EURASHE
European Association of Institutions in Higher Education

Professional Higher Education 4.0: A Change for Universities of Applied Sciences

Le Havre, France, 30-31 March 2017

EURASHE event

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Contents

Professional Higher Education 4.0: A Change for Universities of Applied Sciences

Overview

EURASHE's 27th Annual Conference was held on 30-31 March 2017 in Le Havre (France) in a partnership with the Assemblée des Directeurs d'Institut Universitaire de Technologie (ADIUT), the IUT of Le Havre, and the University Le Havre Normandie. It brought together 118 participants from about 30 countries, including institutional leaders, senior academics, programme managers and administrators responsible for internationalisation, quality assurance, researchers, representatives from national authorities, and from (inter)national associations of institutions. The conference provided the opportunity to learn more and discuss over two days challenges which professional higher education – and in fact higher education in general – is facing due to substantial changes brought by the digitalisation agenda in all sectors of society.

In the context of technological developments, digitalisation, new requirements and expectations towards employability and higher education as a mass phenomenon, higher education institutions are likely to change their role and mode of operation entirely. The 4th industrial revolution, or so-called industry 4.0/industrie du futur, will require a shift in approaches and models. More and more higher education institutions are opening up, in their business models, in their leaning designs, in their access regulations and in the way they relate to the world of work. The conference keynote, as well as panel discussions with a range of experts and stakeholders, focused on the changing environment, identification of potential challenges and opportunities for higher education institutions within a more demanding and competitive environment. The workshops which followed, and other contributions, then opened a space for sharing and discussing practical innovative approaches within a full range of activities from governance and strategic partnerships through teaching and learning provisions and research agenda of professional higher education.

In order to strengthen the interaction between EURASHE as the European political representation of professional higher education and top leaders of universities of applied sciences, EURASHE launched, on the occasion of the conference, a new format – a UAS Leadership Forum – as a platform for informal debate on strategic issues and exchange of views of rectors, presidents and

directors general of universities of applied sciences. The intensity of discussion and participants' reflections have been very much in favour of further continuation of this new initiative.

Conclusions

What may a response to "Professional Higher Education 4.0" be? What changes may universities of applied sciences and other institutions within the sector get ready for? The final interactive session proposed a few conclusions asking the participants to express their view.

"We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before" writes Klaus Schwab, the founder and executive chairman of the World Economic Forum.

The conference clearly showed that the education sphere will not stand apart from this development. The development is likely to introduce new requirements for the profile and qualification, emphasising even more than before, people's capacity for initiative, entre- and intrapreneurship, digital literacy, critical thinking and ability to define personal learning needs and identify possible sources for such learning. There is definitely a further space for a well profiled, yet flexible professional higher education sector, although it may focus on meeting different needs and requirements of various target groups. And while the professional competences should be in the core focus area of professional higher education, the civic and democratic aspects of education should not be left aside. According to OECD findings these two areas are not in conflict, on the contrary, they seem to be rather complementary. New patterns of learning may call for even more flexibility, recognition of achievements through various learning pathways and allowing transfers between various learning provisions. The dynamically changing environment and progress of both professional careers and private life will enhance the importance of lifelong learning, non-formal and informal learning. The focus of teaching and learning provisions, as well as the character of assessment of learners' achievements will have to reflect such specifics and may bring a substantial shift in curricula development.

The envisaged role of universities of applied sciences is likely to be changed from the "school" to a "hub" connecting various partners and stakeholders within their community, allowing suitable provisions for combination of teaching, learning, research and knowledge exchange involving partners and collaborators from outside education. While all higher education institutions will put some focus on meeting the digitalisation agenda, there was a shared belief that professional higher education should still find suitable approaches to address different target groups needing more profession-specific skills and competences.

At the same time, the prevailing expectation is that the digitalisation agenda will enhance the opportunities for internationalisation and opening new markets for those who will have got ready.

The digitalisation agenda is thus a topic to be considered seriously within the strategies of education and individual institutions. However, most of the participants do not perceive their institutions to be ready for the potential changes and the impact of the rigidity of systemic and regulatory framework arrangements for modern teaching, learning and assessment have been mentioned as matters to be addressed. It thus seems an appropriate time to initiate more thorough discussions at the system level on the vision and future requirements of modern higher education and on necessary adjustments within the legal and social regulatory frameworks which would accommodate the new flexible provisions and access to higher education without threatening its role and quality.

The conference has hopefully brought a better understanding of the concept and emerging themes, as well as of more concrete issues to be considered.

Acknowledgement

These conference proceedings gather the contributions from two keynote speakers, nine posters, thirteen breakout sessions and ten examples of good practices. As EURASHE conferences are practitioners' conferences this report includes not only paper versions of these contributions but also information on the posters and presentations delivered in the various sessions. All this material and more is available on the conference website at www.eurashe.eu/lehavre.

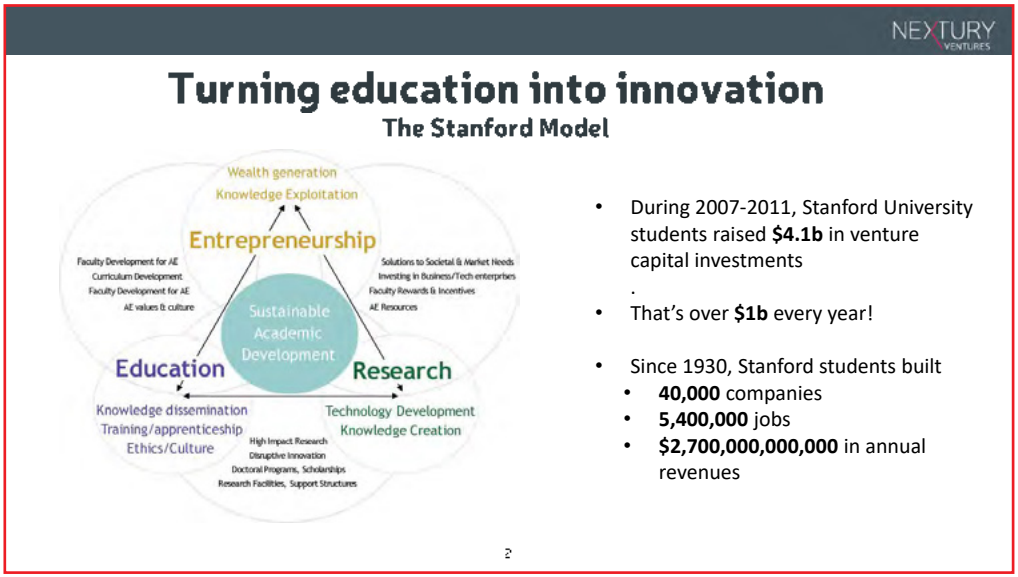
On behalf of EURASHE, I wish to thank the hosts for their wonderful hospitability in France; all contributors to the conference, including participants in the practitioners' panel for their insights and commitment; the members of the conference programme committee who arranged a rich and varied programme; all participants for their exchange and openness in the conference and all those from EURASHE's Secretariat and the IUT of Le Havre including the students who organised the event and took care of its smooth running.

Debates and further peer-learning will continue at our next events, including our 28th Annual Conference, which will be organised in Tallinn (Estonia) on 19-20 April 2018. We look forward to meeting you there.
With many thanks and compliments

Michal Karpíšek
Secretary General of EURASHE

Keynote

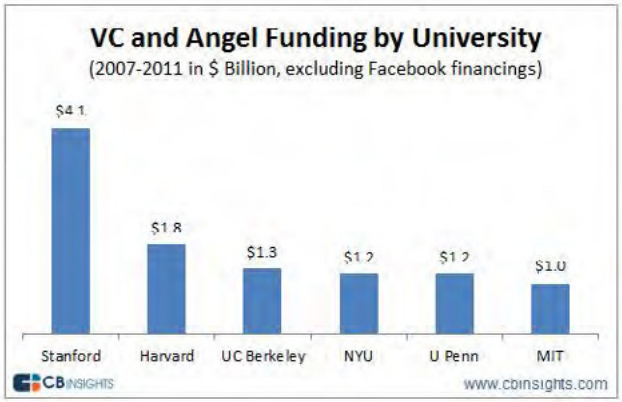
by Ilja Laurs, Founder & Chairman at Nextury Ventures, Lithuania



NEXTURY VENTURES

In fact, it's not only about Stanford

Innovation and technology are driven by young entrepreneurs

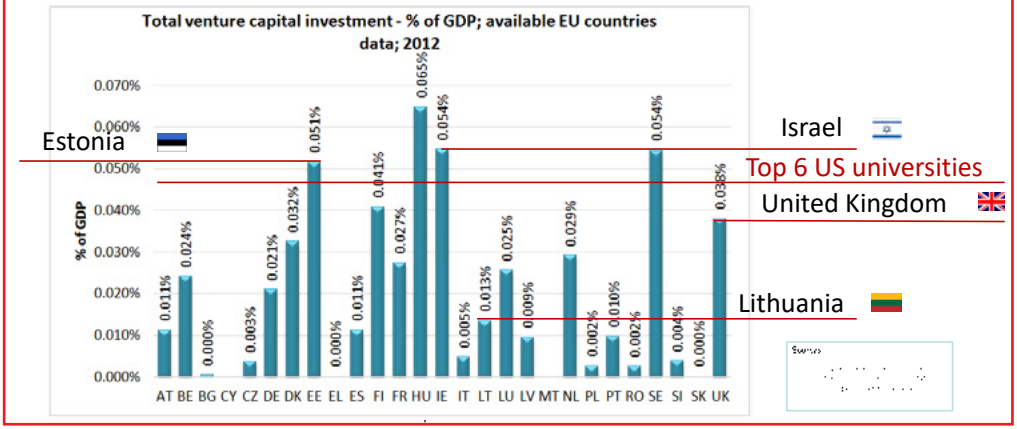


- Students of just six top US universities raised **$10.6b** during 2007-2011
- That's over **$2.5b/y**
- Which is **0.034%** of GDP

NEXTURY VENTURES

EU is far behind US in technology funding

VC investment relative to GDP – 6 US universities beat most EU countries

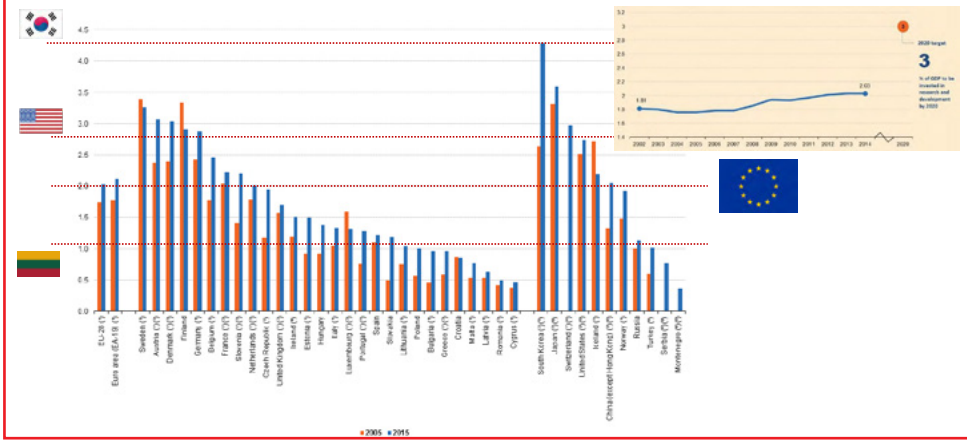


EURASHE
iut Association des Directeurs d'IUT
IUT LE HAVRE
UNIVERSITÉ LE HAVRE NORMANDIE

NEXTURY VENTURES

Investment into innovations

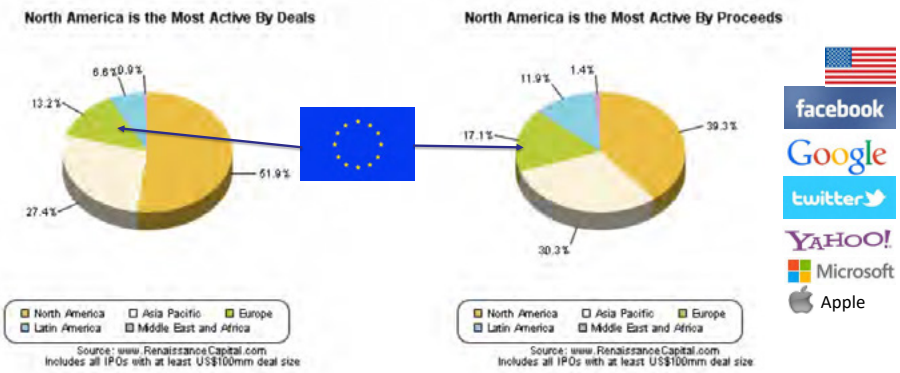
(% from GDP, Eurostat)



NEXTURY VENTURES

EU lags at innovation

global IPOs by region



facebook
Google
twitter
YAHOO!
Microsoft
Apple

NEXTURY VENTURES

Innovation challenges

Top 7

- Lack of entrepreneurship culture, mentality & awareness
- Unestablished education-entrepreneurship-investment-business ecosystem
- Focus on “theory” vs “practice”
- Education lags behind real life
- Heavier business & labor regulations
- Weak connection between universities & business
- Ineffective public funding

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NEXTURY VENTURES

Innovation & Entrepreneurship

5 areas to improve

- Education & Skills
- Access to talent
- Access to capital
- Regulations
- Thought leadership

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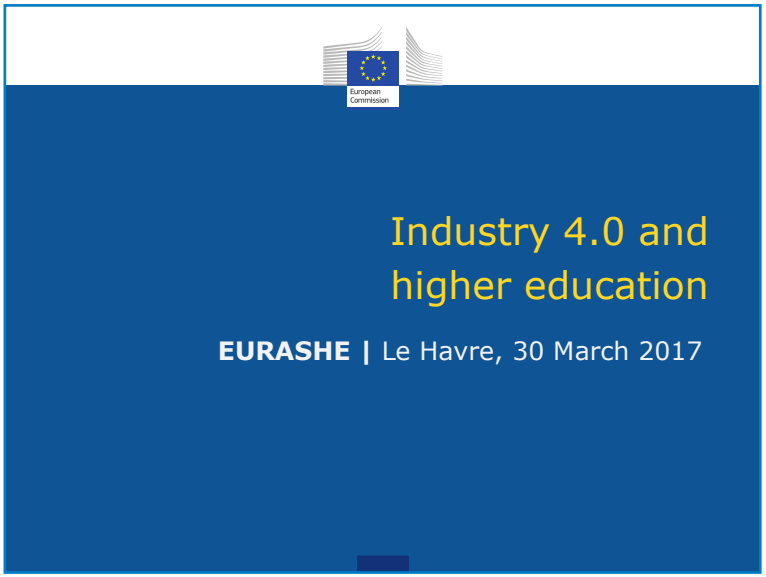
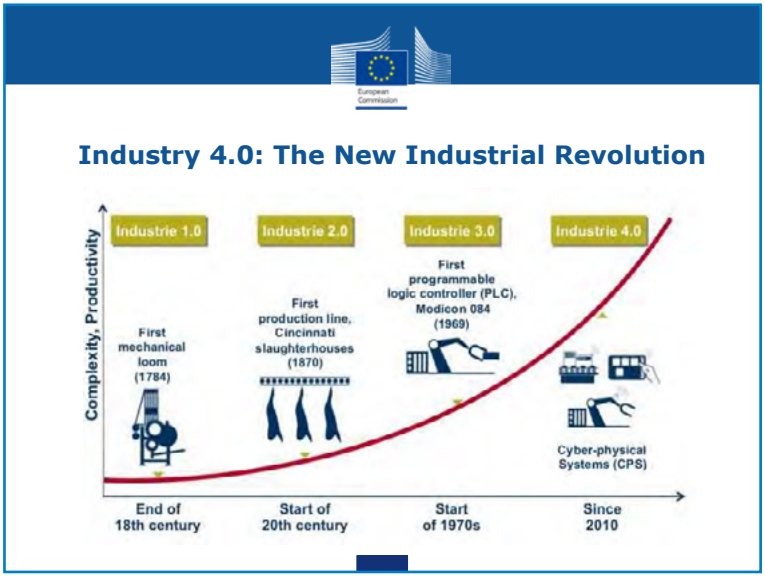
Contribution available for download at www.eurashe.eu/lehavre-laurs

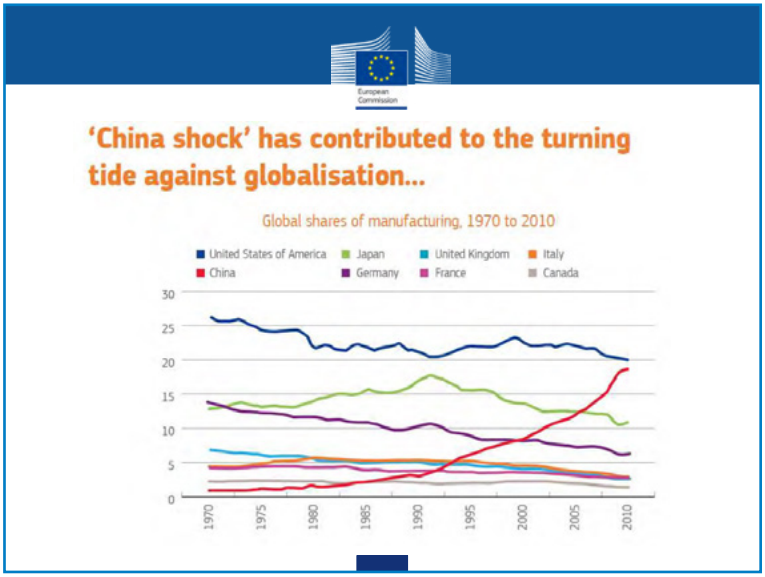
Keynote

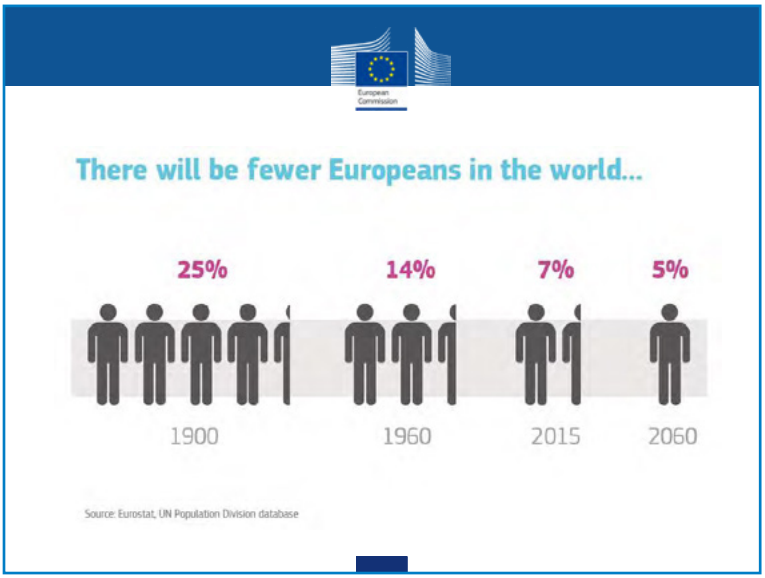
by André Richier, Principal Administrator at the Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (Key Enabling Technologies and Digital Economy Unit) at the European Commission

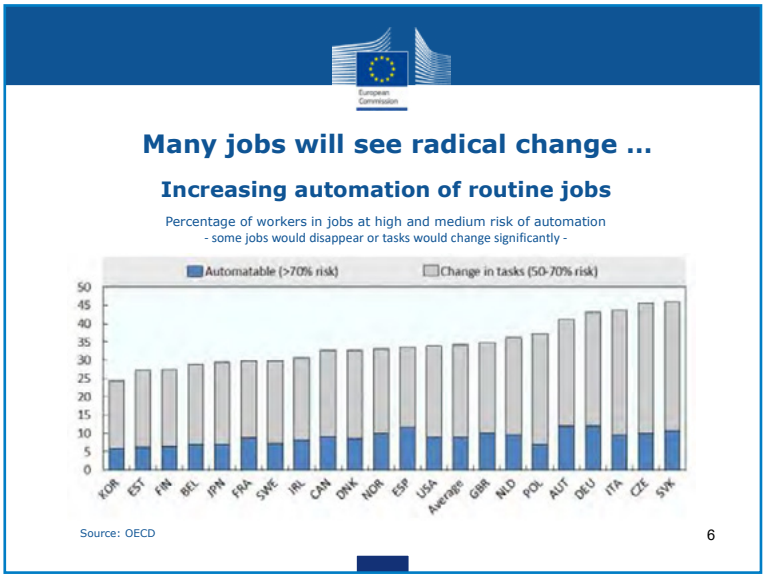





European Commission
MARTIN FORD
THE WEALTH OF HUMANS
FEDERICO PISTONO
TYLER COWEN
CALUM CHACE
THE ECONOMIC SINGULARITY
RICHARD SUSSKIND
DANIEL SUSSKIND
AMERICA'S INVISIBLE CRISIS
MEN WITHOUT WORK
NICHOLAS EBERSTADT
"THE FOURTH INDUSTRIAL REVOLUTION WILL AFFECT THE VERY ESSENCE OF OUR HUMAN EXPERIENCE."
KLAUS SCHWAB


European Commission
'China shock' has contributed to the turning tide against globalisation...
Global shares of manufacturing, 1970 to 2010
United States of America
Japan
United Kingdom
Italy
China
Germany
France
Canada
30
25
20
15
10
5
0
1970
1975
1980
1985
1990
1995
2000
2005
2010


There will be fewer Europeans in the world...
25%
14%
7%
5%
1900
1960
2015
2060
Source: Eurostat, UN Population Division database


Many jobs will see radical change ...
Increasing automation of routine jobs
Percentage of workers in jobs at high and medium risk of automation
- some jobs would disappear or tasks would change significantly -
Automatable (>70% risk)
Change in tasks (50-70% risk)
50
45
40
35
30
25
20
15
10
5
0
KOR
EST
FIN
BEL
JPN
FRA
SWE
IRL
CAN
DNK
NOR
ESP
USA
Average
GBR
NLD
POL
AUT
DEU
ITA
CZE
SVK
Source: OECD
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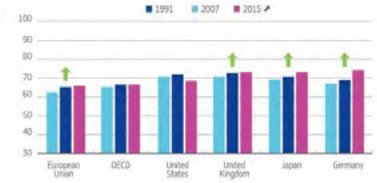
Technological unemployment is not yet a reality

Employment to population ratio in major OECD economies

Percentage of working-age population (aged 15/16-64)



Source: OECD Labour Force Statistics Database

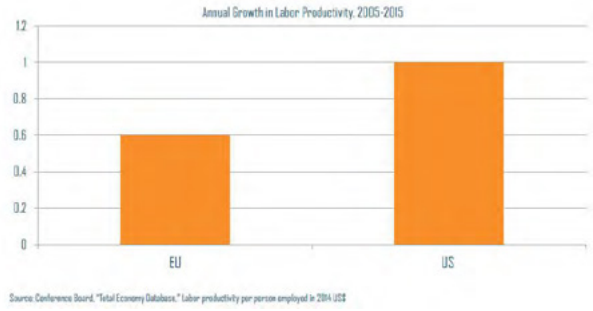
Employment rate at an all-time high in the OECD

Source: OECD

Over 10 million new jobs created in EU27 between January 2013 and September 2016

Source: Eurostat

Productivity growth remains slow

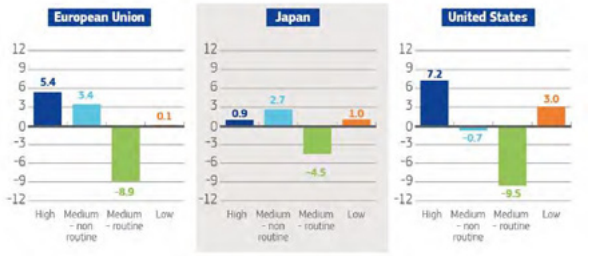


Source: Conference Board, "Total Economy Database," Labor productivity per person employed in 2014 US$

But labour market polarisation is widespread

Job polarisation in major OECD economies, 2002-14

Percentage point changes in employment shares, by occupation



Source: OECD estimates based on EU-LFS, Japanese Labour Force Survey, BLS Current Population Survey

Skills are a key resource of our economies and the engine for innovation, growth and jobs …

- EU needs to **re-skill and up-skill** its workforce
- Global race for talent, a highly skilled and/or specialised workforce is a key factor for **investment and industrial modernisation**
- Positive correlation between the skill composition of the workforce and levels of labour **productivity**
- Member States need to **modernise education and training** and better anticipate **skills needs of industry**

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Communication on Digitising European Industry

- Help coordinate national and regional initiatives on digitising industry by maintaining a EU-wide dialogue with all actors involved.
- Focus investments in EU's public-private partnerships and encourage the use of the EU investment plan and European structural and investment funds.
- Invest € 500 million in a pan-EU network of digital innovation hubs where businesses can obtain advice and test digital innovations.
- Set up large-scale pilot projects on IoT, advanced manufacturing, smart cities and homes, connected cars and mobile health services.
- Adopt future-proof legislation on the free flow of data and clarify ownership of data generated by sensors and smart devices. Review of rules on safety and liability of autonomous systems.
- Present an EU skills agenda that will help give people the skills needed for jobs in the digital age.

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National Policy Initiatives
- March 2015: 6
- March 2016: +3
- March 2017: +3
- Under Preparation: 9

Launch of the European Platform of national initiatives

On ministerial level

Digital Day: Rome 23 March 2017

with 60 years celebrations of the Rome treaty

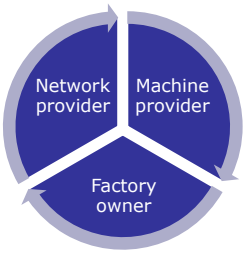
60 ROME DIGITAL DAY

#DigitiseEU

Who owns industrial data?

Guiding principles:

- Enable the trading of machine-generated data
- Facilitate and incentivise the sharing of such data
- Protect investments and assets
- Avoid disclosure of sensitive and confidential data
- Minimise lock-in effects



Possible mitigation measures:

- Guidance on incentivising businesses to share data
- Fostering the development of Application Programming Interfaces
- Default contract rules
- Access for public interest purposes
- Access against remuneration

- **Baseline: General Data Protection Regulation (27 April 2016): Focus on personal data**
- **Communication on "Building a European Data Economy" launched on 10 January 2017**
- **Start of a broad consultation process** (10 January – 26 April 2017)

Cyberspace is a backbone of digital society & economic growth but **cybersecurity** incidents undermine trust

The EU's response

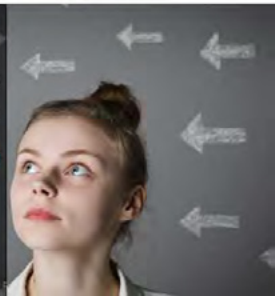
- Communication "**Strengthening Europe's Cyber Resilience System**" includes initiatives to increase cyber resilience, stimulate cybersecurity market, mainstream cybersecurity in EU policies (2016)
- Proposal European **ICT security certification framework** (2017)
  - Increasing trust and security in ICT products and services
  - Integration of ICT security certification in future sector-specific legislative proposals
  - Assessing the feasibility and impact of an EU cybersecurity labelling framework

A forward-looking vision

Watify — Boosting Technological Transformation

Watify is an awareness-raising campaign funded by the European Commission to support the EU efforts to stimulate the modernization of Europe's industry by:

- Fostering European SMEs' digital and technological transformation
- Supporting Europe's regions to translate their smart specialisation strategies in the area of digitisation and KETs into concrete projects.



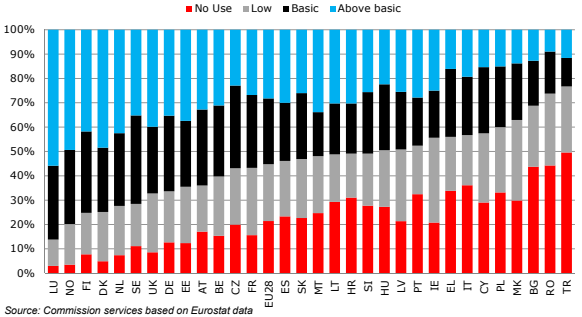
https://ec.europa.eu/growth/tools-databases/dem/watify

NEW SKILLS AGENDA FOR EUROPE (June 2016)

Quality & relevance of skills	Visibility and comparability	Skills intelligence
1. Upskilling Pathways	5. Revision of EQF	7. Revision of EUROPASS
2. Key Competences Framework	6. Skills profile tool for 3rd country nationals	8. Analysis of brain drain
3. VET as a first choice		9. Blueprint for Sectoral Cooperation on Skills
4. Digital Skills and Jobs coalition		10. Initiative on graduate tracking

45% of the EU population has insufficient digital skills, 21% has none at all…

Digital skills in the EU, NO, MK and TR, 2015
(% individuals with above basic, basic and low digital skills and no internet use)



Source: Commission services based on Eurostat data

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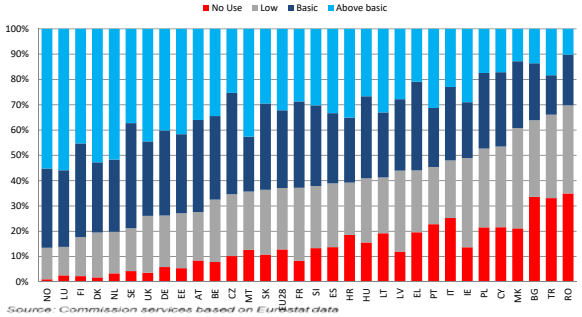
37% of the EU labour force has insufficient digital skills, 13% have no digital skills at all

Digital skills of the labour force, 2015 (% labour force with above basic, basic and low digital skills and no internet use)



Source: Commission services based on Eurostat data

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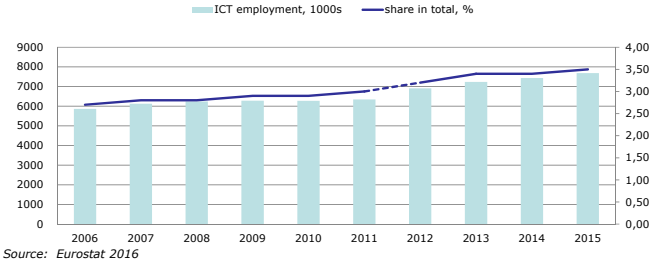
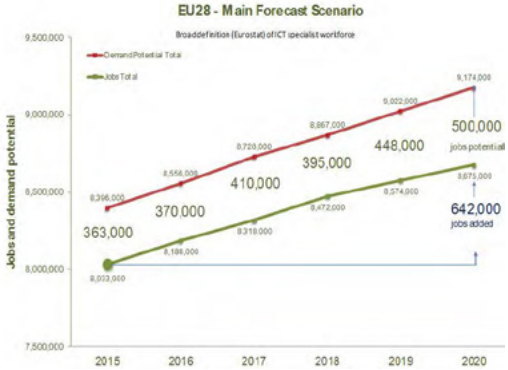
Employment of ICT professionals has grown by around 2 million in the EU over last 10 years

Employment of ICT professionals in the EU in absolute terms and as a share of total employment, 2006-2015



Source: Eurostat 2016

Demand for ICT professionals is exceeding supply

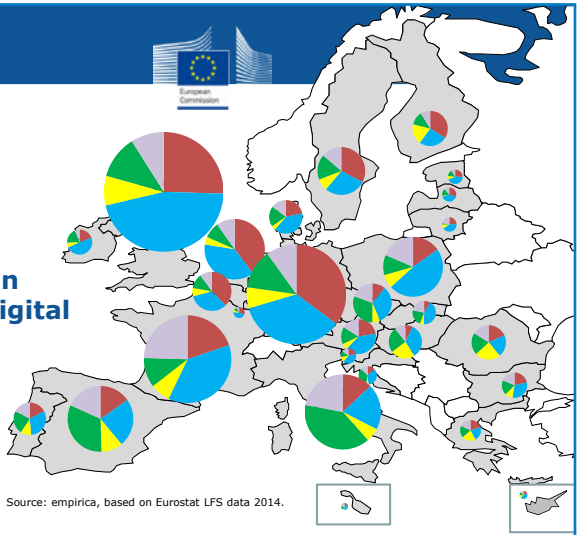


Source: Empirica 2017

Management, architecture and analysis	ICT managers Management and organization analysts (partly) Systems analysts
Core ICT practitioners - professional level	Software developers Web and multimedia developers Applications programmers Other software and app developers and analysts Database designers and administrators Systems administrators Computer network professionals Other database and network professionals
Other ICT practitioners - professional level	Electronics engineers Telecommunications engineers IT trainers ICT sales professionals
Core ICT practitioners - associate/ technician level	ICT operations technicians ICT user support technicians Computer network and systems technicians Web technicians
Other ICT practitioners - associate/ technician level	Electronics engineering technicians Process control technicians not elsewhere classified Air traffic safety electronics technicians Medical imaging and therapeutic equipment technicians Medical records and health information technicians Broadcasting and audio-visual technicians Telecommunications engineering technicians

Source: empirica based on Eurostat LFS data

Composition of the EU digital talent pool



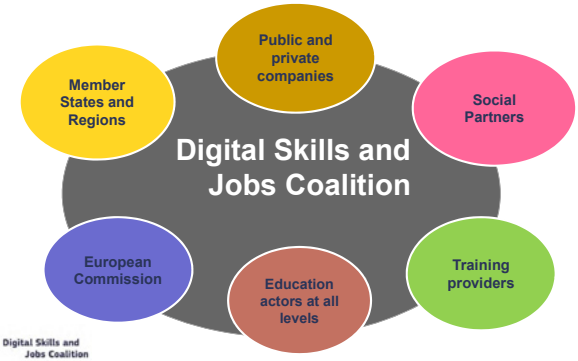
Source: empirica, based on Eurostat LFS data 2014.

IT Professionalism and Digital Leadership

http://ictprofessionalism.eu/

www.eskills-scale.eu
www.leadership2017.eu

Multi-stakeholder partnership
launched on 1 December 2016



Digital Skills and Jobs Coalition

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Digital Skills and Jobs Coalition Goals by 2020

- Train **1 million young unemployed** people for vacant digital jobs
- Support the **upskilling** and **retraining** of the **workforce** and in particular to support SMEs
- **Modernise education and training**
- Reorient and make use of available **funds** to support digital skills
- **Awareness raising**

Where are we now?

- 160 **members**
- 65 **pledges** to take action on digital skills
- 15 **National Coalitions** for Digital Skills and Jobs (*BE, BG, CY, CZ, EL, IT, LT, LV, MT, NL, PL, PT, RO, SLO and UK*)
- **European Digital skills Awards 2016** over 258 submitted Best Practices, 16 finalists, 4 winners

Blueprint for Sectoral Cooperation on Skills

Framework for strategic cooperation between key stakeholders

Aim: to increase the **talent pool** and deliver **sector-specific skills** solutions

Builds on previous work => Links to policy => **Systemic and structural impact**

http://europa.eu/!gc96YU

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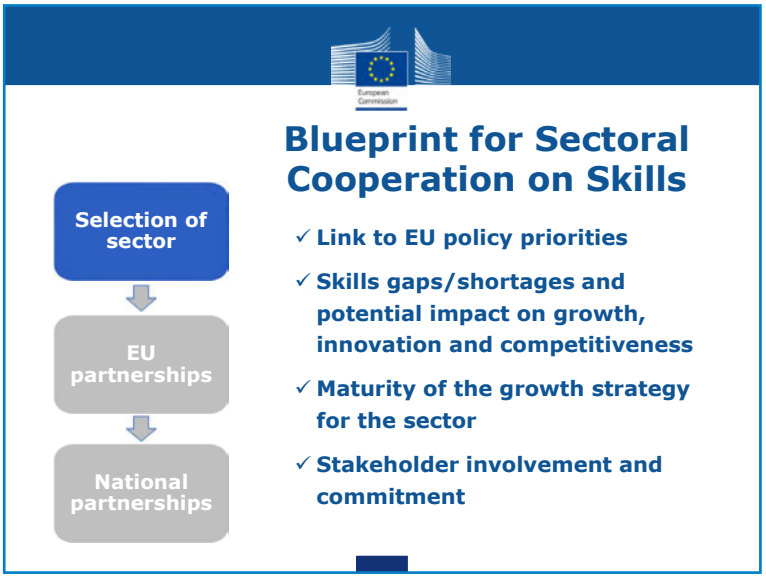
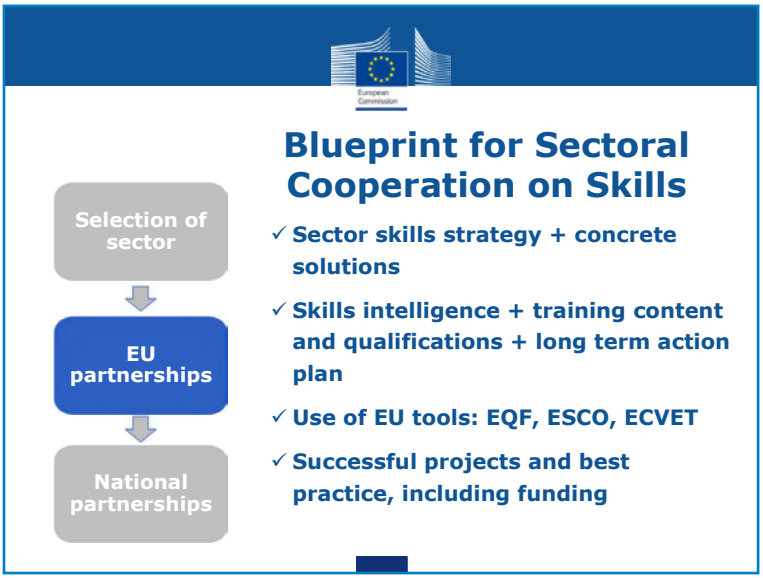
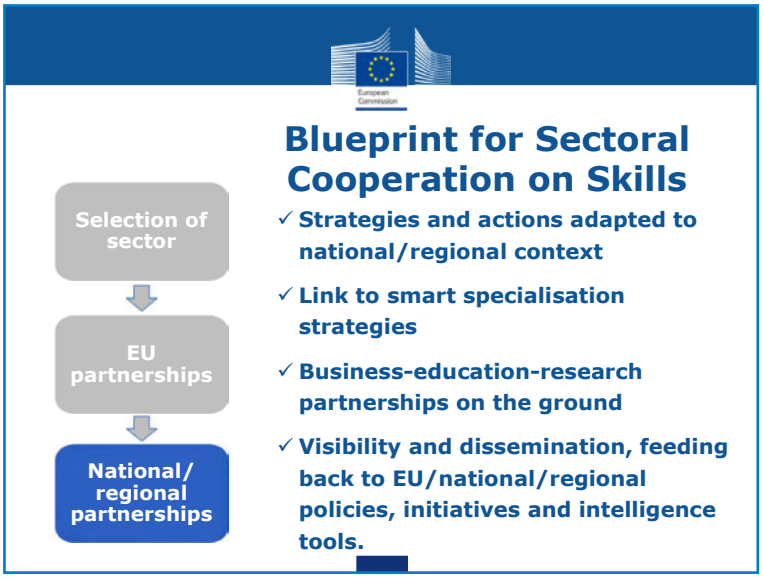



Blueprint for Sectoral Cooperation on Skills
Selection of sector
EU partnerships
National partnerships
✓ Sector skills strategy + concrete solutions
✓ Skills intelligence + training content and qualifications + long term action plan
✓ Use of EU tools: EQF, ESCO, ECVET
✓ Successful projects and best practice, including funding


Blueprint for Sectoral Cooperation on Skills
Selection of sector
EU partnerships
National/ regional partnerships
✓ Strategies and actions adapted to national/regional context
✓ Link to smart specialisation strategies
✓ Business-education-research partnerships on the ground
✓ Visibility and dissemination, feeding back to EU/national/regional policies, initiatives and intelligence tools.


Six Pilot Sectors


Blueprint for Sectoral Cooperation on Skills
Pilot implementation in 6 sectors
• Automotive
• Defence
• Space
• Maritime technologies
• Tourism
• Textile, clothing, footwear and leather
Additional sectors would join in the future: construction, steel, health, renewable energy and green technologies etc.
Digital Skills and Jobs Coalition
Launch conference 1 Dec 2016
• Develop a large digital talent pool
• Ensure that the labour force is equipped with digital skills
• Member States invited to develop national digital skills strategies by mid-2017
The Commission will bring together Member States and stakeholders to pledge action and to identify and share best practices
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Contribution available for download at www.eurashe.eu/lehavre-richier

Opening the ivory tower – third mission activities of small universities of applied sciences in context of economy 4.0

by Gabriele Permoser, Assistant to the Management Board, St. Pölten University of Applied Sciences, Austria, Hannes Raffaseder, Authorised Signatory and Head of Research and Knowledge Transfer, St. Pölten University of Applied Sciences, Austria

The increasing influence of digital technologies in all areas of life is likewisely challenging economy and society. Automatization and human-machine-interaction are calling for new competencies from the employees. The eased access to knowledge asks for critical thinking from the recipients of information. Especially in the context of digitalization of information and post-truth tendencies, universities of applied sciences (UAS) are important partners both regionally and globally. With numerous activities (ranging from hosting science communication events to continuous training for employees of local SMEs), which cannot directly be assigned to teaching and/or research, they foster knowledge transfer to economy and society. These activities can be summed up as "third mission". As a result, higher education institutions (HEI) have to open the well-known ivory tower. Third mission leads to a cultural change of the identity of HEIs. They interact with a divers set of various stakeholders and act as platforms for collaborative innovation. In recent years, third mission became a buzzword both used from public authorities as well from HEIs. Nevertheless, these activities aren't described in any knowledge survey. Metrics, like number of peer reviewed publications and third party funding are still used to illustrate the output of HEIs. Why do especially UAS to open their doors and act as platform for collaborative innovation? How can these activities be evaluated? This poster will describe St. Pölten UAS ideas of a concept for evaluating third mission activities. The idea is to create a set of criteria to show the significance of the interaction with a divers set of stakeholders and how both sides can create a win-win-situation.

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University Fourth Mission. Spin-offs and Academic Entrepreneurship: a theoretical review through the variety of definitions

by Augusto Cocorullo, PhD Student, University of Naples "Federico II" – Department of Social Sciences, Italy

Universities are now considered vital players in the process of the transfer of knowledge, innovation and technology from the academic to the commercial/productive sector. If in the past universities covered this role by granting patents to outsiders, the situation has deeply changed. Today academic institutions are also dedicated to the creation and promotion of spin-offs and start-ups, as instruments for responding to the social pressure on accountability and dialogue with economy through the sharing of scientific research results (Geiger 2006; Laredo 2007). This paper analyzes the existing definitions of USOs in order to systematize them and to identify criteria for classifying the different aspects of this multi-headed concept.

A preliminary issue is the difference between the terms "spin-offs" and "startups" and the reason why only spin-offs is used in this paper. In particular, the label "start-up" can be applied to any new form of innovative company in its embryonic stage. Once the project has launched and has separated itself from the university, it has become its own entity, therefore it can be describe as "university research spin-off". To be a spin-off could be considered as a *genetic condition* which continues throughout the life on the business market and that could be mitigated if the spin-off becomes bigger than the original institution.

Consequently, in this paper, the term "spin-off" has been adopted to describe a new form of entrepreneurship that results from a previous phase of academic research and that is now separated from the original institution and has become an independent entity on the business world, as an instrument of exploitation of academic research. The paper wants to investigate in order to shed light on theories regarding the processes and methods applicable to how this phenomenon continues to spread, whose boundaries of interaction with other fields and disciplinary areas appear to be progressively dilated (Lazzeri and Piccaluga 2012).

The analysis of academic spin-offs needs a preliminary summary, in order to discipline the numerous and different definitions of academic spin-offs that, in fact, are progressively developed by researchers in the various studies on the subject. From the analysis of literature, emerges a substantial absence of a clear notion of the argument and this phenomenon, which eventually lead to the use of the same term to describe totally different phenomena in terms of nature and peculiarities. If, for example, considering the number of companies created by MIT (*Massachusetts Institute of Technology*) in Boston in a thirty-year period, Roberts and Malone (1996) argue that the annual rate of business creation is equal to 6.4. At the same time, Bray and Lee (2000) estimate this rate around 25 spin-offs of the year; Carayannis et al. (1998) and Steffensen et al. (2000), however, through analysis of data contained in a research conducted by the Bank of Boston, they say that this rate is equal to 140 companies a year. The cause of this lack of homogeneity of the estimates is definitely placed in the lack of a clear, unambiguous and shared definition of the USOs.

Such a plurality of definitions «does not involve only theoretical problems, but especially practical since it determines a strong

difficulties in the quantification of the phenomenon and in the comparison of the same in terms of time and space, so that often you have as a consequence a considerable shortcomings from the point of view of supporting policies which should intervene both at the planning stage and in the implementative one» (Grossi and Ruggiero 2008, 58). The definition provided by Steffensen, Rogers and Speakman (2000, 97) allows to demonstrate how simple it is to create confusion, «a spin-off is a new company that is formed by individuals who were former employees of a parent organization, and a core technology that is transferred from the parent organization».

Some authors adopt an expanded definition of the phenomenon, generally including all enterprises established by a person who studied or worked within the university (Roberts 1991), not allowing in this way to be able to develop in-depth and operational analysis of the phenomenon. A narrow definition, however, considers the academic spin-off companies as born from the exploitation of a codified knowledge from the university (i.e. the use of a patent or intellectual property), but so it will exclude all those initiatives that are based on unpatented knowledge (Piccarozzi *et al.* 2013).

One of the first definitions of academic spin-offs, also called university spin-offs (USOs), is due to McQueen and Wallmark that identify three distinctive elements of the phenomenon: «[...] in order to order to be classified as a university spin-off, must be checked three criteria: (1) the founder or founders must come from a university (faculty, staff, students); (2) the company's activities must be based on technical ideas generated in the university; and (3) the transfer from universities to industry must be directly and not through an intermediary» (McQueen and Wallmark 1982, 307).

The definition introduced by Klofsten and Jones-Evans (2002) emphasizes how the academic spin-offs can be identified through four aspects described as follows: a new business (autonomous entity from the university, with its own legal identity); created by the university (thus excluding all other entities or research institutions); for use of the results deriving from academic (not only all the patentable results, but also all those technical and scientific knowledge acquired during the academic activity); the purpose of which is to obtain a gain (for then exclude all non-profit activities).

University Spin-offs: a Typology

In Italy, the spin-off of the research have appeared in the first half of the 80's, when in other contexts – such as the US – the phenomenon appeared to be already widely spread, having found early forms of application since the early years of '900. Italy, moreover, has always been characterized by a smaller number of spin-off companies, when compared to other European countries – such as, for example, France, Germany and Britain. There are those who explains this aspect with the fact that it has tended to focus on quality rather than quantity, aiming thereby to create realities that had a real growth potential (Cesaroni and Piccaluga 2003; Rostan and Vaira 2010).

At the same time, however, this can also be linked to the traditional university idea, which generates a widespread mistrust on the part of academics to do all that is economic finalization of the research (Boffo and Moscati 2015). In Italy, that of the exploitation of research is therefore a recent phenomenon, especially if it is considered that the Italian universities have started to deal with

the technology transfer only at the end of the past century, by means of appropriate structures (Algieri et al., 2011; Chiesa and Piccaluga 2000; Piccarozzi et al. 2013) and that remains in many academics the cited inclination to avoid any commingling between research and economic sphere.

The overall picture of the Italian academic spin-offs is well defined by Chiesa and Piccaluga (2000): in Italy, according to the authors, it has been a very dynamic environment albeit often characterized by small realities dedicated to consultancy and research and development, with a limited number of employees and a rather small initial capital. Moreover, it is important to note that «the phenomenon in question is very grew from what may be considered his date of birth in Italy, and that is the end of the 80's, although some companies have also been established in previous periods, representing the made of the spin-offs before its time. In general, the importance of spin-off companies has progressively increased with the emergence of so-called "knowledge economy", characterized by a competitive process based on the opportunity and the need to continuously introduce new products and services with a high technological content» (Lazzeri and Piccaluga 2012, 43-44).

In particular, just the variety of needs related to financing is a first criterion in relation to which it is possible to classify the academic spin-offs in three different categories (Salvador 2006). In the first, there are companies operating in consulting, design and applied research: in this case, to the small initial investment corresponds a wealth of knowledge and skills acquired directly from the university of origin, which it is necessary to implement a reduced number of instrumental resources. The spin-offs of this type therefore tend to consolidate itself as a consulting firm, thus avoiding switching to the material production phase – if not for the realization of software – and opting for the creation of partnerships with similar companies or industrial groups to whom the production and marketing processes are assigned. The second category includes enterprises that require higher funding: the foundator searches for a lender that is already well established on the market and that has a big liquidity, so as to become the promoter of the project's promoter and to check materially the spin-off on the market. In the third and final category of spin-offs, there are firms established with public fundings.

The mortality rate of the three types of spin-off companies appears to be rather small in Italy and the geographical location denotes a greater presence of these initiatives in the North, with a notable spike that is registered in the universities of Tuscany. As for the areas of activity, most of the companies has been activated in the field of Information and Communication Technologies (ICTs), a sector that is characterized by the need of reducing investments in the process of entry into the market and which in the past included about half of the spin-off companies, «many of these initiatives that provide consultancy services on a local and regional basis have gradually improved the level of specialization and scientific-technological content. In recent years, however, the weight of ICT companies has gradually decreased, while have increased companies involved in the sector of life sciences, companies operating in sectors characterized by high initial investments in R&D, and that often include industrial and financial partners whose model business is characterized by ambitious growth plans; cases in the energy and environment sectors and in electronics have incresead too» (Piccarozzi et al. 2013, 4-5). In the international literature, it is possible to distinguish three different analytical strands (O'Shea et al. 2005) about the academic spin-offs:

- the first explores the nature of the proponents;
- the second analyzes the impact of university policies and procedural steps that must be followed in the implementation phase;
- the third, finally, focuses on the factors that contribute to the success of spinoffs, such as, for example, the presence of adequate facilities, national law and the possible forms of financing.

The areas of study in the literature help locate different types of academic spin-offs. Shane (2004) divides the USOs into two categories considering the financing for which the business initiatives require at the startup phase of the project: the first includes the spin-off that require minimal funding (as predominantly self-financing) as those that operate in the software industry; the second, instead, encompasses spin-offs that, in order to produce a product or to provide a service, need higher funding, as in the case of biotechnological companies.

In turn, Clarysse and Moray (2004) identify three different models of university spin-offs, that are defined according to the policies adopted during the creation process. The first is called "select-low" and is the result of policies that aim to create the largest possible number of spin-offs, which are not necessarily able to achieve concrete objectives: these are mainly companies with a low level of capitalization and characterised by a management structure often poorly consolidated, and that operate on the local or national market. The second model is founded on the "support" and refers to companies that are born with the specific goal to expand their market boundaries: USOs of this type generally have a patentable technology; in this case, the number of business initiatives tends to be lower than the previous model. The third group, finally, is defined as "protective" and suggests to consider the spin-off as a means to commercialize the results of the research activities: it is therefore appropriate to start a business project only if it is clear and certainly a growth path, structured and based on a patent.

Yet, the promotion and support policies are the basis of the proposed distribution by Degroof and Roberts (2004), which identify four models: the first does not require an active policy for the spin-offs, which are only supported by the initiative of individual researchers; the second is based on a minimum level of support and selectivity; the third, however, provides for an intermediate level, resulting in a greater involvement by universities both in terms of selection and financing; the fourth model, finally, is characterised by a high support and selectivity level, with emphasis placed on the transfer of technology with high business potential. Similarly, even the European Commission (2002) has developed its own classification, dividing the academic spin-off companies in relation to the type of intervening link between them and the institutions of origin, thus distinguishing between:

- primary spin-offs, arising from projects related to the original institution's research activity;
- secondary spin-offs, those whose institution does not appear interested in (or is not able) to exploit the intellectual property produced.

The different types contribute to develop a more organic and structured vision of the phenomenon, as they provide classes designed to classify the composite reality of academic spin-offs (Declich 2006). The definitions of university spin-offs so far

processed tend to flatten the complexity that characterizes the phenomenon in question and, for this reason, it is appropriate to consider two main dimensions in relation to which researchers tend to build their own particular definitions of the generic concept of university spin-offs (Pirnay et al. 2003). These dimensions are:

- the status of the individuals involved in the new venture creation process: while some authors (Steffensen et al. 2000) exclusively consider researchers as possible promoters of university spin-offs, other (McQueen and Wallmark 1982; Bellini et al. 1999) adopting a more inclusive pattern, consider as potential founders of spin-off companies also teachers, staff members and students;
- the nature of the knowledge transferred from the university to new business: while some authors (Steffensen et al. 2000) have focused mainly on the spinoffs created from specific products arising from academic research – such as, for example, publications, technical artifacts, computer software, equipment –, thus referring to a form of knowledge "codified", others (McQueen and Wallmark 1982; Rappert et al. 1999) include, among those potentially exploitable in the creation process of the spin-offs, also forms of "tacit" knowledge, thus related to the background and know-how of consultants (eg. personal skills, experience and expertise).

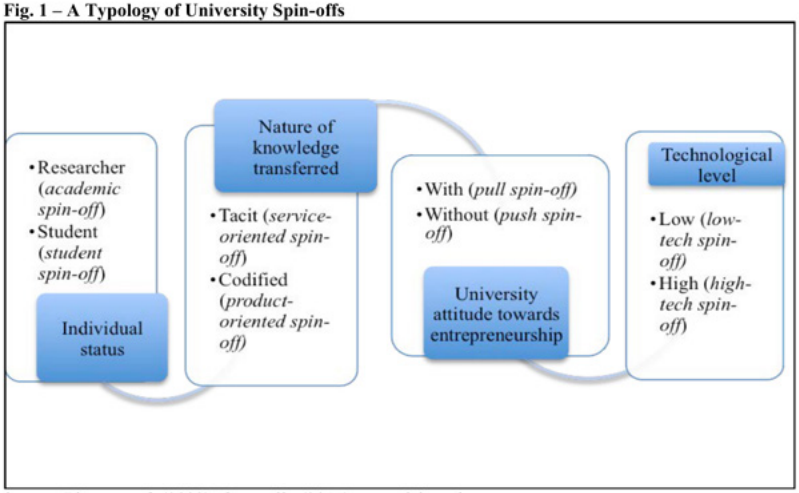
In particular, it is precisely in relation to this second dimension which is a further subdivision of academic spin-offs can be made, that can be considered as oriented "to the product" ("product-oriented spin-offs"), for the transfer of codified knowledge, or "to the service" ("service-oriented spin-offs"), in case of transmission of tacit knowledge. To this point, it seems useful to report that Pirnay and colleagues (2003) propose a third factor to classify the different types of USOs. Specifically, the authors (Pirnay 1998; Pirnay et al. 2003) refer to the attitude of the university towards the new business reality. It is therefore possible to distinguish between:

- spin-offs created without the university's support ("pull spin-offs"), resulting from the initiative of individuals induced to go out from the university upon potential market opportunities;
- spin-offs created with the active complicity and support of the university ("push spin-offs"), arising from academic environments that play an active role in the promotion of an entrepreneurial culture among researchers, thus encouraged to create and launch to market new forms of innvoative companies.

From the combination of the dimensions described above, different types of spin-offs arise, each of which will present specific characteristics in relation to the prevalence of one or other variable progressively considered. In this work, it is intended to add an additional level of complexity to the set of criteria commonly adopted at the international level for the classification of academic spin-offs. In particular, from the literature analysis, it was found that, regardless of the disciplinary area, the long term survival rate of USOs, once they have been launched on the market, depends on the degree of technological investment reached under development. According to this scheme, it is here also proposed the adoption of a new variable to describe the spin-offs of the university research: the investment in technology (see. Fig. 1). Thus, it is possible to distinguish between:

- "low-tech spin-offs", with the use of low-grade of advanced technology;
- "high-tech spin-offs", with the use of high degree of advanced technology.

Fig. 1 – A Typology of University Spin-offs



Source: Pirnay *et al.* (2003); Cocorullo (2017); own elaboration.

Conclusions

So far, the analysis of the literature produced in the field of the university spin-offs has allowed to construct a comprehensive and multidimensional synthesis of the phenomenon, highlighting strengths and weaknesses related to the process of creating new enterprises by universities. The issue of the USOs definition is very interesting and complex at the same time, beacuse of the heterogeneity of definitions of the different researches. In particular, to involving multiple dimensions of the phenomenon – such as, for example, the composition of the founding members group, the type of activity delivered from the spin-off, its orientation towards the market, the relationship with the university of foundation and the potential investors, the nature of the subject area of origin –, it also interfere with the analytical and mapping efforts of these entrepreneurial initiatives promoted by the higher education institutions.

It has been shown that the divergence of the theoretical definitions corresponds to a disorganized overview of the phenomenon by individual universities. In particular, as a consequence of the absence of a single theoretical paradigm, the different higher education institutions adopt different criteria for the identification and the characterization of the spin-offs, even if situated in the same geographical area and at national level, as it is evident for the Italian case. At the same time, the university regulations about the subjects who founded the spin-offs and the accreditation procedures are also uneven and divergent. For this reason, it

would be desirable to have a wider homogeneity to make different researches more easily comparable. Different opinions were also recorded among researchers about the steps in creating an academic spin-offs process, the identification of the different support measures, the classification of the many factors of facilitation and obstruction that characterize the process.

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Paving the path towards Universities of Applied Sciences in Hungary – Summary on the Hungarian developments in the field of Professional Higher Education

by Petra Perényi, Secretary for EU affairs, Hungarian Rectors' Conference (HRC), Hungary

The worldwide tendency to make a stronger link between higher education and the labour market with the aim to increase the employability of the Youth is clearly reflected in the Hungarian governmental measurements lately. The Hungarian Higher Educational Strategy acknowledges: in order to raise the level and competitiveness of education the affected parties have to accept the concept that state higher education institutions can and must operate as a part of the market.
The HE Strategy -with the title „A change of pace in higher education"- includes PHE-related goals and measurements on a large scale, some of which have already been realized. A significant change has been the transformation of the institutional system during 2016, as a result of which many colleges became „universities of applied sciences" offering bachelor and master programs, like universities do, but still keeping the focus on practice, moreover placing stronger emphasis on integrating practice into the programs. In the framework of this an importamt tendency is the establishment of more and more dual courses.
Also, there are other complementary pillars of PHE-related improvements: „Industry 4.0 Irinyi" seeks to improve the contribution of the Hungarian industry to the Hungaran GDP, which naturally entails PHE development, while the Centre for the Cooperation of Higher Education and the Industry is responsible to coordinate PHE with R&D&I activities and to make use of scientific results in practice (making the link between applied research and industrial experience) with the aim of increasing effectiveness in business and promoting innovation.

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Customized x-Learning Environment: e-portfolio integration

by Anabela Mesquita,[*] President of SPACE network and Vice Dean of ISCAP/Polytechnic of Porto (P.Porto), Portugal, Fernando Moreira, Associate Professor at Univ Portucalense, Portucalense Institute for Legal Research – IJP, Porto & IEETA, Univ Aveiro, Portugal, Paula Peres, Pro-President P.Porto, Coordinator of the Unit of e-Learning and Pedagogical Innovation, Teacher and Researcher at ISCAP, Portugal, Lino Oliveira, Associate Professor at ESMAD/P.Porto, Member of e-IPP – e-Learning Unit, Portugal

Education needs to take into consideration the needs and expectations of each student. Additionally, interaction plays an important role in the creation of knowledge. Since the time in physical environment are more scarce, teachers are adopting learning environments that somehow help to build bridges between the world inside and outside school. These environments are putting more and more the student at the centre. Taking this context into consideration, a Customized xLearning environment (where the X can take the form of electronic, mobile or ubiquitous) model was developed. This model brings together the learning management systems, the personalized learning environment, the social networks (horizontal and vertical) as well as the knowledge sharing networks. Communication mediator elements are also present enabling the interaction between students, students and teachers and between students and experts and potential employers.
Education should not be done with the back to the companies' environment and one possible solution is, in one hand, to allow experts and potential employers to participate in the professional development of students with assignments and projects' proposals as well as supervising students. On the other hand students can get closer to the real world by showing them what they are capable of meaning what they have created and developed during their education. This can be done by integrating portfolios in the CxLE. In this poster, we would like to present the CxLE model and how it can integrate the portfolios.

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* Anabela Mesquita presented

Supporting Student Mobility with EMREX – electronic transfer of achievement records

by Anders Bøgebjerg Hansen, Special Adviser, Ministry of Higher Education and Science, Denmark, Mats Lindstedt, Project Manager, CSC ltd, Finland, Pamela Engström, Degree oficer, University of Gothenburg, Sweden, Geir Vangen, Section Manager, University of Oslo, Norway, Janina Mincer-Daszkiewicz, Associate Professor, University of Warsaw, Poland, Stefano Russo, Developer, KION, Italy*

The EMREX project

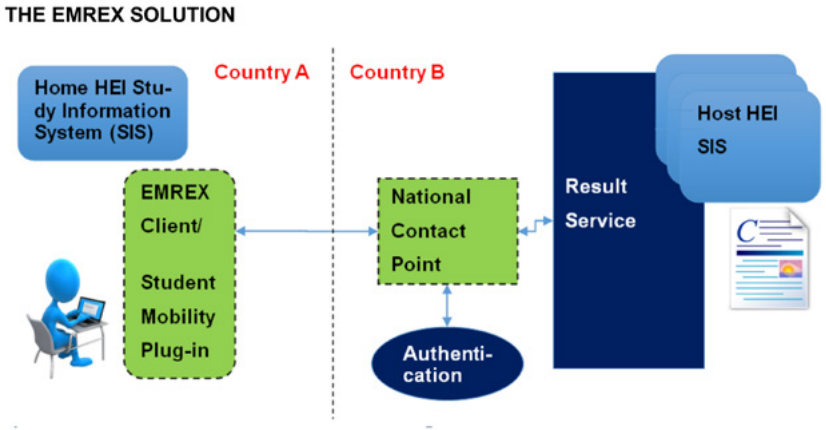
The EMREX project, which is co-funded by the Erasmus+ Programme of the European Union, focuses on the exchange of student achievement records between the Higher Education Institutions (HEIs) – an exchange initiated by the student. EMREX is part of a wider set of EU activities focusing on student mobility e.g. Erasmus Without Paper, FAIR and other similar initiatives. Academic recognition in higher education is seen as a challenge in student mobility and also as a potential area for improvement of a more efficient education system in general. The project is supporting the European 2020 goal, that 20% of all higher education students should be internationally mobile during their studies. The project partners are from Denmark, Finland, Italy, Norway, Poland and Sweden, but we will be more!

The EMREX field trial

The tangible outcome of EMREX is a federated solution, which supports the exchange of student data on achievement records, and the solution will be highly scalable. A field trial is currently being conducted, and students on exchange at higher education institutions in Denmark, Finland, Italy, Norway and Sweden can initiate a digital transfer of their achievement records in a fast and secure manner. 100+ mobile students has already used the system. Poland will soon use EMREX for internal mobility too.

* Anders Bøgebjerg Hansen presented

The EMREX solution



An exchange student returning home can retrieve his/her achievement data electronically. The process is initiated by the student.

Preliminary findings and future benefits and opportunities

The biggest benefit of this policy project will be the increased availability, quality and reliability of information about student records of achievement data. This will make student mobility processes easier, faster and more transparent for students. Students will also benefit from the recognition of previous academic studies and degrees, because of increased eligibility, when applying for studies at a higher education institution. The universities will benefit from a reduction of manual work. The field trial also supports the collection of measurable data on the rate of recognition that can then be analysed and used for improving the national policies on student mobility and rules for recognition of previous studies. The data will increase the quality of the learning mobility statistics.

Another benefit from the field trial will be the comparison of the grade transcripts from the participating countries.
To fully benefit from an electronic transfer of achievement data, a common grade transcript format is required. The solution will also be evaluated from a technical perspective, so it will become easier for newcomers to join the EMREX network.

Upscaling and emrex 2.0

One of the goals and benefits of the field trial is the peer learning of the authorities involved. The way to support this particular

goal is to make the results of the development process available through open source code. New countries can join the EMREX network by providing their students with application(s) that allow them to fetch their results from another HEI. This is called the EMREX Client and includes the functionality of the Student Mobility Plugin (SMP). A country can contribute to the network by providing their own National Contact Point (NCP) with functionality to fetch assessments from the databases containing this information. All institutions of higher education will be able to use the information from countries offering the functionality. The solution will be available for all HEIs in Europe from 2017. The upscaling of the EMREX-platform will therefore be provided by applying a mainly decentralised management model, the only central components being a registry containing adresses of the NCPs (EMREG) and the Student Mobility Plug-in that enables the EMREX Client to communicate with the NCP.

The project is on search for new partners, and expected upcoming partners and associate partners are from Spain, Croatia, The Netherlands, Belgium, China, USA, Slovenia, The United Kingdom and Germany.

Further use of the solution could be for admission services (Norway already has a pilot), and EMREX could definitely also be a building block for internal national mobility, recruitment for jobs, validation of degrees and diplomas and credential verification across countries and HEIs. Please visit www.emrex.eu for much more information.

Contribution available for download at www.eurashe.eu/lehavre-hansen

Increasing South Baltic Mobility and Understanding Via Virtual Communication Platforms in Nurse Education

by Hélène Taylor Kelly, RN, MSc, Associate Professor, International Consultant, University College Zealand, Denmark

The EU promotes workforce mobility within member states and the recognition of educational qualifications in order to match labour market needs. COHAB (Co-ordination and integration of higher education and the labour market around the South Baltic Sea) an EU funded project focused upon enhancing staff and student competencies for South Baltic mobility. Central to the project was the use of virtual communication. A joint semester course was developed that involved study trips, parallel teaching sessions using virtual communication systems, and IT based interactive learning objects. Students rated the semester positively and the project has contributed to professional development both at the personal and the institutional level.

Contribution available for download at www.eurashe.eu/lehavre-kelly

Green Skills for Sustainable Development: the SUSDEV project

by Marek Frankowicz,[*] Academic teacher, Jagiellonian University in Krakow. Coordinator for Quality and Internationalization, State Higher Vocational School in Tarnow, Poland, Stefan Ignar, Professor, Warsaw School of Life Sciences-SGGW, Poland

The main objective of the Erasmus+ Capacity Building SUSDEV project is to enhance the role of Higher Education Institutions in ensuring sustainable development of industry and society, support of national "green policies" in Russian Federation and Kazakhstan and promotion of "green culture" by means of Lifelong Learning. Specific objectives are: development of modules to foster green skills for different target groups and qualifications levels, enhancement of access of target groups to open education resources, promotion of LLL, enhancement of green culture and continuing education through training of teaching staff, external stakeholders and public administration.The project consortium wishes to synthesize - In one project - four important strands of higher education modernization, related with both EHEA priorities and national needs:

- 1.Curricular reform based on learning outcomes and introduction of qualification frameworks
- 2.Development of lifelong learning and increased role of universities as "LLL integrators"
- 3.Development of new teaching and learning methodologies and support tools, including Open Educational Resources
- 4.Increased importance of "green skills" in education and work

The project consortium wishes to combine "four in one": to promote green skills through lifelong learning channels and using new IT possibilities, starting from results of previous projects concerning curriculum development and sectoral qualifications frameworks for three complementary subject areas conditioning better quality of life (ecology, food sciences and land management).

Contribution available for download at www.eurashe.eu/lehavre-frankowicz-2

* Marek Frankowicz presented

Strategic Partnership for Building Professional Higher Education Capacity in Europe: the BuildPHE Project

by Marek Frankowicz, Academic teacher, Jagiellonian University in Krakow. Coordinator for Quality and Internationalization, State Higher Vocational School in Tarnow, Poland

The main objective of the Erasmus+ Strategic Partnership "BuildPHE" project is to increase the quality of the connection of Higher Education with the world of work (WoW) in all its aspects, including teaching, learning, research and governance. The project is coordinated by the State Higher Vocational School in Tarnow (Poland), other partners are institutions from Czech Republic, Croatia, Estonia and Slovenia, as well as EURASHE and Knowledge Innovation Centre Malta. The project is made up of three complementary activities: analysis of institutional strategies, collection of best practice, design of interventions to strengthen institutional strategies. Twelve HAPHE criteria, developed in the framework of HAPHE (Harmonizing Approaches to Professional Higher Education) project have been used as the basis for the design of the self-assessment tool (SAT) for PHE institutions. The tool has been tested in 15 PHE institutions (3 in each Partner Country) and now it is being optimized. In parallel, the examples of best practice for each HAPHE criterion are collected and will be made available for the wider public. The project will, inter alia, foster improved collaboration between PHEIs and enterprises, increase the choice of learning pathways available to students, in particular strengthening 'dual' options involving a mixture of studies and work experience such as apprenticeships and contribute towards addressing skill-shortages in key technical areas of employment. The project will also make recommendations to national policy-makers as to measures to improve and enhance cooperation between academia and enterprises. At EU level, the project will facilitate exchange of practice and increased cooperation between Institutions and Associations of Professional Higher Education.

Contribution available for download at www.eurashe.eu/lehavre-frankowicz-1

Setting up systematic structures for policy-recommendations and best-practice sharing: PROCSEE project

by Alicia-Leonor Sauli-Miklavčič, Project Manager, Association of Slovene Higher Vocational Colleges, Slovenia

The differences in development of PHE across Europe is due to differences in socio-cultural traditions and perceptions, diverse structures of education and training systems and of the economy and labour market, reforms undertaken, the extent of involvement of social partners as well as the employment prospects of PHE graduates, and the preferences of individuals. PROCSEE will set up systematic structures for policy-recommendations and best-practice sharing, focusing on four specific areas:

- Alignment of VET with regional/local economic development strategies
- Promotion of VET, especially to respond to identified skill shortages
- Organising and monitoring student placements in the world of work
- Personal Learning Environments and Further Education

By bringing together leading actors in the field from across Europe, educational institutions & companies from CSEE and European and Regional policy actors, the project will provide specific policy inputs on how to address these priorities in each participating country joint in the National Committies of Professional Higher Education for Excellence (NCPHEE). Those NCPHEEs are a key to assure systematically renewed curricula, constantly modernised delivery, and, crucially active involvement of businesses, especially small and medium enterprises (SMEs).

Contribution available for download at www.eurashe.eu/lehavre-saulimiklavcic

Where would we go from here? The Dilemmas of the Academic and Practice-orientation Strategies of Universities of Applied Science

by Balázs Heidrich, Rector, Budapest Business School – University of Applied Sciences, Hungary

Universities of applied sciences are becoming more and more accepted in higher education systems all over Europe. Previously very Humboldtian higher education systems like the Hungarian and Austrian have also introduced this institutional category. However these "latecomers" have to face the multifaceted challenge of convergence vs. divergence as compared to traditional universities. The strategic challenge here is: how much to converge to the academic-orientation of traditional universities and with the academic requirements of national regulation or how much to diverge to the ever increasing needs of the corporate world? Humboldtian systems with no formal recognition of professional higher education raise serious burdens to respond to the above mentioned questions? The seemingly ambidextrious strategic question is how to fulfill both needs? What kind of human resources are needed to respond to the twofold challenge? What kind of organizational cultural challenges would a university of applied sciences face in such external environment?

Contribution available for download at www.eurashe.eu/lehavre-heidrich

Tackling the disconnect between universities, Small businesses and graduates in cities and regions

by Martin Edmondson, CEO, Gradcore, United Kingdom, Amy Ward, Partnerships Consultant, Gradcore, United Kingdom

A review of the challenges facing companies, universities and places in retaining and utilising graduate talent and remaining competitive in the face of the 4th industrial revolution. Gradcore have been trying to understand the impact of graduates on economic growth for the last decade, and have developed some key principles:

- Graduate utilisation is as important as graduate retention
- The disconnect between graduates and SMEs is two-way
- Graduate underemployment compromises productivity
- Graduates, appropriately used, create innovation and growth in businesses and economies
- Graduate recruitment processes should be designed to develop employability

Bearing all of this in mind, we asked: How can you turn a city or area into a graduate scheme, and better connect small businesses, universities and graduates, and equip them for the future? We created a pilot 'city graduate scheme' in 2011 in Sheffield. The scheme involves a partnership between the 2 universities in the city (University of Sheffield and Sheffield Hallam University), Gradcore and local government.

Workshop content:

- Challenges faced: Graduate retention, economic growth, skills development, SME leadership enhancement and upskilling
- Outline of the model: Creation of a city wide brand, graduate recruitment methods for hundreds of SMEs and multiple universities through one single process
- Results : How we have made more than 6000 graduates more employable, supported more than 300 SMEs and generated a £6:1 return on investment for the local economy
- Lessons learned: Case study on applying the model in a second city with a different economic context. Learning on how this might apply in particular to areas such as digital skill shortages and future economic changes.

Contribution available for download at www.eurashe.eu/lehavre-edmondson

IUT of Nantes and the Factory of the Future / Industry4.0 in machining / Cyber Physical production System

by Olivier Cardin,[*] Assistant Professor, Mathieu Ritou, Assistant Professor, Victor Godreau, PhD student, Fabrice Brau, Engineer, Sebastien Le Loch, Assistant Professor, Benoit Furet, Professor, University of Nantes, France

The Institute of Technology of Nantes University develops many Industrie4.0 activities, from the manufacturing process to the production activity control. This contribution aims at presenting a full scope of those activities: design, control and manufacturing. The general objective of the Institute is to train graduate and undergraduate students from Bachelor to PhD on several industrial fields: Logistics, Mechanical engineering, Materials science, Energy management and Electronics. The teaching is based on the use of many experimental platforms in a shopfloor of 1500 m^2.
Examples of European or National research projects will be presented together with industrial transfer and education activities. These include: practical works of robotics and vibration monitoring for undergraduate students; datamining in manufacturing with the support of EmmaTools; use of robotics in classical and additive manufacturing; machine learning and advanced PLM; implementation and evaluation of Cyber-physical Production Systems on a digital factory experimental platform. An insight about the integration of digital technologies in future design methodologies will also be presented: digital composite manufacturing platform, concurrent engineering with 3D Experience, Bring Your Own Device design platform and a multidisciplinary 3D design platform.

Contribution available for download at www.eurashe.eu/lehavre-cardin

* Olivier Cardin presented

Academic Planning, New Programs, Industry Partners and the 4th Industrial Revolution – One institution's experience innovating for more student success

by Elka Walsh,[*] Director, Institutional Planning and Analysis, Southern Alberta Institute of Technology, Canada, Brad Donaldson, Vice President Academic, Southern Alberta Institute of Technology, Canada

To remain competitive in the 4th Industrial Revolution, industry must adapt quickly. To remain relevant to students, society and employers in this changing environment, higher education institutions must also transform. The Southern Alberta Institute of Technology (SAIT) just celebrated its 100th anniversary, and with input from strategic business partners, is actively adjusting its long standing planning processes to ensure close alignment to the rapidly changing economy. With over 10,000 industry partners, and 49,000 students in science, technology, engineering and math (STEM) focused programs and courses, SAIT has a new strategic plan and academic plan, and is focusing on diversifying its program mix, deepening and broadening industry partnerships, innovating in applied education, and growing applied research. The path has not been easy as the characteristics of the 4th Industrial Revolution are still morphing. To ensure ongoing communication, SAIT adjusted its entire planning processes. The Board of Governors annual retreat now considers trends associated with the 4th Industrial Revolution and how to position the institution; the President hosts a bi-annual roundtable with industry to understand their changing workforce needs; the new Academic Plan ensures all academic areas are considering innovative multi-disciplinary programming opportunities, skills and delivery modes. This workshop introduces participants to SAIT's new planning approach, including lessons learned. Participants will engage in work groups to critique aspects of SAIT's approach and share their own institution's efforts to adapt. Participants will receive a summary of the discussion after the conference.

Contribution available for download at www.eurashe.eu/lehavre-walsh

* Elka Walsh presented

Employer led curricula- degree apprenticeships in England

by Conor Moss, Director of Education and Employer Partnerships, Sheffield Hallam University, United Kingdom

This session will share experiences from England on the development of employer led curriculum through the development of degree apprenticeships. Sheffield Hallam's early engagement in Higher and Degree Apprenticeships (HDA) for the engineering, construction, digital and health sectors has transformed our employer portfolio.
The session will explore the importance of collaboration between employers, quality assurance, commerical and Faculty in the development and delivery of employer led degree apprenticeships.
In summary the session will cover the following:
What are degree apprenticeships?
Why are SHU engaging in higher and degree apprenticeships?
How do they operate and how are employers involved?
How have we developed systems and processes and engaged staff?
Some reflections on ongoing challenges for HEIs.

Contribution available for download at www.eurashe.eu/lehavre-moss

Updating curricula in response to labor market needs

by Assist. Prof. Ekaterina Arabska,[*] Ph.D., Prof. Eng. Dimitar Dimitrov, Ph.D., Prof. Mariana Ivanova, Ph.D., Assoc. Prof. Patricia Georgieva, Ph.D., Assoc. Prof. Petar Petrov, Ph.D., University of Agribusiness and Rural Development (UARD), Bulgaria

Introduction

One of the priority directions in the initiatives to support growth and create new jobs is related to the modernization of higher education in Europe through the improvement of quality and relevance of higher education (For more information: New Skills for New Jobs: Anticipating and matching labor market and skills needs, Brussels, 2008; A new skills agenda for Europe: Working together to strengthen human capital, employability and competitiveness, Brussels, 2016). In this context, an emphasis is placed on the involvement of employers and labor market institutions in the development and implementation of curricula; the use of ICT and other new technologies; training of researchers, etc. Another priority area is the functioning of the knowledge triangle: making the connection between higher education, research and business to achieve excellence and regional development. The accent here is on the close links between education, research and business, as well as public policies that encourage partnership between professional institutions, research organizations and universities, business and high-tech centers. In this sense, higher education institutions are considered as an engine for economic development, which would be impossible without the implementation of an adequate feedback from the business.

Bulgarian educational system is not a stranger to these processes and it is undergoing a reform process to improve the graduate's chances for employment, improve adaptability of initial and vocational education and training for the labor market and continually update skills of training personnel for participation in the knowledge based economy. The government makes attempts to keep the pace with the contemporary realities in the European educational area setting the most important strategic priorities in the field of education and training, putting great efforts and investing in educational system development.

Human Resources Development Operational Program 2007-2013 was part of the National Strategic Reference Framework one of the main objectives of which was to develop the human capital in order to ensure higher employment, income and social integration. The strategic objective of the operational program was to improve the quality of life of people in Bulgaria through improving human capital achieve high levels of employment, increased productivity, access to quality education and lifelong learning, and enhancing social inclusion. Its priority axis 3 "Improving the quality of education and training according to the needs of the labor market to build a knowledge-based economy" aims at increasing the employability of the workforce through quality services in education and training, effectively operating educational and training institutions and sustainable links between education, training and business.

The goal of the scheme BG051PO001-3.1.07 "Updating the curricula in higher education in accordance with the requirements of

* Ekaterina Arabska presented

the labor market" was "to translate to the language of education the social order of business for new professionals". The specific objective was to create a direct link between the management and faculty councils of universities on the one hand and the management of employers' organizations, large enterprises and other key experts, on the other, in order to jointly redefine and update educational programs in higher education.

University of agribusiness and rural development (UARD) is an educational institution that offers programs in the field of agribusiness, rural development, tourism, finance, banking, accounting, auditing, marketing, project management, municipality management, etc. The university is well experienced in international and national projects preparation, management and implementation embracing a number of successful activities in the fields of sustainable development; organic farming, management and entrepreneurship; networking concerning ecological agricultural production and management; integration and implementation of a Quality Assurance System in organic food retailing; investigations on ecological plant and animal food production, management and entrepreneurship in different regions; transfer of innovative technologies for SMEs; consultations, etc. The University has close contacts with relevant industries.

The project BG051PO001-3.1.07-0043 "Updating curricula in University of agribusiness and rural development in response to labor market needs" started on 28.05.2013 with a duration of 18 months. The core project team consists of a project leader, a coordinator, 2 experts in career development, 4 experts in curricula development, key experts from business and university teachers – authors of the new curricula.

Project aim and objectives

The aim of the project was to achieve improved quality of education and employability of learners by providing educational content to acquire knowledge and skills according to labor market demand.

Specific objectives included:

- to create a direct link between the management of the university on the one hand and the managements of enterprises, organizations and key experts, on the other;
- jointly redefine and update the curricula in university;
- update and match skills with labor market and increase opportunities for professional development;
- improve the quality of education in the university.

The project proposal was in line with the National Youth Strategy (2010 - 2020), namely the strategic goal of promoting the economic activity and career development of young people and task 1: Improving the quality of secondary and higher education and informal learning and promoting lifelong learning in accordance with the needs of the labor market.

The project corresponded also to the strategic goal to increase the percentage of Bulgarians involved in education or training and it is in accordance with the National Strategy for Lifelong Learning (LLL) in the implementation of the objective of preparation of

students for professional and personal development, employability and life as active citizens in a society based on knowledge.
Intended results:

- analysis of UARD programs according to specific business needs and requirements of the labor market;
- involvement of business in education at university;
- signing agreements with business organizations regarding specific training needs and providing opportunities for practical training, intrenships and jobs after graduation;
- creating new curricula and/or updating the current and approbation in academia and industry;
- modernization of methods of teaching;
- dissemination of realized activities;
- expansion of interactions between teachers and students of university and business representatives on work on the university curricula;
- improving the quality of education and increasing the employability of graduates.

Target groups have been determined in such a way to assure the active involvement in the learning process of teachers and students:

- university teachers - 45 teachers who would begin to teach new and/or updated curricula;
- university students - 5600 students (from Plovdiv main campus, as well as branch campuses in Ruse and Veliko Tarnovo) to be involved in training according to the new and/or updated curricula;

The project activities for approbation of new and/or updated curricula were designed to contribute to the quality of ongoing practical training and wider interaction of university teachers with business.
The project was also contributing to the realization of horizontal principles of gender equality and non discrimination, innovation and implementation of policies, incl. sharing of good practices, partnership and empowerment, good governance and sustainable development.

Needs analyses

Preparation of analyses activities was discussed and organized during the meetings of project team. The project team organized the gathering of the necessary information on the needs of business of knowledge and skills and analyses on how Bachelor and Master programs in both professional fields in higher education offered by university (Economics and Administration and management) meet these needs. The aim was to perform comprehensive needs analyses through active involvement of business and proven experts from relevant sectors in the upcoming activities of curricula update.
A survey among 23 business organizations - potential employers of students of the university, was conducted. For this purpose

a questtionare has been prepared in advance for current and future partners of UARD to collect information about the profiles of the organizations, the profiles of their representatives – respondents, their opinions on ways of cooperation between education and business, demanded courses and programs, readiness for cooperation with the university, etc. (See Annex 1)
Two roundtables named "Will business and education meet?" with university and business representatives were held which were organized and broadcasted in life by Plovdiv public TV (a subcontractor in the project mediating business engagement) with a direct participation of the audience by phone. Moreover, the TV created a facebook page entitled „How to meet education and business?" for the project implementation which is still functioning.
Twelve bilateral meetings between representatives of the university and representatives of business organizations were organized and held to discusse the project, organization of activities and ways to involve business in the project.
Based on the information gathered, an analysis was made of programs offered in accordance with the specific business needs and requirements of the labor market and involvement of business in the educational process of the university. The document was made in two versions – extended (incl. a very broad presentation of the substantiation and correspondence of university activities with the legislative framework) and a short one for publication on the university web-site (containing only results, conclusions and recommendation). The main result of it was the selection of the courses to be updated under the project, university teachers and business experts to be involved in project activities. 20 framework agreements with business organization were signed for cooperation and collaboration in relation to specific needs and provision of opportunities for practical trainings, internships and jobs for students. 8 key experts from business were engaged in next project activities of curricula update and their approbation.

Competence-based approach in curricula development

A preliminary preparation for updating curricula was conducted – an instruction for updating the curricula, a curriculum template and a review template (in order reviews to be made by the key experts from business) and a guidance to curricula update. The templates design focuses on the presentation of learning outcomes as knowledge, skills and competences and the elaboration of necessary procedures and documents for the assurance of practical trainings (See Annex 1).
In close cooperation with business 24 courses in 18 Bachelor and 6 Master programs were updated. 12 university teachers working under the project were provided support and advice by the other staff of the university on a voluntary basis.
One of the main project activities was the introduction of measures to modernize the teaching through supply of new equipment (interactive boards, computers and other devices) and training of staff to work with it.
To cover the target group of teachers (i.e. to involve more than those 12 working on the curricula update under the project) two three-day seminars were organized - in Plovdiv and Veliko Tarnovo, during which the implementation of activities and project results were presented, in particular updating curricula with the goal to train and motivate the university teachers to participate in next activities on approbation. 51 university teachers (65% of current teachers staff) participated in the trainings at the end of which they filled in questionnaires asking about their opinion showing a high level of satisfaction and providing important

recommendations.

Approbation of updated curricula and project outcomes

The approbation of updated curricula was initiated by training of students in programs updated under the project. Students were involved not only as learners in classes in relevant courses but also in the process of the evaluation of updating curricula by filling in a specially prepared questionnaire, which provided the feedback during the conduct of classes and further improvement of the updated curricula. Key experts from business made the analyses of the questionnaires of students for each course (See Annex 1). 45 university teachers started to teach according to the updated curricula.

The trainings were conducted in lectures and seminars with the active involvement of business representatives in the latter. In them 4348 students out of 5408 (80%) were actively involved in the summer semester of the academic 2013/2014 and in the winter semester of 2014/2015 years.

The discrepancy between the planned and the actual number of participants from the target group of students covered by that activity is due to the following reason: the selection of courses during the analyses with a lower number of students showing that the business choice was directed towards specific curricula rather than basic courses in which a greater number of students is involved. However, the project results are evaluated both on qualitative and quantitative basis and the planned percentage (80%) was reached. After completion of work on curricula and testing it in those trainings, the final programs were adopted at faculty and department councils, and then approved by the Rector according to the university regulations, thereby ensuring their application in work after the project finishes.

The engagement of business in the new curricula development and improvement of the processes of interaction of business and university was also complemented by some other activities. 21 three-day workshops (on 19 different topics) for students with participation of business representatives were organized in Plovdiv, Ruse and Veliko Tarnovo covering issues in management, economics, finance, banking, sales, exchange and exchange operations, entrepreneurship, ICT, tourism, sustainable agriculture, etc. In those workshops university teachers participated actively providing support to key experts from business in their preparation and implementation. 598 student were awarded certificates for participation in these workshops.

In connection with the goal of providing opportunities for visits by students for educational purposes into the real work environment, key experts from business developed 8 curricula for conducting practical trainings in organizations of different fields.

To provide practical trainings in the framework of the financed project activities in companies and organizations, additionally two types of training practices were planned, organized and conducted - for students in Plovdiv in Plovdiv Commodity Exchange (61 students) and for Veliko Tarnovo – in a company working in ICT (23 students).

Regarding the goal of providing opportunities for internships, experts from business developed 8 curricula for the compulsory practical trainings conducted as internships in all the Bachelor programs at the university. This is a compulsory subject in the

curriculum of Bachelor degrees before graduation.

Two forums named "Career Days" were organized on the following topics:

- Challenges and opportunities for student realization on the labor market (91 students participated);
- Career guidance through the promotion of best practices in local governance for sustainable regional development and building an active civil society (60 participants).
-

For promotion, publicity, transparency and dissemination of project activities the following events and activities were realized:

- an opening press conference in Plovdiv for a presentation of project objectives and planned activities;
- preparation, printing and distribution of 300 brochures containing information about the implemented project activities and the operational program;
- advertisements in regional and national radio stations and print media that promote the operational program and present the results of the project;
- video materials of the results of project activities – local Plovdiv Public TV and national Europe TV;
- 2 final press conferences in Plovdiv and Veliko Tarnovo.
- Information on the website of the university: http://uard.bg/
- Facebook page of the project: "How to meet education and business?", etc.

In order to carry out the necessary current and periodic control a procedure was developed and carried out in March, September and November 2014, in which reports were prepared according to the elaborated Instruction for monitoring, control and efficiency of the performed project activities (See Annex 1). Furthermore, the project management team made 25 meetings throughout the project. At the regular meetings of team overviews of the activities were made and appropriate actions to correct and effective implementation of project activities and improvement were taken in time.

Concluding remarks

The project implemented the main objective to achieve an improved quality of education and employability of students by providing educational content to acquire knowledge and skills in demand.

In pursuance of specific objectives the following has been achieved: creating a direct link between the management of the university on the one hand and the managements of enterprises, organizations and key experts on the other; redefinition and update of the curricula in university; updating and matching of skills with labor market needs and increasing opportunities for professional development; improving the quality of education in the university.

The positive results could be formulated as follows:

- Improving the quality of education in UARD involving key interested parties;
- Promoting self-training and career development of students;
- New contacts with business organizations;
- More active involvement of business in academic activities in the university;
- Increased activity of the career development center at the university;
- Increasing demand for graduates of university by businesses.

The end result of the project to the representatives of the target groups is:

- for students: acquisition of knowledge and skills demanded on the labor market;
- for teachers: valuable experience through work and contact with businesses developing curricula and conducting training sessions and practices.

The project established important links to some other projects implemented by the university:

- BG051PO001-4.3.04-0056 "Development of electronic forms of distance learning in UARD" (10.10.2012 - 08.10.2014): Some of the updated curricula were included in the project to develop electronic forms of distance learning, thereby complementing the effect of the presentation of new educational content and use of modern information and communication technologies.
- BG051PO001-3.1.08-0039 "Improving the management system in UARD" (18/07/2013 - 18/12/2014): Module "Curriculum" of the new information system is developed consistent with procedures and forms on the project to update the curriculum. Module "Career Center" is consistent with the recommendations shared by business organizations to implement effective contacts. Administrative modules also take into account the specificities of work on curricula and relationship with the business.
- BG051PO001-3.1.09-0004 "Improving the system for training and career development of teachers at UARD" (04/23/2013 - 12/23/2014): Trainings focused on the use of new technologies and teaching methods in relation to the labor market.
- BG051PO001-3.3.07-0002 "Students internships": The positive experience of students practices was used but without duplication.
- BG051PO001-4.2.06 "Students scholarships": The project enhanced students motivation to actively participate in the educational process and scientific work in university and to participate in additional activities outside the mandatory academic curricula, while facilitating administrative services. This increased motivation and facilitated participation in projects for student placement and student scholarships. A very good basis was established for the implementation of

Students internships project in the current program period 2014-2020 in which UARD was involved in 2016.

Thanks to the involvement of teachers and students of UARD as target groups in several projects implemented under Human resourced development Operational program a complementary effect is observed and the objectives of the operational program and UARD are met regarding access to quality education and motivation for lifelong learning, career management skills and enhancement of human capital.

It should be also underlined that the project outcomes are applied at university assuring their sustainability and activities as they were organized continue after the project and the financing finished at the end of 2014. Furthermore, some of the outcomes, as templates, instruction, documents, etc., are improved and the rest of the curricula are updated too in next years till now.

The involvement of representatives of business organizations leads to the improvement of the curricula and quality of education in university. The updated curricula and the results of students practical trainings, internships and realization were presented during the external audits under ISO (UARD is certified according to the international standard ISO 9001:2008) and accreditation procedures and they were highly estimated. As an overall result of all that is the enhancement in quality of learning and opportunities for practical realization of graduates which leads to a higher competitiveness of the university.

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Contribution available for download at www.eurashe.eu/lehavre-arabska

Strategic partnerships and building a consortium of Universities of Applied Sciences: the good practice of the Urban Research and Education Knowledge Alliance (U!REKA)

by Erik van den Berg, Senior Policy Adviser Internationalisation, Amsterdam University of Applied Sciences (AUAS), Netherlands

This good practice will share insights and experiences of building close-knit international partnerships. The Amsterdam University of Applied Sciences took the initiative to found U!REKA to enhance the quality of applied sciences and professional education. Collaboration between the six U!REKA partners will focus on an urban agenda of smart cities, innovating regions and a triple helix approach. This good practice will center on conceptual and operational challenges of preferred partnerships and invites you to share your experience and reflect on the suitability of this approach for your own institution.

Contribution available for download at www.eurashe.eu/lehavre-vandenberg

Applied Universities as Platform-Based Innovation-Hubs

by Hannes Raffaseder, Authorised Signatory and Head of Research and Knowledge Transfer, St. Pölten University of Applied Sciences, Austria, Gabriele Permoser, Assistant to the Management Board, St. Pölten University of Applied Sciences, Austria

Amongst the most influencing effects of digitalization is a shift from product to platform-based companies. Instead of selling products, organizations such as Google or Airbnb establish multi sided platforms to manage relationships with various stakeholders and enable direct interactions between them. These transitions have a major impact on business models and workflows as well as everyday life as part of a new digital culture.

Universities have been regarded as product-based providers of education and research offering courses and degrees to students as well as scientific papers and other research outcome to industry and society. However, they have strong potential to act as platform-based innovation hubs providing a vehicle for smart individuals from different disciplines and a diverse variety of institutions to interact with each other. Finding overlaps between different needs is key to sustainable success and interdisciplinary skills, creativity and collaboration are core competences to keep up with an accelerating digital society.

While an inside-out approach is in general more difficult for the industry, universities tend to have problems with outsiders engaging in academic activity. Thus, HEIs not only have to develop competence profiles of study programs and research on digital topics, but have to re-think their missions and strategies to become consistent with a digital society.

The breakout-session promotes a shift into platform-based innovation hubs. After a short overview of related theory, major challenges are discussed. Participants share ideas and approaches to manage relationships with various stakeholders and enable direct interactions between them in order to implement a "digital culture".

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Work Based Learning Partnerships between Higher Education Institutes and External Employer Organisations

by Oran Doherty, Regional Skills Manager, North West Ireland, Department of Education and Skills, Ireland

Higher education institutes (HEIs) and external employer organisations are increasingly recognising the benefits of engaging in work based learning (WBL) partnerships. WBL partnerships involve colleges and universities collaborating with an employer (or group of employers) in the design and delivery of an academic programme. The learners are normally employed in the employer organisation and the programme addresses the needs of the employer and employees. Traditionally colleges and universities addressed the needs of those seeking employment but now need to consider the needs of those in employment, because of an increasing emphasis on knowledge, changing work conditions, new work requirements and an extended working life.

Not only is WBL beneficial to the employer, employee and the HEI, but the State can also gain through improved economic performance. However, significant challenges associated with this form of engagement has meant such partnerships are not as widespread as they could be. The purpose of this workshop is to consider the challenges presented to both the employer and HEI and to make recommendations to improve the experiences of the three stakeholders (employer, HEI and employee/learner). The breakout session will present numerous practical steps the HEI and employer organisation can take to ensure a successful WBL partnership. This interactive workshop will examine best practice in relation to programme design, delivery, assessment, coordination and evaluation. A number of sample WBL programmes will be considered throughout the session. Workshop participants will be expected to contribute by identifying challenges and facilitators in relation to WBL partnerships and sharing best practice ideas.

This interactive workshop will involve the audience participating by identifying barriers and facilitators to higher education institutes and external employers collaborating in work based learning partnerships. Practical examples from a number of different disciplines will be provided and workshop participants will be encouraged to share examples.

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Career services/Journey to the future starts today!

by Raimonda Agnė Medeišienė, Head of Project department, International Affairs Coordinator Faculty of Arts and Creative Technologies, Vilnius University of Applied Sciences, Lithuania, Elinga Noreikaitė, Image building project manager, Assistant at Faculty of Arts and Creative Technologies, Vilnius University of Applied Sciences, Lithuania

New Strategies for Working Life Collaboration is a two-year project (09/2014 – 08/2016) which aim is to create new strategies for efficient collaboration between the working life and educational institutions. It has come to grips with six topics: advisory boards, internships, alumni, serving society, project assignments and career services. There are 6 educational institutions from 4 countries involved in this project: Finland, Iceland, Lithuania and Estonia.
The good practice includes the experience of the team of Tallinn University of Applied Sciences that is responsible for one of the topics of provision of career services. Therefore, the main attention has been redundant to that field. It brings together the theoretical background, related works, conducted survey and description of the best practices. The project team of TTK UAS examined the needs and strategic importance of career services for students in higher educational institutions. Education can undoubtedly be considered an important influence on the process of entering the labour market, as well as on the development of the early career. The project team appoints Job Shadow Day and Career Day as the best practices in the field of career services. In addition to Job Shadow and Career Days there are elective subjects in curricula of TTK UAS: personal development, teamwork, planning – topics which support students' career planning.

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Focusing on innovation competencies – examples of successful projects with the help of EU co-funding

by Liisa Kairisto-Mertanen, Dean, Turku University of Applied Sciences: TUAS, Finland

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Higher Education for learning and skills development 4.0

by Raimund Hudak, Head of research & labs, Cooperative State University Baden-Wuerttemberg (DHBW) Heilbronn, Germany, Anna Frankenberg, Scientific Project Manager, Cooperative State University Baden-Wuerttemberg (DHBW) Heilbronn, Germany

What kind of Higher Education do we need for learning and skills development 4.0?

To be prepared for digitization, it is obligatory to combine the understanding of theoretical foundations with the ability to develop practical solutions and products. Mediation of hybrid qualifications and skills is on the rise. Work society is in constant change. Consequently, the education sector has to change constantly in order to adapt to those changes. Therefore, a close link between HE and the world of work (enterprises) is getting more and more important focusing at the development of PHE.
Changed societal demands and values play also an important role in both the world of work and PHE – individual development is vital. So how can the expectations from an individual, the world of work and from education be understood and met today? How can these three important players (students, PHE institutions and enterprises) come together in times of 4.0?
A big step to solve the issue is tried by the Erasmus+ project "Boosting European Exchange on Higher VET/PHE and Employer Involvement in Education Structures". The BEEHiVES project is designed to address cooperation and collaboration barriers and best practices in the strategic partnership triangle – HVET/PHE institutions, employers/labour markets and students – to contribute to the development of skills relevant to labour market needs and equip students with the knowledge and skills relevant for their long-term employability, entrepreneurship and personal development. What are the key topics that need to be changed to become a PHE 4.0 institution? How should the collaboration between the three stakeholder groups (PHE, World of work and student) be strengthen in order to be effective towards the constant changes and needs of 4.0.
The best practice of cooperation within the strategic partnership triangle so far is the Cooperative State University Baden Wuerttemberg, with their dual study system combining theory and practice throughout a study programme. Important are the set policies by the state government's education laws to implement enterprises as partner companies and students in the commission for quality assurance and expert commission of the DHBW, as well as being members of the Senate.

Contribution available for download at www.eurashe.eu/lehavre-hudak

ALUMNI power

by Raimonda Agnė Medeišienė, Head of Project department, International Affairs Coordinator Faculty of Arts and Creative Technologies, Vilnius University of Applied Sciences, Lithuania, Elinga Noreikaitė, Image building project manager, Assistant at Faculty of Arts and Creative Technologies, Vilnius University of Applied Sciences, Lithuania

This break out session is based on findings of the Nordplus Horizontal project New Strategies for Working Life Collaboration (Nr. NPHZ-2014/10017).

Most Higher Education Institutions (HEIs) and Vocational education and training schools (VETs) in Britain and the US which have established alumni societies appointed coordinators to build relationships as a function of their public relations, foster alumni's commitment to the institution, strengthen identification with it, and, what is crucially important, increase philanthropic fundraising to the institutions. These departments replicate the functions of customer relationship management (CRM) of private organisations (Stevick, 2010). They build shared databases and seek to maintain valuable relationships with prospective and current alumni (i.e. customers). They keep the alumni in touch with their alma mater by sending out messages about events and testing the concepts of new products (e.g. curricula), which also helps them to anticipate new customers' needs and respond to labour market demands. Many alumni societies have websites where both alumni and the alma mater share information about the activities and update the news. Other forms of keeping in touch with the alumni and promoting philanthropy for future alumni and their families include welcome receptions for first-year parents in faculty-in-residence apartments, common.
Most of the data (and research findings) about the situation of the character, scope and peculiarities of the cooperation between an educational institution and alumni comes from American and British universities. The situation in continental Europe and, in particular, Baltic and Nordic countries remains largely unexplored. A general situation of alumni activities in most HEIs is fragmented. Most of the universities, same as VET schools, based on the website monitoring, seem to compile a database of the alumni but this is based on voluntariness. Many social gatherings are irregular, they are organized spontaneously. Rarely is there a person whose tasks include coordination of alumni activities.

WHAT WE CAN/HAVE/MUST DO?

Contribution available for download at www.eurashe.eu/lehavre-medeisiene-2

Virtual Classroom as a method to keep in touch with your students during the externship

by Prof. (FH) Kurt Hoffmann, Vice Director of Studies in the International Business Studies program, FH Kufstein, Austria, Diane Freiberger, Vice Rector FH Kufstein, Austria

The situation which was the trigger for the good practice we present as a contribution to the conference was the need, to get in contact with our student during the externship and to provide them with necessary content for preparing their final thesis. At the University of applied sciences Kufstein we send all our students abroad for one term and also in an externship. During the absence of the home university it is important, that we still be in contact with our students. After staying abroad students have to design and finalize their Bachelor thesis. We recognized the lack of contact hours. On the one hand this creates a lack of necessary content we want to give them before they do the thesis and on the other hand, students need time to find back to the home university and this causes a time lack for working on their thesis. The question we were facing was, how can we make sure to provide the necessary content and how can we be in relations to our students. Therefore, we design a virtual classroom session. Subject oriented objective of the course is, to train students in transferring practice experience into theory. The learning outcome of the course is, that students are able to understand the formation of theories, can reflect and evaluate them and have a comprehensive understanding about the issue, so they can applicate theories in a useful way (e.g. in the Bachelor thesis). The course design was based on Merrill's four phases of learning on:
Activation of prior experience (getting practice experience during the externship, passing the course academic writing),
Demonstration of skills (present comprehensive group paper about informations of the topic theory of science),
Application of skills (Writing an individual paper as a conclusion of the findings about the theory of science and the input out of the practical experience),
Integrations of these skills into real-world activities (Basic of Exposé of the Bachelor thesis).
The course is a full online course at the LMS "moodle". Different features like group forum, chat room, web conferences, data storage support the course lessons.

Contribution available for download at www.eurashe.eu/lehavre-hoffmann

Teaching Programmable Logic Controller with 3D virtual production line

by Florence Lecroq, Senior Lecturer, UT, Normandie Le Havre Université, France, Jean Grieu, Senior Lecturer, IUT, Normandie Le Havre Université, France

Today, the fourth industrial revolution is underway. Factories become global networking systems. Industrial production centers are equipped with fully automated, flexible and interconnected units. Machines communicate with each other, without human intervention. Big Data massively produced and collected by various components on the production line allow replicating virtual parts of this chain in order to generate simulations of process or tests. With these new training tools, technicians can familiarize themselves with working environment and understand complex procedures. This approach can even be used to facilitate repairs and predictive maintenance. Virtual Reality will be one the crucial points and key factor of success of the Industry 4.0.
Considering this context, we built a syllabus on PLCs (Programmable Logic Controllers) using 3D virtual operational parts for teaching. The use of 3D environments by students for learning will be developed in this presentation. Our students are in Electric and Industrial IT Department of the IUT (INSTITUTE OF TECHNOLOGY). For the virtual operational parts, we use software which simulates various virtual operational parts. This software uses the technologies of video games. Our students, "digital natives", quickly understand the functioning of the system. They work on real PLC, with the professional software they will encounter in industry. The real inputs and output of the PLC are connected to a device which collects the real information and orders, which return to the PC via USB to act in the simulator. The programs carried out by the students manage directly the real PLC inputs and outputs. The actions are immediately visible on the screen where is posted the simulator of operational parts. The students see in real time the results of the program, boxes moving on the various conveyors.

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Big Data STEM Education: "The Skills key"

by Maria Begoña Peña Lang, Professor and Researcher, University of the Basque Country, Spain

Let's talk about the socio-economic context in which the European Union is currently im-mersed, which is undoubtedly characterized by an uncontrollable and vertiginous tendency towards the globalization of information and knowledge. The role of Education becomes relevant in a way that is inevitable, there's no way to go around it. We believe that Education must become the true vanguard beacon of the deep transformation process that our societies are experiencing. And given the absence of discontinuity that can be deduced from this great social change pro-cess, it is therefore necessary that the concept of Education also acquires and maintains a continuity, for which we must first overcome the gaps or discontinuities that occur throughout the for-mation of the individual throughout its life path.

We are talking about overcoming the stagnation that occurs between the different formative periods through which a person goes through; a rupture from isolation and an aperture to continuity that has come to be known as *lifelong learning*. Though it is true that this concept is not a novel-ty in itself, since in ancient classical texts we find explicit references to the need to extend educa-tion uninterruptedly throughout the life of a person, it is also true that currently the global market to which we are subject imposes with force the urgency to revitalize this concept, but with a new ap-proach that adds value to Education.

Now, the implementation and strengthening of the concept of *lifelong learning* entails a series of challenges that must be faced, the first of which is the aperture to new and multiple peda-gogical dimensions that enable the individual to acquire basic skills and abilities in a truly flexible way, from the first education levels to professional training. And inevitably linked to this first chal-lenge we find the full desirability of fostering social ties that accommodate diversity and equity.

Lifelong learning also should become a way of blurring the socio-economic discontinuities and knowledge gaps between different social groups. The challenge, therefore, is to create a new pedagogical foundation, theoretical in nature, but with a practical application that must be reflected in the development of curricular proposals that respond to the demands of the great heterogene-ous social groups.

In this sense, scientific knowledge, put at the service of the learning process of young peo-ple and adults, in its broadest sense, puts us before a second challenge; how to establish, in a consistent manner, all the modalities of certification of knowledge and competences, and to do so on a scale that exceeds the parameters and contingencies of each country. Europe is the context within which we have to design, institutionalize and evaluate the mechanisms that allow integrating this multiplicity of educational offerings. This implies a complex network of interinstitutional agreements on the different values of different types of knowledge, in accordance with the com-mon objectives pursued, without in any way avoiding the matter of financing of such international consensus.

Consequently, considering all of the above, it seems evident that the greatest challenge lies in involving all actors possible in the

educational process, including schools and colleges, universi-ties, national and international institutions, and the business world. Only this way will the rupture mentioned above be possible. And this context is in turn the framework in which the main objec-tives that the European Commission has designated for *lifelong learning* are contained:

> *"-Improve and increase the mobility of pupils and staff across the EU.*
> *-Enhance and increase school partnerships across the EU.*
> *-Encourage language learning, ICT for education, and better teaching techniques.*
> *-Enhance the quality and European dimension of teacher training.*
> *-Improve approaches to teaching and school management. The term "STEM educa-tion" refers to teaching and learning in the fields of science, technology, engineering, and mathematics. It typically includes educational activities across all grade levels— from pre-school to post-doctorate—in both formal (e.g., classrooms) and informal (e.g., afterschool programs) settings".*

The last of these objectives puts us before the evidence of the important role that STEM studies should play, a term that refers to cross-curricular teaching and learning in the fields of sci-ence, technology, engineering and mathematics. An STEM-based education aims to offer oppor-tunities to students so they can do meaningful and coherent work, while at the same time position-ing them as learners of their own learning, helping them understand how knowledge is grounded and developed, and to solve world problems Through experimental learning projects with STEM, connecting scientific areas, engineering and mathematics, and using technology as an authentic tool for integrating information and knowledge, it is created a non-discontinuous space for discov-ering innovative solutions and connections between the school, university and the company; a path to address the deficiencies referred to at the beginning of this lecture.

That's why we believe that implementing a STEM education will pave the way for new teaching practices and strategies that will create an optimal environment for students to experi-ment, discover, design, create, construct and review; something which would be equivalent to re-ceiving optimal preparation for the jobs of the future. The competences sought to be strengthened through STEM are not chosen by chance or merely by a whim, but they rather obey those princi-ples that will allow young people to be competitive in an increasingly globalized economy. These are skills or abilities that are increasingly necessary to live in an eminently technological world, de-termined by ever evolving telecommunications and a knowledge-based economy. Today we al-ready have strong evidence that this is the path to follow; we have indicators that clearly show that any professional, regardless of the academic field from which he or she comes, must have devel-oped these competencies to effectively perform their work.

In sum, the skills that the 21st century imposes on each individual must be well deployed and strengthened, as they require an orientation that corresponds perfectly with STEM programs; pro-grams that, through the most varied projects, incorporate group and cooperative work, which en-hance the most practical aspects of knowledge, and contribute to a good research profile.

Innova-tion, cooperation and the resolution of complex problems, as well as the capacity for critical analy-sis, are those skills that to a great extent, guarantee professional success and preparation to edu-cate citizens that are capable of making decisions on issues of social importance and diverse, such as health, environmental quality, energy efficiency, national security or the use of natural re-sources.

Finally, we need to emphasize the importance of scientific and technological innovation for the sustained growth of developed countries, as well as design strategies that give opportunities to those who are in the process of development to reduce their dependence on the so-called "First world", thus increasing their competitiveness in the world market and improving the living standard of its citizens. Rodger W. Bybee summarizes the concept of STEM that we have characterized in the following terms:

> *"Most, it means only science and mathematics, even though the products of technology and engineering have so greatly influenced everyday life. A true STEM ed-ucation should increase students understanding of how things work and improve their use of technologies. STEM education should also introduce more engineering during precollege education. Engineering is directly involved in problem solving and innovation, two themes with high priorities on every country's agenda. Given its economic im-portance to society, students should learn about engineering and develop some of the skills and abilities associated with the design process".*

From what has been stated above, two essential ideas can be extracted to finally consolidate a *lifelong learning* concept that exactly corresponds to the parameters and objectives that we have been pointing out: 1) to have powerful tools to do a basic empirical study that allows us to obtain and interpret the data needed to break the gaps between the different formative stages of a person, and 2) to create a conglomerate of multiple and heterogeneous institutions that work as partners and seek educational innovation.

Regarding the first indicated idea, we think that *Big Data* and *Mining Data* are the two tools that will facilitate the enormous collection and interpretation of data that is required. *Big Data* is the term usually used to refer to such an enormous amount of data that exceeds the capacity of con-ventional software to be captured, classified and processed within a reasonable amount of time. It is a fact that in recent years the volume of data has grown exponentially, since it is necessary to have instruments to process and interpret them effectively and quickly. In the field of Education this abil-ity to capture and interpret would greatly favor the decision making process that would be directed towards the goal of lifelong learning.

As for *Mining Data*, the *Knowledge Discovery in Databases* (or KDD) analysis stage, as a specific field of statistics and in general of the so-called computer sciences, can show us its validity when it comes to discovering common patterns on large volumes of data sets, something which is undoubtedly essential to our purposes. We need systematic data compilation and its subsequent classification, but also an adequate interpretation that will lead us to the determination of models that can be used for prediction. Thus, Mining Data, based on artificial intelligence methods, auto-matic learning and statistics, also serves our purposes in the field of Education, since its function is precisely to extract information from a set of data and transform it into

a understandable structure for later use. In this sense, in regards to the use of Mining Data in Education, Jiménez Galindo and Álvarez García, from Universidad Carlos III of Madrid argue that:

> *"Educational data mining offers many advantages by comparing it with more tradi-tional research paradigms related to education, such as laboratory experiments, socio-logical studies, or design research. In particular, the creation of public repositories of educational data has created a foundation that makes possible the mining of educational data. More specifically, the data from these repositories are fully valid (since they are actual data measured from the performance and learning processes of real stu-dents in educational settings, taken from learning tasks), and increasingly more accessible to begin an investigation. These points allow researchers to save a lot of time on tasks such as finding people (such as schools, teachers and students), organizing stu-dies and collecting data, since they are directly accessible ".**

Certainly this term is in vogue, though it is often misused or inaccurately used to refer to any form of large-scale data or all information processing (which would include collection, storage, analysis and subsequent statistics metrics), mixing with it any type of computer support system, artificial intelligence, automatic learning and even business intelligence. However, the key for the subject that concerns us is the term discovery, usually defined as 'the detection of something new'. According to this, the priority task of data mining becomes the automatic analysis of large amounts of data, from which interesting patterns that were previously unknown could be extracted, such as groups of data records (cluster analysis), unusual records (detection of anomalies), or as depend-encies (mining by association rules).

At this point, such patterns can be considered as a sort of summary of all the data being col-lected. Subsequently, an additional analysis begins (automatic learning and predictive analysis), which places us in front of a series of complex systems. By definition, every complex system is formed of various parts that are interconnected or interlaced, whose links provide new information that was not previously visible to the observer. The result of these interactions between elements is the emergence of new properties that are not possible to explain in an isolated way. Thus we call them emergent properties. Complex systems are opposed to other systems that though they are also constituted by different parts, the relations established between them don't add additional in-formation.

In this other type of systems, it is sufficient to know how each of them works to understand them as a whole. In a complex system, on the contrary, hidden variables appear whose knowledge makes it possible to advance in a more precise understanding and interpretation of the data that have been collected. In short, a complex system provides us with information that goes beyond the simple isolated understanding of each component, so that to describe it, we need to know the oper-ation of the parts and also understand the functioning of the system as a whole, as their parts are related to each other. This is the context that can enrich the most the application of these tech-niques to the field of Education. If we want to

* JIMÉNEZ GALINDO, Álvaro y ÁLVAREZ GARCÍA, Hugo (2010); Minería de Datos en la Educación, Universidad Carlos III de Madrid.

move towards a *lifelong learning* that is consistent with the capacity to evolve the educational landscape, we can't neglect these valuable tools.
In conclusion, the *lifelong learning* process to which we aspire to implement must combine the interaction of all parts involved in the formation of a person, in all its stages and in a continuous way, with the tools that the new technologies put within our reach. In other words, we seek an ef-fective cooperation of the most diverse educational agents, supported by empirical research that draws from data, patterns and complex systems that can be extracted and configured from the ap-plication of *Big Data* and *Mining Data*.

Contribution available for download at www.eurashe.eu/lehavre-penalang

Project Proposals' Assessment and Evaluation: The Point of View of the Evaluator

by Nina J Zugic, British Council Consultant (Education & Project Development) & European Commission Evaluation and Assessment Expert

Rationale: Assessment and evaluation requirements are vital to the success of a project proposal. Expertise of each member of the Consortium, clear objectives that are corresponding the outcomes, and robust implementation of the work plan are the key elements for addressing the Excellence, Impact and Implementation criterion of HORIZON 2020 project proposal evaluation.
Learning Objective(s):
- To introduce Project Proposals' Assessment and Evaluation Criterion
- To develop better understanding of the Assessment and Evaluation process
- To share good practice of successfully funded projects

Overview: This workshop will assist attendees in the analysis of project proposals' assessment and evaluation process.
Abstract Details: This workshop will use samples of successfully funded HORIZON 2020 project proposals to showcase the assessment and evaluation process. The Evaluator's point of view will help attendees understand the process better. Attendees will identify its personal/future proposal development needs, in a form of a group exercise. Attendees will be also encouraged to transfer this knowledge in developing its own proposals, involving Universities of Applied Sciences and other PHE institutions.
Workshop Interactivity: Workshop will be interactive, with examples, case studies and group exercises.

Contribution available for download at www.eurashe.eu/lehavre-zugic

The smart factory with part production concept in higher education

by Gorazd Rakovec, lecturer at Higher Vocational College and consultant, Slovenia

Introduction

In Germany, there arose new workplaces called: CDO - Chief Digital Officer, Project manager Industry 4.0 (or digitalization, IIoT. . .), Architect Industry 4.0, Consultant Industry 4.0, Engineer Industry 4.0, etc. On the technical schools arising new objects of Industry 4.0, the habilitations of the lecturers and teachers for the objects of Industry 4.0 are performed. The new researchers Industry 4.0 are making the research projects on Industry 4.0. The new science Industry 4.0 came into existence. Basically it is a synthesis of mechanical engineering, electrotechnics, informatics, organization, logistics and education. The whole life education process has never been so important and part of the profession.

The 3rd industrial revolution began in 1969 with the development of the first PLC (Programmable Logic Controller) – a computer specialized for machine control. In the academic field the revolution was started by the Slovenian Professor Janez Peklenik in 1964, who established the world's first cathedra for computer controlled machines at the University of Birmingham. In the 1970's the concept CIM (Computer Integrated Manufacturing) was established. The production automation and computer aided development of CIM based systems were developed in 1980's. The business information systems ERP (Enterprise Resource Planning) and the Internet were also developed within this time period. Around 2010, all the developed automation and information systems reached their maturity. In 2012, the German government formed a group of consultants who established the next step of industrial development concept under the name Industry 4.0.

The concept of Smart Factory as a factory of the 4th revolution is based on the synthesis of the systems developed in the 3rd revolution which was also called connectivity. In reality nearly all the systems will need to be changed and upgraded to allow a synthesis, not only the connection of them. The particular focus is made on process feedback loops which include the real time visualization of the production processes. The production working processes are visualized through the use of analogue sensors where the signals are measured and visualized what is also called digitalization. The production systems upgraded with connectivity and digitalization are called CPS (Cyber Physical Systems). With the integration of the internet and the cloud we also got the systems called IIoT (Industrial Internet of Things). The biggest novelty in the production is the decentralized logistics of the products which navigate themselves.

The main abbreviations of the 4th revolution

- 2D and bar code - a contrast lines or fields with an encoded record of alphanumeric and other characters for optimal automatic reading
- AGV – Automated Guided Vehicle – an automated vehicle for transport in the production

- BDE – Betrieb Daten Erfassung - a program for the automatic collecting and analysing of production data
- CAx – Computer Aided x (programs) - a common acronym for the group of programs: CAD - Computer Aided design, CAM - Computer Aided Manufacturing, CAE - Computer Aided Engineering, CAP - Computer Aided Planning, CAQ Computer Aided Quality assurance
- CNC – Computer Numerical Control - an electronic controller for controlling the machine tools
- CPS – Cyber Physical System - a new expression for the digitized smart systems
- ERP – Enterprise Resource Planning – a business information system with a focus on production and logistics
- GPS – Global Positioning System - systems for satellite location determination
- IIoT – Industrial Internet of Things - a wireless network connected to physical products and tools with built-in computers or RFID cards, mounted in the machine and communicating with each other and with the machines, people and programs
- MDE – Maschinen Daten Erfassung - a program for the visualization and analysis of the machine processes
- MES – Manufacturing Execution System - a system for the analysis of production processes
- NFC – Near Field Communication – a wireless communication for transferring data from the passive RFID card and others, at a distance of up to 10 cm, built mainly in smartphones
- OEE – Overall Equipment Effectiveness – the factors of relative production effectiveness that simply show the significant utilization of the production systems
- PLC – Programmable Logic Controller - a programmable machine control computer
- PLM – Product Lifecycle Management – a computer supported data management system of a product over its life cycle; from an idea, through its development and production to service and disassembly. The core system are the CAx programs.
- RFID – Radio Frequency Identification – a decentralized memory card for wireless reading and writing data from an antenna connected to a computer, some sensors can also be connected.
- SCADA – Supervisory Control and Data Acquisition Systems – in the part production they are a more commonly used version of the PK (Process Kontrolle -German) - monitoring system for the technological process data production, the automatic diagnostics and for generating output control signals during the process - the highest technology in production

The Business model concept

The Smart Factory of the 4th revolution with a unique part production is the upgrade of the CIM factory of the 3rd revolution and is based on:

1. The development and production of unique products
2. Development products and technological manufacturing, handling, assembly, control processes are made in development with the PLM-CAx systems
3. The basic production unit is a decentralized and highly flexible island. Some islands will be automatically formed of

machines on wheels.

4. Automation and robotization will change into a collaboration of machines and persons
5. Products, tools, the machines, programs and persons will communicate with each other
6. The logistics through the smart factory will be performed using automated vesicles
7. The planning procedure of the products will be decentralized; the products will make an autonomous instantaneous decision where they are transported
8. The maintenance will be predictive, based on the measurement of the processes
9. The quality control will be performed with measurements of the manufacturing and assembly processes (not product) – in process control
10. The information systems will be decentralized, also with cloud data bases
11. The communications will be mainly wireless with agile terminals
12. Data input will be done by the voice interfaces, cameras, touch screens, RFID, 2D, bar codes
13. The manufacturing processes' data will be produced automatically with analogue and binary sensors and measurement systems
14. Education of the staff will be performed at the beginning in dual schools and then every day at the workplace of the Smart Factory

The interactional block diagram of the cyber physical systems

The production floor of the Smart Factory is divided into the basic fixed units called islands and agile (mobile) systems mostly called IIoT (Industrial Internet of Things), which independently communicate with all the systems in production (Figure 1) [1]. Between the Islands, (with the part production processes: forming, preforming, fastening, additive manufacturing (3D printing), separating, energy processing, finishing, handling, assembly and control) with the help of smart logistic machines IIoT (AGV, ...) the products are transported. They communicate through the wireless network with all the systems in production. The basic block structures of manufacturing and logistics CPS (Cyber Physical Systems) are almost identical and shown in Figure 1.

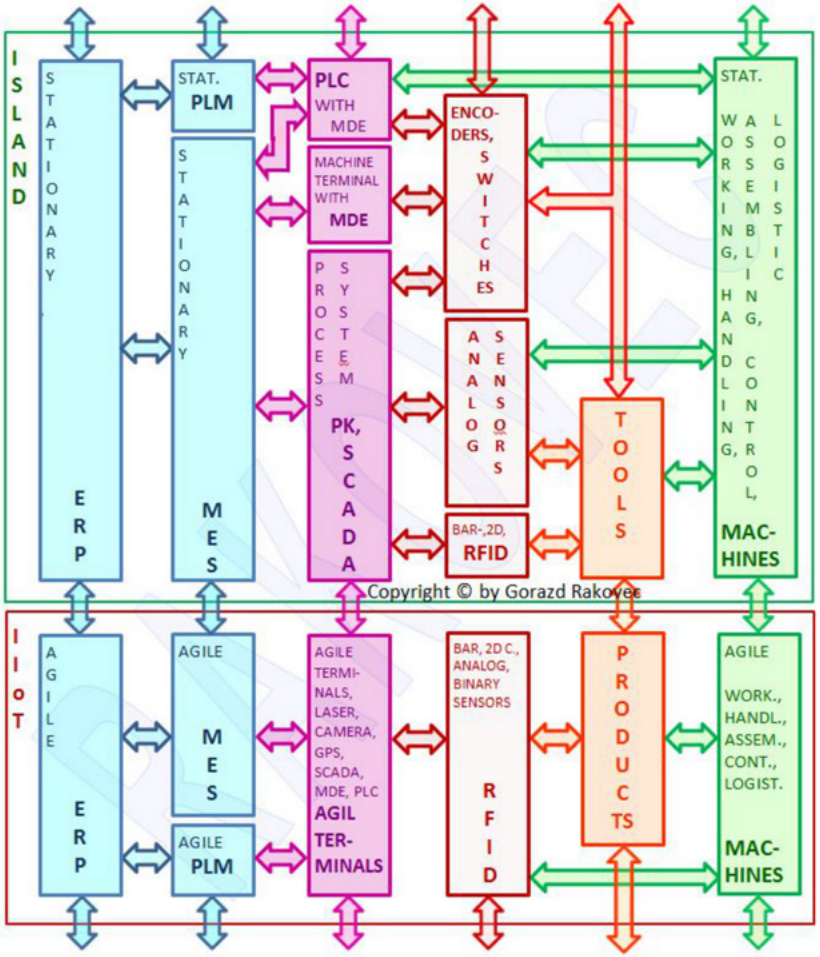

Figure 1: Stationary and agile CPS (Cyber Physical System) as a basic element of the Smart Factory with parts production in a block interactional scheme

The systems are professionally described and built outwards from the basic process. The main process of product manufacturing, is the interaction between the tool (examples: turning knife, milling cutter, plastic injection mould, sheet metal forming tool, the welder, laser beam, gripper, ...) and the product.

The tool and the product are clamped in the working, handling, controlling or assembling machine mostly on the island and each of them is equipped with its own RFID card on which are stored all the data needed for the manufacturing and logistics. The programs with the technological parameters are developed via the PLM-CAx and transferred to the RFID card via the RFID antenna tools in the development department. Antennas for RFID reading and data input are installed on all CPS systems, on mobile terminals, SCADA terminals, hardware terminals and controllers. The analogue sensors and switches are embedded into the tools and other machinery of the island. They convert the energy of the manufacturing processes into analogue and binary signals and transmit them to the input interfaces of the controllers, machine terminals and process systems.

These terminals visualize the processes in real time, make automatic diagnoses, optimize the process data, process them into the output signals which control the actuators and at the same time they write them into the data files which are also sent to the central database. On the screens, new images (curves, diagrams) of the manufacturing processes from their invisible quantities (force, pressure, temperature, acoustics, electrical current, vibration, rotation or path of the moving machine parts depending on time) are generated.

The staff who use the new visual systems begin to think in the new dimensions of the invisible processes, and therefore, think much better, and everything they make is at least one class better. They are creating improvements which are not possible without such systems. The pure new added value that is without these systems not possible is produced. Numerous analyses of the manufacturing processes are converted into indicators of quality and productivity; OEE factors are carried out in real-time with the MDE, MES, SCADA programs and the logistics programs of automatic identification, traceability, location and navigation and also more slowly and wider with the business information ERP system.

Agile (mobile) terminals with agile software MDE, SCADA, MES and ERP, built-in laser scanners, cameras, RFID, NFC and GPS interfaces interact with the RFID cards, 2D bar codes on products and other objects form agile CPS - also called IIoT.

Industry 4.0 in the school

The 4th industrial revolution in the field of the Smart Factory initiated the formation of a new science. In Germany, the new science was named Industry 4.0 and therefore it will probably retain the name. The Smart Factory with the parts production must first be divided into service and production departments. The informatics department carries out the digitization of the service departments such as sales, purchasing, human resources, finance, accounting, etc., which continues its development by upgrading their work and business models based on computer tablets and clouds. In the area of sales a new science called Internet marketing was created, which will not be discussed here. The development department is engaged in the development of smart products and PLM systems' upgrades. A new department named Industry 4.0 performs the digitization in the fields of production, logistics and quality - hereinafter referred as a Smart production. In this area a new science was formed as a synthesis of mechanical engineering, electrical engineering, information technology, logistics, organization, quality, maintenance, and education. The question arises, who can make a synthesis of this entire broad interdisciplinary and

complex field?

Just one of the Sciences (for example Mechanical Engineering) exceeding the capabilities of one man. Whoever works the synthesis must know and understand all the Sciences quite well, some of the main sciences even extremely well. In the field of the new Science Industry 4.0 the complete literature has not been written yet. By just studying the literature alone, however, it is not possible to learn enough about the new areas of industry. The main sources of competences are the engineers from industry who have learned, developed and applied the components of the Industry 4.0 systems for decades during the 3rd revolution period. For the area of Industry 4.0, the core competence is the development of the entire architecture of smart production, which should be well known to all the teachers in the program Industries 4.0.

In the parts' production, the large majority of the manufacturing processes are mechanical, therefore the basic knowledge is about Mechanical Engineering by focusing on an automated factory using the concepts of CIM- Computer Integrated Manufacturing developed during the third revolution. After finishing the school the engineer needs a minimum twenty -or more than thirty years of learning and working in the industry in all areas of Industry 4.0, and in the best case, in each area for a few years. The development of the production software should be included. Nobody can learn all the areas completely. The longer the engineer studies, more he knows. The length of service in the industry also means the level of competence. In the Smart Factory, the required working experience for mastering the processes has increased by at least ten years.

The development of new synthesized school subjects in the field of smart production is the function of the senior managers and consultants from industry who can make a synthesis of competencies from decades of experience and write them in the form of learning material for the new objects and the learning programme Industry 4.0. The students, who study the synthesized material, will not need to do the whole synthesis and analysis, so the objects will correspond to the level of studies in higher education. Students could learn valuable basic knowledge and concepts at school, but the real empirical skills could then be upgraded with the work in Smart manufacturing at first as a process of dual education and after that, in the Smart Factory continuously until they retire.

Conclusion

The Smart Factory is not smart because of the computers and process feedback loops. It is the people who are smarter. Because they are watching the measured analogue curves of invisible processes which give them the true pictures of the process, they understand the processes much better; they think in more dimensions, they are smarter and therefore they do everything better. The longer they learn, more they know and more added value they produce. Therefore, the Smart Factory is built for the people who work to seventy years of age and older. With the increasing average age of continuous learning an average level of complex employee competencies and consequently added value, competitiveness, quality and length of life will be raised.

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Contribution available for download at www.eurashe.eu/lehavre-rakovec

A broader perspective for the EHEA

by Hans Daale, Manager Leido, Netherlands

The 'market' for education providers at the higher levels is changing. That process has not ended yet... it just has started. Of course, there are the formal degrees in the European Higher Education Area. But since the introduction of the European Qualifications Framework in 2008 more and more member states are using a National Framework (NQF) for linking other types of qualifications to their higher levels. HE cycles can be linked automatically to them (levels 5 till 8 of the EQF), as formal education. But providers of non-formal qualifications can have them recognized by a 'national coordination point', looking at the learning outcomes at a certain level.
The most interesting case is the position of VET providers, offering qualifications by using work-based learning. Those programs can be designed close to the actual needs of (dynamic) sectors of the labour market, based on certain types of professions. But the market for so-called Business Academies is also growing, offering tailor-made programs for companies. They are able to have more status by mentioning the NQF level on the diploma or certificate. Besides that, apprenticeships are being seen in several countries as a solution for growing rates of youth-unemployment, stimulated by the government by having agreements with employers' organizations. One of the consequences of these developments is the emergence of new types for diplomas, also international, at a level equivalent to 5 or higher of the EQF. What does this mean for Higher Education Institutions, like a UAS? Should they also shift their focus to the provision of non-formal education, by broadening their 'port-folio' of qualifications?
In this breakout session, a glimpse into the future of lifelong learning...

Contribution available for download at www.eurashe.eu/lehavre-daale

Working with British partners after "Brexit"

by Alan Sherry, Chair of the Colleges Partnership/WoSCoP, United Kingdom, Dugald Craig, Interim Chief Executive of the Colleges Partnership/WoSCoP, United Kingdom

Objectives:
To explain the implications of Britain leaving the EU
To reinforce Scotland's position in the context of "Brexit"
To look at how partnerships may be maintained and extended in the context of "Brexit"

Questions:
1. Does the UK leaving the European Union mean that there will be significantly less opportunities for institutions in other countries to partner with their peers in the UK?
2. Will the UK refrain from participating in the EQF?
3. Will the UK's participation in international cooperation such as through EURASHE be reduced by the former's exit from the European Union?

Contribution available for download at www.eurashe.eu/lehavre-sherry

Learning from Industry: An Industry Sourced Platform for Academic Quality Assurance Processes

by Barry O'Connor, Registrar and Vice President for Academic Affairs, Cork Institute of Technology, Ireland

A Dynamic and Integrated Evaluation and Reporting Process (DIERP) is proposed to address some of the current questions in Academic Quality Assurance (AQA). The proposed platform would enable a more integrated and consistent approach to AQA across the full spectrum from the learner and academic practitioner, through Higher Education Institutions (HEI) to national and international quality and accreditation agencies. While the questions which form the basis of the academic review process are numerous, they are indeed a finite number. Hence they can be structured in a coherent way. Supported by off-the-shelf interpretative tools, the products in many cases of industrial process control/ validation developments, a new template can be put in place to support a coherent approach to AQA and institutional validation. This, in turn, will lead to advances in benchmarking, AQA enhancement and mutual recognition of qualifications, professional licenses etc. The migration of these tools from industrial/ manufacturing sphere would well mirror the original transfer of Deming's PDCA toolkit into earlier AQA practices. It is time to embrace new technology and generate new ideas in AQA. Process Analytic Technology (PAT) offers a new platform for AQA.
DIERP would enhance AQA processes and align some with industry methodologies, increasing industry understanding and acceptability of academic quality values and outcomes, providing a common platform for industry and academic stakeholders alike.
Issues such as what, when and how to review, compliance or enhancement and relevant ICT enabling tools are other components in this platform.
This input is an example of proposed best answering the increasing demands for evidence-based accreditation and validation exercises.

Contribution available for download at www.eurashe.eu/lehavre-oconnor

Optimizing translator training and student employability through project-based learning: The case of the IATE terminology project

by Themis Kaniklidou, Assistant Professor, Hellenic American University, Greece, Emmanuel Peclaris, Translator, Terminologist, Directorate General for Translation, European Parliament[*]

1. Introduction[**]

This contribution wishes to foreground the increasingly central role of terminology in graduate translation programs in EU in the pressing context of an exponentially growing translation industry. It does so by describing translation and terminology/terminography through a project-based learning environment (PBL) rolling out in the context of a graduate translation program at Hellenic American University. One aspects underscored in this paper is the persistent need for even more cooperation between the academia and other stakeholders with an aim to have students be as prepared as possible for a technologically streamlined and fast paced market, that of Language Service Provision. As a whole, the discussion put forward in this paper showcases the practical applicability of integrating in the curriculum projects with industry and other stakeholders in the field as a means to enhance employability opportunities of graduates and make them market-ready.

One of the dimensions that this paper discusses is the importance, benefits and key relevance of integrating Project-Based Learning (Diehl, W., Grobe, T., Lopez, H., & Cabral, C. 1999), in a graduate terminology classroom in a University environment. Project-Based Learning has been defined as "as a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks".[***] In this sense, it is a student-centered approach that prioritizes project and task-based learning and therefore can be seen as very much linked with employability and market-based preparation. Research on project-based learning (Thomas 2000) has been increasingly placing emphasis on how the latter is used to motivate and engage students who are given the chance to develop self-reliance and work with minimal supervision over extended periods of time. Experts have been insisting on the idea that it is through the benefits of Project-Based Learning and primarily through the introduction of different levels of "scaffolding" (different training methods, apprentices) that students learn and become experts in conducting work and are prepared to lead activities inside and outside the classroom environment. In this context, students who are immersed in project-based learning gradually engage with activities that are very much similar to those of the market.

In this project, students are introduced to PBL through a project that is conducted in cooperation with the Terminology Coordination

* Presenters could not be physically present at the conference

** A special thanks to Mr. Rodolfo Maslias, Head of TERMCOORD for his support and coordination of the project.

*** https://www.bie.org/images/uploads/general/20fa7d42c216e2ec171a212e97fd4a9e.pdf

Unit (TermCoord), a supporting unit to the translation units of the Directorate-General for Translation (DG TRAD). In section 3 below more details are provided in regards to the structure of the project, the workflow, QA and validation processes before it can address the employability potential for students engaging in the project.

2. Project context: on IATE and Termcoord

The context, and general setting within which Research on Project-Based Learning is taking place can be a key factor for (REFERENCE) for the success of a project. Many call this "situated cognition," learning which is interpreted as a factor for facilitating the simulation of learning that resembles the real-life context.The context for this project that students at Hellenic American University are conducting is that of the IATE environment and TERMCOORD. This is not without importance; on the contrary, the organizational and institutional culture (REFERENCE) of the organizing institution can play a pivotal role in how a project is rolling out and the extent of its success with student engagement.

IATE* is the EU's inter-institutional terminology database; it has been operational since 2004 and has been consistently used in the EU institutions and agencies managing and sharing domain-wide, EU-specific terminology. As it is a vast resource repository for terminology the public version receives on average 3500 queries per hour from the entire world and it is managed and fed by several EU Institutions, such as the European Commission, the Council and the Parliament.**

IATE was launched in 1999 with the objective of providing a web-based infrastructure for all EU terminology resources, enhancing the availability and standardization of the information and the Internet version now receives over 70 million queries a year. The IATE Management Group meets several times a year; in these meetings, the European Parliament is represented by TermCoord, the Terminology Coordination Unit.

3. Project scope and organization

The IATE terminology project is one of those high-impact synergies that Hellenic American University and the MA in Translation have been engaged in and which aim at providing students with increased learning and employability opportunities in a highly competitive in the 4.0 industrial revolution. It gives students the opportunity to contribute to IATE by decoding*** terminology from English into Greek and allowing then IATE to populate the base with new terminology together with its metadata (definition, context, context reference, synonyms) that has not been submitted before in Greek. In this

* http://iate.europa.eu

** Partners of the IATE project include the Court of Justice, Court of Auditors, Economic & Social Committee, Committee of the Regions, European Central Bank, European Investment Bank and the Translation Centre for the Bodies of the EU

*** Decoding of terminology relates to the "presentation of terms" (Sager, 1990:3) that spans from collection, retrieval of equivalents in the target language together with their associated data i.e. definition, context and reference sources for each one of these.

way, students actively participate in the dissemination of terminological knowledge.
The aims of the project are three-fold:

a) present an optimal example of a good practice towards professionalization and employability enhancement, the ties between academic institutions and other industry stakeholder, with as a result employable and ready-for-the-market students;
b) showcase the applicability of terminology for translator training and development. Terminology and Terminography remain grounded on a concept-based theory orientation which requires training on terminology theory remain grounded on a concept-based theory orientation which requires training on terminology theory;
c) reveal the potential of learning through interaction and engagement in the context of a Project-Based Environment, by including the compilation of domain-specific glossaries. IATE allows students to download* and integrate in their computer assisted translation systems, thematic glossaries which, in turn, assist with terminology consistency.

This project ultimately offers insights as to how hands-on, student-directed learning can have a positive effect on student engagement and success. In the next section, we explain the context of the project, the organization, its benefits and talk about potential spin offs.

3.1. Structure of the Project, participants and outcomes

TERMCOORD is placing emphasis on the organization of the project and has allocated resources to support the cooperation with various universities across Europe working on similar projects. The project has two phases: phase one, the implementation phase and phase two the validation phase. The implementation phase includes a kick-off meeting where the Coordinator of the Project introduces the project to students and provides them with the thematic area from where the terms will come. Also, they learn about the different requirements, needs and deadlines and are provided with the necessary forms.
Terminology is allocated to students top-down i.e. from TERMCOORD to students through the coordinator. This top-down approach is selected as it assists singling out those terminological units that are of particular interest to IATE and which have not been analysed before. Different thematic domains are allocated every year based on the needs of IATE for terminology. Table 1 below illustrates the terms assigned to students for the current rolling out of the project. The domain selected is that of waste management.

3528505	end of waste criteria
3530061	waste-derived material
3530069	recycling society

* http://termcoord.eu/iate/download-iate-tbx/

3533916	granular waste
3534507	waste water stripper
3541395	waste sector
3541790	ready for recycling certificate
3544281	waste intensity
3551170	controlled incineration
3559421	upcycling
3561223	downcycling
3562050	zero waste
3562412	mechanical biological treatment
3562412	MBT
3563735	non-separable plastic fraction
3564211	solid recovered fuel
3565226	green-listed waste
3565227	amber-listed waste

Table 1: list of terms assigned to students from IATE.

Terms are accompanied by their IATE number i.e. a number assigned to each term which then corresponds to the databased entry. To better understand the positioning of the terms within the field or thematic domain in which they pertain, IATE is providing us with a mind map* which illustrates the breakdown of domains as they are "hanging out" and branch out from overarching thematic categories used by IATE to categorize and index terminology. This mind map ensures that students understand fully the so-called master-domains (e.g. environment) and the associated sub-domains. Thematic understanding is key to the success of the project since it assists research methodologies to develop efficiently.

52 - ENVIRONMENT

5206 - Environmental policy

5206001 - Environmental protection

5206002 - Environmental policy

5206003 - Pollution control measures

* Mindmap is accessible online at: https://framindmap.org/c/maps/273493/public

5206004 - Waste management
5206005 - Water management
5206006 - Climate change policy

5216 - Deterioration of the environment
5216001 - Degradation of the environment
5216002 - Nuisance
5216003 - Pollution
5216004 – Waste

Figure 1: Domain-specific mind map for waste management

The implementation phase also includes completion of the data entry form. This form is the first form that students fill out with terminology together with their associated data. All terms need to accompanied by their respective definition, context and context references. This information is necessary to indicate a) conceptual understanding of the term (definition), b) usability of the term is different contexts and registers (formal, informal etc.) and validation of usability and conceptual delineation of the term (references for definition and context).

Phase 2 includes the evaluation of result by TERMCOORD experts. Evaluation is performed using the entry forms submitted by students during phase one and it is taking into consideration areas such as

i) Appropriateness of definition and relevance of this in respect to the term and thematic domain.
ii) Scope and overall applicability of the contextual information provided. Terms that are provided with contexts that are not relevant to the thematic field or contexts which do not underscore the usability of the term and its penetration in a given field are singled out for further review.
iii) Appropriateness of reference material provided
iv) Term variants which exists but have not been adequately analysed and expanded

An interview with a thematic expert is also included in phase II. During this stage student meet with an expert from the Hellenic Solid Waste Management Association* who is familiar with the assigned terms and who advises them on the usability and appropriateness of the terms. Interviewing an industry expert and engaging in a stock-taking exercise is a key step in making students more market-ready and bringing them closer to the applicable professional standards.

4. The IATE project as an optimal practice for student engagement and employability

The IATE project forms an optimal example of project-based learning for graduate translation students. Translator training has,

* http://www.eedsa.gr/default.aspx?lang=en

traditionally, remained largely blind to industry needs for training translators with project management skills and techniques. In the past years, however, the need for more connectivity between the academia and the translation industry has been underscored by different stakeholders (e.g. OPTIMALE project) and significant stock-taking has been taking place to highlight how industry needs could be addressed through curriculum changes. The IATE project is one such example of how both the industry and EU institutions. The IATE project presents increased learning opportunities to students as it i) introduces them to a project workflow and allows them to familiarize with dimensions of project management such as deadlines, ii) promotes communication with experts and industry stakeholders iii) presents an optimal example of phase segmentation in projects iv) allows them to presentation of results in a publicly available outlet.

The Industrial revolution 4.0 necessitates, innovation and adaptability to the professional requirements of the market. In this framework project based learning can form a step before work based learning and full employability.

5. Conclusions and spin offs

Experience gained from rolling out three rounds of the IATE project with TERMCOORD has highlighted the need to design and integrate in university curricula project-based learning that connects the industry with the academia. For teaching to moving away from the traditional classroom environment it also needs synergies and activities that will involve the universities with institutions that can launch and run projects by engaging and empowering students to take decisive steps towards professionalization. Spin offs of this project can include project-based educational practices that take market demands and leverage graduate student experience and knowledge to collaboratively develop innovative pathways to student success.

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Employability in the European context and ensuring the quality of work based learning

*by Marko Grdosic, Project Manager, EURASHE, Belgium**

Ever since the economic crisis hit the world economy, education has been giving more attention to its role in ensuring employability and development of skills required by the labour market. Employability is defined as the ability to find and maintain employment at one's level of qualifications. It is a relative concept as it depends on a combination of factors such as: personal, acquired in education and external factors. Higher education institutions are not the only factor influencing employability but are a very important one, and it is also the one policy makers and higher education structures can influence most easily.
EURASHE has been addressing the issue of employability more intensively in the past years, mostly focusing on strengthened links between professional higher education institutions and the world of work. Our latest initiative focuses on supporting development of internships and apprenticeships between PHE institutions and small and medium size enterprises, understanding the potential this cooperation has for improving work-based learning.

Contribution available for download at www.eurashe.eu/lehavre-grdosic

* This contribution was added instead of the contribution of Themis Kaniklidou and Emmanuel Peclaris

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