Universitat Oberta de Catalunya

TeSLA / Val-id

Verificación de la identidad del estudiante en el proceso de evaluación en un entorno on-line

uoc.edu

Valladolid, 9 de mayo de 2018

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Agenda

1.- **Introduction: Background**

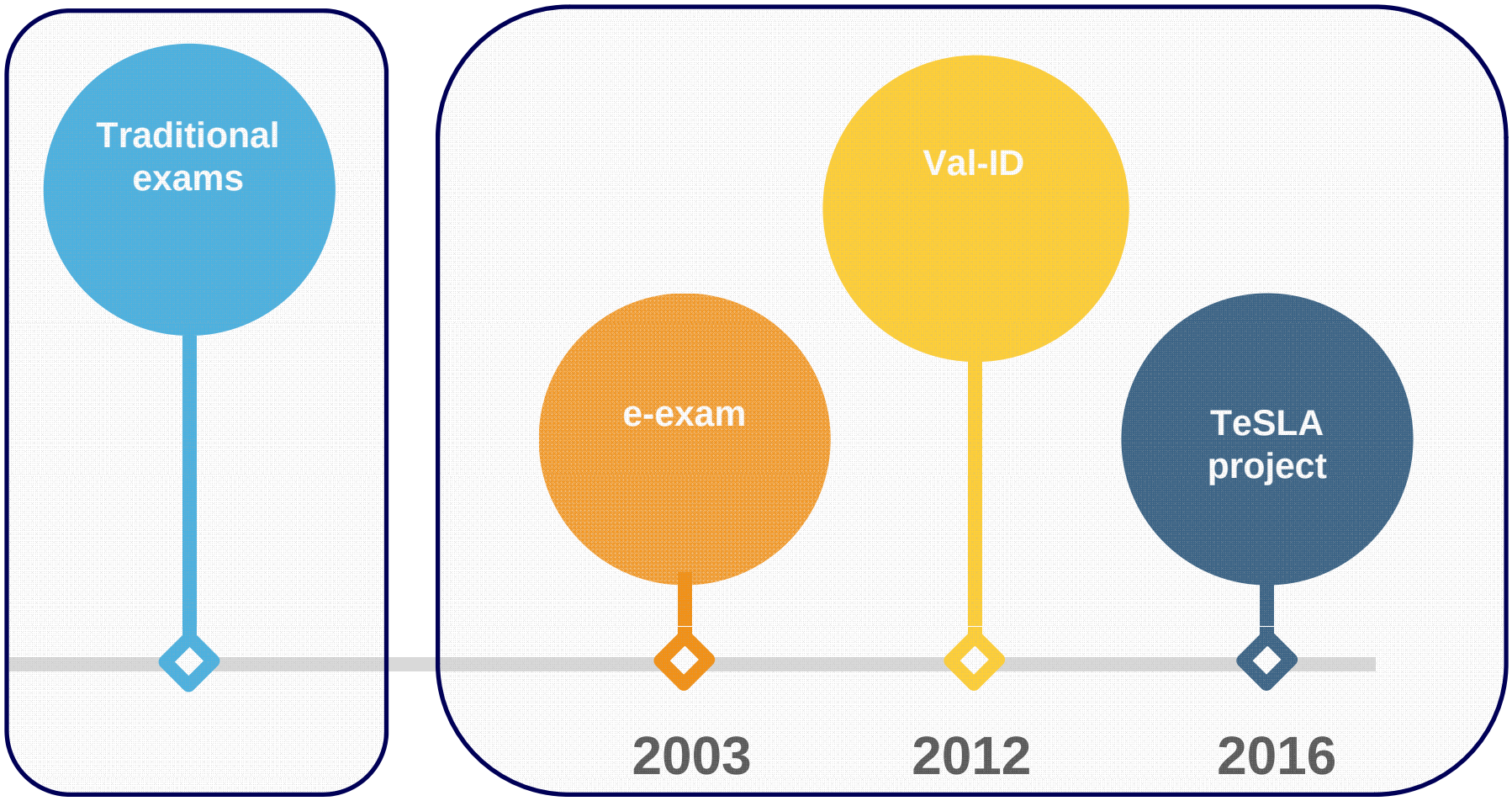
- 1.1 Background: traditional F2F exam
- 1.2 Background: e-exam, internal pilots & prototype (UOC case)
- 1.3 Background: Val-id & TeSLA

2.-**TeSLA: H2020 project**

- 2.1 Features of the call, consortium and Impact
- 2.2 Concept and objectives
- 2.3 Pilots scheme
- 2.4 The TeSLA system: Architecture Overview
- 2.5 Demo

3.- **Val-id: UOC+Smowl system**

1.- Introduction: Background



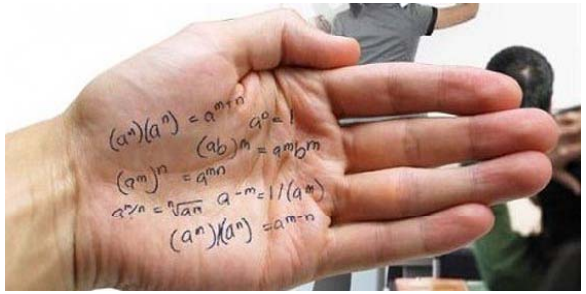
1.1 Background: traditional F2F exam

Background: traditional exam – 1 [crime_scene]

Background: traditional exam - 2 [trad_copy]

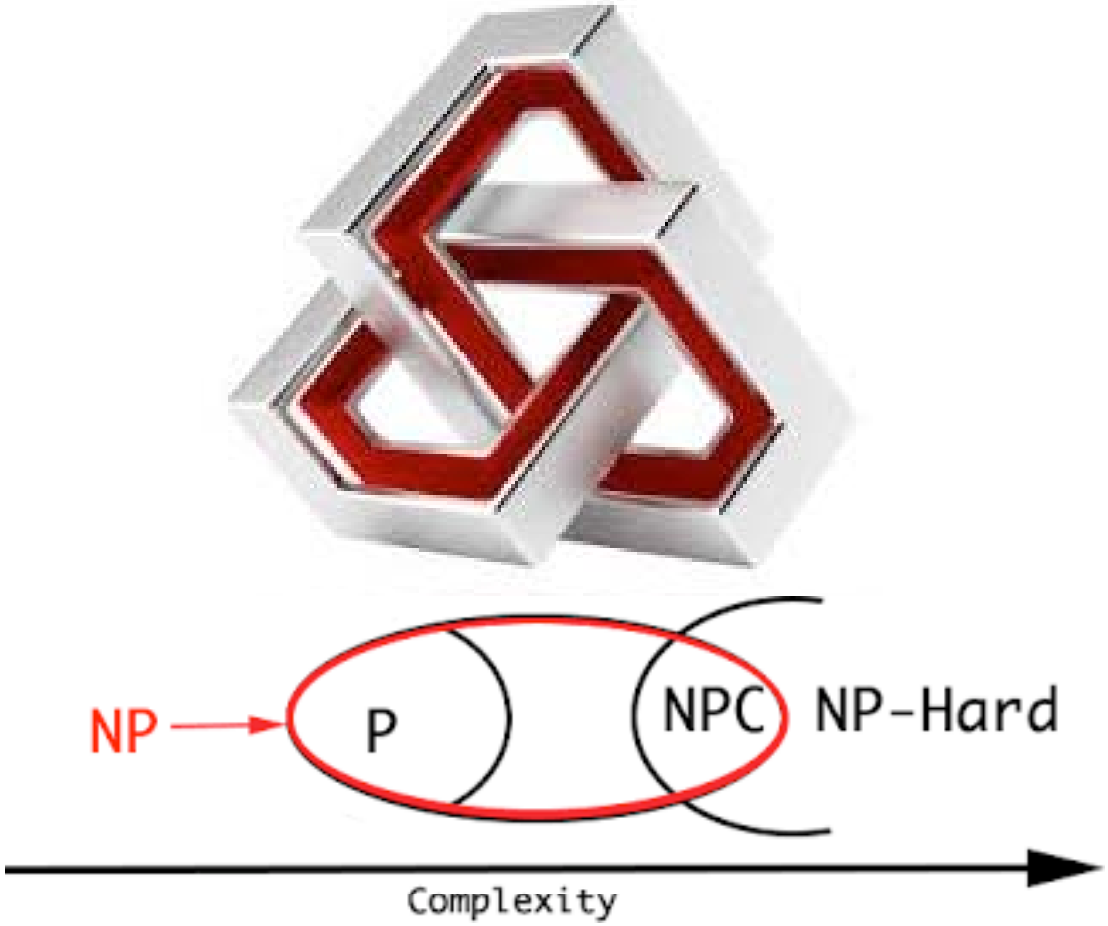
Background: traditional exam - 3 [solution_1]

Background: traditional exam - 4 [unlimited_imagination]



Background: traditional exam - 5 [the_solution!]

Background: traditional exam - 6 [NP-Complete]

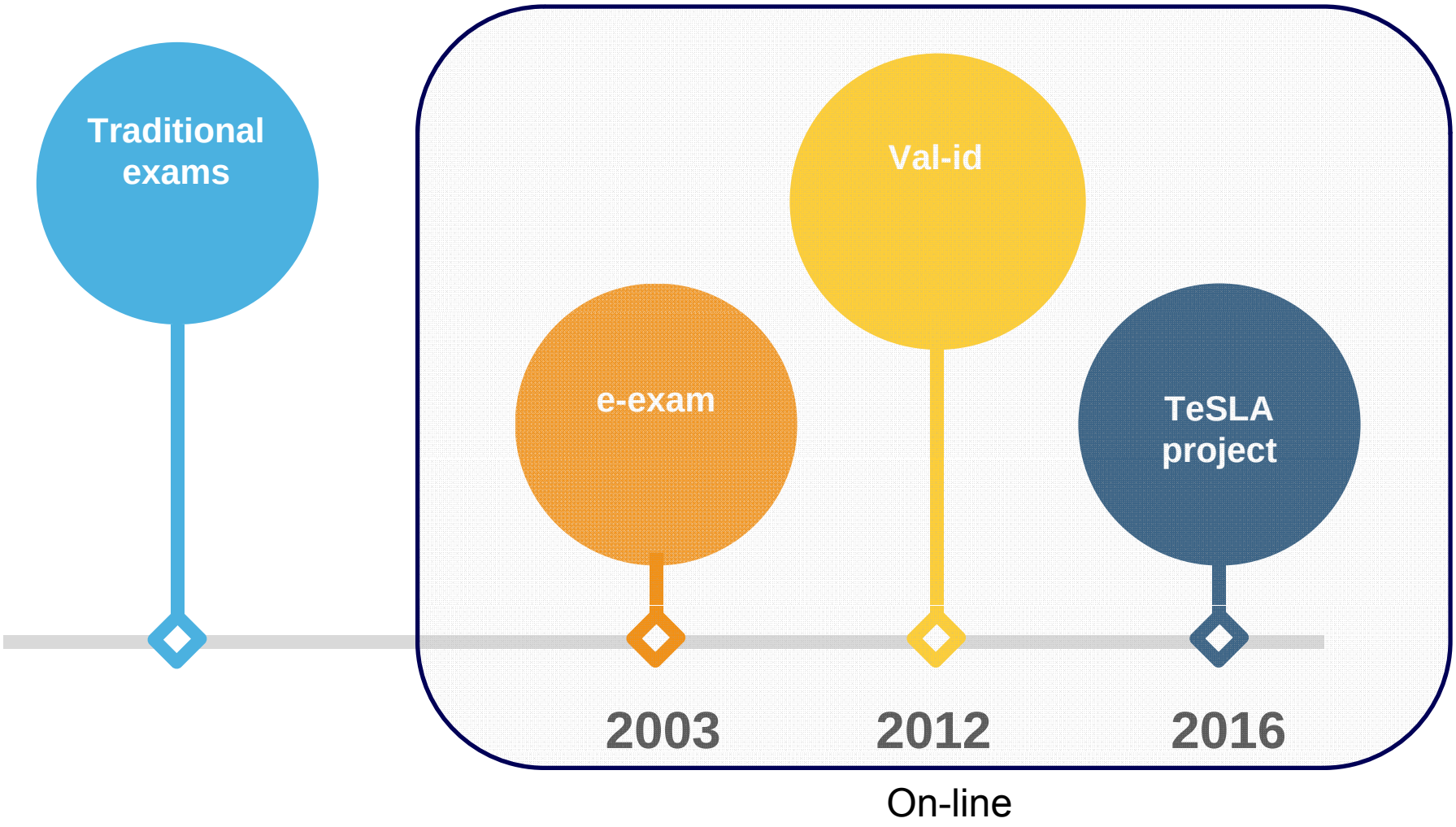


1.2 Background: e-exam & internal pilots & prototype (UOC case)

Background: To on-line scenarios

- **Mobility of teachers and learners** is increasing
- As a **online/distance university** we consider the **e-assessment process** as a key element in learning process.
- **Activities** are the core **for achieving competences** (cross curricula or specific competences).
- **Technology** has to improve and to **facilitate how can we teach and how can students learn.**
- **Authorship and student identity** is behind the teaching and learning process.

Background

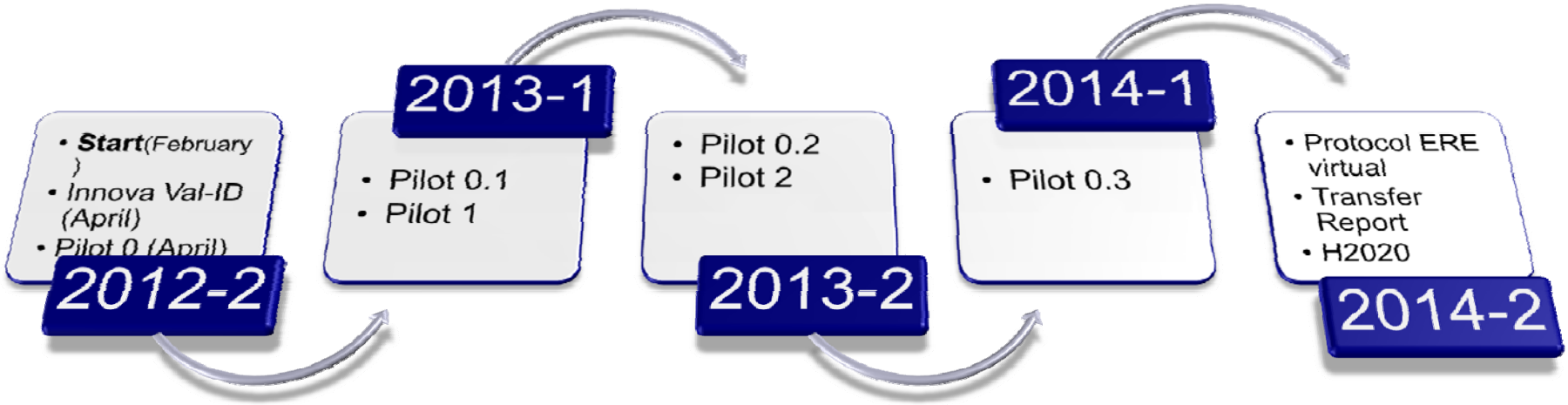

Traditional exams
e-exam
Val-id
TeSLA project
2003
2012
2016
On-line

Background: e-exam – 1 (2003)

- Autentificación
- Veracidad y integridad
- Confidencialidad
- No-copia:
- libros
- espectador experto
- ordenador limpio
- comunicación vía radio

Background: internal pilots & prototype (UOC case)

UOC-Val-ID project: Evolution



Background: internal pilots & prototype (UOC case)

Pilot 2: March 2014- June 2014
Goal: to test the same methods and techniques in other subjects and introduce a prototype for final exams

350 students from 11 subjects (degrees and master level, language school)

Continuous Assessment Activities:

Image and video in activities
Synchronous interviews
Plagiarism tools
Peer reviews on collaborative works
Trust level by teachers feedback

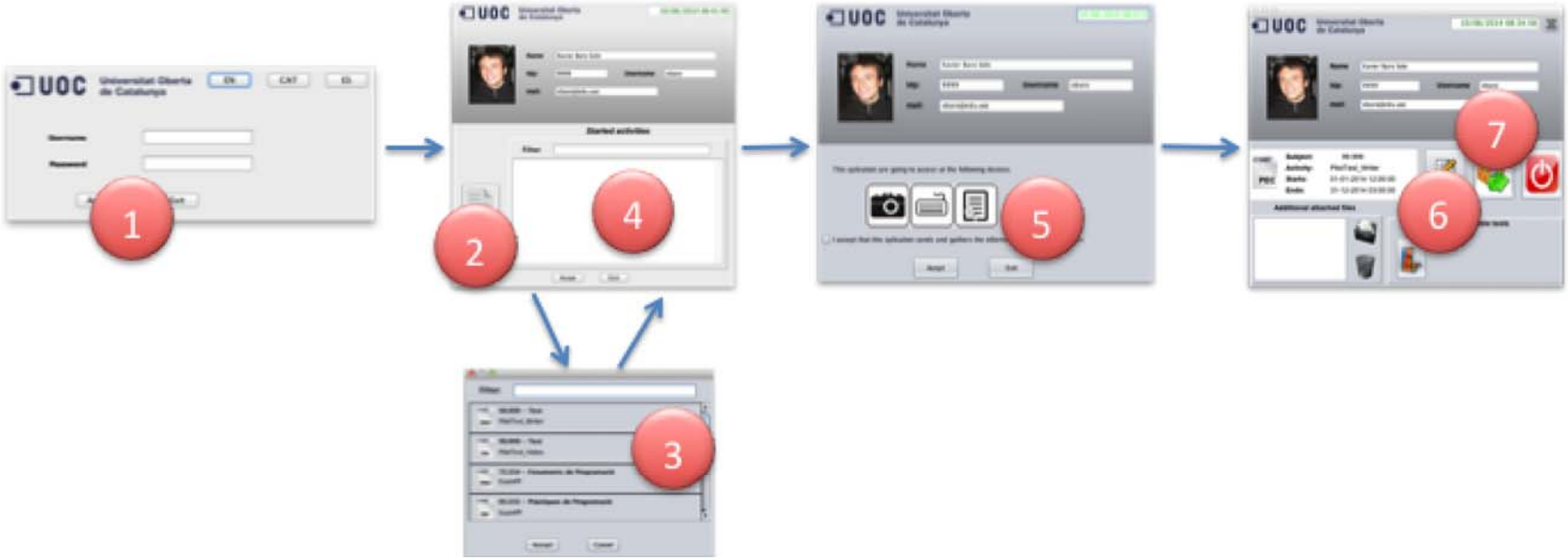
Final examination with prototype for:

Facial recognition/Keystroke dynamics
TimeStamp/Digital Signature

Background: internal pilots & prototype (UOC case)

UOC Prototype

1.- User login
2.- Current activities list
3.- If activity hasn't been started, it can be selected and downloaded from server
4.- Selection of desired activity
5.- Control acknowledgement and acceptation
6.- Available tools (video recording)
7.- Activity deliver (TS and signature)



Background: internal pilots & prototype (UOC case)

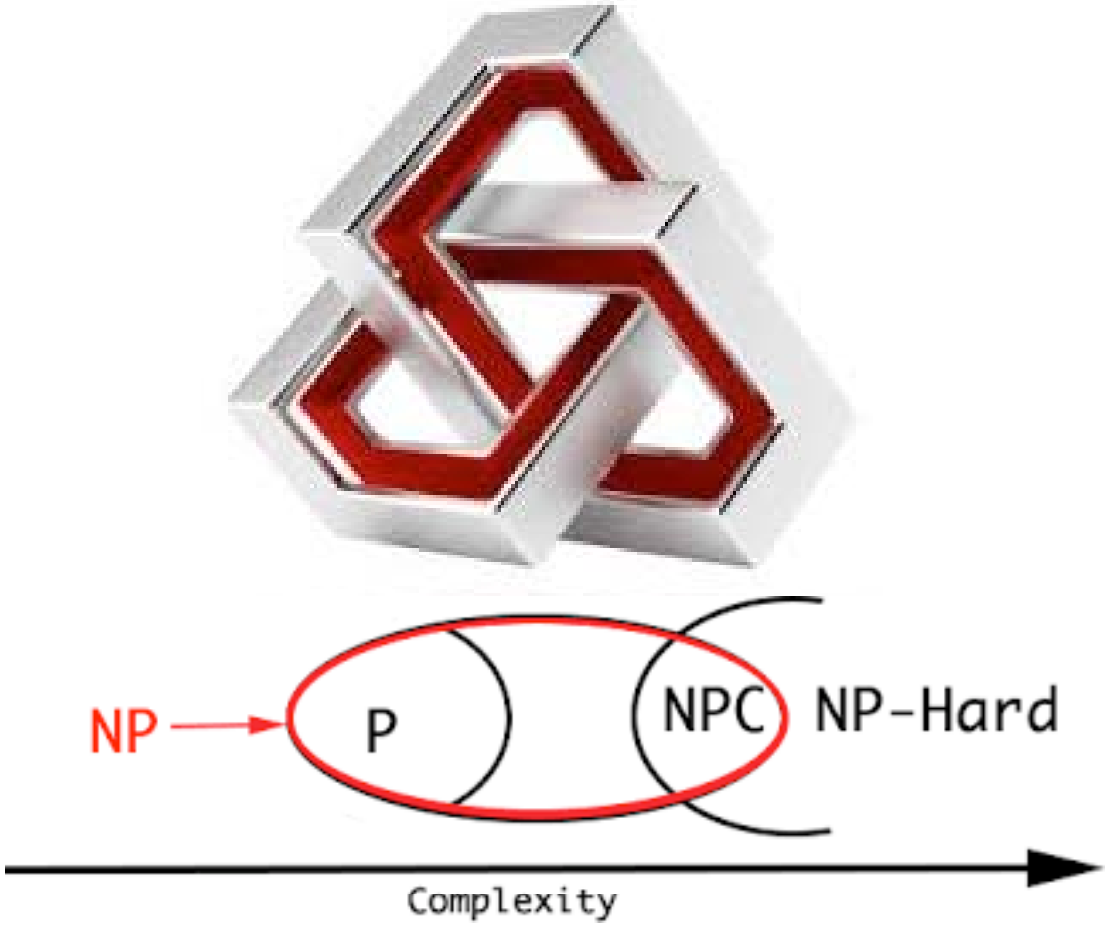
Prototype results

Tested Biometric Mechanisms

Facial Recognition	90.3%
Voice Recognition	71.2%
Keystroke patterns	52.6%

- Values present results of instruments **in an isolated manner**. In a real system, the different modalities must be combined.
- Small amount of data and classical instrument aproaches (not state-of-the-art)
- During the pilots we have detected many **issues in how the learners use the tools**, that must be addressed in future implementations.

Background: e-exam - 6 [NP-Complete]

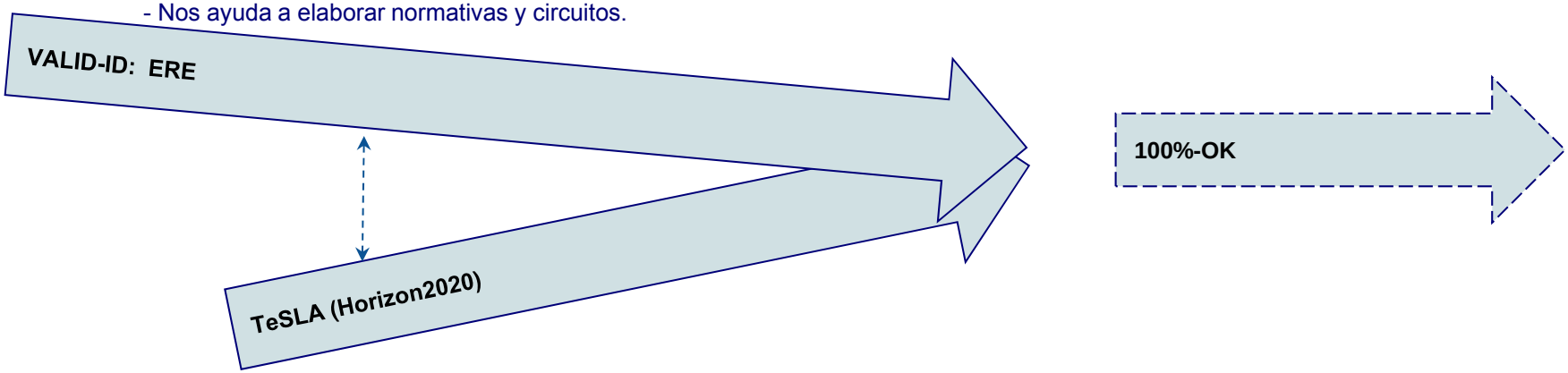


1.3 Val-ID vs TeSLA

TeSLA vs Val-ID

2015	2016	2017	2018	2019	2020

Objetivo: Incorporar el instrumento del reconocimiento facial en el proceso de exámenes virtuales de la UOC (ERES).
- Nos ayuda a probar el servicio como un servicio provisto externamente.
- Nos ayuda a elaborar normativas y circuitos.



Objetivo: Verificar la identidad del estudiante en todo el proceso de evaluación en línea
- Hub para incorporar diferentes instrumentos de reconocimiento (facial, voz, teclado, PACPlagi, ... etc).
- Agencias de calidad
- M etodología

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- 2.5 Demo

3.- Val-id: UOC+Smowl system

An Adaptive Trust-based e-assessment System for Learning

Overview

Call submitted
Horizon2020 – INFORMATION AND COMMUNICATION TECHNOLOGIES
Topic: Technologies for better human learning and teaching.
Type: Innovation Action, with Large Scale Pilots.

Funded by
the European Union

Project Number: 688520 – TESLA – H2020-ICT-2015/H2020-ICT-2015
Agreement Number: 688520

Features of the call and Budget

Horizon2020 – ICT 20 (Information and Communication Technologies)
Topic: Technologies for better human learning and teaching

Type: **Innovation Action**, with Large Scale Pilots

Means: 20% Research & 80% Innovation

TeSLA is one of the 6 selected projects for funding (universities, not usual, first)

Total budget: 7.283.092€

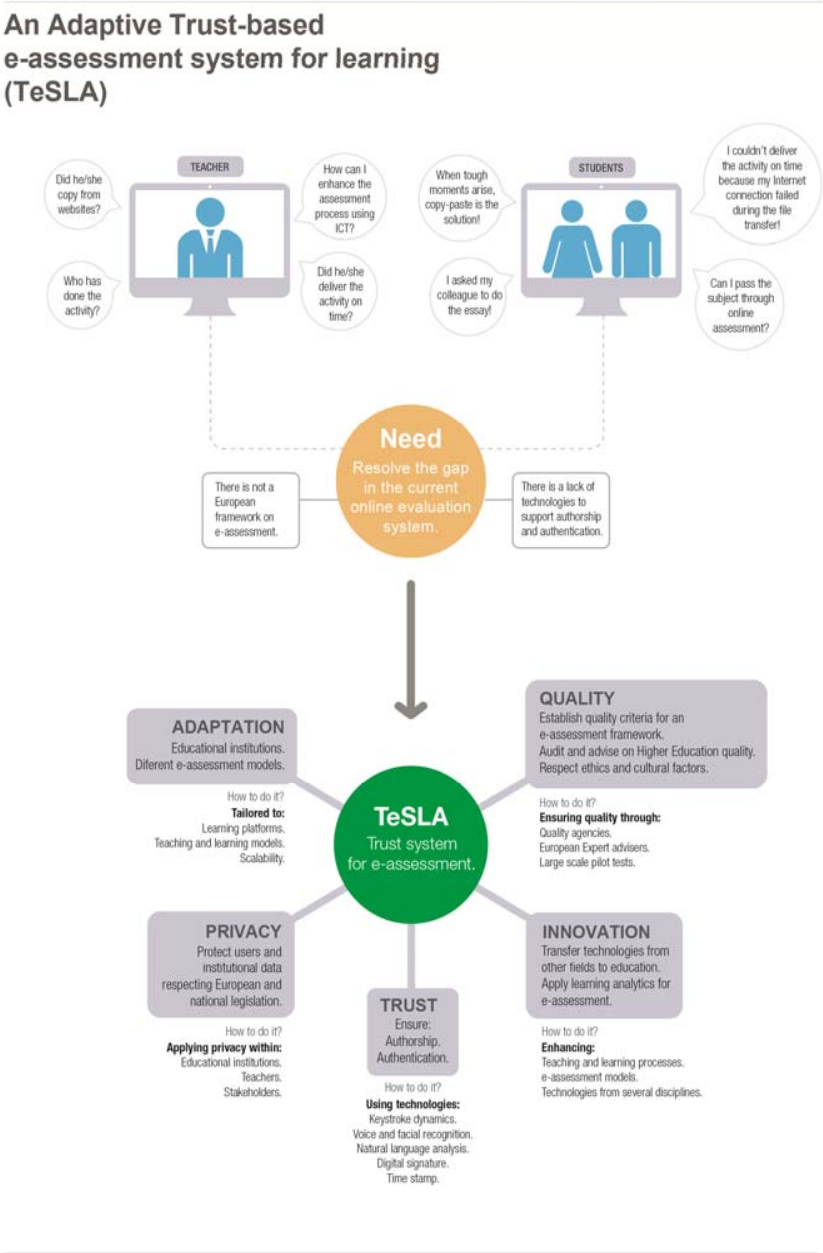
TeSLA
Adaptive trust-based e-assessment

Consortium

18 Partners (130 members)

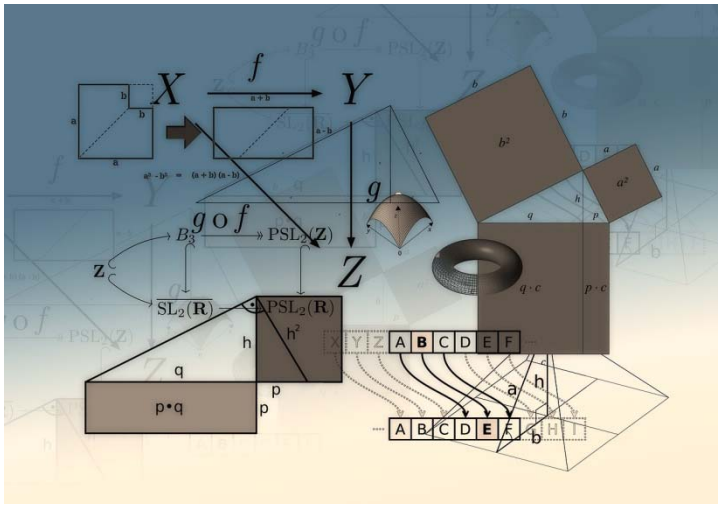
8 Universities | 3 Quality Agencies | 4 Research Centers | 3 Enterprises

TeSLA concept



Main objective

The overall **objective** of the TeSLA project is to define and develop **an e-assessment system**, which ensures learners **authentication and authorship** in online and blended learning environments while avoiding the time and physical space limitations imposed by face-to-face examination.



The TeSLA project will **cover teaching and learning processes as well as ethical, legal and technological aspects**.

Specific objectives

O1. Analyse and design the most appropriate **learning activities** for e-assessment taking into account both, academic requirements to ensure the learning process and the adaptation to a fully online and cross-curricular assessment.

O2. Improve the e-assessment process by **introducing tools and resources** in the learning activities that **capture learners' data** to ensure their authentication and authorship.

O3. **Conduct several pilots** of the TeSLA e-assessment system that **guarantee the equality of opportunity and respect for diversity** in real teaching and learning scenarios while ensuring the authentication and authorship of the learners during the e-assessment processes.

O4. Provide a **core version** of the TeSLA e-assessment system **free of charge** for educational institutions, in order to improve their e-assessment processes.

O5. Hold a set of **training** workshops, provide guidelines and elaborate learning resources for teachers to show how the TeSLA e-assessment system can be used for enhancing e-assessment processes.

O6. Implement **a professional and commercial version** of the TeSLA e-assessment system to be sold and distributed at international level.

Work Packages

WP 1. Project Management (UOC).

WP 2. Requirements and modeling of the educational model (UOC).

WP 3. Data privacy and ethics (Namur).

WP 4. Quality assurance in online higher education (AQU).

WP 5. Design and implementation of trusted assessment mechanisms (Lplus).

WP 6. Integration of the framework in learning environments (Watchful).

WP 7. Design and development of pilots (SU).

WP 8. Pilots evaluation (OU).

WP 9. Communication, dissemination, liaisons and exploitation (protOS).

TeSLA
Adaptive trust-based e-assessment

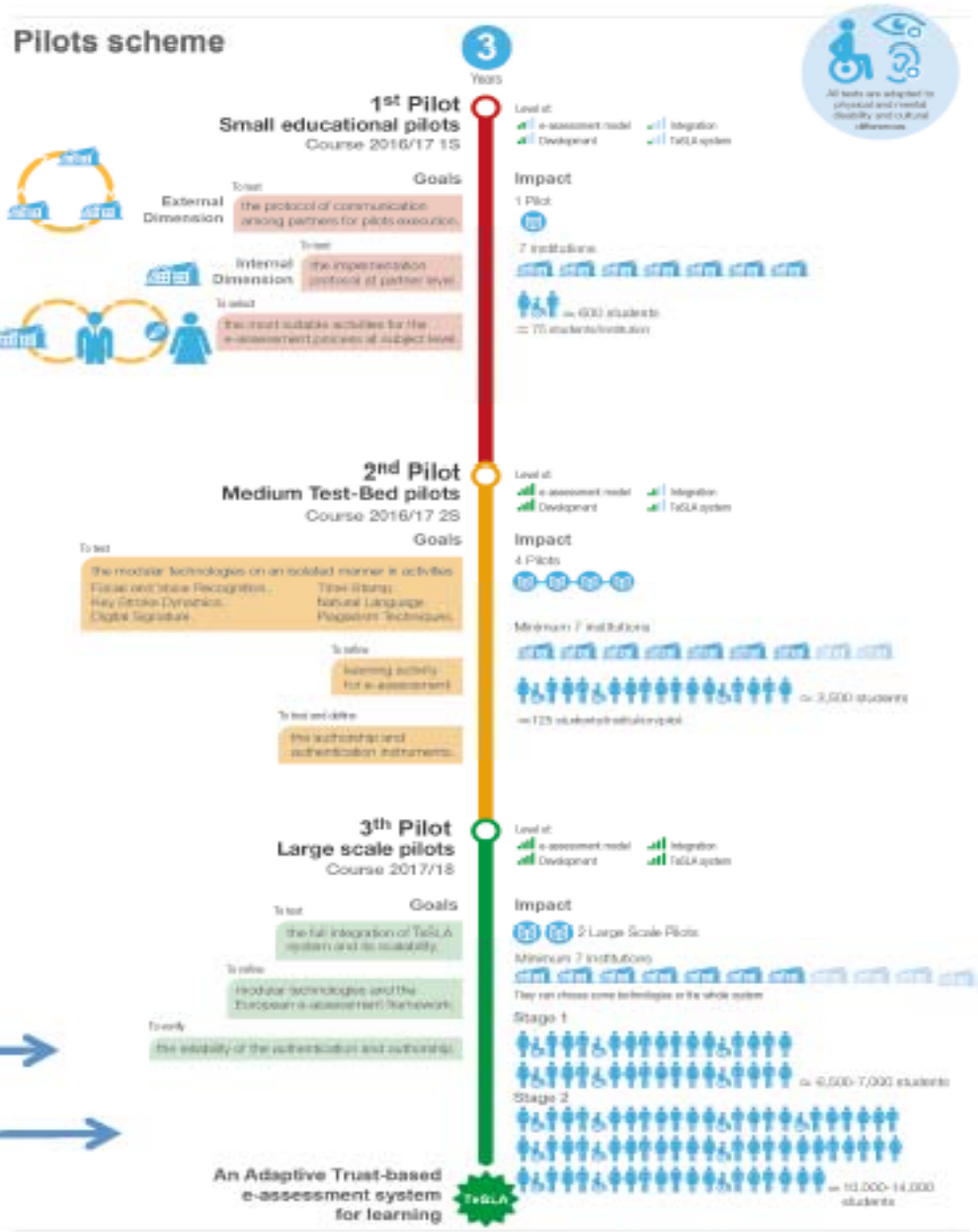
Finished

Finishing

Large Scale Pilots scheme

September 2017 (1st stage)

February 2018 (2nd stage)

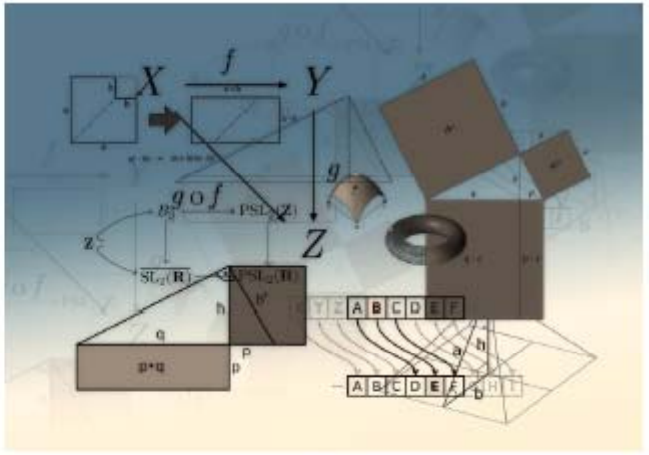


TeSLA
Adaptive trust-based e-assessment

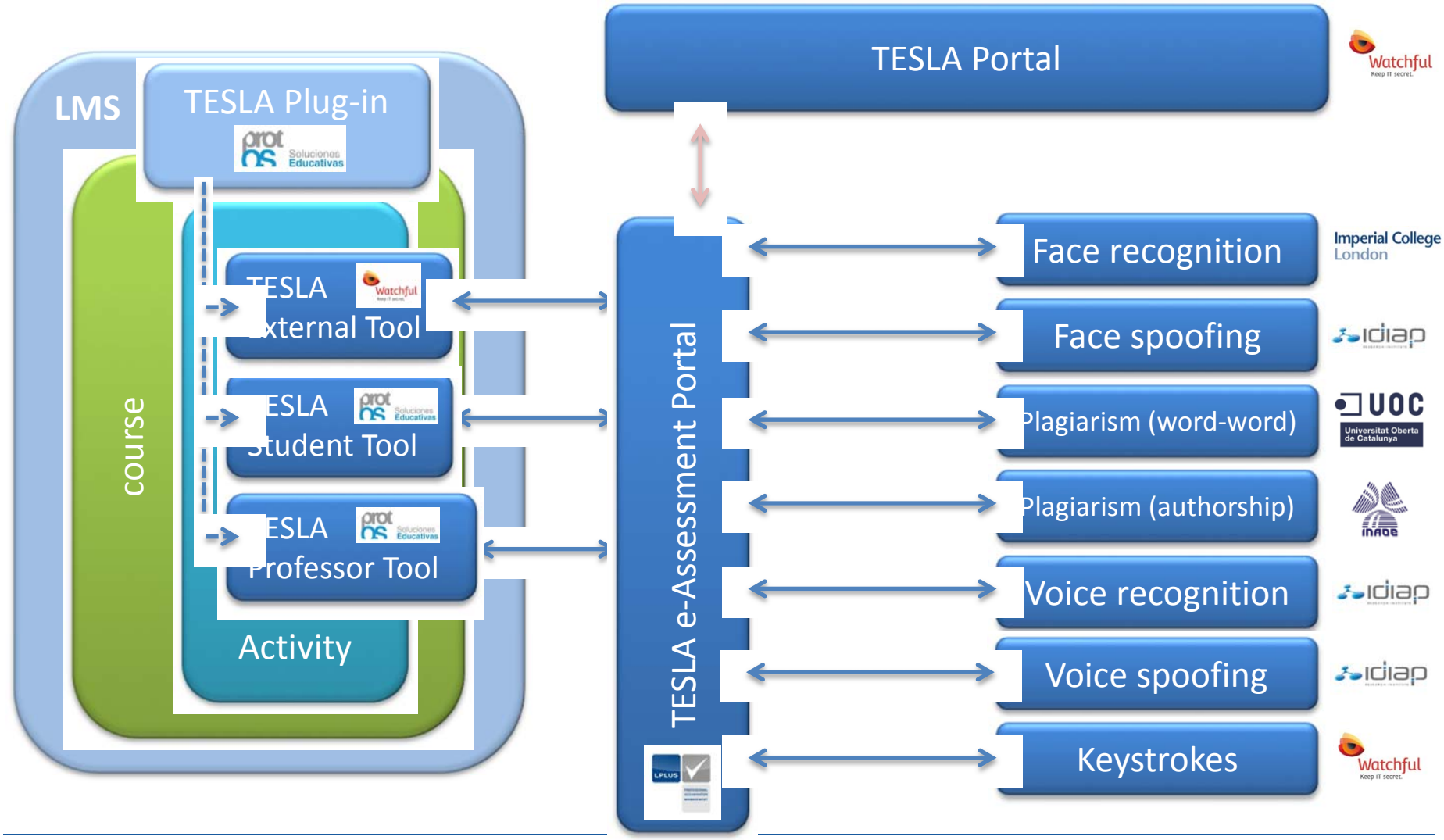
Tools and resources of TeSLA System

Authentication: digital certificate, face recognition, keystroke dynamics, voice recognition, time stamp.

Authorship: plagiarism tool and forensic analysis (linguistic techniques comparing creations from the same user and with Internet sources).



TeSLA architecture: available for Moodle & Blackboard

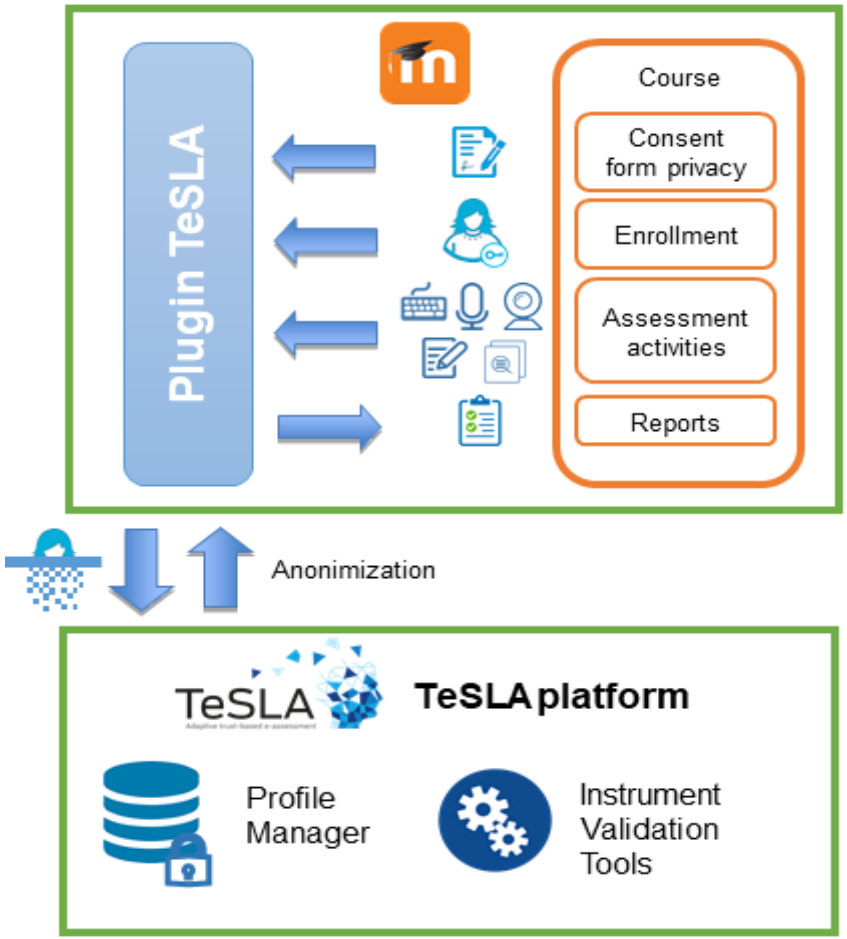


TeSLA
Adaptive trust-based e-assessment

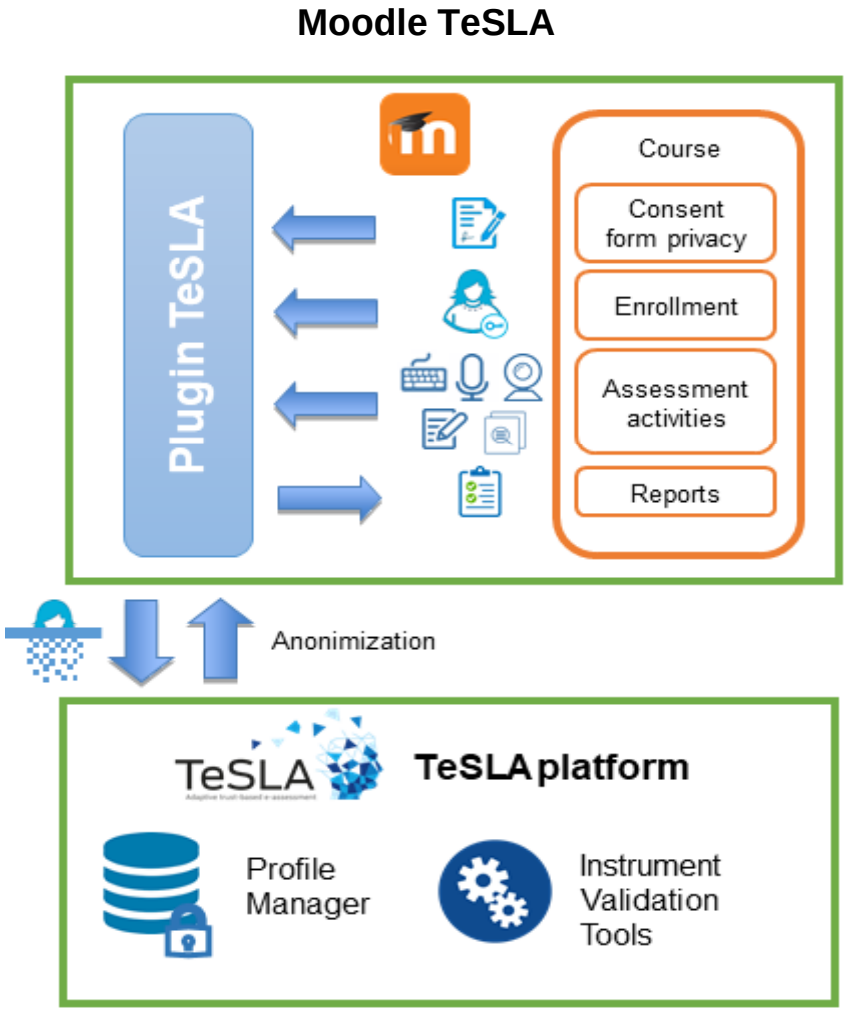
Demo TeSLA

TeSLA system

Moodle TeSLA



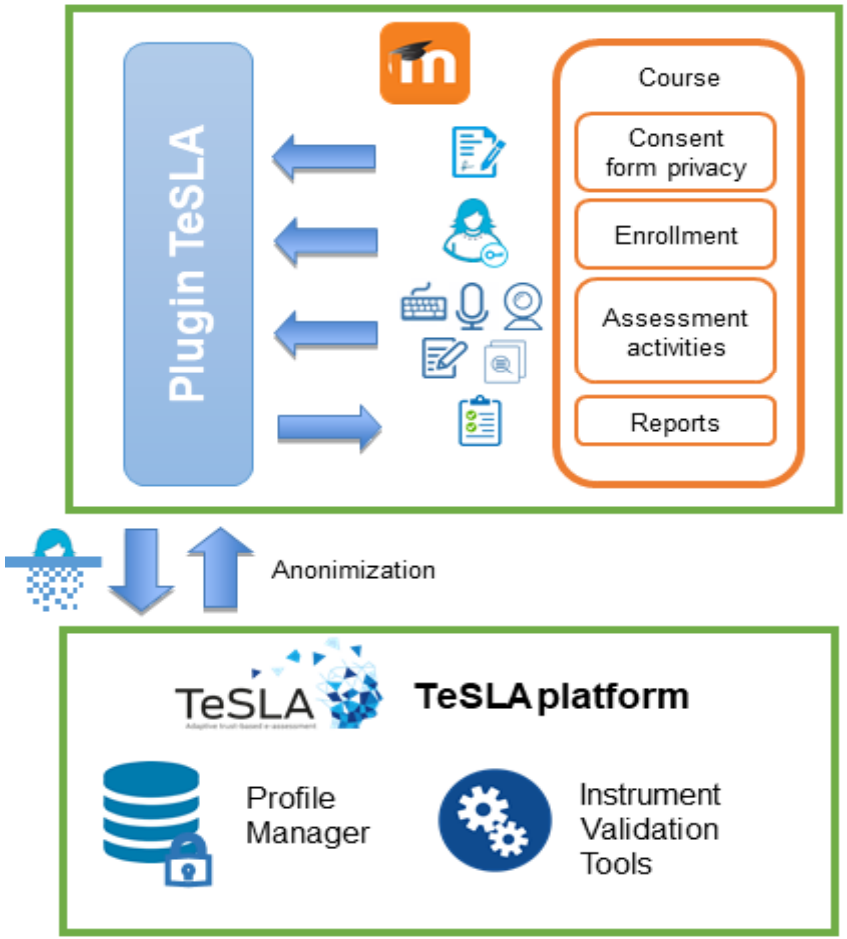
TeSLA system



- TeSLA system can be used in other Virtual learning environment by using LTI connections

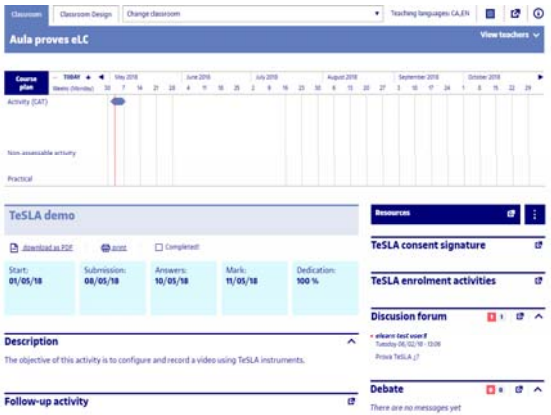
TeSLA system

Moodle TeSLA



LTI Connection

UOC Classroom



- TeSLA system can be used in other Virtual learning environment by using LTI connections

TeSLA
Adaptive trust-based e-assessment

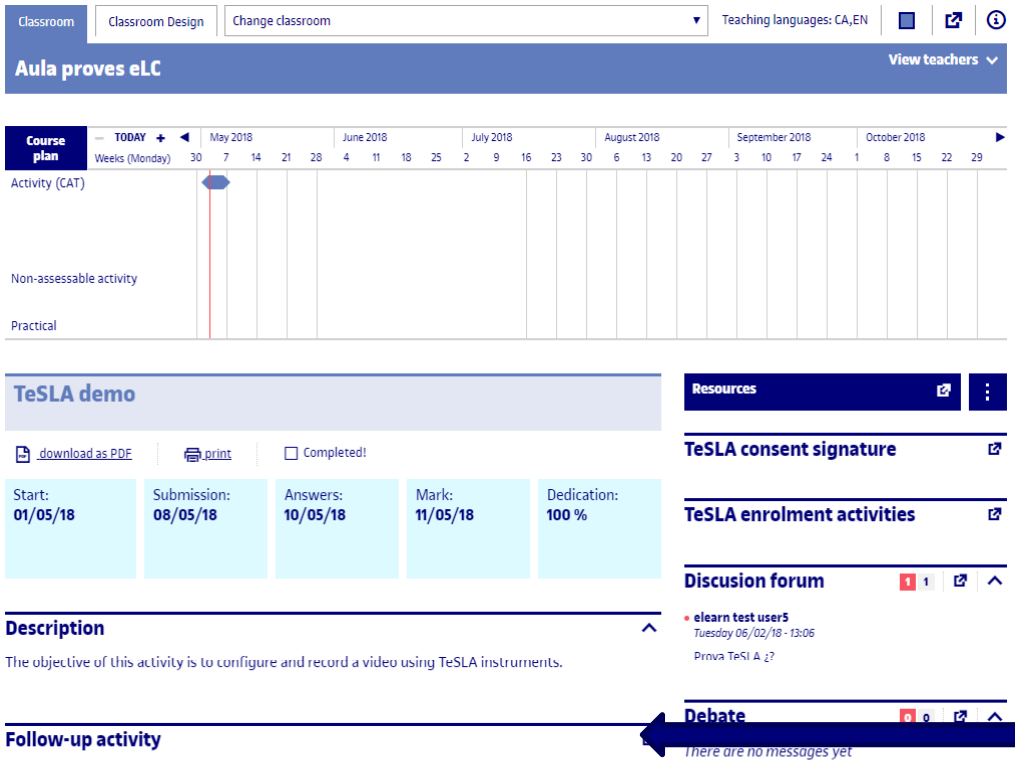
Student View

TeSLA Demo

- TeSLA system is based on three phases:
  - Signature the consent form
  - Realization of the enrollment activities
  - Follow-up activities where TeSLA instruments are deployed

TeSLA Demo

- UOC Classroom



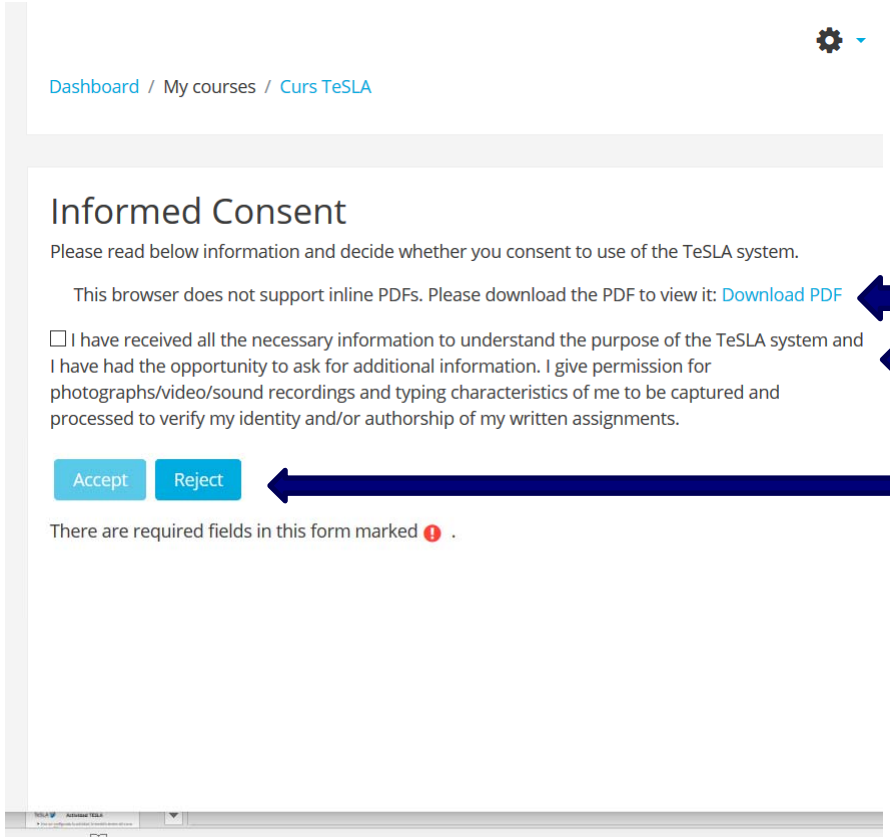
1) Signature consent form

2) Enrollment activities

3) Follow-up activities

Consent form

- Privacy policy document that the student has to accept



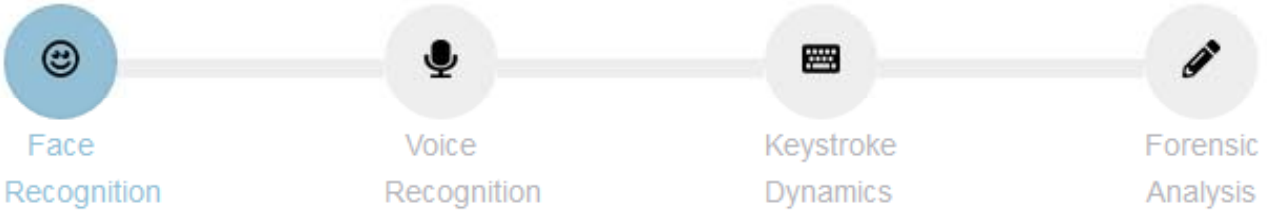
1) Privacy policy document

2) Checkbox to accept

3) Click to accept

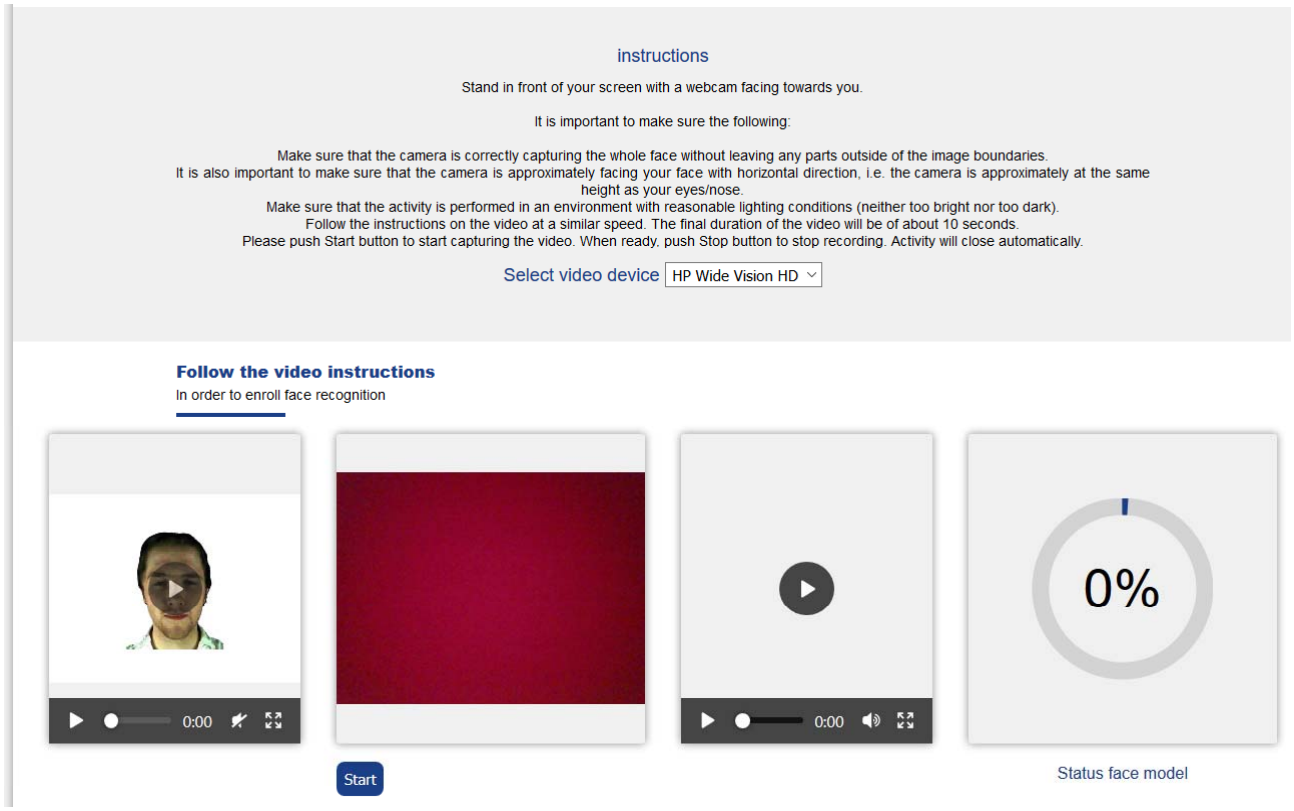
Enrollment activities

- The enrollment has to be done for the four instruments



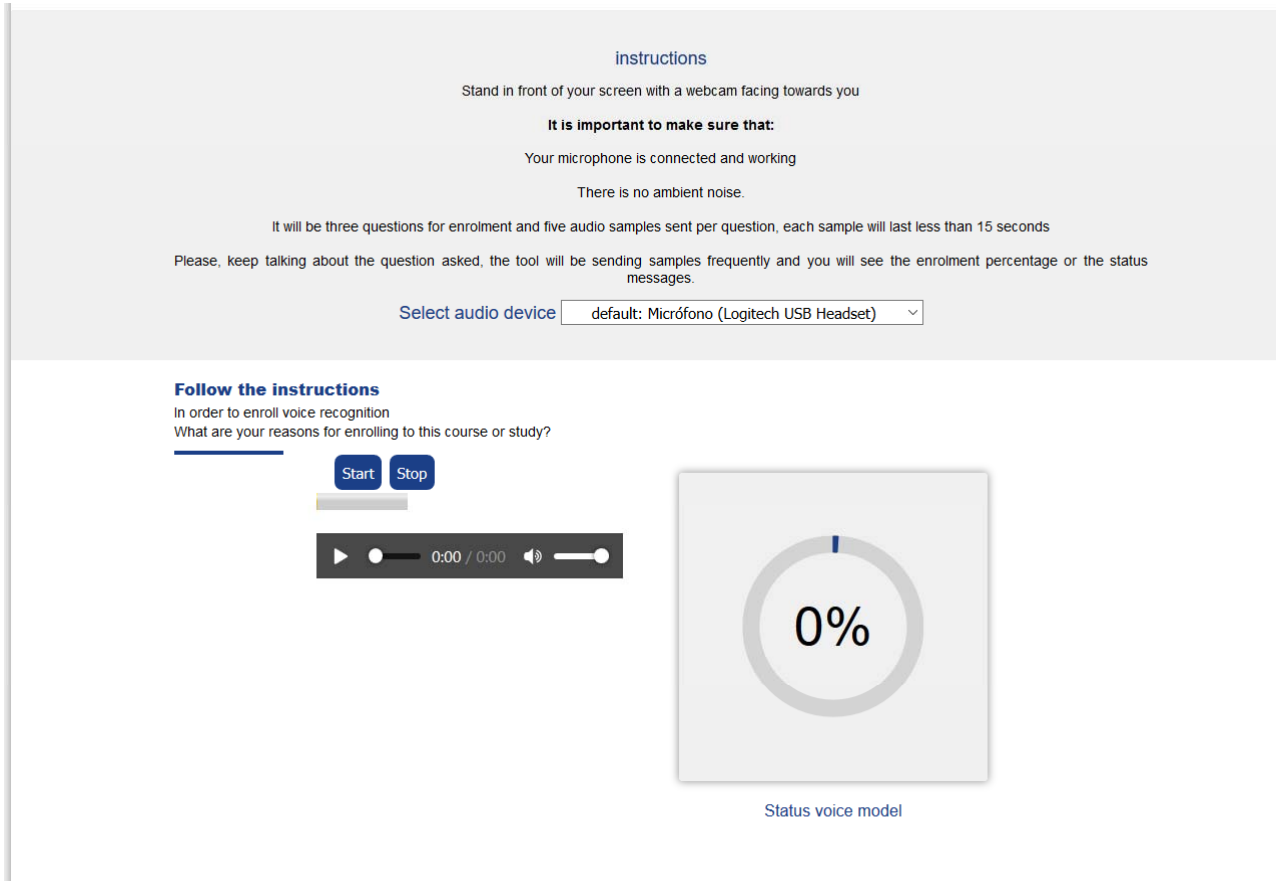
Enrollment activities

- Face recognition



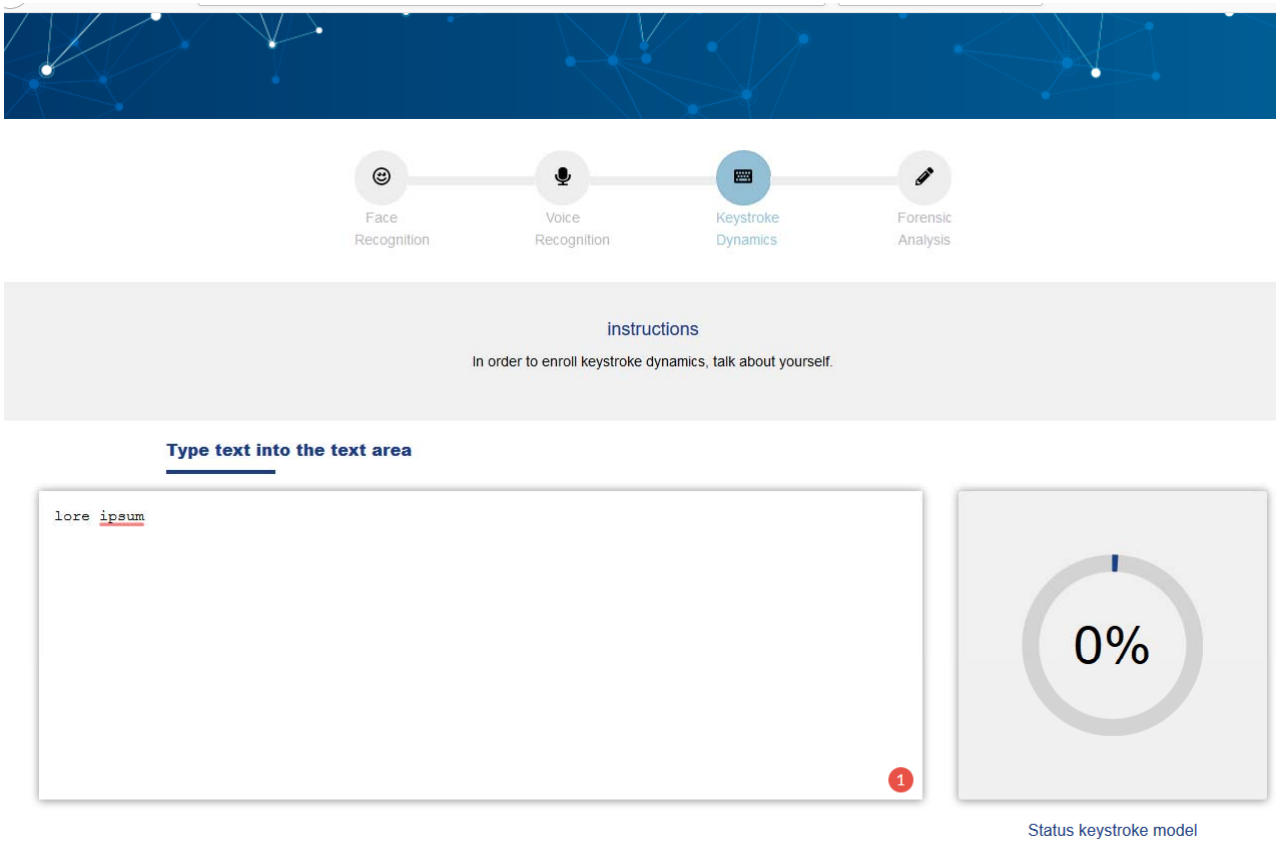
Enrollment activities

- Voice recognition



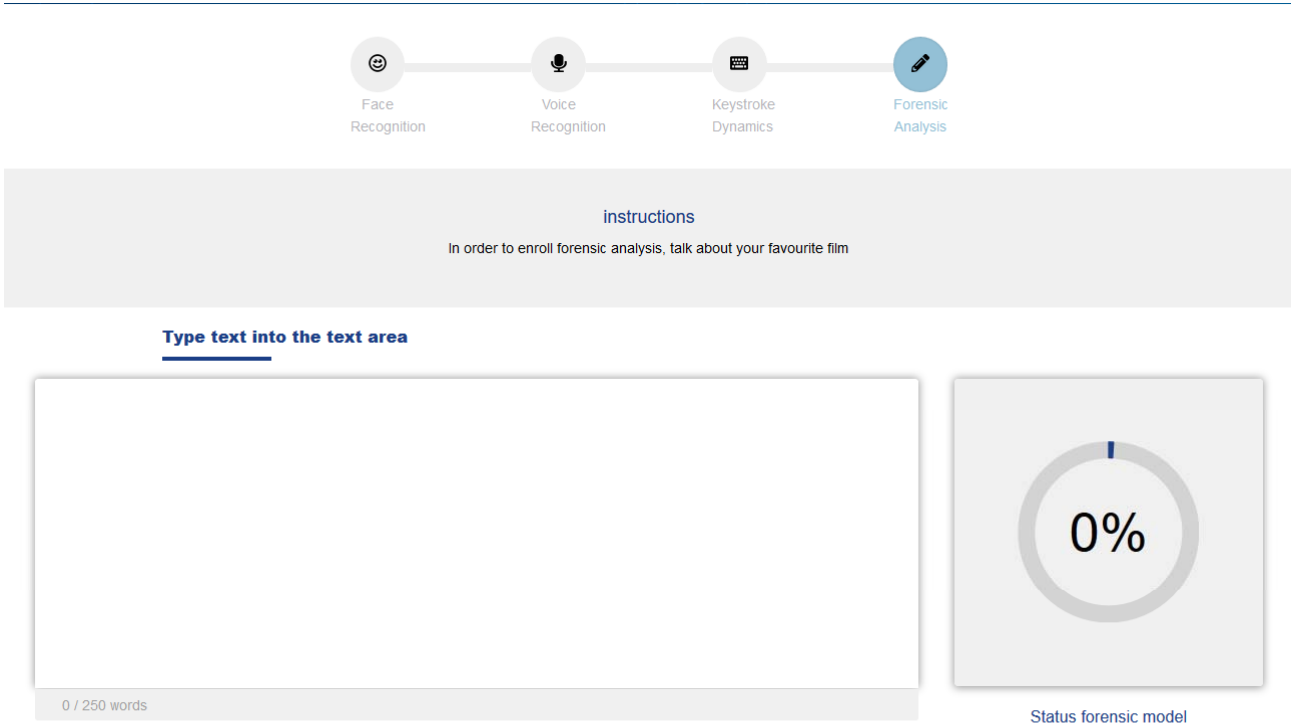
Enrollment activities

- Keystroke Dynamics

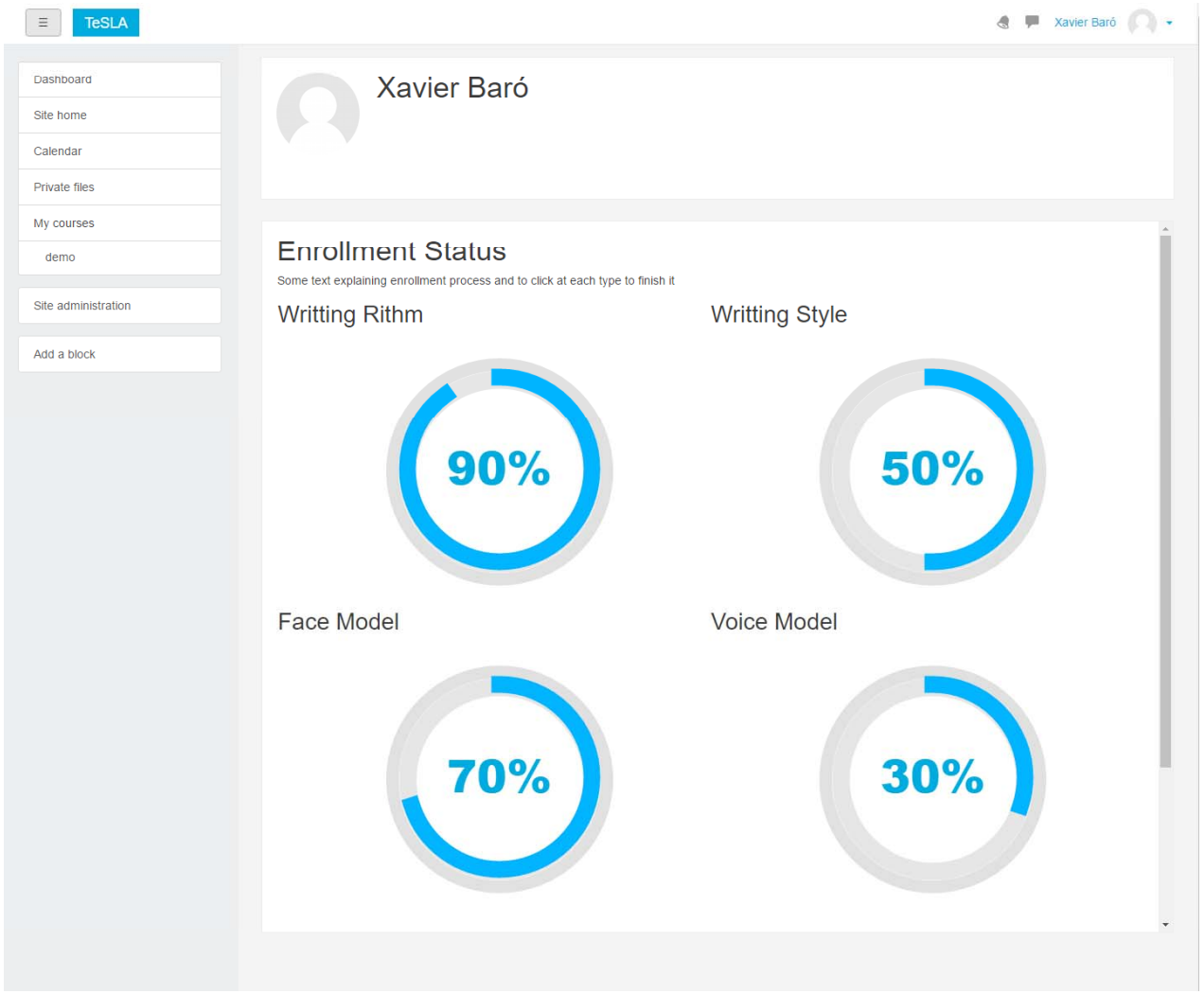


Enrollment activities

- Forensic analysis

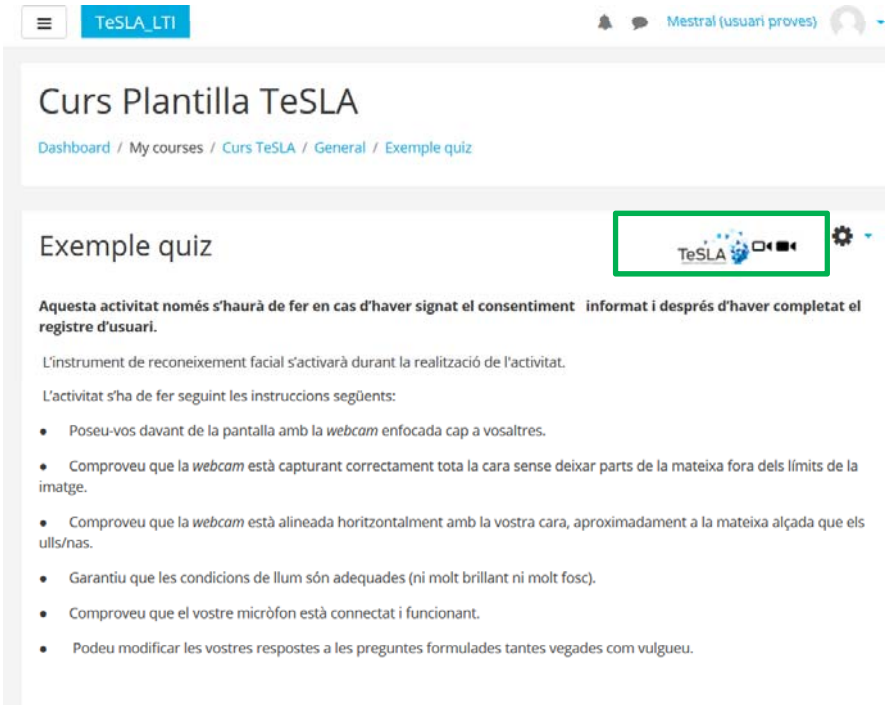


Enrollment activities



Follow-up activity

- The activity is a classical Moodle activity with some TeSLA instruments enabled



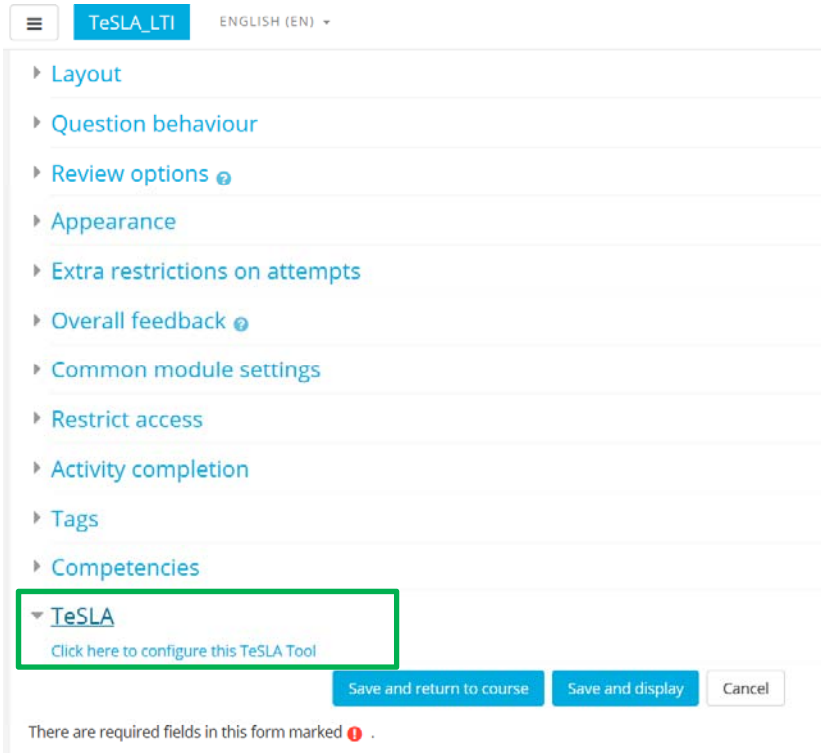
In this case, Face recognition and anti-spoofing is enabled

TeSLA
Adaptive trust-based e-assessment

Instructors View

Configuration Activity TeSLA

- The activity TeSLA is configured equally to a Moodle activity
- At the end, the instruments have to be selected.



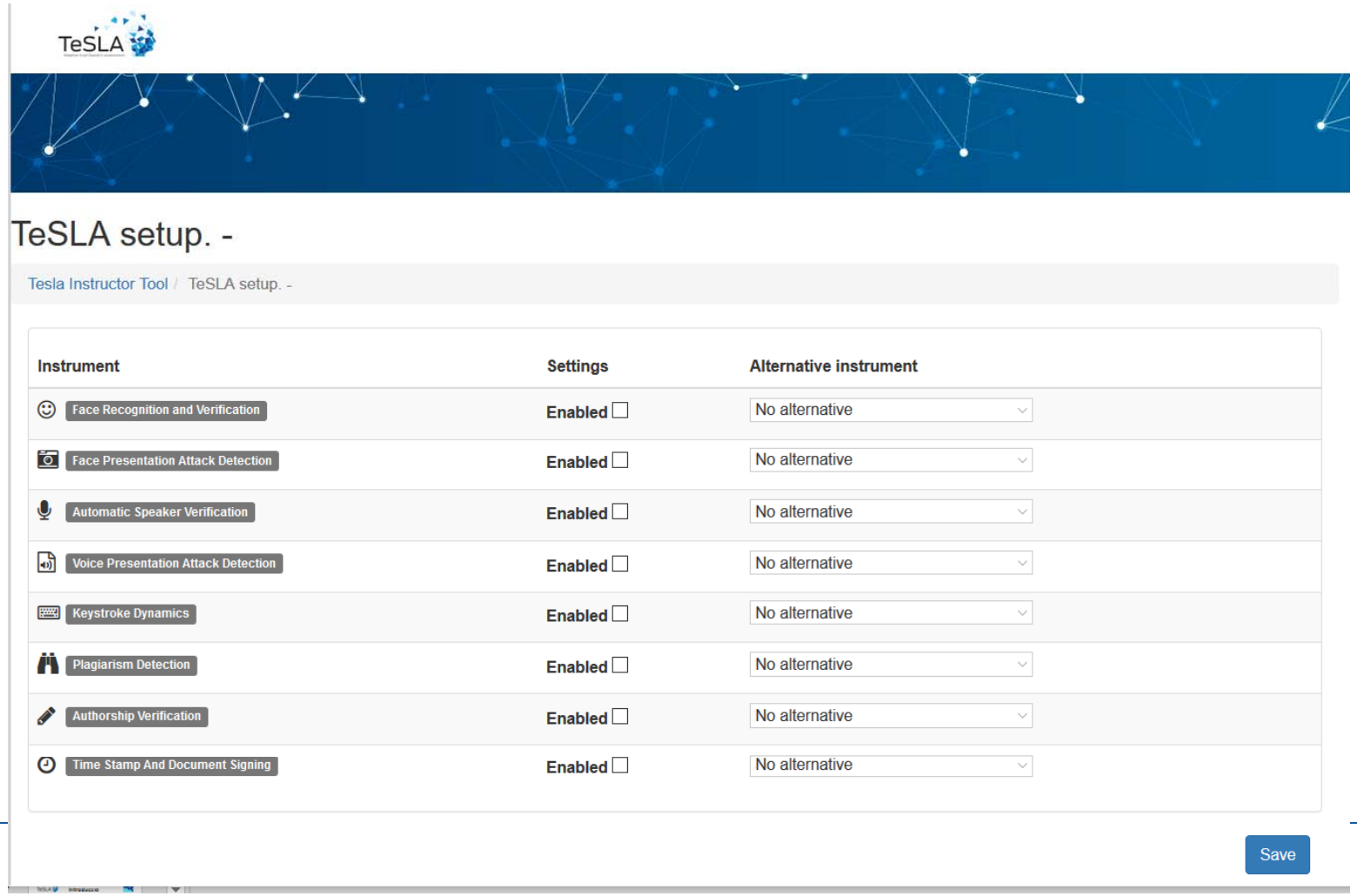
Supported activities are:

- Quizzes
- Discussion forums
- Assigment

The plugin TeSLA offers this new option in "Edit settings" of the activity

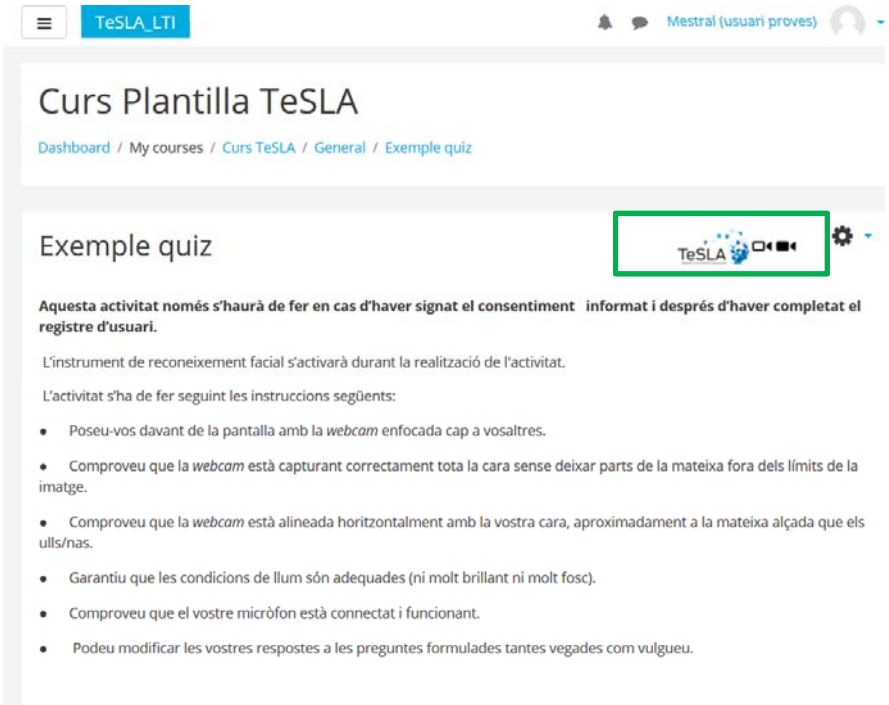
Configuration Activity TeSLA

- TeSLA platform is used to select the instruments



Monitoring

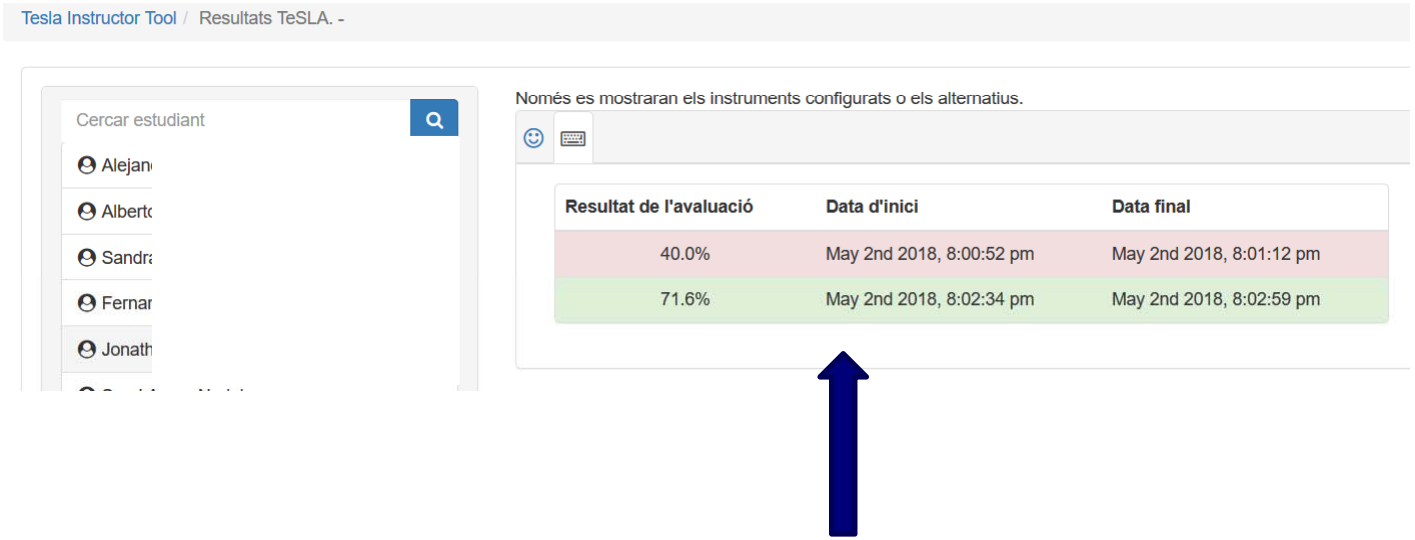
- Instructors can review results using the monitoring feature



The icons are the links to the monitoring information

Monitoring

- Example on Keystroke Dynamics



Three colors shows potential Issues:

- Green (x>=70%): ok
- Yellow (70%>x>=50%): warning
- Red (50%>x): check

Note that, thresholds can be configured by activity

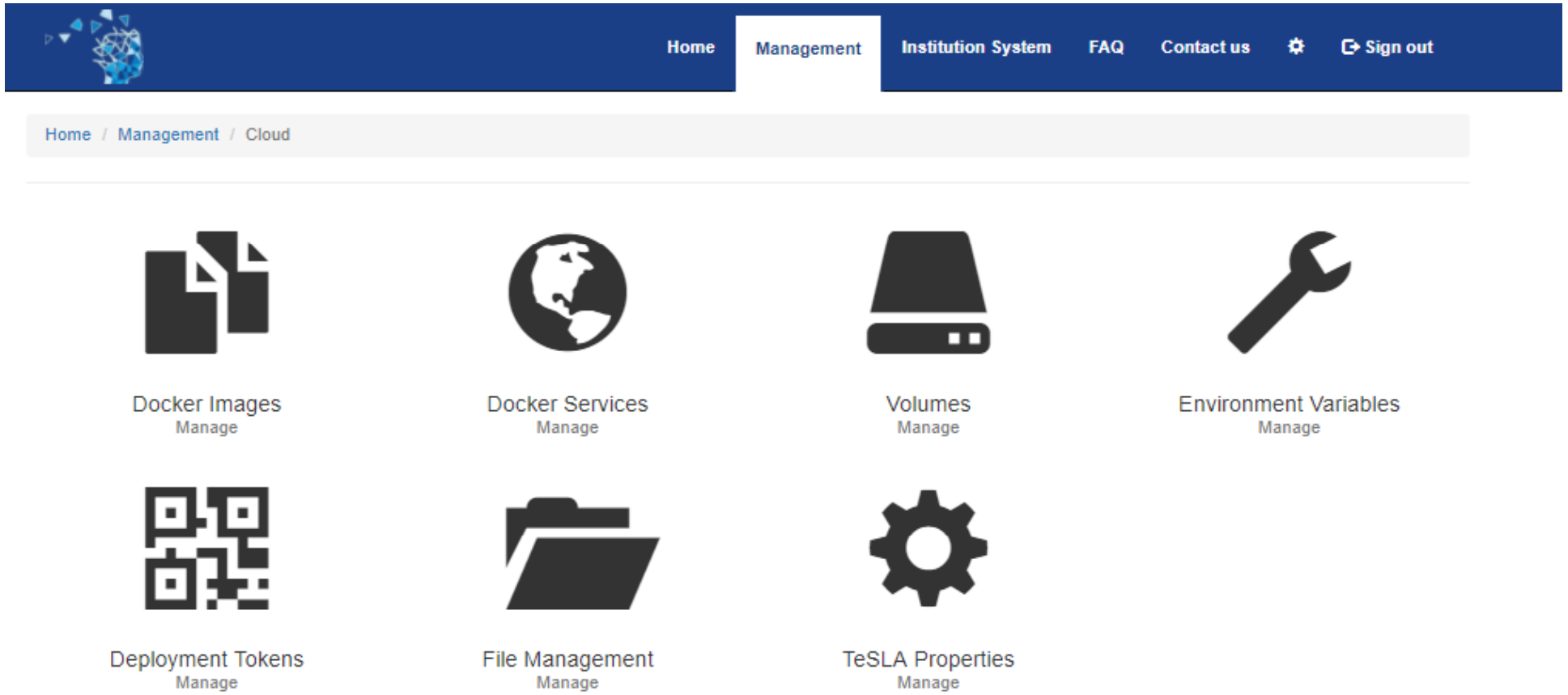
Instrument Results 1st pilot

Data summary			
	Num Enrollment Samples (Users)	Num Validation Samples (Users)	Num Users with both
video	1389 (418)	528 (283)	217
audio	1295 (407)	581 (301)	219
text	703 (450)	563 (329)	257
ks	8167 (495)	2130 (193)	162

Instrument results					
	TP	TN	FP	FN	Accuracy
plagiarism	588	527	81	21	91.62%
face recognition	68	7	13	32	62.50%
voice recognition	110	439	4	335	61.82%
forensic analysis	7	28	11	37	42.17%
keystroke				269	81.46%

Output/Expected	Correct	Fail
Correct	TP	FP
Fail	FN	TN

DEMO OF TESLA SYSTEM



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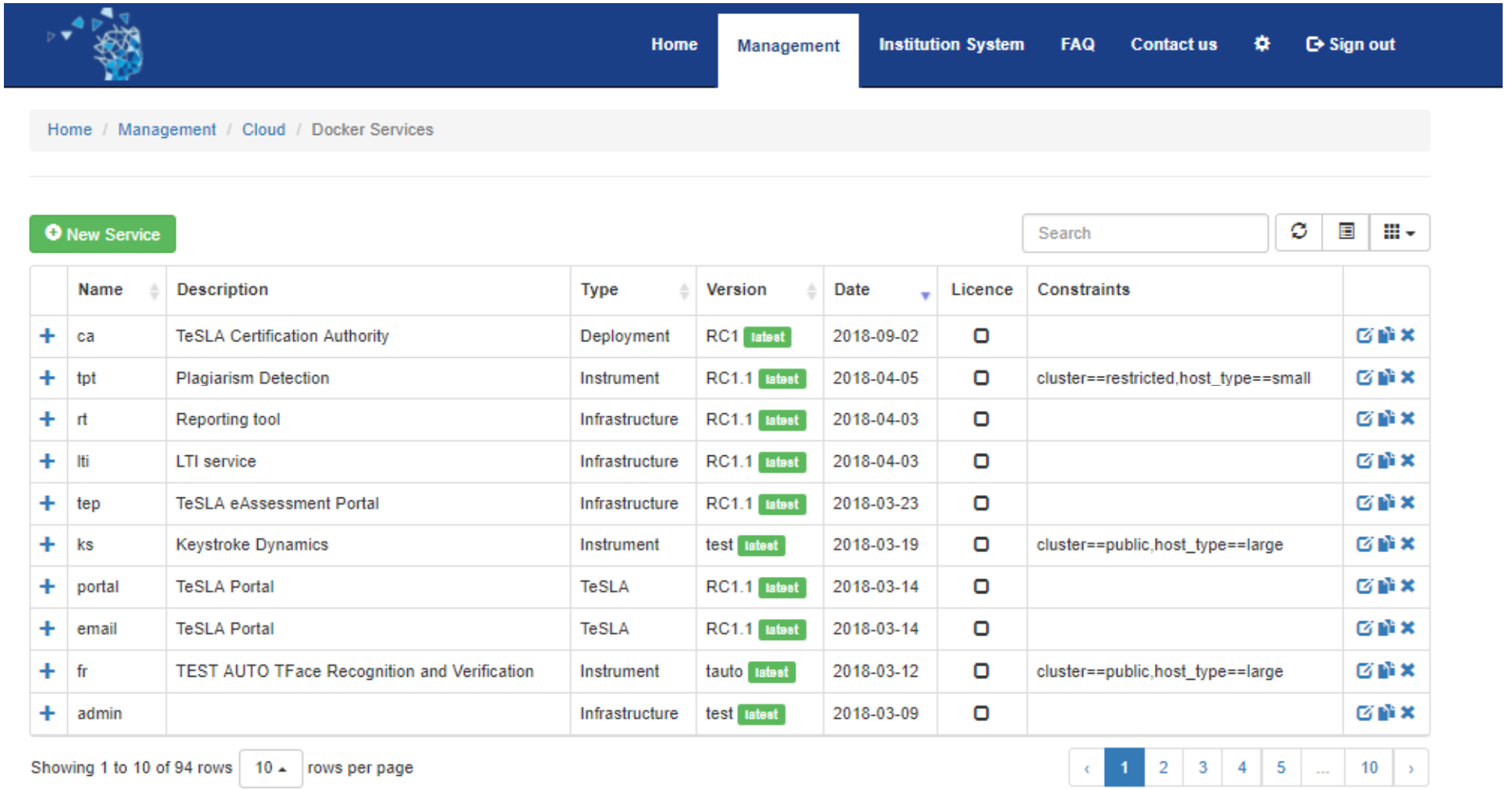

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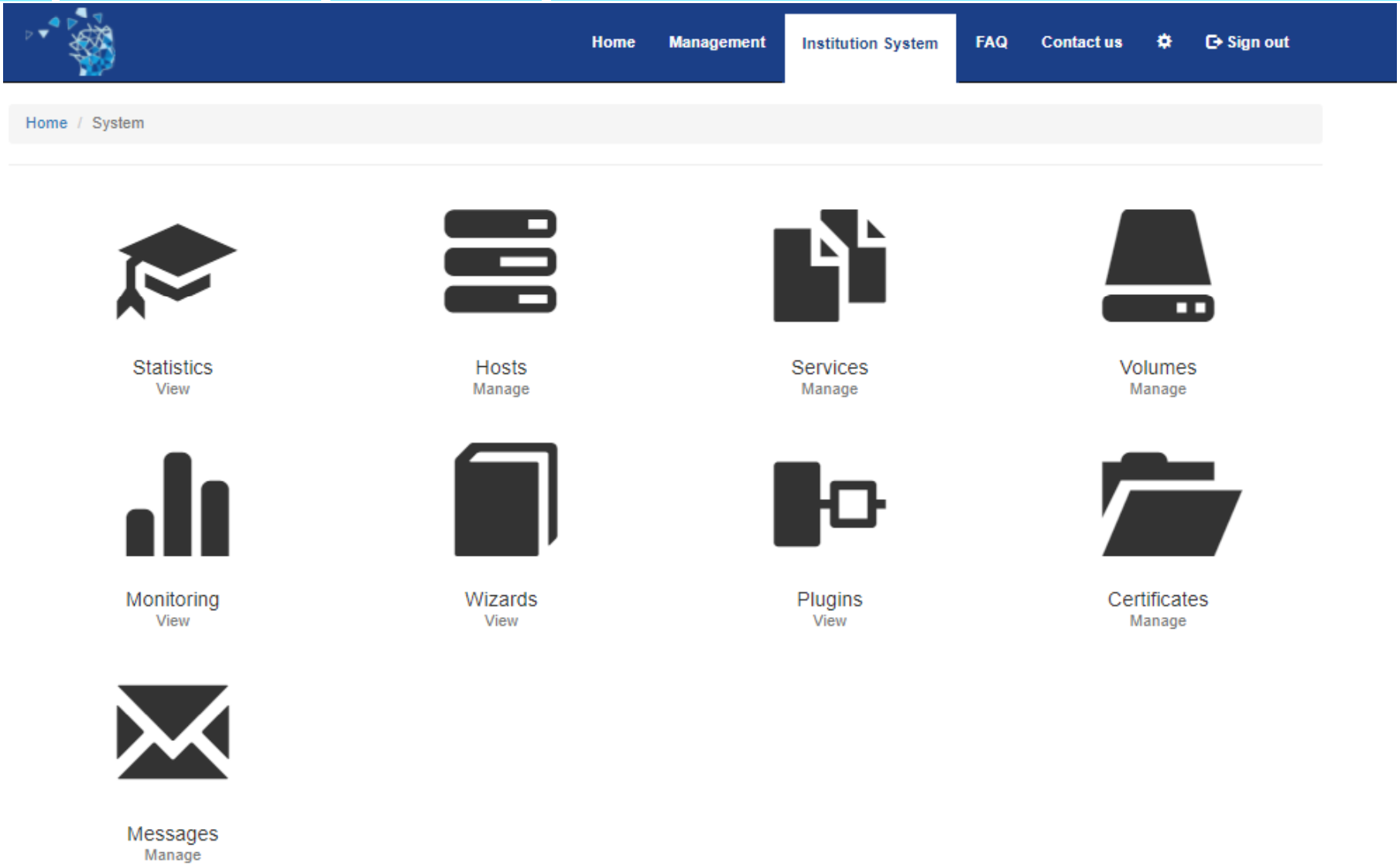

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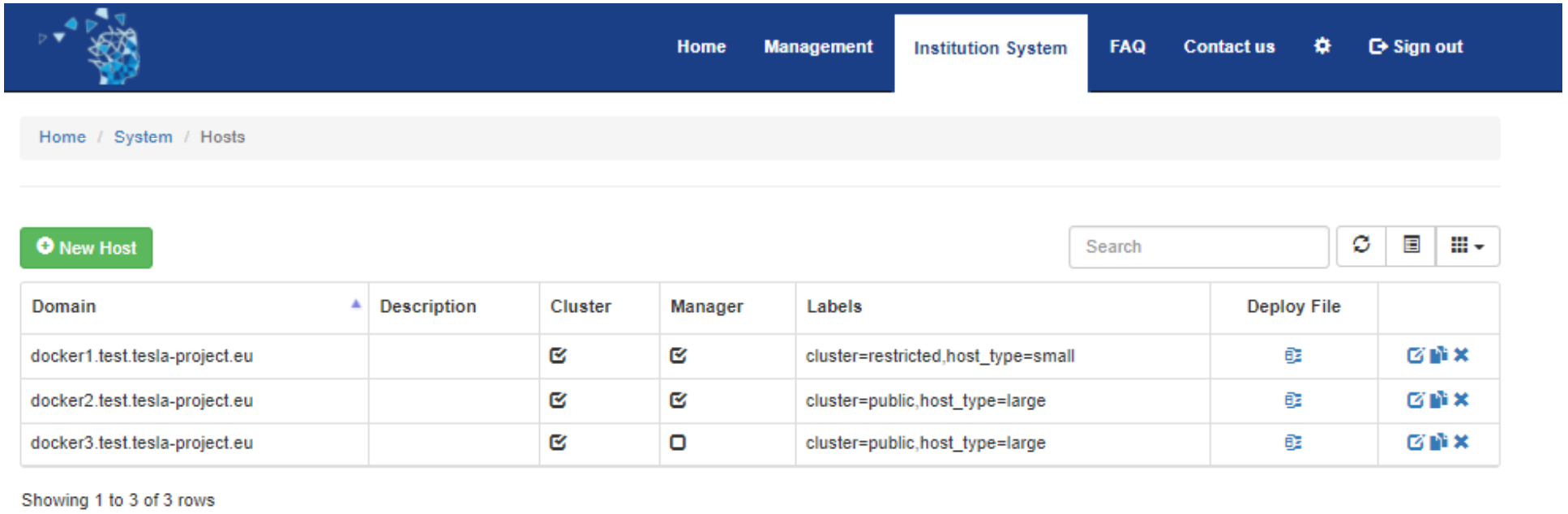

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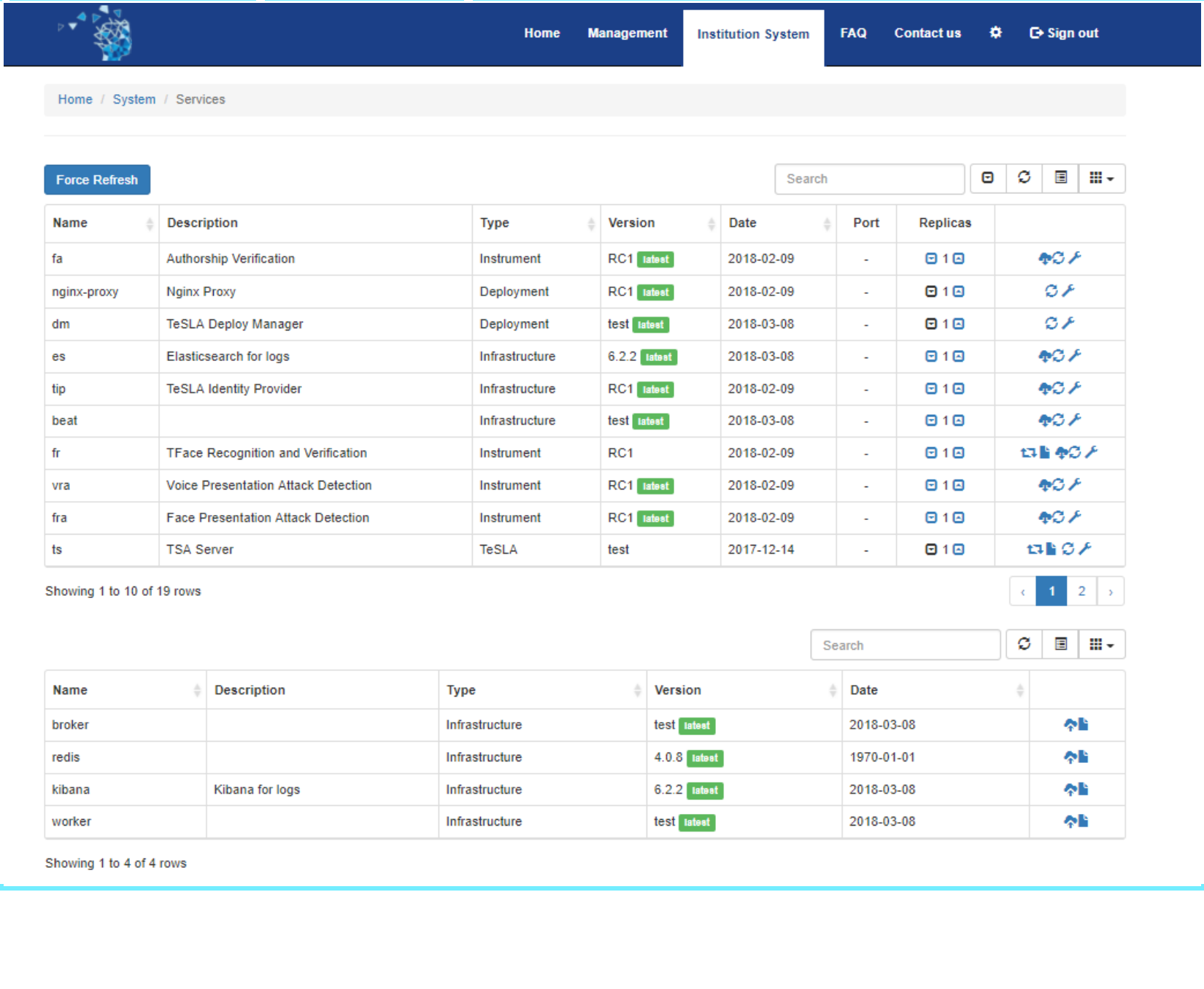
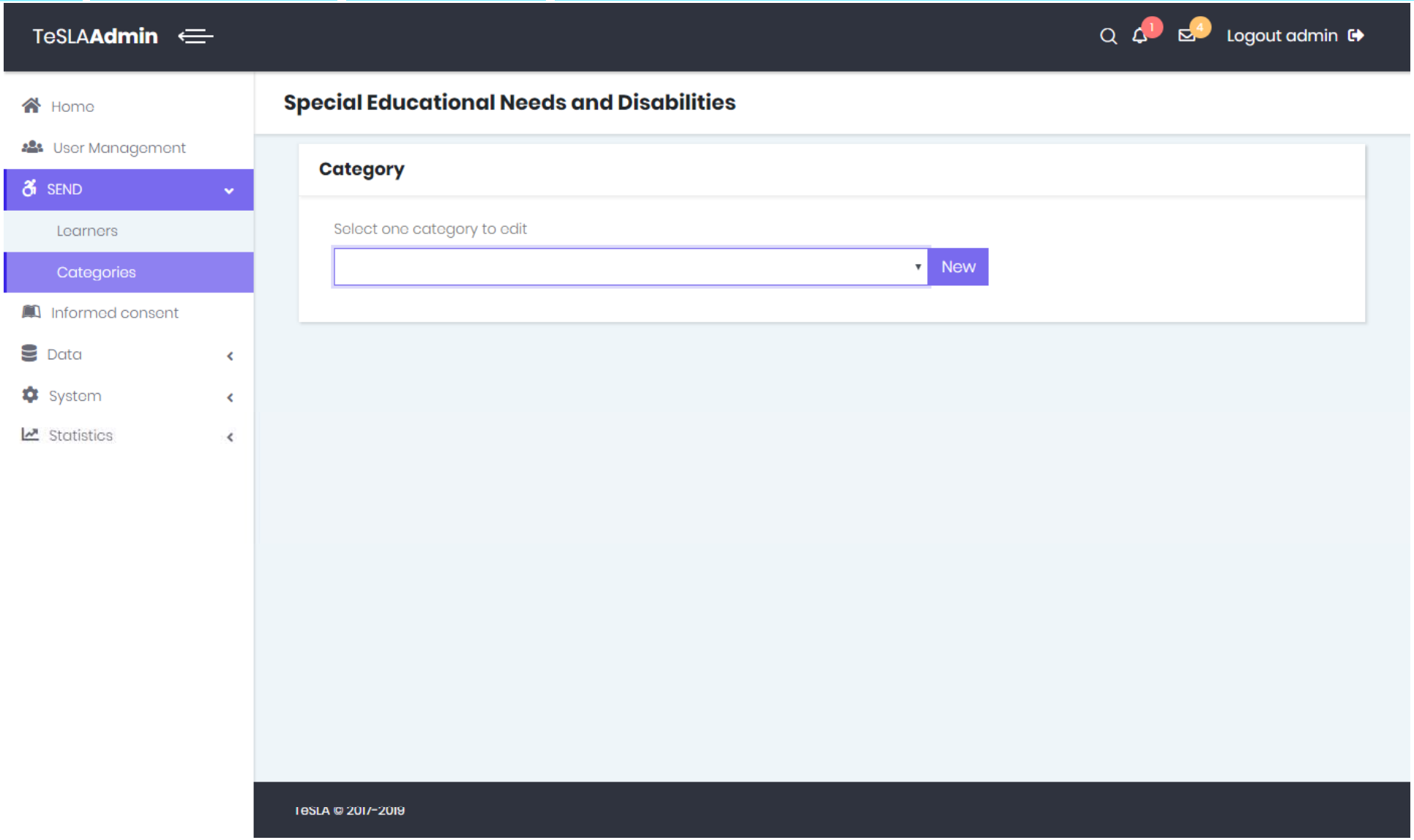
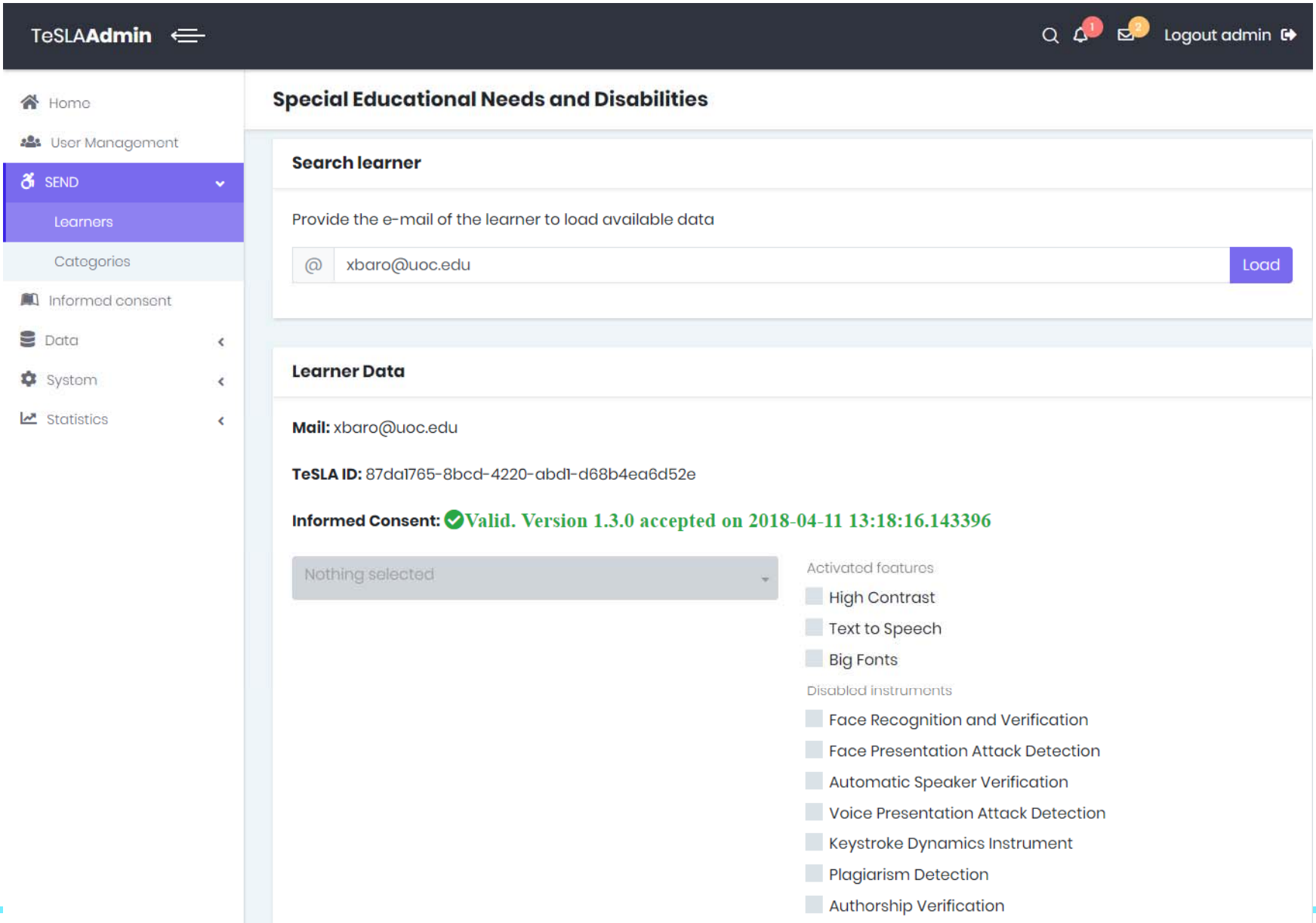


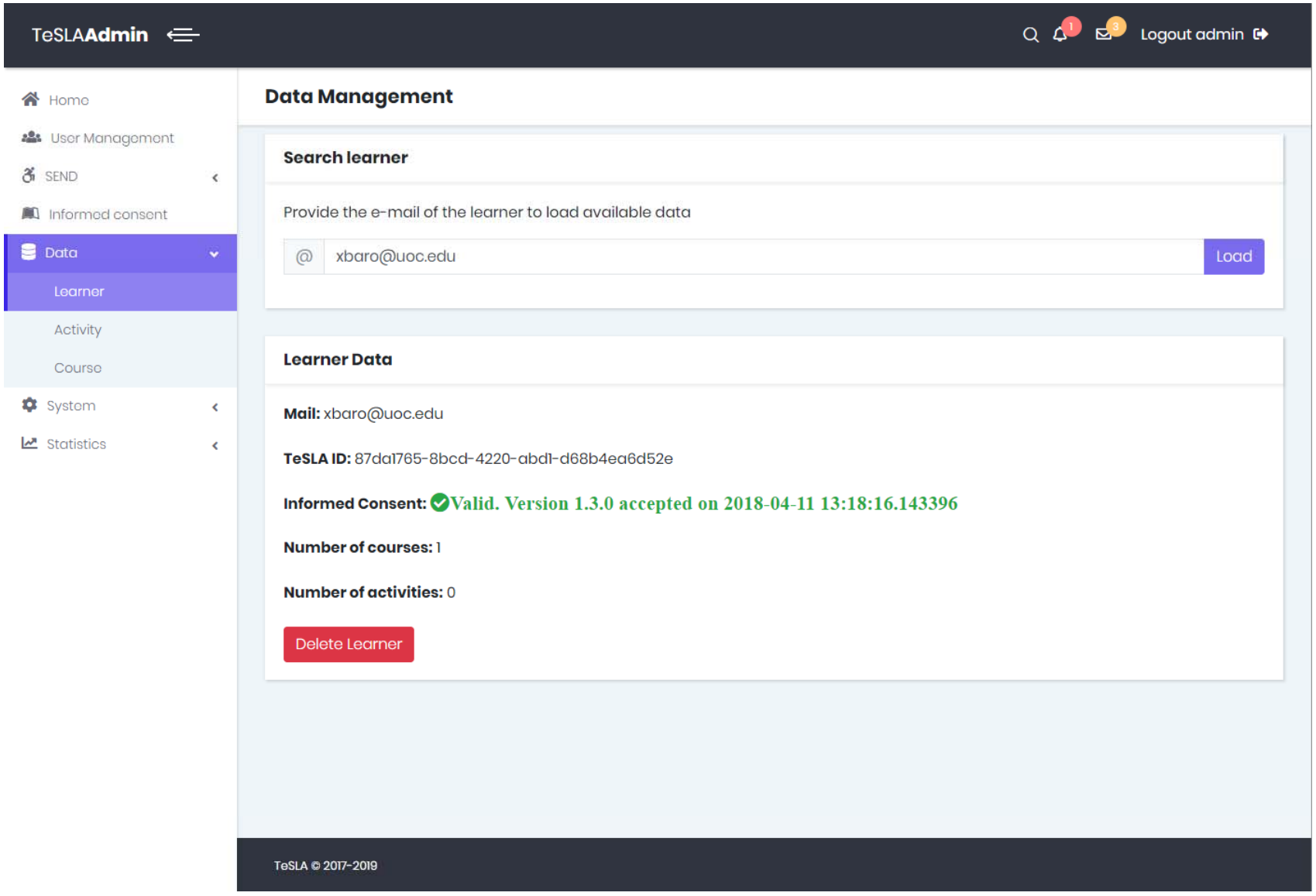
DEMO OF TESLA SYSTEM



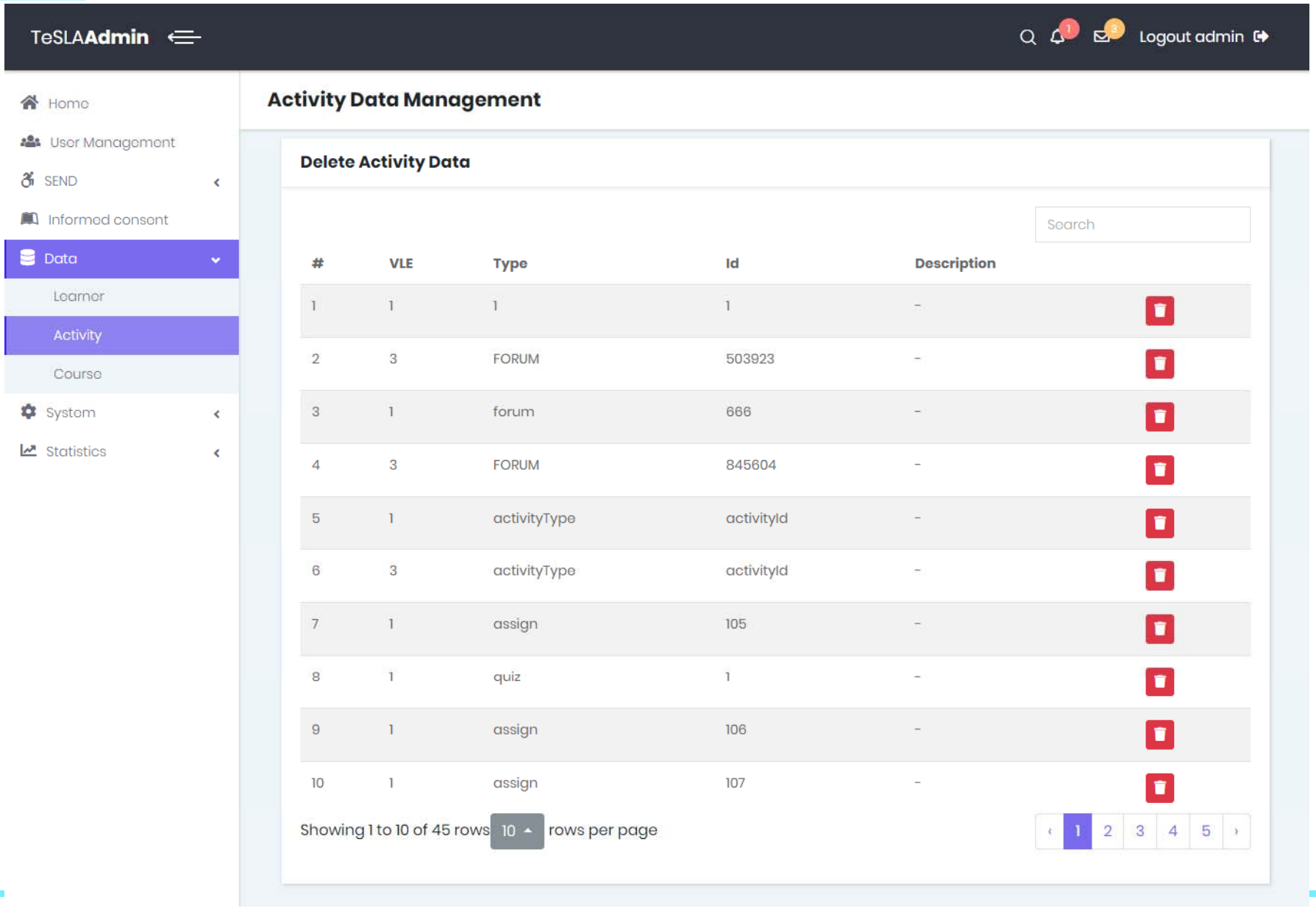
DEMO OF TESLA SYSTEM



DEMO OF TESLA SYSTEM



DEMO OF TESLA SYSTEM



Agenda

1.- Introduction: Background

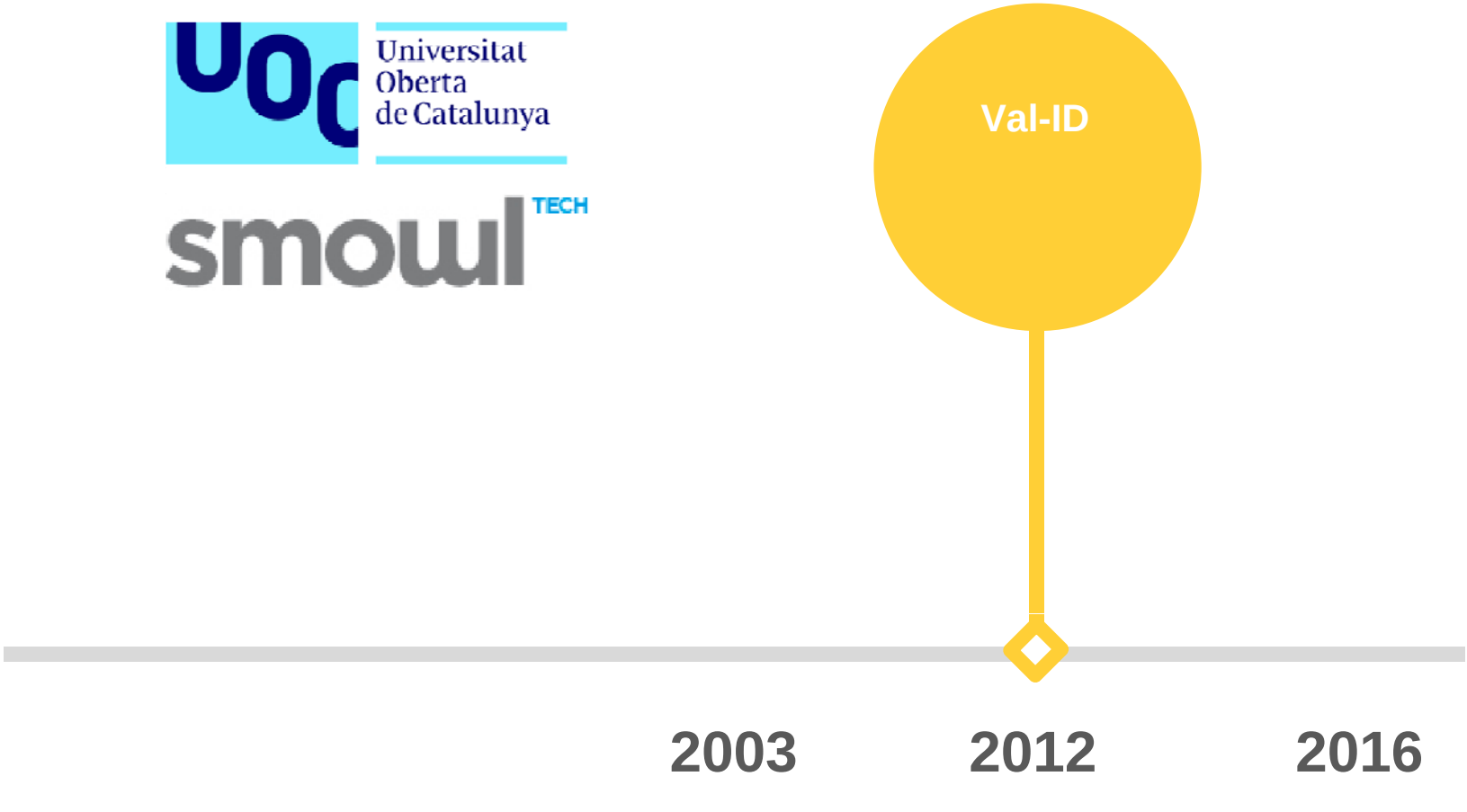
2.-TeSLA: H2020 project

3.- **Val-id: UOC+Smowl system**

3.- Val-ID

Universitat Oberta de Catalunya

smowl TECH



smowl - eProctoring

smowl es un **sistema continuo de autenticación de la identidad del estudiante online** que utiliza un **algoritmo de reconocimiento facial** automático para verificar la identidad del usuario y detectar comportamientos incorrectos a través de todo el proceso de aprendizaje. (tecnología patentada)

Continuous Assessment Proctoring

Autenticación continuamente la identidad del estudiante a través de la evaluación. **Tarifa plana.**

Este servicio **monitoriza varias actividades** del curso:

Exam Proctoring

Autenticación continuamente la identidad del estudiante a través del examen final. **Precio por examen.**

Este servicio **monitoriza** una actividad: **el examen final.**

Características
- Continuo
- Pasivo/Automático
- Escalable
- Fiable
- Fácil de usar
- Flexible
- Seguro
- Privado (LOPD)

Ricardo Vea, CEO
ricardo.vea@smowltech.com
www.smowltech.com

1.- Resultados 2º piloto - 2017
Análisi imagenes recibidas

Análisis imágenes recibidas:

Reconeixemento facial	Número	%
% pruebas con el 100% de verificación	358	70,20%
% pruebas con más del 90% de verificación correcto	447	87,65%

El 90% parece un buen umbral.

Nº de imágenes por prueba

Grupo	Número	%	Conclusión
Imágen capturada cada 2 minutos o menos	**423**	**82,94%**	La mayoría van bien.
No aplica ya que no tenemos hora de subida y/o bajada de la prueba (sistema UOC)	**56**	**10,98%**	No tenemos información de un10%
Imágen capturada entre 3-6 minutos	**24**	**4,71%**	No sembla significatiu i l'interval encara és acceptable
Imágen capturada en más de 6 minutos	**7**	**1,37%**	Revisar estos casos. En la mayoría no hay más de 3 imágenes.

1.- Resultados 2º piloto
Análisi imagenes recibidas

Anàlisi imágenes por tipologia

Tipologia	Número	%	Conclusión
Condiciones no válidas	98	19,22%	Examen escrito = 41,84% La persona se mueve = 26,53% Afecta a 1-2 imágenes al principio o al final = 8,16% La persona se tapa la cara (se rasca o similar) = 8,16% Cámara mal colocada (sólo se ven los ojos) = 7,14% Cámara mal colocada (sólo se ve la boca) = 3,06% Poca luz = 2,04% No hay nadie en la imagen = 1,02%
Imágen vacía	37	7,25%	Primeras imágenes = 45,95% En medio = 40,54% (pocas imágenes seguidas) Últimas imágenes = 13,51%
No se detecta persona	26	5,10%	No hay persona = 80,77% (pocos fotográmas. No significativo) La persona se ha levantado y se la ve al fondo de la imagen = 11,54% La misma persona que se gira = 7,69%
No hay cámara	13	2,55%	No es significativo, en todos los casos son pocas imágenes.
Reconoce más de 1 persona	6	1,18%	Pocos fotográmas. No parece significativo.

1.- Resultados 2º piloto
Análisi imagenes recibidas

Anàlisi imágenes por tipologia

Tipologia	Número	%	Conclusión
Reconoce más de 1 persona	6	1,18%	Pocos fotográmas. No parece significativo.
Webcam tapada	4	0,78%	Pocos fotográmas. No parece significativo.
Otra app bloquea la cámara	3	0,59%	No parece significativo.
Webcam rechazada	2	0,39%	No parece significativo.
Otra pestaña	2	0,39%	No parece significativo.
Usuario incorrecto	0	0%	
Intento de trampa	0	0%	
Navegador no soportado	0	0%	

Estudiantes FAKE:

- Ha detectado:
  - El uso de un programa que emite una grabación hecha previamente (Manycam).
  - Un caso de suplantación entre registro y exámen.

- No ha detectado:
  - El uso de un programa que emite una grabación hecha previamente. El programa es (vlc2vcam, plugin de VLC).
  - El uso de un portátil emitiendo un video pregrabado y con la cámara enfocada al video.
  - 2 gemelos que se intercambiaron.

Conclusiones:

- Si alguna de las imágenes tiene “intento de trampa” o “usuario incorrecto”: Se tiene que revisar.
- Si el 90% de las imágenes son correctas se puede dar por bueno.
- Añadir en las instrucciones UOC para los estudiantes
  - No hablar por teléfono durante la prueba.
  - No levantarse
  - No puede aparecer nadie más en la imagen
  - Recalcar el tema de condiciones(luz, colocación cámara ...etc).
- Examenes escritos: Muchas imagenes son detectadas como erróneas. Pensar que hacer.

DATOS INICIALES

Entidad: UOC
Actividad: quiz75.562
Usuario: UOC_911942

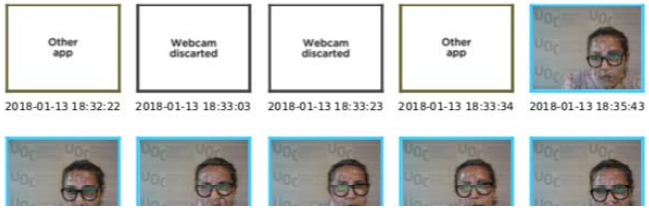
LEYENDA DE COLORES

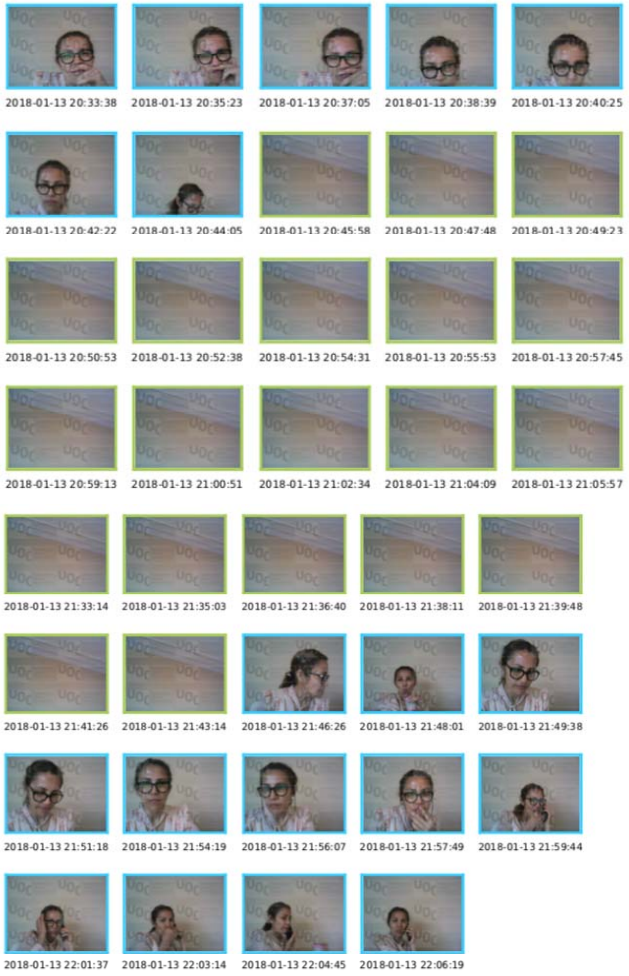
Usuario correcto (90) | No hay nadie (35) | Usuario incorrecto (0) | Varias personas (0) | Webcam tapada (0)
Luz o pose incorrectas (0) | Intento de trampa (0) | No hay cámara (0) | Otra app bloquea la cámara (2)
Webcam rechazada (2) | Navegador no soportado (0) | Otra ventana (0) | Imagen vacía (0)

IMÁGENES DE REGISTRO

IMAGEN UNIVERSIDAD

IMÁGENES DE ACTIVIDAD





IMÁGENES DE REGISTRO

Universitat Oberta de Catalunya

Resultados encuesta 2018

Pregunta		Resultados 1 piloto 20151	Resultatdo 2 pilot0 20161	Resultat 3 pilot 20162	Resultat 4 pilot 20171
Funcionament general de l'eina (de l'1 al 5)		4	3,9	3,9	4,3
Facilitat d'ús de l'eina (de l'1 al 5)		4,2	4,1	4	4,4
Comprensió manual d'usuari (de l'1 al 5)		4,2	4,2	3,9	4,3
Informació que et vam donar abans i durant la realització de la prova (de l'1 al 5)		4	3,9	3,6	4
Percepció de la seguretat i el tractament de dades		3.6	4,1	3,7	4
Has tingut alguna incidència durant la realització de la prova?	Sí	38%	61%	44,3%	32,2%
	No	58%	39%	55,7%	66,9%
	NS / NC	4%	-	-	0,9%
En el cas que sí, valora l'atenció rebuda (de l'1 al 5)		4,3	4,3	3,9	4,4

P:221, m=118 (53%)

Universitat Oberta de Catalunya

Muchas gracias!

Valladolid, 9 de mayo de 2018

Josep Prieto (jprieto@uoc.edu)