

# **Enterprise Architecture: The Process Mapping with the BPMN 2.0 Standard using MEGA HOPEX**

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<p>The thesis reflects upon updating the version of MEGA at Haute Ecole de Gestio Geneva (HEG). The author is completing a double degree program and the project is carried out simultaneous in two schools (HEG and Haaga-Helia). As a chance to compare the working routine of the two universities of Applied Sciences.</p> <p>The goal is to provide both universities with a diagram of the curriculum by using MEGA HOPEX. With the experience of its usage and the knowledge base from the theoretical background study, a solution has initiated development to make a decision about the update of MEGA.</p> <p>To collect the information needed, different methods have been used. As to the theoretical background, the data mainly comes from books, articles and the internet. In the practical part of the project, the author own experience with reinforced with interviews with stakeholders and information available on the website of schools.</p> <p>The study reveals that the processes of curriculum have a common base but as students at Haaga-Helia can choose orientation so the processes are a bit more complex. After answering different sub questions, it appears that, in the short term there are no risks for HEG if keeping in the current version of MEGA. An evaluation of other software could be done to see if another could meet the requirements and maybe cost less than MEGA.</p>	
<p><b>Keywords</b> BPMN 2.0, Enterprise Architecture, Process Mapping, Switzerland</p>	

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### 3 Terms and Abbreviations

AFNOR	French Association of the Normalization
BIT	Business Information Technology
BPA	Business Process Analysis
BPM	Business Process Management Business Process Modeling
BPMN	Business Process Modeling and Notation
BPMI	Business Process Management Initiative
EA	Enterprise Architecture
ECTS	European Credits Transfer System
GRC	Governance, Risk and Compliance
HEG	Geneva School of Business Administration
HES-SO	UAS West Switzerland
IS	Information System
ISO	International Organization for Standardization
ITPM	IT Portfolio Management
MEGA HOPEX	Modelling Software
UAS	University of Applied Sciences
WFMC	Workflow Management Coalition

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## 5 Introduction

The project is set up to bring information for a possible migration to the new version of MEGA at the Geneva School of Business Administration (HEG). Instead of going directly on the subject a description of HEG and Haaga-Helia, the other university involved in this project, could make the rest of the paper easier to understand. HEG and Haaga-Helia are both University of Applied Sciences, as a University of Applied Sciences (UAS) from the west part of Switzerland HEG is included in HES-SO. That is the entity that manage different schools around the region. Those schools can deliver degree in a lot of different field like engineering, social, health or even music. However HEG is, in this project, considered as a university on his own. HEG has a single campus in Geneva, there is more than 1.000 student divided in four different degree at the bachelor level:

- Business Administration
- International Business Management
- Information Studies
- Business Information Systems

Haaga-Helia is split in five campuses and count approximatively 10.000 students. This Finnish school offers education in diverse fields (in the hotel & restaurant field, in physical education, in management assistance as well as in business, sales, finance, journalism and information technology). The common point of those universities is that they offer a bachelor in Business Information Systems or Technology (even if the name is not exactly the same the curriculum is relatively close), but in Switzerland this kind of degree is considered as Bachelor of Science and in Finland as a Bachelor of Business Administration.

To come back on the main subject of this project, MEGA is a French company that provide software and support for the EA of companies. The question of a migration does not exist because of failure in the actual version but only because of the benefits the new one can bring in addition to the fact that the new version will evolve at the same time as other software that HEG need. Currently HEG has all its administrative processes modelled on the software MEGA 2009 SP5 in a different way that Business Process Model and Notation (BPMN) because this famous standard did not exist when the school started to model. The choice of the school at this moment was to model with the standard created by the French Association of the Normalization (AFNOR), all the models have been done according to AFNOR regulation.



As explained, HEG has his administrative processes in MEGA, these processes are modelled, in part, to receive the ISO 9001 certification. Haaga-Helia also own this certification. The International Organization for Standardization (ISO) provide all over the world certifications to attest, in the case of the 9000 series, the quality management of a company or in this case of schools.

It is now easily understandable what both schools earn, more over a good vision of their process, with the process mapping and why it is so important to maintain at a very good level these maps. As the dilemma for HEG is about the software who is there to produce, manage, help for their process there is a potential impact of the software on the certification when the time to renew it will arrive. The idea of staying on this version is also not that easy because the question of the support provides by MEGA for the old version is probably not infinite in the time.

The reason why the migration is not obvious is that all the models have to be recreated with the BPMN 2.0 standard to suits with MEGA HOPEX. Now that the new version of MEGA (MEGA HOPEX) arrived and only supports BPMN the member of the team responsible for the process mapping has to choose if they continue with MEGA and then change all the processes to BPMN, if they stay on the current version or if they change the software.

More than finding an answer to this problem, the project will also use MEGA HOPEX and BPMN 2.0 to model processes that are not modelled yet from two different University of Applied Sciences. The processes are the one who decide the way of a student completing his/her degree in Business Information Technology at HEG (Switzerland) or Haaga-Helia (Finland). At the end of the project the two schools will have their model, a review of the processes and some comparison with the other university.

As Haaga-Helia is currently updating his curriculum, this study could reveal other mistakes that the new version could fix. This part could be very interesting due to the reputation of the educational system of both countries. The schools have difference in the number of choices the students can do for their degree, this number is low for HEG and high for Haaga-Helia.

The part concerning the cost of the different changes is not included in the thesis. Same for the Enterprise Architecture (EA), it is described in this study but any change is planned on both schools.

## 5.1 Goals of the project

The goal of the project is to create models of processes who exist in two different University of Applied Sciences by using MEGA HOPEX, the new version of the software MEGA. Using this software in particular is important because it could be implemented at HEG instead of MEGA 2009 SP5. As there is obviously other software that can be used to model the process of a school other software is going to be tested to compare them to MEGA HOPEX.

Of course to reach this goal there are many different factors to deal with around the main goal. The processes that are going to be modelled are the processes related to the curriculum of a student doing his Business Information Technology or Business Information Systems degree from the point of view of the school. Doing the model is the starting point and when it is done there is some work to do with these models. This project will allow to establish a comparison between the system of HEG and the one of Haaga-Helia. The main difference will probably be in the number of possibilities for the students, as Haaga-Helia let their students choose a lot of courses in a list and HEG have a fix template the all the students have to follow (except for 2 optional courses).

To be able to build, discuss and compare these models it is important to build a theoretical part (background theory). In this part the main elements of the thesis:

- Enterprise Architecture
- BPMN 2.0
- MEGA HOPEX
- ISO 9001

As the administrative processes of HEG have been certified for ISO 9001, it is also interesting to know what this norm is about.

Finally, all the elements explained above will be the criteria to emit an idea for the decision about the future of the process mapping at HEG.

### 5.1.1 Research problem

The main research question that the whole project will lead to the answer:

- Would MEGA HOPEX be worth it implementing for HEG to be used in process modelling?

To answer accurately to this question, the problem is divided in 6 other sub-questions or tasks:

1. What are the business requirements for the process modelling tool in HEG?
2. What are the new functions in MEGA HOPEX compared to the version MEGA 2009 SP5 used in HEG currently?
3. What are the changes required to be made in HEG in order take MEGA HOPEX in use?
4. What impact there would be for HEG if there replace mega by MS Visio or other solution?
5. What HEG can lose if they replace MEGA with MS Visio or other solutions?
6. Testing the functionalities of MEGA HOPEX in practice when analyzing and comparing the selected processes of two different organizations.

## **6 Background Theory**

The background theory takes place on this paper to present and set the whole environment that will be used all along this project. It includes the different technologies or methods required to reach the goal and the software, which is in the heart of the project. On this part all of this will be presented in avoiding situations related to the project himself to be as neutral as possible on each term.

Enterprise architecture can be considered as a base from where the process mapping of a company can be built. Without a strong EA the expected results cannot be reached during the process modeling. As explained in the introduction, MEGA is here for supporting the two point above and ISO one of the reasons why it has to be well done.

### **6.1 Enterprise Architecture**

Enterprise Architecture is set up in a company or in a department of a company to align the work objectives with information systems. The EA defines the IT strategy through the services provided by the information system (IS) or with the definition of the processes of the company (The Federation of Enterprise Architecture Professional Organizations 2013).

Enterprise Architecture can be compared to a total description of the enterprise; a master plan which 'acts as a collaboration force' between aspects of business planning such as goals, visions, strategies and governance principles; aspects of business operations such as business terms, organization structures, processes and data; aspects of automation such as information systems and databases; and the enabling technological infrastructure of the business such as computers, operating systems and networks (Schekkerman 2004).

This master plan has the capacity provide a very good overview of the state of IS and all the evolution currently in progress. It also helps to optimize the usage of the available resources and the reactivity of the system himself. In one word EA simplify the IS of the company. (Schekkerman 2004)

The precise, high-quality information an EA provides also makes it much easier for the organization to respond to the forces of change and make better decisions. (Schekkerman 2004)

The EA can be seen as a management tool. It gives a certain type of information that can lead to different decision.



**Figure 1. Enterprise Architecture of a company (Wikipedia 2016)**

During the implementation of EA there is one main rule to follow to stay on the way to make the IS easier to understand and manage. Between the main entity of the EA it is important to have a strong consistency but at the same a coupling as low as possible. In managing to do it in this way it prevents problems in the future if there will be some change to make.

In the EA, the structure of the IS is usually represented by graphs like workflow diagrams, organigrams or diagrams entity-relations. For the processes the usage of BPMN is today the most used, it is why the next chapter will describe it.

These diagrams are perspective that depends on the point of view adopted by the author (architect). The architect can also choose which elements or section he prefers to highlight in his diagrams.

## **6.2 BPMN 2.0**

### **6.2.1 Business Process**

As BPMN is the acronym of Business Process Modelling Notation it is first important to know what exactly a Business Process is before starting to model it in a certain way.

A business process is an activity or set of activities that will accomplish a specific organizational goal. (Rouse 2005)

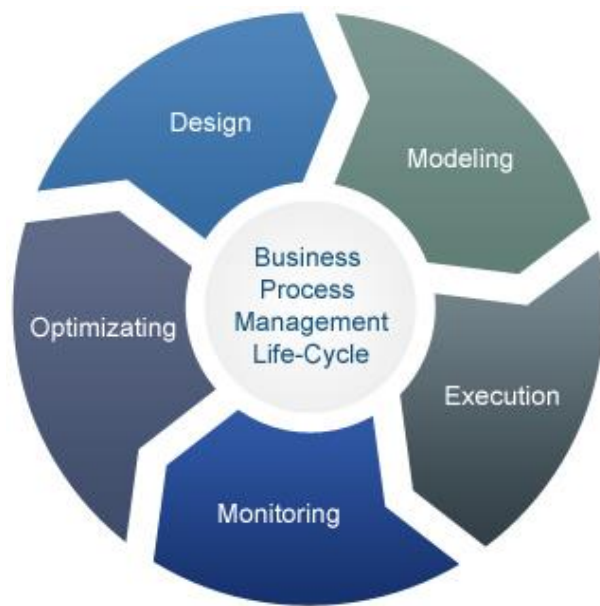
It must have defined clearly the beginning, then end, all the inputs and the unique output. Basically the process defines only what we want to do/achieve when a procedure also includes details like that, when or where. According to Stephen A. White, PhD, and Derek Meirs there are two types of processes. The first type includes processes which are 'formal, repeatable and well-structured'. This is the kind of process we can be automated. The second type comprises the ones which are unpredictable and which contain a part of randomness.

### **6.2.2 Business Process Management**

The engineering of corporate processes or business processes are often represented by the acronym BPM whom means Business Process Management or Business Process Modelling, these two options mean the same thing (Shapiro, et al. 2011). The BPM technic find his origin on the work of the workflow, it appears with the industrialization of the tertiary, the development of those technic grew up at the same time as the importance of the management of the information systems.

Today, BPM can be seen in an engineering of the business processes with the help the information technology. It is a goal to model, deploy, execute and optimize on a continuous way the different type of process and then improve the agility of a company. BPM became the heart of the building of applications. As it is important to define the data structure, it is also important to choose a model of business processes.

The BPM method always define the life cycle of a business process like a continuous loop. The heart of BPM vision is the principle of reengineering. Modelling a process including human activity is often imperfect (cf. unpredictable process) but has to be analyzable and improved continuously to reach the optimal management of the activity.



**Figure 2. BPM Life Cycle schema (Interfacing s.d.)**

Figure 2 shows exactly the goal of perpetual improvement wanted with Business Process Management.

### **6.2.3 Business Process Model and Notation**

The Business Process Management Initiative (BPMI) is the organization in charge of the standard BPMN since the first version was released in May 2004. Later the Object Management Group (OMG) join the project with the fusion of the two entities. (White PhD 2004)

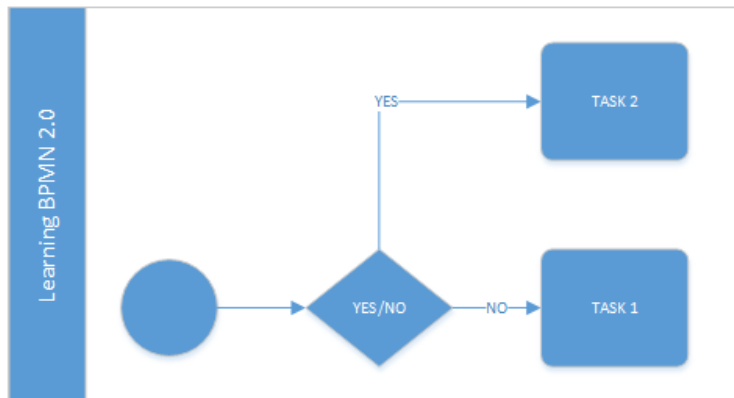
BPMN can be defined as a graphical representation for the specification of business processes in a workflow (Costa 2013). The Workflow Management Coalition (WFMC) explains that workflow is the automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action (activities), according to a set of procedural rules.

BPMN has been created to provide an easily understandable system of notation for all business users including the business analyst who could do first drafts to the developer who have to implement the technology to reach the goal of the process. (White PhD & Miers 2008)

BPMN gives a graphical notation who is used to represent a business process as a Business Process Diagram (BPD) (Chinosia & Trombetta 2011). A Business Process

Model, then, is a compilation of related graphical objects, which are activities and the flow controls, who gives the order of execution (White PhD 2004).

BPD is composed of different graphical elements whom all enable easy development of simple diagrams that will be recognizable for most users. The elements were chosen to be very different by the shape and so become clear directly at the first check. (White PhD 2004)



**Figure 3. BPMN Basic Shapes on MS Visio**

Figure 3 shows a small diagram that contains the flow object of BPMN. The circle is an event; events can be considered as a trigger that has impacted on the process. If an event influences the process, it has to be in the diagram, but anyway a diagram starts and ends always with an event. There is a specific circle for the beginning and the end of a process. All the event has to contain the condition that makes them react. (Visual Paradigm 2016)

The start and end event are very important for the reader; in fact, he can directly see where the process begins in the BPD and when the process is totally complete, because after the end event any other action can append. Intermediate events are connected to an activity for modeling an event that can append right after the last activity. (White PhD & Miers 2008)

If the flow of the diagram above is followed, the next symbol is the gateway. This diamond shape is used to manage the different options for the next activity. With this symbol comes a condition, the condition can be accepted or refused and then allows the reader to know where he has to continue. (White PhD 2004)

There is also a specific kind of gateway that allows to trigger different path at the same time. The inclusive gateway can contain a condition that has multiple answers and so,



multiple paths to trigger. Later in the diagram a symbol can show to the reader that all the paths have to reach a certain point before the next instruction. (Visual Paradigm 2016)

And the last shape present of the diagram is a very important one, the activity. The activities are represented by a rounded-corner rectangle and means in the diagram that a certain work is going to be achieved at this moment in the company. An activity is not always automatic but can be. BPMN 2.0 implement special symbols that allow to identify how the activity is going to be completed, by a human, automatically or if a message is sent during this activity. (Polančič 2014)

These shapes are included in the flow objects category. There are 3 other categories:

- Connection shapes, they are useful the continuity of the activities, the messages and the associations.
- Swim lanes, they contain the flow of the actor.
- Artifact, which contains the data, the groups and the annotations.

These other categories also contain different symbols. For connections, the Flow Objects are connected together in a diagram to build the structure of a business process. There are three Connecting Objects that provide this function. These connectors are:

A Sequence Flow is used to show the order that activities will be performed in the Process.

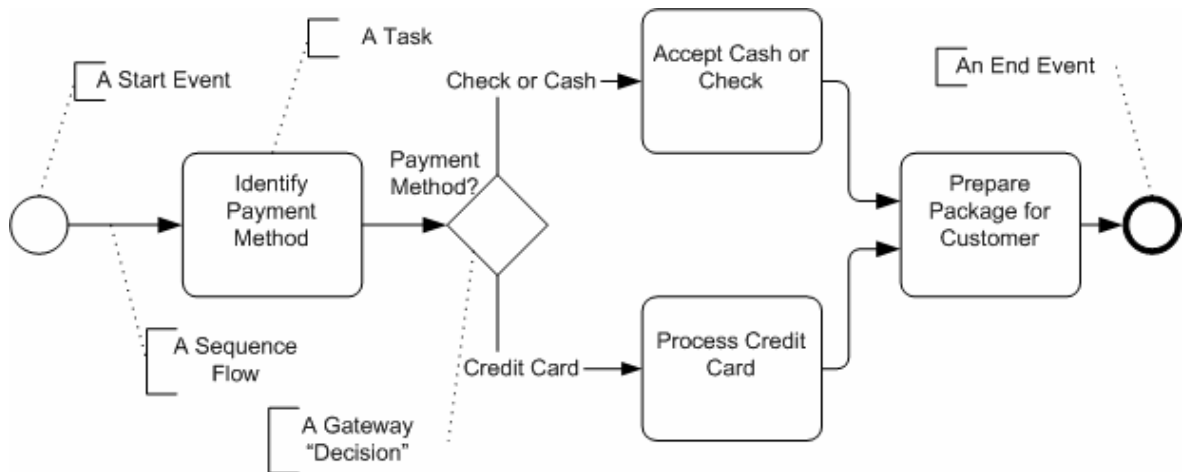


A Message Flow is used to show the flow of messages between two separate Process Participants it can be entities or roles that send and receive them. In BPMN, the different participant can be identified by the pools.



An Association is used to associate data, text, and other Artifacts (that are going to be defined down below) with flow objects like event.



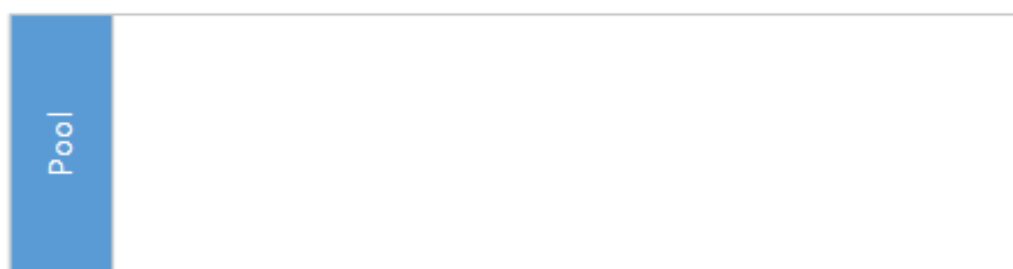


**Figure 4. Simple BPMN Schema (White PhD 2004)**

The short diagram in the figure 3 uses all the shapes that have been previously presented. Having a simple system of notation absolutely does not mean simplistically, BPMN defines a lot of variation for each shape and so make possible the description of the processes in a very accurate way. (White PhD & Miers, 2008)

The swim lanes have two options who help to the identification of the actors in the business process. This is a common technique to use this graphical shapes to show that many actors are required for the process.

A pool is added for each participant during the whole process. It is the containers for all the other shapes like activity, events, sequence flow or artifact.



**Figure 5. A BPMN pool draw with MS**

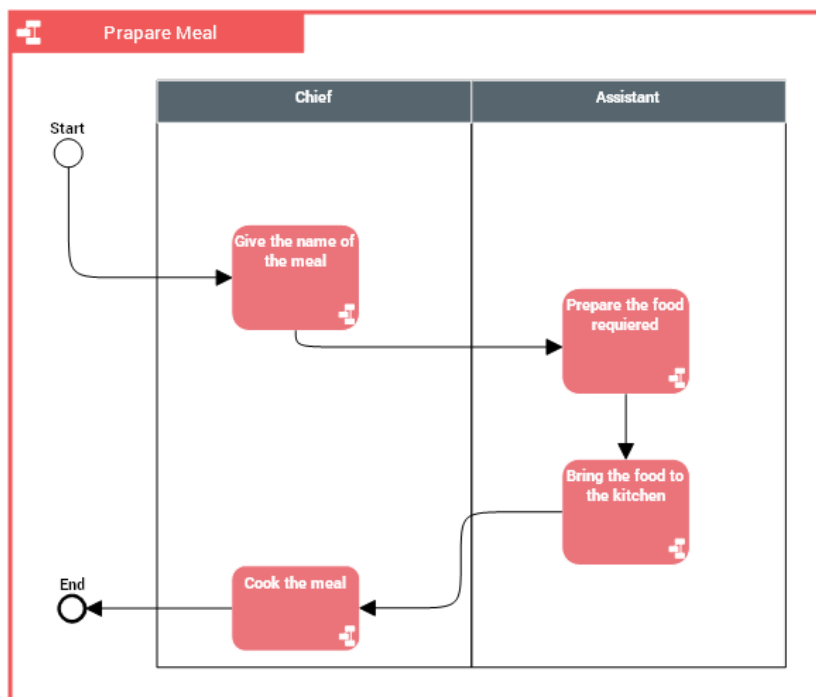
The pools (like the one in the figure 4) allow to separate different business entities or participants. It says in a logic to make it simple because they are separate also in the diagram by the pools. The sequence flow is not an element that should cross the borders of a pool because the continuity is not always maintained when the actor change, so the message flow is the better one to use to connect two pools.

The lane can be seen as a container of pools. For example, the lane can be used to describe the Marketing Department and inside includes pool for the marketing manager, the secretary or others.



**Figure 6. BPMN Pool with two lanes.**

The major difference can be seen in the figure 5 by putting two pools in the same lane instead of using the normal pool is that they are more connected and a sequence flow may go through and a message flow is not required. (White PhD & Miers 2008)



**Figure 7. Two pools grouped as one lane on MEGA HOPEX.**

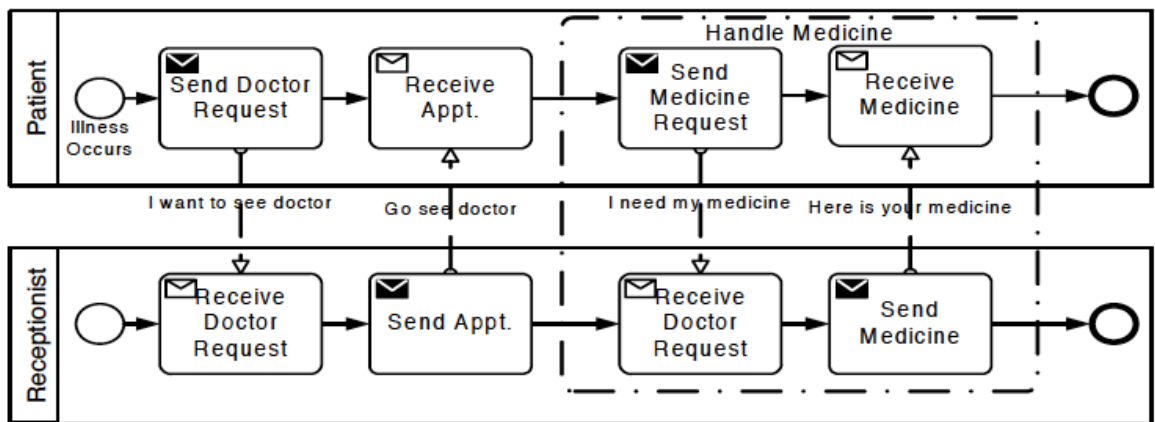
In the diagram from the figure 6 as the chief and the assistant can be both considered as 'kitchen workers' it is a solution to put them together in a lane to make the communication

easier. If we add in the diagram the waiter, according to our definition of a 'kitchen worker' the waiter would have been adding on a separated lane or alone in a pool.

The last category of element that exists in BPMN is the artifacts. The artifacts bring to the modeler the possibility to add details, resources or group similar activities. Regarding the resources that can also be called data can be input or output. Indeed, certain process may require a document to fill for example to go to the next step and others will have activity that is going to involve a document as output, for example, a successful execution of the Place Order task will produce data like purchase order, invoice, receipt, etc. (Visual Paradigm 2016)

In BPMN cannot be considered as an activity or any flow object, this means it cannot be connected with a sequence flow or message flow but only with the association.

Furthermore, a group can overpass the limits of a pool or even a lane to link, only visually, different activities. The usage of the groups are often just to highlight a specific part of the diagram and not add any other constraint or create sub process that could impact performance. Groups do not affect the flow of a process. (Object Management Group 2011)



**Figure 8. Highlighted activities in a group (Object Management Group 2011)**

The diagram presented in the figure 7 includes a group for the activity related to the medicine, this helps the reader, or even the modeler if he comes back later on the diagram, to identify quite fast different activities across the pools that are for some reason connected but not enough to add a constraint in the diagram.

The last element that is part of the artifact is the text annotation. As the group it allows for the stakeholders of the diagram to have some reminders placed on different activities,

gateway, etc. According to PhD Stephen White it is possible for a modeler to create his own artifact. In fact, this kind of element does not impact the process that is determined by events, activity, gateways, flow sequence or others.

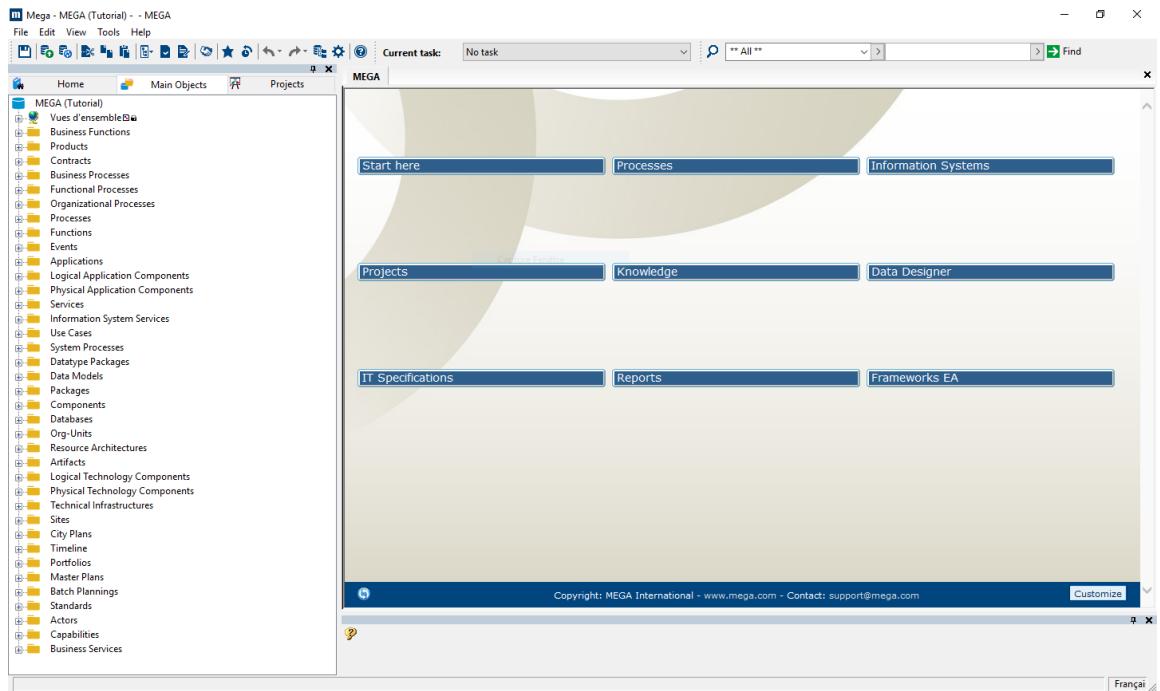
### 6.3 MEGA HOPEX

HOPEX is the latest platform developed by the company MEGA International. This company has to main goal, provide a platform like HOPEX that company can use for their Enterprise Architecture and assist companies for their processes analysis, enterprise architecture, systems planning, risk management, internal audit and conformity. (MEGA, 2016)



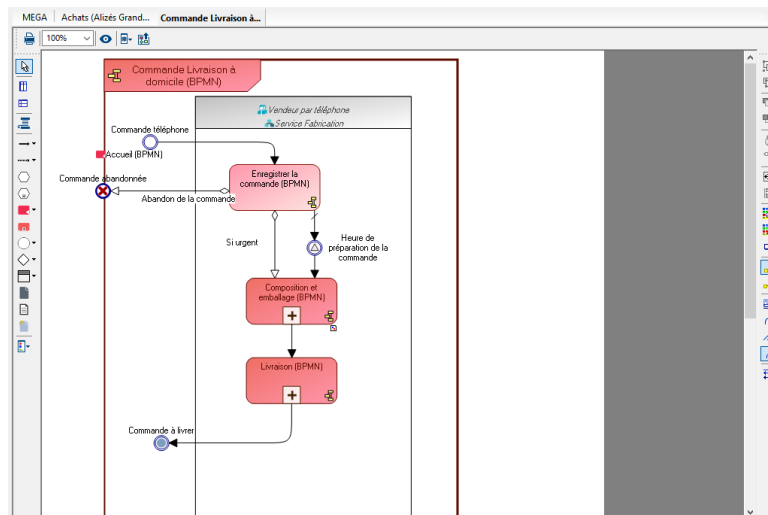
**Figure 9. Services provided by MEGA HOPEX**

As shown on the graph from the figure 8, MEGA HOPEX can provide services for different sectors of a company in a single and integrated software. It means that with MEGA HOPEX it is possible to manage enterprise architecture (EA), business process analysis (BPA), IT portfolio management (ITPM), and governance, risk and compliance (GRC). What is important with all these different tools is that they are all connected and use the same repository. The employees who need to access resources from HOPEX can access it through a role and a web-based interface.



**Figure 10. MEGA HOPEX's start page**

The figure 9 shows the start menu of MEGA HOPEX. It is composed of many folders on the right that include the business process, organizational process, use cases, etc., the company own. On the main container of the page there is access to different sub menu that can help us to access existing projects.



**Figure 11. A BPMN diagram in MEGA HOPEX**

After opening the organizational process on the right from the start menu, all the existing process appears. During the creation or edit of a diagram the windows looks like the figure above. The BPMN shapes are available on the left and easily addable to the diagram.

#### **6.4 ISO 9001**

The ISO 9000 family addresses large vision of quality management and contains some of ISO's best known standards. The standards provide guidance and tools for companies and organizations who want to ensure that their products and services consistently meet customer's requirements, and that quality is consistently improved. (ISO 2015)

The norm ISO 9001 defines a list a requirement concerning the setup of a quality management system in a company. This norm is applied the same regardless the size of the company and his type of activity. By having the same requirements for all companies it's easier to judge the enterprise. This norm ISO has been created in 1987 and is regularly updated since this date. The term of process appears first in the revision of 2000.

Checking that the system works is a vital part of ISO 9001:2015. It is recommended that an organization perform internal audits to check how its quality management system is working. An organization may decide to invite an independent certification body to verify that it is in conformity with the standard, but there is no requirement for this. (ISO 2015)

The latest norm ISO has been published in September 2015 and allow extended liberty in terms of adaptation of the quality management in the companies. The new also released defined in a generic way the methods to allow easier usage of the services. The biggest change of the version is in the fact that now the quality management system is seen as a prevention tool instead of a finality.

ISO comments in the introduction to the survey that the 8% increase in ISO 9001 certificates, compared with the 3% increase in 2008, 'confirms the importance of ISO 9001 in the global supply chains and as the pioneering model on which subsequent management system standards have been built and flourish'. (ISO 2010)

The norm force to the certified companies to have their different activity in processes. With this the activities are going to be:

- Understandable
- Readable
- Transparent

This is the first step to improve the level of confidence that the other company have for the certified one. With that there is other exigencies, the processes have to be fluent and coherent. The possibility of fail is always considered in the processes.

In terms of the certificates, only the external organism who control the operations of the processes is the organism who gives the certificates and he is engaged by an accord of confidentiality. In this way the company become more transparent and more tractable, by keeping the confidentiality of the activity and his know-how.

In many situations the client is the origin of the wish to be certified (because they want to reduce the risk of bad surprises). During the quality project, it is the quality norm ISO 9001 who define the dispositions to take by the company to upgrade his organization and his operations. To upgrade company to a valid situation from the point of view of ISO 9001, a real list of steps for the improvement of the quality and his management is set up, this period could take 18 months. This project depends on the actual situation of the company and his history.

The norm describes how an efficient quality management system has to be established, documented and kept up to date to prove to the client of the enterprise is:

- Engaged to be on a continuous research of improvement of the quality
- Can answer the demand for quality of the different client

After a verification of an official organism, the company receive a certificate who valid for the next 3 years. A quality audit of following related to the norm will be handle once per year. At the end of the third year of certification an audit of renewal will be done.

With ISO 9001:2015 the standard get closer to the EA frameworks by considering organization context, knowledge management and risk-based thinking approach. Instead of having only some best practices for the EA ISO 9001 is now able to consider the whole structure of EA. (Mohsen, 2015)



## 7 Methods

This chapter is there to present and describe the data I found and how I used them to create the models and answer the questions asked in the introduction. The approach is quietly the same for theses to tasks as they are closely related. Using the information from the theoretical framework, my own knowledge and my experience added to the one of different person of the schools staff I built the solutions or possible solutions for the problem set up by this project.

For the research problems, there are seven sub-questions that are going to be answered in the first time:

1. What are the business requirements for the process modelling tool in HEG?
2. What are the new functions in MEGA HOPEX compared to the version MEGA 2009 SP5 used in HEG currently?
3. What are the changes required to be made in HEG in order take MEGA HOPEX in use?
4. What impact there would be for HEG if there replace mega by MS Visio or other solution?
5. What HEG can lose if they replace MEGA with MS Visio or other solutions?
6. Testing the functionalities of MEGA HOPEX in practice when analyzing and comparing the selected processes of two different organizations.

I used the information Xavier Burdet, who is responsible of the quality management at HEG Geneva, gave me in a first meeting where the main subjects of the thesis were discussed. He described me, different constraint and aspect of the actual system and his vision and questions for the future.

The process mapping of the curriculum of a BIT student in the two universities requires a different approach depending the school we are working on. This situation produce obligatory a very strict diagram that don't let many option for the path. On the other side, for Haaga-Helia the fact that the students have the possibility to build themselves their own curriculum makes a way more open diagram that allows a lot of different path. With a second meeting with Xavier Burdet, this time concerning the processes. The vision he brought from his position allows me to build diagrams as close to the reality it was possible to do. Some part of the processes, considered as to deep or out of subject, have been discarded.

## 8 Results

During this project the question that has to be answered at the end is:

- Would MEGA HOPEX be worth it implementing for HEG to be used in process modelling?

Different sub-questions exist to act like chapter for the main one. Of course the practical part of the project also serves to build a conclusion.

These five sub-questions cover a large field of the project and give an idea on crucial points for the in the process of taking a decision for the future of HEG.

### 8.1 What are the business requirements for the process modelling tool in HEG?

The processes available at HEG a quite all dedicated to the administrative staff, the teachers and the direction of the university. So all these people have to access the process and be able to see them whenever they need or want. It can be by a web interface as MEGA 2009 SP5 allows it currently or by the software himself. The second solution involves the installation of a heavy client for each collaborator.

One of the main factor that allow me to answer the research question is that for him, evolve with MEGA don't let the choice of the standards to use and force HEG to remodel all their process, however going to BPMN 2.0 doesn't really bring interest and value except for taking the updated version of MEGA. I also got the explanation of the multiple positive aspects of MEGA and how the HEG is familiar with it.

By the size of the school having a tool that provides facilities to treat the number of processes or actors is a real need. HEG being a part of the HES-SO network there is also some requirements that come from the common part of all the UAS that are part of HES-SO.

It is important to be able to describe the common process of the 6 schools in Geneva (HEPIA, HEM, HETS, HEDS, HEG and HEAD) in addition of the processes specific to each. For a perfect matching the way to give names, the vocabulary and the actors has to be used alike everywhere. Such synchronization require also a common databases for all the models. A unified way to model has been defined 4 years ago.

## **8.2 What are the new functions in MEGA HOPEX compared to the version MEGA 2009 SP5 used in HEG currently?**

With the new version MEGA bring some new features and correct some unwanted behavior with the diagrams. One of the new possibilities is the advanced initialization is allowing the modelers to refer to others process diagram when he will create new ones. At the moment when this kind of options can be used has been extended. (MEGA 2014)

Now, the name of the activities BPMN calling a BPMN process is automatically updated when the process is renamed or when the name is translated. This is the reason why now BPMN 2.0 is supported. However it is still possible to define an activity name differently of the process name and in this case the update does not take count of any changes. The usage of flux in a process diagram is also now allowed (MEGA 2014) . The capacity of export of BPMN diagram has been improved. There is still the features that allow to export it to a web page or also in XPLD format.

## **8.3 What are the changes required to be made in HEG in order take MEGA HOPEX in use?**

The processes themselves do not require any changes but the way they are modeled has to be updated to BPMN 2.0. As for the moment, any tool of 'translation' to the BPMN 2.0 standard has not been found it means that some people of the school are going to be responsible to recreate all the models by using the BPMN 2.0 standard instead of the actual one.

## **8.4 What impact there would be for HEG if there replace mega by MS Visio or other solution?**

In a short term vision it is not that risky to stay in MEGA 2009 SP5, however, if we think in a longer term some problems could appear. First, as MEGA is used in HEG to generate web page, word or pdf documents and all these things can possibly evolve if MEGA is only capable of generating documents or web pages in an old format this could be a problem to read it or use it in a good way. It also blocks HEG for using new features of these parallels tools. In a second way, the support provides by MEGA for the software will probably not stay forever on an old version and for certain specific problem some help from this firm is required. The ISO certification could be removed in case of non-respect of norm due to problem with an old version of MEGA.

I think that for the people who know MS Visio and read the previous chapter the answer is maybe quite obvious but it is still important to explain it. Software like MS Visio that HEG also pay in the Microsoft Office Suite could be a solution if there is only a small amount of diagram to model. The fact that HEG has a certain amount of process to have in model it is a first reason to say that MS Visio couldn't be a solution to replace MEGA 2009 SP5. Previously we saw that MEGA is able to generate content on the web page, export the BPMN diagram, let users access diagram by a browser or things like the name of the process that are automatically updated. All these features are not, or only a partially, implemented in MS Visio. HEG would be rapidly blocked by capacities of this software.

In the background theory part MEGA HOPEX was compared to BonitaBPM. This solution could be a better option than MS Visio. Indeed, BonitaBPM allows users to change models easily. There are also a lot of small tools that permit to the modelers to manage in the best way a large number of processes in a company. (Bonitasoft, 2016)

In the Appendix 1 the table describe the difference with another software that could be used for approximatively the same work. MS Visio is of course a cheaper solution compared to MEGA. It is easier to use and offer different preset that are conform to BPMN 2.0 standard, UML or others. Some new functionalities allows different stakeholders to work together on diagrams. (Microsoft 2016)

### **8.5 What HEG can lose if they replace MEGA with MS Visio or other solutions?**

By changing MEGA for another solution it would probably involve recreating all the diagram, exactly the same problem with going to MEGA HOPEX from MEGA 2009 SP5 if the process is not in BPMN 2.0. The last chapter explained that MS Visio was too limited for a university so by using it HEG would lose a lot of automation that makes modelers life easier and for the staff of the school it would be more complicated to access the diagram. There is also the problem of the resource that MEGA can handle or create it is something that allows not to leave the diagram and have all the documents the users need directly available. With BonitaBPM the features that could be lost if way less important because the software is more in relation to the needs of HEG but there is still the problem of recreating the model, something that staying on the current version does not need.

## 9 The results of modelling

### 9.1 Processes related to HEG

For the processes related to HEG the diagram concerning the curriculum is based on the Appendix 2 that describe in details which courses are required to go on in the studies. Each courses count as 5 European Credit Transfer and Accumulation System (ECTS) except for the thesis that allows to earn 12 ECTS. In total a student will work for 180 credits to have his/her degree. The system of studies is highly structured and a student know exactly since his/her first day the path he will follow during the next three years. For someone who succeed in every course at the first attempt his/her path will exactly look like the model. In case of failure and so, of repassing a course it will delayed the part of the studies involved but the rest can continue normally. It means that it is possible to have gap between the courses, for example a student can follow a programming course planned in the third semester and at the same time a course of accounting planned in the first semester because he failed at this one in the first attempt.

For the detail of the courses, there is many actors involved in different moment of the semester. The secretariat is responsible of checking if the student can continue in the normal path or need some adjustment. If the student is in the normal way the secretariat just enroll the student to course he has to follow in the semester to follow. Then course is gave by a teacher who has to organize evaluation during the semester and an official exam at the end of it. The secretariat is again closely related to this different action. Depending of the result of the student the credits a given or the course has to be retaken next year, a possibility of re-exam is also possible if the student grade is close to E (according ECTS grades scale). A meeting with all the teachers and the Head of BIT degree analyze the case of the students in definitive failure. Students also have the possibility to contest their grades in a formal way, the director of the university take a decision about it.

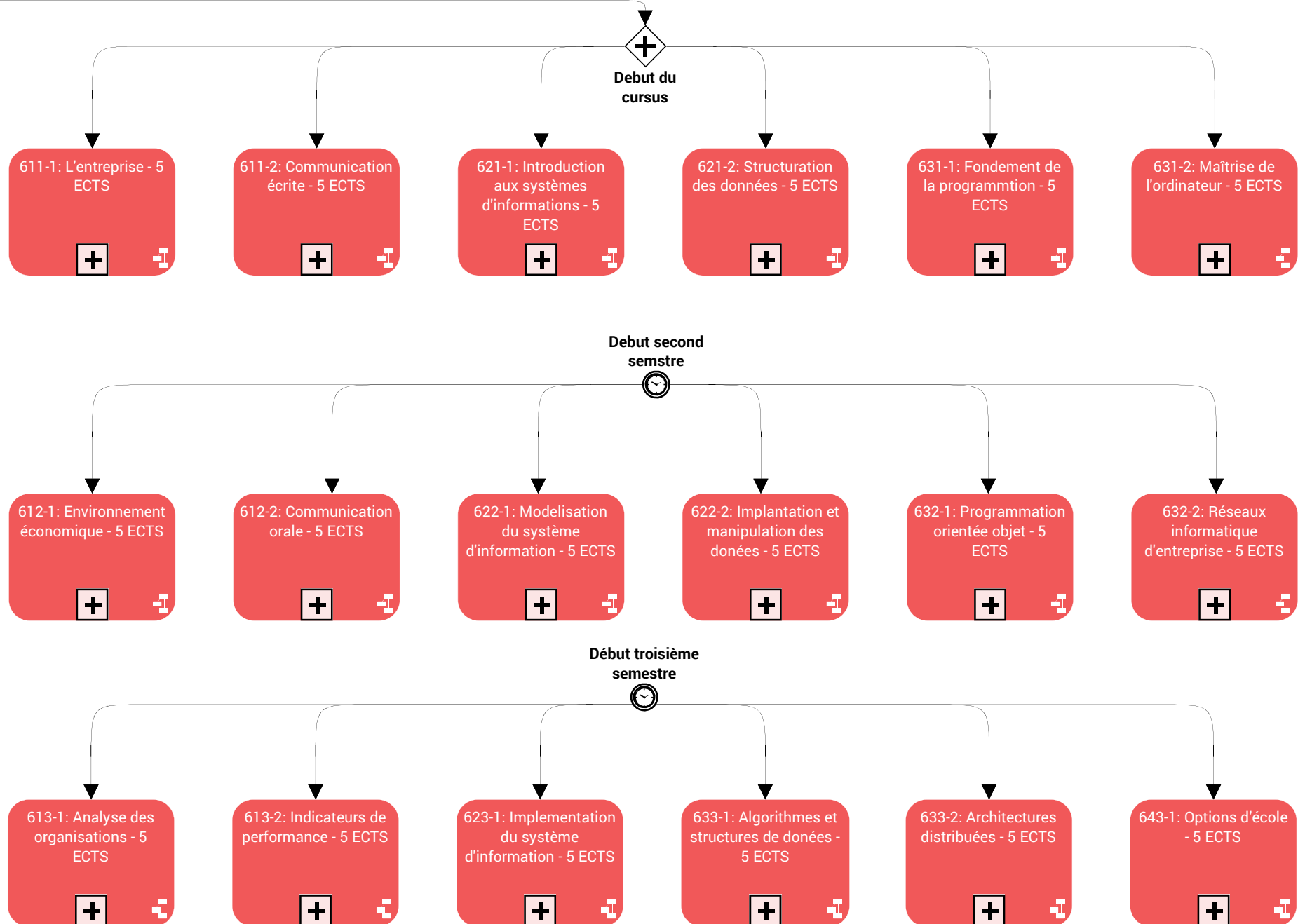
On the diagram related to the curriculum at HEG named "Cursus Etudiant - IG" the diagram contains a unique actor, the student himself. Then each semester there is six courses that worth 5 ECTS each and represent different field of study. The sixth semester is a bit different, it contains less courses can possibly include the thesis. The thesis can be started with 120 ECTS or 100 ECTS and the courses of the fourth semester completed. Then with 180 ECTS the degree is completed.



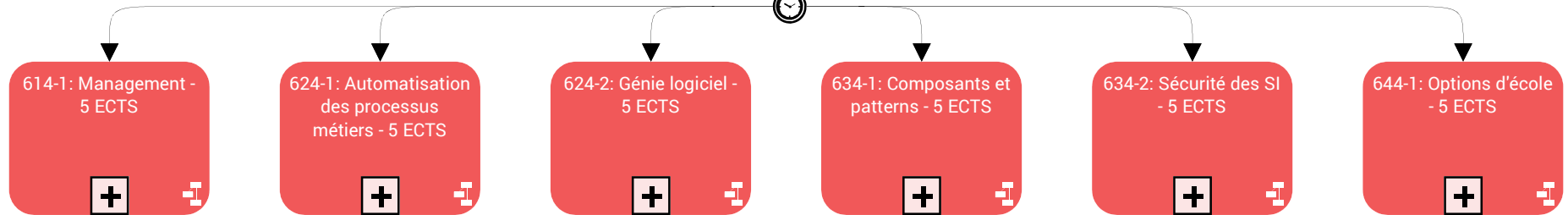
Début



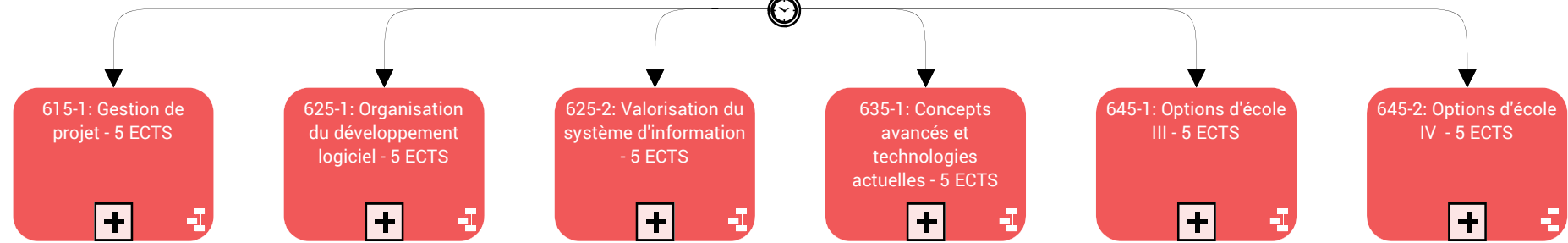
Etudiant A R



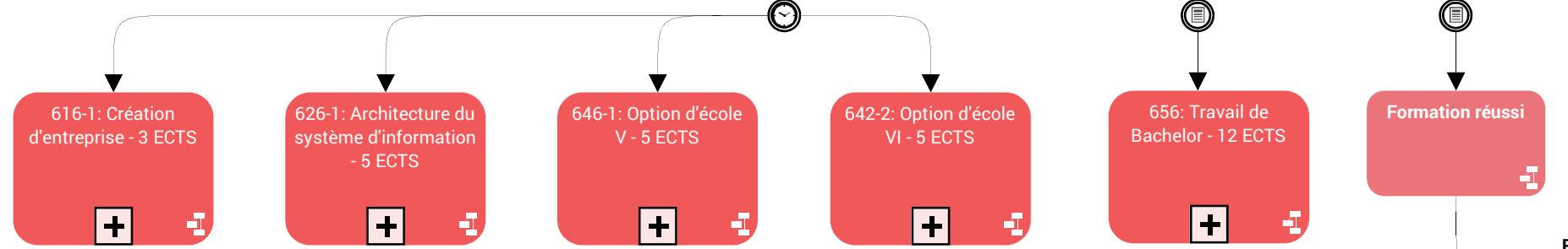
Début quatrième semestre



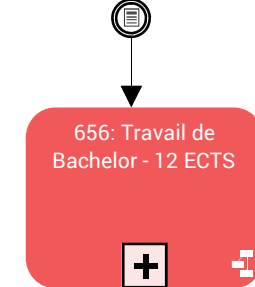
Début cinquième semestre



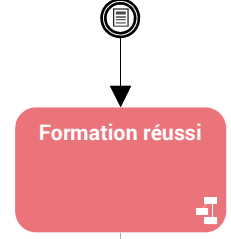
Début sixième semestre



120 ECTS ou 100 ECTS et cours du semestre 4 suivi



180 ECTS



Fin



The second diagram of HEG named "Cours - HEG" starts two weeks before the beginning of the semester. Indeed, the secretary of the field of study is responsible of the enrollment of all the students according their success in the different others courses. During the semester only the students and the teacher are involve. The teacher organize his/her course and exams and the student come in class and attend to the exams. After the correction of an exam the teacher has to post the grades of all the student of AGE, then all the students have access to their results online. The secretary is reintroduced in this process before the end of the semester to set up the delay of the submission of grades on AGE by the teachers. The secretary also has to collect the final exam that the teacher prepared and put them into a safe until the day of the exam.

After the exam the student can again check his/her grade on AGE. Depending of the grade and average results the actions are different, with 4 or more (equal to 1 to 5 in Finland or E to A according ECTS) the student receive the ECTS for the course and the process is over. With less than 3.5 (0 in Finland and between F and E ECTS) the student can attend a re-exam during the summer. With less than 3.5 the course is failed and the student will retake the course the year after. The student can, no matter the result, send a reclamation to the direction. The director will treat the reclamation and agree or not with the student.

The last steps of the diagram are concerning the counsel that all the teacher attend in addition of the head of the BIT degree. They check together all the students that are in definitive failure and will be exclude of the school and decide if the student deserved a second chance or not.





# Cours - HEG

Début



Secrétaire de Filière IG R

2 semaines avant le début du semestre

Vérification des pré-requis

Inscription des étudiants au cours

Avant la fin du semestre

Défini le délai pour les notes dans AGE

Défini la date d'examen

Stock les copies d'examen dans un coffre

Etudiant R

Au début du semestre

Participe au cours

Participe aux contrôles continus

Professeur R  
Responsable de Filière IG

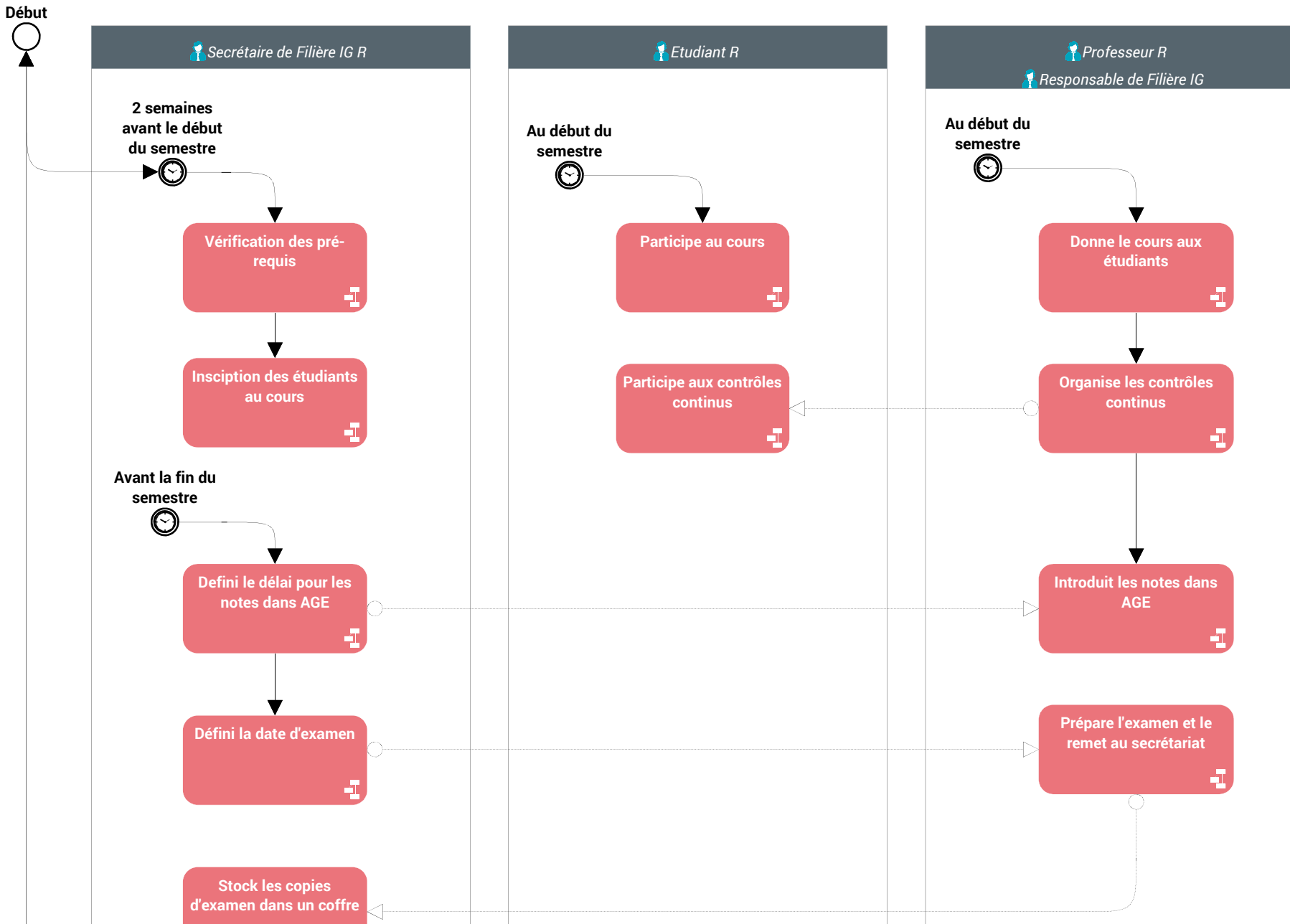
Au début du semestre

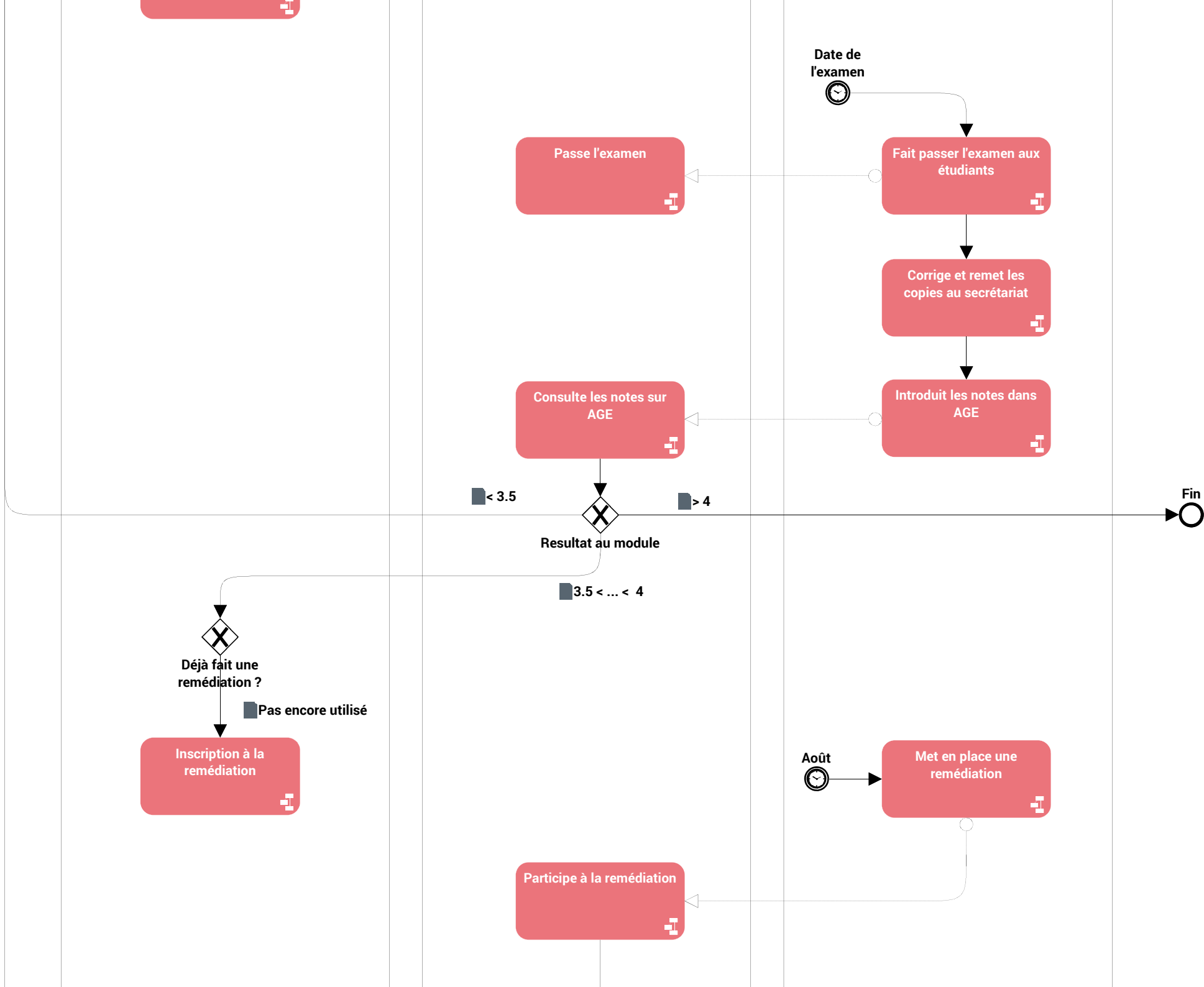
Donne le cours aux étudiants

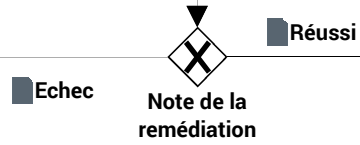
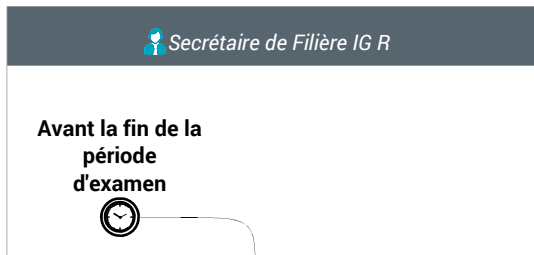
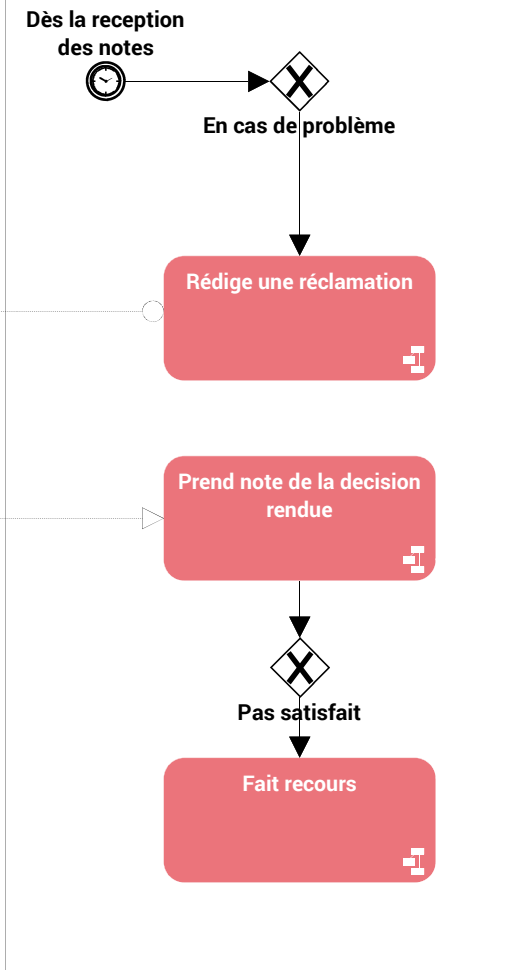
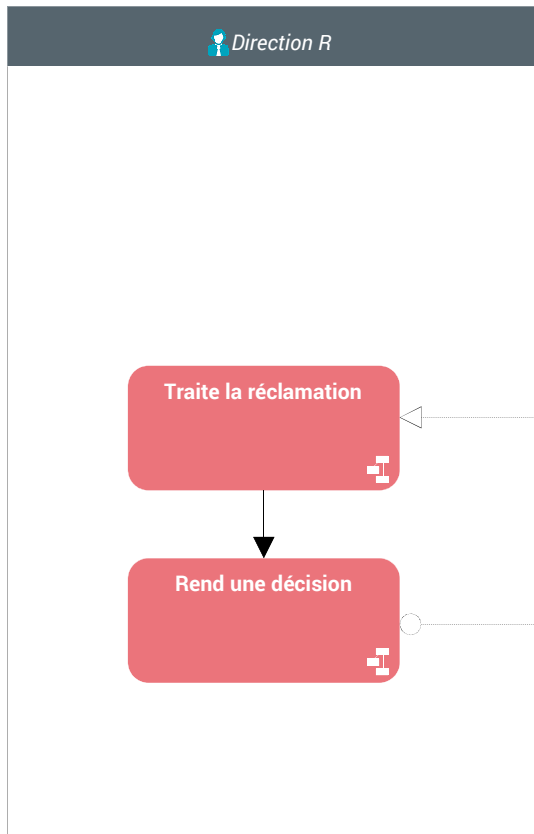
Organise les contrôles continus

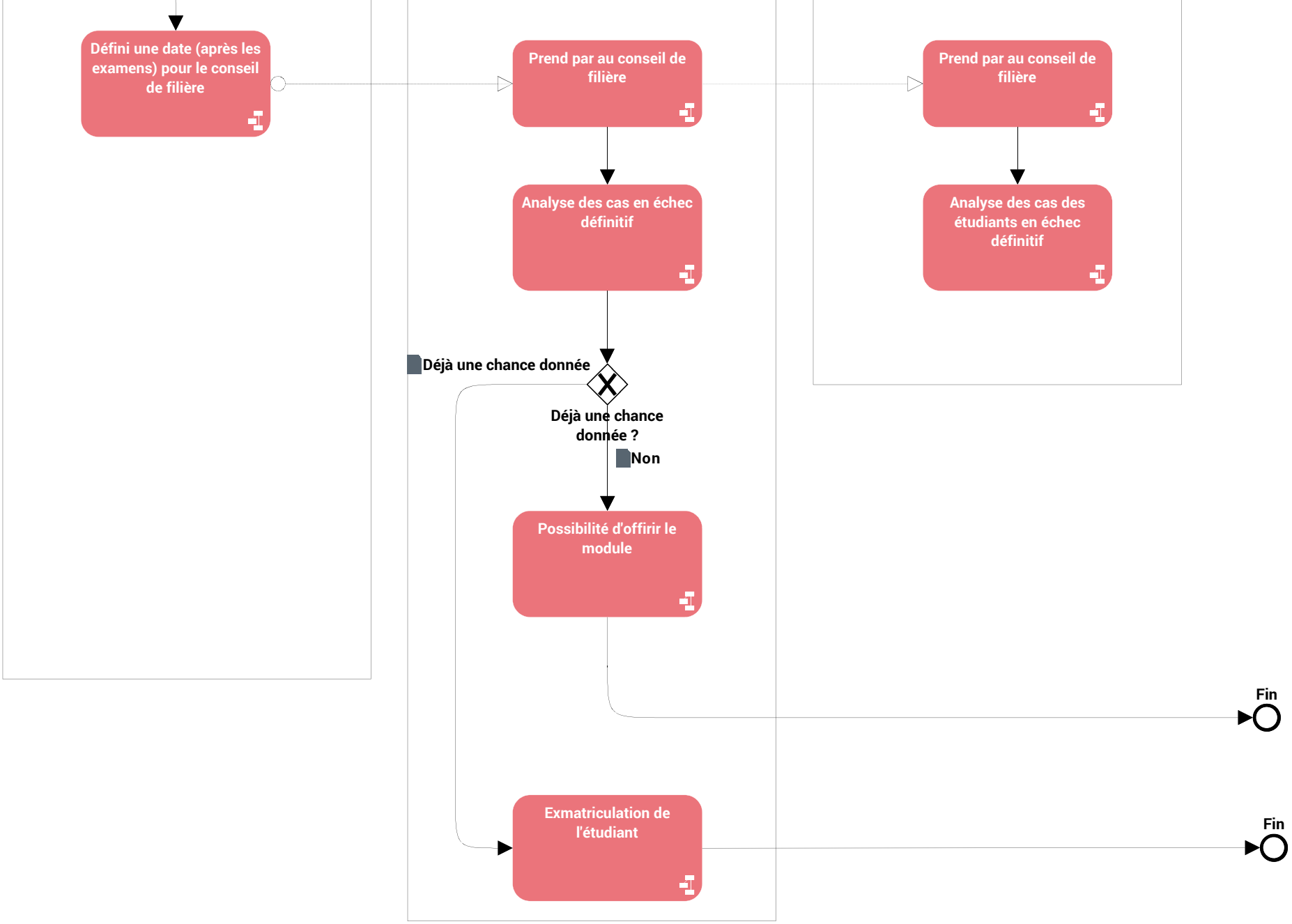
Introduit les notes dans AGE

Prépare l'examen et le remet au secrétariat









## 9.2 Processes related to Haaga-Helia

The main process of the curriculum at Haaga-Helia is describe as the one of 2013 (last version fully described on the HH web site). There is an older version (BIT 2007) that is still in activity for the students who start before 2013. The new version of the curriculum is taken into use at the moment semester by semester, it started in 2015. The BIT 2013 process requires more sub process than the one from HEG because the degree contains different orientation. It means that 2 students who finish their degree in BIT cannot always work in the same kind of company and even not the same post. In this case the two different orientation are Business IT Consultant and Web Application Developer. There is still a common structure that all the student has to follow that is described in the diagram. In addition to the two orientations, there is a difference between the students who speaks Finnish and the ones who don't, some are going to learn it and other are going to master it in communication course and also improve their Swedish. (Haaga-Helia 2016)

There is way more different diagram for Haaga-Helia due to the different orientation that requires sub-processes to be described in the better way. If we take consideration of all the choice a student can have the number of path is large, there is the language that act as a first selection, then the choice of the orientation and the choice of the free courses.

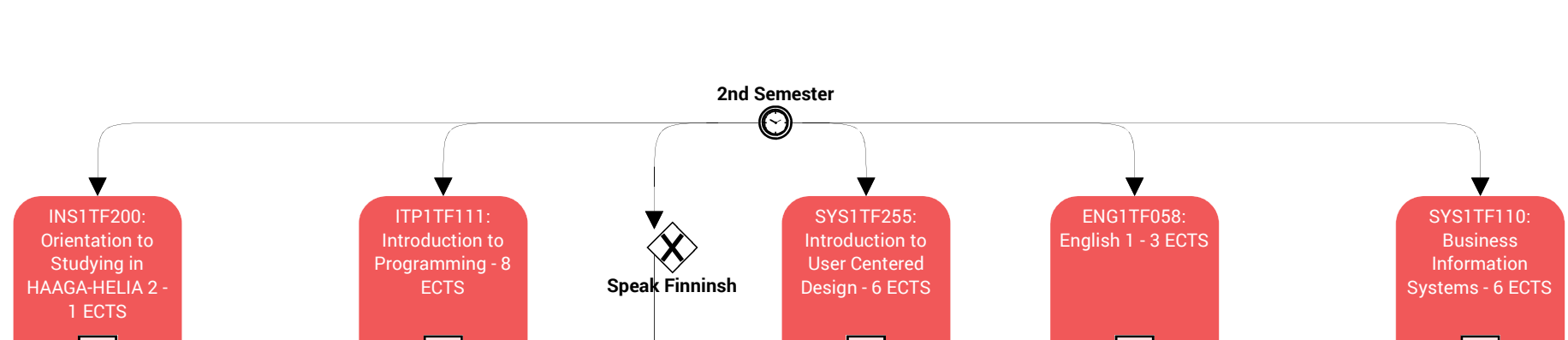
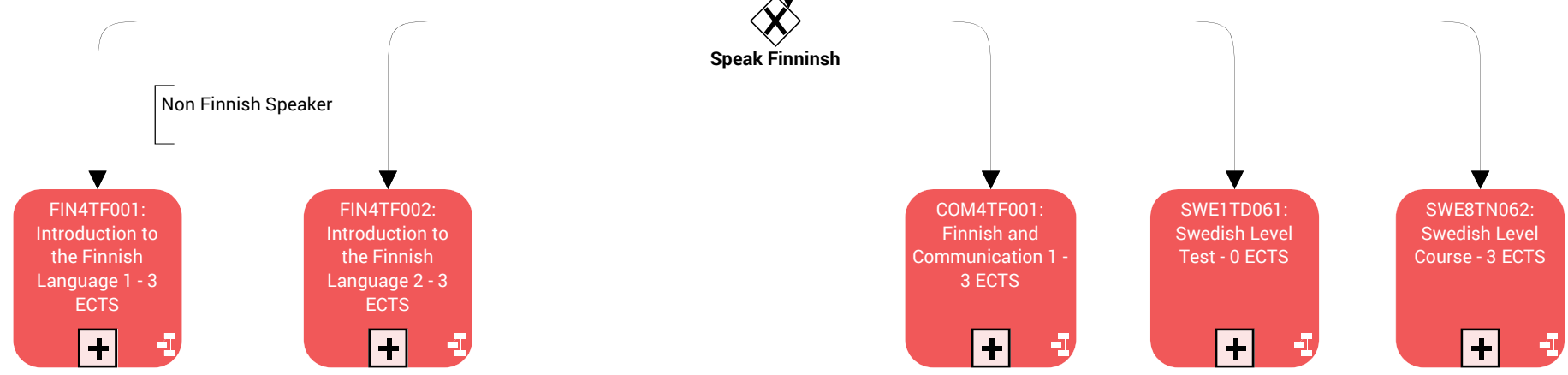
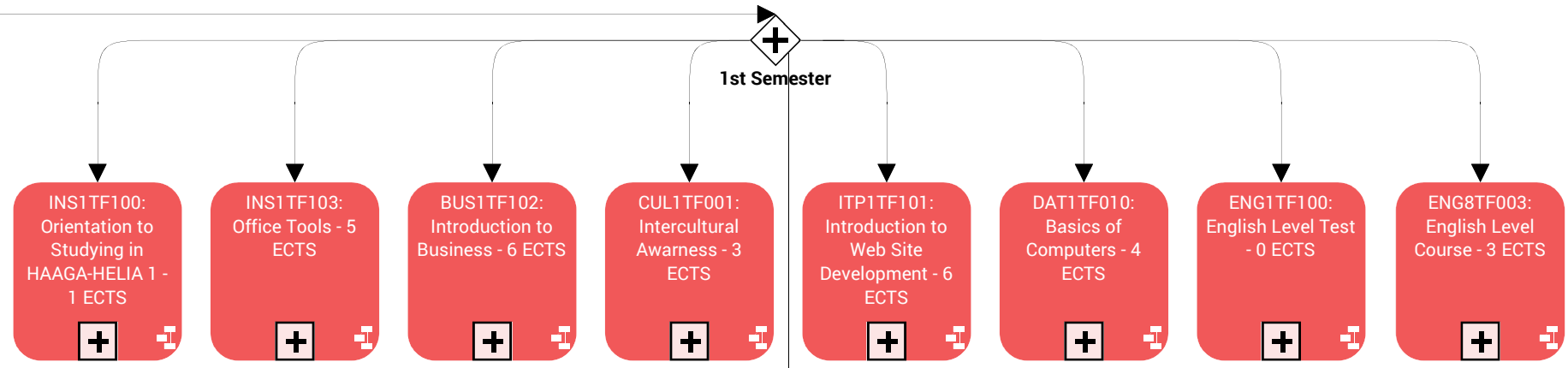
In the details of the courses, at Haaga-Helia the student has to enroll himself to participate at the course, this kind of details allows the school to don't involve a lot of different actor in such a process.

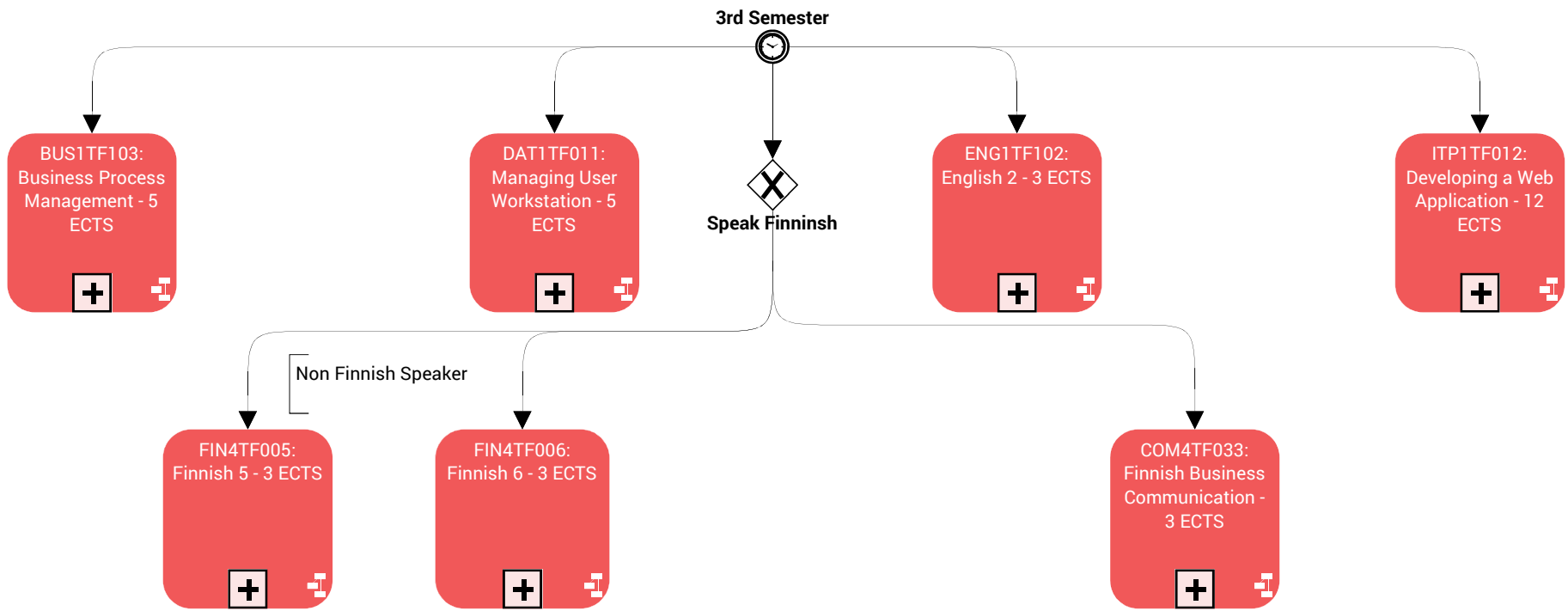
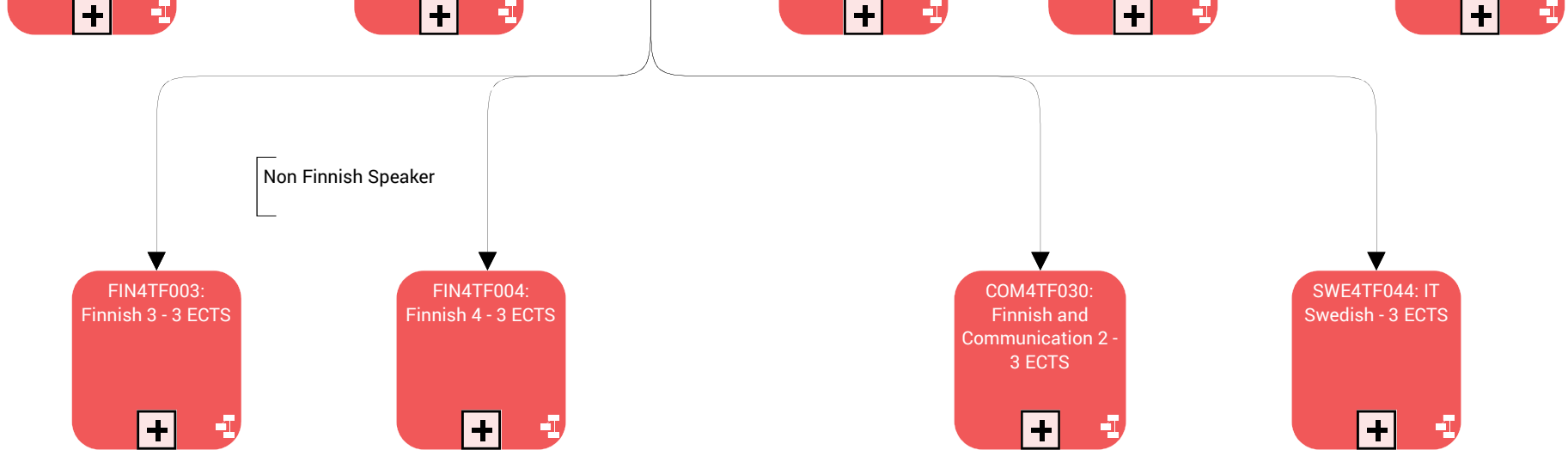
The first process described, named "Curriculum – Haaga-Helia", describe the curriculum of a BIT student through each semester. The diagram shows all the courses a student has to attend to receive his/her bachelor degree. Directly in the first semester the distinction between student who speak Finnish and those who don't is made. Indeed, the path is a bit different. This separation is hold until the fourth semester and at this one there is a choice to do for the students. They have to select an orientation, it can be Business IT Consultant or Web Application Developer and with that they have some free choice of professional studies. The curriculum also includes a work placement in the fifth semester.

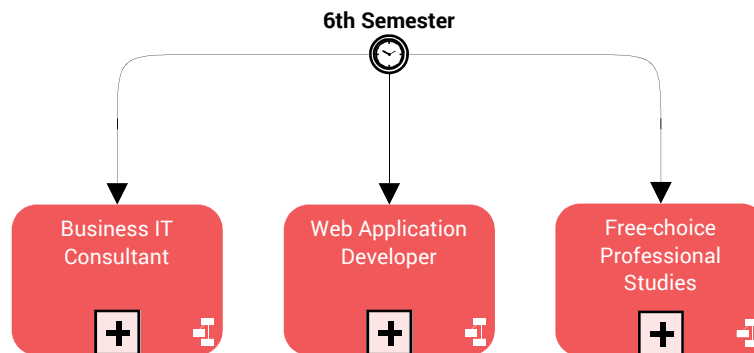
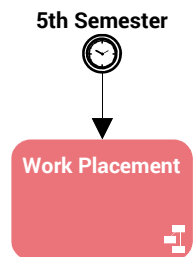
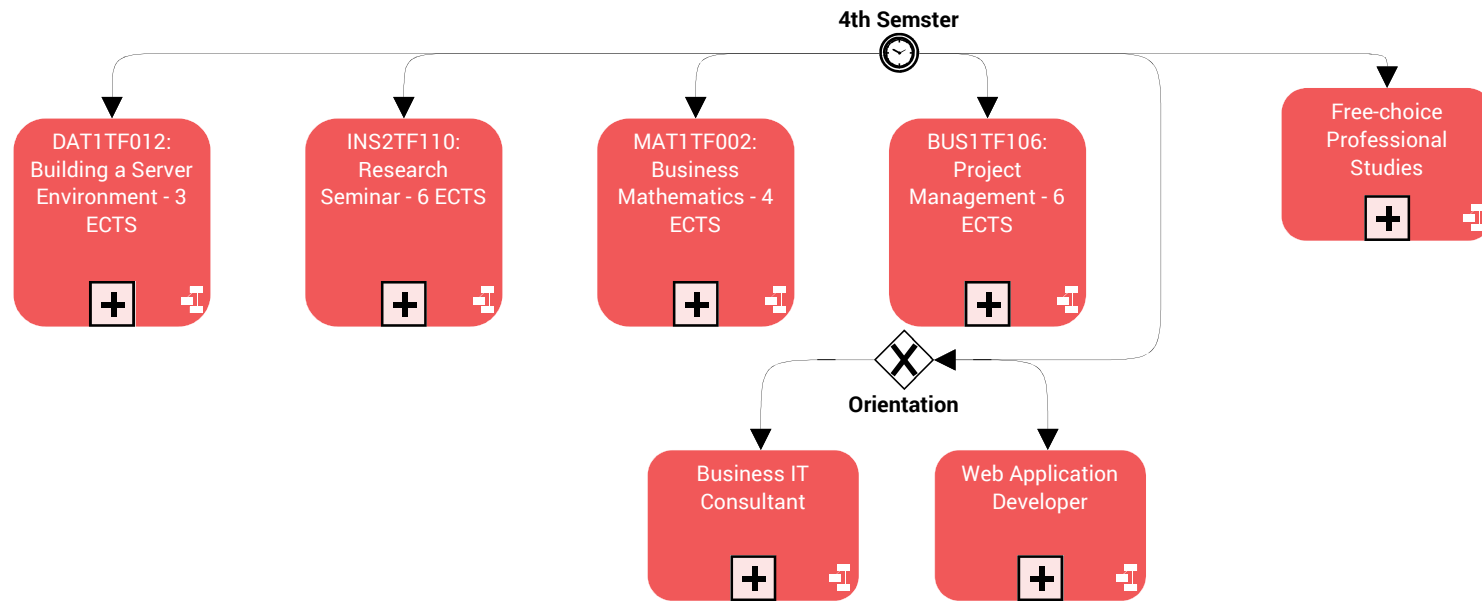
Start



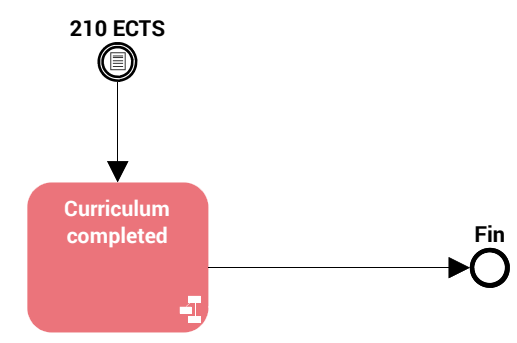
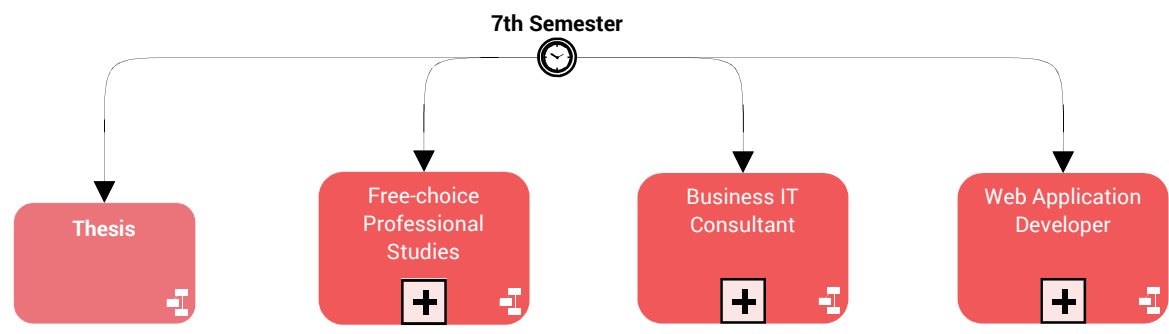
Student





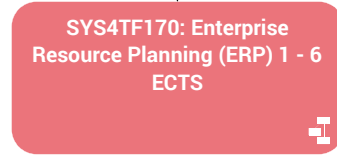




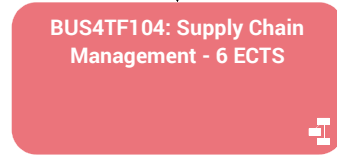
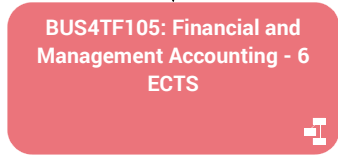


The next three diagrams are the descriptions of the different choice a student can do between Business IT Consultant, Web Application Developer and in addition to the Free-choice Professional Studies. On these diagrams there is different entry point, they are due to the fact that the process is used at different place in the main one (Curriculum – Haaga-Helia). They are working the same way as the main one and the course are also connected to a description that come above.

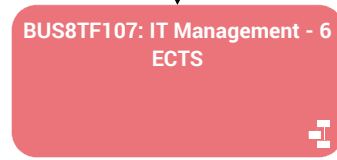
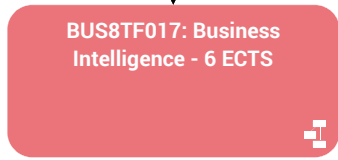
4th semester



6th semester



7th semester



end



## Free-choice Professional Studies

4th semester



FIN8TF100: Spoken Finnish - 3 ECTS



6th semester



BUS8TF158: Sales and Service Development - 3 ECTS



SYS8TF010: Enterprise Resource Planning (ERP) 2 - 6 ECTS



DAT8TF063: Corporate and IT Security - 5 ECTS



BUS8TF300: Linux Basics - 3 ECTS



SYS8TF171: Requirements Analysis - 6 ECTS



7th semester



BUS8TF159: Selling Professional IT Services and Solutions : 3 ECTS



SYS8TF172: Enterprise Resource Planning (ERP) 3 - 6 ECTS



ITP8TF155: Mobile Development - 6 ECTS



SYS8TF172: Web Security - 5 ECTS



ITP8TF301: Advanced Web Technologies - 6 ECTS



ITP8TF114: Java Programming - 6 ECTS



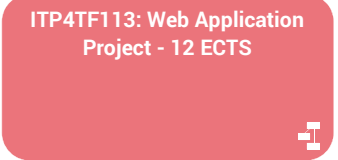
end



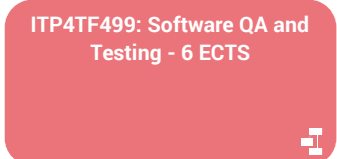


# Web Application Developer

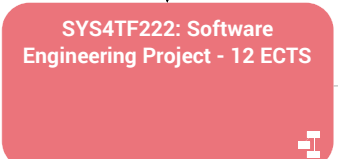
4th semester



6th semester

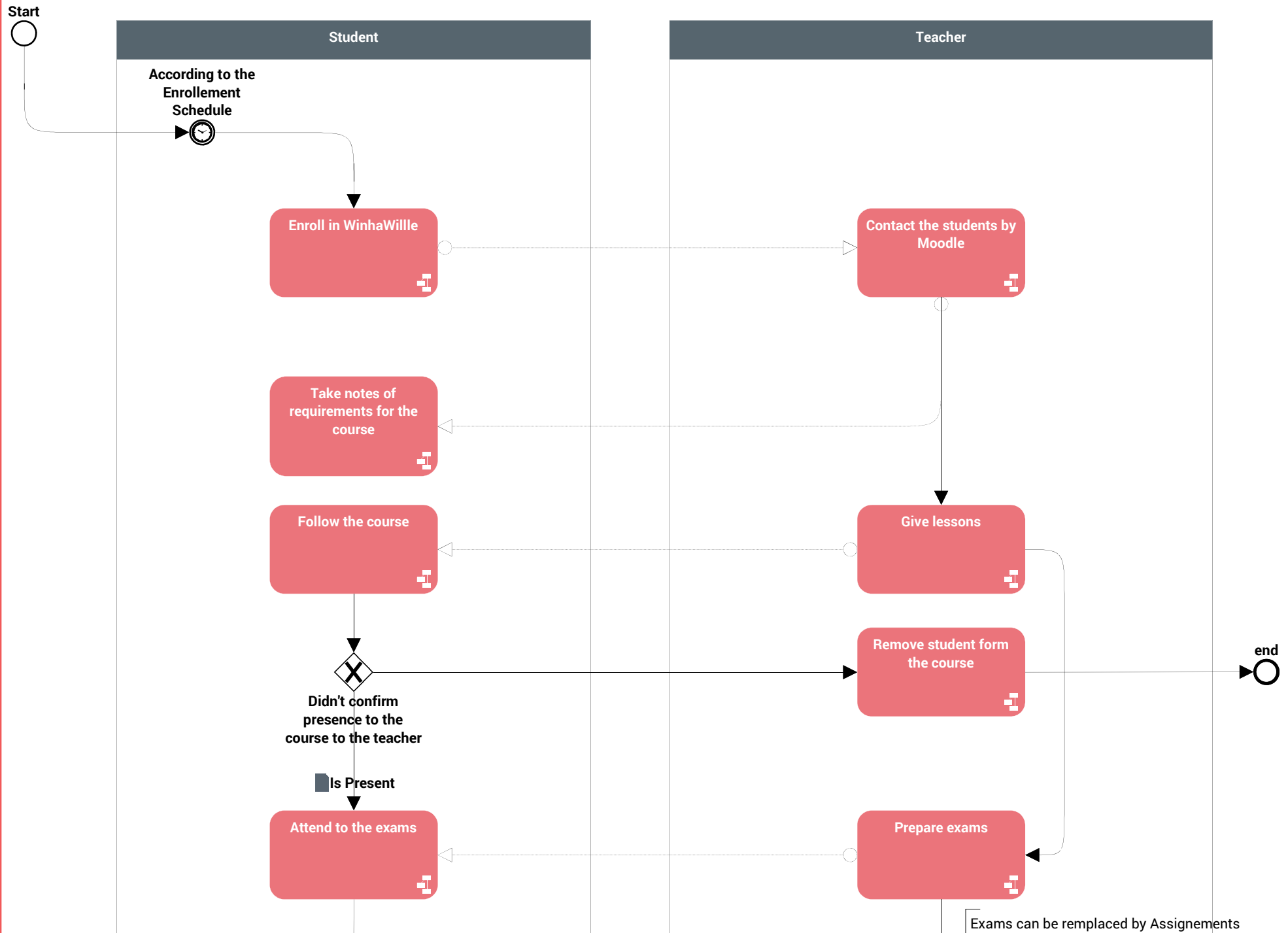


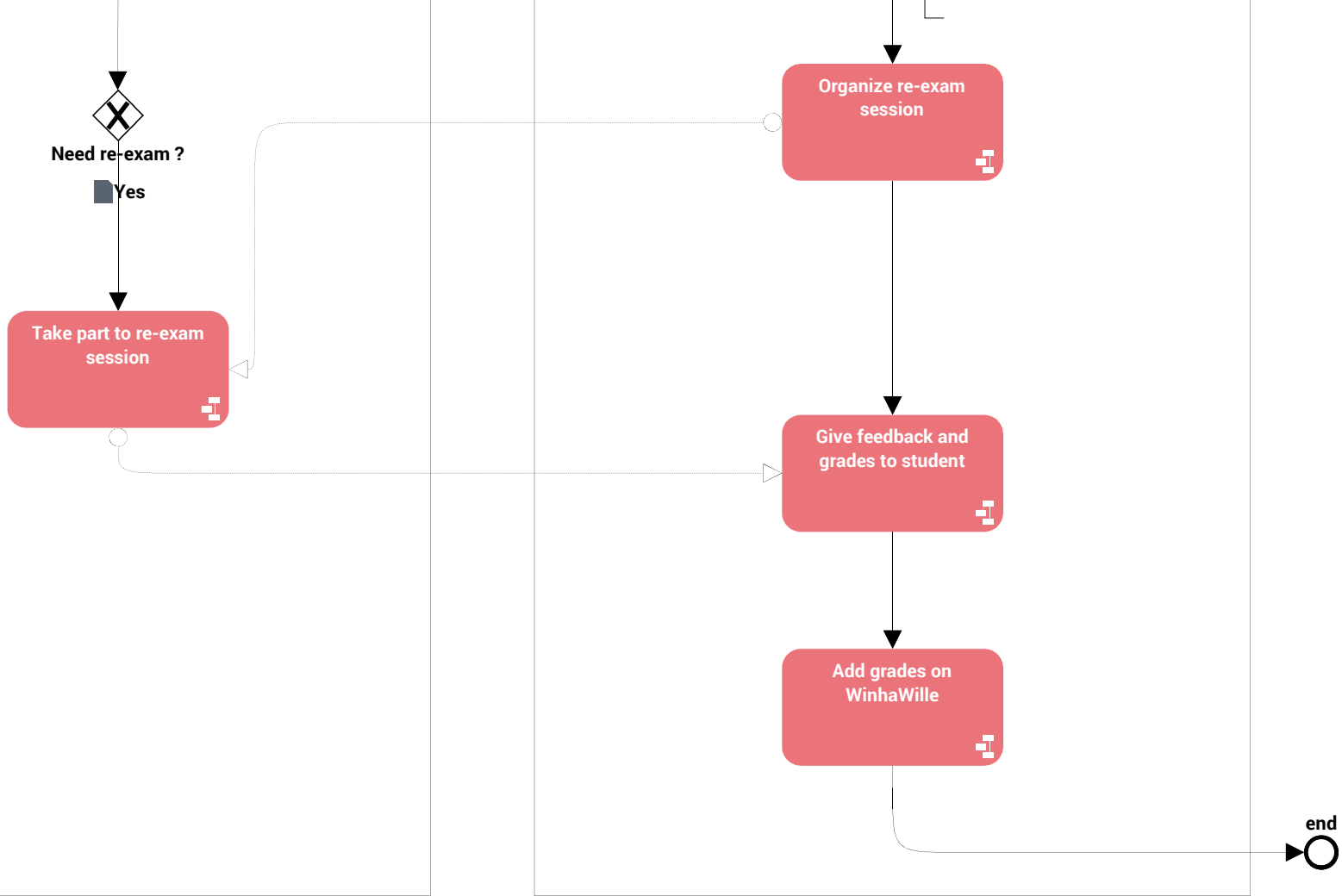
7th semester



end

The last diagram called "Course – Haaga-Helia" describe in detail how a course is done at Haaga-Helia. There is not an exact date as starting point but each year a schedule is published and it contains the enrollment planning. So according to this planning the student enroll in WinhaWille the course he/she has/want to follow the next semester. After receiving all the enrollment the teacher contact all the retained student by Moodle to communicate about the beginning of the course. Then the semester is handle as in all school, the student has to come in class and if not, the teacher can remove him/her from the list of the course. The student attend the exam or do the assignment or project at home (depends of the course). At the end of the semester the teacher organize a re-exam session that all student can attend if they want improve their grades. At the end of the semester the teacher add the grade in WinhaWille.







## **10 Evaluation and Conclusions**

### **Conclusions**

By comparing the two full process of Haaga-Helia and HEG we can easily see that the approach is completely different. Haaga-Helia is prepared to welcome students from all around the world and provide them different possibilities of evolution through their curriculum. At HEG, the first problem for students attending such a choice of path with an international dimension is the fact that all the courses are in French. About the choice of having a lot of different paths can be interesting for the students but there is one point that is loose. Indeed, a company that hires a student with a degree from HEG can know exactly his/her path and if the company already works with people who complete the same degree they know that the next employees will have at 90% the same knowledge. Employers can see a sign of regularity and the reputation of the school is quite good.

Haaga-Helia is able to give to the students the possibility to be project manager in IT, ERP specialist or even Web Programmer, at HEG students will have some courses in all of these subjects but not as deep. It doesn't mean that in Geneva students don't have courses that are going deep, in fact Java Programming and Cisco networking are courses that the students have during almost three full years.

About the main research questions the answer isn't that easy. There is not a lot of benefits to migrate MEGA HOPEX but it could be problematic to stay on MEGA 2009 SP5 for too much time. We saw that BonitaBPM could be another solution, but this paper didn't bring enough information about it to conclude that this software could replace MEGA at HEG.

There is an aspect that BonitaBPM brings that can make the difference, indeed it is free to use and compared to MEGA this is a huge difference. To talk again a bit on MS Visio we saw that the connected process between the different schools from HES-SO would be too hard to manage with a tool like Visio. I used MEGA for doing all these diagrams and I cannot say that it is a software easy to use, there are so many things that are related or connected that some modelling mistakes are hard to fix.

### **Results Validity & Sources**

About the validity of the result, I would say that my own experience influenced a lot my work and the fact the procedure in place are not always followed can create some mistakes in the diagram I produced. For HEG the interviews I have with the staff help me to do it as

well as possible and more over as close to the reality it was possible. As the models have been produced using MEGA HOPEX the main goal of the project is reached. By using all the work produced for answer the research question I believe it was at level expected by HEG to have a concrete and clear idea of the situation. However I think that this kind of project needs time to be tested and then apply some adjustment. As explained in the BPM chapter, we are here in a logic of perpetual improvement. Anyway the diagram produced can already give a very good vision of the system of both universities.

The sources I used all along this project where from many horizons, books, teachers, staff, my own experience and the existent documentation. Having all this kind of sources helps to have a better quality of the theory and concept used during the thesis process. A solution that I didn't use was to present the diagram to someone who not used to any of the two schools to see if there was some misunderstanding or problems that I couldn't see.

### **Project Management & Learning**

Based on the project plan I have made in the very beginning of my project, the order and the time spend on each tasks was close even I had to do some adjustment due to a small delay. At some moment when I had a lack of data or possibility to work I differ this work to another to be able to continue my work and don't be blocked at this step.

The thesis was also an opportunity to exercise some project management skills from the very beginning of the project with the plan and prevision for the progress of the work to the project himself with all his unexpected situation. Of course, in a project like that the parameters related to different person involve doesn't exist due to the fact I was working alone on it. Anyway this project was for me a very good experience for learning to manage the project, deal and organize meeting with the stakeholders and adapt my job the requirement and desire of the "client".

The project management and all the obligations around the project is completely include in skills I developed / improved during this period. Although I had some courses about BPMN and MEGA working with these standard, software and technics allow me to go deeper on those subjects. It's mainly when I wrote the background theory that I learned a lot of new things and master skills that allowed me to model in the best way possible the curriculum of the schools. Writing this paper in English, that is not my mother tongue, was very challenging for me, I believe that my language improved at the same time my paper was more and more completed.

## 11 Summary

The initial situation HEG is that the software they are using for modelling, stock and publish the results on webpages has been updated to a new version. The problem with the new version is that the only standard that is supported is BPMN 2.0. The decision to go on the new software is not easy because it involves to remodel all the process in BPMN instead of AFNOR. As I am completing a double degree program it was an opportunity to use the new version to model an inexistent process (curriculum of BIT degree) at HEG and compare it with the one from Haaga-Helia. As Haaga-Helia is updating the curriculum, having an idea of how a university in Switzerland is working can give idea of improvement or bring a new vision in the process of reflection.

The goal is to provide both universities, with a diagram of the curriculum modeled with MEGA HOPEX a description of their curriculum as well as the description of a typical example of how a course is handled. With the experience of its usage and the knowledge base from the theoretical background study, a solution has initiated development to make a decision about the update of MEGA.

To collect the information needed, different methods have been used. As to the theoretical background, the data mainly comes from books, articles and the internet. In the practical part of the project, my own experience with reinforced with interviews with stakeholders and information available on the website of schools.

The study reveals that the processes of curriculum have a common base but as students at Haaga-Helia can choose orientation so the processes are a bit more complex. After answering different sub questions, it appears that, in the short term there are no risks for HEG if keeping in the current version of MEGA. An evaluation of other software could be done to see if another could meet the requirements and maybe cost less than MEGA. At long term some problems could appear due to the fact that MEGA is interacting with other software, technologies used at HEG. If those technologies evolve too fast compared to MEGA there is a risk of incompatibility. The client support provided by MEGA could also possibly stop for the old version and be only available for the client with the new version (HOPEX).

## **Further Development**

The future of this project is the possible deployment of MEGA HOPEX and then the remodeling of all the process in BPMN 2.0 for the HEG. Implementing a new system like this one requires a lot of changes. All employees who need to use it will have to follow a training program to be able to use the new system. A migration always contains risk during the phase of evolution and to assure the best service during the transition it requires a lot of control and bigger checks at different steps of the project.

As a further development it could be interesting I think for HEG to have this kind of process for all the three degree programs. As the system is quite the same and there is even certain teachers who work in different degree programs these kind of new implementations should not be too long and too expensive to build. If HEG decides to not go on the new system of MEGA and so transform all the processes in BPMN 2.0 the integration of this process could still be integrated with some transformation to fit with AFNOR.

For Haaga-Helia that is currently transforming the curriculum of the BIT degree, a further analysis could be the evaluation of the changes and if needed the possibility to be inspired by the very strict system of HEG. The fact that the two schools will stay in contact due to the number of students doing an exchange every year between these two schools is of course a big advantage for Haaga-Helia and HEG Geneva some concepts could be integrated in possible ways to fit with the situation in Switzerland and in Finland.

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## 13 Appendix

### 13.1 Appendix 1: Table of comparison between two solution

Nom	Description	Company in number	Usage	Language
BonitaBPM	<p>French editor. 4 versions of the product:</p> <ul style="list-style-type: none"> <li>• Community: Management of Business Process</li> <li>• Teamwork: Building of business applications for the company</li> <li>• Efficiency: Management of business application web and mobile</li> <li>• Performance: Critical business application</li> </ul>	<ul style="list-style-type: none"> <li>• More than 1,000 clients.</li> <li>• 60,000 contributors. 140 employees.</li> <li>• More than 3,000,000 downloads.</li> </ul>	Easy to use	<ul style="list-style-type: none"> <li>• Java</li> <li>• Studio Eclipse</li> <li>• AngularJS</li> <li>• Apache Server</li> </ul>
MEGA HOPEX	<p>French editor. 4 categories of tools:</p> <ul style="list-style-type: none"> <li>• Enterprise Architecture (EA),</li> <li>• Business Process Analysis (BPA),</li> <li>• IT portfolio management (ITPM)</li> <li>• Governance, Risk and Compliance (GRC).</li> </ul>	<ul style="list-style-type: none"> <li>• 40 countries</li> <li>• 2,700 clients</li> </ul>	Many possibilities of setup, require good knowledge	<ul style="list-style-type: none"> <li>• .NET</li> </ul>

### 13.2 Appendix 2: Requirements in the curriculum at HEG

TABLEAU RECAPITULATIF DES PRE-REQUIS DES MODULES DE LA FILIERE IG

