Italy, offering degrees and courses in different disciplines ranging from Economics to Psychology, Law, Letters and Computer Science.
The University offers services to a large numbers of international and Italian students, the latter ones being almost 35000 (almost 7000 of these are freshmen students), almost 10000 post degree students and researchers, almost 1500 teaching and non-teaching staff people, external agencies and college community.
Being enrolled in a Master of Science in Data Science at this Italian University, I wanted to analyze its Information System and the services it offers, focusing especially on the parts of its e-service that handle exams registration and taxes payment processes.
In recent years, technological advancements and renovations to the Information System led to significant changes in the exams' registration and verbalization procedures. While before information revolved mostly around papers, now processes are all digital.
As far as this e-service's tasks are concerned, in the beginning they were way more formal and time consuming. The data entry procedure could be completed only by the department secretary system after it had received the exam or official degree's verbalized result: this required the active involvement of both the teacher and the student.
Nowadays, instead, exams data are inserted by the teacher at the exact moment they are created in the University IT system, where they get digitally checked by the department secretary system (databases are accessed at this stage).
The central secretary system then handles the bureaucratic steps concerning students' taxes and further required checks, always interacting with the databases.
Anyway, this new digital process in its standard version can be improved adding more steps to the sub-areas regarding Teacher/department secretary system and especially central secretary system, allowing greater efficiency for all parties involved.
In the following sections we are going to have a detailed look to both the standard model and the improved one, using BPMN process documentation.

Purpose

The BPMN documentation for the standard model allows us to understand how the given process of the exam registration office is **c**arried out in the version as-is, and which are the weaknesses and bottlenecks to be removed or improved. The main

purpose and goal of adopting an improved version of the aforementioned model is to guarantee that everything follows bureaucratic rules applied to the University institution, especially those related to taxes (in the standard model, not enough attention is reserved to their management process). Besides, just like with any kind of digital service, data and databases need to be used and handled in a proper way to ensure that the process can be successfully repeated and integrity and security policies are respected. Let's consider the following important requirements: in order to register an exam, the secretary office must verify that the student has successfully payed his/her taxes and is then officially enrolled to his/her degree course. What happens if these requirements are not met? The exam is memorized and stored in a temporary register and database.
As a consequence, the secretary system has the duty to periodically verify whether any student who was not regularly enrolled to University has finally payed taxes and, if that's the case, activate his/her online registration. Last but not the least, continuous checks have to be made to ensure that there are no inconsistencies during the whole process in order to be able to eventually fix them. In the following section we will have a look at the various steps that the standard method for exams registration consists of.

Method

While the improved model will address the students' taxes payment process more in detail, the standard model is focused especially on exams registration:

- When a student passes an exam, the teacher fills a register with biographical data of the student. When the exam session ends, the teacher sends the register to the department secretary system;
- The department secretary makes a first check of the completeness of the registers of the exam session, and, when an incompleteness is found, this gets reported to the teacher;
- Once all the registers of the exam session have been collected, the department secretary system sends them to the central secretary;
- At this point, the central secretary system re-analyzes the registers for errors or inconsistencies, and checks that students:

1. have the course of the exam in their study program, and
2. are in good standing with university taxes.

- In case of errors or inconsistencies in the register, it is sent back to the teacher;
- When the registers are complete, the results of the exams are stored in the student's exam database, along with the course and the teacher who took part to the exam.

Process Model

In the following page, the BPMN process documentation for the original e-service has been inserted.

TEACHERS AND DEPARTMENT SECRETARY

EXAM REGISTER

TEACHER

DEPARTMENT SECRETARY

START

FILL THE EXAM REGISTER

CHECK THE REGISTER

XOR

COMPLETE

INCOMPLETE

TEMPORARY DATABASE FOR REGISTER

TEMPORARY DATABASE FOR REGISTER

EXAM REGISTER

REPORT INCOMPLETE-NESS

INFORM AND END EXAM SESSION

CENTRAL SECRETARY

CENTRAL SECRETARY

SOFTWARE ACTIVITY

XOR

OK

INFORM TEACHER TO END EXAM SESSION AND REOPEN IT

ANALYZE THE REGISTER

UPDATE THE EXAM DATABASE

END

TAXES

STUDENTS STUDY PROGRAMS

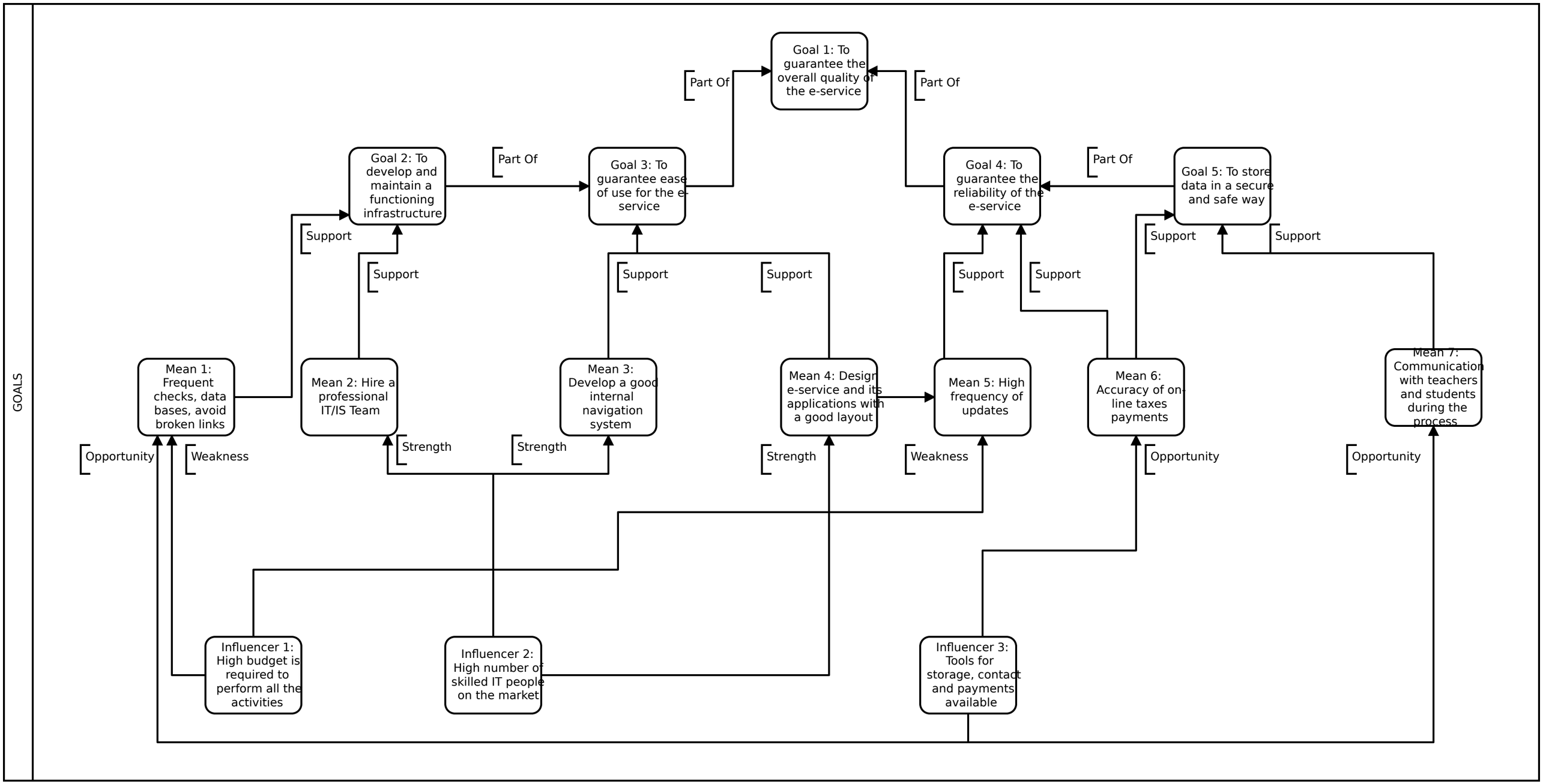
DATABASE

REPORT ERRORS AND INCONSISTEN-CIES

ERRORS AND INCONSISTENCIES

Goals

In the two following pages, the Goals' graphical representation and the improved BPMN process documentation for the University e-service have been inserted.


GOALS
Goal 1: To guarantee the overall quality of the e-service
Goal 2: To develop and maintain a functioning infrastructure
Goal 3: To guarantee ease of use for the e-service
Goal 4: To guarantee the reliability of the e-service
Goal 5: To store data in a secure and safe way
Part Of
Part Of
Part Of
Part Of
Support
Support
Support
Support
Support
Support
Support
Support
Mean 1: Frequent checks, data bases, avoid broken links
Mean 2: Hire a professional IT/IS Team
Mean 3: Develop a good internal navigation system
Mean 4: Design e-service and its applications with a good layout
Mean 5: High frequency of updates
Mean 6: Accuracy of on-line taxes payments
Mean 7: Communication with teachers and students during the process
Opportunity
Weakness
Strength
Strength
Strength
Weakness
Opportunity
Opportunity
Influencer 1: High budget is required to perform all the activities
Influencer 2: High number of skilled IT people on the market
Influencer 3: Tools for storage, contact and payments available

TEACHERS AND DEPARTMENT SECRETARY

REGISTERS' FILLING PROCESS

START

TEACHER

FILLED REGISTER

DEPARTMENT SECRETARY

FILL THE EXAM REGISTER

CHECK THE REGISTER

XOR

INCOMPLETE REGISTER

TEMPORARY DATABASE FOR REGISTER

TEMPORARY DATABASE FOR REGISTER

REPORT INCOMPLETE-NESS

INFORM TEACHER TO END EXAM SESSION AND REOPEN IT

INFORM TEACHER TO END EXAM SESSION AND REOPEN IT

REGISTERS' MANAGEMENT PROCESS

OK

XOR

COLLECT AND ANALYZE REGISTERS

TEMPORARY FILE

VERIFICATION OF PENDING PAYMENTS

VERIFY TAXES PAYMENT

XOR

ANALYZE PRESENCE OF PENDING EXAMS TO REGISTER

SOFTWARE ACTIVITY

STORE IN DATABASE

END

TAXES PAYMENT

PENDING PAYMENTS

TEMPORARY EXAM MEMORIZATIO N

SOFTWARE ACTIVITY

DATABASE

TEMPORARY DATABASE

TEMPORARY DATABASE

NOTIFY ERRORS

CENTRAL SECRETARY

IMPORTANT NOTE: WHEN PENDING EXAMS ARE FINALLY REGISTERED, THE CORRESPONDING ENTRY STORED IN "TEMPORARY DATABASE" GETS DELETED

Requirements

Req ID	Requirement	Type	Realize	Priority	Traceability
Req.01	A teacher shall be able to fill the register	Functional	By developing the University website's interface and functions destined to be used by teachers	Essential	Req.21
Req.02	A teacher shall be able to submit the filled register to the department secretary system	Functional	By developing the University website's interface and functions destined to be used by teachers	Essential	Req.21
Req.03	The department secretary system shall be able to store the register in a database and access the latter	Functional	By coding additional functionalities for the system	Essential	Req.23
Req.04	A teacher shall be able to recover the submitted register from the system	Functional	By coding additional functionalities for the system	Essential	Req.21
Req.05	The department secretary system shall be able to verify registers' integrity	Functional	By developing the e-service's interface and functions destined to be used by the department secretary	Essential	Req.21
Req.06	The department secretary system shall be able to store the correctly filled record in a final database	Functional	By coding additional functionalities for the system	Essential	Req.23
Req.07	The department secretary system shall be able to recognize whether something is incorrect or incomplete within the record	Functional	By developing the e-service's interface and functions destined to be used by the department secretary	Essential	Req.21

Req.08	The department secretary system shall be able to report inconsistencies found in the previous step	Functional	By developing the e-service's interface and functions destined to be used by the department secretary	Essential	Req.21
Req.09	The teacher shall be able to close the exam registration procedure if the integrity check by the secretary has a positive result	Functional	By developing the e-service's interface and functions destined to be used by teachers	Essential	Req.21
Req.10	The central secretary shall be able to access the taxes database to check students' payments and withdraw money	Functional	By coding additional functionalities for the system	Essential	Req.23
Req.11	The central secretary shall be able to analyze and store the files collected at the end of the department secretary process in a database	Functional	By coding additional functionalities for the system	Essential	Req.23
Req.12	The central secretary shall be able to report any errors found at this point and in this case to reopen the exam registration process for the teacher	Functional	By developing the e-service's interface and functions destined to be used by the central secretary	Conditional	Req.11 Req.20 Req.22
Req.13	The teacher shall be able to retake the exam registration process if any error was found by the central secretary	Functional	By developing the e-service's interface and functions destined to be used by the teachers	Conditional	Req.01 Req.12
Req.14	The central secretary shall be able, in absence of any errors, to proceed to the verification of students' taxes payments	Functional	By developing the e-service's interface and functions destined to be used by the central secretary	Essential	Req.10 Req.23

Req.15	The students shall be able to submit and edit their personal and family data and contact details (for example for taxes)	Functional	By developing the e-service's interface and functions destined to be used by students	Essential	Req.21 Req.23
Req.16	The central secretary system shall be able to store exams in temporary databases before and during the taxes payment checks	Functional	By coding additional functionalities for the system	Essential	Req.11 Req.23 Req.24
Req.17	The central secretary system shall be able to definitely store the exam in memory after the final check	Functional	By coding additional functionalities for the system	Essential	Req.11 Req.23 Req.24
Req.18	The central secretary system shall be able to delete the temporary databases once the final check has been completed	Functional	By developing the standard infrastructure of the e-service	Conditional	Req.11 Req.17 Req.23 Req.24
Req.19	The students shall be able to pay their taxes through the secretary online portal	Functional	By developing the infrastructure of the e-service and by coding additional functionalities for the system	Essential	Req.27
Req.20	Central secretary system shall be able to provide list of choices of how students and teachers could be contacted for notifications/problems concerning exams and taxes	Functional	By coding additional functionalities for the system	Conditional	Req.22
Req.21	The System should be developed to be able to add, edit and delete applications to be used by the different actors of	Non-Functional	By hiring an IT team able to code advanced and specific functionalities for the system	Essential	Req.27

	the e-service				
Req.22	The Information System shall be able to send notifications, emails or texts to teachers and students	Functional	By coding additional functionalities for the system	Essential	Req.20 Req.21
Req.23	The System shall be able to retrieve, edit and update/save data and information in/to databases	Functional	By coding additional functionalities for the system	Essential	Req.28
Req.24	The System should be highly efficient and usable	Non-Functional	By running periodic tests to check the system's efficiency and usability	Conditional	Req.21
Req.25	The System should be developed in such a way that it can stay active 24/7	Non-Functional	By making the IT team check System's effectiveness during the entire week	Conditional	Req.27 Req.28
Req.26	The Information System should handle confidential data in a very secure way	Non-Functional	By developing reliable and sophisticated authentication system and technologies	Essential	Req.27
Req.27	The Information System should be developed, upgraded and maintained periodically	Non-Functional	By letting a professional IT/IS team handle the maintenance and update tasks of the system	Essential	Req.28
Req.28	The Information System's infrastructure should be upgraded and maintained periodically	Non-Functional	By letting a professional IT/IS team handle the maintenance and update tasks of the system's infrastructure	Essential	

Discussion

After interviewing two Professors at University of Milano-Bicocca, I received some relevant feedback about the effects of the improvement on the original model.
In fact, the new model for exams registration is obviously more reliable and addresses inconsistencies or errors related to registers and taxes in a more efficient way.
The e-service can operate in two different scenarios:

1. Absence of errors and inconsistencies in the processes
2. Inconsistency in student's data on taxes or else in the study program

In the first scenario, when we think about the BPMN model documentation, the "Notify incompleteness" node has to be removed from the section related to teachers and department secretary, while the "Notify errors" node has to be removed from the section related to the central secretary system.
In our case study, efficiency of the whole process is given by the number of exams registered correctly (our output) in a specific interval of time divided by the amount of resources needed for producing the aforementioned output (human, economic and time resources).
If errors and inconsistencies are effectively found in the process, since the controls are now more sophisticated, the total amount of human resources needed would increase. More specifically, hours spent by both department secretary and central student secretary in error checking would increase. At first, this could look like a setback. Anyway, in the long run this is still extremely beneficial to the process and the whole institution because overlooking errors within the procedures becomes very unlikely. Besides, if the taxes payment and management online process is efficient, a significant amount of time that would otherwise be destined to handle problems (even having to physically address students' demands at the desks, with the creation of never ending cues) can be saved and optimized.
Furthermore, by adding multiple and more careful changes regarding databases and exams/registers' memorization capabilities, maintenance of manual and software activities becomes a principal activity for the secretary systems and the whole institution, guaranteeing a steady and smooth e-service for both students and teachers. When we talk about manual activities we refer to: filling, checking and analyzing the paper exam registers; reporting errors and inconsistencies.
The software activities instead are the ones concerning the update of the databases by the central student secretary system.
Exams, registers and financial information and data are obviously kept in a secure and private way in the secretaries' databases. The whole process is guaranteed to be safe, so there won't be negative ethical consequences as a result of these implementations.

Conclusions

The improved quality of the system and overall e-service greatly simplifies the relationship between students and University institution/secretaries by reducing desks' cues, time needed to obtain several types of documents (for both students and teachers) and facilitating usual processes like exams registration and registers check. As explained before, resources are better managed and as a consequence the e-service's efficiency increases. Finally, privacy and maintenance of both manual and software activities become crucial because of the new steps and changes applied to the process, and this leads to durability and high reliability of the whole e-service.