IAFeS Edition

"Smart Learning"

14th NETTIES Conference
(Networking Entities)
Politehnica University Timisoara, Romania
May 19 – 20, 2016

Volume 4

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The association, whose activity is not directed towards profit, aims:

- to promote the development, education and research in the area of eScience: Information and communications technology (ICT), telecommunications, e-learning, e-media, e-commerce, e-government, e-democracy, e-culture, e-health, …
- to promote young researchers in these areas
- to offer an exchange platform for experts
- to offer an international co-operation platform

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1 Preface

Each year the International Association for eScience (IAFeS) organises the Networking Entities conference (NETTIES). NETTIES 2016 was held in Timisoara (Romania) in collaboration with the Politehnica University of Timisoara and ASLERD - Association for Smart Learning Ecosystems and Regional Development.
For ASLERD it was the first conference and the subject was „Smart Learning Ecosystems and Regional Developments“.

The first IAFeS conference - and it´s former organization EATA (European Association for Telematic Applications) – took place in 1994 in Vienna. Since that year every year a NETTIES (Networking Entities) conference was held in an other country, like in China, Greece, Spain, Italy, Finland, Germany, Great Britain, Switzerland, and others.
Many delegates and speakers from around the world contributed to interesting and often passionate debate on the positive, negative and even controversial issues surrounding „Smart Learning“.
The proceedings of NETTIES 2016 are contained in this book. We hope that you, the reader, will find the content interesting and enjoyable and inspire you to contribute to future IAFeS research and events.

That the result of this conference is now available as book is thanks to our colleague Graham Orange from Leeds. He made the proof reading of all the scripts.

The conference itself was excellently organized by Prof. Dr. Radu Vasiu and Prof. Dr. Diana Andone.

Johann Günther
Secretary General of IAFeS and
Professor at Jianghan University Wuhan, China

2 Words of the President of IAFeS.

Radu Vasiu, PhD
Professor at Politehnica University of Timisoara, Romania
President of IAFeS – International Association for eScience

The NETTIES (Networking Entities) conference is organized since 1994, when the first edition took place in Vienna, Austria. The promoter of the conference was EATA – European Association for Telematics Applications. As a continuator of that association, IAFES (International Association for eScience) continued to organise the NETTIES conference.
The past conference, held in 2015 in Tenerife, focused on the relationship between globalisation, internet and big data.
The NETTIES 2016 conference took place between 19-20 May 2016, in Timisoara, Romania, in connection with the first international conference on Smart Learning Ecosystems and Regional Development (SLERD) organised by the association with the same name. The context of the conference was an international one, addressing different issues related to the global economic and social development, with the focus on the importance of education at all levels in that area. When we speak about Smart Cities and Smart Communities, we have to consider factors that are contributing to that. And certainly, Smart Learning is one of that factors.
The NETTIES conference this year attracted researchers and presenters from Greece, Austria, Romania, Spain and Finland, and participants from some other countries. As usually the NETTIES conferences was quite small and intimate, concentrating on quality of presentation and facilitating informal discussions between researchers intending to play an active part in future IAFeS events and initiatives.
In the context of the joint meeting organised by the two associations, IAFeS and ASLERD, there were very interesting debates on the future of learning in our societies, that took to the adoption of the Timisoara Declaration – Better Learning for a Better World through People Centred Smart Learning Ecosystems, that has been signed by the presidents of five different European associations (ASLERD – Association for Smart Learning Ecosystems and regional Development, EADTU – European Association of Distance Teaching Universities, EATEL – European Association of Technology Enhanced Learning, EDEN – European Distance and E-learning Network and IAFeS – International Association for e-Science), as well as by representatives of different municipalities, universities, other associations and individuals with a recognized interest in education and development policies.
This book contains the proceedings of the conference in the hope that readers will be inspired to follow up on the research and ideas within.

3 Politehnica University of Timisoara

Prof. eng. Viorel-Aurel Șerban, PhDNN
Rector Politehnica University of Timisoara

Politehnica University of Timisoara is synonym with professionalism in higher education, passion for technology, promoting of true values and regional development. In 2016, we had the pleasure of hosting and co-organizing the Smart Learning Ecosystems and Regional Development Conference. The three main topics of the conference – understanding influences, relations and models, abilities, skills and competences, and techno ecosystems – are of interest for our university, as they are in line with our strategical preoccupations. Therefore, we consider that any academic discussions and research concerning smart learning ecosystems and the development of new learning and teaching models, adapted to the needs of the millennials, are not only welcomed, but very much needed by universities throughout the world.

Politehnica University of Timisoara has always supported innovation, through creative thinking and team work, that is why we are now proud to be among the best universities in Romania and Eastern Europe.

After 96 years of existence, Politehnica University of Timisoara impresses through its many amphitheatres and classrooms, modern laboratories, student residences, canteens and student restaurants as well as through its modern sport complexes unequalled in Romania and in the neighbouring countries.

Politehnica University of Timisoara, nowadays, welcomes students and fellow researchers with a new library, opened in 2014, with new didactic and research laboratories, with a new sport complexes and synthetic grass – the most advanced from Romania.

Moreover, our university has always tried to find solutions to improve the chance of successful careers for our students and now it presents itself with a new system of practice in companies that allows a better gathering of practical competences and a good insertion on the labour market.

With the strength of tradition and the power of dynamism we shall find the means to adapt to the changes of the world.

I wish you success in your academic endeavour.

4 Smart City – Smart Learning. Is there a correlation?

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4.1 Abstract

This presentation intends to give some answers to the question if there is a correlation between the smartness of a city and the quality of education provided in that city. It is widely accepted that the smartness of a city depends on the smartness of its citizens, the smartness of the governance provided in that city. But is there a level of correlation between the level of education provided, its quality and the level of innovation included in that education?
The study has been performed in Timisoara, the largest higher education centre in the west of Romania. The target group of the research has been formed mainly from students of the Politehnica University, living in the campus.
The research has been interpreted based on students' perception in general about the campus conditions, on the conditions offered by their university, but also on the specific given by the faculty where they are studying.
The intention is to repeat the study regularly and to enlarge the target group to the rest of the students in the other 3 state universities in Timisoara and after that to the pre-university students in the city.

4.2 Introduction

A study made by the United Nations Department of Economic and Social Affairs [1] is defining Smart Cities as "complex ecosystems supported by technological infrastructures transforming citizen engagement, learning and participation".
On other words, it is recognized that a Smart City is a very complex ecosystem, that it is able to transform learning provided in its area. And this is suggested to be done by the use of technology, ie the new educational technologies available in a digital society.
However, more focus should be given to find out where is the smartness of learning in smart territories.

4.3 Smart Learning in a Smart City

The traditional approach to a Smart City is given by the 6 pillars model [2], that has been adopted by the European Union. These pillars are considered the dimensions to be taken into consideration when building a smart city. One can consider a city as

fully qualified for the smart title only when fulfilling all those pillars. However, there are cities that are able to develop only part of those pillars, so qualifying for smartness only in some dimensions.

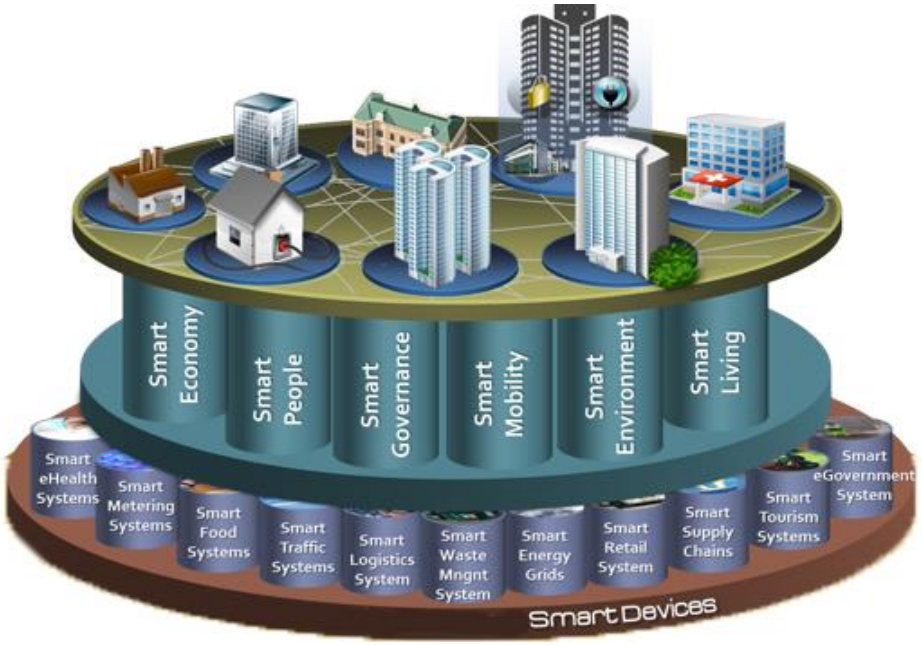

Fig. 1. The 6 pillars model for territorial development in a Smart City approach [2]

The six indicators defined in order to measure the "smartness" of a city in order to assess its success in the transformation process are defined as [3]:

1. Smart Economy (Competitiveness)
   - Innovative spirit
   - Entrepreneurship
   - Economic image & trademarks
   - Productivity
   - Flexibility of Labor market
   - International Embeddedness
   - Ability to transform
2. Smart People (Social and Human Capital)
   - Level of qualification
   - Affinity to lifelong learning
   - Social and ethnic plurality
   - Flexibility
   - Creativity
   - Cosmopolitanism / Open-mindedness
   - Participation in public life
3. Smart Governance (Participation)
   - Participation in decision making
   - Public and social services
   - Transparent governance
   - Political strategies & perspectives

4. Smart Mobility (Transport and ICT)
   - Local accessibility
   - (Inter-)national accessibility
   - Availability of ICT infrastructure
   - Sustainable, innovative and safe transport systems
5. Smart Environment (Natural resources)
   - Attractivity of natural conditions
   - Pollution
   - Environmental protection
   - Sustainable resource management
6. Smart Living (Quality of Life)
   - Cultural facilities
   - Health conditions
   - Individual safety
   - Housing quality
   - Education facilities
   - Touristic attractivity
   - Social cohesion

From this short description of the pillars, it is clear that many of the achievements are closely linked to the learning infrastructure, to its performance and spread inside the population.

UNESCO defines a learning city [4] as a city that:
- effectively mobilizes its resources in every sector to promote inclusive learning from basic to higher education;
- revitalizes learning in families and communities;
- facilitates learning for and in the workplace;
- extends the use of modern learning technologies;
- enhances quality and excellence in learning;
- fosters a culture of learning throughout life.

By doing that, the smart city will enhance individual empowerment and social inclusion / cohesion, economic development and cultural prosperity, as well as sustainable development.
All those benefits will be a result of defining and implementing a clear strategy of "lifelong learning for all" as the city's future, that will bring wider benefits for people.
Correspondingly, the major building blocks of a learning city are defined as [4]:
- Inclusive learning in the education system
- Revitalized learning in families and communities
- Effective learning for and in the workplace
- Extended use of modern learning technologies
- Enhanced quality and excellence in learning
- A vibrant culture of learning throughout life

But, the fundamental conditions for achieving the goal of building a learning city would include:
- Strong political will and commitment
- Governance and participation of all stakeholders
- Mobilization and utilization of all needed resources

Of course that it should be recognized that:

1. “Change begins with the citizen”. Citizens must be empowered to anticipate and tackle constantly changing social, environmental and economic challenges.
2. “Lifelong learning is an important way of empowering citizens”. Providing citizens with a broad array of learning opportunities helps them develop the skills, competences and attitudes needed for sustainable development.
3. “Implementation happens at the local level”. Cities have the facilities and potential to motivate and enable citizens to learn.

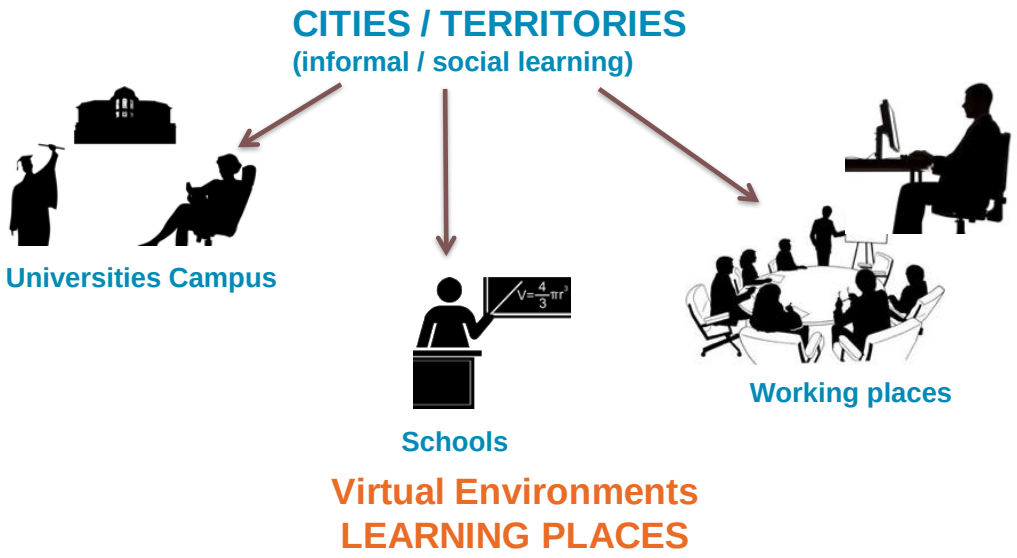

Fig. 2. Formal and informal learning places

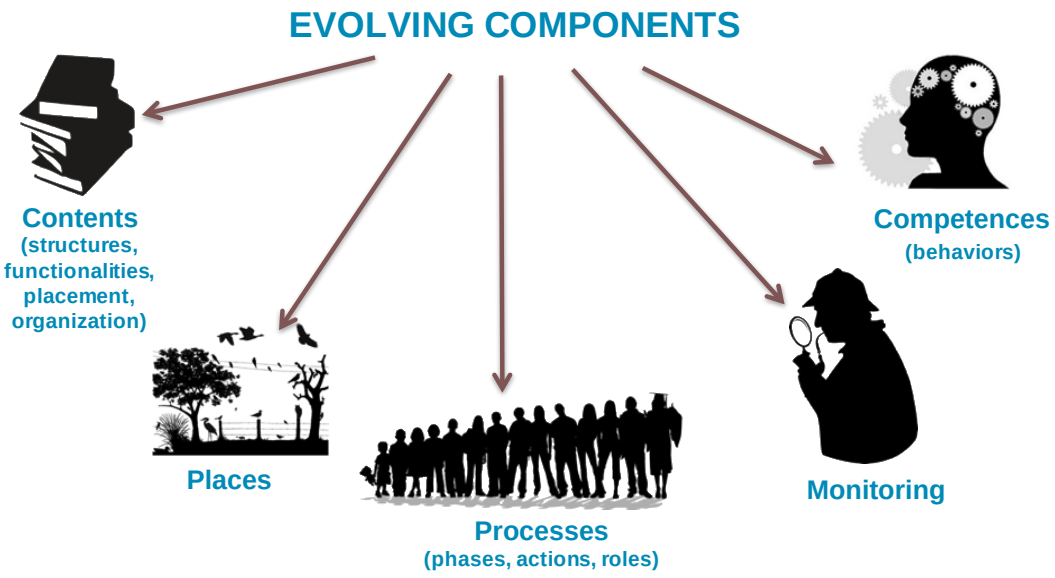

Fig. 3. Factors influencing / facilitating learning quality

4.4 Smart Learning Observatory

The study on the “smartness” level of education provided in Timisoara, Romania by the Politehnica University, has been conducted as part of a European collaboration with the University of Rome Tor Vergata, under the name of Smart Learning Observatory [5].

An online questionnaire has been opened to the students and staff of the Politehnica University, through the online platform of the university called Virtual Campus. All responses are anonymized, but saved in the data base according to the affiliation of the respondent. All respondents have been asked to provide a score between 1 (the lowest) and 10 (the higher) for the level of satisfaction with different questions.
Some very preliminary results are discussed here below. The questionnaire has been answered by 249 people, from which: 119 bachelor students (47.80%), 35 master students, 11 PhD candidates, 2 owners of a research scholarship or grant, 69 professors and lecturers (27.70%), 5 technicians and 6 administrators.
Most of the students are living in the campus, which is located quite central to the city and is a common campus with that used by students in other 2 state universities in the city (the University of West and the University of Medicine).

According to the field of study / work, the respondents are representing:

- Faculty of Electronics and Telecommunications Engineering: 69 (27.70%)
- Faculty of Automation and Computers: 50 (20.10%)
- Faculty of Mechanical Engineering: 29 (11.70%)
- Faculty of Civil Engineering: 28 (11.20%)
- Faculty of Management in Production and Transportation: 24 (9.60%)
- Faculty of Industrial Chemistry and Environmental Engineering: 16 (6.40%)
- Faculty of Communication Sciences: 12 (4.80%)
- Faculty of Electrical and Power Engineering: 7 (2.80%)
- Faculty of Engineering in Hunedoara: 7 (2.80%)
- Administration services: 3 (1.20%)
- Other: 4 (1.60%)

As far as accommodation needs, the university and the city seems to offer a good level of services (average score between 7 and 8, for the satisfaction provided by the student campus accommodation or the rented house in the city). However, there are remarks such as: renting is expensive, there are few parking places, or it is too noisy.
The location of the campus is very close to most of the university buildings (the rate is 10 for how easy it is to move within the Campus ? University area and within the university buildings.
When they have to spend all day long at the university, they mainly take lunch at the university/campus canteen (30.90%) or they bring their own lunch-box (28.90%). The availability of enough basic facilities like bar, canteens, restaurants and access to drinking water is appreciated with an average of 6.8, which means that there is still room for improvement.
Another question was related to the perception on the “green level” of the Campus (availability of green areas, air quality, separate waste collection, etc). The perception is on an average level of 6.7, with main remarks like: not “alive” in terms of colors used – buildings are “gray”, no ventilation, no thermostats, not enough recycling facilities, danger in case of fire, no seating places on the halls, not enough trash beans.

The respondents seems to feel safe in the university area (not only on a physical level), as the average score to this question was 9.
In terms on how the university infrastructure (classrooms, libraries, laboratories, student areas, WI-FI) are adequate for the activities they are carrying on campus, the perception is at an average score of 8, with the main remarks that there are still too old PCs, it is still used software without license, there are video-projectors out of work and there are problems with the access to wi-fi.
The respondents are mainly using smartphones (68.70%) or laptops (63.50%) to connect to the Internet from within the campus/university. Tablets are used by 11.70% and desktop computers by 31.70% of the respondents. By that time, in the laboratories are practically used only desktop computers for doing the experiments. The connection to the Internet is done through the campus/university wi-fi (69.10%), while only 37% are using the 3G and 35.70% a private provider.
In terms of using the technology, the respondents are telling that they are always connected (33.70%), they are staying online between 2 to 5 hours/day (25.30%) or less than 2 hours/day (20.50%). The rest are staying connected for less than half an hour/day.
The administrative services offered by the university are perceived at an average score of 7, with the main remarks that: info on curricula is unclear, secretaries are having a bad attitude, professors are not responding to the questions on the virtual campus, there are no online administrative procedures, proxy in the campus is not working and the websites are not-updated.
The social interaction was appreciated in terms of how the University supports social interaction (student/worker organizations, web environment, cultural and sports activities, interaction with the surrounding territory, etc.). The perception is quite good, with an average score of 8.
Asked to indicate how much they feel that the University is able to challenge them and/or offer them interesting opportunities (exchanges and scholarships, participation in projects with concrete impact, stages, etc..), the respondents gave an average score of 7.8 and nominalized the student league from the Faculty of Automation and Computers as a best practice example.

Another question was related to the level of satisfaction with the quality of the curriculum undertaken (if student) or the work carried on (if worker), and the results was at the average score of 8. The main remarks on how their satisfaction can be improved were:

- real options to choose from disciplines in other specialties
- different way to learn like video tutorials, other links for study
- curricula in some cases is very old
- more practice and less theory
- more internships and projects involvement
- more support in laboratory equipment and consumable materials

The perception on how the skills and competences they are developing may met those requested by the working domain in which they operate or wish to operate in the future was quite good, with an average score of 8.2.
Globally, the perception on how the university has been / is able to develop their potentialities, was rated at a score of 8.1.
Overall the University performs reasonably as the environment is concerned but the support to the social interaction is perceived as quite scarce. The existence of room for service improvement is quite evident, as quite evident is also the beneficial

influence that may arise from a better use of the available technological infrastructure and on-line services (administrative procedure, access to information, support to socialization).

Satisfaction and self-fulfillment appear to be strongly correlated to indicate that students feel self-fulfilled when are satisfied with the quality of the curriculum. The average satisfaction and self-fulfillment are quite high, even though the scarce performance of the university on the offer of challenges/opportunities
(average score 7.8).
It appears that students wish to be more challenged by the learning eco-systems.
Future work should address the possible role of technologies in improving the performance of the learning eco-system. Among other possible research directions we can mention:

- adaptation of the proposed evaluation framework to schools, informal and not formal environments as well to virtual ones;
- extension of the research towards the rest of universities in Timisoara
- investigation of the influence that could be exerted by local culture, especially in the context of Timisoara nominalization as European Capital of Culture 2021;
- integration of this bottom-up approach with the traditional top-down ranking methodologies;
- extension of the framework to other smart cities and territories.

4.5 Conclusions

As seen from analysing the 6 pillars that are defining a smart city, there is a strong correlation and dependence between the smartness of the city as a whole and the smartness of the education provided. This is why, we refer to the ensemble city – learning infrastructure as to a learning ecosysyem.
Indeed, a Smart city is a city where the human capital owns not only a high level of skills, but is also strongly motivated by continuous and adequate challenges!

4.6 References

[1] United Nations, Department of Economic and Social Affairs. Population Division, World Urbanization Prospects, the 2011 Revision, 2012, New York
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[3] United Nations. The Government Summit, Smart Cities: Regional Perspectives, February 2015
[4] UNESCO Institute for Lifelong Learning, UNESCO Global Network of Learning Cities, learningcities.uil.unesco.org, last accessed May 2016
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5 A new wave of applications in Piraeus University of Applied Sciences (PUAS) concerning modern research areas

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5.1 Abstract

A sample of the ongoing Projects is presented below. In some of these Projects Piraeus University of Applied Sciences is the Leader of the consortiums that have undertaken these Projects. The sample shows the research and development activity of the scientific staff of the University and the domains that some research groups are engaged.

5.2 Introduction

Piraeus University of Applied Sciences (PUAS) is engaged in several research and development programs. The main aim of this activity is synergy in research and development with several partners (Universities, Enterprises, Economic Champers, ...) that are active in solving problems by using novel method that are based on the modern technology. This process gives to PUAS the possibility to gain new knowledge in several domains and funds that may enforce research and development procedure. PUAs submits many proposals every year and collaborates with many universities from many countries (EU and non EU) and organizations that have improved knowledge in the specific subjects.
Some of the ongoing projects are presented below. The main characteristic of these projects are that they have an interdisciplinary nature giving advantage to the researchers to have a holistic view of the problems and face challenges and opportunities.

Some of the national programs that are presented below are focused on the improvement of the infrastructure of PUAS and the national databank for e- learning in the technological education.
Also, activities of the students of PUAS in the research and development area presented in this paper. The two activities gave advantages to the students to participate in international contests and gain special experience in a very demanding context.

5.3 EU Funded Projects

5.3.1 UNITE - TEMPUS PROJECT [3]

Title: UNIVERSITY AND INDUSTRY FOR THE MODERNISATION OF THE TEXTILE MANUFACTURING SECTOR IN BELARUS (UNITE)
UNITE projects brings together the major players of the textile manufacturing sector in Belarus with partners from European Union countries and aims to build a cooperation framework between Industry and Academia in Belarus, transferring experience and knowhow from Greece, Spain, Portugal Belgium and Lithuania. It is based on three pillars:

- The development of UNITE Council, bring together all major stakeholders of the textile sector in Belarus, with the aim to facilitate cooperation between Industry and Academia.
- The development of Liaison Offices in the Belarusian Universities as connection points between Academia and Industry.
- The establishment of continuing professional development of on-line courses for the textile sector.

The total budget of the project is about 680K, the duration 2.5 years and now is in the final procedure.

5.3.2 PROJECT TILOS [4]

Title: Technology Innovation for the Local Scale, Optimum Integration of Battery Energy Storage (TILOS)
TILOS aims to demonstrate the optimal integration of **local scale energy storage** in a fully-operated, **smart island microgrid** that will be developed on the island of Tilos (South-eastern Aegean Sea) and that will also communicate with a **main electricity grid** through **cable interconnection.**

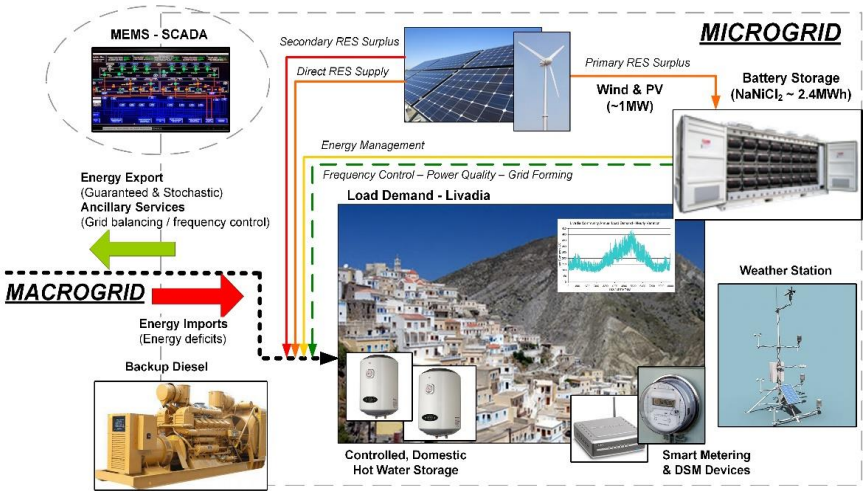


Fig. 1. General diagram of the Project TILOS

In the project consortium industrial and academic partners in cooperation with distribution system operators and nongovernmental organizations are engaged.
The main objective of TILOS will be the development and operation of a prototype battery system based on ZEBRA batteries supporting multiple tasks, including:

- Synergy with wind and PV power,
- Microgrid energy management,
- Maximization of RES penetration,
- Grid stability,
- Export of guaranteed energy,
- Ancillary services to the main grid,
- Synergy with DSM.

The battery will support both stand-alone and grid-connected operation, while proving its interoperability with the rest of microgrid components, such as smart meters, demand side management devices and distributed, residential heat storage.

5.3.3 PROJECT TRILLION - E.C. HORIZON 2020, FCT-14-2014 [2]

Title: TRILLION - TRusted, CItizen-LEA colLaboratIon over sOcial Networks
TRILLION proposes an open, flexible, secure and resilient socio-technical platform to foster effective collaboration of citizens and law enforcement officers. Using the TRILLION platform citizens will be able to report crimes, suspicious behaviour and incidents, identify hazards and assist law enforcement agents through active participation for achieving better urban security management. On the other hand, Law Enforcement Agencies (LEAs) will be able to detect incidents in a more efficient, content and context aware manner, locate onsite citizens, other LEA representatives and first responders communicate with them, request more information and assign them specific actions to address on-going incidents.

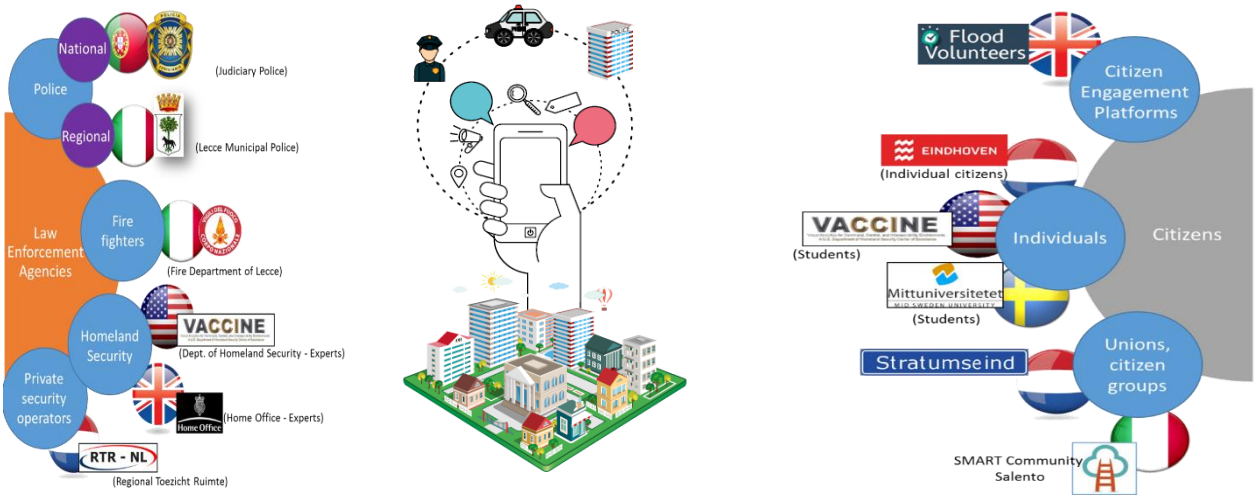


Fig. 2. TRILLION interoperability

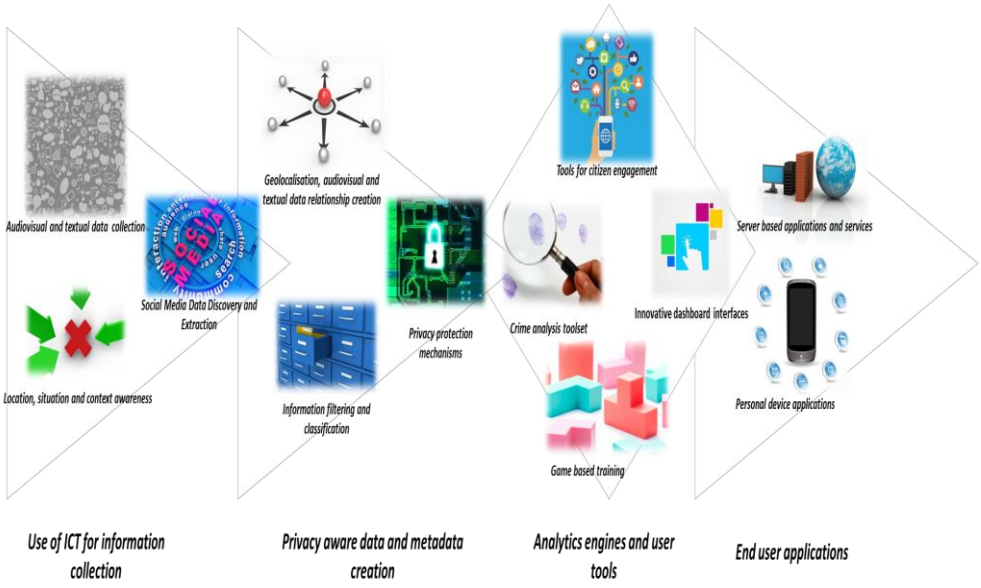


Fig. 3. Operation details of the TRILLION network

5.3.4 PROJECT STORM - E.C. HORIZON 2020, DRS-11-2015, no 700191 [2]

Title: STORM - Safeguarding Cultural Heritage through Technical and Organisational Resources Management.
STORM plans to introduce an integrated framework and a platform providing tools and services both at macro level to give a global view of the entire value chain and at specific level to promote the improvement of specific processes for protection and prevention. A novelty of STORM is to promote both views in the same framework; STORM will allow users to address each single issue within a simple process supported by the related technology. The STORM integrated framework will manage those modules to give a view that can be drilled down to give stakeholders the possibility to improve it. To support this, STORM will introduce a system to identify existing processes adding critical relationship management automation to improve the process itself. STORM aims to provide critical decision making tools to all European Cultural Heritage stakeholders affected by climate change and natural hazards. This will be a new innovative capability to improve existing processes related to three identified areas: Prevention, Intervention and Policies, planning and processes.

The total budget is about 7.297.875 € and the duration is 36 months.

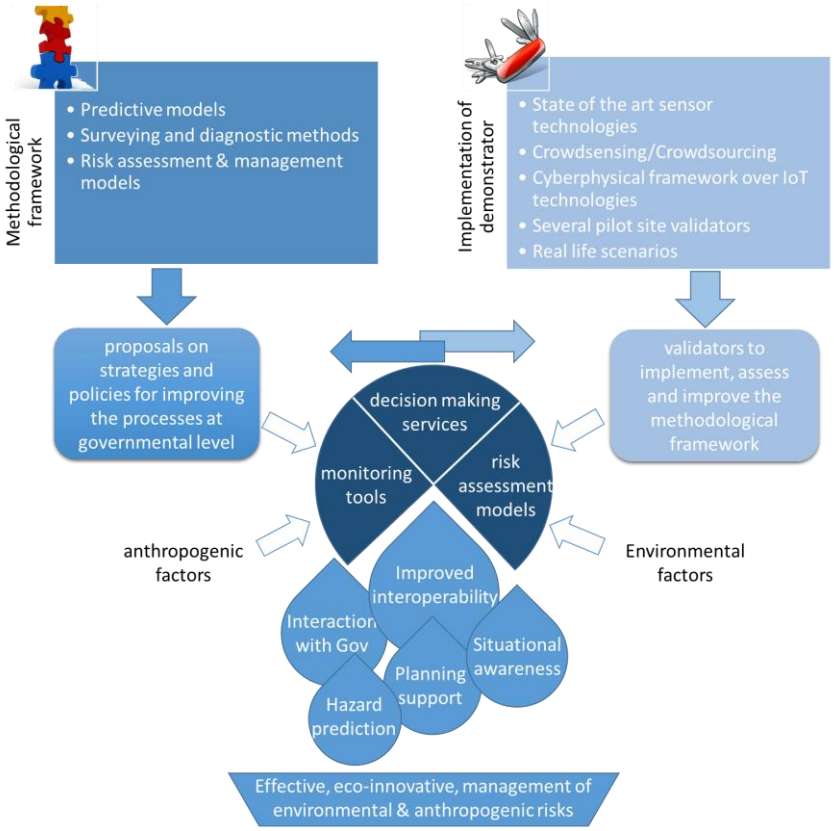


Fig. 4. General diagram of STORM Project

Pilot site	Historical period (*)						Material
	Pre-history (... – 3600 BC)	Ancient history (3600 BC – 500 AD)	Postclassical era (500 AD – 1500 AD)	Early modern period (1500 AD – 1750 AD)	Mid modern period (1750 AC – 1914 AD)	Contemporary period (1914 AD – present)	
MELLOR	 Cairn (3500 BC)	 Hillfort (800 BC)	 Medieval Church (1200 AD)		 Mill (1790)		• Wood • Bricks • Stone
BATHS OF DIOCLETEAN		 Roman Baths (298-306 AD)		 Cloisters (1565-1650 AD)		 Museum building (~ 1920)	• Wood • Bricks • Stone • Marble • Mortars • Concrete
HISTORICAL CENTRE OF RETHYMNO		 Hellenistic shipyards – Neoria (3rd-2nd BC)		 Fortezza fortress (late 16th century)	 Buildings in the old city (~1850)	 Minister (1955)	• Bricks • Stone • Mortars • Iron • Renders • Wood
TROIA		 Roman settlement (1st-5th c. AD)	 Early Christian Basilica (5th c. AD)				• Stone • Bricks • Marble • Stucco • Mortars
EPHESUS		 Ephesus Great Theater (3rd BC)					• Stone • Bricks • Marble • Iron • Mortars

* Stearns P.N., Adas M., Schwartz S.B., (1996), World Civilizations: The Global Experience (Vol.2), HarperCollins College Publishers

Fig. 5. Application domains of STORM Project

5.4 NATIONAL PROJECTS:

5.4.1 PHAROS PROJECT [5]

Title: An integrated planning tool for meeting the energy and water needs of Aegean sea islands using optimum renewable energy sources hybrid systems (PHAROS)

In this program participate OSMO (Developer & Supplier of RO Desalination Units). The total budget is about 300.000 € and the duration is 21 months.

Fig. 6. Pharos Project Environment

5.4.2 Developing Open Courses in Piraeus University of Applied Sciences

Open Courses or Open Course Ware (OCW) are courses / course lessons created at universities and published for free via the Internet. In PUAS 90 open courses with organized digital material available to both students and general public with creative commons licenses through asynchronous learning platform and 32 open courses which will include full video lectures synchronized with slides, were produced.
The infrastructure includes: Portable Video Recording Equipment, Specialized Equipment for Video Mixing & Broadcasting (Telestream wirecast), Authoring Tools for Interactive Multimedia Content - Articulate Studio 2013, Articulate StoryLine, Adobe Audition, Sony Vegas, VMix HD , Video on demand Server (Wowza Media Streaming Server Software)

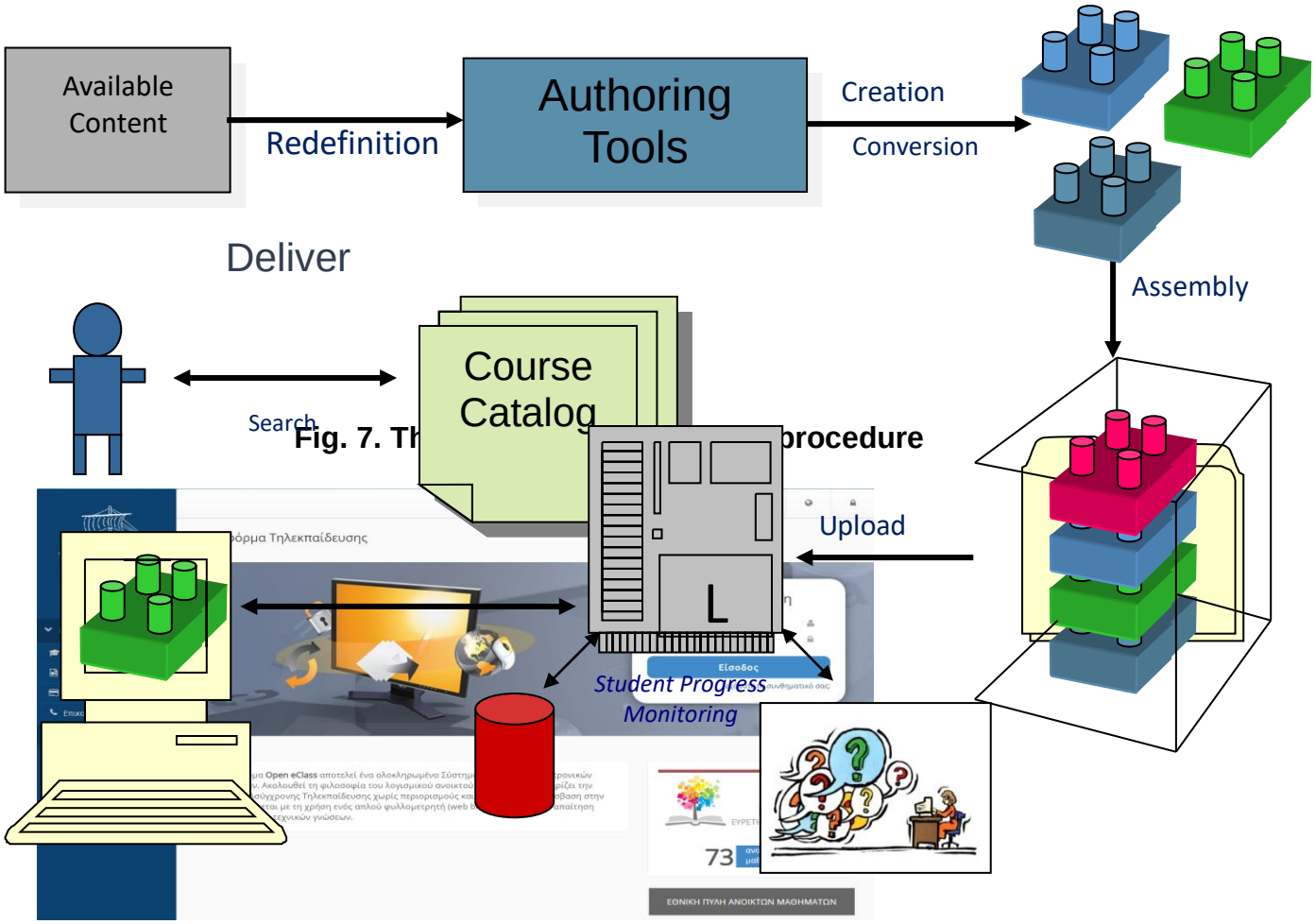


Fig. 7. The initial page of the PUAS Open Courses Platform

5.4.3 THE CHP OF THE RIRAEUS UNIVERSITY OF APPLIED SCIENCES

Some of the major problems of the times we live are the dramatic impact on the environment, the reduction in stocks of conventional fuels, growing energy demands. For this reason, the global research community has fueled interest in the exploitation of renewable energy sources and efforts to increase efficiency in existing energy systems. An attempt to increase efficiency in existing technologies is the Cogeneration. Cogeneration is the production of two or more useful forms of energy in one process. The chemical energy of a fuel (typically natural gas) is converted into mechanical and thermal energy. The mechanical energy used to produce electricity and heat is typically used to produce steam, hot air / water or cooling. The main advantage and incentive to implement the cogeneration system is the improved performance compared to conventional separate heat and power generation systems.

The advantages resulting from the use of CHP technologies Heat and Power is summarized below:

- Fuel savings,
- Energy autonomy,

- Higher efficiency compared to conventional separate production of electricity and heat technologies,
- Flexibility and minimization of losses due to lack of transmission lines,
- Reduction of pollutant emissions to the environment.
  The total budget of the project is about 3M and the duration about 3 years. Now is able for full operation.

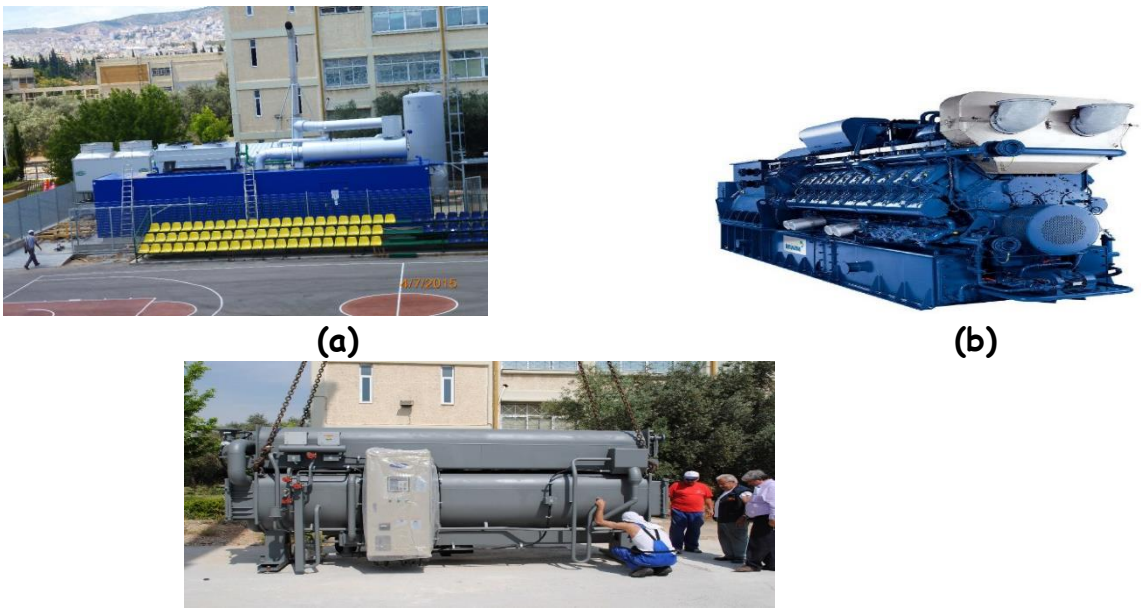


Fig. 8. The general view of the plant (a), the power couple(b) and the absorption chiller (c)

5.4.4 PV-BATTERY EV CARPORT

Self-funded, stand-alone & grid connected solar-based EV charging station was constructed, with the contribution of Greek and foreign industrial partners. The main characteristics of the station are about 3kW of PVs and about 18kWh of battery storage. Station upgrade will welcome the introduction of an integrated hydrogen unit and a wind turbine along with smart interaction with the local grid.

Fig. 9. PV-battery ev carport

5.5 STUDENTS ACTIVITIES

5.5.1 "POSEIDON"

is a student team representing Piraeus University of Applied Sciences in Shell Eco Marathon. Students are challenged to design, build and optimize ultra-energy efficient vehicles. The main goal is to reduce energy losses to a minimum. The projects are supported by sponsors and research funds of PUAS. Members of the team are 15 Mechanical Engineers, 9 Electrical Engineers, 10 Electronics and Automation Engineers. Trireme Project focuses firstly on a worthy representation of *Piraeus University of Applied Sciences and secondly on a better result that will place trireme project the highest possible in the rankings.* This year, the focus is on a much better result for PUAS and Greece, by enriching the team with a complete set of electrical, computer, automation and mechanical engineering students. Big national and multinational companies may offer a set of sponsorship collaboration, to enable a proper preparation.

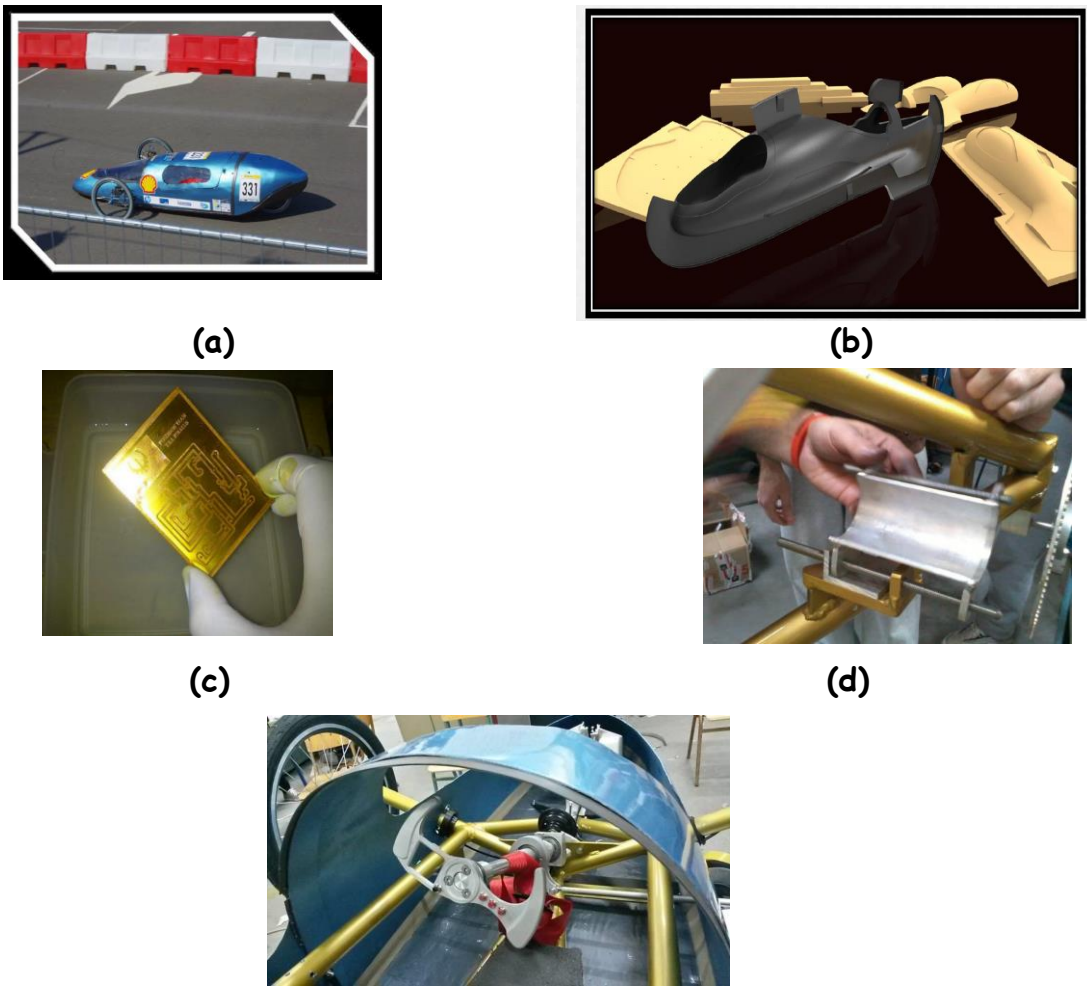


Fig. 10. The trireme vehicle (a) the improved parts designed by a CAD station (b), real parts of the ensemble (c), (d) and details of the steering mechanism (e)

5.5.2 The Freescale Cup - Intelligent Car Racing

Two groups of students were engaged in the Freescale Cup. The activity was proven successful and many other students contributed in the appropriate construction of the car for the racing. Innovative software tools have been used to develop the software for the autonomous (self-guided) car and special hardware was organized for the car development.

Fig. 11. The Freescale Cup car parts: (a) the base, (b) the servo motor, (c) the DC motor, (d) the battery, (e) FRDM-KL25Z , (f) the camera, (g) the speedway and (h) the motor drivers

5.6 Contributing Laboratories

There are 25 Laboratories [1] for research and development in Piraeus University of Applied Sciences. Some of contributing laboratories in the above projects are presented below.

5.6.1 The Laboratory of Non-destructive Techniques

The Laboratory gives emphasis to the following research topics: Characterization of nano-materials, non-destructive characterization of artifacts, analysis and identification of pigments and paintings, material characterization with applications in solar cells.
Have the possibility to do in-situ measurements using portable instruments, Raman, XRF, FTIR, VIS/NIR, Hall Effect. Identification and provenance of semiprecious stones. The partners are Universities, Museums, Libraries etc. from Greece, Cyprus, Germany, Belgium, Slovakia, Czech Republic, Croatia, and Saudi Arabia. Specific seminars in the specific area of “Applications of Non-destructive techniques in cultural heritage” are offered.

A Scientific Conference with the title “Conference on Digital Heritage” in cooperation with Cyprus Technical University and University of Thessaly has been organized on September 2015 in Volos. Now prepares the 6th International Conference on Digital Heritage- EUROMED 2016 (31/10 - 5/11/2016 Cyprus).

5.6.2 Soft Energy Applications & Environmental Protection Laboratory - SEALAB

Provides **education** and carries out **applied research** within the context of national and EU funded projects, in collaboration with public and private entities, for the last 25 years.
The main research interests are Wind and Solar Energy, Energy Storage, Green Island / Smart Grid Concept, Building energy Efficiency, Integrated Energy & Water Schemes, Electric Vehicles [6].

5.6.3 The Laboratory of Computer Control and Telematics

The Laboratory gives emphasis to the following research topics such as Telematics, Measurements – Data Acquisition, Computer Control Systems – Computer Networks and Artificial Intelligence – Swarm Intelligence [7].

5.6.4 The Laboratory of Design of Innovative Textiles

The Laboratory gives emphasis to the following research topics Design of innovative textiles and garments, Quality Control of textiles manufacturing processes, new technologies and materials for textiles production.

5.6.5 The Laboratory of Open Courses

The Laboratory includes Video Recording Team (6 members), Multimedia Content Development Team (10 members), Learning Management Administration Team (4 members), Content Certification Team (3 members).

5.6.6 The Laboratory of Mechanical Engineering Design

The Laboratory gives emphasis to the following research topics: 3D Printing, Manufacturing, CAD/ CAM/ CAE, Advanced Materials, CNC.

5.6.7 CONSERT: COmputer Networks and SErvices Research Team (Part of the Communications and Networks Lab Dept. of Electronics Engineering PUAS)

The research interests lay in the areas of Computer Networks and Applications, Internet of Things, Smart Environments, Machine Learning, ICT in Education, Games design and development. Members of CONSERT have been long involved in related research activities in the context of research projects at national and international level. The CONSERT faculty members in research activities at international level is a long one, starting from the early 90's, and involving participation in more than 30 research projects, in many of which involvement has been at technical coordination level.
The expertise at teaching level is similar, counting more than 20 years of teaching experience of CONSERT faculty members on Computer and Network related courses at many Universities. Since 2013, CONSERT has been accepting applications from international students for intern positions at the Communications and Networks Lab. Several projects have been completed successfully in the context of local and international student internships, on topics including Computer Networks, Internet of Things, smart homes, STEM education, game based learning, as well as the support of Computer network courses at laboratory level and the preparation of student exercises. CONSERT is welcoming applications from students in order to be part of our research team, and work with us on topics involving: Internet of Things, Smart environments, Cloud computing, Use of ICT in education or participate in the improvement of our courses on Computer Networks, Broadband Networks, Computer Programming.

5.7 Conclusion

The sample of the ongoing research programs of PUAS that were presented in this paper prove that the scientific staff of PUAS is active and collaborates with many researchers of other Universities, Institutions, enterprises and authorities in the EU context and worldwide. The results of cooperation are very significant and the social impact is very important and measurable in most cases.

5.8 References

1. Piraeus University of Applied Sciences, http://www.teipir.gr/index.php/en/
2. Department of Electronics Engineering (PUAS) http://www.electronics.teipir.gr/index.php/en/research/2016-02-01-11-01-57/research-programs
3. UNITE http://unite-tempus.eu/
4. TILOS http://www.tiloshorizon.eu/
5. PHAROS http://aristeia.sealab.gr/tag/renewable-energy-sources/
6. SEALAB http://www.sealab.gr
7. Department of Automation Engineering (PUAS) **http://auto.teipir.gr**

6 xAPI-Taking E-learning Outside of the Web Browser

Erwin Bratengeyer
Danube University Krems, Austria

6.1 Abstract

A new eLearning specification, the Experience Application Programming (xAPI) Interface, was released recently which enhances traditional SCORM-based standards considerably. Features and issues of this specification are explained. xAPI-enabled learning scenarios, allowing for tracking and storing learning activities, which may result from real world experiences no longer limited to browser-based activities, are illustrated.

6.2 Introduction

E-learning, from the learners' point of view, basically means sitting in front of a computer screen and mostly using a web browser. Though this allows a variety of interactions and experiences it nonetheless leaves the learner cut off from the "real" world. Many learning experiences occur outside of the traditional Learning Management System (LMS) and web browser (see Fig.1). In order to allow tracking of learning activities and experiences, including both, formal courses and also informal learning scenarios, the widely used but too limited e-learning interoperability standard SCORM (Sharable Content Object Reference Model) had to be expanded [1]. SCORM was initially developed to make courseware interoperable between LMSs and reusable by different organizations and authors. What is wrong with SCORM is that it is complicated, that all learning activities must be launched from an LMS, that content must reside on the same web server as the LMS, SCORM is not designed to handle mobile learning neither learning from game-based applications nor from social learning scenarios. In a nut shell, until recently, with the SCORM standard in place, content had to run in a browser.

Fig. 1: Two learning scenarios - within the browser versus real world scenarios.

6.3 The Experience API

In 2010 the ADL (Advanced Distributed Learning) initiative, a US government program, began investigating new standardized experience tracking capabilities [2]. In 2013, the Experience API (xAPI) was released. From a technical point of view, xAPI requires an architecture consisting of specific web-service Application Programming Interfaces (API), a Learning Record Store (LRS), and typically an LMS and a Personal Data Locker (see below). An LRS can be equipped with reporting and analytic tools (see Fig.2).
xAPI is a learning technology specification that makes it possible to collect data about a learner's learning experiences independent from a web browser [3]. xAPI focuses on data not on content. The data comprise of the actors (learners) and their (learning) activities. These data may go beyond traditional data like test scores, page views, or mouse clicks. xAPI intends to provide all types of learning activity data that can be analyzed and correlated to performance metrics.

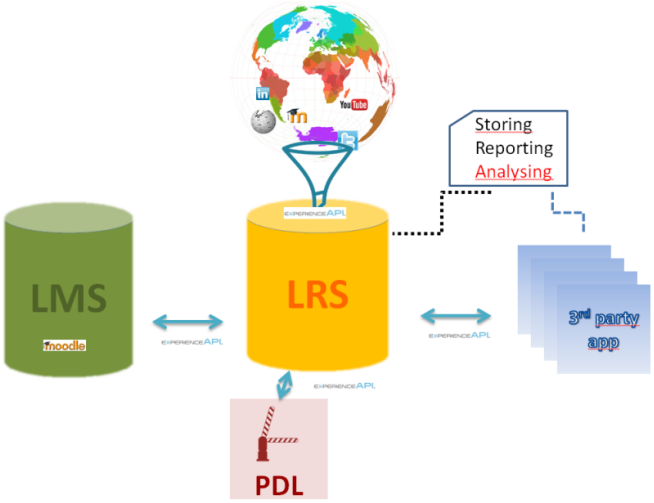


Fig. 2: xAPI-enabled architecture consisting of the Learning Record Store (LRS), Learning Management System (LMS), Personal Data Locker (PDL) and 3rd party applications.

People learn in many places, like in school, at home, in the work place, or while travelling using different devices and tools like laptops, smartphones, books, paper and pencils, by different activities like reading, listening, discussing, searching, measuring, approving, playing, thinking and so on. xAPI-supported environments are capable of recording all those activities and delivering quantifiable, verifyable, and shareable data. When activities are to be recorded statements are sent to a Learning Record Store. The statements are in the form of "Noun, Verb, Object". The simple grammar is in the form of: "I did this". This simple structure using nouns, verbs and objects allows for tracking almost any activity and is both, human and machine readable. Any xAPI-enabled device (smartphone, e-book reader, VR headset, smart watch, beacons, camera, …) can sent statements such as "I read an article with an eBook", "I completed a MOOC", "I mastered a game", "I passed a test", "I watched a movie clip", "I performed in a mobile app", "I posted in a blog", "I interacted with my supervisor", "I attended a conference", "I completed safety training", and much else. xAPI is designed to be flexible, so it does not require any particular verbs. One could make up one's own verbs or one can refer to a list of verbs provided by ADL [4].

Those recorded learning activities do not have to reside in one single LRS but LRSs can share data with one another, so the learners' experiences can follow the learner from one organization to another or stay secured within a "personal-data-locker"-restricted LRS.
The combination of life-long learning, e-learning and xAPI-enabled learning inevitably generates an enormous amount of data. Naturally, the question of privacy has to be raised whenever it comes to big data and learning. Privacy concerns and mostly inconsistent and thus impracticable data protection regulations do not seem to support the idea of tracking and storing all of a learner's activities, all the more when they occur in the real world outside of the web browser. A Personal Data Locker (PDL) provides a solution to privacy concerns [5]. Instead of directly recording statements to an LRS, data are recorded to a PDL which is controlled by the learner. The learner decides which statements are stored and delivered to the LRS. The PDL thus provides a vital extension helping to assign data sovereignty to the learner rather than to institutions. Still, there are a lot of conceptional issues and questions left, such as Who owns the data? Who can see it? Who can manipulate/delete/copy it? Who benefits?
Educational institutions may benefit from the learning analytics and reporting features provided by the LRS thus optimizing courses and contents. But the focus is on the learners. Learners can generate data allowing for the creation of adaptive learning environments and the optimization of their individual learning processes. The wealth of learning experiences in a student's life can be made more meaningful and quantifiable on the fly.

6.4 Conclusions

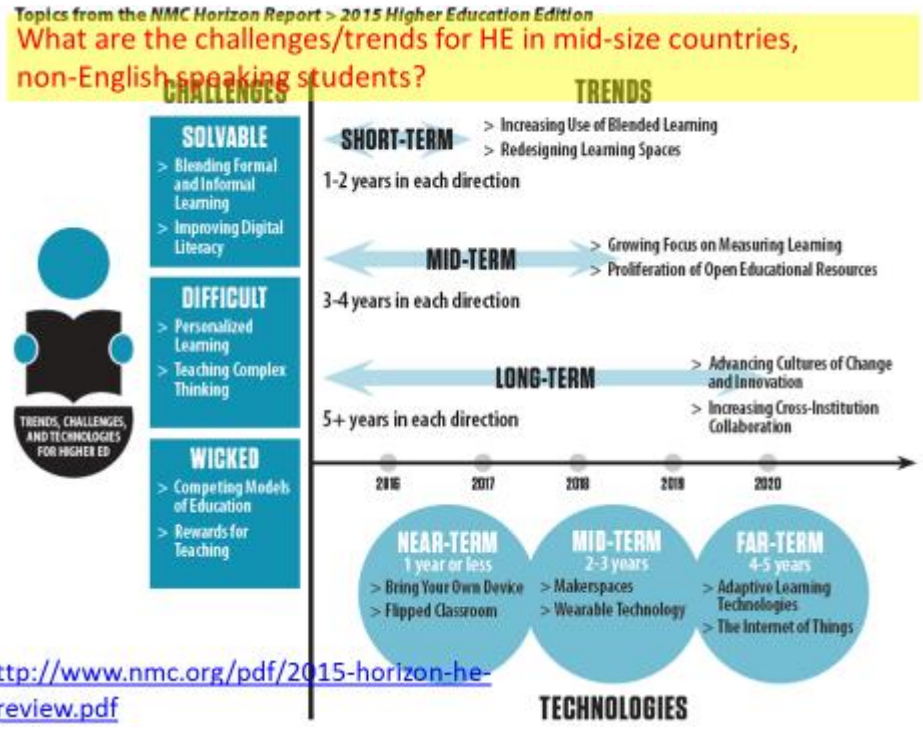
The claim raised by xAPI is high – not less than the ability to track real-world performances. The ability to communicate learners' activities in a flexible way is certainly a step in the right direction. xAPI could turn out as a key component of next training and learning architectures. The volume of data being written to LRSs can become really big. This is why xAPI is also depending on solving the problem of big data analytics, which however will not happen tomorrow. A major stumbling block for widespread use is the lack of practicable data protection regulations. From an ethical point of view dehumanization could overshadow the benefits of automatization. As of today, the jury is still out whether xAPI is able to improve one's overall learning experience in a substantial manner.

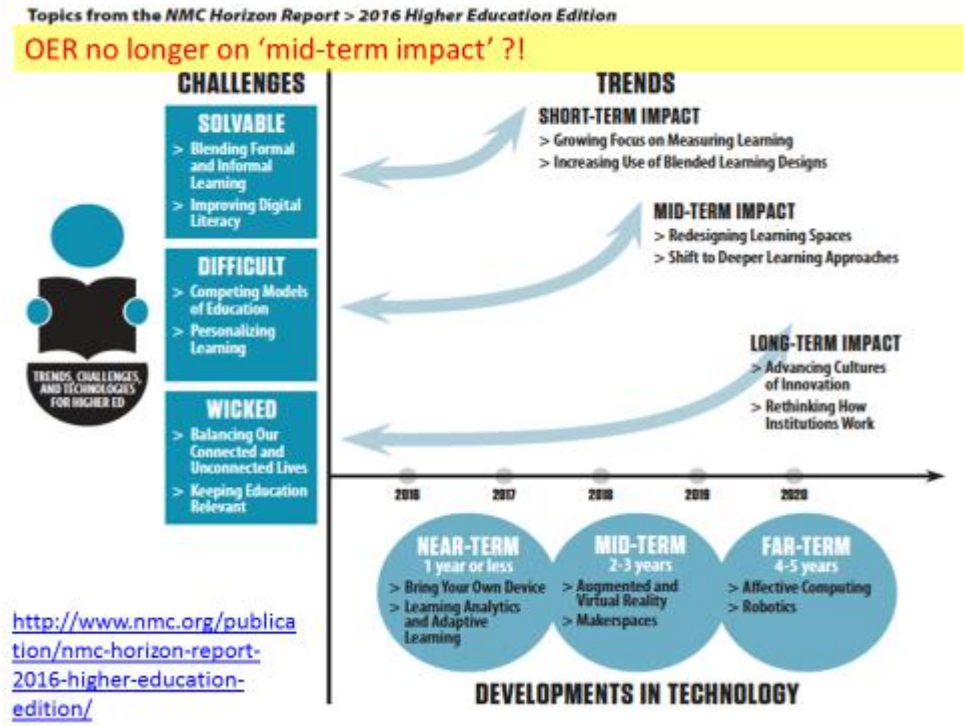
6.5 References

[1] https://www.adlnet.gov/scorm/ [Dec 2016]
[2] https://www.adlnet.gov/adl-research/performance-tracking-analysis/experience-api/xapi-background-history/ [Dec 2016]
[3] http://tincanapi.com/layer-2-record-any-learning-experience-informal-learning/ [Dec 2016]
[4] http://xapi.vocab.pub/datasets/adl/ [Dec 2016]
[5] http://www.wise-qatar.org/edhub/data-sovereignty-big-data-e-learning-under-control [Dec 2016]

7 Smart Learning through Opeb Educational Resources

Diana Adone
Politehnica University of Timisoara




Topics from the NMC Horizon Report > 2016 Higher Education Edition
OER no longer on 'mid-term impact' ?!
CHALLENGES
SOLVABLE
> Blending Formal and Informal Learning
> Improving Digital Literacy
DIFFICULT
> Competing Models of Education
> Personalizing Learning
WICKED
> Balancing Our Connected and Unconnected Lives
> Keeping Education Relevant
TRENDS
SHORT-TERM IMPACT
> Growing Focus on Measuring Learning
> Increasing Use of Blended Learning Designs
MID-TERM IMPACT
> Redesigning Learning Spaces
> Shift to Deeper Learning Approaches
LONG-TERM IMPACT
> Advancing Cultures of Innovation
> Rethinking How Institutions Work
NEAR-TERM
1 year or less
> Bring Your Own Device
> Learning Analytics and Adaptive Learning
MID-TERM
2-3 years
> Augmented and Virtual Reality
> Makerspaces
FAR-TERM
4-5 years
> Affective Computing
> Robotics
DEVELOPMENTS IN TECHNOLOGY
http://www.nmc.org/publication/nmc-horizon-report-2016-higher-education-edition/


Open Education

WHAT IS OPEN EDUCATION?

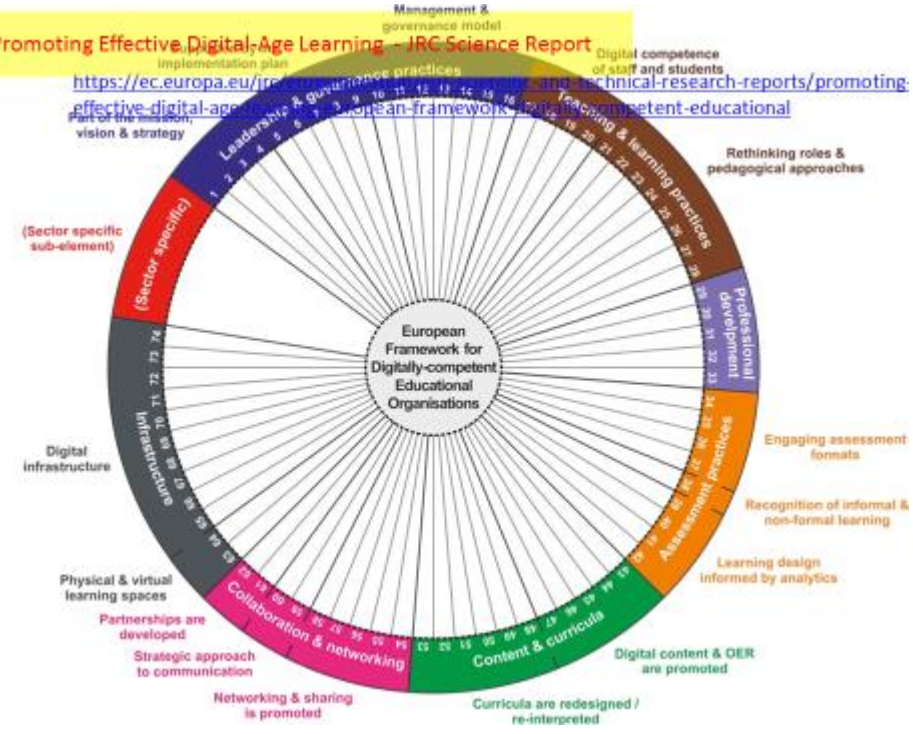
Open education is a mode of realising education enabled by digital technologies aiming to widen access and participation to everyone.

It offers multiple ways of **teaching and learning, building and sharing knowledge**, as well as a variety of access routes to formal and non-formal education, bridging them.

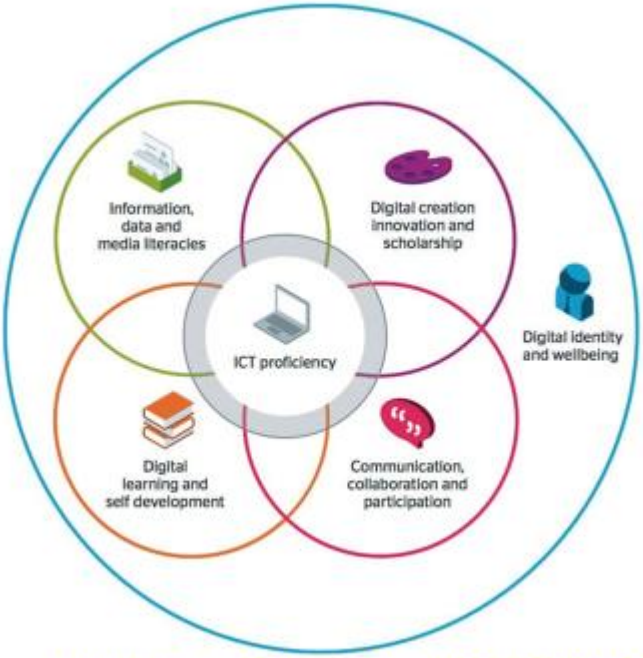
Source: OpenEdu IPTS, 2015

Promoting Effective Digital-Age Learning - JRC Science Report

https://ec.europa.eu/jrc/[illegible]and-technical-research-reports/promoting-effective-digital-age[illegible]European-framework-digitally-competent-educational



https://www.jisc.ac.uk/guides/developing-students-digital-literacy



https://www.jisc.ac.uk/guides/developing-students-digital-literacy

Digital Literacy

Social Networking	Transliteracy	Maintaining Privacy
Managing Digital Identity	Creating Content	Organizing and Sharing
Reusing / Repurposing	Filtering and Selecting	Self-Broadcasting

(Steve Wheeler http://steve-wheeler.blogspot.co.uk/)

Computational thinking

Today students will learn independent and digital all their life

21st century skills

OPEN life long learning STUDENT

Are they ready to identify, access, learn, analyse, apply, practice new knowledge across different media, information, communication, tools as to enhance their skills and develop their careers?

DEFY THE TRADITIONAL

TalkTech 2008 -2016 Students

707 students involved, no dropout

Boston, Bentley Univ

Intro to Information Technology

45 students per year

Spoke English

Frequently use the web, computers, and mobile devices

Age 19-22

Timisoara, UPT

Multimedia Technologies

50 students per year

Spoke English

Frequently use the web, computers, and mobile devices

Age 21-22

Project Debrief: Skyping in

Mark Frydenberg @checkmark · Nov 11

Welcome @diando70 to IT101X @bentleyu skyping in from timisoara to talk about global collaboration, tech trends

Tools used by students

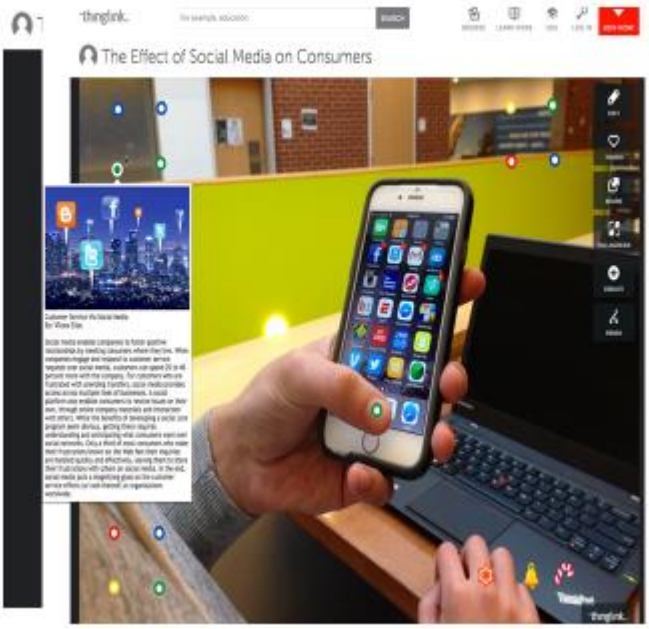
Task	Tools
align time zones	timeanddate.com
chat	Facebook, Messenger, WhatsApp, Google Hangouts
create and host audio	SoundCloud
create and host video	Vine, Periscope, YouTube, PowToon
create interactive images	ThingLink
edit audio	Sound Forge
edit images	PhotoShop, Paint.net
edit video	Windows Live Movie Maker
email	Gmail, Outlook
hold video conferences	Google Hangouts, Skype
record video	mobile phone camera apps
schedule meetings	Doodle
search the web	Google, Bing
share photos	Flickr, Tumblr
share screens	join.me, Google Hangouts

Students projects 2015

ThingLink

TalkTech 2015 Students

ThingLink

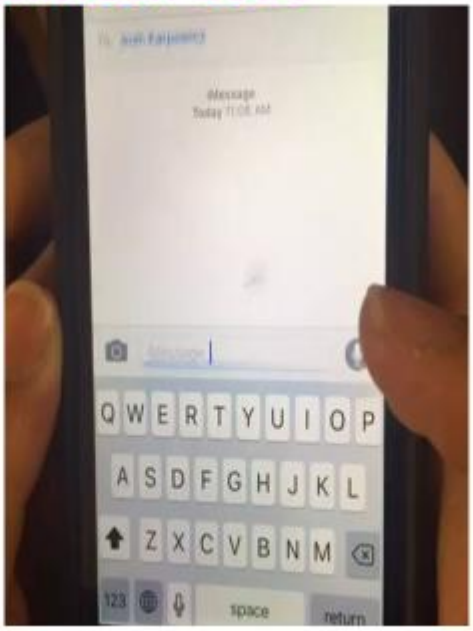


TalkTech 2016

Vine

exemplu

Messaging App



TalkTech 2016

Vine

exemplu

Internet of Things

TalkTech 2016

PowToon

exemplu

Wearables

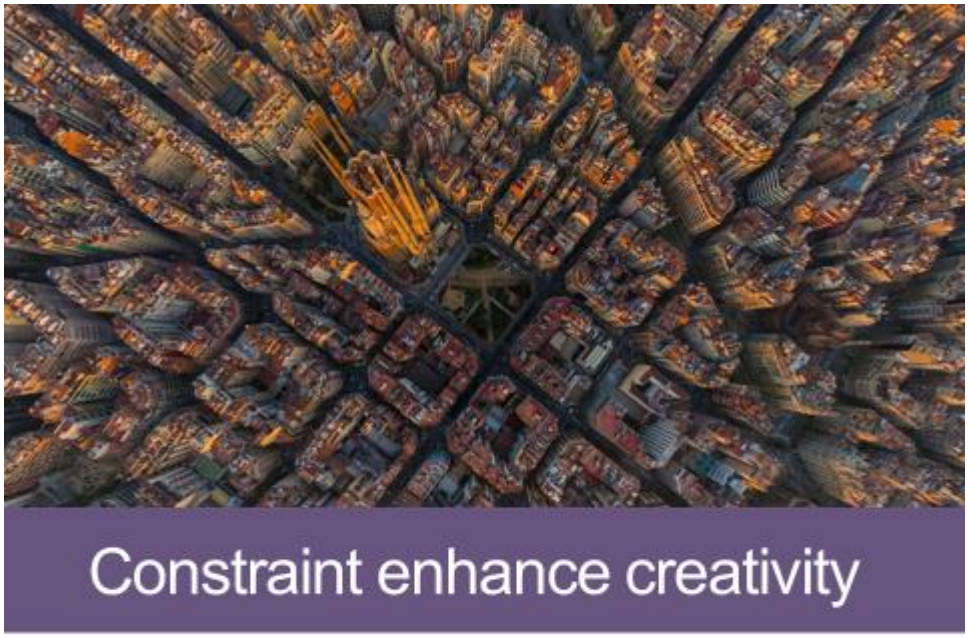
TalkTech 2008- 2016

Multicultural

Online - different time zones

Simulate real world work in an IT company

Students freely choose the tools,
communica esult


Constraint enhance creativity


Engage

Challenge

http://rubyforwomen.com/wp-content/uploads/2015/02/Weakness_Strength.jpg

CONTACT

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Director
e-Learning Center
Email: diana.andone@upt.ro
Web
Elearning.upt.ro/diana.andone

EDEN Fellow 2011

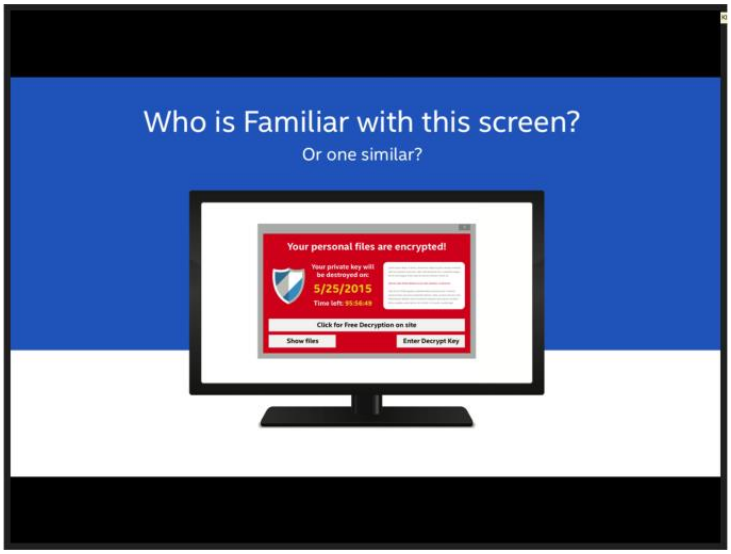
@diando70

http://www.slideshare.net/diando70/

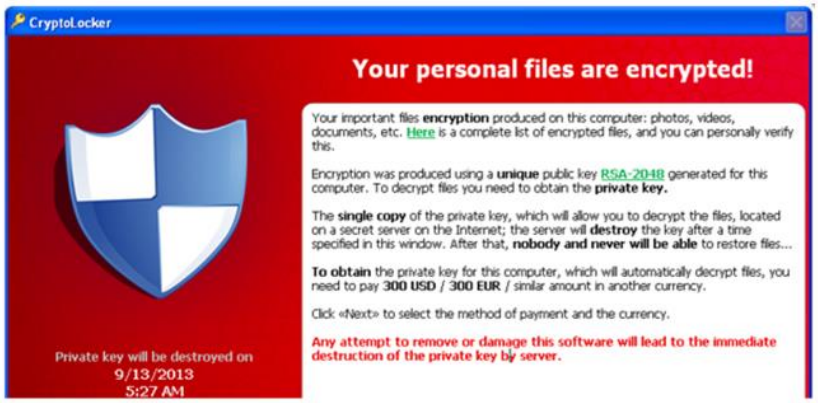
8 Ransomeware & How to Defend Against it

Ing. Felix Edelmann, MSc
Helix IT Consulting
edelmann@helix.at

In the following slides you will discover how ransomware attackers deliver their malicious software and which techniques they most commonly employ. You'll find out how you can leverage process, procedure, and advanced technology to reduce the risk of becoming a ransomware victim. Finally, you'll learn how to recover from a successful ransomware attack and how to implement additional protection measures to guard against ransomware attacks.



Ransomeware taking over an endpoint, with removal instructions.



Ransomeware taking over an endpoint


Crime


Crime

Digital Transformation of Crime

No criminalization of digital business

But: Digital transformation of criminal business

Simplest proof: CEO / President fraud

December 2015 FAAC € 50.000.000,--

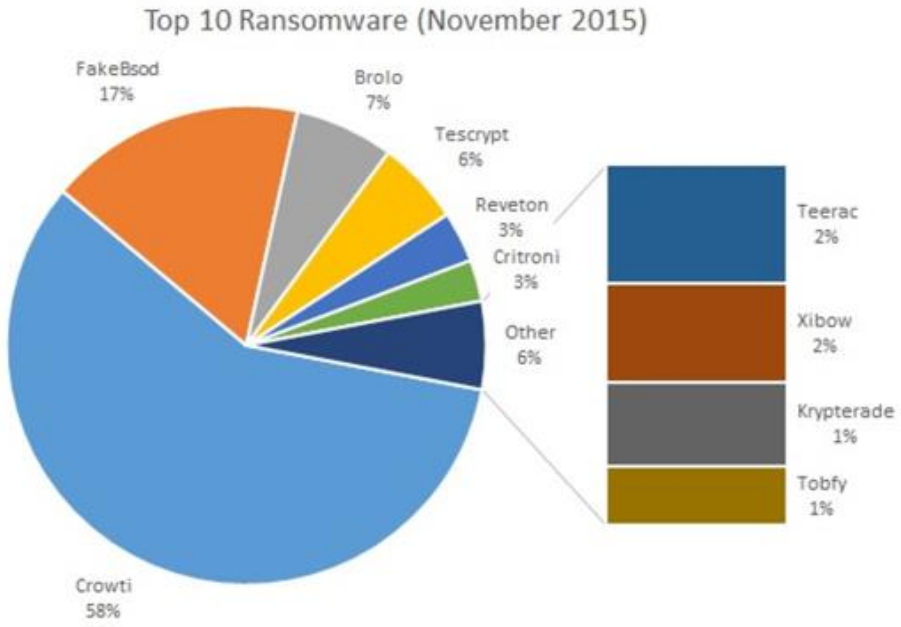
Ransomeware

Type of malware

Typically a Trojan attack

Access denial type attack, encrypt all files on your PC

Goal to get money



Source: Microsoft

How does ransomeware work - 5 steps

Targeting

Propagation

Exploit or user activity - 23% open phishing mails, 11% click on attachments; Source: Barracuda

Infection

Execution

Layer 8 security
Social Engineering Attacks

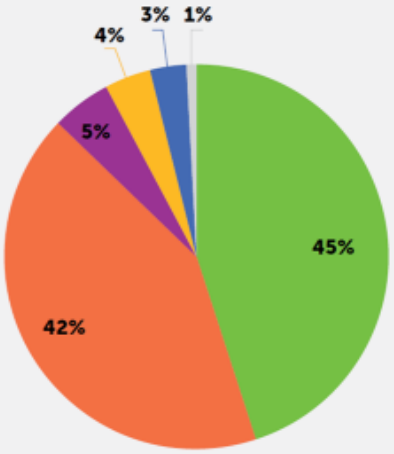
Vulnerable Applications

VULNERABLE APPLICATIONS USED BY FRAUDSTERS

The graph of vulnerable applications shown opposite is based on information about the exploits blocked by our products. These exploits were used by hackers in Internet attacks and when compromising local applications, including those installed on mobile devices.

- Oracle Java
- Android OS
- Browsers
- Adobe Flash Player
- Adobe Reader
- Microsoft Office

The distribution of exploits used by fraudsters, by type of application attacked, 2014



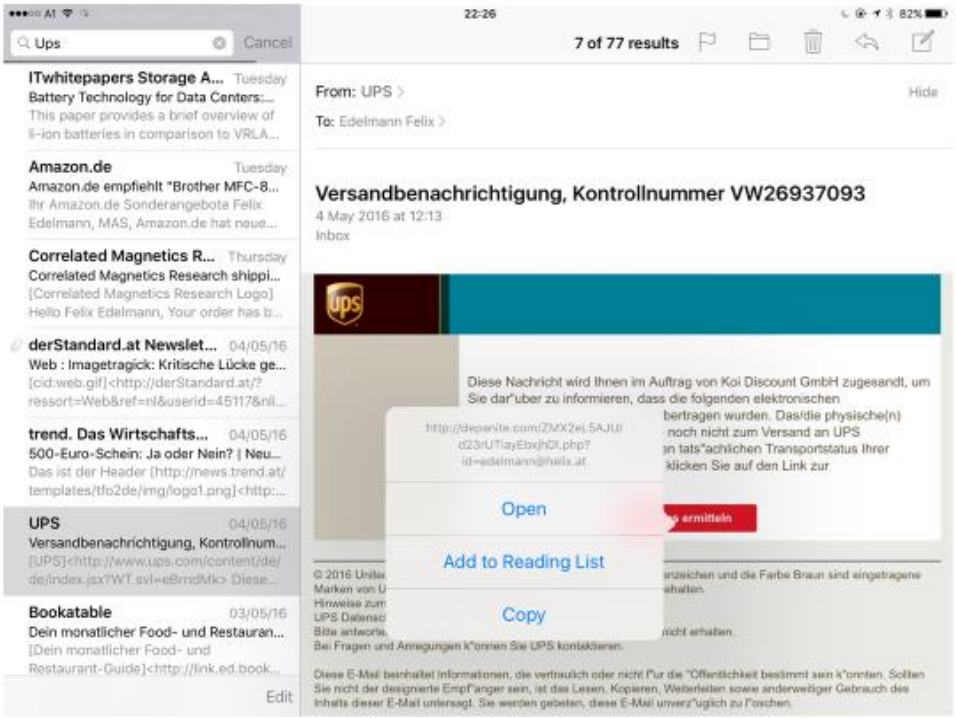
Source: Kaspersky Lab

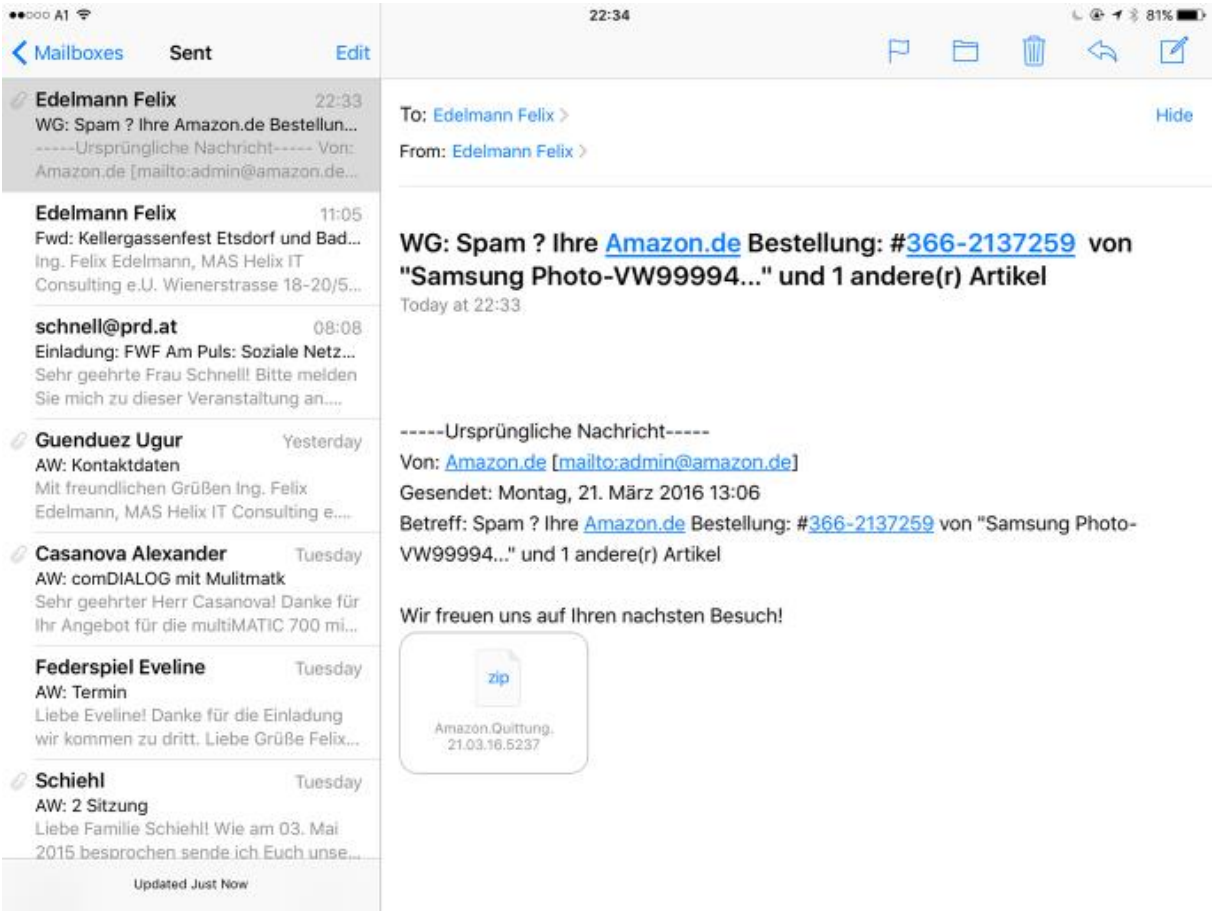
Advanced Threat

Zero-Day Exploits, Unknown Malware, Advanced Malware

There is no AntiVirus / Intrusion Prevention System Signature

Phishing mail with fake link





Advanced Threat Defense ATD

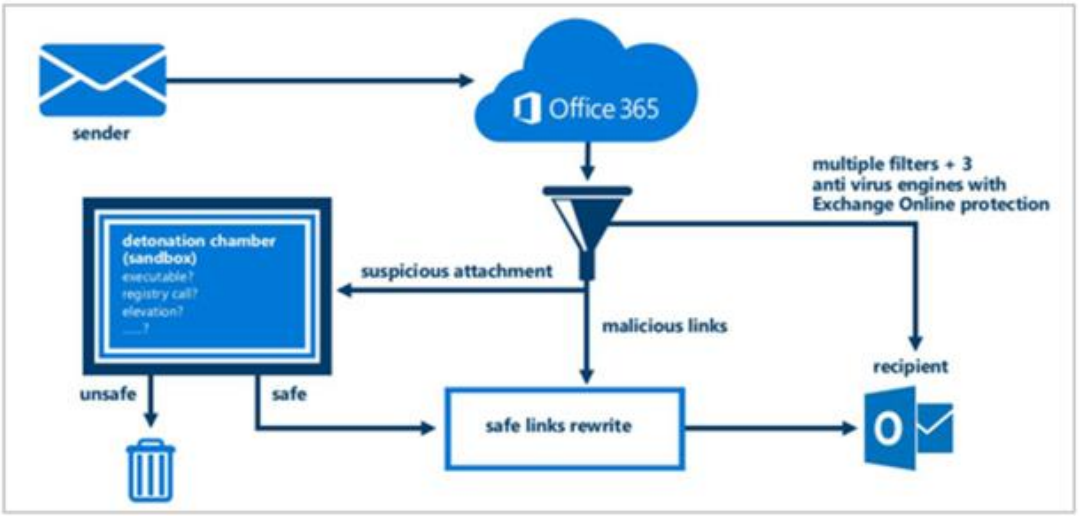
Local:
Sandbox
www.sandboxie.com

Cloud based:
Exchange Online Advanced Threat Protection
www.microsoft.com

Barracuda Essentials for Office 365
www.barracuda.com

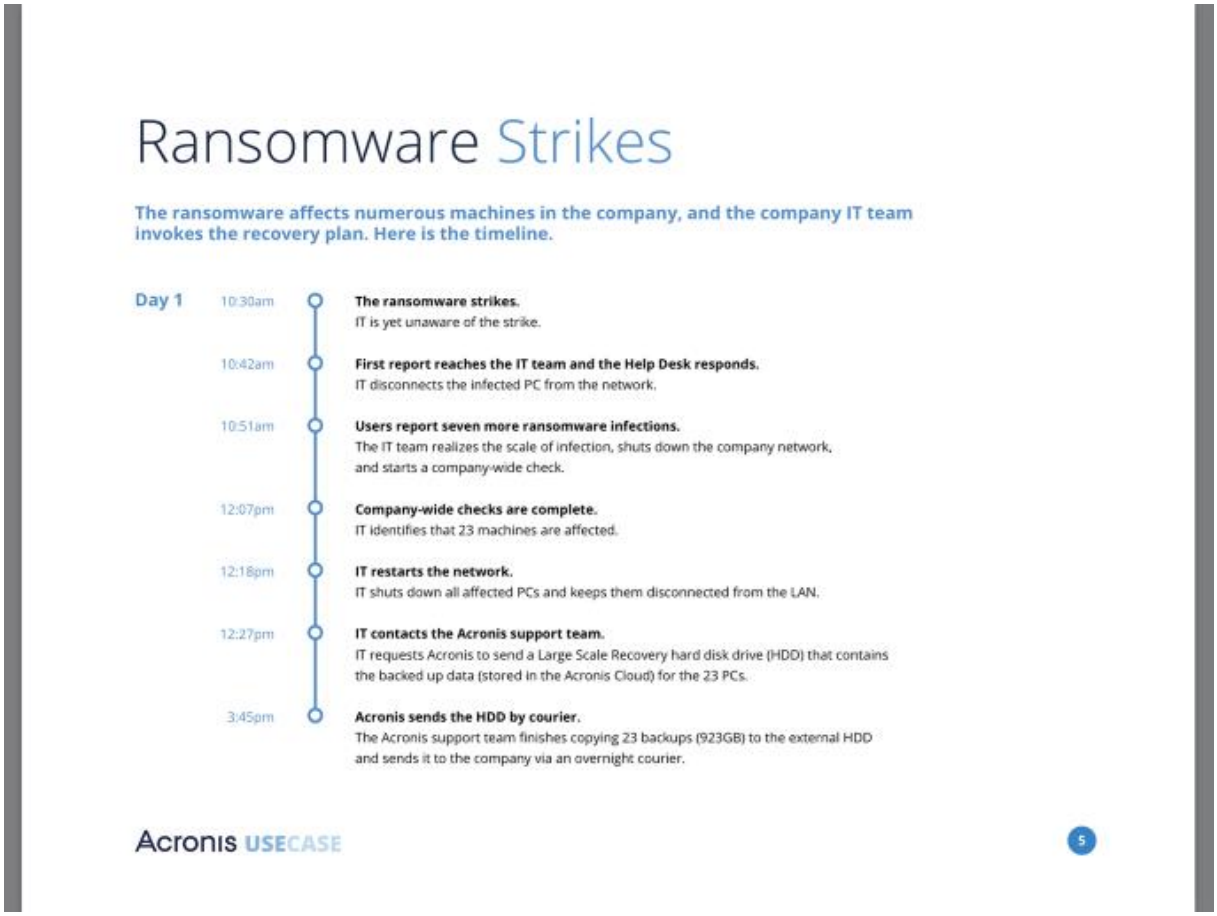
McAfee ATD, Intel Security, Cisco Cyber Threat Defense, ...

Exchange Online Advanced Threat Protection



What to do if:

Alert law officials
Isolate the affected machine
Remediate actions
Restore from back-up
Pay the ransom ???



Prevent Infection

Apply all Updates and Security Patches immediately
Have a "recent" back-up, online with automatic sync
Remove the administrator right from yourself
Don't open phishing mails
Don't click on attachments
Don't click suspected links
Use Advanced Threat Defense

Your best defense: Back up, Back up, Back up...

9 Knowledge Cities versus Smart Cities - discussion triggered on occasion of the case of Timisoara, Romania

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9.1 Abstract

“Smart City” is a term which denotes a current “hype” in characterizing advanced cities being equipped with up-to-date ICT infrastructures. This article aims at investigating the difference between a city defined to be smart and a city which is profiled as a knowledge city. Starting point is a presentation on Timisoara, Romania, presented as a template of a Smart City at the 2015 and 2016 NETTIES conferences. Reflections also include the example of Vienna, Austria, the author’s home place. An short outlook to the future of smart / knowledge cities is given for perspective.

9.2 Some definitions first

Smart in a personal dimension means to master some quick intelligence or ready mental capability, to be very good at learning or thinking about things, to be clever, readily effective, witty and showing good judgement.
A city is a large and permanent human settlement. There is no agreement on how a city is distinguished from a town or a municipality in general meanings. Cities usually have a particular administrative, legal, or historical status based on local law.
After Wikipedia [1] “a Smart City is an urban development vision to integrate multiple Information & Communication Technology (ICT) and Internet of Things (IoT) solutions … to manage a city’s assets including information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, waste management, law enforcement, and other community services. … ICT allows … to interact directly with the community and with the city’s infrastructure and to monitor what is happening in the city, how the city is evolving … Through the use of sensors integrated with real-time monitoring systems, data are collected from citizens and devices … then processed and analyzed. The information and knowledge gathered are key to tackling inefficiency.
Today (2016) 78% of European citizens live in cities, and 85% of the EU’s GDP is generated in cities. Many European cities are forerunners in the much-needed transition towards a low carbon, resource efficient and competitive economy. Cities are central to delivering on key challenges for Europe’s society and economy: jobs, growth and investment, innovation, energy- efficiency, low-carbon development and CO2 –reduction.

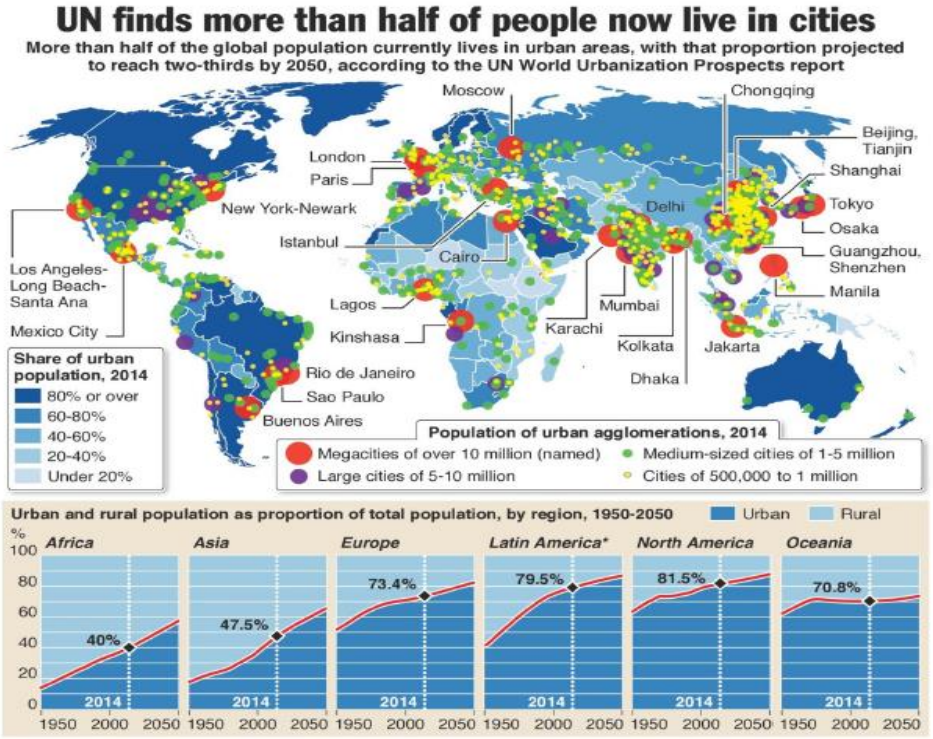

Fig. 1 UN's analysis of the distribution of inhabitants in cities and rural areas

In Wikipedia, no entry on Knowledge City could be found when this article initially was written. After the "IGI Global Publisher's dictionary" [2], "a Knowledge City is a city that searches for the creation of value in all its areas and develops high standards of life, cultural support and economic development, among other aspects including higher level of income, education, training and research, at the same time it is a regional knowledge economy- driven city with high value added exports created through research, technology and brainpower and purposefully designed to encourage the nurturing of knowledge".

9.3 Timisoara as a template for a Smart City

Timisoara in Romania, as Radu Vasiu introduced in [3], is a city which may well serve as a template for the current status of a midsize smart city, and even more as a vivid location where the process of implementation is not only a matter of a technical investment program, rather than also to get citizens and guests involved in the city's development. It follows a roadmap as has been worked out in general by expert communities organized within a European Commission's framework, as published by the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) , [4] – see Fig 2 .

For the citizen as well as for any visitor of Timisoara, using the Open Data Sets as provided by the city government in cooperation with Politehnica University of Timisoara, and the consortial Smart City Association, smart phone apps have been developed covering mainly location based identifications of public places such as administration offices, museums, art monuments or street histories.

Fig. 2 Transforming an EU designed roadmap into a concrete local implementation

In addition and amongst several initiatives, The Innovation Labs 2016 program of Timisoara organized by the two local tech agents TechLounge and BanatIT in partnership with Orange, Carrefour and The Romanian-American Foundation organized a hackathon thus getting event external contributors to Timisoara's smart city development engaged. (By the way, his hackathon was run during the conference NETTIES 2016 to which this article is devoted). Timisoara's Innovation Labs program fosters the learning-by-doing quest to nurture hatching ideas of its participants into thrilling new services for the city. It is clear and conforming to the definition of a smart city, that in the case of Timisoara, smartness is created by the design intelligence of those being invited, mainly from the IT-technological and creative community.

Smart City concepts, however, are going beyond the IT intelligence horizon. The claim evolves towards the idea of a city which is developed with a holistic framework in mind, as is shown in Fig. 3. As R. Vasiu [3] referring to B. Cohen [5] points out, that a true smart city would be developed in a concerted approach covering six different aspects synchronously, as are: smart economy, … mobility, … environment, … governance, … people, and … living.

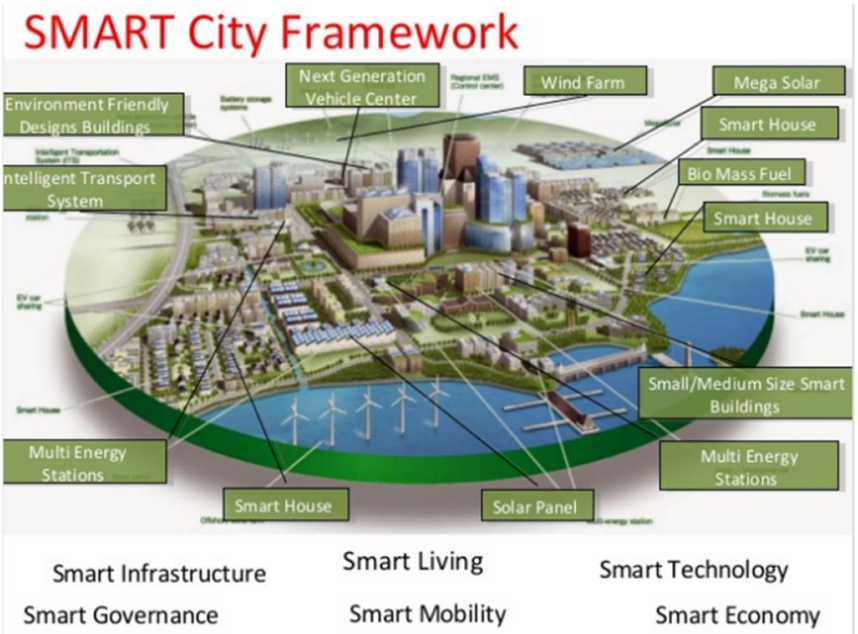

Fig 3. A holistic technological framework of a Smart City

To give guidance how these many different dimensions can be managed, the European Innovation Partnership (EIP) on Smart Cities [6] initiated six action clusters which, in the case of Timisoara , mirrors the concerns to be addressed by any city government, which are

- Business Models, Finance and Procurement
- Citizen Focus and Involvement
- Integrated Infrastructures & Processes across Energy, ICT and Transport (including Open Data)
- Policy & Regulations / Integrated Planning
- Sustainable Districts and Built Environment
- Sustainable Urban Mobility

Although by definition, a smart city in its first instance is defined by its installations and uses of ICT technologies, it should be recognized that from a political and societal perspective the involvement of humans in their role as citizens in this list ranks top, at least second. We will see that the human aspect is a key discrimination factor to differentiate smart cities versus knowledge cities.

9.4 The evolution towards knowledge cities

The concept of a city as a knowledge city has been discussed since long by e.g. F.J. Carillo [7] or A. Bounfour and L. Edvinsson [8]. A recent conference [9] within the 10 years' series of the "Knowledge Cities World Summits" was exclusively devoted to the profiling and identification of knowledge cities.

In history knowledge often has been associated with science. Cities as e.g. Vienna, Austria, long before they committed to be perceived as a knowledge city called itself to be a science city, referring to the many universities and research facilities the city is hosting. Such transformation in denotation in German language is supported by the nearness of the spelling of the terms science = Wissenschaft and knowledge = Wissen, thus the notation Wissenschaftsstadt easily transforms into Wissensstadt. This is not only a matter of wordings rather than an extension indicating the inclusion of all citizens.

The historic evolution from sacred and isolated locations of science and knowledge towards open cities for its knowledge citizens as intensively involved key stakeholders is explained by Fig. 4 first time introduced by Debra Amidon [10] in 2004

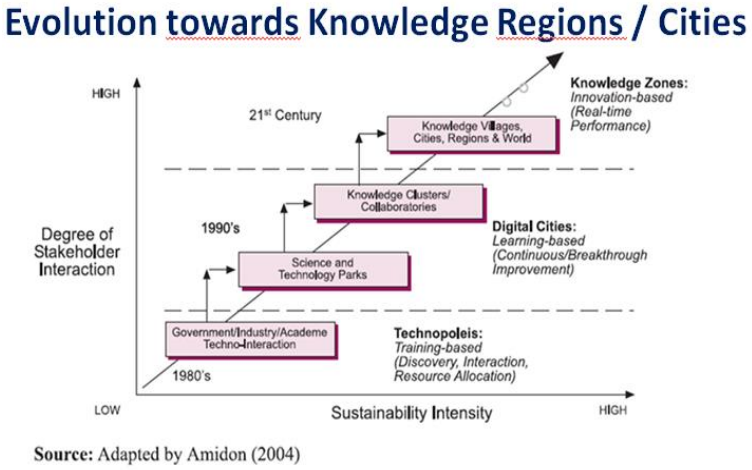

Fig. 4 The historic evolution towards knowledge cities

The idea of a city as a more and more open place and space for knowledge exchange goes in parallel to a modern understanding of a university embedded in a city, thus developing towards a multiversity, as has been defined already in 1963 by Clark Kerr [11] stating (quote): “The ‘Idea of a University‘ was a village with its priests. The ‘Idea of a Modern University‘ was a town with intellectual oligarchy. The ‘Idea of a Multiversity’ is a city of infinite variety… This city is more like the totality of civilization as it has evolved… and movement to and from the surrounding society…“ (Remark: Humboldt Cosmos Multiversity (www.humboldt-cosmos-multiversity.org), of which the author is the current president, aims to be such a future discourse platform which once may complete the classical university).
The more the concept of knowledge is being accepted as an economic issue in terms of a common valued good, i.e. a good everybody should have access to, the more politics is asked for policies creating “knowledge spaces” and motivation to develop knowledge at large. In the case of Romania, which naturally also maps to Timisoara, its former science minister Adrian Curaj took this idea as a challenge and initiated a study [12] on how his country may master the transition to become a knowledge nation by introducing concepts for the identification and its further development of the country’s intellectual capital. (Fig. 5)

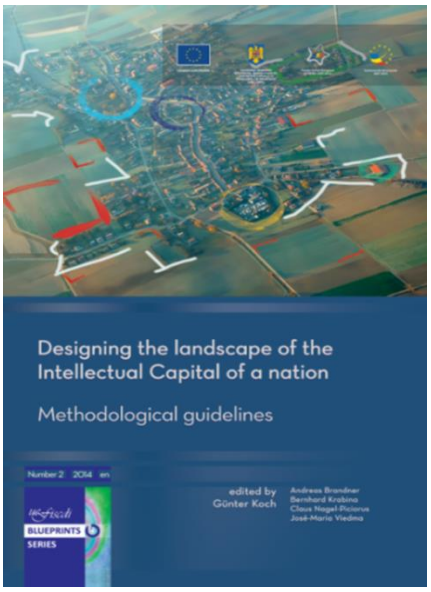

Fig. 5 Cover page of the study on how to turn a whole nation like Romania into a knowledge country

9.5 Differentiating Knowledge Cities from Smart Cities

The Economist taking up the discussion on the future of cities in 2016 [13] in a poll found out that citizens would prefer that smart (city) technologies would give them better opportunities to enter communication with “their” city, i.e. with those running the city, i.e. the city administration. Participation and feedback communication, a requirement supported by 58% of the citizens, as well as other wishes of citizens towards the city government looks to be positioned high in the priority list – see Fig. 6. In this picture also some statements from city managers having been involved in The Economist study are quoted, the majority confirming that the ultimate goal of any

smart city development must be a better integrated communication between all stakeholders constituting the substance of any city.
Taking this in mind and applying the criteria which define what a knowledge community e.g. a knowledge region shall be, it becomes clear that the Knowledge City is a concept well based on the existence of a smart city as a sufficient but not necessary requirement, however it aims at a higher level which is the humanistic perspective of a city model.

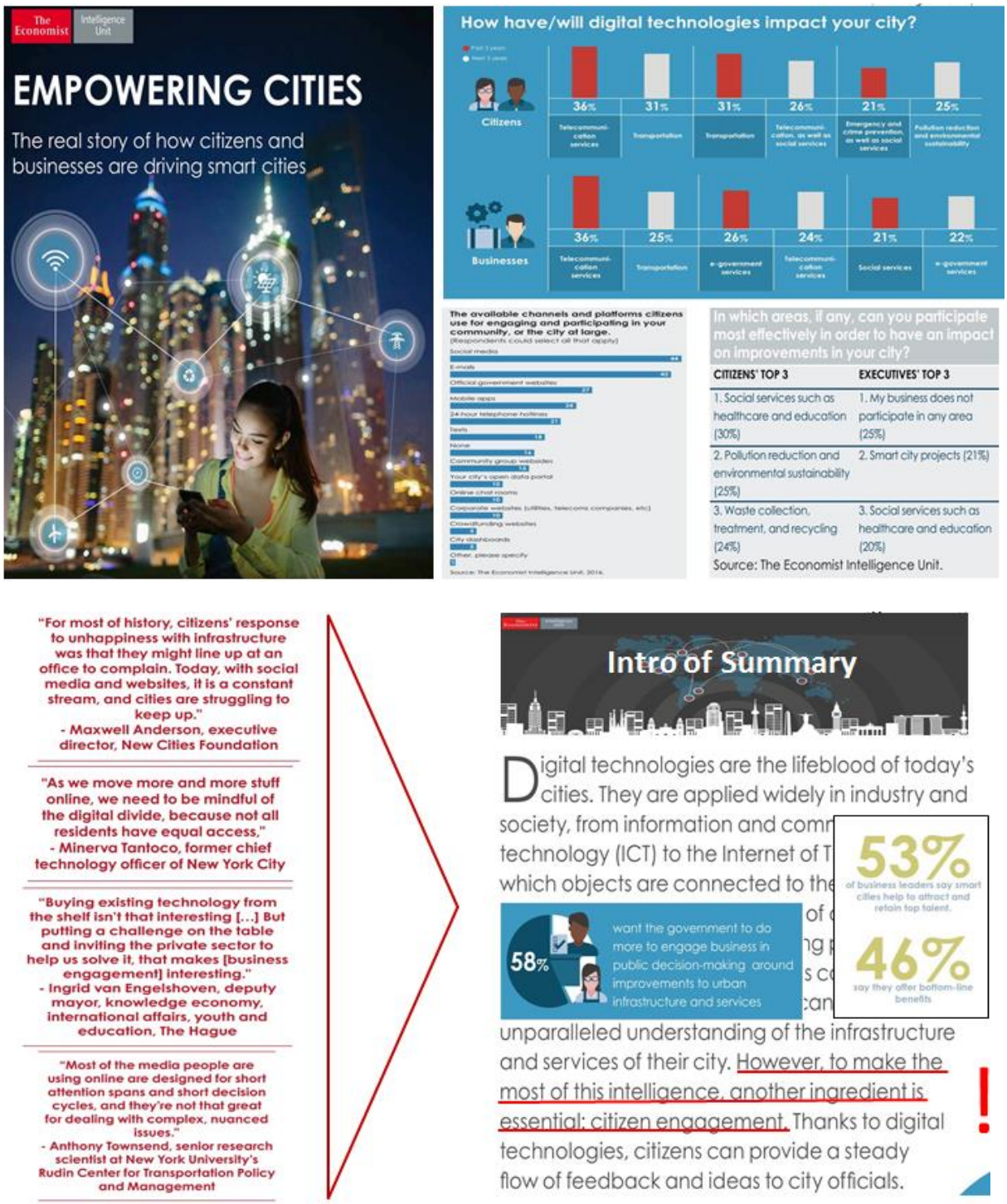

Fig. 6 A condense summary from the Economist study

In this understanding – inspired by Maslow's model of the hierarchy of human needs [14] – the suggestion is to model a city also in terms of layers, starting from the physical bottom structure of buildings and housings, further stepping upwards by introducing hard infrastructure on a next higher level, then the ICT hardware and software levels and further the next upper "layers" – each one using the underlying ones - where the highest levels are defined by the human and humanistic needs. To state it even sharper: The so far discussions about smart cities are reflecting the lower level "hardware layers" offering the many functionalities a smart city is based upon, whereas the knowledge city is defined by the highest "soft(ware) layers" made by people – as demonstrated in Fig. 7.

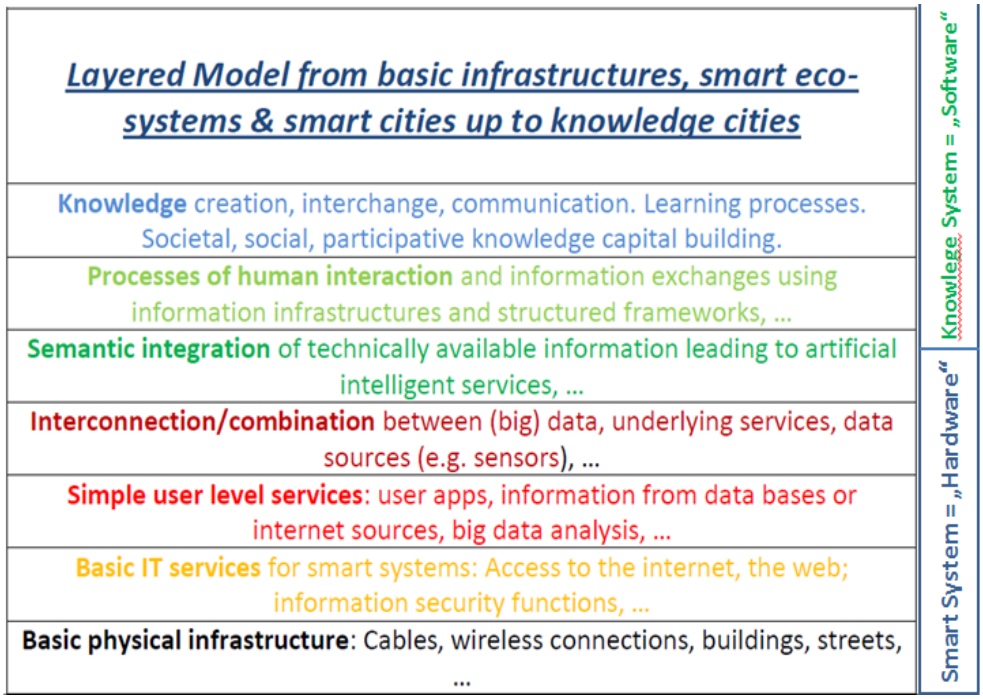

Fig. 7 Definition of a Knowledge City built upon a Smart City by means of a layered model (© G. Koch)

For instance the city of Vienna, marketing itself by stating that it is "different", in its self definition as a smart / knowledge city, it comprises the dimensions of

- resources, i.e. buildings, infrastructures, energy supply, mobility etc.
- quality of life, i.e. environment, healthcare, social inclusion, participation
- innovation, i.e. economy, research – technology – innovation (RTI), education

which have to be designed and developed synchronously, equally and in a balanced way. I.e. Vienna clearly sticks to the criteria to be a true knowledge city. Vienna is on its best way to succeed by maintaining its always top rankings as a most livable place, since the city government tries its best to combine top down strategies with bottom up participative communication, and as well tries to follow the success of implementations by (partly) applying methods of intellectual capital measurements (Fig.8 right up).

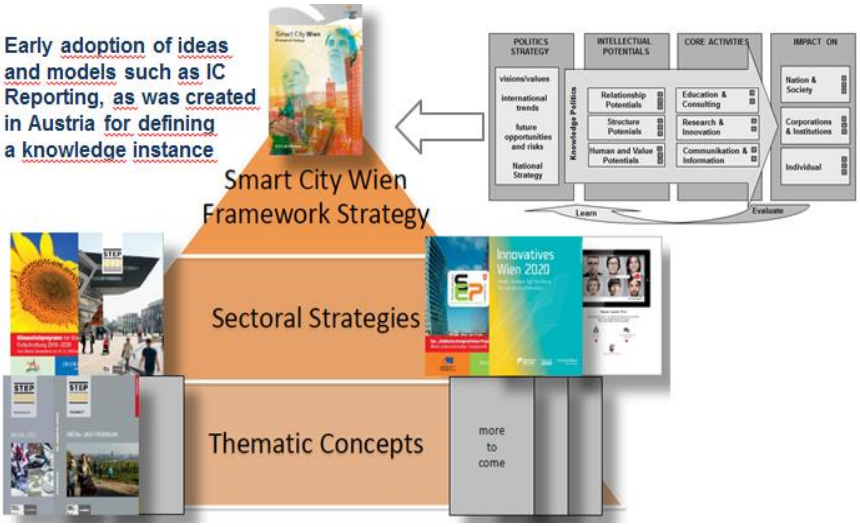

Fig. 8 A well structured process for developing a city from smart towards a knowledge city, as applied by Vienna

On a discourse level, the discussion space addressing a Smart City in comparison to a Knowledge City also shows differences in some cultural instances. In the Smart City space, subjects of concern and the language used are more technocratic, whereas subjects of discourse in the Knowledge City tend to be humanistic. Fig. 9. tries to capture this idea in a comparison between the two concept spaces. In a simplified conclusion we may say, that in a knowledge city we expect to meet diverse people with different cultural and knowledge backgrounds, a multitude of institutions offering spaces and platforms for exchanges and being more driven by social intelligence instead of technical intelligence only.

Smart City	*Criteria*	Knowledge City
physical	*„physicality“*	immaterial
immobiles	*main asset type*	intellectual capital
hardware	*comparison in IT*	software
infrastructure networks	*co-fct./co-oper. model*	innovation & knowledge system
public + private administrations	*key institution(s)*	Higher Education Institutions (HEIs)
make daily life easier/liveable	*main role to citizens*	offering (life long) learning + commun.
consultation	*participation*	coworking
grand design directive	*management paradigm*	guided self organization
managing complexity	*main mgt. competence*	“political” & cultural influencing
“techn. / org. intelligence”	*main participant qualification*	social and societal intelligence

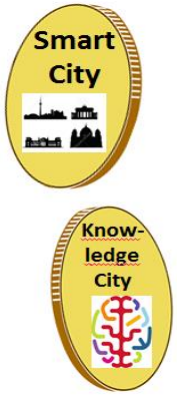

Fig. 9 Comparing Smart Cities to Knowledge Cities as two different sides but of one coin (© G. Koch)

9.6 The future of smart / knowledge cities

As we learned, the tendency of growth of cities is unbroken and we may even conclude, that cities by size, weight and political importance may outweigh nations. Europe during the so called Lisbon strategy period in the first decade of this century started to discover itself as the “Europe of the Regions”. We may soon discover that it will be the “Europe of the Cities”.

Cities, although they have and will maintain their own characteristics, are becoming less and less self contained and self sufficient. They have the potential to be much better and much more intensely interconnected by means of transport infrastructures for global connections – e.g. airports – as well as by high volume data communication. With little fantasy we can predict, that no more countries will constitute the future structure of living areas rather than cities, especially future metro- and megapoles will become the powerhouses in global development. In support of this idea see Fig. 10 caught from an internet blog.
The closer and more dense interconnections and communication by technological means will be, the more they will foster the tendency towards virtualisation and immaterialisation of the future globalized economy – despite the fears that re-nationalisation in the 2nd decade of this century will stop this process. Especially cities have developed their own specific cultural and knowledge competences and aggregated them over long historic periods. Combining their mutually complementary potentials across the globe will open doors for new and not yet known innovation both in technological and societal dimensions for the benefit of urban living conditions. We are looking forward to a new society forming their own new global "republic" independent from existing and restricting national or regional limitations: The global Knowledge Republic .

Fig. 10 Future political geography will be constituted by cities rather than by nations

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10 Change of Education System – International Process seen by Experts, Teachers and Students

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10.1 Abstract.

Our society is more mobile. This influences also our education system. It brings more international communication and cooperation. Teachers and students must change their behavior. The speed of this change is different by area. Asia has a high change rate and United States and Europe has a too slow process for adaptation.
The future of education is shown in this paper from 3 perspectives:

- Teachers
- Experts
- Students

10.2 Introduction

- Our society is more mobile than ever before. People expect, wherever and whenever they want to work, to learn and study. This has also an influence on students and teachers.
- Existing communication technology supports this change of behavior. It allows us to work everywhere. Mobile communication helps us to have contact with important data. Technology is cloud-based and support is decentralized.
- The world of work is increasingly collaborative. This changes how students work. There are more and more projects which can be national or international and may go out of the institution.
- Teachers must change due to mass of information. Fact oriented know how is no longer the only part of standard teaching.
- Teaching models draw more and more on online-, blended-and collaborative learning
- Teaching is more and more problem-based and active learning

10.3 International Change

Up to now there was a difference between OECD countries and countries with low-skilled and low wages inhabitants . Now we are at the point of a big change. The "West" cannot keep the low level countries out of their economy. In the last decade Americans and Europeans were responsible for development whilst production was made by low level countries in Asia. Many European countries and the US are stagnating. The key point of this change is education. Asian countries make massive investments in education. This can be seen already in the last OECD Pisa tests. In communist countries like China the elite is coming up. Ten percent of disadvantaged 15 years old scholars in Shanghai have better results in mathematics than the most privileged scholars in same age in the United States.

Similar results can be seen in the ranking lists of universities. China and India deliver students with high skills for moderate costs. Traditionally the the highest proportion of university Alumni were in US. However, during a silent revolution this is changing. China opens every week an institution for higher education China has also introduced the same university system like United States and Europe. This makes the education comparable.
In the upcoming period till 2030 the number of European and American Alumni will increase by 30%; but in China it will be 300%.
Another trend is, that the industry needs more and more natural science skills and young people in Europe or US are not interested in these subjects. Students in China and India like to study mathematics, engineering computing. These are the subjects which leads to innovation in technology.
"In 2013 40% of Chinese graduates completed their studies in a STERN (science, technology, engineering and maths) subject – more than twice the share of US graduates.

By 2030, China and India could account for more than 60% of the STERN graduates in major economies, compared with only 8% in Europe and 4% in the United States."
The change can be also seen in the investments. For example in eLearning the investments in Europe and United States are more than 3 times lower than in Asia. Also inside Europe a gap can be seen: Eastern Europe invests more than Western Europe. Same like in America: Latin America had a five years growth rate of 20% and North America just 4%.

e-Learning Growth reate by region: Worldwide-eLearning-Market, page 6
http://www.ambientinsight.com/Resources/Documents/Ambient-Insight-2010-2015-Worldwide-eLearning-Market-Executive-Overview.pdf

Africa gets some founding from international organizations, but it is not enough to catch up to international standards. By this generation – and maybe also next generation – Africa will be still on a low level.

Africa has more children in primary school, than ever before:
- out of 1000 children 118 die before 5 years

The international targets for 2060 are:

- 99 % broadband access
- 97 % literacy

This is a very low level too and just in 2060!

10.4 Future?

At the beginning there are general questions such as:

What will the future be like…?
How will life be different in the future?
The future – whatever we define in years – is

- far away
- always better than today and
- more.

Everything should be more, bigger and better than today.
Up to the 18th century science was focused just on the past, on history. Nowadays researchers also hold discussions about the future – like we are doing at this congress.

I looked at the future of education from 3 points of view: how it is envisaged by

- experts,
- teachers and
- students.

10.5 View of Experts

The key questions raised by experts are:

- Will we have more or less ressources ?
- How will we gain revenue?
  How much revenue?
- How will we see certificates?
  What will be the value of a certificate?
- In line with the intellectual property: who owns the content?

The teacher?
The University?
A platform?
A company?

- Privacy – who owns the data?
  Student?
  Teacher?
  Platform?
- Will there still be Campus Teaching?
- Where are the competitors?
- Will we get a two-class education?
- Are students prisoners of the school?

Some answers from experts:

MOOCs (Massive open online course) will be a reaction to the new forms of communication. The new generation, the digital natives read short communication tools. They discussed questions first between themselves via platforms and later with the teacher.
Teenagers are growing up with different media. Their cultural technique is to work in a virtual reality like in real life.

Traditional education institutes will address more and more new target groups. When Stanford University introduced MOOCs in 2011, they got 160,000 students, but none of them came from Stanford itself.
Education institutes will have more cooperation. They will not develop every subject. They will have more cooperation and each will focus on a special subject which they can offer to others.

The education market in the future will bring open competition between
- different teaching methods,
- teaching approaches and
- communication channels.

In the year 2025 the experts expect that we will have a two-class education system.
On one hand, our society is evolving more and more into an economy-orientated system. This trend will also reach the education institutes.
On the other hand, we have more and more free access to information through the Internet. Why should people spend money on an Excel course if Youtube offers this for free?
The education market will be affected by both trends.

10.6 View of Teachers

Teachers are involved in the process. They are affected. Often they defend their own job.
A study was made by Daniel Tenger with the title "Future of Education", which is not yet published (Zürich 2014). He has set up the following theses:

* There is a turning point in the development of education.
* Technology has a disruptive potential.
* Formation processes of brokering knowledge between learners and media influence.
* Experts recognize these changes.

70 % of teachers envisage a scenario in the year 2025 which does not replace their jobs by machines. They underestimate the dynamics of the mechanization of education. Their interpretation is that technology brings a dehumanization of education.

Teachers foresee a divergence in the development between

- basic school and
- further education.

10.6.1 Mechanization of Education in Basic School

In basic education (compulsory education) teachers are still needed. There is an educational task. The children need personal support for acquiring basic skills. For this, discussion skills and role models are needed for perfecting social skills.

10.6.2 Mechanization of Education in Further Education

In the field of further education also for teachers themselves it is not sure that teachers are required. There is currently already competition between

- technical methods and
- human methods.

The pioneer in this field was language training. For 40 years language courses have been provided

- on TV
- on cassettes / DVDs / CDs

This does not mean that teachers will become jobless. Educators are needed to develop this content.

In the year 2025 teachers see front teaching and personal feedback no longer as a market advantage. Digital education data will provide a more precise feedback. 65% of teachers agree on this thesis.

Teachers have 4 suggestions for the future:

1. Modularisation

Courses will be distributed in smaller modules than before.
They can be booked individually. In the first phase of a new course there will be many "tasters" and just 10 percent will follow the course to the end.

2. Projectisation

Support will get more importance for

- mentoring and
- coaching

3. Networkisation

A change from

- supply of knowledge to
- "get to know"

is expected. The main target will be to establish contacts with like-minded students.

4. Enterprise Services

Not everything will be developed by every institution. There will be more taking-over of

- the organization and
- the training management

by other institutions.

10.7 View of Students

For this question, I used my students from the master program "Research and Innovation in Higher Education" at Danube University.
This is a very international group. 19 Students from 14 different countries (Bangladesh, China, Ethiopia, Germany, Indonesia, Korea, Mexico, Moldavia, Russia, Serbia, Turkey, UK, US, Vietnam). They are very high level students due to the fact that they were selected out of 400 applications. We can use their answers for the question "How young people see the future of education".

First of all, they categorize education institutes in 3 types:

1. traditional state-run institutions,
2. private institutions (both local and foreign institutions) and
3. joint-nation institutions.

Maybe some of their future perspectives are wishes for themselves because they are closer to the future. They will be affected more by the next years than older people like teachers or experts.

They envisage more practical application in education rather than theory. Practical experience will have an impact on theory.

Basically education institutions are more like market-orientated companies, they will compete more with each other to get more students, more funds and more academic fruits.

There will be an increasing number of education institutes and fewer students worldwide.

Technology will be the top priority of education. Every institution will specialize in certain areas.

The role of governments will change. Government will no longer favour only state-run schools. There will be an increasing competition. The governments will give more autonomy to public schools and they will no longer favour only state-run institutions. Schools will be allowed to have more business cooperation.
Students today envisage professional managers for management positions, such as rectors, deans, etc. Professional managers will have an academic background or outsiders will come from firms. Private funding will play a more active role.

The education landscape is very different all over the world.
New technologies have different impact to education:

- in developed countries it is an additional tool
  and
- in undeveloped areas it is a chance to reach more students.

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11 Tailored University Student Practice contributes to Regional Development

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11.1 Keywords

Outcome Based Education – Technical skills – Competence – Professional pathways – Performance-based assessments – Employability.

11.2 Introduction

The regional development depends on many facts, but the quality and availability of personnel is one of the most important factors. Presently, entrepreneurs select the personnel, based on the development strategy of their company, and in correspondence to the local offer. It is more and more obvious that they focus on the most relevant segment – the professional youngest one, coming from the region, in order to reduce costs and count on continuity and progress. The development of technology contributed to the fact that more and more the necessity of educated professionals rises; they are invited for interviews and then also selected. The best chances are given to those students and/or graduates who have technical but also entrepreneurial knowledge, as well as specific practical training, best in connection with the future position. Experience gained during practical training internships, courses and special bridge connections between universities and enterprises contribute to develop a personnel market, in adequate concern to its real economic necessities.
Never the less, engineering is a key driver of human development. Engineering societies must provide valuable resources and support to both engineers and engineering students.
Thus the role of engineers for regional development is focused in the paper, based on the experience of the authors in running offer for carrier planning. At the Politehnica University of Timisoara (UPT) already several programs and support for complex development of students, including practical competences, are running and challenging the future tendency. Between desire and possibilities a gap is open, but not only because the lack of financing or professional orientation of undergraduate students, before starting engineering. Degrees in the different fields of engineering and engineering technology are accredited to ensure that the programs provide students with a top engineering education. The structuring of the curricula, with focus

on practical work, as well as new, more attractive teachings methods, such as learning by doing.
Being better prepared for the real life, the students can dream about a carrier, and start build it up, by accumulating special skills, and not coming into the situation not to get any job offer, or accepting whatever the market is offering, far from the expectation.
It is known that the labour market (in general but also in the joint regions in particular) is poorly accessed by young people, even highly educated. In EU countries, the youth unemployment rate reached 18.4 % by 2016, October
https://www.statista.com/statistics/266228/youth-unemployment-rate-in-eu-countries
(Figure 1), much more over general unemployment figures (Figure 2) and experts believe that this issue would lead to the failure of an entire generation if no rapid and active measures will be taken.
The importance to educate and offer to the youth, staring from childhood up to university and postdoctoral training, of best opportunities of study and evolution (in spirit and profession) is the only solution. The professional development must be connected to the personal possibilities and accorded to the social and economic needs of the society.
The investment in people' education, especially for young persons, must prevail; even the results are not accounted immediately, and cannot be associated to an absolute value. The real value is incommensurable, with long effect (in both directions, when the support is not offered).

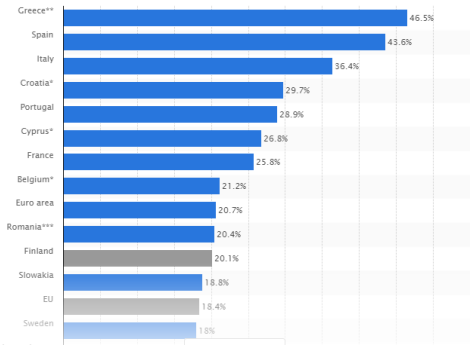

Figure 1. Youth unemployment rate in EU member states as of October 2016, (seasonally adjusted)
https://www.statista.com/statistics/266228/youth-unemployment-rate-in-eu-countries/

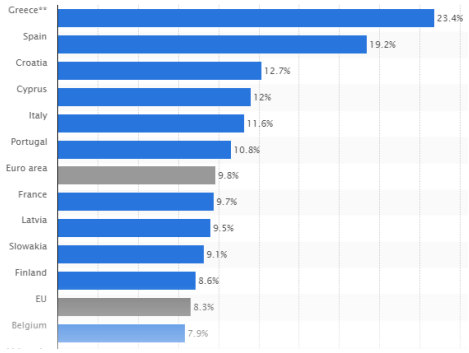

Figure 2. Unemployment rate in member states of the European Union in 10. 2016
https://www.statista.com/statistics/266228/youth-unemployment-rate-in-eu-countries/

Regional development depends a lot on the quality of the employees, especially young ones, as they represent the link between present and future, anywhere. The paper is focussing on: (i) importance of the training of the undergraduate teachers from vocational schools, (ii) importance of the curricula oriented offer of universities, and (iii) development of additional skills for students, in order to become more flexible and prepared for integration on the market, from the very beginning, in the field of their education as engineer. A measurement of performance of EU cohesion policy projects is indicated, which will be followed by the proposed frameworks for assessing the implications of network structure and what effect of performance of the partnership were achieved.The research and conclusions are based on structural funds financed programs, in relation to international partnerships aiming approaches in public policy implementation within the EU cohesion policy.

11.3 Future Trends & Tasks – Solution for the present Situation

"Many students will get tired and bored if they only are taught theory. An internship can be a good change for those students. Internship and projects done in cooperation with companies are important for students. Students come know the culture of the companies and can establish good relations to the companies. It can help them to find jobs, and many students find inspiration for their final projects. Internships and students projects are also important for companies. They get opportunity to influence the students (and teaching curricula as well), and it can help them to find the right employers" [Adapted from Source: Jorgen Hansen, (Denmark's Technical University, Copenhagen) chapter 2 "An international project / internship course" pp 51 - 64 in "PROJECT WORK AND INTERNSHIP THEORY AND PRACTICE- PRAXIS conference, October 2013].

Understanding and learning science and technology related subjects would be better if students were stimulated to experience reality instead of reading in a book, looking at a blackboard or listening to the teacher recite theory, in other words learning by doing.
The students need to be given the opportunity to see what knowledge can be used for, both during classes but also on the labour market (by internships, PRACTICE). This will make education more meaningful and will motivate them to learn and to work hard with their education and career [Adapted from Source: European Commission, CORDIS, Final Report Summary - GAPP (Gender Awareness Participation Process: Differences in the choices of science careers) Italy; Horizons in Physics Education (http://hopenetwork.eu/))].

Progress based on necessity is needed, but first the skills of students, future employees, must be developed. The skills must act additionally to the theoretical ones, and make a difference, by contributing to a better
There are many qualities and skills needed to become an effective engineer and to have a successful career. Engineering is dynamic so it needs people who can work across disciplines, with others, and continually adapt to new challenges http://tryengineering.org/ask-expert/what-skills-do-i-need-develop-become-effective-engineer

Good technical skills are of course also essential. In preparation for an engineering career students should focus on developing a variety of skills, including: technical competence, communications skills, leadership skills, and not last teamwork. In order to become an effective engineer one does not need to master each of these qualities and skills. The successful engineer is well-rounded, with knowledge of the key skills and an ability to apply them when needed
http://tryengineering.org/ask-expert/what-skills-do-i-need-develop-become-effective-engineer

The main real motivation for developing special programs in order to retrofit the Romanian university curricula and training (including tutorial practical work) for younger generation is based on the reality and necessity, meaning the following facts, as the authors indentified them, form major obstacles:

- Less undergraduate students choose engineering training as a future possibility of a carrier development
- Teachers in vocational schools are not having contact with latest state of art in modern, attractive teaching, and especially in novel science developments
- Lack of real models of success available for young generation
- No entrepreneurial information offered during study neither for undergraduate nor for bachelor or master students
- No connections between curricula offered in different universities, and exchanges of students are only possible by interpretation and special agreements
- No clear practical training, even credits are offered, a curricula exists, in most of universities;
- Great need of skilled engineers in basic sectors, such as Energy, Transportation, Advanced Technology, Environmental protection, etc.
- Trends for new high tech technologies implementation exist (or mainly is expressed by companies and industrial sectors), but no real clear offer from universities is spread out
- Great offer from the Sectoral program;
- Education is not sufficient financed in Romania, even national budged legislation is indicating a percentage of 6% from the GDP;
- Lack of interconnections between curricula in undergraduate and higher educational system is not worked out through solutions (for the teachers, for the students, for the stakeholders, strategy planners, etc.)
- Practical training in underground classes is missing or not available.
- All young people hope to “learn” in universities, regardless the lack of employment, and no matter of what the expectations are.
- No connections state of art of technique and state of art in teaching, in many cases
- Need for teachers to be trained as well, including modern teaching, less theory and interdisciplinary approaches and practical examples;
- No clear practical training curricula
- Practical work is not considered “a matter of importance” as all the rest (for ex. Mathematics, Physics, Chemistry, Technology, etc.)
- Great need of skilled ‘personnel’ not always with high education background
- Less language skills and contact to high ranked information from state of art knowledge is usual, Romania being on last position concerning literature availability (reading) according latest statistics;

- Nothing else is taught except ‘normal’ curricula, regardless for special capacities developments (such as languages, entrepreneurial features, communication and presentation skills, expressions, outfit, etc.)
- It is thus understandable why the expected outcome based education is only a dream and not a realization. But steps for further start are generated, mainly based on the financial support of the structural funds. Even Romania had a great opportunity, it did not succeeded in attracting and thus it is located on the last position between the member states.
- Despite investment in training in high value-added sectors, skills shortages persist. There are mismatches in the type of studies offered. In addition, learning mobility and career guidance measures as well as soft skills needed for the labour market, such as entrepreneurship and digital skills, are insufficiently developed. Participation in adult education is the lowest in the EU (1.5 % in 2014 compared with an EU average of 11 %). There are plans to better link curricula with the needs of employers, connect education and labour market databases and improve the functioning of the centres for the evaluation and validation of competences. [SWD (2016) 91 final COMMISSION STAFF WORKING DOCUMENT Country Report Romania 2016, page 59]

11.4 Technical Skills for Teachers

The technical skills of students are highly depending on those of the undergraduate pupils (enrolled in lower secondary education), that start the university training, in often cases without having benefit of any professional counselling or orientation and without any examination at the admission. A major fact is that in the present era of technique the progress is registering a very rapid development and mostly all teachers, do not have the possibility to be informed, especially because lack of offer, and also lack of money to support individually the reshaping and updating of the level of knowledge. The features that are state of art consist mainly of the following real aspects:

- No practical work, no consistent connections with the market problems and no orientation versus a fruitful carrier are offered to present students, especially engineers, even the high necessity on the market needs;
- No bridges between industry and educational offer are active, or only few links are pioneering starters;
- Lack of interest from the civil society to develop a young more educated generation of engineers, even it is supporting the financing of the studies, over more than 12 up to 15 (and over) years.

Thus a project CONCORD (National Network Training courses for teachers of Pre-University Education Vocational and Technical, POSDRU/87/1.3/S/61397, http://www.proiectconcord.ro/) was launched aiming directly to support , under the financial support of the EUROPEAN SOCIAL FUND, Sectoral Operational Programme Human Resources Development 2007 – 2013, Priority Axis 1 "Education and training in support for growth and development of the knowledge society", Key Area of Intervention 1.3 "Developing human resources in education and training". CONCORD project's overall objective consists of developing professional skills and technical up dated vocational and technical education, within a complex system of "blended learning", which includes: study on line and face to face, assisted by trainers; individual home works completed by on-line learning in an interactive

environment (e-learning MOODLE platform). The EU needs creativity and competitiveness and this is based especially on innovative science education. Thus the teachers were formed more versus applicability of knowledge, in technology, engineering, mathematic, physics, environmental issues, chemistry, etc. and they also must be trained for being able to raise the attractiveness of science education and scientific carriers and boost the interest of young people to support technically the development of a democratic, knowledge-based society. The project developed 11 professional training programs, including two types of programs in accordance to the Minister Order No. 4611/2005, with a maximum of 340 hours and 105 credit points (certified by national attested body): Environmental training program (Management and Communication and Information and Communication Techniques) and Thematic programs of type long way, on 4 domains and 11 sub domains, consisting of:

- two subjects from basic training;
- two subjects of specialized training.

Table 1 gives an overview of the offer, and Table 2 some main results, attesting the large interest of the teachers to be trained. Another main result is the initiating of a new project on the topic HRD – MENTOR.

Table 1: Offer of the CONCORD project for the educational training of teachers

NO	Programs/Course modules	No of courses
1	PROMANAGEMENT/Management & Communication	8
2	PROMANAGEMENT/TIC for starters (initiation)	1
3	PROMANAGEMENT/TIC for advanced persons	1
Thematic offer 1 "Core subjects" with the following areas		22
4	PROELECTRIC I	6
5	PROMECANIC I	6
6	PROMEDIU I	6
7	PROIT I	6
Thematic offer 1 "Fundamental Disciplines" with the following areas		33
8	PROELECTRIC II	9
9	PROMECANIC II	9
10	PROMEDIU II	9
11	PROIT II	6

Table 2: Results (main indicators achieved versus target) of the CONCORD project

No	Indicators	Target value (Nb of teachers)	Realized value (Nb of teachers)
1	228 Number of teaching staff trained	600	811
2	231 Number of participants ESF - Women	300	520
3	232 Number of ESF participants in rural	20	42
4	Rate in education and training prepared staff of certified (%)	80 %	92,1 %
5	236 Number of certified participants in training	480	1438

11.5 Educational Offer trough practical Training and Interships of Students

Over the last decades, environmental protection and climate change have been key subjects discussed in politics and the media. Hardly a day goes by without news about environmental protection or climate change, while another problem – the world's overpopulation – is only too willingly concealed. The world population is currently increasing by around 80 million people per year. This means an increase of more than 200,000 people per day, or 2.6 per second.

Thus, as result, quality control of all environmental natural ecosystems must be continuous developed and applied, according general rules, worldwide, transportation must be developed all kind of modern technologies must be implemented in industrial production sector, in the energy sector, including renewable energy sources and economical solutions that fit together economy, development & needs of the society.
Only the young specialist can be future active participants in these mentioned areas, and they must be trained for this scope, from the university offer and curricula as well, including very good contacts to real economy, professional knowledge and practical work & training.
A real success in the area of completing the technical development of students oriented versus economic and social needs in the frame of engineering and not only might be considered the PRACTICOR project (PRACTICOR: Transnational educational grid for the orientation, counseling and practical work supporting the carrier, in accordance with the labor market, in the knowledge society, www.practicor.ro), in the frame of the EUROPEAN SOCIAL FUND Sectoral Operational Programme Human Resources Development 2007 – 2013, Priority Axis 2 "Linking lifelong learning and labour market", Key area of intervention 2.1, "The transition from school to active life". It was continued by PRACTICOR EURO REGIO (Regional and Euro-regional partnership for the transition to the labour market through career counselling and internships at employers - PRACTICOR ® EURO-REGIO, www.practicor.ro/euro-regio).
The PRACTICOR ® model (Figure 3), for which UPT holds a registered trademark [Brand of Politehnica University of Timisoara, Romania, NB M2013/005320, 25.07.2013], is described, based on a network formed by enterprises, teachers and students. Also some new ideas of learning by doing, in the frame of an Experimentarium are addressed. By this way a smart tendency for offering to the students' best chances for an engineering carrier based on practical skills is developed, enhancing the labour market in the region as well. The authors propose to enlarge the model, by structuring a network also between the enterprises, and strengthen their power to support the practical development and experience of students. Development of success engineers must not be carried only by universities and state.

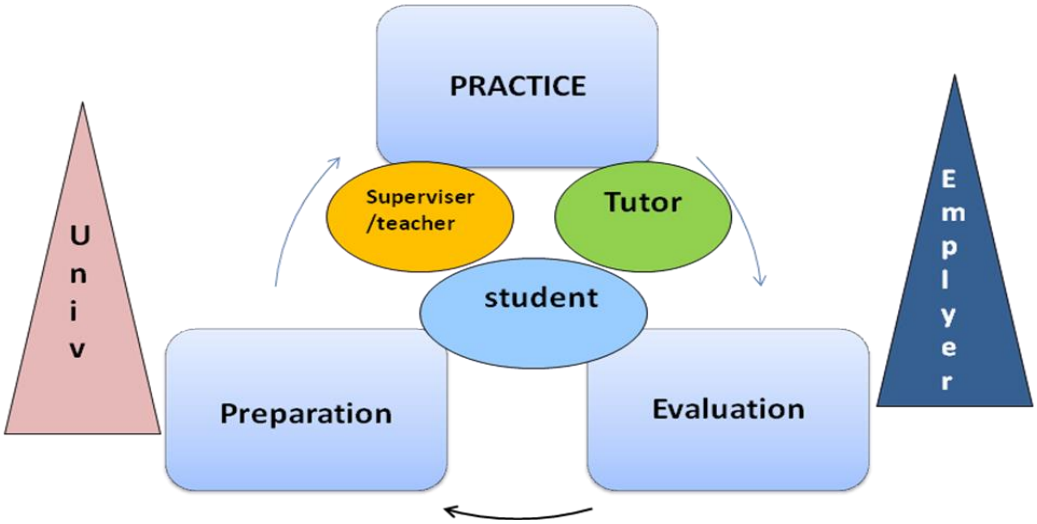

Figure 3. PRACTCOR trade mark, as registered for UPT [Brand of Politehnica University of Timisoara, Romania, NB M2013/005320, 25.07.2013]

One proposed and succeeded to turn into a success an innovative tutorial model of practice addressed to students from technical universities in order to increase their performance and quality of training (bachelor and master students), and open their skills and minds for them multinational and interdisciplinary perspectives. Getting into contact with real economic units, starting already from bachelor position, represents a real chance for the students. The practical work directly related to economic units is fully completing the information that the student receives as a graduate, developing specific, practice oriented capabilities and knowledge. The curricula of a main Romanian university (UPT-Politehnica University Timisoara, www.upt.ro) requires, at all levels, a practice training compulsory carried out (starting 2013/2014): 2 months in total for a bachelor and 7 weeks for the master student. As main future objective of the present UPT strategy one focuses upon the fact that the practical work must not be formal and not accomplished under unrealistic terms, and must answer social needs and correspond to the expectations and background of the students, in correlation with the economic needs in the companies/market.

The success and importance of the project and the fact that the idea was totally agreed by the students, generating finally an acceptance of the abbreviation as a standard state of art in technical universities, determined the author to apply for a patent holder of the name and new opportunities of continuation, on higher level. PRACTICOR® EURO-REGIO: Regional and euro-regional transition to the labor market through career counseling and internships to the employer was planned.

A future engineer, who is granted a major role by the members of the group in which he will act and contribute professionally and who, by interpersonal relationships, fulfils a clear role in human resource structure, must be developed through higher education doubled by practical work, focusing as main features, mainly some of the following attributes:

- Cognitive experience both in up-dated techniques and economics, marketing and dissemination;
- Communication skills and power of self-understanding and evaluation of own capacities and needs and qualities & defaults;
- Judgment power and understanding the transmitted message;
- Resolute capacity, creativity in thinking and action;

- Availability to knowledge and understanding of technical information (literature, brochures, etc) and designs (drawings, schemes);
- Availability for cooperation and interpersonal communication within the group;
- Self-confidence and confidence versus another;
- Attitude to overcome the obstacles to attaining the proposed profit;
- Flexible style of approach to the task and interaction with partners to achieve the common goal of the group;
- Honesty, responsibility and empathy in interpersonal relationships;
- Need for cognition, affection and social valuation for relationships, development, acceptance and integration in the work group;
- Satisfaction with participation and individual and group success;
- Professional skills doubled by interpersonal skills.

In this spirit contracts with several main companies to host students for their practice have been accomplished. Thus, business people and companies that intend to hire our graduates were active and personally interested involved in the training system, generally in the educational system, as they will represent the future employers of our present young engineers, and quality and a lot of other information and features development of the young generation are expected.

"From the point of view of the evaluation of the students, the medium degree in which the defined skills have been acquired is satisfactory. About the comparison between students who have realized their projects with local and international companies, it can be concluded that the behavior of the two groups is similar. The major differences are found when evaluating skills related to the communication in second language, those related to work in an international context and the ability to travel" [Miguel Fernandez, Samuel Ver Hoeye, (University od Oviedo, Spain) chapter 7 "Enterprise oriented Praxis internships" pp 139-153 in "PROJECT WORK AND INTERNSHIP THEORY AND PRACTICE- PRAXIS October 2013].

The general aim of the mentioned cooperative project consists of the establishment of a transnational active network regarding the educational guidance for the future engineers (represented by students and undergraduate middle and superior school students), counselling and practice for offering a better carrier and change to develop and integrate into the society of the future young high educated workers (students of all level), coupled with the present necessities of the labour market, in the knowledge society in development. This project proposed an innovative model of practice offered to students from technical universities, in order to increase their performance and quality training under the coordination of a tutor representing the economic system and a tutorial support from the university training & teaching staff. Reviving the notion of practice applied and directly related to economic units, under the technical guidance of tutors and educational staff, will complement the theoretical information that the student receives as graduate or master and completes fully his basic studies. The tutors representing the economic society are formed as well through the project founding, in order to receive both scholastic and educational skills, being fully able to coordinate practical work for students, at demand, in accordance to the planned strategy and present trend of development in their own companies (state owned or private ones).

Practice and internships are considered to be the key link between specialist and the social needs of the economic environment. Currently there is a great demand for professionals trained to support sustainable development tendencies of the European Community, especially in energy, transport and modern technologies, including agriculture domains. These ever-increasing necessary trends is resulting from basic needs, arisen both from companies of all kind as well from industrial units,

and must result from a training strategy of the universities. Presently, the Law Practice (No. 258/2007) correlated with the Education Law are setting conditions and ongoing regulation for the practice and counselling, which did not exactly become true, especially the lack of funds, and the lack of connections to employers. As result in most universities, practical work (practice) is organized on non standard level, without opening towards applicable and modern needs of the economic society, without a strategic concept or financial support, thus the practice is turned into a personal responsibility taken either by students themselves (if they have any discernment) or by teaching staff that are their guidance, officially. PRACTICOR model is assuring best conditions of application and implementation of the Law Practice for pupils and students by students and university students in the national system (bachelor) and practical ways to support them. Not only will enable fulfilment of all items and their application, but will also provide a framework financial technical and innovative support that, once formed, will continue in this regard. The student will have the opportunity to make professional contacts with companies and potential employers operating in the market in the priority areas in which to prepare and can embrace practical training through real issues related to economic and technical needs of companies, but and community being in sustainable development.
Figure 4 is giving the data concerning the structure of the fields/themes requested by the students, in accordance to the offer from the enterprises/entrepreneurs/agencies, economic units/. The Percentage of students, beneficiary of professional orientation & practice (internships) in real economic units, with tutorial support is based on total of (4132 +815) students.

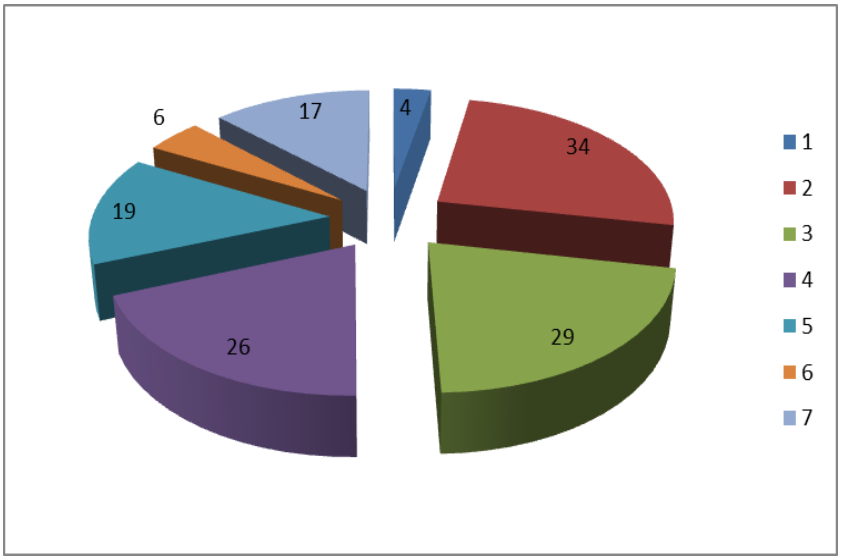

Figure 4.: Percentage of students, beneficiary of professional orientation & PRACTICE (internships) in real economic units, with tutorial support (total 4132 +815 students),
1- Management, 2 - Maintenance, 3 - Technological Processes, 4 - Research and Development, 5 - Optimization of processes, 6 - Quality of processes and ecological aspects, 7- Renewable Sources, energy quality and systems

Contracts and activities within several main companies hosting students for their practice have been accomplished (more than 72, including a company from Germany, one University from Hungary). The companies were involved not only in practical supervising of the students, during PRACTICE, but also in the training

system (being tutors with certification), generally in the educational system (giving ideas to shape the curricula, themes for the final dissertation, etc.).
ELI-NP (Engineering Maintenance for ELI-NP - Extreme Light Infrastructure - Nuclear Physics) is another project that financed special skills development for students, in order to prepare, from now on, already the future specialist to work in this outstanding infrastructure.
Extreme Light Infrastructure (ELI) is the only European and International Centre for high-level research on ultra-high intensity laser, laser-matter interaction and secondary sources with unparalleled possibilities. Its pulse peak power and briefness will go beyond the current state-of-the-art by several orders of magnitude. Because of its unique properties, this multidisciplinary facility provides magnificent new opportunities to study the fundamental processes unfolded during light-matter interaction. ELI creates a platform, where Extreme Light applications for the benefit of society will be dynamically promoted [http://www.eli-np.ro/about-eli.php]. Laser-based Nuclear Physics pillar will be built in Magurele (near Bucharest/Romania) and focuses on laser-based nuclear physics. While atomic processes are well suited to the visible or near visible laser radiation, as a third pillar ELI-NP will generate radiation and particle beams with much higher energies, brilliances suited to studies of nuclear and fundamental processes. It is for sure that very talented students must be attracted even from their university studies; and this was the basic idea of the ELI POSDRU (Intermediate Body for the Regional Operational Programme Human Resources Development project.

11.6 Examples from Questionnaires (243 respondents), Lessons learned

Responses to the question “What is your impression about the tutor, you worked with, during the practice stage in the economic unit?” - addressed to the student participating in the program.

- The tutor (female tutor) was open, calm and willing to help and explain everything new and difficult to understand. I think that was involved in our training from the practice and learned many new things.
- During practice we had faced wonderful experiences with great people. I believe that my guardian has done his job exactly as it should, was involved, was open with us, he explained and not least, listened to our questions.
- From the beginning, the tutor taught us the basics that we need to know about the area in which I did practice. It was friendly, answered all our questions.
- The tutor was a competent proven good teaching because I understood what he taught us, motivated us and was involved in our activities. At the end of anecdotal and helped with filling specifications.
- My tutor is a funny guy, sociable, yet serious. If I had any queries I could ask him and we responded in small details. I asked myself something and stood next to me, explaining to me until I understood. It has been a pleasure to have him as guardian.
- My tutor is a person who knows how to organize and manage a team. He is a person who knows his duties; knows how to understand us, how to explain and cover our leakages, while being still a friendly person. E used appropriate language, according to the working environment.
- In terms of personal and social qualities I consider her a very good professional, very responsible, balancing thinking and actions and even

looking like she enjoyed the work that I realised. It is a very organized person, hardworking and has great pleasure of working with us, young people.

- The involvement of the tutor was excellent because patience gained in so many years of work and experience has helped him to deal with us and giving us a lot of information and knowledge. The language used was adequate explanations that were fixed and we can use in the future. Proven organizational skills during practice motivated me to practice solving theme.
- My tutor is a special person, a tutor with many qualities, especially in terms of the degree of involvement in this internship. He is a generous man, kind, very open communication with a very natural language, with extensive experience and a very rich baggage of knowledge in the field where we worked. He is a tutor who deserves all our praise, always motivating us to solve and achieve thematic work practice.

Special thoughts were also expressed by the students, meaningful in terms of **what they really were impressed of**:

- "In any field work you have to do things ‘as by book',
- "Going to school, watch out for hours and learn that you do; you'll see later how good it will be for you",
- "Do what you love and take advantage of student years because you will not meet with them",
- "No matter what profession you choose, you must be aware that you do throughout life",
- "Work where you like and do what you love",
- "You must put your heart into everything you do; just so that you succeed in life",
- "If you do what you like you will be the best".

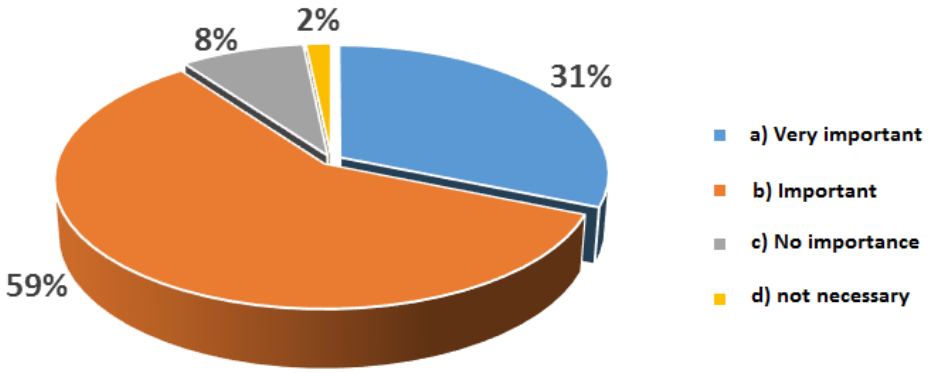

Figure 5.: Answers for questions: How important do you consider that the student practice activities for your professional preparation are?

The practice activities were rated by students as important and very important in a proportion of 90%, which shows that students become aware of the crucial importance of the practice activity in their professional preparation during university (Figure 5).

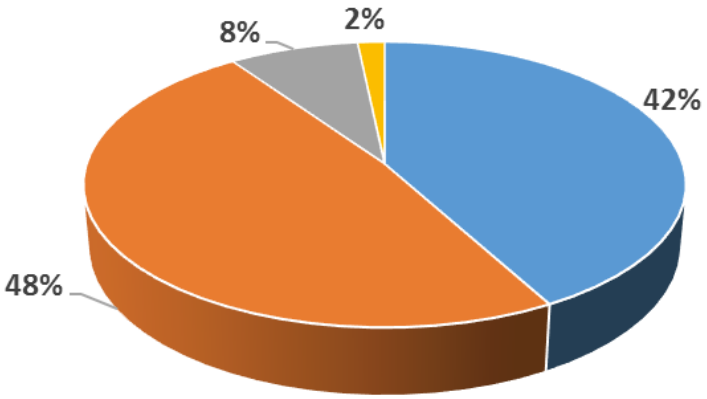

Figure 6.: Answers for question: Do you consider the student practice offers provided by the university or the direct relationships with the companies in the field to be enough to be appropriate?

a) YES, they provide access to student practice positions within companies/special topics (42%),
b) YES (48%),
c) NO, because the student practice is conducted only in the form of laboratory work, even if this is less important (8%),
d) NO, practice does not matter, what is important is the theoretical knowledge accumulated during studying (2 %).

90% of the students considered appropriate the student practice offers provided by the university, because they facilitate the access within companies with experience in student practice activities (Figure 6).

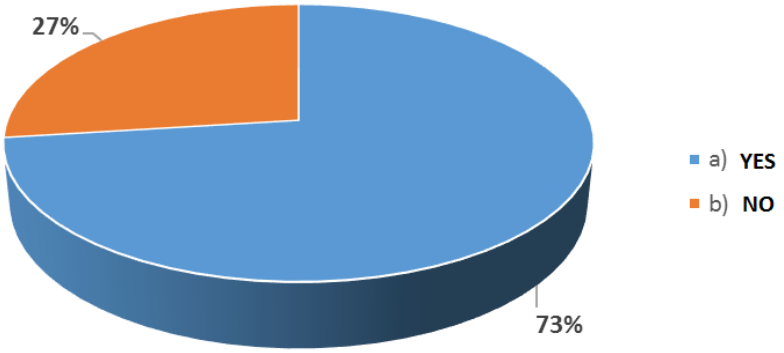

Figure 7.: Answer to the question: Have you ever received logistics and material support to conduct student practice?

A gratifying result is that most respondent students (73%) received logistics and material support to conduct student practice (Figure 7).

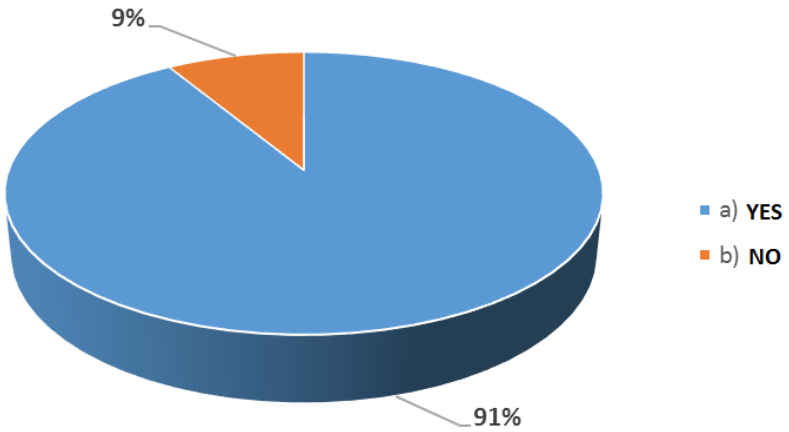

Figure 8.: Answer to the question: Do you consider that student practice must be carried out through activities organized by the university?

Over 90% of the respondents believe that the organisation for the student practice should be carried out by the university's implication, offering practice positions, in close connection (official) with local companies (Figure 8).

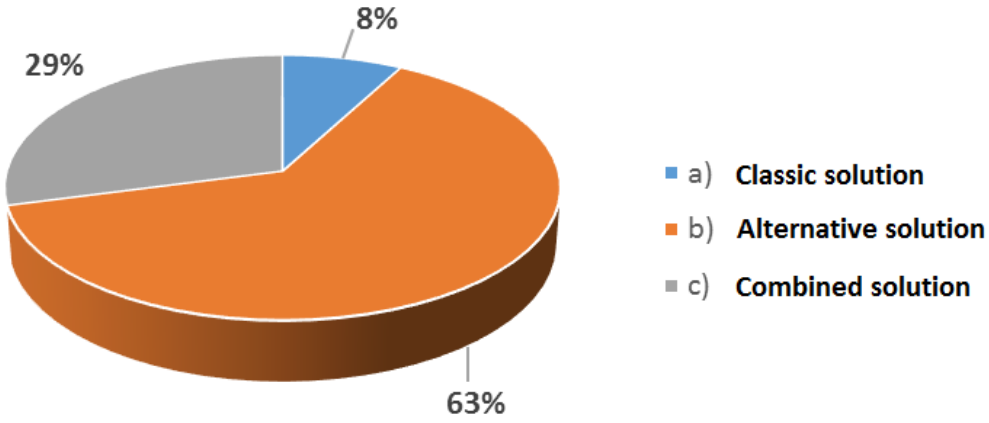

Figure 9. Answer to the question: How do you assess the realization of student practice by choice within certain companies?

a) Non-compliant solution, as certificates do not show reality
b) Good alternative solution, by finding a practice position by one's own resources, the student choosing a convenient place to do her/his student practice (theme, location, other interests)
c) Combined solution, targeting companies of one's own free choice and student practice periods organized by the university

It can be observed (Figure 9) that only 8% of the surveyed students believe that a good solution in the certification of student practice is to present certificates from the company where they carried out the practice.

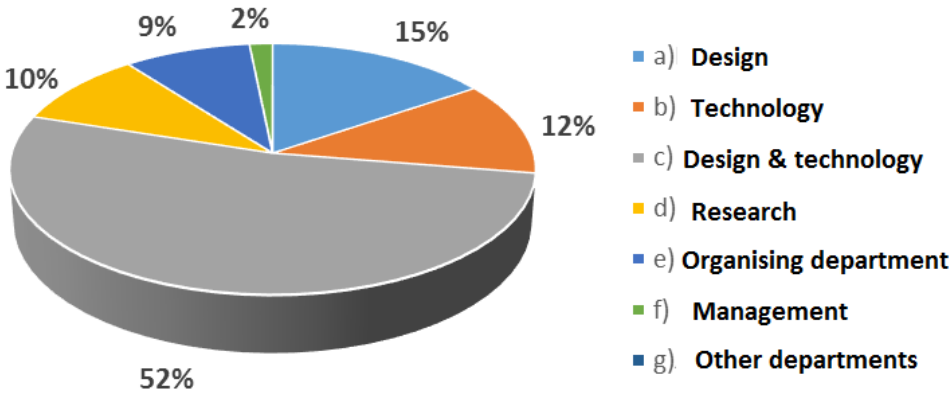

Figure 10.: Answers to question: Regarding student practice in your own field, this should relate to:

a) Design,
b) Technology,
c) Design and technology,
d) Research,
e) Organization,
f) Management,
g) Others, usually interdisciplinary fields.

Most of the surveyed students believe that the periods of student practice should refer to the field Design and execution (79%), followed by the fields Research (10%) and Organization (9%) (Figure 10).
Regarding the way student practice is carried out, students' opinion is divided, some preferring Active participation in order to carry out some works (21%), others Full time during summer (21%), followed by Visits (20%) (Figure 11).

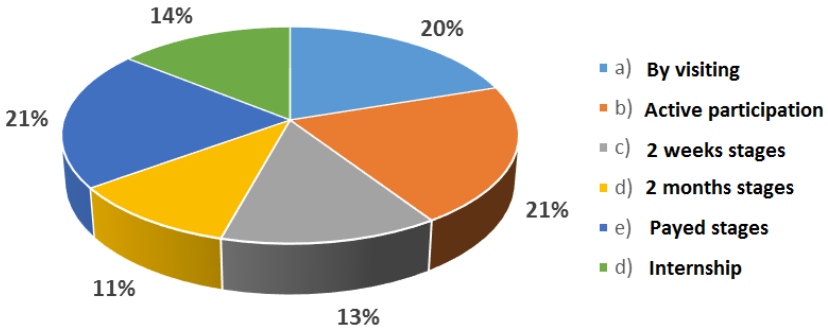

Figure 11.: Answer to the question: How do you think that students should participate in the practice activity?

a) As a visit, the number of hours being covered only by this activity of practical counseling;
b) Active participation in order to carry out some works;
c) 2 week period annually;
d) 2 month period during one year of study;
e) Full time during summer;
f) Internships, paid or unpaid, in the 3rd year of study.

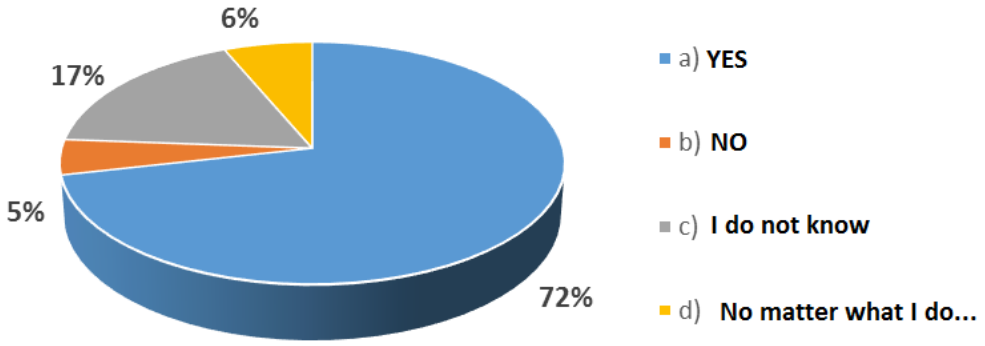

Figure 12.: Answer to the question: Do you think that conducting a student practice increases your employment opportunities?

a) YES;
b) NO;
c) I DO NOT KNOW;
d) No matter the student practice conducted, I believe that the whole system of relationships will enable my employment, i.e. finding a first job.

It stands out that 72% of the respondent students consider that conducting a student practice increases their chance of finding a job (Figure 12).
Regarding the opinion on the knowledge acquired by students in their practice activities carried out previously, students believe that this knowledge was Fundamental, but without application (53%), Very useful (25%), Current, with immediate applicability (14%) (Figure 13).

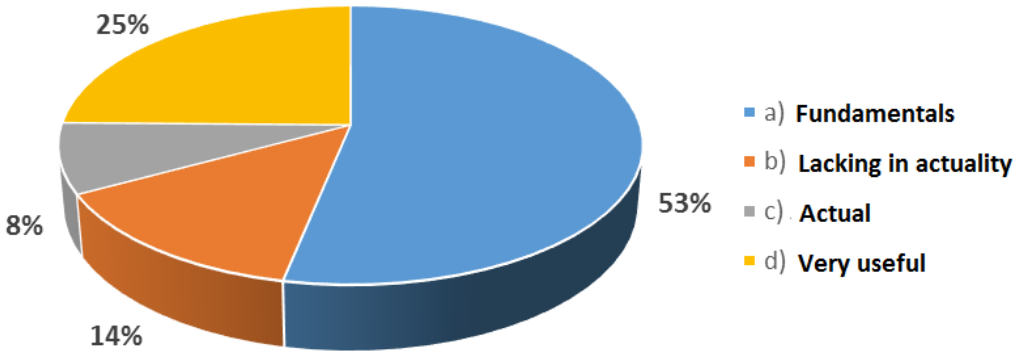

Figure 13.: Answer to the question: How do you consider the knowledge you acquired from the practice activity so far:

a) Fundamental, but without immediate application,
b) Lacking actuality,
c) Current, with immediate applicability,
d) Very useful, it complements my knowledge and widens my horizons/employment opportunities.

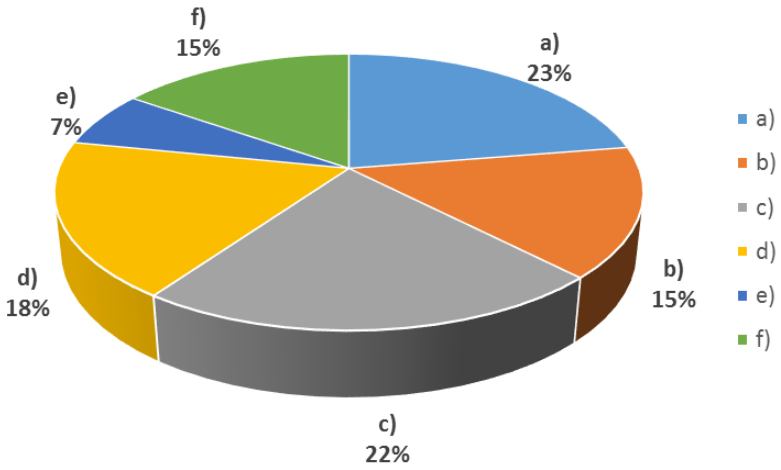

Figure 14.: Answers to the question: There are different methods for career development through student practice. Which do you think are the best?

a) Mandatory annual student practice in institutionalized regime, according to curricula
b) Student practice covering a number of hours required by the curricula, carried out in jobs individually identified
c) Student practice in the 2nd year of study (in summer) according to a number of hours required by the university curricula, given that specializations are usually chosen at the beginning of the 3rd year of study
d) Student practice performed in the 3rd year of study, according to a number of hours required by the university curricula, with an employer
e) Continuous student practice, tutored by a specialist either in the university or in the economic environment or combined
f) Student practice performed after a period of professional counselling and guidance, which must begin in the 1st year of study

The best methods for career development through student practice are considered to be the following, according to the students surveyed: 23% - mandatory annual student practice, according to curricula; 22% - student practice in the 2nd year of study and 18% - student practice in the 3rd year of study (Figure 14).

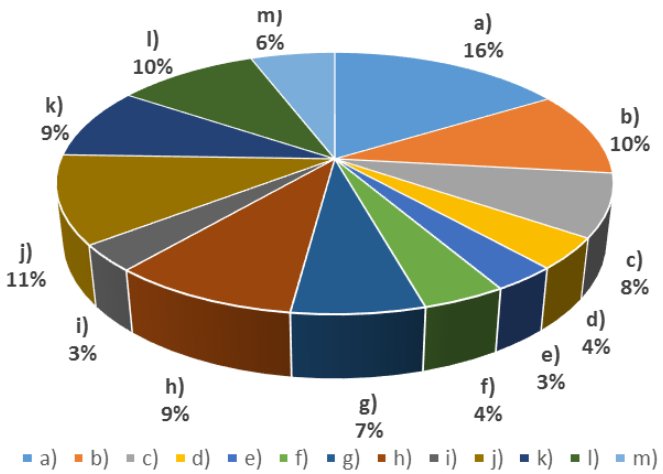

Figure 15.: Answer to the question: Which do you think are the skills that can be developed through participation to student practice activity (maximum 10 answers can be indicated)

a. knowledge and understanding of some basic concepts of advanced and priority technologies of the economy,
b. compliance with regulation/ procedures/ schedule/ timetable,
c. creativity,
d. intellectual property right,
e. ICT,
f. environmental protection,
g. current level of information,
h. importance of teamwork quality,
i. redaction,
j. technical expression,
k. socializing with colleagues and business representatives,
l. group integration,
m. Speech and writing.

Among the skills that students would like to develop during the period of student practice, the following are included: knowledge and understanding of some basic concepts (16%); technical expression (11%); compliance with regulation/ procedures/ schedule (10%); group integration (10%); teamwork (9%) and socializing with colleagues and business representatives (9%) (Figure 15).

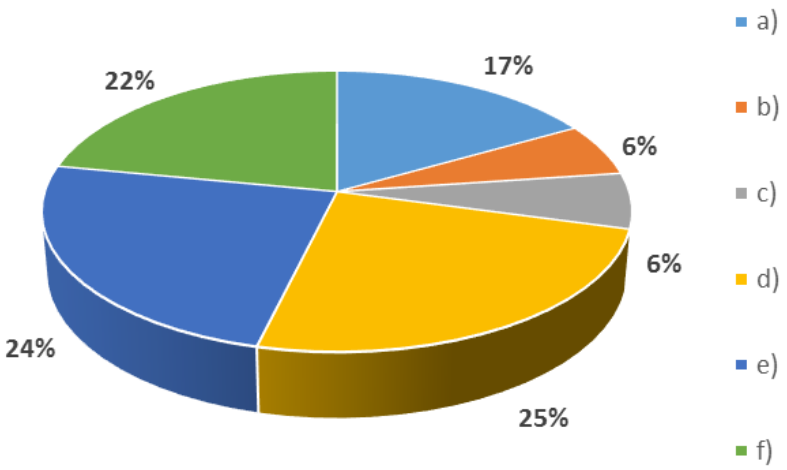

Figure 16.: Answers to the question: Since you are a member of the project's target group, which do you think are the most effective activities offered for counseling (you can circle maximum 3 variants):

a) Counseling through educational courses,
b) Individual interactive work on the portal,
c) Watching educational movies offered by the portal,
d) One day thematic trips,
e) Several days thematic trips,
f) Job shadow-type experiences.

Among the activities carried out within the project Practicor EuroRegio, 25% of the students believe that the most effective was One day thematic trips, followed by Several days thematic trips (24%), Job shadow-type experiences (22%) and Counselling through educational courses (17%). Activities such as Individual

interactive work on the portal and Watching movies were seen as less effective (Figure 16).

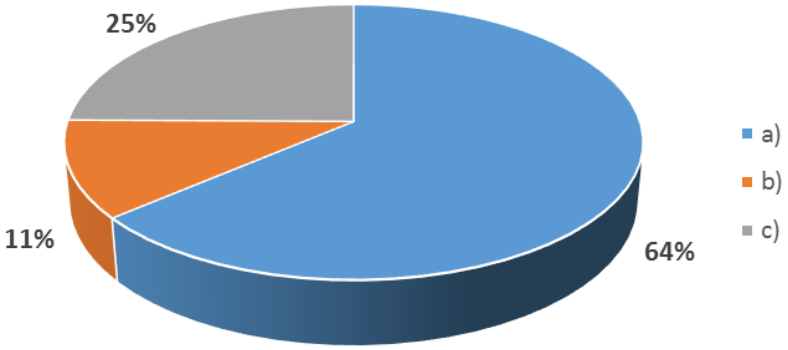

Figure 17.: Answers to the question: Do you consider that your future evolution and career development depend on the student practice performed?

a) YES, they depended very much,
b) NO, they do not depend, luck and knowing how to cope with are the ones that matter,
c) I refrain from an answer.

A proportion of 64% of the students surveyed believe that professional evolution and career development depend on the student practice they performed during the university degree (Figure 17).

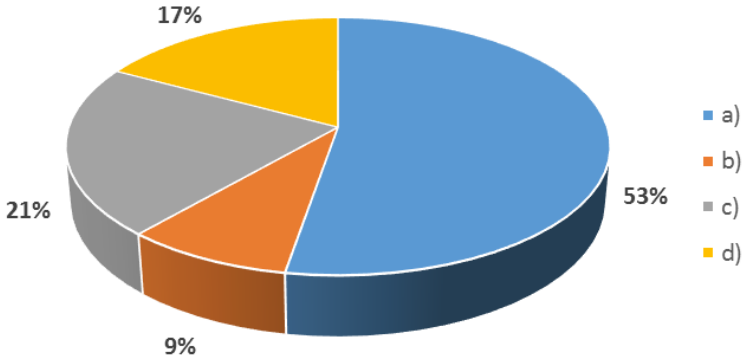

Figure 18.: Answers to the question: Do you think that the theoretical educational offer is correlated in relation to the load of the student practice in the university curricula?

a) YES,
b) NO,
c) I refrain from an answer,
d) Too much theory, lacking correlation with/cross-reference to the actual economic needs.

The majority of students (53%) think there is a good correlation between the load of the student practice in the university and the theoretical formation. However, 17% of the respondents believe that there is too much theory in the university curricula (Figure 18).

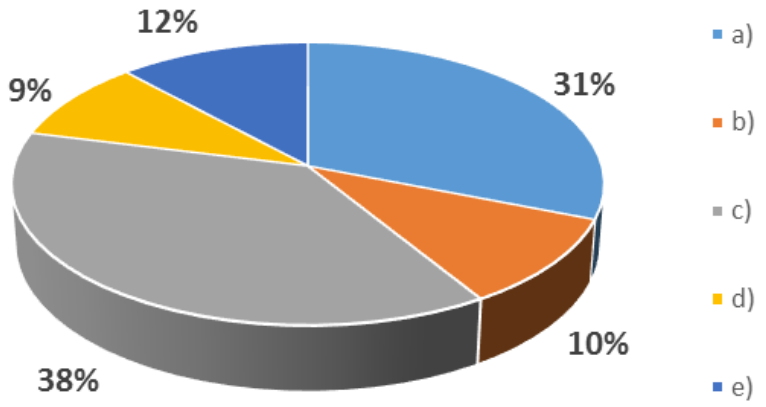

Figure 19.: Answers for the question: Which do you think is the greatest difficulty you faced when you went before an employer?

a) Lack of minimal technical knowledge
b) Lack of communication skills
c) Lack of practical skills
d) Lack of knowledge of a foreign language
e) Lack of some technical and economic knowledge

The greatest difficulty faced by students when coming before an employer was Lack of practical skills (38%), Lack of technical skills (31%), Lack of technical and economic knowledge and Lack of knowledge of a foreign language (10%) (Figure 19).

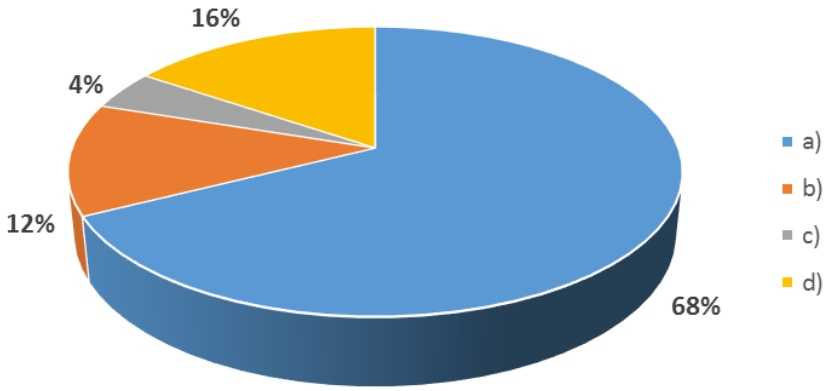

Figure 20.: Answers for the question: Has the topic of your graduation thesis or final/specific discipline project helped you in your professional formation?

a) YES,
b) NO,
c) Almost at all, I work in a totally different field,
d) Very little.

A proportion of 68% of the students surveyed believe that the final/discipline projects they did during university helped them in their professional formation (Figure 20).

11.7 Conclusions

Practice and internships are considered to be the key link between specialist and the social needs of the economic environment. They assure a local development as key issue.
Currently there is a great demand for professionals trained to support sustainable development tendencies of the European Community, especially in energy, transport and modern technologies such as IT, including agriculture domains.
These ever-increasing necessary trends is resulting from basic (not only local) needs, arisen both from companies of all kind as well from industrial units, and must result from a training strategy developed by universities and offered to its students, in close connection with the regional demand and necessities of the economy and society!
The words of King Ferdinand I, spoken at the inauguration of the original Politehnica University of Timisoara building (the present Faculty of the Mechanical Engineering of the university) became the motto that guided many generations: “It is not the walls that create a school, but the spirit which reigns in it” and represents the spiritual inheritance turned in facts by both students and professors that were formed and served this stable cultural and scientific unit in time. This spirit is motivating us, as contemporaneous, to build up an even brighter future!

11.8 Acknowledgement

The authors address thanks to the POSDRU (Regional Operational Programme Human Resources Development), for financing the following projects:
- POSDRU/161/2.1/G/132889,– PRACTICOR ® EURO-REGIO/ (Regional and Euro-regional partnership for the transition to the labor market through career counseling and practice internships at employers);
- POSDRU/90/2.1/S/48816,– PRACTICOR (Educational transnational network on guidance, counseling and career practice correlated with the labor market in the knowledge society);
- POSDRU/87/1.3/S/6139,– CONCORD (National Network of Training courses for teachers of Vocational and Technical School continuous Education);
- POSDRU/156/1.2/G/142253, ELI-NP (Engineering Maintenance for ELI-NP - Extreme Light Infrastructure - Nuclear Physics).

The first author, as project manager, expresses warm thanks and appreciations for the entire team involved in both projects.

12 University adaptation of digitalisation

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12.1 Abstract

Following strategies of different official organisation digitalisation is one of the main key issue to survive and get success just now and in the future. In the present paper the operational actions for implementations of digitalisation strategies are under discussion especially in higher education institutions (HEI), e.g. universities and universities of applied sciences.
Great demands and huge innovation capacity are set for HEI organisations to be updated for serving digitalisations skills of new generations.
Discussion is based on authors' diverse and active experiences, research activities and observations in promoting digitalisation in UASes and Universities.
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12.2 Different forms of digitalisation in HEI´s

EU-strategy for education and training is pronouncing e.g. modernisation of higher education and digital skills and competencies (Fig. 1.). In Finland just like in other countries rapid changes and huge challenges are pronounced in strategies of meaningful organisations e.g. Ministry of education and culture, Confederation of Finnish Industries (EK), Tekes – the Finnish Funding Agency for Innovation.
There several to topics under discussion in the case of adaption rates and methods of digitalisation in HEI´s. Topics fits also to other topics which are under rapid change e.g. energy, environment and all of the new applications of technologies. When we are discussing rapid changes if education in HEI´s it doesn´t include only new applications just like digitalisation it includes also changes in topics e.g. economy, entrepreneurship, physics, mathematics. There are actually very rare topics staying in the stabilised state.
The history of active digitalisation started roughly from the invention of transistor. After microprocessors the digitalisation has followed the Moore´s law. Earlier digitalisation was clearly focused on technology sciences e.g. robotics, mobile phones, automation, intelligent vision, neural networks, 3D printing. Slowly also service and client based applications are in a more and more active role. Intelligent construction, intelligent clothes, clean tech, logistics, intelligent healthcare and whole social media. These topics among other things e.g. car tire with it´s own internet

address, deal more and more with big data and step by step the whole society is under digital control and guidance and also the intelligent innovation and development procedures are run by complicated digitalised algorithms.
Digitalization is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business." and "Integration of digital technologies into everyday life by the digitalization of everything that can be digitised." are two trials to define what digitalization is.
In finish law for universities (Ministry of Education and Culture), it´s also very clearly stated that they have to take into account the surrounding society promoting the impact of research findings and the higher education is based on research. In the case universities of applied sciences it´s more clarly stated the regional needs.
The main topics under discussion in this paper are following: motivation jump of teachers and professors, role of students, wolf pits of funding, dead of best practices, tightly limited developments, order of degree programs, role and vote of business.

Fig. WG:s of EU strategy for education and training.

12.3 Role of students, teachers and professors

Students are very active in adaptation of totally new things, tools and cultures. This is also resource to activate and spread these new things. It also demands allowing spirit in the university. Following the history e.g. microprocessors, networks and their applications, which started nearly and only following students activities producing new courses and lectures and new type of degrees and university organise practical

surroundings and administration. This was also an easy way for university staff to get adapted into new culture. Professors activity was to initialise new branches of research leaving back anyway partially their earlier research field.

12.4 Dead of best practices

There are several working groups all around the world to study and test new methods e.g. in digitalisation and innovation producing useful and top quality best practices. The problem appear in dissemination of best practices which are dying because the application body is always making it´s own changes and the best practice has lost it´s benefit nature.

12.5 Limited developments

Research of digitalisation is living active phase but real applications are still very limited e.g. basic software tools and networks and interfaces are in use but in the development and revenues of business processes and models hardly nothing happens.

12.6 Future of degrees

The question is have we reached the time that culture of university degrees of working lives is going over? First step will be loosening administration norms to allow free mixing of studies between several faculties giving totally new degrees e.g. mixing social, engineering, art and culture. Additionally next step will studies with totally free combination made by student into his/her portfolio.
This portfolio gives tailored change to adapt into working life or start as an entrepreneurship. It is also easy to fulfil e.g. with lifelong studies following society needs.

12.7 Wolf pits of funding

New funding measures are needed when structure of degrees is changing. The use of risk money could be useful funding way also in education innovations. The same thing concerns also research. In this field lot of valuable work has been done at European level. Research funding is also needed in the topics which are not yet fulling scientific criteria. Courage to cut off long time research funding which has not any more scientific or business relevance.

12.8 Secondary and vocational education

In the previous discussion we have concentrated on HEI education but even more important are changes in secondary and vocational level maybe also at the level of day care. At these levels all of the teachers have degrees of HEI´s. Also this needs high activities of university lifelong learning for digitalisation and innovation and

modern entrepreneurship. Innovation based teachers are also needed in university faculties of education.

12.9 Role and vote of business

Working life is very active to take part into discussions for future needs and quality of education. Co-operation is acting well and similar co-operation between public sector and HEI´s will be needed. HEI´s have ideal and eligible targets which guarantees the status of autonomous HEI´s. It avoids also too short time client based demands for HEI education.

12.10 Conclusion

As a conclusion radical changes in HEI adaption of things and topics running with full speed in surrounding society and business. Main things will allowing wide scale freedom for foresight teachers and professors, full freedom to use young forerunner, intelligent and pioneer students. It´s also important that education doesn´t follow too long time earlier professional needs. New fully multidisciplinary structure of university degree where the student has big responsibility for his/her portfolio. Radical changes of funding system is also needed.

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Tekes – the Finnish Funding Agency for Innovation

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13 Biographical Notes on Contributors

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Dr.ing. Diana Andone is the Director of the eLearning Center of Politehnica University of Timisoara, responsible for planning and implementing eLearning. She runs the team who developed and assure daily integration of the university award wining Virtual Campus CVUPT. She is also lecturer at the Politehnica University of Timisoara, Romania, in the area of multimedia, interactive and web technologies. She is passionate about the ubiquitous access to technologies and how they can be used to improve people's life.

Diana Andone holds a PhD in Designing eLearning Spaces for Digital Students with University of Brighton, UK, an MA in European Studies, an "Learning about Open Learning", postgraduate distance education course at the Herriott-Watt University, Edinburgh, UK; an MSc in Artificial Intelligence at the Politehnica University of Timisoara, Romania. She attended different specialisations in universities in UK, France, Finland, Greece, Germany. Since 1998 she teaches course modules in universities from UK, France, Finland, Italy and Greece.

The publication list comprises 17 books and over 80 papers presented at international conferences, she is reviewer for 12 International Conferences, 5 journals, 7 best paper awards at different conferences and since 2010 Co-chair at the IADIS WWW/Internet International Conference. In 2012 she received the EDEN Fellow Title (European Distance and E-Learning Network) and in 2014 was elected member of the EDEN Executive Committee.

In the last years she was involved in over 30 EU funded projects, recently with a focus in open education, publishing and technologies. She was co-ordinator of the LLL ViCaDiS (Virtual Campus for Digital Students) project and national responsible on m-commerce , SKILL2E, CBVI, i2Agora, TafCity, ESIL, e-Taster, e-report projects, as well as the national DidaTec project (Training in blended-learning and new educational technologies for university academic staff). She is now leading the UniCampus project with the goal of creating the first Romanian MOOCs. She actively promotes Open Educational Resources (OER), Open Knowledge (OKF) and Massive Open Online Courses (MOOCs) as part of her everyday activities or thorugh her work in different associations or task-force.

She is also involved extensively in several professional organisations and associations (IEEE, EDEN, IADIS, AACE, W3C, IAFES), actively supports the local start-up movement (StartUp Weekend, HacktTM, hackathons, CoderDojo) and Girls in Tech, as well as acting in the Board of local Romanian NGOs (Pentru Voi Foundation) and a member of Rotary Club Timisoara and Rotary International.

13.2 Erwin BRATENGEYER

Danube University Krems, Austria

Education

1982 -1988: Doctorate Study at Vienna University of Technology, Faculty of Electronics Engineering, Dpmt of Communications Engineering
Degree: Doctor of Technical Sciences, Topic: “Electro-optic Waveguide Phase Modulator”

1976 – 1982: Diploma Study at Vienna University of Technology. Dpmt. of Communications Engineering
Degree: Diploma Engineer (Dipl.-Ing. equivalent to MSc), Topic: “Mono-mode Waveguide in Lithium Niobate”

1976 – 1978: Study of Philosophy at University of Vienna

Work Experience

2009 to present: Head of E-Learning Center, Danube University Krems, Austria.

2006 to 2008: Head of Academy of Educational Technologies and Innovation, Department for Interactive Media and Educational Technologies, Danube University Krems, Austria.

2003 to 2006: Head of Research-Center TIM-Lab, Danube University Krems, Austria. Director of the Research-Phd Program

2002 to 2003: Interim Head of Center of Education and Media, Danube University Krems, Austria. Course director, course developer and lecturer

1996 to 2002: Course director, course developer and lecturer at Danube University, Krems

1995 – 1996: Research on Distance Education at TELAB GesnbR, Vienna. Co-founder of TELAB GesnbR.

1988 – 1995: Head of Development and Production at FOCUS electronics GmbH, Vienna. Co-founder and associate director of FOCUS electronics GmbH

1984 – 1988: University Assistant at Vienna University of Technology, Dpmt of Electronics Engineering

Research & Teaching

Research and teaching activities in the area of technology enhanced learning and Internet based applications.
Other relevant activities Organizing international conferences on technology enhanced teaching and learning. Chairman of the ecoMEDIAeurope conference series, chairman of the Austrian eLearning conference series and co-chair of the eLearning Summit Tour Germany-Austria-Switzerland. Founding member of the International Association of eSciences.

Serving as an external expert for higher education accreditations for Kosovo Accreditation Agency and for Public Agency for Accreditation of Higher Education Albania.

13.3 Felix EDELMANN

Helix, Austria
edelmann@helix.at +43 664 2000 547

1966 Austrian Atomic Research Center Seibersdorf.
1969 Siemens Medical Group
1972 First Austrian employee of Digital Equipment Corporation DEC.
High level technical and business consulting in the areas of networking, telecommunications and online transaction processing in Europe, CEE, Middle East and USA
1997 Master degree at the Danube University Krems and the Alaska Pacific University USA.
Since then running my own company Helix IT Consulting and working for the European Commission in Brussels.
Today Helix IT Consulting is focused on Mobility, Cloud Computing, Video Surveillance and Digital Signage solutions.

13.4 Johann GÜNTHER

johann@johannguenther.at
Prof. at: Jianghan University, Wuhan, China
State University for Telecommunications, Saint Petersburg, Russia
Visiting Professor at Danube University Krems, Austria

- Professorship at Jianghan University, Wuhan, China
- 2010 and 2011 vice chancellor University of Buraimi (foundation rector)
- 2010 visiting professor at Janghan University, Wuhan, China
- 2007 – 2010 Director of Agency for European Integration, Office Prishtina, Kosovo, “Multidimensional Project for the Implementation of an Institutionalised Partnership between Austria and Kosovo in the Field of Higher Education, Research and Innovation”
- 2004 – 2007 Executive Director University of Applied Sciences St.Poelten
- 1999 – 2004 Vice-president Danube University, 1996 – 2004 dean of “Telecommunication, Information and Media“
- President of EATA (European Association of Telematic-Applications)
- 1979 - 1996 lectures at the University of Vienna
- 1986 professor of the State University of Telecommunication in St. Petersburg
- 1988 - 1996 several duties with Alcatel: sales director of Austria, export director for Central- and Eastern Europe and Latin America.
- Headquarters in Paris with the responsibility for Latin America and Europe, development of the distribution network of Alcatel in Eastern Europe, foundation of 12 companies with nearly 100 subsidiaries (Kazachstan to Hungary)
- Publications: more than 50 books, 2 in seven languages
  participation in more than 60 compendiums
  more than 200 articles in specialist journals

13.5 Ioana IONEL

Office: Politehnica University of Timisoara, Faculty of Mechanical Engineering, Department of Mechanical Machines, Equipment and Transport, 1 Bvd. M. Viteazu, Room 131A, 300222 Timişoara, România
ioana.ionel@mec.upt.ro Ionel_Monica@hotmail.com
http://practicor.ro/ioana_ionel/

WORK EXPERIENCE

- October 2007 – 2012 Professor, expert, evaluator
  Technical University of Graz (Austria), Technical University of Braunschweig (Germany), Technical University of Munich (Germany), University of Stuttgart (Germany), European Commission, Brussels
- Teaching Professor in the ERASMUS/SOCRATES framework or with other occasions such as scientific workshops, summer courses, individual or co-supervision of doctoral theses, EC evaluator
- Teaching courses, coordinating didactic activities, academic management, peer-review assessment, or expert evaluation
- October 2006 – January 2012 Head of Department, Politehnica University of Timisoara, Faculty of Mechanical Engineering, Department of Mechanical Machines, Equipment and Transport
- September 2002 – Present Head of Laboratory of the Research centre Politehnica University of Timisoara, Faculty of Mechanical Engineering Laboratory accredited by the Romanian Accreditation Association [RENAR] www.mediu.ro; Head of laboratory
  www.energieregen.mec.upt.ro
- November 2001 – Present: Research Centre Director, Politehnica University of Timisoara, Faculty of Mechanical Engineering
- Director of RESEARCH CENTER FOR THERMAL MACHINES AND EQUIPMENT, TRANSPORT AND POLLUTION CONTROL
- mSeptember 1988 – present: Assistant, Assistant Professor, Associate Professor, Full Professor, Politehnica University of Timisoara
- September 1985 – August 1988: Research engineer, with additional teaching responsibilities
- August 1977 – August 1985: Engineer, researcher, 23 August Plant, Bucharest

EDUCATION AND TRAINING

- October 14-16, 2011: Graduation certificate, academic course Schöne Neue TECHNIKWELT. Challenges of women in Career-an international review, TU München, Univ. der Bundeswehr München, Ludwig-Maximilians Universität, Evangelische Akademie Tutzing
- October 10-15, 2012: Graduation certificate, seminar Women of TUM Seminar “Connect for Success” Workshop “Fit for public”, “Konzepte für Nachhaltigkeit/ Concept for sustainability”, TU München, Univ. der Bundeswehr München, Ludwig-Maximilians Universität, Evangelische Akademie Tutzing
- October 2012: Graduation certificate, specialised programme for Project Managers, Didakticos Association, Timişoara in collaboration with the National Council for Adult Education, Ministry of Labour, Family and

Social Protection and the Ministry of Education, Research and Innovation

- March 2011: Graduation certificate, training module in university management “Management of tertiary activities”, Executive Unit for Financing Higher Education, Research, Development and Innovation, MECTS, Romania
- March 2011: Graduation certificate, training module in university management “Service and support for students”, Executive Unit for Financing Higher Education, Research, Development and Innovation, MECTS, Romania
- July 2012: Diploma of Associate Professor (Privatdozent), Technical University of Munich, Germany
- September 2011: Habilitation degree – Habilitated doctor engineer Technical University of Munich - Weihenstephan, Germany
- 1991-2005: Various scholarships and fellowships, Technical University Munich, Univ. Stuttgart, Univ. All Technical Braunschweig in Germany, Queen Ann's College London, UK, Univ. Technical Graz – Austria
- October 1982 – September 1987 Doctor engineer, PhD in engineering, Polytechnic Institute of Bucharest (UPB), Ministry of Science and Education, Romania
- October 1972 – June 1977: BS in engineering, Polytechnic Institute of Bucharest, Romania, Faculty of Mechanics

EXPERT
In different organizations like NCSRHE [CNCSIS], CORDIS,

13.6 Günter KOCH

Humboldt Cosmos Multiversity, Tenerife

Günter Koch as a professor is guest at Technical Universities in specific in Austria and at the “Danube University”, and permanent Adjunct Professor in Informatics at the IICM-Institute of the Technical University of Graz. He works as a consultant to governments, banks, industries, in specific software dependant or software producing industries.
Professor Koch unites several and even divergent qualifications in his person: entrepreneur, manager and scientist. His last appointment as a manager of a big organisation was until the 1st half of the 1st decade of this century as the CEO of the Austrian Research Centers (ARC), Seibersdorf, today called Austrian Institute of Technology (AIT) , Austria’s largest applied research organisation, employing some 1200 people in many different disciplines, including material sciences, life sciences, information technologies, system research, medical technology, energy and environment etc.
In his role as CEO in cooperation with a colleague from Graz University he developed the now widely used model ad method of an Intellectual Capital Report (ICR). This model served as the basis for even a law after which all Austrian universities must report their annual progress in respect to the development of their “intellectual capital”.
In 2012 he built-up the Humboldt Cosmos Multiversity, a university complementary think tank in Tenerife, Spain, which became legal in 2014. Since then G. Koch ist its President.

His first appointment in Austria was in the early 90ies, when he was invited to become a guest professor in systems analysis and systems architectures at the computer science faculty of Graz Technical University. During this period he was also a member of the university board of the Sévenan branch of the French University of Compiègne. From 1993 to1997 he was the Founding and General Director of the European Software Institute (ESI) in Bilbao, Spain, at its time a most prominent foundation by the European industry and the European Commission, which later served as the model case for the European Institute of Technology (EIT) with its head office in Budapest. In 1997 he joined SUN Microsystems in their Geneva offices as a chief consultant in Software Engineering and Management.

After having been assistant professor at Karlsruhe University's computer science faculty from on 1975, he became the founder managing director of a systems company specializing first in medical informatics in 1981 and later in automation and in software technology. He served in this function until 1993. In an extra appointment he was initiating and heading a Technology Center in the city of Freiburg / Germany. Günter Koch since 1998 lives in Vienna and acts as the Vice President of the Austrian Association for Research in IT and managed (part time) as General Secretary of 'The New Club of Paris' from 2005 to 20014. He is a member of the Board of the Fraunhofer Institute FIRST in Berlin, and he is affiliated with the Vienna-based Knowledge Management Associates/ Academy / Association (KM-A) and its cooperation partner www.execupery.com , where he can also be contacted. An extensive CV can be found via http://www.execupery.com/kontakt.htm and – in German - in Wikipedia : http://de.wikipedia.org/wiki/G%C3%BCnter_Koch

13.7 Matti LÄHDENIEMI

Tampere University of Technology, Finland

Adj. Prof. Matti Lähdeniemi gained a Ph.D from the University of Turku, and is presently an Adjunct Professor at Tampere University of Technology and at the University of Turku. His special fields are automation, image processing, entrepreneurship, knowledge transfer, quality and impact evaluation and RDI processes. He is/has been the director and consulting tutor of numerous industrial projects, and a member of several groups evaluating the impact of RDI and quality at universities on a national level and RDI measures on a national and European level. He has prepared and analysed the international evaluation of RDI activities at Finnish Universities of Applied Sciences. He has written about 190 articles on the above-mentioned topics. Previous positions include Research and Innovation Director, Vice president and Dean (Satakunta University of Applied Sciences), professorships (Computer Science/Tampere University of Technology, Materials Science/University of Turku, Surface Physics/Humboldt-Foundation), project manager in different research and industrial projects in Finland, Sweden, Germany and Japan, and chairman or board member of several organisations and foundations.

13.8 Olli Mertanen

Executive Director at Federation of S-W Finland UAS (CoastAL), former Vice President of Turku University of Applied Sciences

He has long background as well in industry in the field of communications technology as in engineering education in the field of information technology. He received B.Eng in automation technology (1976) in Kotka Institute of Technology, M.Sc. in digital and computer technology (1979) in Tampere University of Technology where he also received Lic.Sc. in computer science and telecommunications (1985) and D.Sc. in computer communication (1992). His industrial background includes positions in Philips Data Systems and Ericksson telecommunications. During his university career he was mentioned among 100 finnish avantgardists in the field of industry and business and awarded the recognition of EIS / excellent educator in electronics. 2012 he got an Achievement Award by INEER organization for his excellent work in the field of education and for his contribution to the creation of entrepreneurial spirit among future engineers. At the moment he is active in the field of enhancing creation of innovations as a result of co-operation between industry and University and furthermore leading to entrepreneurship.

13.9 Dimitris TSELES

Technological Education Institute (T.E.I.) of Piraeus School of Engineering
Department of Automation Engineering

Professor of Automation Engineering Department of T.E.I. Piraeus, Deputy President of T.E.I. Piraeus, Vice-President of Hellenic NARIC. BSc in physics, MSc in Electronics and Communications, MSc and PhD in Electronic control.
2003 – 2010: Dean of Engineering School of Technological Education Institute of Piraeus, 1995 – 2000: Head of Department of Automation of T.E.I. of Piraeus, 2003 – 2006: Vice – President of Research Committee of T.E.I. of Piraeus, 2002-2010: Member of the Council of the Center for Technological Research of Piraeus and Islands, Director of many research projects, concerning new technology applications in various fields and especially in agriculture in previous years, directing a special program for young farmers funded by General Secretariat for Youth. Chair (and founder) of eRA Conferences. Over 130 objects of publications.

13.10 Radu VASIU

President IAFeS
President of the Senate of the Politehnica University of Timisoara, Director of Multimedia Research Center, Politehnica" University of Timisoara
Bul. V. Parvan No.2, 300223 Timisoara, Romania

Radu Vasiu received the M.Sc. and Ph.D. degrees in Electronics and Telecommunications Engineering from the Politehnica University of Timisoara, Romania in 1982 and 1997, respectively. He is currently a professor at the Faculty of Electronics and Telecommunications Engineering of the Politehnica University of Timisoara. His research interests in the last years are in the area of smart city, open data, e-learning, multimedia and web technologies. Since 1993 he was involved in many international projects (Tempus, Phare, Socrates, Leonardo da Vinci, Life Long

Learning, FP6, etc), especially in the field of multimedia and e-learning, both as coordinator or as contractor. He is now the President of the Research Committee of the Politehnica University Senate and the Director of the Multimedia Research Centre.
He acted as invited professor in different universities from UK, Finland, France, Austria, Greece and Netherlands. He has initiated and further developed 5 new degree specialisations at undergraduate and postgraduate level in Multimedia, Digital Media and e-Activities.
The publication list includes 12 books and more than 100 papers presented at different international conferences. He was involved in 28 research or international cooperation projects. He has initiated in 2013 the Timisoara Smart City Commitment as part of the EU Smart Cities and Communities Initiative
Currently, prof. Vasiu acts as President of the International Association for e-Science (IAFeS), that promotes at international level the use of ICT in science and technology.
He is also a member of IEEE Computer Society and IEEE Communications Society, European Association for Telematics Applications (EATA), European Distance and E-learning Network (EDEN), International Association of Science and Technology Engineers for Development (IASTED), European Portal for Advanced Collaboration in E-learning (EuroPACE) and of the Commission for European Integration of the Romanian Academy, Timisoara branch.

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- to promote young researchers in these areas
- to offer an exchange platform for experts
- to offer an international co-operation platform

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Biberstrasse 4/4
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International Association for eScience

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