Co-funded by the
Erasmus+ Programme
of the European Union

prowide

prowide

IO1: Further education program Online Proctoring Manager

Activity 3: Creation of Digital Learning Content

Module 7

Change management in HEI for adopting proctoring online exams

UNIVERSITA TELEMATICA INTERNAZIONALE
UNINETTUNO

Staatlich anerkannte, private Fachhochschule des Mittelstands (FHM)
proctorio
LIEPAJA UNIVERSITY
UNIVERSITÀ TELEMATICA INTERNAZIONALE UNINETTUNO
ANADOLU ÜNİVERSİTESİ

Summary

Aim and structure of the document

The aim of this document is to provide the reader with a description of the methods and strategies to understand and learn the main paths of change management in proctoring, i.e., in supervising, carrying out and applying the procedures related to supervised online exams. In other words, starting from general and well assessed best practices in change management in companies and business, we try to summarize which type of change must be followed and what steps must be taken for a correct implementation of the proctoring process in the high-education institutions (HEI). We will consider both the HEIs business level and the cost level, evaluating its benefits, risks and future prospects. Then we will discuss in detail the changes induced by the implementation and use of the proctoring software in the HEIs. Why chooses Proctoring? What are the advantages of this choice? We will describe some of the most commonly adopted proctoring software including their main characteristics and functionalities. Through the discussion of various newspaper articles and interviews of peoples that have tested proctoring procedure, we also examine the "personal" feeling, individual perception as well as the typical socio-psycho-pedagogical and socio-economic effects associated with the adoption of proctoring strategies and related change in the HEIs.

The document is organized in five parts:

1) A chapter about proctoring in HEI exams that describes this methodology with some classification and examples. We summarize what are the main actors (teachers, students, OPM, administrative secretary, IT technicians, etc.) in proctoring activities and their role, skills and possible needs in carrying out lessons and exams with manned or computer-aid supervision. The aim of the chapter is to show the need of change that the actors have and that this request them to be trained, to develop/refine some skills and in general to manage the change asked by the supervised exams.
2) A chapter about change management. We summarize the process, methodologies and steps in managing the change in general trying to develop a culture of change management. The aim of this chapter is not only to provide too detailed indications for change management in proctoring: this could be too detailed or too much specific, depending from the HEI conditions, OPM role, and particular situation. Instead, we aim at providing a better consciousness about the general need and best practise in change management that will be customized by the actors in the specific environment where they act.

3) Some general flow-diagrams that summarize activities and procedure online exams, the management of proctoring, the adoption of the proctoring SW, and some key point of the change management.
4) An appendix is devoted to discuss what are the most frequent situations, opinions, and impressions from students, teachers and managers involved in the proctoring activities. Some material is constituted by citation of interview, survey, newspaper, etc. The aim of this chapter is to provide a further deepening about the discussion on proctoring. Who is asked to carry change management in proctoring could have the unpleasant feeling to face new problems, poorly understood? He/she could consider these situations due to his/her lack of experience in the field. Instead, many situations, problems and reactions are recurrent in HEI application of proctoring. Therefore, we believe that to be informed about the general situation could be important for the reader, even though the discussion in the Appendix has any claim of scientificity about the statistical significance of reported issues, opinions and features. Anyway, this part could strength the need of a conscious change management.
5) Finally, we provide a list of questions that the reader could use to check his/her knowledge about the change management in HEI proctoring.

1 The proctoring in HEI lessons and exams

Aim of this chapter is to analyse the activities of online exams and the task useful for the change management associated to the introduction of methos and procedure for carrying automatic surveillance during the execution of online exams by remotely

1.1 Online exams

Let's assume that the higher education institution (HEI) has adopted several procedures and software for the management of online tests and exams during the lockdown from Covid-19 and, more in general, for the execution of the assessment of students who are learning remotely: the so-called online supervision.

In general, all higher education institutions that have adopted a system for conducting tests and examinations online with a mentoring system should provide teachers with guidelines and webinars, and in some cases even hotlines, focusing on three main aspects:

- the management of the technical aspect, including IT, related with the software adopted, the necessary internal communication procedure and an update of the didactic requirements;
- the management of legal aspects (for example: identification of the student, respect for privacy, management of personal data, etc.);
- the management of the soft skills in the interaction with students in order to manage technology mediated interaction (such as the exam session, the automatic alarms, the "litigation" related to possible technical problems of connection, allowed/not-allowed behaviours, cheating, etc.)

1.2 Surveillance services

Schools and universities are switching to online surveillance for a variety of reasons:

- Many more students study online. This means that traditional exam formats are moved to online platforms in order to allow the participation of a larger audience.
- Online exams save HEI money, but are also convenient for both teachers and students in terms of scheduling the exam date and time.
- Online exams can be taken by students from all over the world instead of meeting in the classroom and the teacher can immediately decide the outcome of the online exam. This is

particularly important not only for working professors / teachers, but also for working or parenting students and allows them to take exams in the time slots dedicated to them.

With the rise of online testing, online supervision is needed to discourage cheating and monitor students as they take exams at home.

1.3 The proctoring

Proctoring is a range of tools, based on artificial intelligence, that acquire a data set of the device used to carry out final exams, middle term tests and any type of verification. The collected data are processed in real time by an algorithm that decides whether the student is copying or not, could be using note or other not allowed materials or more in general is having a suspicious behaviour. Provided it is easy to apply, a series of precautions are required prior to the application of the chosen proctoring software.

In general, it is need to select an online platform to provide lessons and exams such as:

1) A shared / public learning platform like Teams, Google Classroom, etc.

2) An audio and video platform, preferably from the same owner.

It is also needed to clearly state the hardware and software minimal requirements. For example, in general, for the Operating System: Windows should be in version higher than Windows 7; MacOS from 10.12 to 10.15, OS X 10.11 and OSX 10.10; vice versa Linux devices are not generally supported. It is also possible to use an iPad to perform the exam but, in this case, it will be necessary to have an iOS system in version 11.0+ and to have a compatible LMS (Learning Management System) integration. In other cases, the Proctoring SW can also be used with Linux devices, but not generally with iPads.

1.4 What a proctoring software can do?

Several proctoring software are available. Beyond the differences, proctoring software controls each supervised exam, online or in person, as a step towards students' achievement of their academic and career goals. That's why this platform makes audited assessments accessible to anyone, anytime, anywhere. Before the start of the exam, the proctoring SW identifies the student in order to be sure that it is the "correct" student taking the exam. This process is carried out either through self-authentication or live-authentication: in the first case, the student is identified by taking a photo of their identity document and face. In the second case, the supervisor performs a live facial comparison with the student's identity document.

1.4.1 Types of proctoring

During the exam, the proctoring platform monitors the student through three types of checks, according with three main types of surveillance:

I. Live online proctoring

A person devoted to surveillance monitors candidates with audio and video in real time. Typically, the supervision service provider includes people (staying in a remote location) that have been trained in order to verify student authentication and to prevent / report activities of potential cheating. The candidate and supervisor can be thousands of kilometres away of distance.

In general, each person devoted to supervision can monitor up to 15/30 candidates at a time. The main advantage of this approach is that it removes the constrain of having localized proctoring.

On the other side, the contras are that: i) it still requires exam planning; ii) it is not very scalable (because human involvement equals offline supervision); iii) it is the expensive proctoring procedure.

II. Recorded proctoring

In this strategy, no supervisor monitors the candidates in real time. Instead, candidates' activities are recorded during the test. A representative plays these recordings quickly (3X to 20X speeds) and reports any suspicious activity with annotations. The advantage of the method is that it eliminates both planning and location constraints. However, it still requires humans to do the review and therefore is not very scalable and is still expensive.

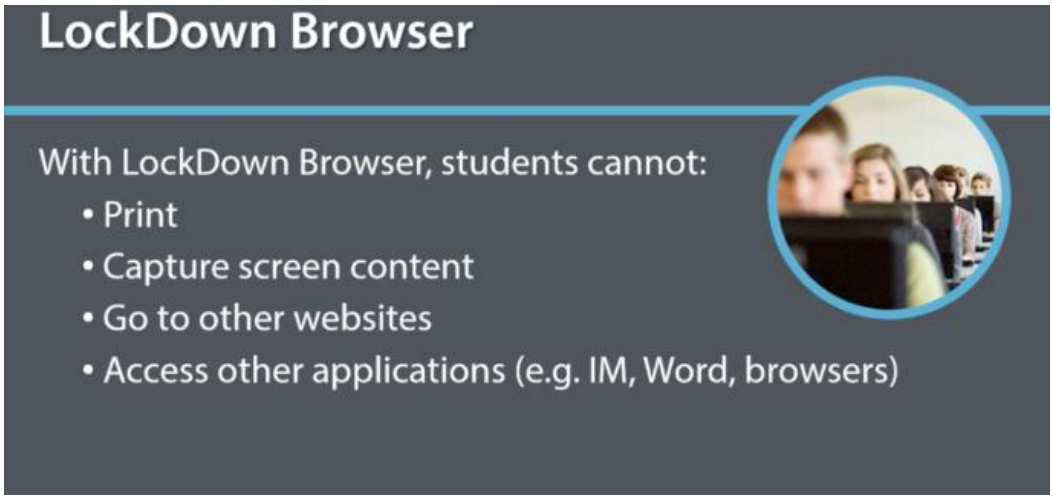
Secure or Remote Proctor Now software follows this model.

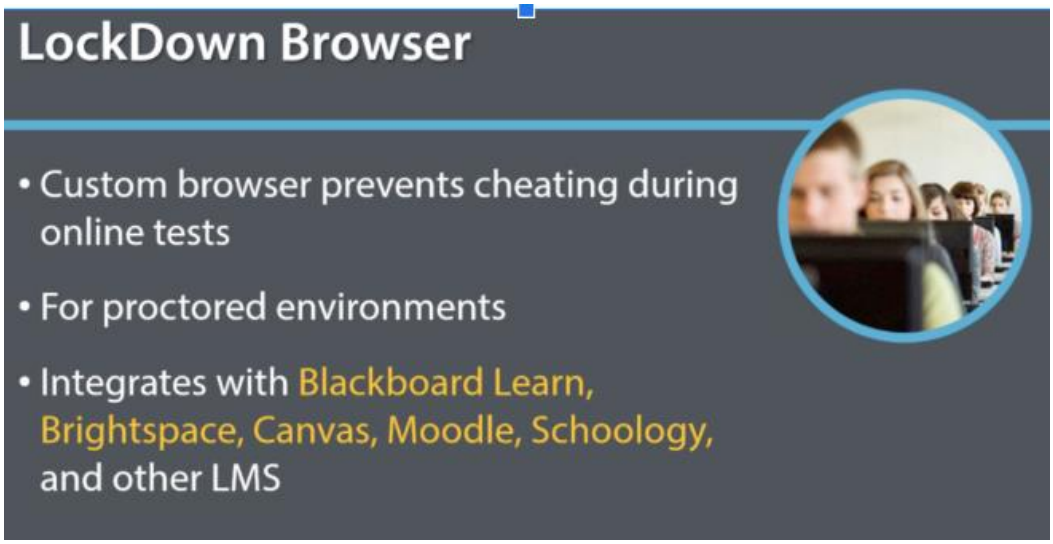
III. Advanced automated proctoring

Also in this method, the test candidates' audio-video and screen-sharing feeds are recorded during the test. But in addition to logging, the system also monitors feeds for any suspicious activity using advanced and automatic video and audio analytics.

1.4.2 An example of proctoring software: Respondus lockdown browser

Respondus lockdown browser is a largely adopted proctoring software.





At the beginning of the test, the SW forces the student to close the internet, to interrupt access to the printer or other desktop applications such as Skype, camera, etc.

It integrates with Moodle and is always activated automatically from Moodle. The teacher can set the setting according to needs and activate the closed browser or not, or grant the student permissions: use iPad, consult specific web pages, use the calculator, print something, etc.

The teacher can also decide if you want the Respondus Monitor with webcam. In this case it will be the camera, which, after identifying the student, will supervise the environment in which the exam will take place, and will start a recording of the same checking if the student lowers or you look up or if, too often, you turn in other directions, to allow the teacher, after viewing the recording, to reject the candidate or not.

1.5 Change management for using proctoring

How to manage the very revolutionary change of using proctoring within an HEI?

How to manage the social partners involved, which can be multiple and must be ready for a change of this type?

This change involves different social partners and is seen by each one in a different way. It involves students, teachers, but (from the part of drafting the project and acquiring any proctoring model chosen) also the figures responsible for its proper functioning as well as any effects on the HEI. Previously, in general, it was the teachers who mainly managed the supervision. Now with the proctoring software it will be necessary to prepare new technical procedures to train teachers in the correct use of the software. This technical staff will provide continuous service aimed at supporting teachers in case of inconvenience during the exams, and this is a mandatory requirement to guarantee a robust and reliable system. In any case, the parties most involved in the preparation of the exams online under the control of proctoring are the students and the teachers.

1.6 Students

The procedure for carrying exams with proctoring can be summarized as follow.

- Students connect to a reserved page on the University website, access the exams section, and a sort of preliminary check is started which includes, among other things, showing the entire room, testing the operation of the microphone and show your identity card.
- After this phase, the actual query starts where the camera evaluates any suspicious movements and marks / highlights them in order to allow the teacher to review that specific moment to understand whether, in fact, the student was copying or not.
- Student's identification. Identification takes place via the webcam and the microphone for any suspicious noises or voices. With regard to body movements, maximum attention is paid to the gaze, which if moved for several seconds in a different direction from the front of the screen and if lowered for a few seconds, leads to the appearance of the warning on the screen.
- Warning. This warning, which also appears quite frequently in the case of completely innocent movements such as bending over to write on a sheet of bad calculations or other, led to two different reactions on the part of the teachers. Some have decided to ignore most of the warnings, if not the most striking ones, allowing you to write on bad sheets where

necessary, while others have decided for a more rigid way, directly removing the possibility of using sheets, sometimes with an obvious penalty. for students. The final choice is therefore made by the teacher and not by the software. proctoring systems use all possible tools to achieve the set purpose. Computer camera, audio, mouse. Anything from which an important data could emerge is controlled by the software: There is maximum attention, in particular, on the gaze, which if moved for several seconds in a different direction from the front of the screen and if lowered for a few seconds, leads to the appearance on the warning screen. We do not know if in addition to these warnings visible also by students, teachers receive other forms of reporting.

1.7 Teacher's training

In carrying out their professional activity, professors require refresher courses, support to update their knowledge on more advanced information technologies, etc. Managing new software to perform well-evaluated and standardized procedures such as exams has not always been an easy task, especially for older professors who have had to learn something new, with some reluctance. They also had to change their way of taking exams. In addition, they had to learn how to manage integration, for example of Respondus and Blackboard. In any case, the impact on professors changes according to their technical skills. Some teachers reported that several training webinars were helpful in dealing with the problem.

The adoption of automatic online supervision procedures would have required the teachers involved an additional effort and the time necessary for the exams. One of the difficulties encountered by the teachers was the need to adapt their exams to the new way, for example to create quizzes or to understand how to interpret the warning videos. In fact, the new procedure provides that the exam texts must be prepared correctly and correctly loaded into the surveillance systems (well in advance). The procedure must be repeated for each exam and / or session. Furthermore, the supervision software usually generates many false positive alarms, so the teacher has to spend some time watching all the selected videos, eventually without finding any real cheating situation.

In some cases, teachers reported that they sometimes needed to reduce the length of exam sessions at the expense of the quality of the assessment.

1.7.1 Managing failure, difficulties in evaluating and complains

In order to manage the cases in which, for one reason or another, the online supervision procedure of the exam was not successful, the teachers could organize more sessions of examination in the presence. Either way, this remediation strategy could be a rather time-consuming solution. There is a common feeling that online manned exams are not equivalent to face-to-face exams. Even though statistics are not available, it could be guessed that in written exams in presence the percentage of cases of possible cheating is not lower than with online proctoring. Therefore, beyond all, a change management key point will be to manage the possible complains (from administrative personnel and teachers) due to the need to organize additional exam sessions. This would mean an additional effort both for the teachers and for the students.

Some teachers have complained that even with supervision software it is not possible to fully control the desk headset and that the student can use multiple devices (such as a dual mobile phone). Although, as with manned supervision, no automatic online supervision system can guarantee complete efficiency and one hundred percent reliability. Furthermore, even a written "face-to-face" exam is not entirely reliable. However, even if oral seems preferable, this procedure takes a long time and cannot be applied to examine a large number of students remotely also due to the lack of reliable shared supports (e.g., paper or blackboards) necessary for carrying out some exams that require writing formulas, graphs, etc.

1.7.2 Avoid cheating

With the development of online exams, the problem of deception is widespread: cheating is more easily done without a supervisor and therefore the supervision that is used to prevent such cheating, it is somehow "studied" by the students in order to be contained.

In fact, many students who reacted badly to online supervision (especially with concerns related to the topic of privacy) said they felt uncomfortable.

Here are some tips for teachers to help prevent students from overwhelming proctoring:

- Randomize the questions: It is possible to create a "bank" of questions; This allows the platform to extract a series of different and random questions for each student who will be "forced" to answer and take the exam to the fullest of their skills and knowledge.
- Set a timer: Cheating takes time, so if you have little time to answer questions correctly or not, cheating is more difficult.

- Ask problem solving questions: For exams based on common information texts, it is actually easier to cheat by simply searching through online sources, textbooks etc. But if students will be asked to use their own logic in reflection on a problem posed by the teacher, in order to develop their own critical thinking, it will be difficult to find the answer among books, notes and the internet.

1.8 The OPM

There are several initiatives aimed at training the professional figure of the OPM and try to develop, test and establish a qualification profile and a corresponding training program Online Proctoring Manager with the aim of supporting the implementation of remote exams at HEI. Higher education institutions need professionals who can develop, implement and manage the online proctoring strategy within their institutions. The implementation of online proctoring services requires consolidated efforts of the stakeholders of the higher education institution at different levels, such as managers, teachers, education and examination offices, IT departments which must be coordinated by a specialist with an interdisciplinary qualification profile which embraces the issues of data protection, education law, technical aspects, communication with internal and external stakeholders, management skills. These types of professional skills are associated with the OPM professional profile and it is believed that qualifying and recruiting this type of specialists at higher education institutions is crucial when moving to high quality online education based on integrity, flexibility and accessibility.

1.8.1 OPM's training

The training principle is based on the specific skills of the OPM able to manage managerial or business information relating to the purchase of the software, define its characteristics, utilities and functions through further e-learning courses, and manage (with the help of an IT technician pre-trained and pre-informed on the topic relating to proctoring) all the cases of any failures or malfunctions of the SW. The OPM, for example, will take care of managing the maintenance, with periodic report about the highest cases of failure, malfunction etc.

The OPM will have the task of managing the data provided at a managerial level to optimize the process of using the SW and any decisions to change or swap the SW.

The training of the OPM takes place through the aid of some e-learning platforms, the most used is Moodle: it is a well-known free software dedicated to the development / management of e-learning

courses, or a learning management system, which allows (even teachers and students) to develop their own features, as well as easily customize them at their discretion. In using Moodle there is also the possibility not only to attend the course, but for anyone to keep another course hand in hand regardless of qualifications and with payment methods, for all those enrolled in the course, very simple and efficient. In other cases, is has been adopted another online platform called Exams.net. This provides various features, similar to those provided by Moodle, but also provides an online supervision service.

1.8.2 Why HEIs ask for adopting proctoring?

What factors are leading HEI to proctoring? And why choose it?

An analysis of what is driving the growth of remote proctoring in exams reveals that the key points are:

1. The growth in the request of e-learning.
2. The reduction of costs in manned assessment centres.
3. Reduction of time and costs for students.
4. In general, the IT requirements needed to manage online proctoring exam are fulfilled by the already existing HEIs IT infrastructure.
5. An increase attention to work-based apprenticeship and a better alignment between learning process and assessments of acquired knowledge.

1.8.3 Advantage of proctoring

What will be the benefits of online supervision for the HEI?

- For all test administrators, digital tools that support remote supervision provide a reasonable level of security for exams taken remotely.
- Also, for online universities and MOOCs, it provides validation for online education. For recruiters, it significantly reduces the logistical requirement of entry-level hires and thus the hiring time and cost of hiring.
- For test takers, these systems offer the opportunity to complete online assessments in a variety of times and places depending on convenience.

- Remote controlled exams can be unscheduled and immediate, delivered with Internet-based tests. All data for the candidate, video and audio logs, screenshots, etc. are available for future reference.

1.8.4 How to select the best tool for proctoring

Which tools is advantageous to use in the proctoring application?

It is impossible to provide a straight answer or sharp criteria. Anyway, remote monitoring tools will become the cornerstone of online courses. It could soon have an impact on other types of assessments as well. Current trends include:

- Enhance candidate authentication through the use of biometric inputs from devices such as smartwatches and fitness monitors.
- Smartwatches and fitness monitors can also be used to detect changes in pulse and temperature and send that data to monitoring software to act as clues of negligence.
- Facial recognition with detection of background sounds and noises is already used to avoid impersonation. Keyboard behaviour analysis is also in use. In the future, touchscreen behaviour analysis could be used as additional controls.
- Head movement and position and lighting analysis are already used looking for cheating. Also, the tone of voice, facial expressions, etc. can be used in the future.

1.8.5 Needs, risks and limits of proctoring

What are the limits or risks, if any, of proctoring?

1. In the current global scenario, it is almost impossible to perform offline surveillance due to possible bans and firewalls in some countries.
2. Providing a supervised exam centre close to the candidate's position is a significant challenge for most organizations that manage any form of testing: you need to know how to manage exam tests properly, and this cannot be the teacher's job.
3. Well trained OPMs are “difficult to find” and it is difficult to guarantee the quality of proctoring and management of the same. Therefore, there is a need to train competent OPMs, capable of guaranteeing the correct development and functioning of online proctoring.

1.8.6 Providers of proctoring

Who can use online exam supervision?

Assessment providers who provide ready-made assessments or provide a testing engine to customers who have their content can leverage supervision for the following benefits:

- Become a valuable partner by allowing you to administer assessments more cost-effectively and quickly.
- Generate additional revenue opportunities.
- Improve usage per customer by providing on-demand testing anytime, anywhere
- Take the business globally by enabling remote monitoring

Assessment service providers such as Pearson, IBM Kenexa, provide online supervision services through Talview.

Actually, the biggest users are training providers: private universities, online universities, public universities, MOOCs, (even schools): Online training providers, schools and MOOCs are challenged on how to effectively verify the validity and quality of their online programs. Use cases can be as varied as recruiting, college entrance tests, certifications, promotions, etc.

1.8.7 HEI proctoring's choice

Once an HEI has defined its change assessment with any risks, benefits and costs, the HEI will make the decision to purchase the software. The administration will have the opportunity (and this applies to most Proctoring SW) to speak with a consultant dedicated to the possible purchase of the software, underlining its interest in purchasing it and the needs that drive the university to do this. purchase, this choice. There is also the possibility through an online consultation to buy the software directly. Once the SW preparation actions have been developed, on the first useful exam date, there will be the possibility for students and teachers (prepared through training, as mentioned above, to know how to manage the SW proctoring applications available to them), to start the exam session.

1.9 Privacy

Monitoring systems for online exams seem to have a big problem, that of privacy and data processing. In several HEI students generated a big debate on this issue, expressing their opposition to the adoption of these software which, in addition to saving student records for the entire exam session, acquire a large number of data and metadata.

1.9.1 Privacy policy

The privacy policy of several proctoring software (such as Respondus, Proctorio, etc.) specifies how personal information is collected and processed. During the exam session, a series of data derived from the recording through the student's webcam are acquired. This is necessary for the face detection and recognition technologies to be able to analyse the position of the student's face relative to the webcam and to determine if the student has remained within the frame, if more people have appeared and if the person present in the frame is the same who started the exam. But the software, in addition to recording the student's face and its surrounding environment, also processes other data such as:

- the date and time when the student start the test,
- the time at which the answer to each exam question is given, the time taken to write it, if and when this is changed.
- the quality of the user's Internet connection during the examination session (including the time and duration of any Internet disconnections);
- mouse, keyboard and screen activity;
- the quality of the video recording (in terms of lighting, contrast, movement) and audio.

1.9.2 GDPR regulation

The data in question should be processed in compliance with the European regulation on data protection GDPR, as declared by the proctoring software in their privacy policy, but it should be emphasized that the data collected is transferred to the SW servers, located sometime in the United States, and stored for 5 years, unless the licensing institution requires a shorter retention period. With reference to the transfer of transatlantic data, the Respondus company mentions its adherence to the Privacy Shield, an agreement that regulates the transatlantic exchanges of personal data for commercial purposes between the European Union and the United States, which was however invalidated in July 2020 through the Schems II judgment. This reference to an agreement that is no longer valid can leave users who use the service in question perplexed.

The Proctorio software also claims to comply with the directives established by the GDPR, declaring its commitment to guaranteeing protection and security in the processing of personal data. Although Proctorio's privacy policy transmits particular transparency and clarity on how the data is processed, it is not clearly specified where they are stored and stored. In this regard, the company merely declares that, in cases where the data are transferred outside the European Union, it

undertakes to check that the processing is adequate and compliant in compliance with the rights of the data subjects.

2 Introduction to change management

Change management can be defined as the set of planned activities aimed at managing change in companies, education institution (HEI) and more in general in groups and communities.

In such a scenario a gradual and smooth approach could help, but the ideas that little changes could work without any systematic intervention could fail. In fact, some time even very limited changes and innovations undertaken by companies and HEI are too little in order to have a useful impact. Small changes are almost irrelevant for companies and HEI that are not really innovating, but would need of a stronger impact in terms of change. And, independently from the amount, numbers and extensions/depth of the changes, a conscious and structured management of the change is mandatory in order to prevent negative effects.

To give an example, there are frequent and widespread cases of changes apparently localized / limited that anyway don't work at all:

- Simple and small digitization tests on individual processes and functions, that are not uniform between the HEI levels (departments, courses, etc.) and people (secretaries, teachers, IT technicians, etc.) can create inhomogeneities and further problems in managing the multiple different cases and consequences generated by an apparently "surgical" approach.
  - Lesson to be learned: Planning the interventions should always be accompanied by an assessment of local and global effects.
- Using external innovation managers, agencies or technology providers, that are not integrated into the HEI system calling for innovation. In this case the external provider can be perceived as a problem instead such as a partner and can became a reason for complaints justifying the internal rigidities against the request/needed of change.
  - Lesson to be learn: To explain to people involved in the change process is always preferable and more effective.
- Using of new digital tools in "commodity" mode without adapting them to the specific needs of the HEI. This can cause, from the outset, an absence of "interest" because different HEI can have different needs and consequently it is necessary that digital instruments are (at least partially) customized and adapted to their specific requirement.
  - Lesson to be learn: Sometime the need or the request (from the people in HEI or any company) to customize the activities and interventions applied for changeset are

over evaluated, but the need and the request to listen and consider the need of personalization/customization should never be under evaluated both for the effectivity/reliability of the processes and for the human reactions.

2.1 Change starts with people

In general, the path of change can be particularly articulated and complex (or could be individually perceived as "very heavy" to be accepted), as it has a strong impact on the habits of people, who by their nature generally show a certain resistance to change. Managing the human aspects, soft skills and interpersonal relationships, means accompanying people towards new goals and habits.

> *"With the term change management, we mean the construction of a path of change that from a current situation sets a goal and a transition necessary to achieve it".*
>
> *[Source: https://www.whappy.it/] [https://lnkd.in/dwnMRBd]*

Moreover, in general nowadays, change management intrinsically moves with digital transformation.

The main problem that afflicts several HEIs is that, even though they need of innovation, HEI can face a structural block of some initiatives and processes taken into consideration, due to an immobility of people, processes and also of the context. Thinking of introducing technologies without transforming habits and processes is useless and can turn out to be a waste of resources, energy and time.

2.2 From an historical conjunction to an epochal change

Since 2020 up to the 2022 Spring, the medical-health problems due to the COVID pandemic and the related legal restriction to movements, as well as the socio-economic vicissitudes, have prevented worldwide the possibility of carrying out the traditional didactics in presence, for schools of any level, professional learning, university and health sectors. The world of learning and teaching, including the most conservative HEIs – reluctant to accept the e-learning possibilities – has been forced to move forward digital platforms in order to provide lessons, carry teaching activities as well as to manage test, intermediate verifications and final exams. The traditional class in presence, with blackboard and frontal lesson, has been unavailable for many students for a couple of years, that has been a serious loss. By, on the other side, from eLearning the students gained an individual and direct interaction with the teacher (possibly synchronous or asynchronous) for lessons, tutoring, questions & answers and examination. Obviously, this transformation has not been smooth neither

without consequence (neither has been uniform or complete) mainly for classes of mathematics, physics and other disciplines that require laboratory activities, physical supports for tests and more in general need to carry both written and oral homework and exams.

> *"The results of the Assochange 2020 survey, in collaboration with the HR Innovation Practice Observatory of the Politecnico di Milano, carried out between March and November of this horrible year, confirmed digital transformation and technological innovation in first place as reasons for launch of a change project, while cost reduction and efficiency remain in second place, followed by the need to develop new skills and professionalism".*
>
> *[Source: Observatory report on change management 2020 - assochange.it]*

In this framework, change management has become one of the most critical and delicate aspects that involved universities and schools in the transition from face-to-face exams or interrogations to their assessments, to online exams before and then to proctoring.

Therefore, the approaches involving an update of the technologies available to HEI ask for a conscious change management of the processes and the approach of the personnel because if the HEI system is not ready to incorporate them, these innovations will tend to replicate the inefficiencies already present or, in the worst cases, create new ones. But it is precisely in this perspective that change management today takes on even more value for HEI and companies wishing to innovate strategically and in an impactful way, undertaking a needed corporate digitalization path.

2.3 How can change management be dealt with in an active, constructive and logical way?

How to design and implement change management effectively to revolutionize processes within the company and be successful, regardless of the technologies used? Today, two out of three digital innovative projects fail. Knowing - if not in full and in detail, at least in part and for the general - the design and the implementation techniques of the change required is in fact a vital need to avoid unpleasant surprises.

2.4 The 4P model

Effectively introducing change management involves the consideration of various elements, whose pillars are 4, according to the 4P model:

2.4.1 People

It is necessary to change people's mentality and culture, and it represents the most difficult and costly aspect. This is true in general, but one of the main criticalities that emerge in the change forward distance learning.

Effective change management aims to put the user at the centre, so a project of this type MUST start from people and their "mindset", that is, their mentality. Social psychology tends to divide people's approach to their work or study context into various typologies, placing the two psycho-social positions of "fixed mindset" and "growth mindset" at the extremes. In the first case, we are faced with a thought static and not very inclined to incorporate novelties; in the second, however, we are confronted with a mindset inclined to learn and innovate.

To cite parents and families could appear out of scope in this framework. But the health emergency has taught us that the process of transferring activities from the traditional class to online in general and to proctored exams in particular has an impact on families and their internal management. Good quality internet connection is important but also the sharing a limited bandwidth within each family unit could be a problem that cannot be simply ignored. Quality of computer hardware as well as environmental conditions (noise, space, distances and point of view between camera and student in exam session impact the possibility to carry fruitful online exams with proctoring. Therefore, the requests in general from HEIs and in particular from each teacher should be straight and simple, but not too rigid to ignore that the carrying an exam by remote in an office is not as currying it at home. For high school and adolescents, the change in the social partners involved is fundamental: always maintaining differences of role and “distances”, parents and teachers should avoid frictions and facilitate the eLearning and exams process.

2.4.2 Process

Processes need to be reviewed in a modern, effective and digital way. Without the implementation of a new process, even the most innovative technology is doomed to fail.

In many companies, the tactics used are of different types. Among the best known, there is the use (for which considerable resources are soften spent in their purchase) of ERP systems: Enterprise Resource Planning. With ERP we refer to those useful and innovative IT systems for business management and planning capable of integrating all the business processes of an organization: administration, accounting, resource procurement, production, logistics, purchasing, sales.

- Obviously, in some cases, and in the HEI in particular, the use of ERP can appear too much, too slow or more complex than the changes to be applied. The most important point is to evaluate the scale, the extensions and how in depth the innovation is impacting the

company/HEI. It is different to introduce the proctoring procedure in online exam in a large HEI (with several departments and laboratories with different needs), for using it on a stable/long period (eventually forever) or for a small-scale case such as for some specific exams, of a given faculty, on the basis of a specific request (e.g., only limited type of online examinations and test) for a time limited period.

- The use of ERP platforms or solutions that should theoretically revolutionize processes is widely used and combined with the analysis of one's LEGACY system. This is the necessary and anyway present feature or component that the company has or perceives as “inherited value from the past”. Its presence dates back to several years prior to the current analysis, which is why it is assumed that every company owns one or that, at least, wants to preserve. In some HEI also some traditional teaching and learning accroach or procedure (middle term test, face-to-face lessons, physical classes, etc.) can be perceived in this way. The term "value inherited from the past" indicates how necessary (even though maybe obsolete) can be perceived the presence of a system which continues to be used because (or only because) the HEI and/or some HEI’s users do not intend or cannot replace it. A legacy system can be then either completely upset, or used and exploited, referring to its "past values" in order to recreate new systems / processes / business management that can improve its integration. This is why, in some cases, to start from the LEGACY version / environment is mandatory for managing the change in order to not have unpleasant impact on the HEI “identity”, brand placement and operating conditions.

2.4.3 Platform

Nowadays it is more and more necessary to introduce digital technologies to support productivity in HEI, even more than in some other companies in general.

- In recent years, we have been witnessing a profound metamorphosis in the way we work and produce and not taking it into account would mean putting a brake on the efficiency dynamics that govern HEI flows. Consequently, to not govern the change of technologies in HEI can cause: failure in updating the learning methods and strategies, a loss of feeling with new generation of students (eventually natively digital) and a loss of the competitiveness with respect other HEI competitors.

- In this perspective, cutting-edge HEI have introduced new technological platforms that combine personal productivity applications (such as for example the classic Microsoft Office suite) with the ability to communicate in a simple and immediate way (as with Skype, Teams, Zoom, Google Meet-Classroom suite, etc.), with the possibility of share data and documents in cloud (GDrive, OneDrive, etc.), with the availability of common access to suite for cloud computing (CoLab, etc.). Through one of these platforms (typically chosen and decided by the HEI as a "place" to take the exam), professors can easily get in touch with the student who can enter in the devoted "virtual classroom" in order to carry out his/her the exam.
- These platforms can also be used outside the office - thanks to the expansion of cloud computing with any mobile device - and this makes us understand even more how much a change management path cannot be separated from introducing collaboration and communication tools into the HEI. The collaboration and communication tools are the keywords to speed up and improve the HEI business mechanisms and teaching/learning process.

In this framework, the platforms mentioned earlier (for e-learning, sharing and co-working) tend to marry with the new frontiers of individual and group work (or study). The adoption of these technologies and platforms leads to numerous advantages, which can be summarized as follows:

- Respect for objectives.
- Respect for deadlines.
- Respect of the budget.
- Increase in return on investment (ROI). Return on Investments is the index of the business economy that aims to maximize the return on the capital invested by a part of an economic unit.

2.4.4 Place

Workplaces in higher education institutions need to be rethought with a view to an activity-based workspace and smart working. This applies to all companies or universities that face the challenge of innovation but it is mandatory for EHI which by definition welcome the new generations and therefore must be updated to the substantial trends of new technologies to avoid appearing Jurassic in the eyes of the students who experience highly technological and updated stimuli every day from all the environments that surround them. Evaluation or learning platforms are a key part of this and

they merge together: workplaces are such, even if online, because a platform has made them so. On that platform the teacher can take exams, question a student, or work together with colleagues, just like in our workplace or physical study.

Physical workplaces represent a value linked to inspiration and the need of people to meet even physically in the HEI, but more and more Institutions are experimenting with smart working, which should not be thought of as an alternative or replacement of the workplace, but as a particular type related to it. Some of the benefits found by HEI that develop and work in smart working are the following,

- Performance optimization.
- Efficiency and savings.
- Worker satisfaction.

That's why activity-based work includes both physical and virtual places, where the challenge of change management finds a perfect synthesis between a culture of change and digital innovation.

2.5 Change management strategies and eLearning

Does so-called change management somehow involve or apply to the management of learning processes and verification of acquired knowledge?

Do the ideas and procedures outlined above, even though quite general, can involve active minds in the study and procedures adopted in universities, schools, training courses, business degrees, managing it in the same way as managing change?

Defining their main characteristics, it is almost obvious to look for an application or use that in real life, every day, can cope with the descriptions written above, and demonstrate the value of our own theses on change management even in higher education institutions.

Perhaps having become necessary - or perhaps even being an absolute necessity -sometimes enables radical change (unforeseen and difficult to implement) that would otherwise be continually procrastinated. In a process of change that is so strongly needed but also radical and perhaps difficult to implement, it is necessary to proceed in stages, gradually approaching the final goal:

- **Define a scenario**: the vision of what is to be undertaken is crucial for good planning, as well as for the proper consolidation of the activities undertaken.

- **Defining our plan must be realistic**: Adoption of changes in the HEI takes time and involves many users (including especially teachers and students), all of whom are social partners who must be concretely trained to carry out their "new" and "innovated" tasks.
- **Implementation** is crucial in the context of change management: It is true that several stakeholders (as mentioned above) do a good job if formally trained, but with the understanding that useful tools need to be provided to consolidate this knowledge.
- **Consolidate**. Consolidation occurs by stabilizing new habits, learning how to manage the most commonly used platforms and with all the related tools, or, by combining the previous three parts into one big training and consolidation effort.

2.6 The Design thinking & the Agile methodologies

The best method to manage the change process in general is the application of *design thinking* managed in an *Agile* way. This is particularly true in the HEI where the “company’s product” is by definition the knowledge that includes: teaching and learning, to carry scientific research and to share and disseminate intellectual results. Even though the knowledge is intrinsically immaterial, the management of change in the processes devoted to learn, generate and share knowledge is based on physical structures and human actors, institutions and dynamics. Therefore, to apply methods developed in industrial framework or in the engineering of systems is also particularly appropriate.

2.6.1 Design thinking

Design thinking is a methodology codified in the early 2000s by Tim Brown, CEO of the Californian Ideo. It is defined as a human-centred approach that draws on the designer's tool-kit to integrate people's needs, the possibilities of technology and the requirements for business success. *Design thinking* is based on the principles of strategic design and therefore aims to find an innovative solution to a problem taking into account the 3 fundamental aspects:

- human,
- technological,
- economic.

The methodology is developed in five iterative phases:

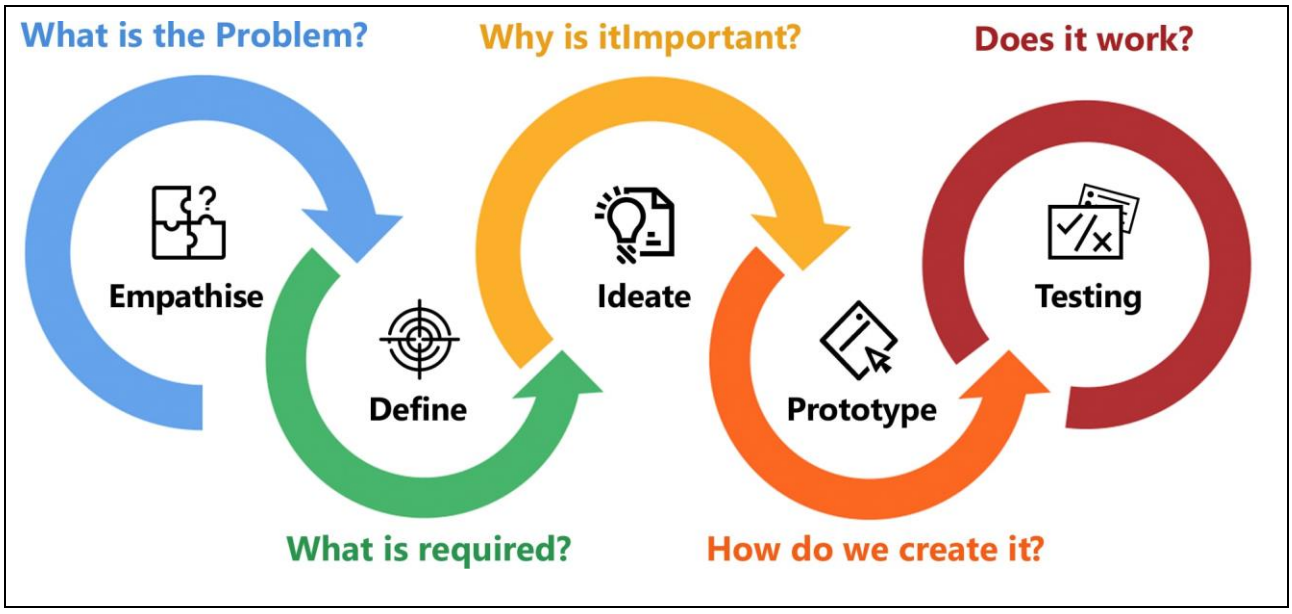
- empathise (understanding),

- exploring,
- define (ideate),
- prototype,
- testing.

A characterizing element of *Design thinking* methodology is the involvement of a multidisciplinary team, to address a particular issue from different points of view. The change process is linked to a process of co-planning the path: only constant and interactive work between the parties (consultant, company team and customer) allows the conception of new ideas and innovations.

2.6.2 The Agile approach

To meet these needs, it is necessary to manage this methodology with an Agile approach. The Agile methodology asks for a close collaboration between developers and product managers aimed at: i) continuously testing the releases; ii) to define of incremental requirements; iii) to have a close interaction with the customers in order to develop valuable products ".



[Source: https://www.mirketa.com]

[https://www.mirketa.com/design-thinking-innovative-approach-towards-product-development/]

So, the Agile method allows a greater reactivity to requests, which must not turn into a condescending attitude, losing sight of the real usefulness of the final product, which is why this

method of working should be integrated within the company and sequential: design thinking helps to conceive, define and empathize an idea. This idea must then be built and progressively improved through Agile.

Defined how to get there, we conclude then, that a winning change management process involves five essential steps:

I. Definition of the strategy for change.
II. Assessment of staff perception of change.
III. Design of functional factors and dynamics capable of involving people.
IV. Implementation and supply of work tools for change.
V. Maximization of the return on investment (ROI)

2.7 The change management cycle

The change management is a circular process including:

- Request for change
- Impact Analysis
- Approve / Deny
- Implement change
- Review / Reporting

Each phase is connected with the previous and the following one and can be interpreted such as a single unit with inputs/outputs, internal check and feedback connections.

For starting a profitable change management, we have to clearly focus what is the kind of change needed? How do we get started? Both are neither rhetorical or obvious questions. Even though apparently clears, the reason and the aim of a change are frequently not known or accepted in depth by all actors of a company, and the HEI are not un exception.

2.7.1 The scale of change

The first actions that should be taken concern understanding the actual extent of the change and how many social units are involved. By observing the types of change, is it possible to have a guideline to give a dimension to the initiative that should be undertaken.

Depending on whether the change is local or large-scale, tactical and strategic changes are distinguished.

- If change management is large-scale, it affects the global organization and strategic changes will be needed at the company level.
- On the other side if a department makes changes to improve customer service, a tactical change can be envisaged that may involve a small number of stakeholders. In this case, change management concerns for example a single HEI department and not the whole organization (although it cannot be excluded that it could have an impact on the entire HEI system). The first step involves a meeting of the project team, which must decide, at a macro-organizational level, where the change is located.

Subsequently the changes will rest on the other areas and all their (and their own) related interconnections will begin.

2.7.2 The actors and the environment

Therefore, once the purpose and objectives of the change management have been defined, it is necessary to evaluate the specifics of the change, which include the evaluation of:

- Leadership support and change alignment.
- Stakeholders and assessment of their level of involvement.
- Internal context of the people involved.
- Readiness for change.
- Business impact.

2.7.3 The leadership

In fact, leadership is the element that makes the difference in the success or failure of projects. It is well known that a good leadership is important in a company as well as in HEI in order to supports change management in general, to explain and to describe the reasons asking for the change and the benefits that it will generate back.

Therefore, leadership that does its job correctly ensures that it:

- Make the vision of change clear, stimulating and shared.
- Communicate rational and compelling reasons for change.
- Motivate people to have an attitude of appreciation.
- Make resources available and eliminate reticence.

- Model new behaviours and new ways of working.

After reflecting on which leaders inside the HEI need to be involved and how ready they are to welcome change, it is necessary to understand how it impacts the organization. With this information, recommendations can be made to reduce the risk of failure.

2.7.4 The readiness

Readiness to change measures the willingness of the individual or group with respect to the willingness to adopt new behaviours and processes. This is an important measure as it does not only concern the introduction of a new system or process, but it involves a cultural and behavioural change of the organization.

Activities that analyse this response to change are designed to:

- **Increase awareness** within the organization of the likely impacts of the change process and how the change should be managed.
- **Identify hidden issues and resistance issues** that require early mitigation.
- **Ensure that key stakeholders support the initiative** and have an interest in doing so, and that they are authorized to make the change.

2.7.5 The actions plan

Another key factor that enables change in organizational design is the planning of the actions necessary to accompany social units through the stages of change. In reality, what is interposed between the very action of "change" and the phases in order to achieve it is a necessary expenditure of money (sometimes very large), aimed at being contained and not extended beyond the pre-established budget. In particular, the predefined ROI objectives are very often not achieved due to non-compliance with the changes implemented in the activity. Large sums of money, as well as energy and time, are often invested in some changes without making sure, for example, that employees and staff have a good understanding of the project. This necessarily leads to problems and inefficiencies and, above all, to possible heavy losses. Change management affects the success rates of change projects and helps to save from the point of view of production and organizational inefficiencies.

2.8 Business Impact Assessment

The objective of the Business Impact Assessment (BIA) is, therefore: i) to identify and analyse the type and degree of change within an organization and the expected impact of this change; ii) to

carry any (but recommended) activities aimed at mitigate possible negative impacts that may fail; iii) to manage the associated risks; iv) to plan the necessary actions to accompany the social partners through the different 5 stages of change.

- Define the essential functions.
- What are the risks based on the priorities chosen by the HEI?
- Define a management manual (possibly paper and shared).
- Prepare the social partners for innovation through training exercises.
- Continuous IT innovation, based on new technologies.

2.9 Implementation costs

In general, the most significant costs for the implementation and management of change management are usually the costs of personnel or support tools. However, other costs may be included, such as the following:

- Cost of personnel who work and constitute a burden of change management, both as an initial cost (such as the cost of hiring), which can also include both data entry and data identification, and operational (salaries, etc.).
- Cost of the premises used for change management, both initial (furniture) and operational (rent, electricity, telephone ...).
- Cost of change management software tools such as purchase of software licenses or assistance costs.
- Cost (very necessary) of the hardware to support this change management, which includes the purchase of the same and its implementation, as well as its operational maintenance.
- Costs of initial training such as advanced courses or similar.
- Costs for external consultancy normally identified as the set-up of processes or as a continuous improvement of existing processes.

Once the main strategies (even “almost “perfect”) of implementation of change management have been defined, it is still possible to incur in failing performances in managing the planned change project.

2.10 Post implementation review

The post implementation review is useful, which includes an assessment of both the real project performance compared to the original/theorical objectives, and the key success factors in order to

identify opportunities for process improvement. The post implementation review is a fundamental element which, if well managed, guarantees the continuous improvement of the results produced by the change management team.

As part of a post implementation review, it is critical to consider a few things:

- Examine the outcome of the transition plan.
- Assess whether critical deadlines have been met.
- Lessons learned: unexpected costs, emerging problems, risk mitigation strategies.
- Feedback from the project team on communication and change management activities.

The level of commitment required in a post implementation review will vary, not only based on the scope of the project itself and based on the impact of the project on the business economy, but also based on "any" similarities of the same to previous initiatives (for example a more detailed review for new types of initiatives), as well as the final gaps between the project objectives and the final results. This last step underpins the change thanks to immediate visibility on all the difficulties that users may encounter in the concrete use of the new work tools. In this way, timely corrective measures can be introduced, capable of consolidating the results achieved and avoiding the risk of failure for the entire process.

2.11 Gamification

An effective, but not obligatory or necessary, tool for evaluating statistics of project success chances in relation to predetermined goals is gamification:

> *"Gamification, thanks to its ability to communicate objectives and provide real-time feedback on employee performance, is a powerful tool for corporate change".*
>
> *[Source: https://www.whappy.it/]*

It is used aiming at the exploitation of gaming machines and mechanics to influence the behaviour of the subjects involved in the change process: these types of mechanics satisfy basic human psychological needs such as the sense of competence, autonomy, progression, ambition and relationship. In fact, the main purpose is to improve user involvement and generate immediate feedback in the communication in order to provide indicators of improvement or otherwise of the user involved in the communication.

Gamification can drive important transformations for employees, whether it's a post-merger cultural shift or a realignment of processes and habits. In all these cases, gamification efforts are centred on adapting to an environment that is constantly changing.

The decision to invest in a new platform or system is usually driven by technology. However, the question of how people will react to this change is often not considered in the whole of the change itself (as such). Although there is a structured process of change, people forget a lot of what they have been taught from the moment the system is implemented. In this case, gamification can motivate people to carry out new activities continuously in order to guarantee a deeper learning between the different parties and the different skills of each.

Solutions that adopt gamification have proven to be a more efficient option than traditional systems, thanks to their high rates of engagement and retention of the content learned. Here are some of the most obvious advantages found:

- Playful representation of a concrete task to be performed.
- Involvement of employees in the learning process.
- Immediate feedback on the learned content.
- It has a considerable power on the consolidation of the knowledge acquired over time.

2.12 Summary of a change management process

Change management has as its very basis the change EVEN of the individual parts: users, processes, management of the same, places, costs ... Stimulating an organization to change behaviour requires a well-planned and organized process:

I. Define the change and create a strategy.
II. Evaluate how people perceive this change.
III. Guarantee an engaging and stimulating Design.
IV. Implement and guarantee users the tools and skills to be able to implement change successfully.
V. Incorporate and maximize "ROI".
VI. Adopt different tools capable of being able to "facilitate" the implementation of your change process: such as for example communications tools, gamification (possibly), capable users, responsibility in virtual and non-virtual places, etc.

3 Flow-diagrams

3.1 Change management flow-diagram

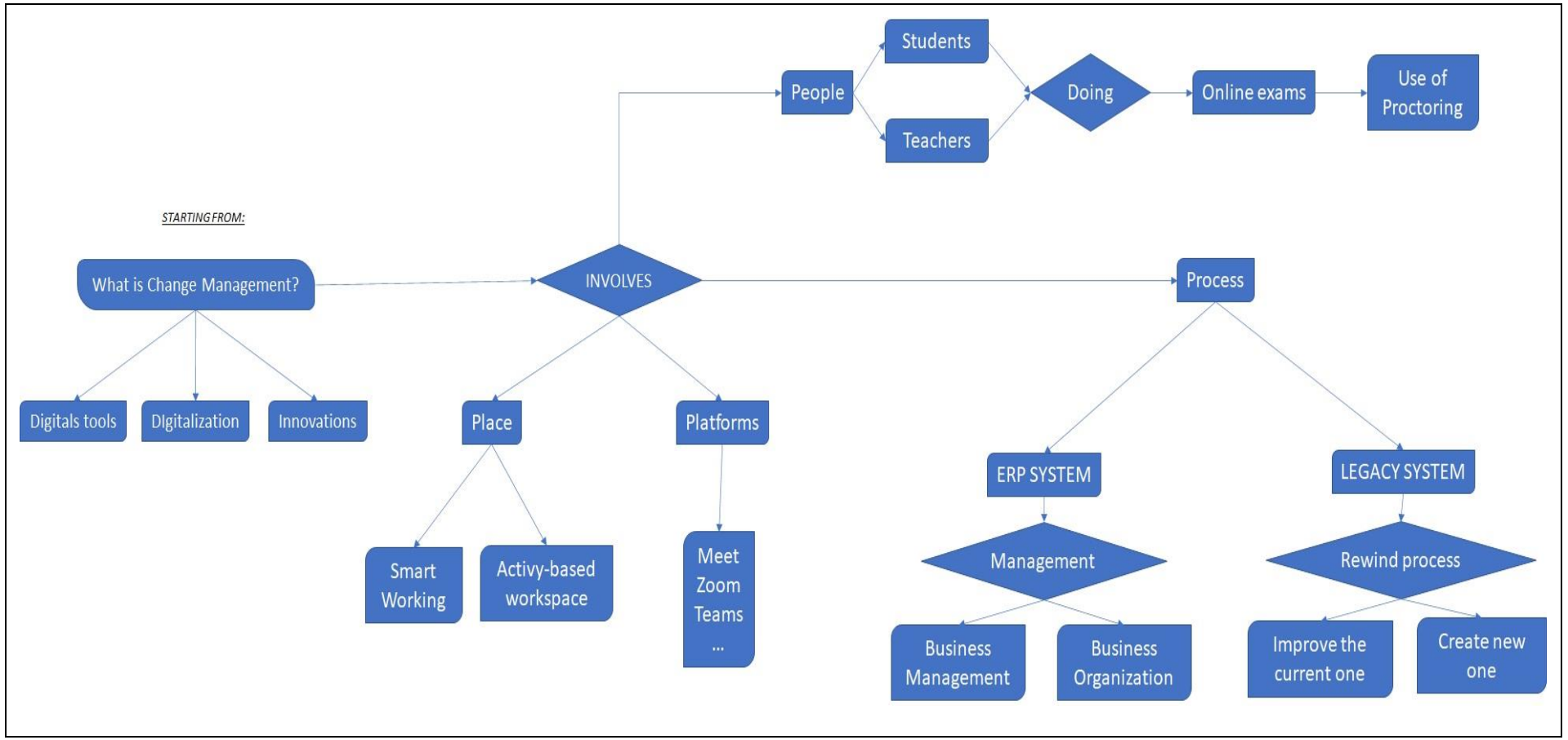


Figure 1

Having defined what change management is and its main characteristics and tools, it involves People (the most important of the 4 entities involved), Processes, Platforms, and Places. The scale of processes is important for the HEI: is it necessary to integrate an ERP system for the management of our business, or is it more convenient to look at the processes with a view to exploiting the Legacy system? The entities involved in the Online Exams

system are the professors and students. Once the operating platforms (which we have listed), and the workplaces (including smart-working) have been decided, the HEI will be faced with a choice, that is to acquire or not the Proctoring SW.

3.2 Online exam flow-diagram

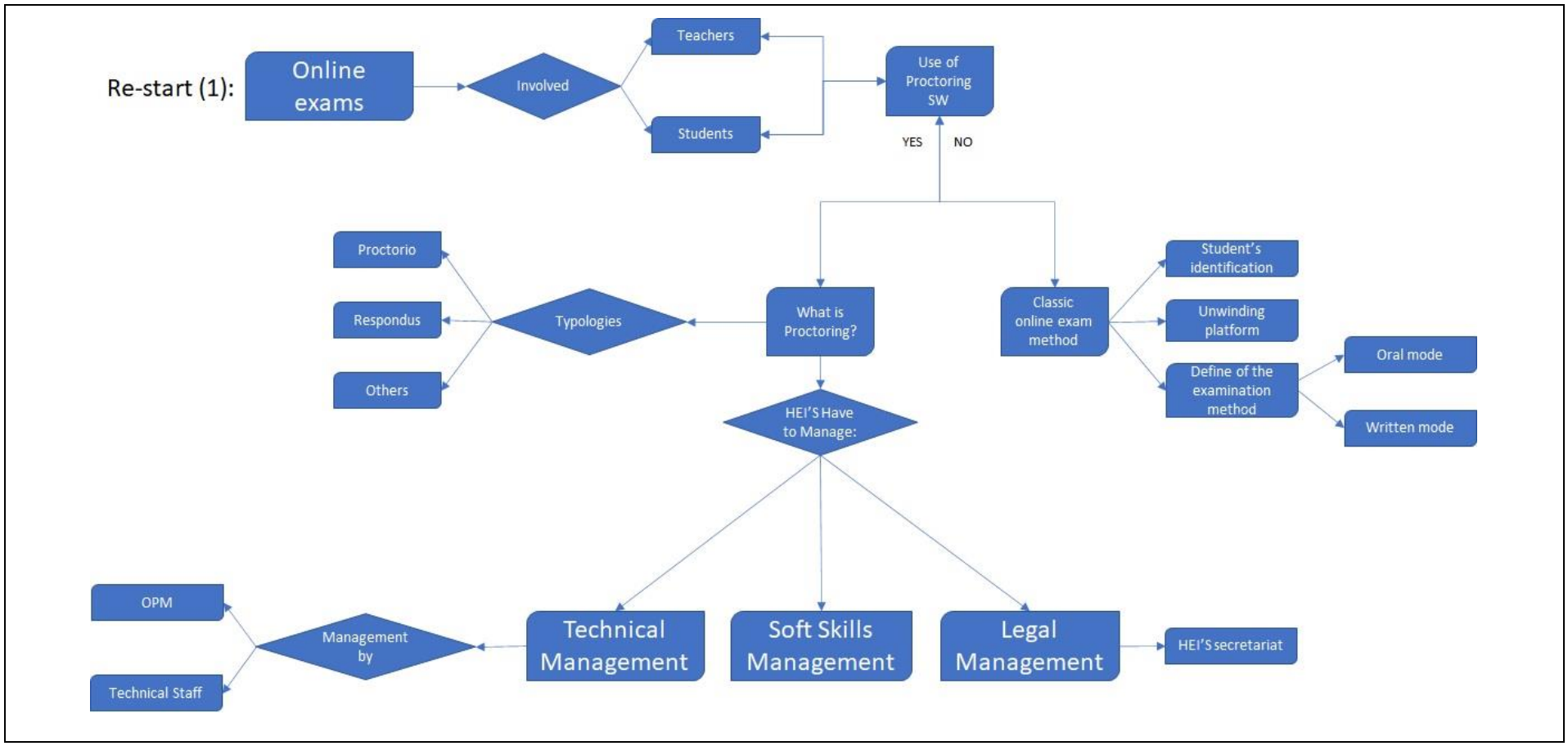


Figure 2

In choosing the type of online exam, students and professors are involved who, based on the choices defined by the HEI, will be able to take the exams in classic online form (including student identification, choice of platform and type of exam, or if written or oral), or with the "help" of proctoring. There are different types according to your needs, of which the best known is Proctorio.

3.3 Management flow-diagram

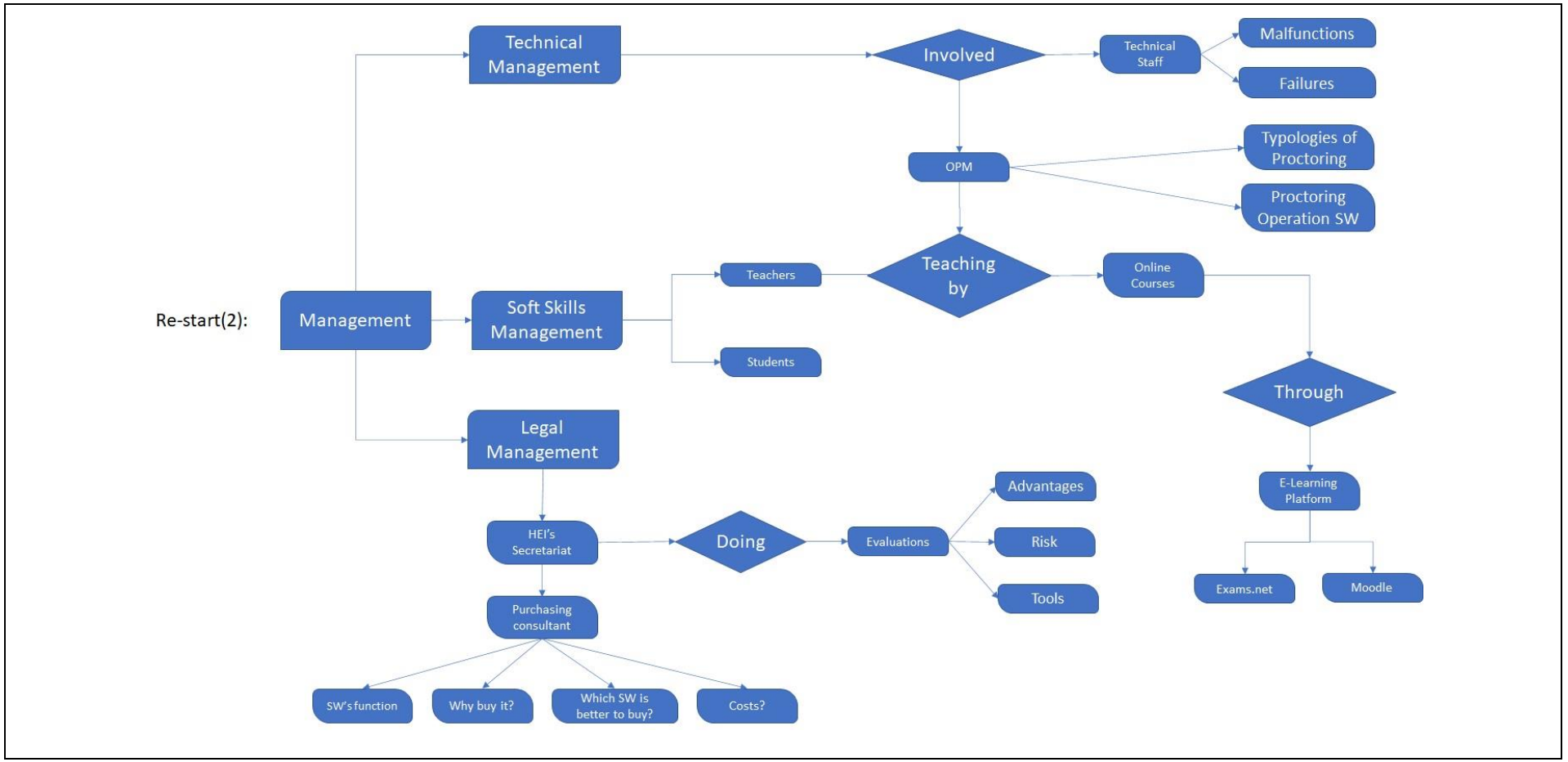


Figure 3

Several entities are involved in the change management related to the adoption of proctoring in HEI, of which the most important are: Teachers, Technical staff and OPM. The first side of this management "pyramid" is the legal management: the HEI secretariat will have the possibility, given the desire, to purchase the proctoring software: the secretariat will contact a SW consultant who will describe the most important functions, costs, and your possible reasons for buying it or not. The secretariat, following, will make its own assessments: advantages, risks, implementation tools, etc. In the technical management, the technical staff will deal with any malfunctions or breakdowns. The most important figures remain the OPM and teachers. Both will be trained through certain e-learning platforms with courses in order to learn the use of the platform. Professors will learn how to use it, handle it and "manage" it for the duration of the exam. Instead, the OPM will know specifically (for all types of proctoring) how each single component of the SW works: in fact, the online proctoring manager is a figure responsible for the functioning and knowledge of proctoring.

4 Appendix: A survey of proctoring in HEI by comparing benefits, limits & opinions

What has been the impact of the pandemic on schools and pupils? On HEI students and their teachers? Or, more generally, we can ask whether the adoption of eLearning and online exams has improved or worsened the educational offerings of HEIs. These are few of the recurrent questions raised by people involved in managing HEI proctoring. In the following sections we provide some discussions about these and other open questions in order to summarize the debate about the proctoring. The aim of this chapter is not to provide well assessed claims about the main benefits, limits and features of proctoring, but only to inform the reader about the variety of issues related to proctoring that ask for a conscious change management from teachers to students, from administration to OPM.

4.1.1 The impact of pandemic on the HEI

Even though scientific studies are needed and the only ones available are mainly (and only) survey internal to HEI, the common perception is that the impact of eLearning in the universities was less problematic than in lower school levels. The universities are already aware that the pandemic emergency, for better or for worse, has represented an important and useful lesson. Indeed, it is inevitable to think of the possibility, in this way, that the lessons delivered at a distance can be easily recorded, or that the university material or the lesson itself can also be used asynchronously. Many teachers have begun to "exploit" distance learning in a more active, capable and effective way, enriching it with many interactions. These elements were strongly appreciated by the students, and most of the time perceived not as simple substitutes for classic face-to-face teaching, but also as improvements compared to now.

4.1.2 Better or worse marks in online exams?

Therefore, the coronavirus emergency has forced all parties, both students and teachers, to make a virtue of necessity, experimenting with new solutions in order not to interrupt the teaching in progress. There is a lot of data collected during the extraordinary appeals held in the bloody months of the lockdown (March-April 2020), in which a lower number of students usually participate than in ordinary sessions. In reality, conflicting opinions have been received.

> *"From the student representatives we register some complaints about the risk that, in the case of online exams, the mark is lower than those carried out in the classroom. On the other*

hand, however, we have also received reports that show how, in some cases, the exams are going better than they did previously".

[Tiziana Pascucci, Vice Rector for the quality of teaching and the right to study at the Sapienza University of Rome, in an interview with AGI - https://www.corrierepl.it/]

In fact, it must be borne in mind that, in these months of lockdown, the students had been supplied with materials that were not made available in the case of classroom lessons: such as the recordings of the courses that can be enjoyed in subsequent moments, or additional explanations. All this support material remains available to the student, who is thus enabled to prepare very well for the exam.

"I don't find that there is a different level of difficulty, because the methods have remained similar: those used to cross-check exams with multiple choice or multiple choice, for example, continued to propose tests in the same way. At the beginning, when we started talking about remote written exams, there was agitation mainly due to the fear of not having the availability of suitable tools and devices to take exams in a virtual way, for example a sufficiently new computer on which make the platform work. [...] From the teachers' side, we noticed that online exams are a great source of stress: the reason is the fear that something could go wrong, for example that the internet connection might be skipped ".

[End of article: Tiziana Pascucci, Vice Rector for the quality of teaching and the right to study at the Sapienza University of Rome, in an interview with AGI - https://www.corrierepl.it/]

4.1.3 The risk of cheating

In fact, in the case of oral exams, where the student interfaces more than directly with the teacher who will examine him, students are asked to use two screens and as many video cameras: the webcam of the computer on which to carry out the test and a second device, for example a smartphone, which frames the environment around the student, or the sheet on which to write the exam text. In reality, the real purpose is to ensure that you do not have any material not allowed during the exam: not allowed notes, tablets, phones, or someone who advises to carry out the test. The case of writings is different: pen and paper, the only tool necessary for the student to carry out his exam and, as an objective, always ensure that the test takes place in the conditions of greatest correctness possible for both parties.

Among the many knots that have come to a head regarding online teaching, there was certainly also the difficulty of expressing an evaluation on the preparation of the students: The problem is the risk of any copying or even personal mistake! With the massive spread of distance learning, the need arose to identify new ways to test the actual performance of students.

In this context and with these ambitions, it immediately seemed of primary importance to ensure that remote tests do not turn into suitable systems to encourage fraud, rather than to verify the actual skills and competences of candidates.

> *"I am convinced that, as much as we teachers try to understand how not to make students copy in distance learning or during the online exam, we can do it anyway: I put my heart in peace, it is impossible to avoid it".*
>
> *[Source: https://www.ilpost.it/2021/03/15/impedire-agli-studenti-di-copiare-in-dad-e-unimpresa-disperata/]*

How can you and how should you evaluate the students taking into account the possibility that they copy in the tests and that they suggest each other with messages, in chat or in presence?

So, from the genuine connection problems of the students to the more or less astute attempts to keep notes, or even a prompter, on hand, the casuistry is very varied. In times of pandemic, even in the Public Administration sector, it was decided to operate the selective tests of public competitions in "remote" mode, so that it was not only possible to preserve the health of the candidates, but also to guarantee greater speed and "serenity" in the selection process, but also to allow both candidates and the PA a certain economic saving (no more costs for travel and overnight stays at the exam sites, as well as potential savings from an organizational point of view for the preparation of physical spaces designed to host the tests).

4.1.4 The proctoring procedure

It was only a matter of time before someone proposed digital solutions to verify the good faith of the test takers, in their different places of interest (school, university, competitions, etc.). It is called *proctoring*, and consists in supervising the correct execution of the exam, starting from the identification of the interlocutor, through the implementation of this same methodology.

"The Online Proctored Exam" is, in fact, the examination method characterized by the supervision of an examiner called "Proctor", whose role is to monitor the progress of the examination and its process. For this a structure has been regulated. Several tools are available. Proctoring is a range of

tools, based on artificial intelligence, which acquire a set of data of the device used to carry out the test and whose most widespread and used programs are “Proctorio” and “Respondus”.

> For "Respondus", for example (even if the proctoring SWs are very similar to each other for their application) it happens that a few days before the exam, the student must download "LockDown Browser" on their PC. Later, on the day of the exam, he / she must connect to the university's “online exams “page and, before starting the actual exam, he / she must "launch" LockDown Browser. Once this is done, you will finally be able to open the test but, before starting, you will need to follow a series of instructions: audio and video checks are made and you are asked to show an identification document. Finally, the student can easily begin his exam. The collected data is processed by an algorithm that decides whether the student is copying or not, if he is receiving a suggestion, if he is in company and not alone, so that the teacher can examine it in full transparency.

4.1.5 Diffusion of proctoring and related protests

In many European countries, the use of these systems is rapidly developing. However, at least for some students but also teachers, the proctoring, the use of the SW, is not as efficient as it promised to be. The reports are not always exact and teachers are often forced to ignore most of the signals. In some case, the proctoring system asks for a very stable connection. This means that many students would have difficulty taking exams due to unavailability of material.

In some cases, the student organizations tried to propose amendments to the regulation of online exams, starting a protest, occupying the rectorate for eight days and chaining themselves at the entrance of Politecnico di Torino.

With regard to body movements, in proctoring SW, maximum attention is paid to the gaze, which if moved for several seconds in a different direction from the front of the screen and if lowered for a few seconds and held for a long time, leads to the appearance of the warning on the screen. (In addition to this, the proctoring software records all the activity of the student's mouse or touchpad, keyboard and screen by examining)

This warning, which also appears quite frequently in the case of completely innocent movements, such as bending over to write on a sheet of bad calculations or other, led to two different reactions on the part of the teachers. The final choice, in general, is therefore made by the teacher and not by the software, but some have decided to ignore most of the warnings, if not the most striking

ones, allowing you to write on bad sheets where necessary, while others have decided to a more rigid way, directly removing the possibility of using sheets, at times with a clear penalty for students if they realize it thanks to the software.

4.1.6 The Proctoring SW, which does not need to be installed on PC

The Proctoring SW, which does not need to be installed on your desktop or laptop computer, works in parallel with the platform chosen for online teaching, from Zoom to Google Meet, Microsoft Teams, and is paid according to the minutes. There are two ways for application:

1. *Lessons:* it should help to maintain control of the class during online lessons or during the exam session, checking in real time if students are distracted or if there has been a change of person (unfortunately often frequent), and this represents a strong foundation of integrity, as it represents an important index of prestige. For this reason, managers, teachers and trainers must do their best to promote it and to ensure fairness and correctness in their assessments during exams and beyond: with an entire generation of students forced to continue their studies in e-learning mode online, assessments are taking place in a completely different way, namely, as online exams. It is therefore absolutely necessary, in order to face the training challenges that this period has imposed on us, to equip ourselves with the right digital tools for simple and reliable exam monitoring.

2. *Exams:* indicates whether during an online exam the students are cheating: the technology would make it possible to detect, for example, the presence of a prompter near the student, but also the position of the head and the trajectory of one's gaze, evident "symptoms" of the possible presence of hidden notes. Under still possible changes, before the actual launch on the Proctoring platform, there would be the possibility of identifying the use of headphones, smartphones or prompts not framed by the webcam, through the recognition of the tone of voice of those who are whispering. With regard to the "Exams" methodology, T. Pascucci resumes:

   “It’s intuitive and minimally invasive, and everyone, both students and teachers, recognized its ease of use. "Exam.net", then, provides a useful tool: every time a student leaves the work screen, a warning is sent to the teacher. The goal is to ensure that the test takes place in the conditions of greatest fairness possible in respect of the work of the various teachers involved in the exam session “.

[Tiziana Pascucci, Vice Rector for the quality of teaching and the right to study at the Sapienza University of Rome continues, in an interview with AGI https://www.corrierepl.it/]

4.1.7 Evaluating the multiple impacts of proctoring

And therefore, proctoring was created to prevent students from cheating or cheating during exams, but two fundamental aspects must be taken account.

- **The impact on organization, process and student context of the use of proctoring systems.**
  Given that technology does not stop and is very mature in this field, it is advisable to set rules to govern change, especially on the teacher side. Changing a procedure usually also requires changing the rules that guarantee its correct development and legitimate.
  For example, in relation to the fact that these systems record the (alleged) anomalies in the behaviour of the student during the exam and report it to the teacher, at the end of the test, in detail, in the form of a report. It does not mean, however, that it must always be something wrong, because a student can find his concentration by staring at nothing, or at a corner of the room, without this implying that he is drawing on hidden sources to copy the right answers, or seeking advice from someone in presence with him in the room.
  So: one thing is to catch the student "live", but practically no teacher would ever take the responsibility of penalizing an exam through a report read much later (thanks to the report), when it is now, among other things, impossible to show any proof or any change of vote.
- **The security of personal data and privacy.**
  In fact, for all that has been said, the question arises: what is more important? That a student does not use a note during an exam, copy and cheat, or preserve the security and integrity of the same as well as sensitive data? In fact, beyond the strictly functional defects of these proctoring systems, the main problems to be considered concern the processing of data, the privacy and security of those involved. Seen on the surface, the question may not arouse suspicion, but if we go deeper, some doubts come to the surface: Webcam, screen, microphone and browser of the user under control, facial recognition, eye tracking ... and with regard to these factors, the SW could "decide" and be able to distinguish those who behave well from those who are less diligent.
  And that's not all, because in some cases the control is visual, over the entire room of the person being examined, in addition to the collection of data related to the browsing history, the recording of keystrokes and mouse clicks, etc.

In a nutshell, on the one hand we strive to find ways to improve our online privacy and security, and on the other hand we create software and contribute to the spread of behaviours that contribute to putting them at risk. There are many associations concerned with these control systems that are moving to clarify, and more and more petitions from students and professors from all over the world (including the famous ban e-proctoring), to put a stop to their use.

Currently, in the United States only, there are at least fifty universities that use and intend to continue using these systems, but sometimes encountering problems related to their functioning, and the manifest opposition of a considerable number of students.

4.1.8 A difficult equilibrium between privacy and academic honesty

Although the managers of the main proctoring software, claim to respect all privacy regulations, the question of data processing is not entirely transparent. For example, "Proctorio" is one of the most used systems and should presumably be one of the safer. However, the exact place where the servers containing the data are located is not specified on the official website. Precisely for this reason, to date the possibility of using proctoring systems for public competitions has been considered prohibited, as the related processing of personal data could not - at present - be considered lawful. The Guarantor, however, does not exclude those proctoring systems may in the future be used by the PA for public competitions, provided that the Parliament regulates their application, with which it is intended to encourage a legislative provision (even generic) that authorizes the use of these systems but with a very specific discipline that can in some way balance protection and non-corruption of data and the guarantee of correct performance of these competition tests.

In fact, the data collected by the proctoring software are transferred to foreign companies which must therefore comply with the GDPR (General Data Protection Regulation, EU regulation no. 2016/679 on Privacy and Right to be forgotten).

Despite this, schools and universities are responsible for the choice of systems, therefore any penalties for violations are entirely their responsibility and unfortunately, it has happened that data security has been affected. On July 27 the ProctorU company declared that it had suffered a loss of confidentiality of approximately 444,000 records. During the attack, the cybercriminals acquired biometric data, images and videos of the rooms, voices, as well as physical assertions from the users involved.

Although some scattered cases of crime related to strong attacks on cyber security, the product created is thought to be simple and easily applicable, but at the same time very powerful because it still implements an innovative technology by introducing the constant detection of the mood and emotions of the student during the exam, as well as suspicious movements. All this without forgetting to create, at the base, a "GDPR compliant" solution and therefore able to guarantee (at least in most cases) full respect for the privacy of students, aware that in any case, the problem linked to cyber security is very difficult to mitigate and combat. The founder Stefano Bargagni explained:

> *"Not only that: the technology underlying the web app, based on neural networks, would continue to "learn" over time, thanks to the amount of data analysed with machine learning. All in compliance with the GDPR, since the data are not saved locally and not even on the server; instead, a frame is taken from the video stream and inserted into RAM, the volatile memory par excellence, to be analysed by the algorithms that obtain anonymous data on movement, emotions, age and gender ".*
>
> *[Source: https://www.hdblog.it/mobile/articoli/]*

It is likely that the dispute between privacy and academic honesty will reopen in the future. The concept of privacy is in fact increasingly fundamental and it seems absurd that it can be questioned by the systems adopted by universities, even if they are valid and certified systems that allow to both parties, and in particular to the teachers, to carry out university exams from session to session in full transparency and serenity. And not only that, it has also been noted that they greatly reduce "judgment" times since, in full fidelity to the performance of a written task, or to the answer to an oral question, the proctoring software greatly reduces the time by putting light any "regrets".

4.1.9 The psychological impact of proctoring: the debate is open

However, with regard to other interviews with university students, problems have emerged relating to the great psychological impact deriving from their implementation: can universities and schools really force students to use proctoring software? The question is legitimate considering that they certainly need the consent of both in order to function. But can this consent be said to be free? In the opinion of whoever writes the answer, i.e., the students interviewed, for most of them it is negative because, if the student denies the use of such a system, he would not be able in any case to access the exam and, therefore, the consent is to be considered absolutely forced and

consequently not in line with the provisions of the GDPR. Regarding this, Francesco, a Business Administration and Management student at *Cà Foscari* in Venice, speaks:

> *"To me, on the other hand, the Proctorio system brings us back to the "Big Brother" of George Orwell's 1984 novel ..., how is it possible that such a delicate activity as a university exam has been entrusted to a machine? Can a machine really determine if the student is copying or if he has hidden a prompter under his desk? ".*
>
> *[Source: https://laboratoriaperti.netsons.org/vita-da-studente/proctorio-il-software-che-spia-gli-esami-di-francesco/873/]*

Francesco therefore confirms that the inconvenience for him and certainly other comrades is quite considerable and even, he says that many of his comrades have been blocked by the system only for having moved more than they should. So, if pre-exam anxiety is already part of each student's study path, today with Proctorio (or in general the acquired proctoring type SW), the situation is greatly amplified.

4.1.10 Possible biases in proctoring software

However, there are other problems deriving from the software itself and from the possibility that it is affected by "bias", deviations that lead to illogical and, in some cases, unethical results. According to a study by a student and researcher of an American university:

> *"One of the software used by many educational institutions uses a face detection algorithm which, however, can be a significant problem, since some disabilities could be incompatible with the way in which the algorithm profiles the behaviour of students, who could be "defined" as suspicious or even cheaters, due to their personal characteristics relating to their disability. […]. Furthermore, the algorithm has a hard time recognizing people's faces, even more so when they are coloured, with a frequency of over 50% of cases ".*
>
> *[Source: Vcube - The Spyware (will?) Defeat Proctoring: https://www.vcube.it/e-proctoring-sotto-esame/]*

In fact, it emerged from a Venture Beat survey that these artificial intelligence systems do not work properly when used by black women.

For this reason, Kiana Caton, a California student engaged in the Bar exam, is forced to use very bright lights during rehearsals in order to make her skin appear lighter in order to avoid the bias of the proctoring system.

This is something that actually has a bit of the absurdity. Why would a black boy or girl have to undergo such mortifying tricks in order to take an exam?

> *"Given the invasive and discriminatory nature of facial recognition technology, the proposed use of software that collects biometric data for the administration of the bar examination would be antithetical to the State Bar's mission of protecting the public and increasing access and inclusion in the legal system".*
>
> *[Source: https://venturebeat.com/2020/09/29/examsofts-remote-bar-exam-sparks-privacy-and-facial-recognition-concerns/]*

In short, once again, the impression is that the technological-information solution has prevailed, creating unacceptable distortions: Proctoring was created to prevent students from cheating or cheating during exams, or from putting the teacher in difficulty in expressing the own evaluation. But can this purpose justify invasive data processing (as described above), risk of data loss, consent obligations and, last but not least, a humiliation like the one suffered by Kiana Caton?

The answer in the opinion of the writer is clearly no. Only the future will allow us to understand if a balance between the different needs to be preserved exists and is within reach.

4.1.11 The difficult task in managing copying and cheating

The student, regardless of the application or not of the service offered by the proctoring SW, will be able to understand how unusual and senseless it is to copy, "cheat" or listen to suggestions: the exams are such because they represent and express, in this regard to a vote expressed and then definitively decided by the teacher, our awareness and knowledge with respect to a given topic relating to that exam (Contemporary history, Physics I-II, Financial Mathematics, etc.).

At the same time, for the few who are unable to take the exams in a "clean" and transparent way, the proctoring SW turns out to be an excellent stratagem for the teachers, who can thus express their votes in complete tranquillity and sincerity or correction against students, with the help of this "bluff" reception system.

In the meantime, however, attention will be needed, because the technologies are available to everyone, not only the controllers, but also the controlled ones. Some students may very soon find a way to bypass technology controls. And at that point what can be done?

> "In fact, as soon as the "Exams.net" solution (described above) became a popular means of proctoring, the Internet resources presented many topics for enthusiasts, who are looking

for various ways for this session monitoring system exam (clearly in great favour of the teachers) ".

We could print a photo of the face and hold it in front of the webcam while looking for an answer on the phone; Use a second monitor? Or a virtual machine to view another user? We could record the video in advance (in loop) starting from the identification of the user.

The rules indicate that it is necessary to demonstrate a 360-degree overview of the room before the start of the exam: does this mean that it is possible to put a smartphone in a notebook on the keyboard of the laptop? Or, will it be possible to stick a note directly on the screen?

Ultimately, in the context of change management, this type of synchronized and decisive control would have or perhaps have (although not much used yet) led to sudden changes in the university-school life of both parties.

Both teachers and students, are involved in a system that is still not very well known and clear, with many ambiguous facets related to the control of privacy, documents, establishment and installation of the same, which produce not too positive feedback (although not always) towards both of students and teachers, engaged in their work to face not only new technologies but a very demanding and complex "psychological" technology to manage.

Therefore, the software used to check the regularity of students' work does not yet seem to be up to par on several fronts: they prove to be invasive towards the privacy of students, they can accentuate the existing inequalities in educational results, and they prove that they cannot yet completely match the control that schools are used to imposing during the exam, as well as challenging for teachers.

Educational institutions will have to adapt to distance learning, understanding how to evaluate students' learning in a fair, equitable and respectful way of the privacy and safety of students, and teachers are involved in this process who must also protect themselves from the point of view. in view of the "cheating" and ensure to evaluate the student in a transparent way (and certainly proctoring helps the teacher a lot on this side), but you will still have to accept and be (above all) aware that you do not have complete control of the environment of a student connected remotely, and perhaps in reality, according to the teachers themselves: "we shouldn't get to impose it, and neither humanly want it"