



TESLA PROJECT:
AN INSTRUMENT TOWARDS ONLINE QUALITY ASSURANCE
Zaragoza [14/11/2018]



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

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- TeSLA System
- Demo
- Next steps
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TESLA MAIN GOAL



Innovation Action, with **Large Scale Pilots**. From January 2016 to March 2019.



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.



TeSLA covers teaching and learning processes as well as **quality, ethical, legal and tech** aspects.

AUTHENTICATION



AUTHORSHIP



CONSORTIUM

18 Partners (130 members) + 50 external experts

8 Universities

3 Quality Agencies

4 Research Centers

3 Enterprises



PROJECT 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).

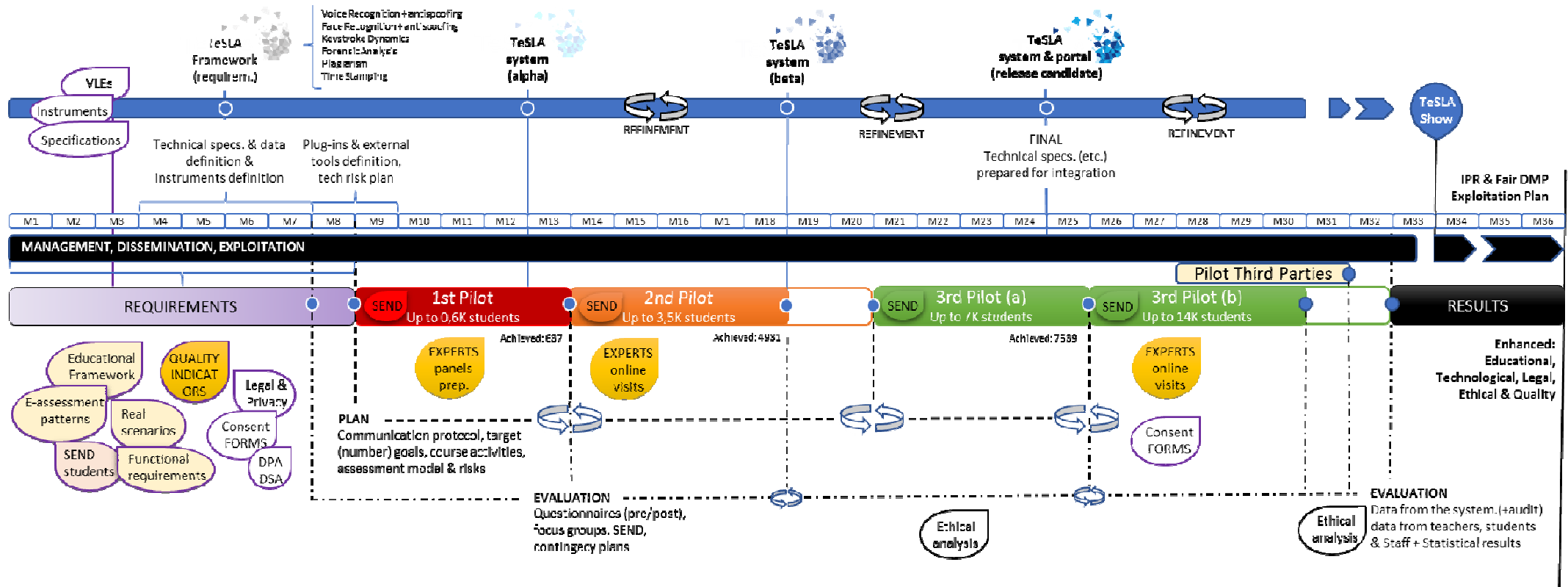
WP4

QUALITY ASSURANCE IN HIGHER EDUCATION

The main goal of this WP **is to assure and guarantee the quality of e-assessment processes** in Higher Education. It includes:

- **Define the quality aspects that must be followed** during the project development to be aligned with the aims of the quality assurance agencies responsible for the Higher Education System.
- Establish the **quality parameters of learner assessment** in online Higher Education (considering ESG).
- **Guarantee that the proposed model of e-assessment fits the criteria defined by quality agencies to be accredited.**
- ...

PROJECT TIMELINE



SOME FIGURES



A) Learners & Teachers

Learners (unique): **22.941 (SEND incl.)**
Teachers: 500 aprox.

B) Fields

Computer Science
Education & Psychology
Economics, Law, etc



C) Instruments/learners

VR: 2.799
FR: 11.989
KS: 4.923
FA: 5.416
PL: 9.978
Total: 35.105



D) VLEs

Moodle, Blackboard
yOUlearn, Koppa
Own VLE

E) Legal, Ethical & Quality

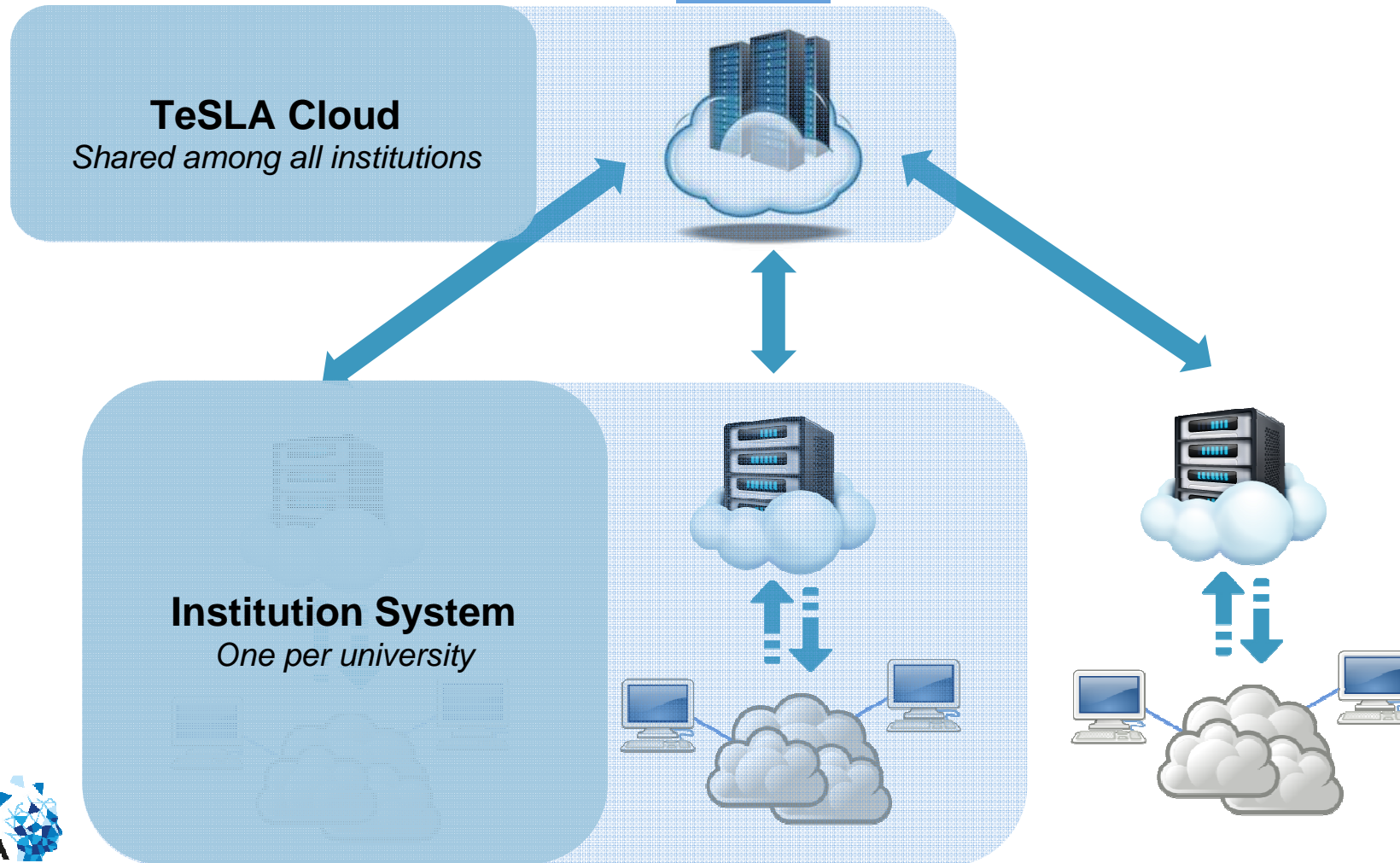
Legal framework
Ethical recommendations
FAQs and Roadmap
Quality framework for e-assessment



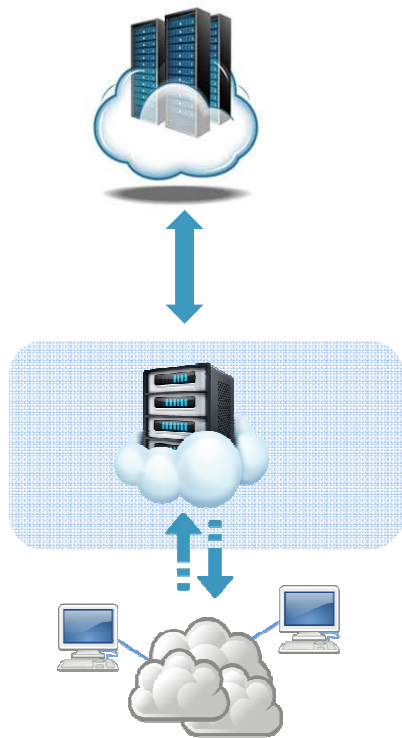
F) Third parties ofTeSLA

Tech providers (2)
HEIs (5)

TESLA SYSTEM



TESLA SYSTEM

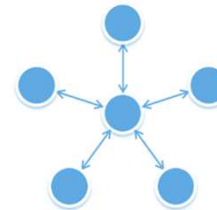


INSTRUMENTS

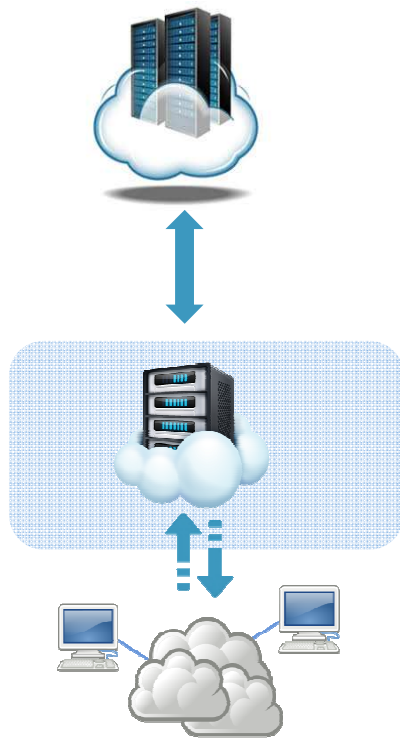
- Instruments provide to TeSLA their analysis capabilities.
- TeSLA defines a standard instrument interface.



- TeSLA system can be seen as a hub to connect any instrument.



TESLA SYSTEM

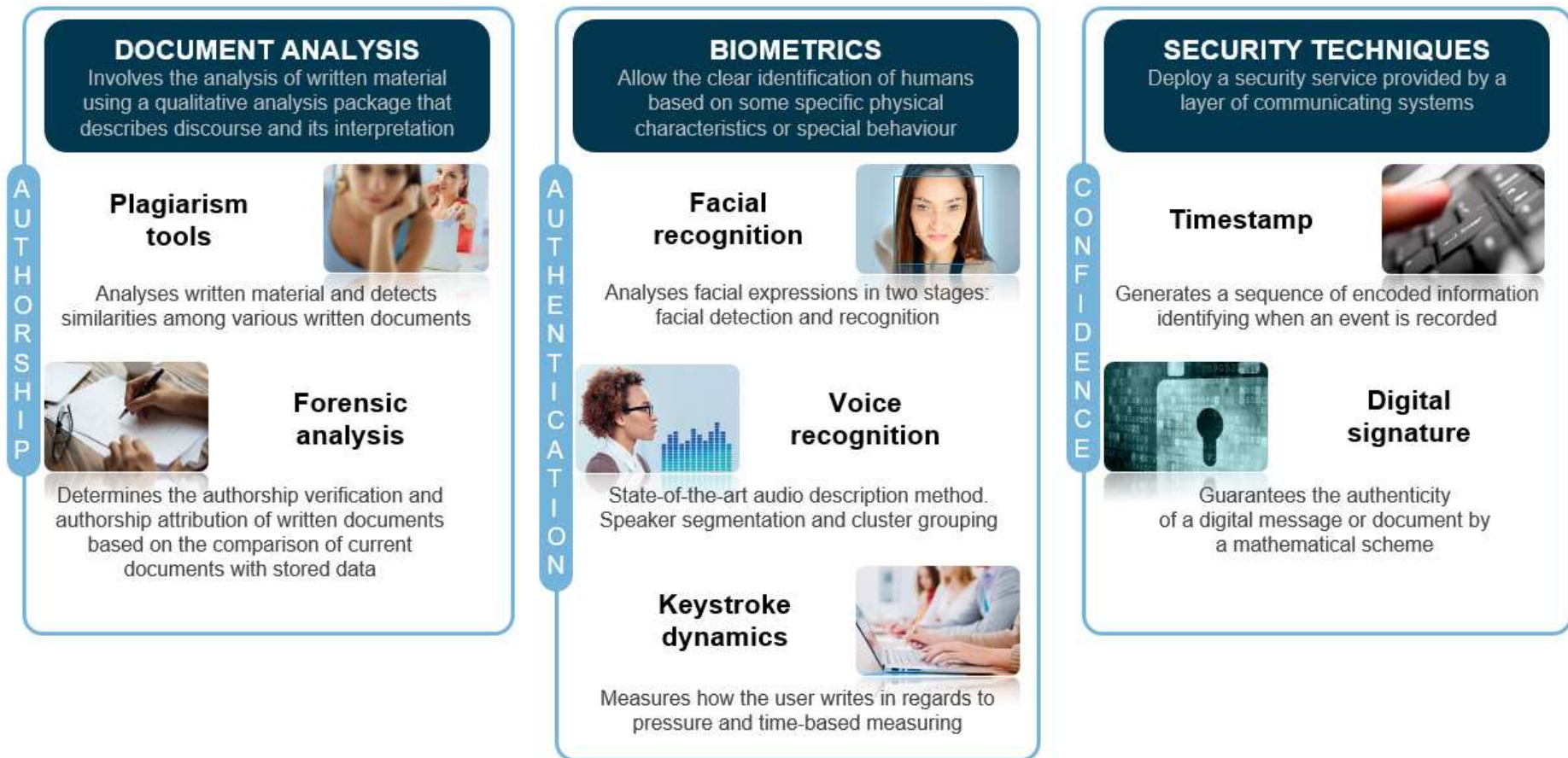


INSTRUMENTS

- TeSLA project was tested with instruments using only standard hardware:
 - Microphone
 - Webcam
 - Keyboard
- Not standard hardware can allow to include new instruments:
 - Fingerprint readers
 - Digital Tablets for handwriting
 - Official digital certificates / e-Passport



TESLA SYSTEM



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DOCUMENT ANALYSIS
Involves the analysis of written material using a qualitative analysis package that describes discourse and its interpretation

Figure 1: Schematic representation of the experimental design.

The figure is divided into two main sections: **Pretest** and **Main Experiment**.

Pretest:

- Pretest 1:**
 - Pretest 1a:** Stimulus: 1000 Hz, 100 ms. Response: 1000 Hz, 100 ms. Feedback: 1000 Hz, 100 ms.
 - Pretest 1b:** Stimulus: 1000 Hz, 100 ms. Response: 1000 Hz, 100 ms. Feedback: 1000 Hz, 100 ms.
- Pretest 2:** Stimulus: 1000 Hz, 100 ms. Response: 1000 Hz, 100 ms. Feedback: 1000 Hz, 100 ms.

Main Experiment:

- Main Experiment 1:**
 - Main Experiment 1a:** Stimulus: 1000 Hz, 100 ms. Response: 1000 Hz, 100 ms. Feedback: 1000 Hz, 100 ms.
 - Main Experiment 1b:** Stimulus: 1000 Hz, 100 ms. Response: 1000 Hz, 100 ms. Feedback: 1000 Hz, 100 ms.
- Main Experiment 2:** Stimulus: 1000 Hz, 100 ms. Response: 1000 Hz, 100 ms. Feedback: 1000 Hz, 100 ms.

Pretest 1 Table:

Condition	Correct	Incorrect
1000 Hz, 100 ms	1000	1000
1000 Hz, 200 ms	1000	1000
1000 Hz, 300 ms	1000	1000
1000 Hz, 400 ms	1000	1000
1000 Hz, 500 ms	1000	1000
1000 Hz, 600 ms	1000	1000
1000 Hz, 700 ms	1000	1000
1000 Hz, 800 ms	1000	1000
1000 Hz, 900 ms	1000	1000
1000 Hz, 1000 ms	1000	1000

Main Experiment 1 Table:

Condition	Correct	Incorrect
1000 Hz, 100 ms	1000	1000
1000 Hz, 200 ms	1000	1000
1000 Hz, 300 ms	1000	1000
1000 Hz, 400 ms	1000	1000
1000 Hz, 500 ms	1000	1000
1000 Hz, 600 ms	1000	1000
1000 Hz, 700 ms	1000	1000
1000 Hz, 800 ms	1000	1000
1000 Hz, 900 ms	1000	1000
1000 Hz, 1000 ms	1000	1000



Determines the authorship verification and authorship attribution of written documents based on the comparison of current documents with stored data

BIOMETRICS
Allow the clear identification of humans based on some specific physical characteristics or special behaviour

Facial recognition

A woman with curly hair and glasses is shown in profile, looking towards a bar chart. The chart has several vertical bars of varying heights, colored in shades of blue and green.

State-of-the-art audio description method.
Speaker segmentation and cluster grouping



AUTHENTICATION

SECURITY TECHNIQUES

Deploy a security service provided by a layer of communicating systems

[illegible]

CONFIDENCE



ONLINE DATA GATHERING

DOCUMENT ANALYSIS

Involves the analysis of written material using a qualitative analysis package that describes discourse and its interpretation

AUTHORSHIP

Plagiarism tools



Analyses written material and detects similarities among various written documents



Forensic analysis

Determines the authorship verification and authorship attribution of written documents based on the comparison of current documents with stored data

BIOMETRICS

Allow the clear identification of humans based on some specific physical characteristics or special behaviour

AUTHENTICATION

Facial recognition



Analyses facial expressions in two stages: facial detection and recognition



Voice recognition

State-of-the-art audio description method. Speaker segmentation and cluster grouping

Keystroke dynamics



Measures how the user writes in regards to pressure and time-based measuring

SECURITY TECHNIQUES

Deploy a security service provided by a layer of communicating systems

CONFIDENCE

Timestamp



Generates a sequence of encoded information identifying when an event is recorded

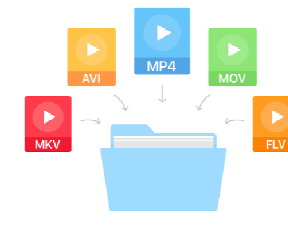
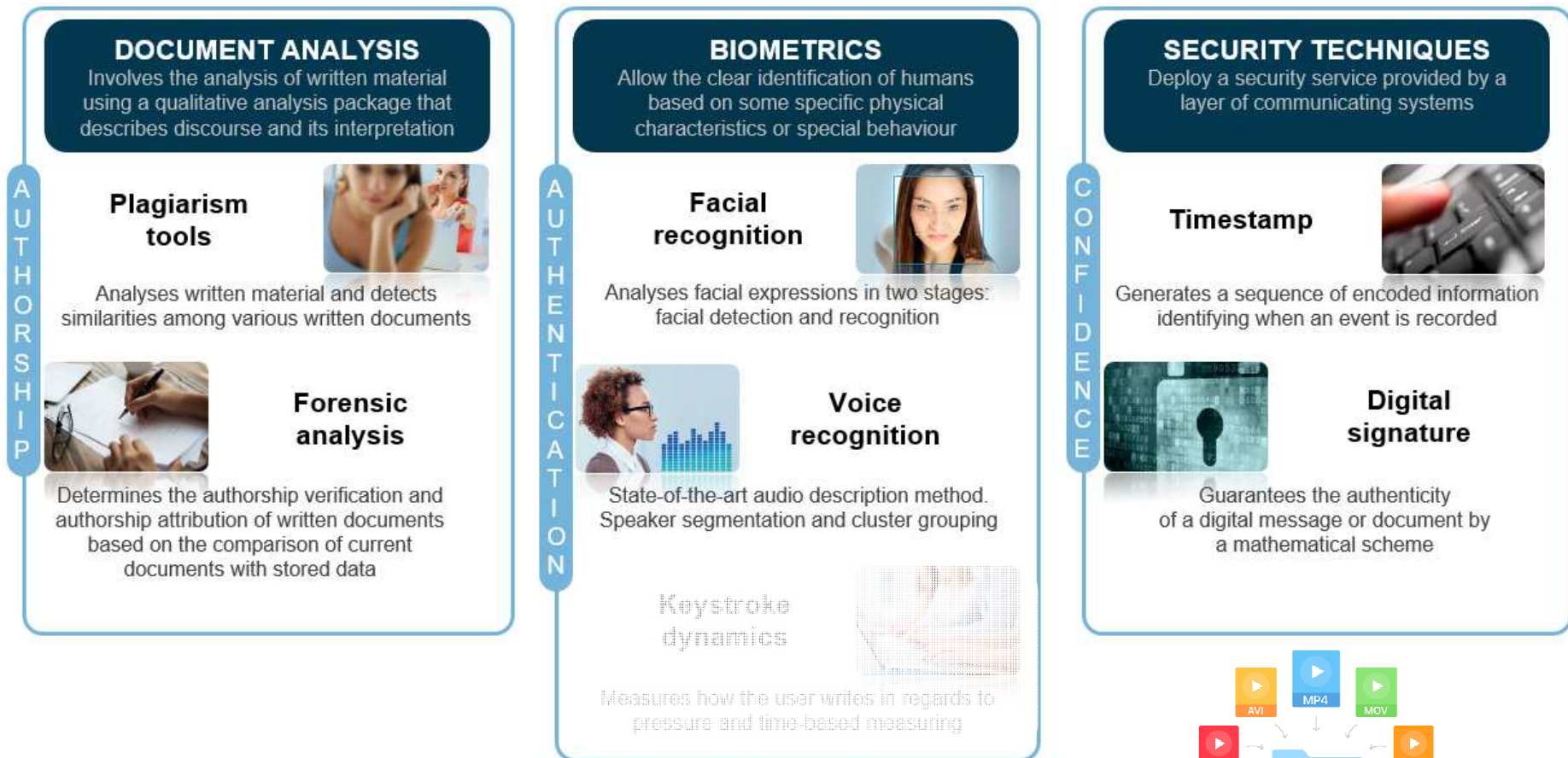


Digital signature

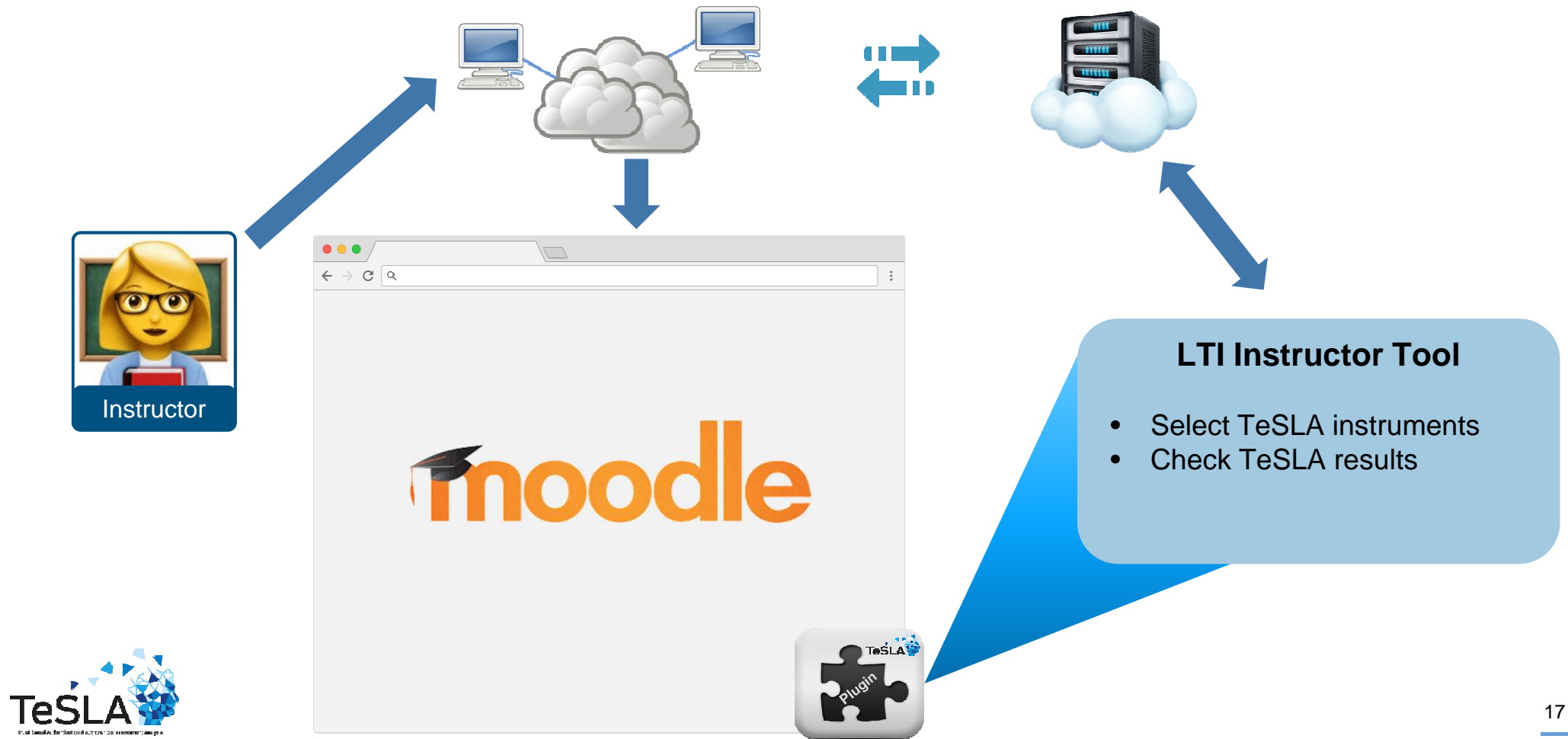
Guarantees the authenticity of a digital message or document by a mathematical scheme



OFFLINE DATA GATHERING



INSTRUCTOR TOOL- ACTIVITY CONFIGURATION



INSTRUCTOR TOOL- ACTIVITY CONFIGURATION



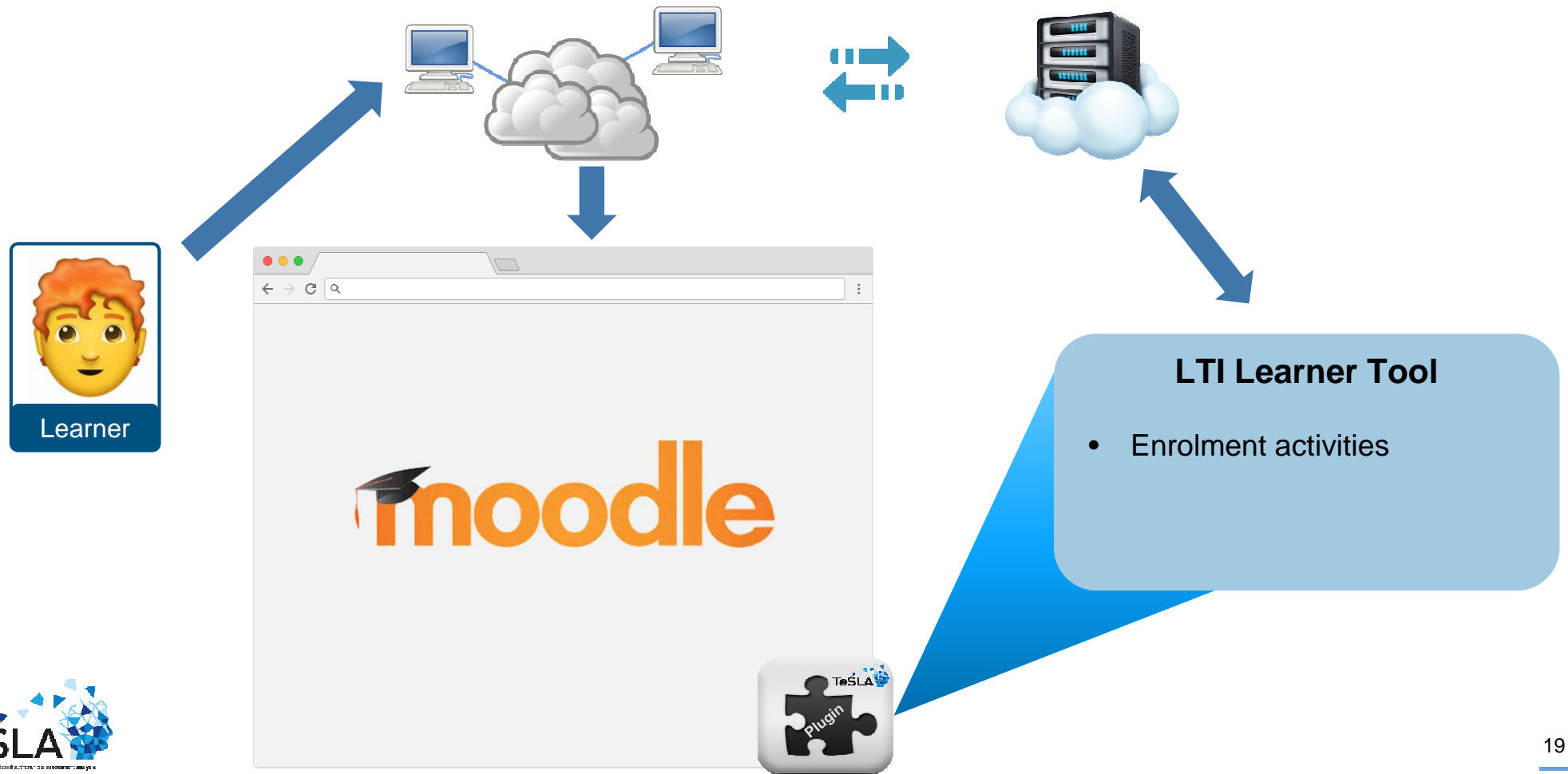
Configure TeSLA available instruments on activity

Tesla Instructor Tool / Configure TeSLA available instruments on activity 36

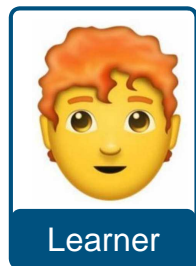
Instrument	Settings		Alternative instruments
Face Recognition and Verification	Enabled <input type="checkbox"/>	Required <input type="checkbox"/>	(1) --- ▾
Face Presentation Attack Detection	Enabled <input type="checkbox"/>	Required <input type="checkbox"/>	(2) --- ▾
Automatic Speaker Verification	Enabled <input type="checkbox"/>	Required <input type="checkbox"/>	(3) --- ▾
Voice Presentation Attack Detection	Enabled <input type="checkbox"/>	Required <input type="checkbox"/>	(4) --- ▾
Keystroke Dynamics	Enabled <input type="checkbox"/>	Required <input type="checkbox"/>	(5) --- ▾
Plagiarism Detection	Enabled <input type="checkbox"/>	Required <input type="checkbox"/>	(6) --- ▾
Authorship Verification	Enabled <input type="checkbox"/>	Required <input type="checkbox"/>	(7) --- ▾
Time Stamp And Document Signing	Enabled <input type="checkbox"/>	Required <input type="checkbox"/>	(8) --- ▾




LEARNER – ENROLMENT ACTIVITY



LEARNER – ENROLMENT ACTIVITY (FR)





Face Recognition

Voice Recognition

Keystroke Dynamics

Forensic Analysis

instructions

Stand in front of your screen with a webcam facing towards you.

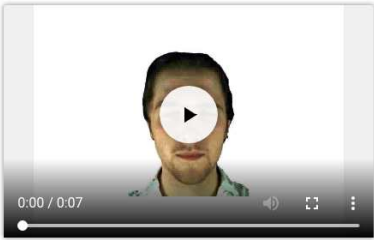
It is important to make sure the following:

- Make sure that the camera is correctly capturing the whole face without leaving any parts outside of the image boundaries.
- It is also important to make sure that the camera is approximately facing your face with horizontal direction, i.e. the camera is approximately at the same height as your eyes/nose.
- Make sure that the activity is performed in an environment with reasonable lighting conditions (neither too bright nor too dark).
- Follow the instructions on the video at a similar speed. The final duration of the video will be of about 10 seconds.
- Please push Start button to start capturing the video. When ready, push Stop button to stop recording. Activity will close automatically.

Select video device: USB2.0 VGA UVC WebCam (04f2:b52b) ▼

Follow the video instructions
In order to enroll face recognition


0:00 / 0:07



Start

0%

Status face model

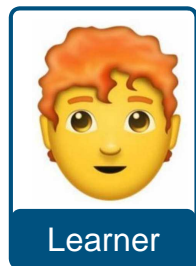



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LEARNER – ENROLMENT ACTIVITY (VR)





Face Recognition

Voice Recognition

Keystroke Dynamics

Forensic Analysis

instructions

Stand in front of your screen with a webcam facing towards you

It is important to make sure that:

Your microphone is connected and working

There is no ambient noise.

It will be three questions for enrolment and five audio samples sent per question, each sample will last less than 15 seconds

Please, keep talking about the question asked, the tool will be sending samples frequently and you will see the enrolment percentage or the status messages.

Select audio device

Follow the instructions

In order to enroll voice recognition


What are your reasons for enrolling to this course or study?

Start Stop

0:00 / 0:00

0%

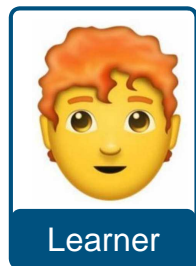
Status voice model



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LEARNER – ENROLMENT ACTIVITY (KD)



TeSLA

TeSLA

Face Recognition

Voice Recognition

Keystroke Dynamics


Forensic Analysis

instructions
In order to enroll keystroke dynamics, talk about yourself.

Type text into the text area


0%

Status keystroke model



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LEARNER – ENROLMENT ACTIVITY (FA)



Learner



TeSLA

Face Recognition

Voice Recognition

Keystroke Dynamics

Forensic Analysis

instructions


In order to enroll forensic analysis, talk about your friends

Type text into the text area

0 / 250 words


0%

Status forensic model




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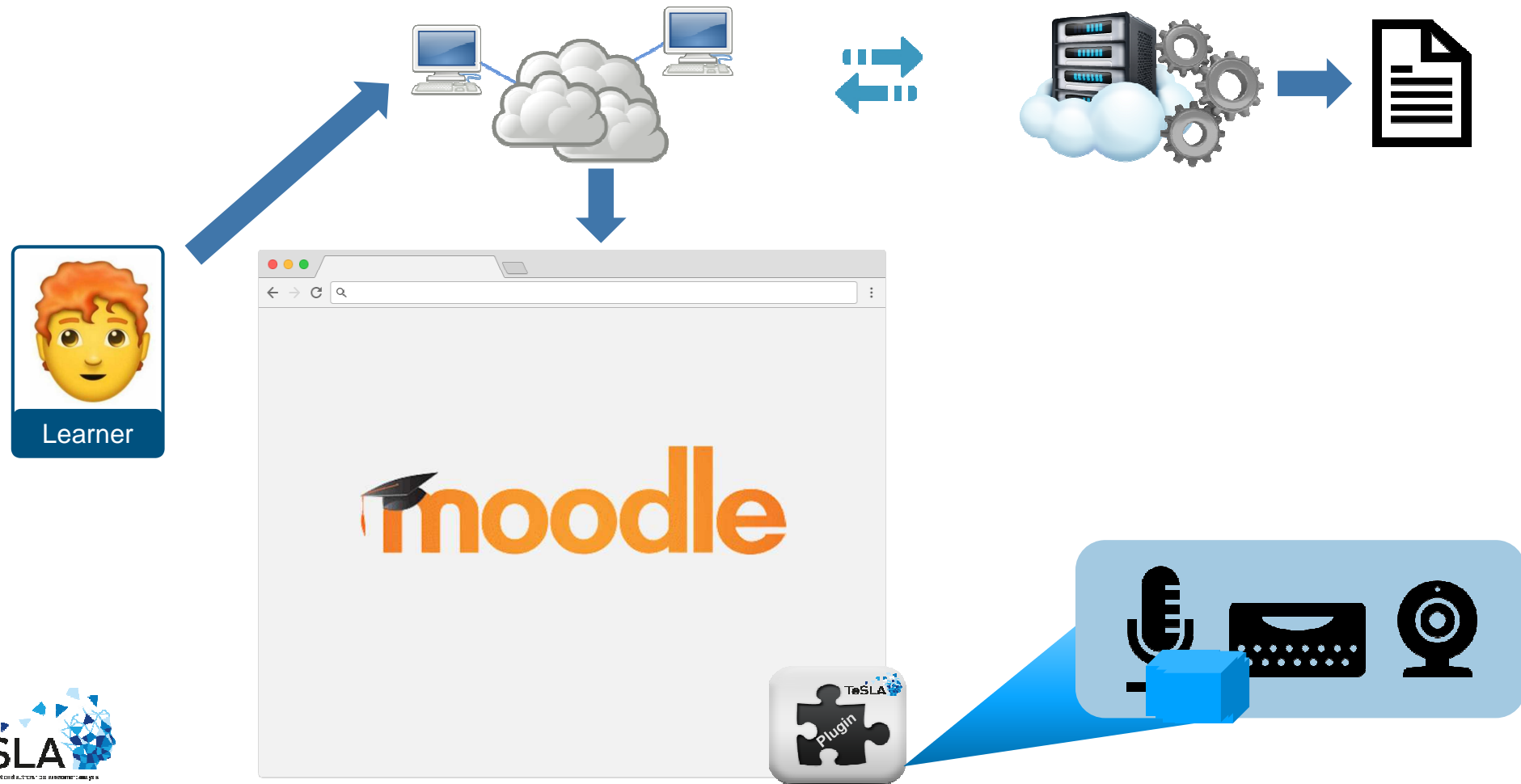


TeSLA

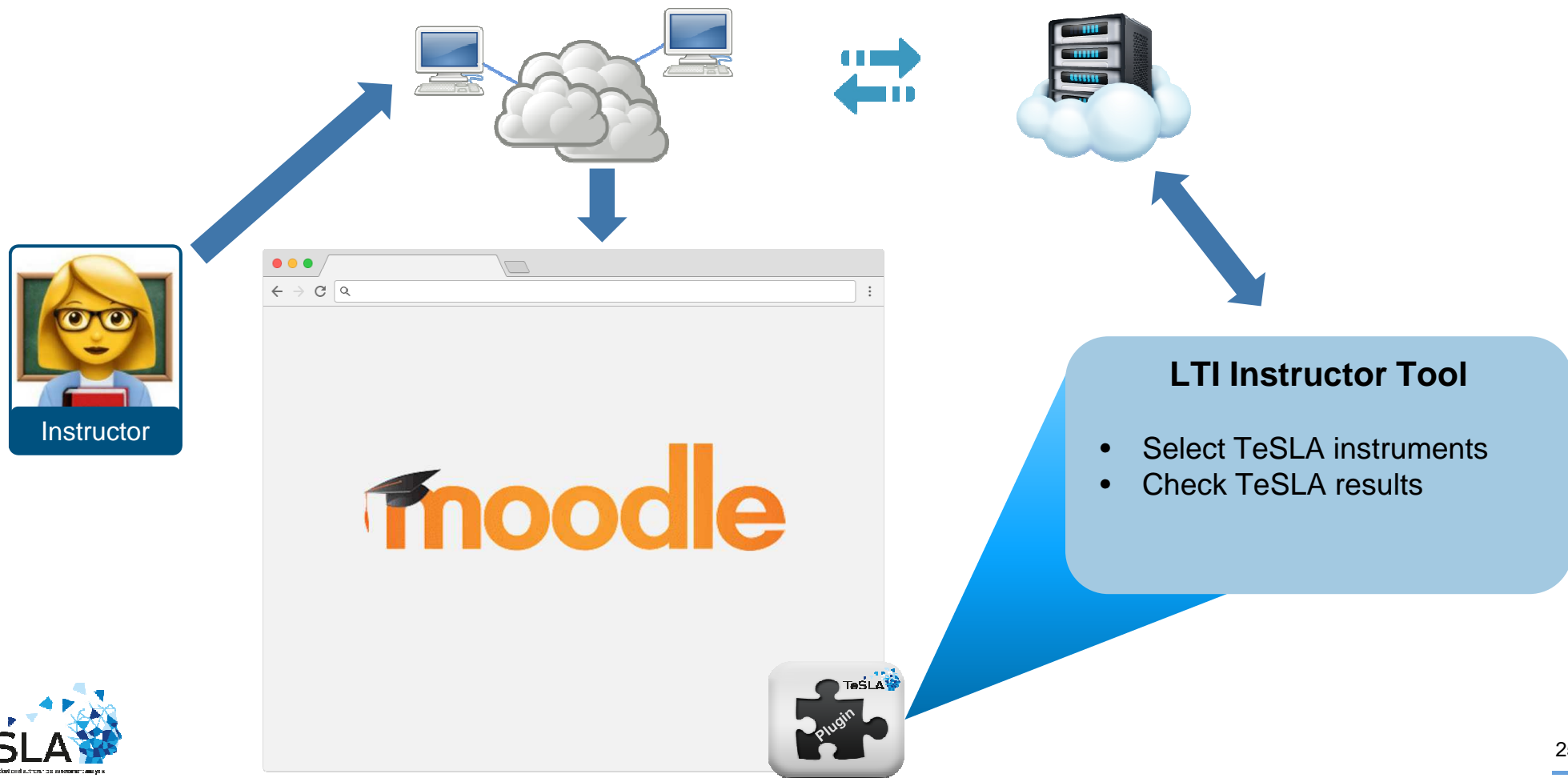
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LEARNER – ASSESSMENT ACTIVITY



INSTRUCTOR TOOL- ACTIVITY RESULTS



INSTRUCTOR TOOL- ACTIVITY RESULTS

Resultats TeSLA. -

Tesla Instructor Tool / Resultats TeSLA. -

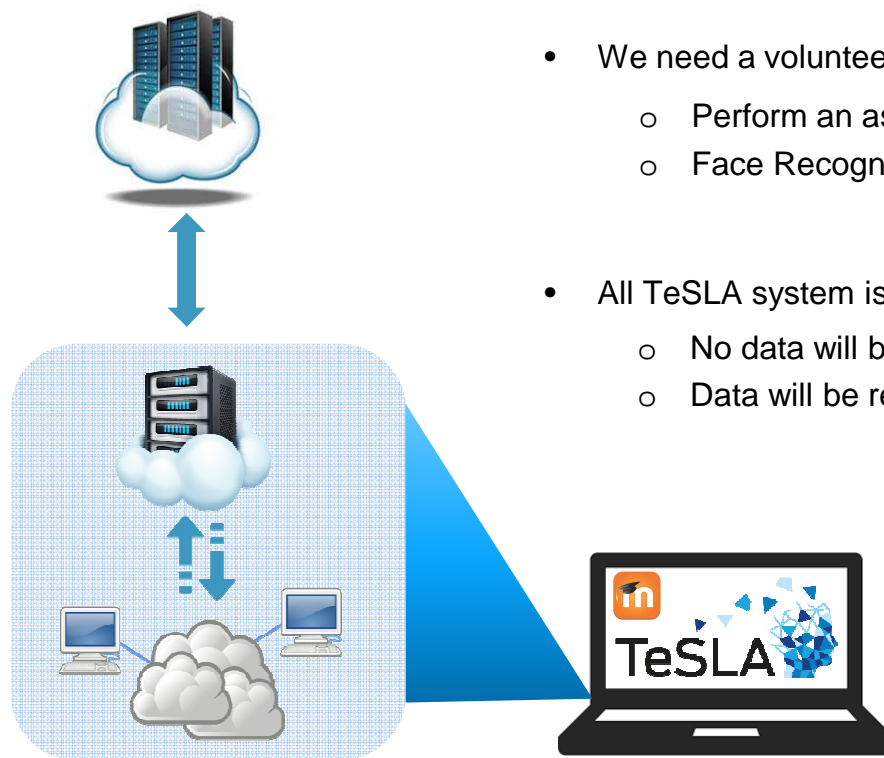


Cercar estudiant

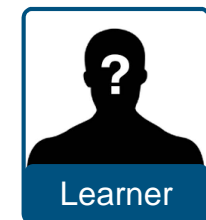
Només es mostraran els instruments configurats o els alternatius.

Resultat de l'avaluació	Data d'inici	Data final	Auditoria
0.0%	mayo 31º 2018, 5:41:27 pm	mayo 31º 2018, 5:41:45 pm	Més informació
66.5%	mayo 31º 2018, 5:41:29 pm	mayo 31º 2018, 5:41:46 pm	
0.0%	mayo 31º 2018, 5:41:33 pm	mayo 31º 2018, 5:41:48 pm	Més informació
0.0%	mayo 31º 2018, 5:41:36 pm	mayo 31º 2018, 5:41:47 pm	Més informació
69.3%	mayo 31º 2018, 5:41:39 pm	mayo 31º 2018, 5:41:47 pm	
0.0%	mayo 31º 2018, 5:41:42 pm	mayo 31º 2018, 5:41:48 pm	Més informació
71.3%	mayo 31º 2018, 5:41:45 pm	mayo 31º 2018, 5:41:48 pm	
68.7%	mayo 31º 2018, 5:41:59 pm	mayo 31º 2018, 5:42:19 pm	
69.7%	mayo 31º 2018, 5:42:03 pm	mayo 31º 2018, 5:42:19 pm	
58.6%	mayo 31º 2018, 5:42:05 pm	mayo 31º 2018, 5:42:20 pm	
53.8%	mayo 31º 2018, 5:42:06 pm	mayo 31º 2018, 5:42:20 pm	

TESLA LIVE DEMO



- We need a volunteer:
 - Perform an assessment activity as a learner
 - Face Recognition will be used to verify identity
- All TeSLA system is in the laptop, including the VLE
 - No data will be sent outside
 - Data will be removed after the event

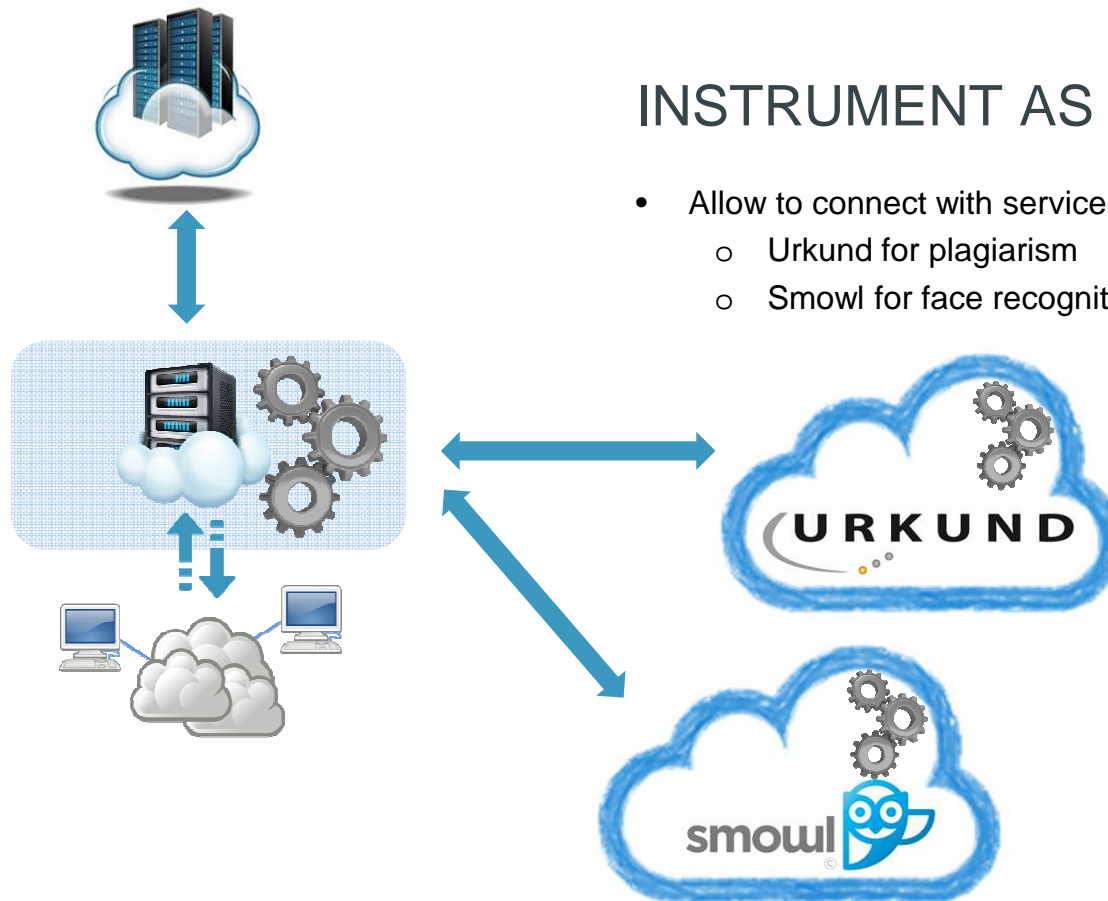


NEXT STEPS



INSTRUMENT AS A SERVICE

- Allow to connect with service providers:
 - Urkund for plagiarism
 - Smowl for face recognition



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Journal compilation © 2006 Blackwell Publishing Ltd

NEXT STEPS



Join summary (All available information)

Summary at instrument level. Only types valid for each instrument

TeSLA ID	Summary	Enrolment	Confidence	Result	Summary	Enrolment	Confidence	Result	Summary	Enrolment	Confidence	Result	Summary	Enrolment	Confidence	Result	Summary	Enrolment	Confidence	Result	Summary
0098f8c7-df44-4a1f-9524-30a8b34d064b		-	-	-		-	-	-		100%	100%	70%		-	-	-		-	-	-	
0225ea9f-be5c-457b-94f3-f506bcc0832f		-	-	-		-	-	-		-	-	-		100%	60%	-		-	0%	-	
036c5545-11eb-4bc5-b9f2-400b58d06836		-	-	-		-	-	-		-	-	-		100%	83%	-		-	0%	-	
038185ea-7a64-454a-8930-cb09816cfc41		-	-	-		-	-	-		100%	100%	72%		-	-	-		-	-	-	
04ae7156-ab5d-4e38-b9d0-c02fbc0e8d8d		-	-	-		-	-	-		-	-	-		100%	60%	-		-	0%	-	
0642e3b7-232b-4cad-8f88-4711529222		-	-	-		-	-	-		-	-	-		73%	-	-		-	-	-	
081f21f5-3b53-4ab6-bb0f-6870fca8d3c2		-	-	-		-	-	-		-	-	-		100%	31%	-		100%	100%	100%	
085b9c5f-4e00-4ac6-ba19-4820b56f3887		-	-	-		-	-	-		-	-	-		100%	43%	-		-	0%	-	
0861b2d4-f488-49d6-ae40-50efc5de457d		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-	
08b14b41-b01e-4a11-8795-7a7d8da8b39c		-	-	-		-	-	-		-	-	-		100%	58%	-		100%	100%	100%	
08dd4b3-22a5-46c2-bfe4-05c46169226b		-	-	-		-	-	-		-	-	-		100%	0%	-		100%	100%	100%	
08e722ad-49f1-498a-bdc3-9ec3158b54b1		-	-	-		-	-	-		100%	100%	68%		-	-	-		-	-	-	
09453b97-4167-429f-a7de-40fa8c8bfdd0		-	-	-		-	-	-		100%	100%	57%		-	-	-		-	-	-	
09d3297a-d893-49ed-b6b7-00c3379c0cc3		-	-	-		-	-	-		-	-	-		100%	52%	-		-	0%	-	
09f9de2-e6b4-4082-9b57-507f8d385ac7		100%	100%	0%		0%	-	-		100%	100%	69%		-	-	-		-	-	-	
0a131888-fb67-4933-88f9-34e7cbb518f3		-	-	-		-	-	-		-	-	-		100%	93%	-		-	0%	-	
0a5063be-d2c1-45db-98b3-eba2b1a7adca		0%	0%	-		0%	-	-		100%	100%	65%		-	-	-		-	-	-	
0a8cc322-5220-49e0-94b3-e56f1d4cb83d		-	-	-		-	-	-		-	-	-		100%	40%	-		-	0%	-	
0af3a4dc-8401-4949-8772-f80f0e2eed7		100%	100%	4%		0%	-	-		100%	100%	72%		-	-	-		-	-	-	
0c7f4035-207f-4081-a3a5-055bd5f031b		-	-	-		-	-	-		100%	100%	68%		-	-	-		-	-	-	

- 1) This will be the name of the learner in LTI
- 2) Allows to see the detailed information



Information about learner identity



Information on the document contents (authorship)



Security information (Anti-spoofing tools)



No information available



We have a good confidence that everything is correct



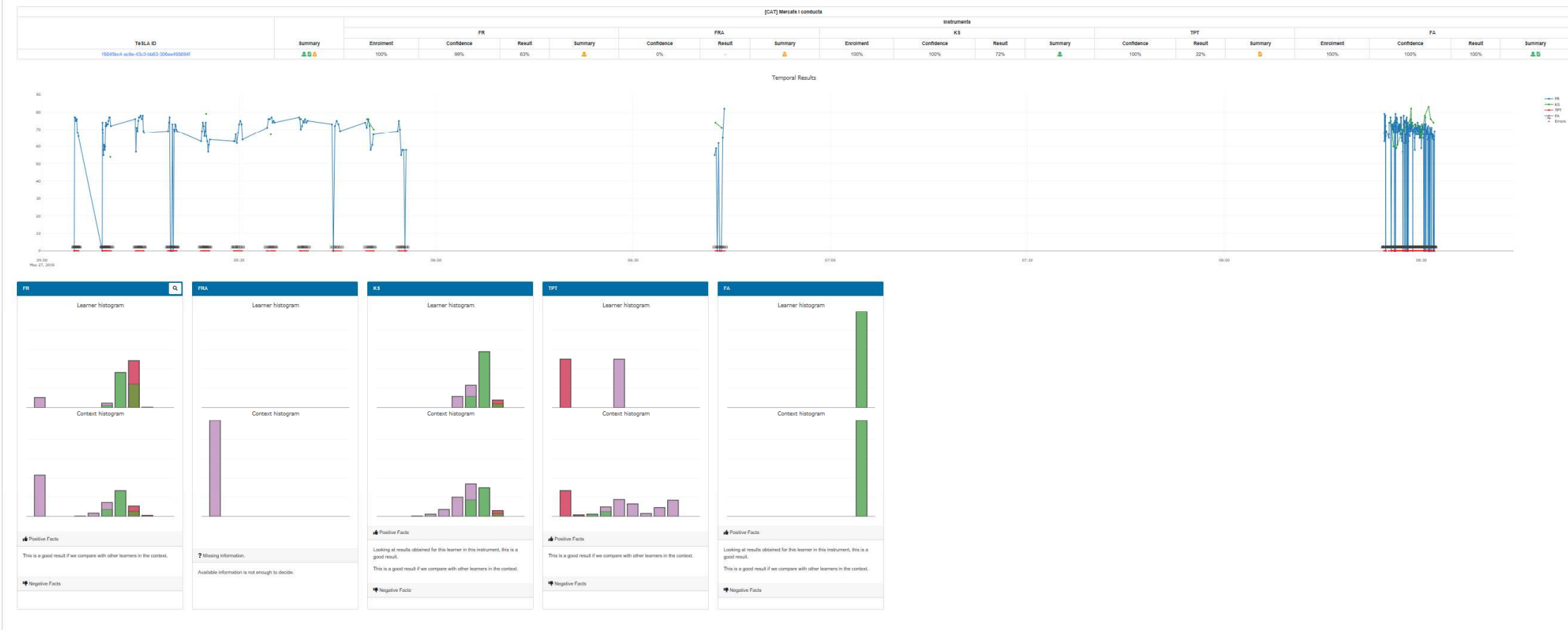
Information is not good enough or is contradictory (Review)



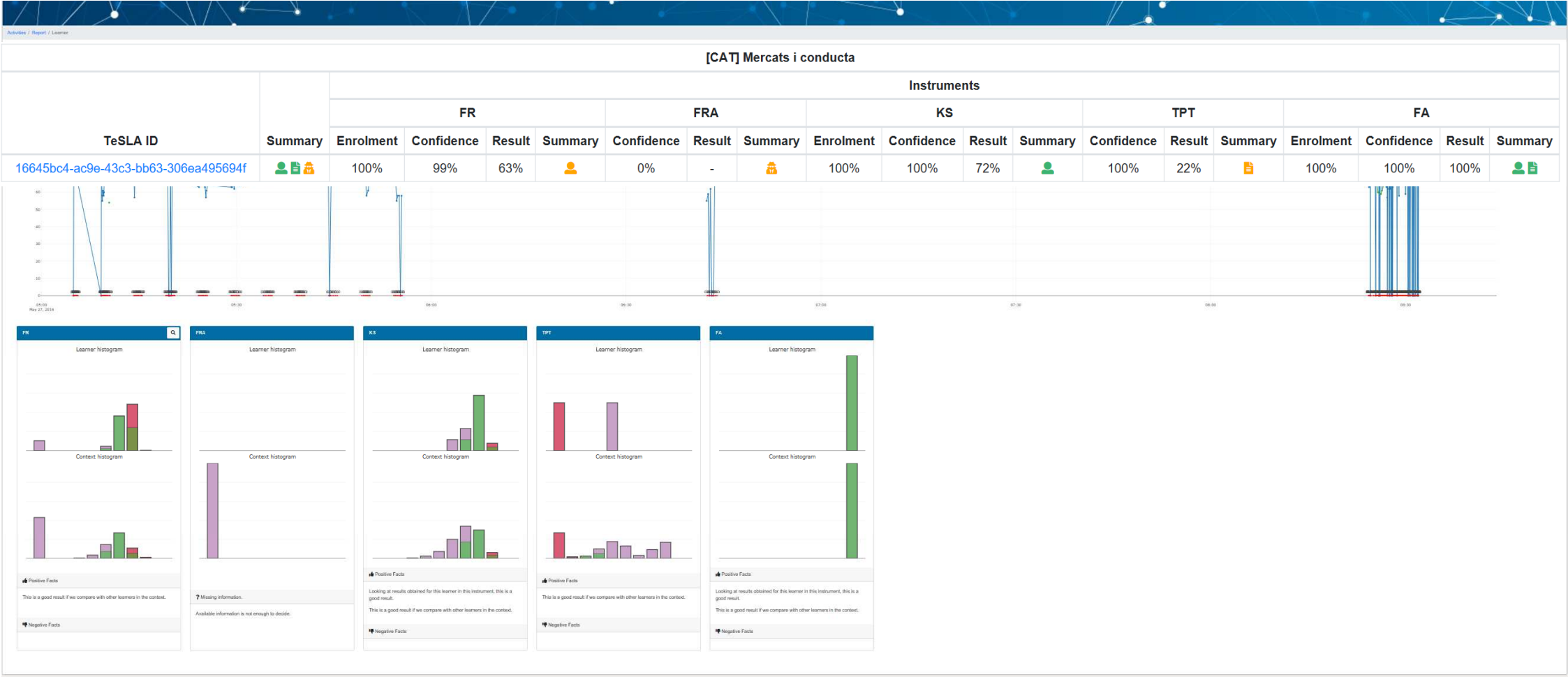
Information tell us that probably is a cheating case

NEXT STEPS

Activities / Report / Learner



NEXT STEPS



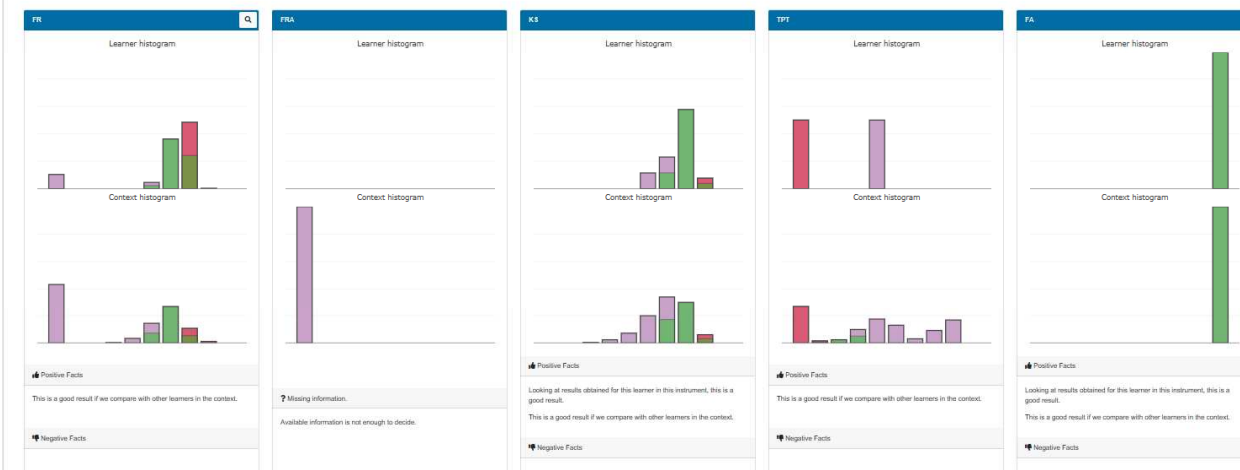
NEXT STEPS

Activities / Report / Learner

[CAT] Mercati I conduce																				
T&L ID		summary	FR				FRA			KS				TPT			FA			
			Enrolment	Confidence	Result	summary	Confidence	Result	summary	Enrolment	Confidence	Result	summary	Confidence	Result	summary	Enrolment	Confidence	Result	summary
1584504-acthe-43c3-3463-300ea49294f			100%	99%	63%		0%	-		100%	100%	72%		100%	22%		100%	100%	100%	

Temporal Results

Temporal Results



NEXT STEPS

Activities / Report / Learner

		[CAT] Mercat i conducta																	
Test ID	summary	FR				FRA			Instruments KS				TPT			FA			
		Enrolment	Confidence	Result	summary	Confidence	Result	summary	Enrolment	Confidence	Result	summary	Confidence	Result	summary	Enrolment	Confidence	Result	summary
15845040-actde-43c3-3463-300ea49294f		100%	99%	63%		0%	-		100%	100%	72%		100%	22%		100%	100%	100%	
Temporal Results																			

Temporal Results

FR

Learner histogram

Context histogram

Positive Facts

This is a good result if we compare with other learners in the context.

Negative Facts

FRA

Learner histogram

Context histogram

Missing information.

Available information is not enough to decide.

KS

Learner histogram

Context histogram

Positive Facts

Looking at results obtained for this learner in this instrument, this is a good result.

This is a good result if we compare with other learners in the context.

Negative Facts

TPT

Learner histogram

Context histogram

Positive Facts

This is a good result if we compare with other learners in the context.

Negative Facts

FA

Learner histogram

Context histogram

Positive Facts

Looking at results obtained for this learner in this instrument, this is a good result.

This is a good result if we compare with other learners in the context.

Negative Facts



Thank you!



TeSLA Project:
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THANK YOU FOR YOUR ATTENTION



USER ROLES

TeSLA Admin

- TeSLA cloud management and monitoring
- Software versions management
- Licence management
- Institution access management

Institution Admin

- Institution cloud management and monitoring
- Apply software updates
- Scale system according to assessment needs

Learner

- Accept Informed Consent
- Perform enrolment activities
- Perform assessment activities

Instructor

- Select instruments for activities
- Review TeSLA results for each activity

Institution Roles

- Legal
 - Manage content and versions of the Informed Consent [GDPR]
- Data management
 - Remove learner data [GDPR]
 - Remove old activities data [GDPR]
- SEND
 - Define SEND categories
 - Manage learners SEND data
- Result analysis [Alpha]
 - Statistical information
 - Global access to TeSLA results for learners (Course, Semester, Degree , ...)