

OPPORTUNITIES AND CHALLENGES FOR E-ASSESSMENT: THE CONTRIBUTION OF THE TeSLA PROJECT TO IMPROVING TRUST IN E-ASSESSMENT

(TeSLA)

AN ADAPTIVE TRUST-BASED E-ASSESSMENT SYSTEM FOR LEARNING

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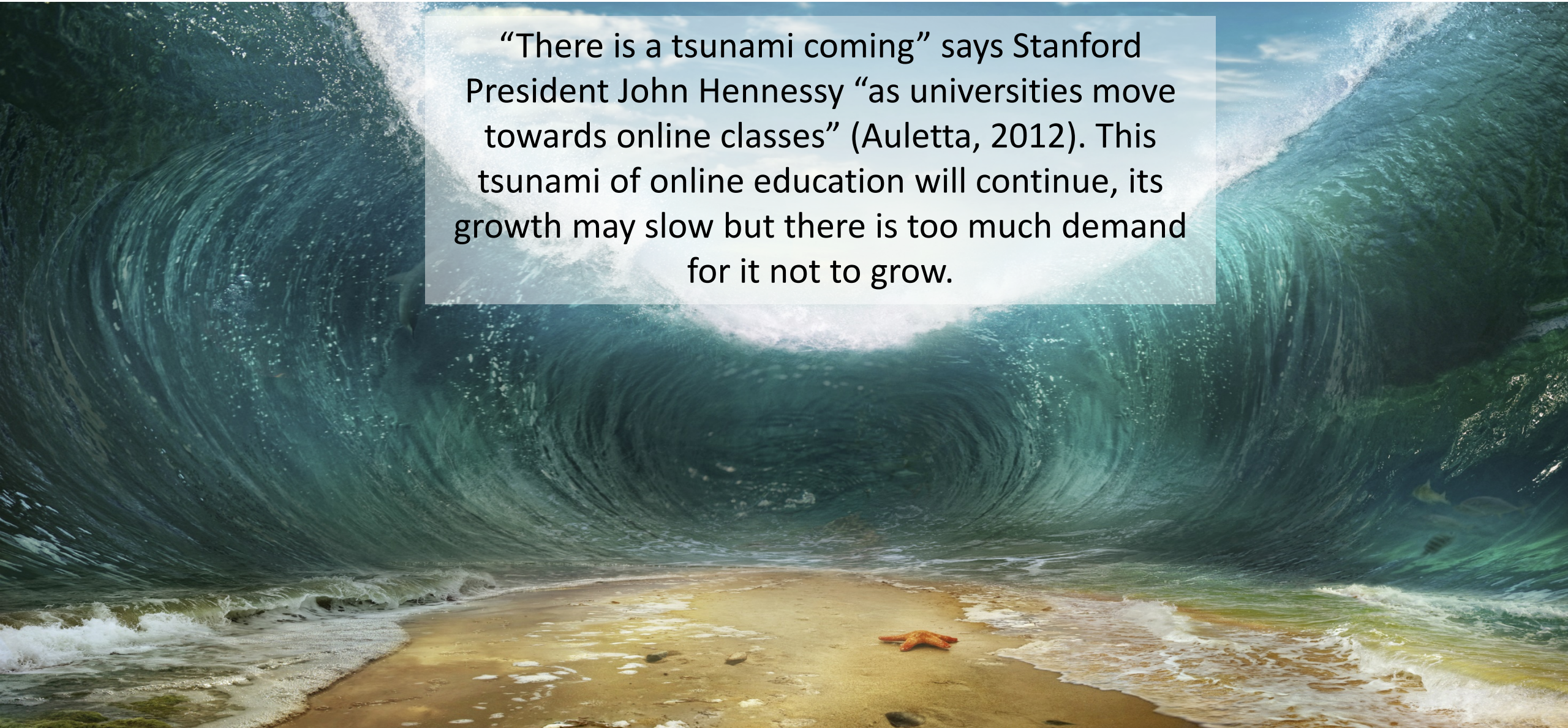
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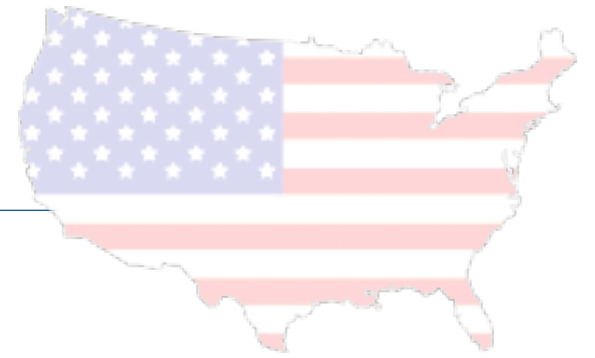
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The expansion of online education

“There is a tsunami coming” says Stanford President John Hennessy “as universities move towards online classes” (Auletta, 2012). This tsunami of online education will continue, its growth may slow but there is too much demand for it not to grow.



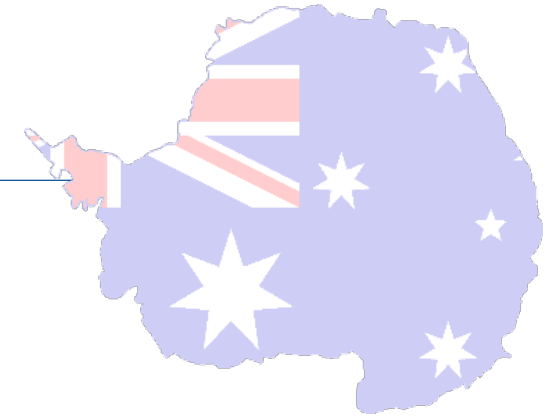


Some statistics to prove the “tsunami”

USA

- In 2010, 6.1 million students representing almost one-third of college students were enrolled in at least one online class and the numbers are growing each year.
- Online classes grew at a rate of 10%, while the overall higher education student population grew at less than 1% (Allen & Seaman, 2011).
- Today even the elite universities in the USA are embracing the internet: Harvard, MIT, Stanford, Yale, Carnegie Mellon.

“When one professor at Stanford can teach an online artificial-intelligence course to more than 160,000 students universities and society cannot ignore the cost benefits.”
(Auletta, 2012)



Australia

(according to ICEF Monitor)

- Over the past five years, the online education market in Australia has grown by almost 20% and is expected to be worth an estimated US\$ 4.68 billion this year;
 - In addition to the biggest online Australian universities like Kaplan, Seek Learning, and Open Universities Australia, many smaller schools are also bringing in a fair amount of students as well;
 - Many online programmes attract students from Asia;
 - With the international market expected to grow to millions of students during the next 10 years Australia will become one of the world's leading providers of online education.
-

Europe

Enrolment numbers in distance universities alone exceed at least 2 million.

The European Association of Distance-Teaching Universities (EADTU) provides the following approximate numbers for their largest members (https://idealprojectblog.files.wordpress.com/2013/11/ideal_report_final.pdf):

- **Anadolu University, Turkey:** 1,360,000
- **Open University UK:** 250,000
- **Universidad Nacional de Educación a Distancia, Spain:** 250,000,
- **Universitat Oberta de Catalunya, Spain:** 80,000
- **Fernuniversität Hagen:** 80,000
- **Fédération Universitaire de l'Enseignement à Distance/Centre national d'enseignement à distance, France:** 50,000
- **Open University, The Netherlands:** 20,000.



Europe

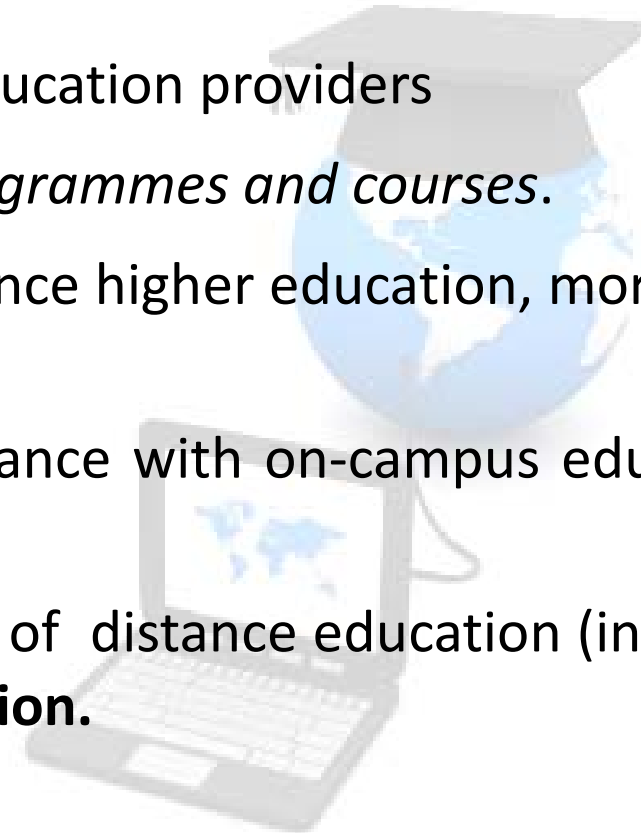
Distance-teaching universities – the largest distance education providers

More and more traditional universities offer *online programmes and courses*.

In Germany – of around 133,000 students taking distance higher education, more than 1/10 (18,000) are enrolled in dual-mode institutions.

In Sweden – the number of students combining distance with on-campus education has roughly tripled since the beginning of the century.

The overall number of students taking some form of distance education (included blended learning) *in Europe* must be higher than **3 million**.

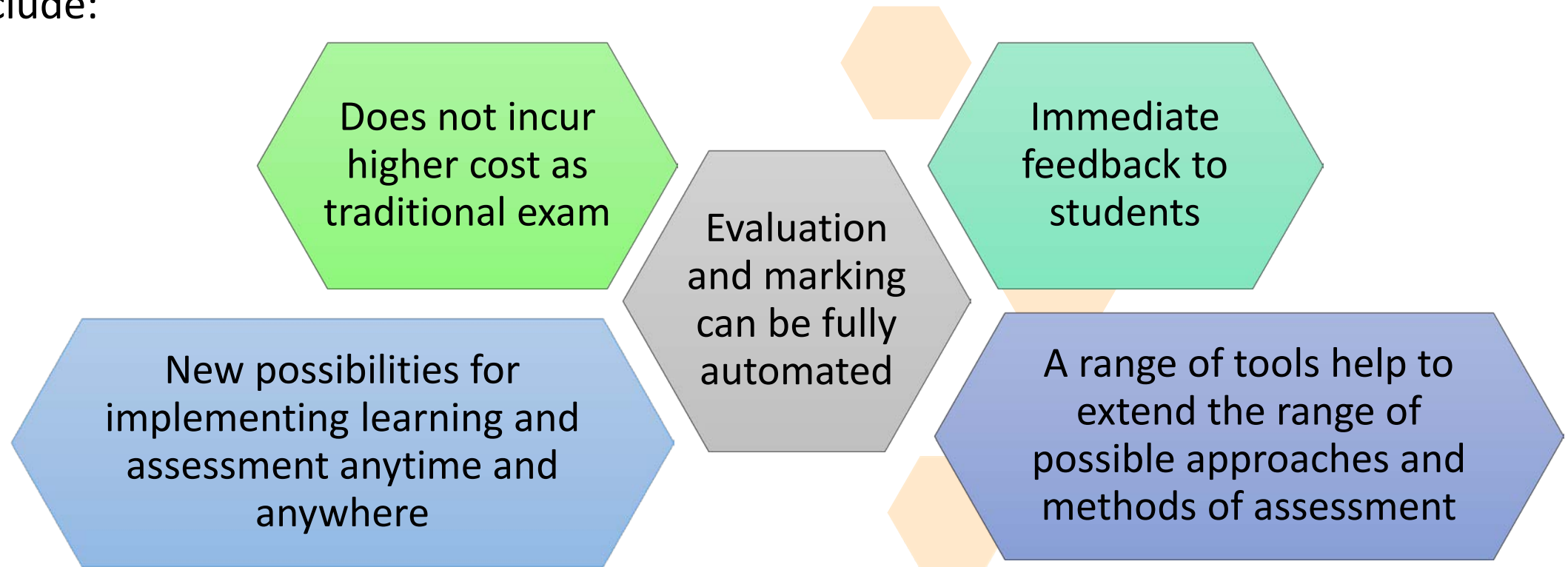


The bigger is the growth of online education the more important the way of assessing online students become.

In order to provide an alignment between the teaching, learning and assessment processes, it is essential to employ the use of ICT in assessment.

Brown et al.(1996) suggests that *“due to paradigm shift in educational technology, it may become unfair to train students online and then use pens for assessments.”*

Among the advantages of electronic (online) assessment and examination the authors include:



The opportunities/benefits/advantages of e-assessment and online assessment

Different types of assessment which could be employed online: formative, summative and diagnostic assessment

Opportunities for lifelong learning and improved access for disabilities or geographically dispersed students

Significant advantages in terms of cost, ease of use, reliability, replicability, scoring, aggregating results, and data management

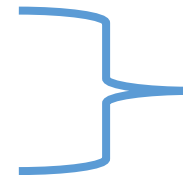
Variety of means for assessment: pre- and post- testing, diagnostic analysis, student tracking, rubric use/analysis, the support and delivery of authentic assessment through project based learning, artifact collection, and data aggregation and analysis;

Challenges identified by researchers and practitioners related to e-assessment:

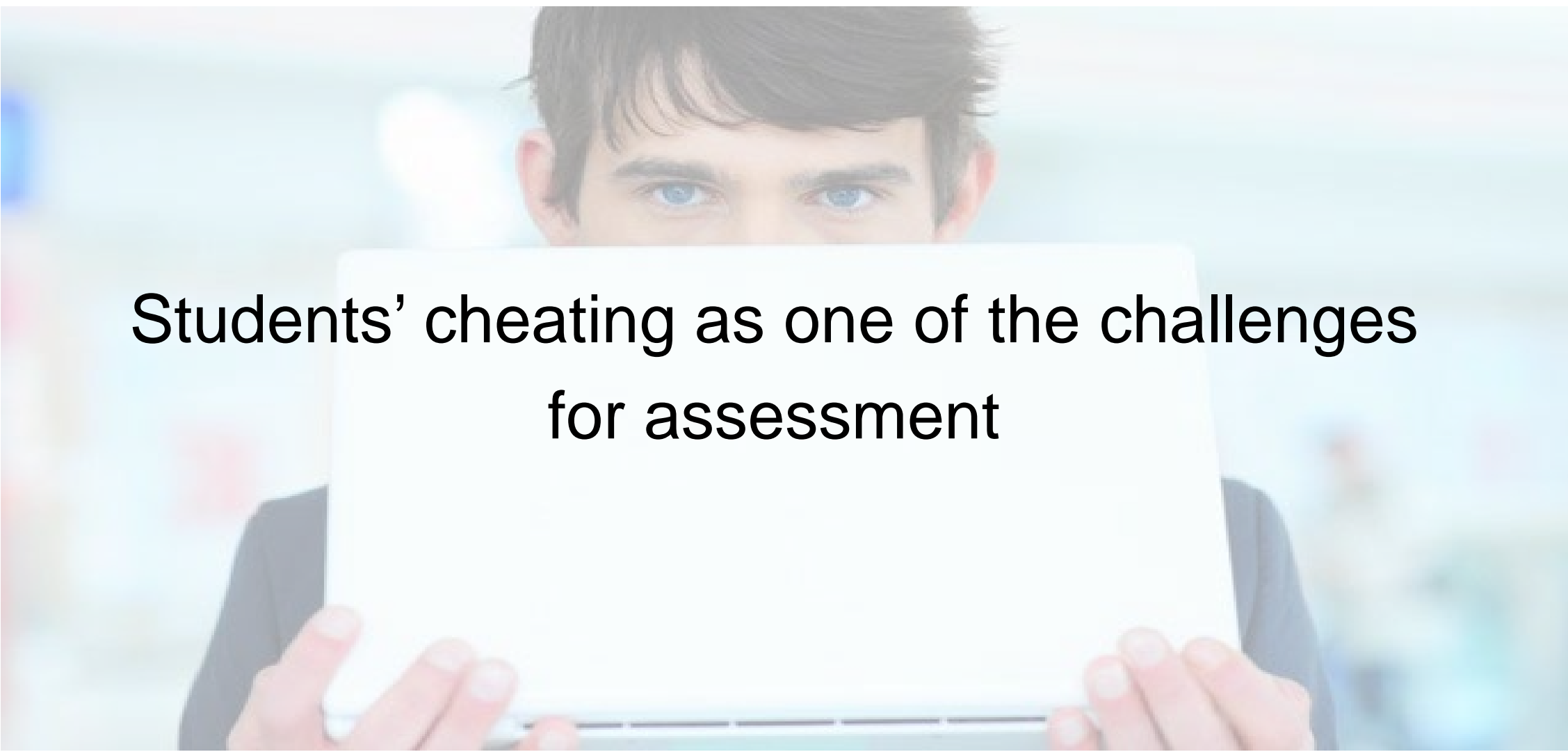
- fairness to the student;
- objective testing of knowledge;
- the capacity of students to respond in electronic mode;



- plagiarism;
- the possibility of online impersonation and cheating.



Students cheating



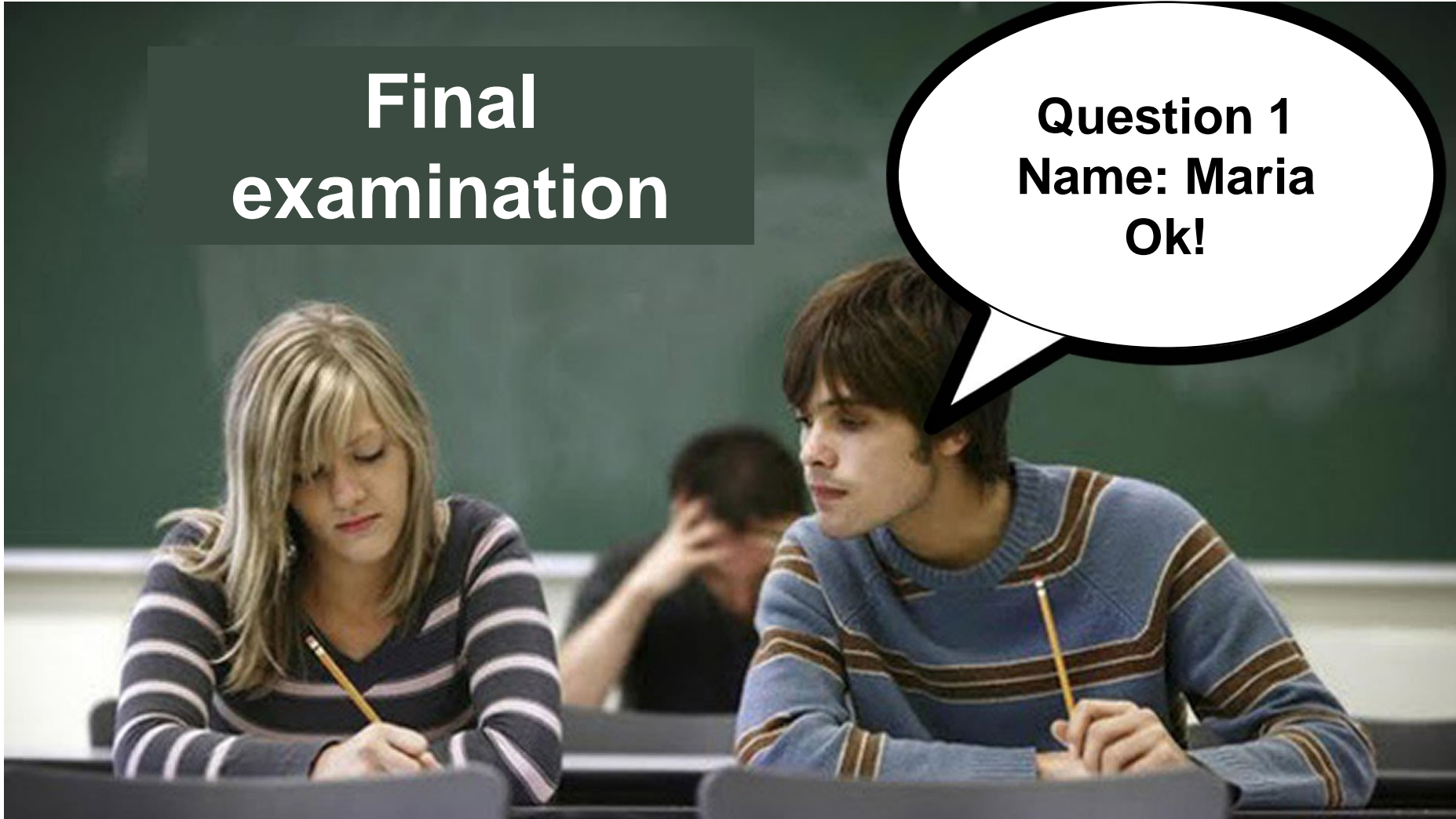
**Students' cheating as one of the challenges
for assessment**

traditional exam/ assessable activity – 1 [crime_scene]



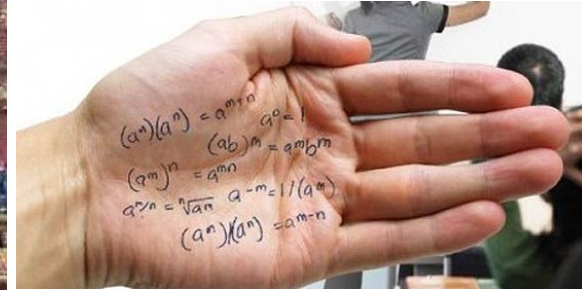
Final examination

Question 1
Name: Maria
Ok!





But cheating at a final examination in a face-to-face environment becomes much more difficult nowadays!

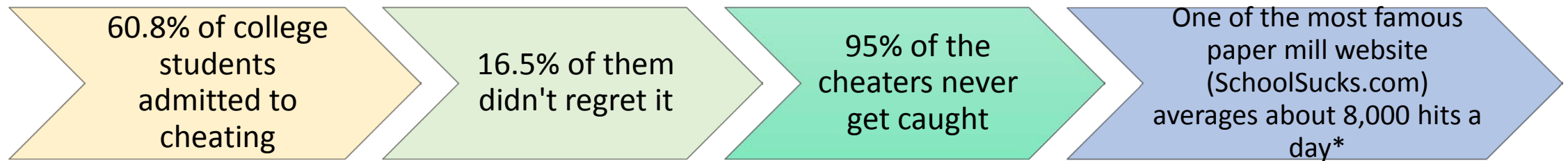


Online cheating - There are several aspects of online education that increase the opportunity for cheating

“Online examinations are reported to be more vulnerable to academic dishonesty and authentication attacks due to lack of physical interaction.”

Harmon et al.2010

Extent of cheating in higher education according to research statistics (research on North American universities - a 2007 poll quoted by Harbin, J., 2013):

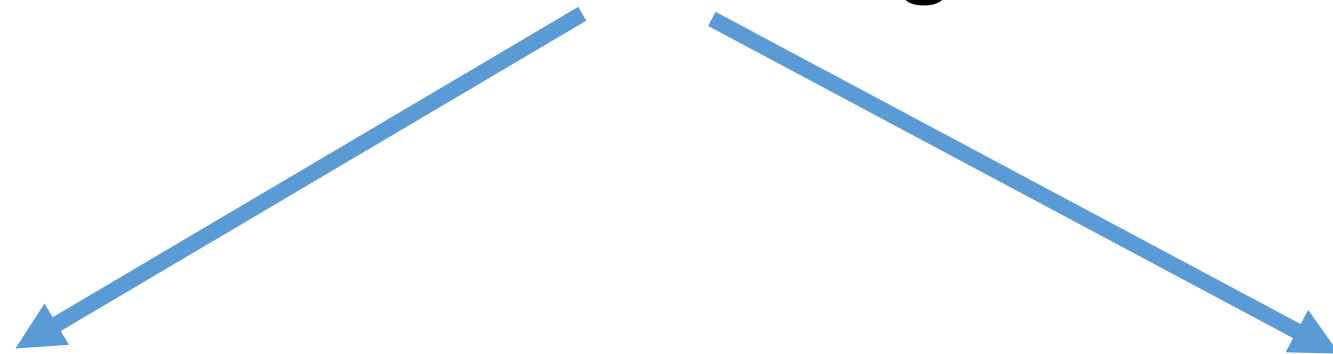


*(8 Astonishing Stats on Academic Cheating, 2012)

A 2012 Chronicle of Higher Education article suggests that as online enrollment increases, so does the number of people who find ways to cheat the system (Young, 2012).

“With the rise of social media and mobile connectivity, dishonest sharing via technology has become a major problem” (Academic Integrity and Tech Cheating, 2012).

Online cheating



Impersonation



Impersonation - Is the student really who they say they are?

A common problem in online examination is verifying that the person at the keyboard is the actual student registered.



“Due to the inherent anonymity of being online, compared to taking an examination in a classroom environment, students may attempt to artificially boost their scores in online examination. This may occur by having another individual take the exam for them, which a typical user/password authentication scheme cannot detect.”

Gathuri et al., 2014

A number of authentication procedures have been evolved over time to ensure secure authentication.

Plagiarism as a challenge for e-assessment

“Over the past decades, cases of student plagiarism in higher education have increased substantially.”

Dee & Jacob, 2012

Donald L. McCabe conducts a research on cheating among college and university students in North American universities. He collected data for 3 consecutive academic years using a web-based survey on 83 different campuses in the US (67 campuses) and Canada (16 campuses).

Some findings:

Cheating on written work seems to occur even more frequently than cheating on tests and examination

Unauthorised collaboration, paraphrasing or copying a few phrases or sentences from either a written or web source (‘cut and paste’ plagiarism) and fabricating or falsifying a bibliography occur frequently, being reported by one quarter to one half of undergraduates and as many as one quarter of graduate students.

Large number of faculty (79%) report they have observed one or more instances of these behaviors in the last three years, driven in part by a perception that a large number of students (59%) have copied material almost word for word from a written source without citation

The assessment is at the center of education

If assessment is not able to validate the knowledge and competences of students adequately it affects the reputation of educational institutions and casts doubt on all stakeholders.

The impersonation and plagiarism question the reliability and credibility of online education

Some accrediting agencies are asking universities how they are verifying student identity in distance education

The lack of trust in e-assessment could ruin the public support that higher education system depends so heavily upon.

“When cheating becomes commonplace and acceptable, the integrity of the entire higher educational system is at risk.”

Harbin, J. and P. Humphrey, 2013

lack of trust in e-examination

the cost of the technology in support of students' authentication

most of the institutions that offer online or blended courses are still reluctant to integrate online assessment and examinations

They offer e-learning but the exams are done in a classroom setting

A good place to start to deal with the problem is by acknowledging that it exists.



face **voice** **keystroke** **anti-plagiarism**

- TeSLA project attempts at eliminating (or at least reducing to a great extent) the chances of impersonation and plagiarism.
- The system will support the prevention and detection of cheating and academic dishonesty and promotion of academic integrity.

About the TeSLA project

- ◇ Horizon2020 – ICT 20 (Information and Communication Technologies)
- ◇ Topic: Technologies for better human learning and teaching
- ◇ Type: Innovation Action, with Large Scale Pilots
 - Innovation Action means: 80% Innovation and 20% Research
- ◇ Budget: € 6,000,000
- ◇ Implementation period: 3 years (2016-2018)




Objectives of the project

- ◇ 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.
- ◇ TeSLA will offer to educational institutions, accrediting agencies and to society an unambiguous proof of learners' academic progression, authorship and authentication during the whole learning process.



Specific objectives

- 
- ◇ Analyse and design the most appropriate learning activities for e-assessment.
 - ◇ Improve the e-assessment process by introducing tools and resources in the learning activities that capture learners' data to ensure their authentication and authorship.
 - ◇ 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.
 - ◇ It will draw up a workable solution consisting of a mix of techniques that can be applied in different combinations in the learning environments of the project partners.

Specific objectives students with disabilities

- ◇ The TeSLA project has a strong commitment to consider the accessibility issue meaning that students with special educational needs and students with disabilities are included as potential users of the TeSLA system.
- ◇ The TeSLA system will support the students with disabilities mainly through the flexibility of assessment modes allowing identification and recognition of authorship of their work.
- ◇ It is as an opportunity to students to have an e-exam at home or any other place without requiring an assistance of another person.



The technological solutions

Different technologies will be used to achieve the TeSLA goals in building such trust between learners and educational institutions.

For learner authentication



- ✓ digital signatures;
- ✓ timestamps;
- ✓ biometric systems
(typing pattern recognition,
face and voice recognition,
etc.).

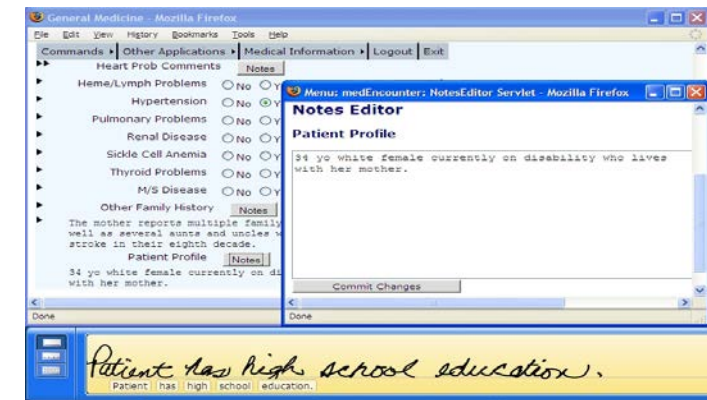
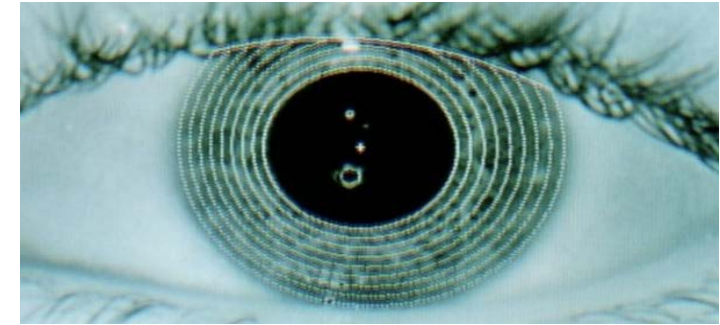
For work authorship



- ✓ automated plagiarism
detection tools;
- ✓ written natural language
analysis;
- ✓ the direct gathering of
data in the workspace (monitor
programs, etc.).

Biometrics

- ◇ Biometrics allow unique recognition of humans based on their behaviour or intrinsic physical characteristics.
- ◇ Biometric recognition is based on the use of mathematical and statistical techniques to identify or verify a person's identity.
- ◇ The biometric data most commonly used today are digital fingerprints, retina, iris, facial patterns, palm vein geometry, handwriting and voice, among others.



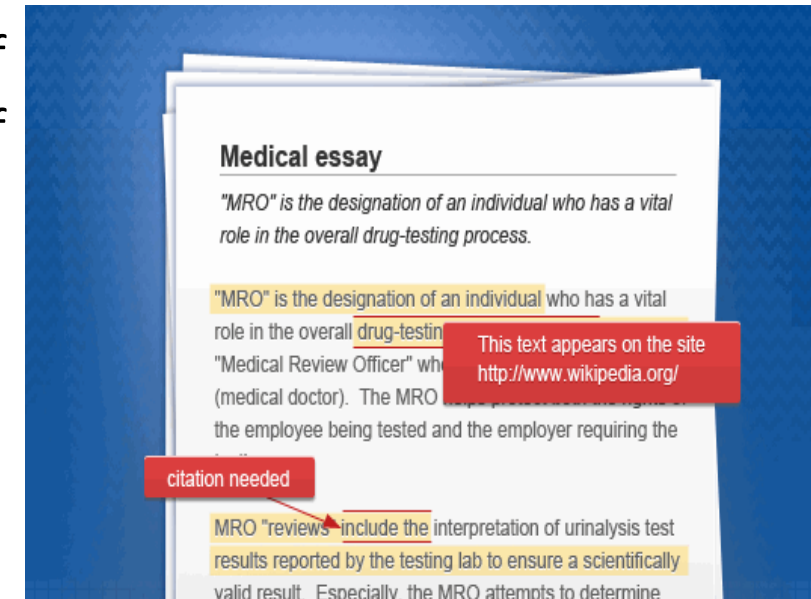
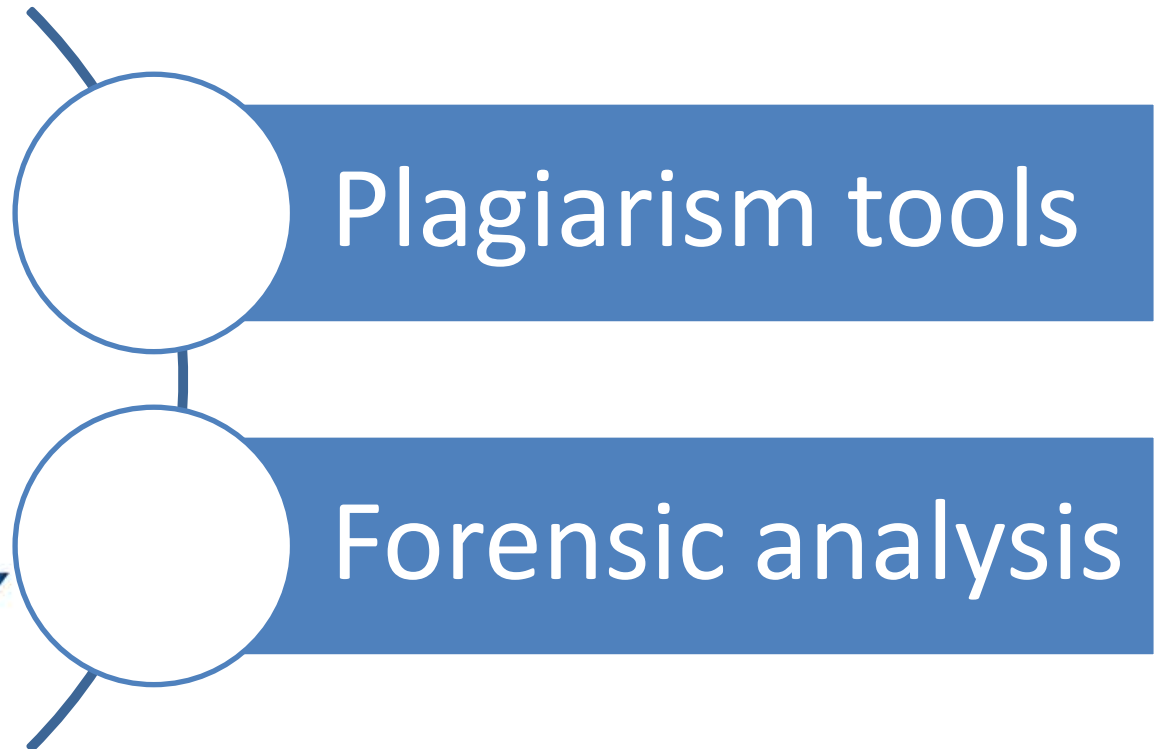
Security mechanisms

- ◇ Digital signature: a mathematical scheme for demonstrating the authenticity of a digital message or document.
- ◇ Timestamp: It is a sequence of characters or encoded information identifying when an event is recorded by a computer.



Document analysis

It is a social research method which involves the analysis of written material like essays, descriptions, the outputs of learning activities, etc, using a qualitative analysis package.



Consortium

- ◇ TeSLA consortium is composed by Higher Education institutions and research centers in collaboration with technological companies as well as accrediting quality agencies.
- ◇ It is formed by 18 partners:
 - 8 universities
 - 3 quality agencies
 - 4 research centers and
 - 3 companies.



Universities



- Universitat Oberta de Catalunya – Spain
<http://www.uoc.edu/portal/en/index.html>
- University of Namur ASBL – Belgium
<http://www.unamur.be/en>
- Open Universiteit of the Netherlands- Netherlands
<https://www.ou.nl/web/english/home>
- Sofia University – Bulgaria
<https://www.uni-sofia.bg/index.php/eng>
- Open University – UK
<https://www.uni-sofia.bg/index.php/eng>
- Imperial College London – UK
<https://www.imperial.ac.uk/>
- Technical University of Sofia – Bulgaria
<http://www.tu-sofia.bg/>
- Anadolu University (AU) – Turkey
<https://www.anadolu.edu.tr/en>
- University of Jyväskylä (JYU) – Finland
<https://www.jyu.fi/en>
- Institut Mines-Telecom (IMT) – France
<https://www.mines-telecom.fr/en/>





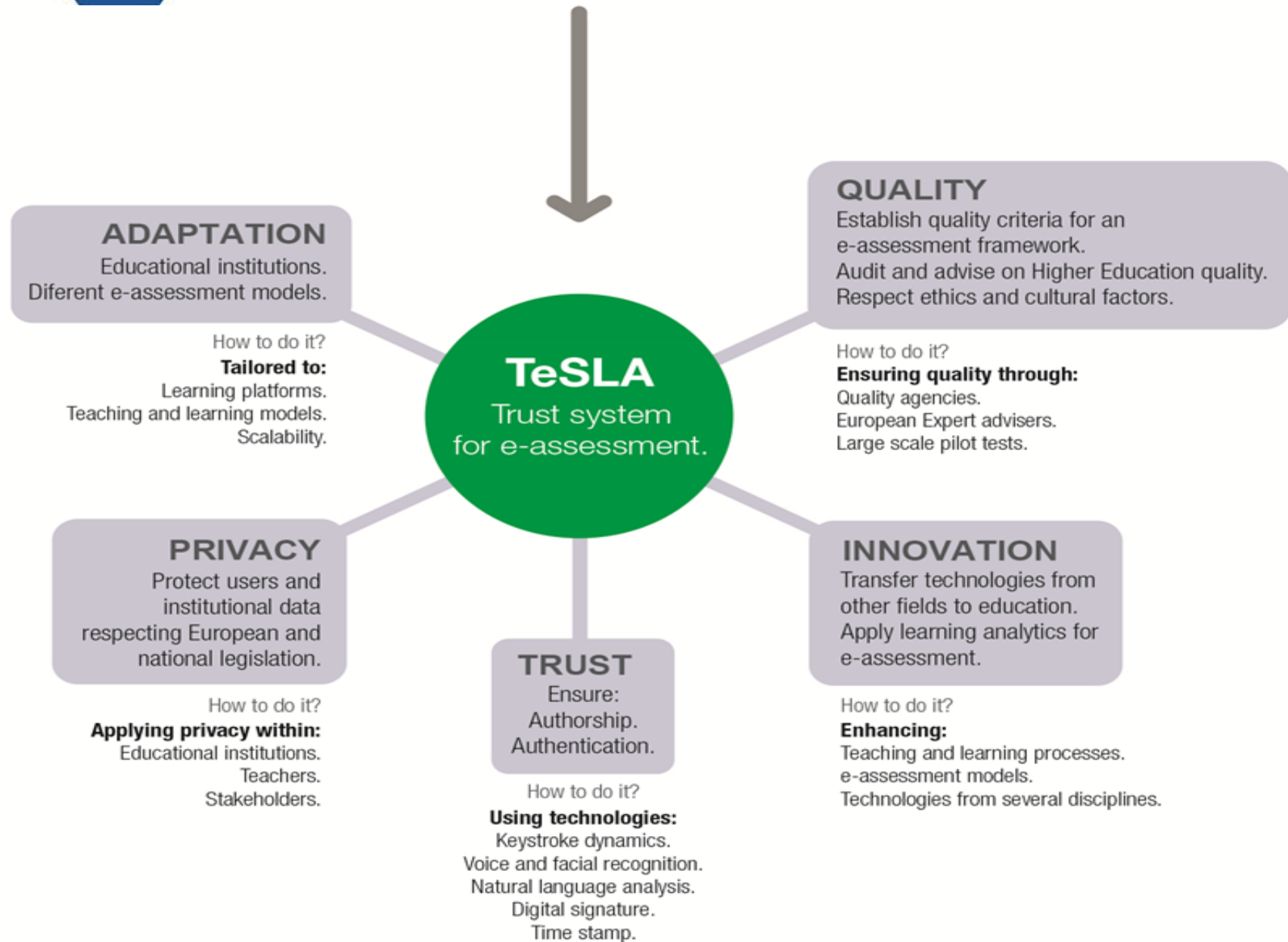
- European Association for Quality Assurance in Higher Education AISBL (ENQA) – Belgium
- Catalan University Quality Assurance Agency (AQU Catalunya) - ИспанияOpen Universiteit of the Netherlands – Netherlands
- European Quality Assurance Network for Informatics Education EV (EQANIE) – Germany



◇ PLPLUS GmbH – Germany

◇ Protos Sistemas de Información S.L. (protOS) – Spain

◇ WFSW SA (Watchful) – Portugal



Large Scale Pilots scheme

Pilots scheme

3
Years



1st Pilot Small educational pilots Course 2016/17 1S



External Dimension

To test the protocol of communication among partners for pilots execution.



Internal Dimension



To test the implementation protocol at partner level.



To select the most suitable activities for the e-assessment process at subject level.

Level of:
 e-assessment model
 Development
 Integration
 TeSLA system

Impact

1 Pilot

 7 Institutions

 ≈ 600 students
 ≈ 75 students/institution

2nd Pilot Medium Test-Bed pilots Course 2016/17 2S

To test

the modular technologies on an isolated manner in activities:
 Facial and Voice Recognition, Time-Stamp, Natural Language, Digital Signature, Plagiarism Techniques.

To refine



learning activity for e-assessment.

To test and define

the authorship and authentication instruments.

Level of:
 e-assessment model
 Development
 Integration
 TeSLA system

Impact

4 Pilots

 Minimum 7 institutions

 ≈ 3,500 students
 ≈ 125 students/institution/pilot

3th Pilot Large scale pilots Course 2017/18

To test

the full integration of TeSLA system and its scalability.

To refine





modular technologies and the European e-assessment framework.

To verify

the reliability of the authentication and authorship.

Level of:
 e-assessment model
 Development
 Integration
 TeSLA system

Impact

2 Large Scale Pilots

 Minimum 7 Institutions

 They can choose some technologies or the whole system
 Stage 1

 ≈ 6,500-7,000 students
 Stage 2

 ≈ 10,000-14,000 students

An Adaptive Trust-based e-assessment system for learning



≈ 10,000-14,000 students

Large scale pilots

3
Years



1st Pilot Small educational pilots Course 2016/17 1S



External
Dimension

To test
Goals
the protocol of communication among partners for pilots execution.



Internal
Dimension

To test
Goals
the implementation protocol at partner level.



To select
Goals
the most suitable activities for the e-assessment process at subject level.

Level of:

e-assessment model
Development

Integration
TeSLA system

Impact

1 Pilot

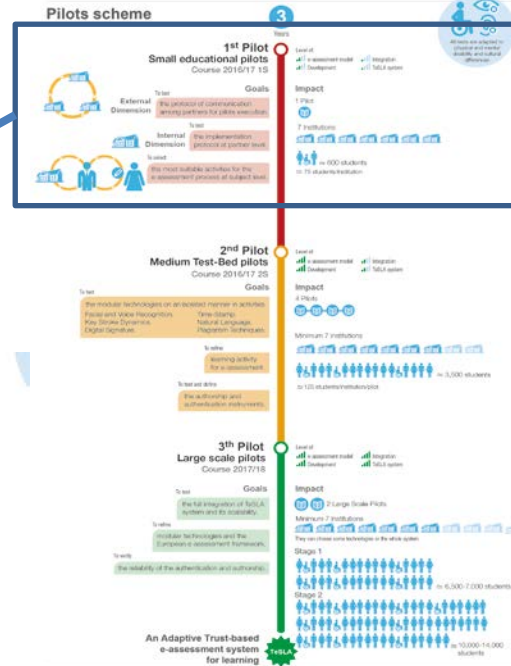


7 Institutions



≈ 600 students

≈ 75 students/institution



Large scale pilots

2nd Pilot Medium Test-Bed pilots

Course 2016/17 2S

Goals

To test

the modular technologies on an isolated manner in activities
 Facial and Voice Recognition, Time-Stamp.
 Key Stroke Dynamics, Natural Language.
 Digital Signature, Plagiarism Techniques.





To refine

learning activity
 for e-assessment.

To test and define

the authorship and
 authentication instruments.

Level of:

-  e-assessment model
-  Development
-  Integration
-  TeSLA system

Impact

4 Pilots

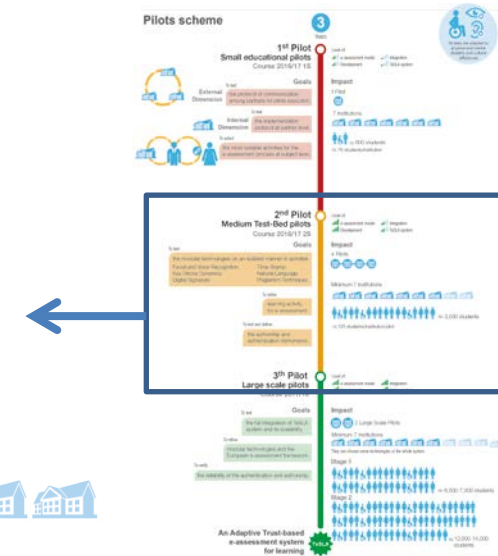


Minimum 7 institutions

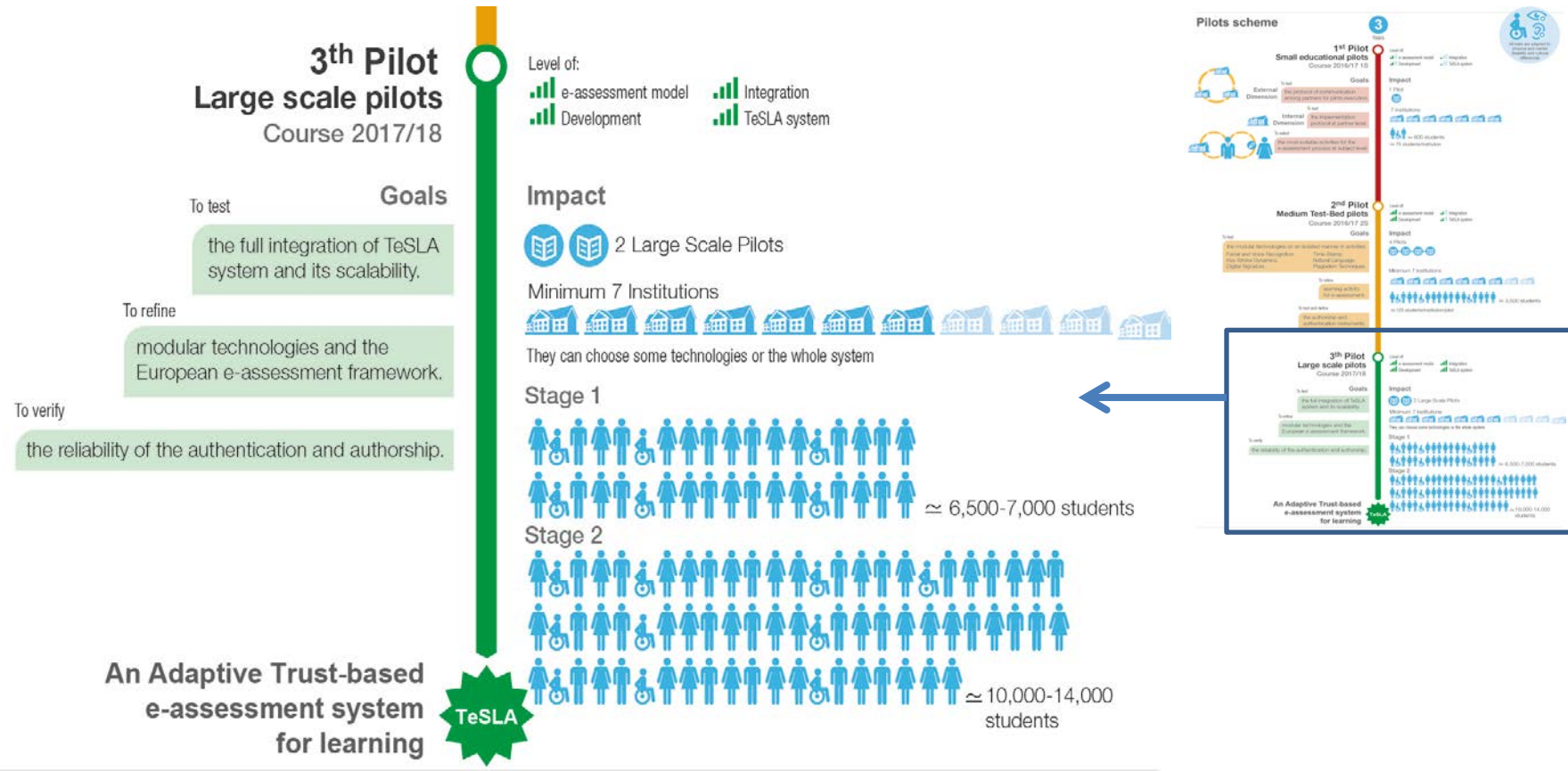


≈ 3,500 students

≈ 125 students/institution/pilot



Large scale pilots



Impact

Students

They will be evaluated through activities attending different kinds of assessment models. The assessment process can be done not only at educational institutions but through the Net at home.



Teachers

They will be able to define and design new learning activities including multimedia aspects and security items for ensuring learning data.



Agencies

An online validation model accepted by educational quality agencies in Europe that follows their educational and technological criteria.



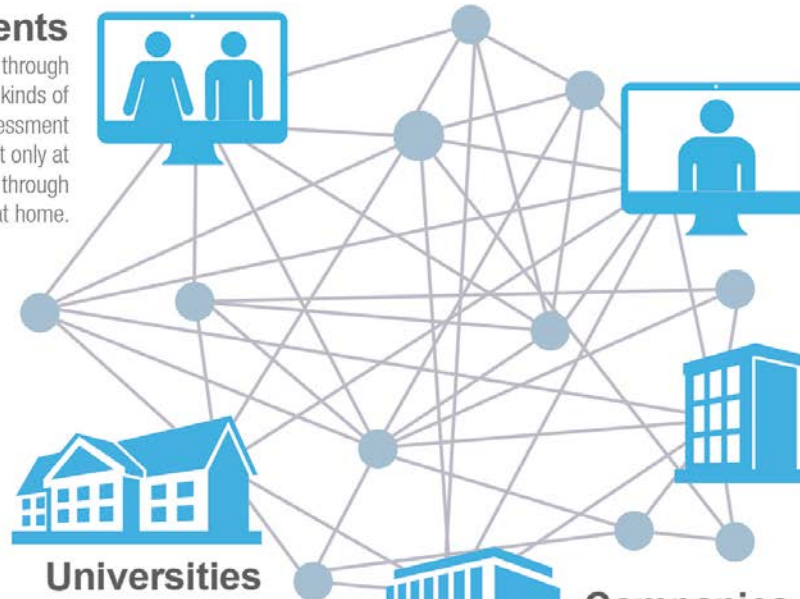
Universities

An e-assessment model adapted to their learning environment, to ensure learner authentication and authorship. A reliable e-assessment system will open new opportunities in a global space.



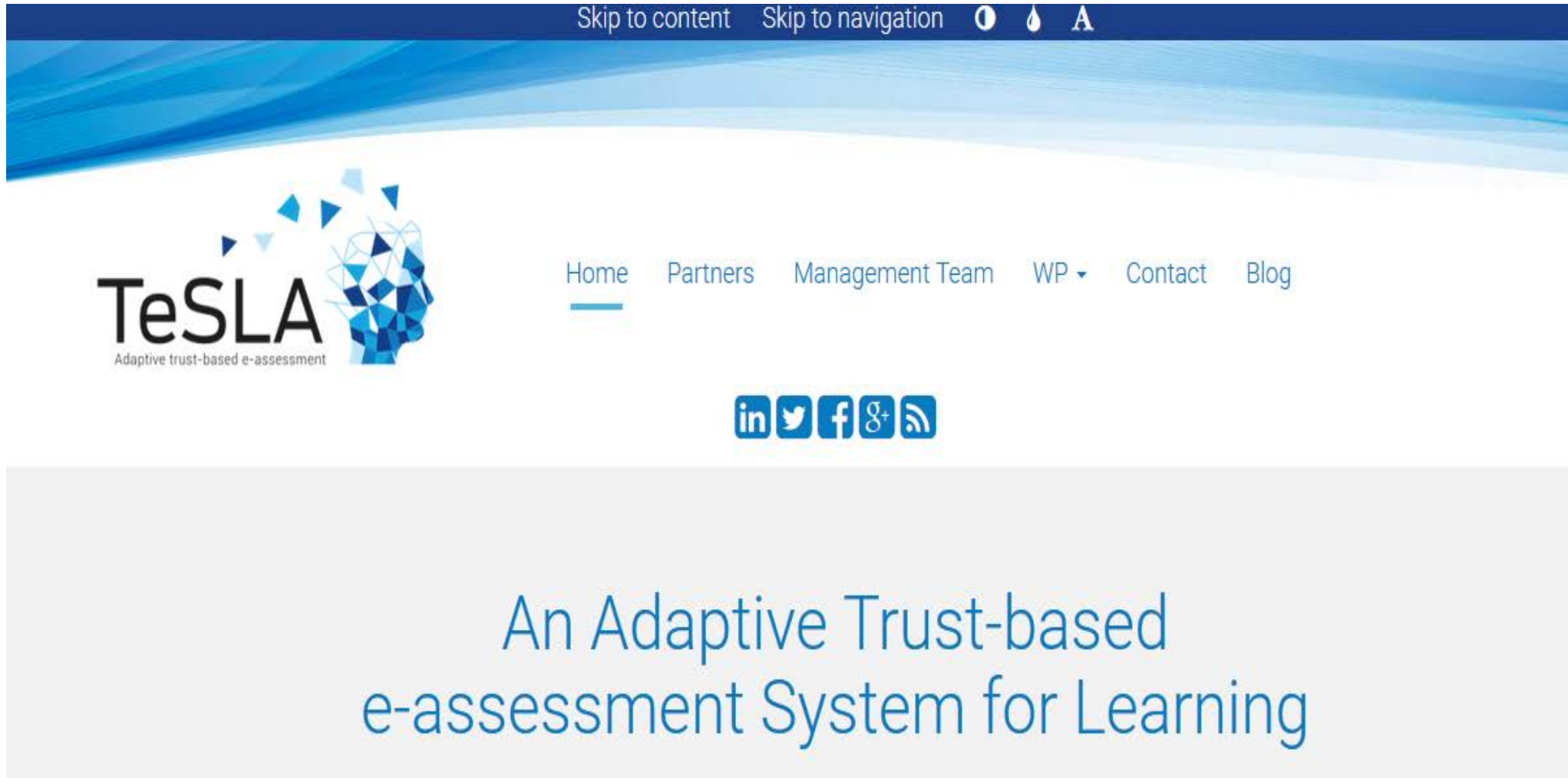
Companies

Consultancy and implementation of the model in educational institutions all over the world (exploitation).



Site of the TeSLA project

<http://tesla-project.eu/>



The screenshot shows the homepage of the TeSLA project website. At the top, there is a dark blue navigation bar with the text "Skip to content" and "Skip to navigation" followed by icons for a search, a water drop, and a large letter 'A'. Below this is a decorative blue wave graphic. The main content area features the TeSLA logo on the left, which consists of the text "TeSLA" in a bold, black font, with "Adaptive trust-based e-assessment" written in a smaller font below it. To the right of the text is a stylized blue head icon composed of geometric shapes. To the right of the logo is a horizontal navigation menu with the following items: "Home" (underlined), "Partners", "Management Team", "WP" with a dropdown arrow, "Contact", and "Blog". Below the navigation menu is a row of social media icons for LinkedIn, Twitter, Facebook, Google+, and RSS. At the bottom of the page, there is a light gray banner with the text "An Adaptive Trust-based e-assessment System for Learning" in a blue, sans-serif font.



Acknowledgements:



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