

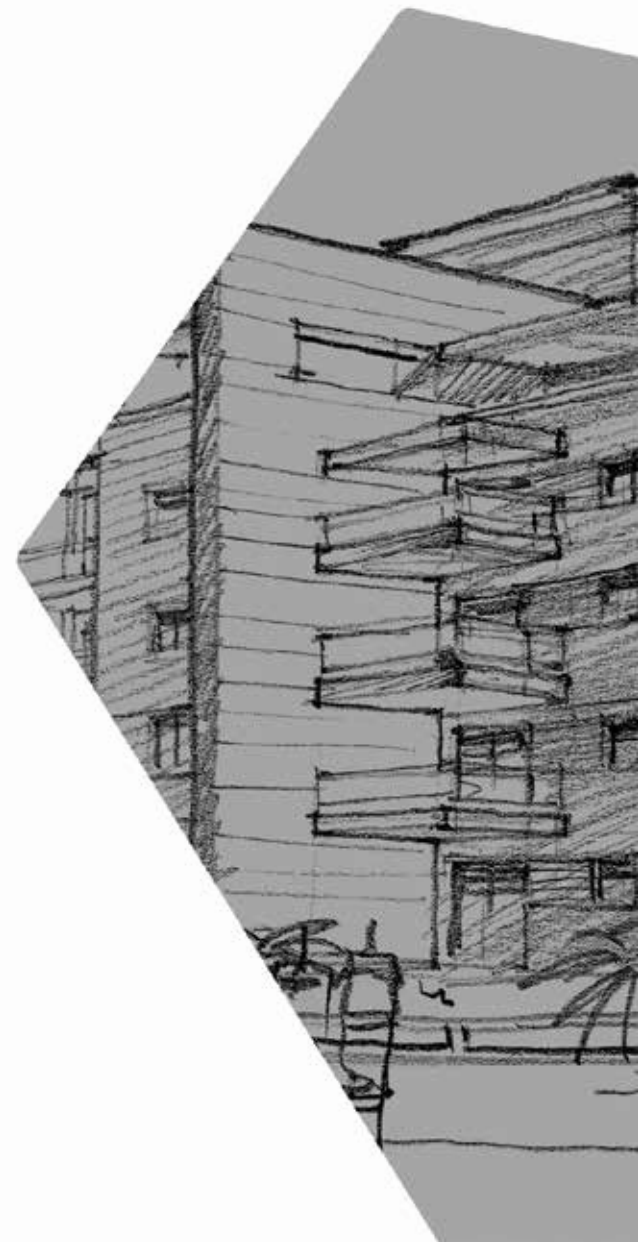


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40 PERSPECTIVES ON HOW ENGAGED
AND ENTREPRENEURIAL UNIVERSITIES
WILL DRIVE GROWTH AND SHAPE OUR
KNOWLEDGE-DRIVEN FUTURE UNTIL 2040

THE FUTURE OF UNIVERSITIES THOUGHTBOOK

TODD DAVEY, ARNO MEERMAN,
BALZHAN OPAZBAYEVA, MAX RIEDEL,
VICTORIA GALÁN-MUROS, CAROLIN FLEWA,
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The Future of Universities Thoughtbook

40 perspectives on how engaged and entrepreneurial universities will drive growth and shape our knowledge-driven future until 2040

EDITORS

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Balzhan Orazbayeva, Max Riedel,
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THE FUTURE OF UNIVERSITIES THOUGHTBOOK

*40 perspectives on how engaged
and entrepreneurial universities
will drive growth and shape our
knowledge-driven future until 2040*

PREFACE

Predicting the future is an impossible and futile activity, hence effective ways of anticipating future events are few and far between. Well intended future predictions often become amusing quotes in presentations many years later. An example is of the advice from a president of the Michigan Savings Bank given to Henry Ford's lawyer Horace Rackham not to invest in the Ford Motor Co: "The horse is here to stay, but the automobile is only a novelty – a fad."

Nevertheless, the exercise of estimating or predicting the future triggers (1) simultaneous consideration of the events of the past, (2) estimation of the present situation, the most important forces affecting it and factors for success as well as (3) brainstorming and analysing the likely future development possibilities. These aspects are the **key elements of strategy development.** Yes, the future may be impossible to predict, but by working together to envisage a course for a desirable 'tomorrow', it is possible to embrace adaptability and innovativeness and ultimately turn uncertainty into opportunity.

Given this highly complex activity and the probability of error, the approach taken in this Thoughtbook was to invite **global experts to offer a diversity of perspectives.** We really wanted to challenge the

thinking about the university by selecting authors who:

- are already challenging and shaping the development of universities,
- are current or future 'game-changers' and 'thought-leaders,
- already have a prominent position of power with respect to universities globally,
- together can provide a 360-degree view of universities from the vantage of different stakeholder groups.

In doing so, **a range of 'possible futures'** emerge, from more conservative estimations predicting 'business as usual' for universities, to situations whereby universities are superseded by technology and/or new market-facing competitors. These 'possible futures' then provide a basis for the better establishment of university and industry strategies, which enable more efficient investment of resources and more productive outcomes.

When reading the contributions, a general consensus around **the opportunities and threats** facing universities emerge. Like our experts' contributions, you will undoubtedly lurch from optimism to doom with respect to the future of the university, and back again. If this is the case, then we have achieved our major ambition with the Thoughtbook! ... to take your thinking about the university of the

future to pieces, and then offer insights into how you can piece a realistic future view back together.

Considering this, **the Future of Universities Thoughtbook (FUT) becomes a manifesto for the development of the Future-Oriented University.** A vision for the university by 2040 (University 4.0) whereby academics and students work in real time symbiotic partnerships with industry, government and societal stakeholders to simultaneously create and implement new knowledge and solutions to address business and social issues.

Those universities that drive change hard within their institutions will get a head start on the rest by embracing uncertainty and a more innovative evolution whilst, if some of the contributions are precise, having a better chance of surviving..

Why now?

Facing enormous global challenges, there is an **immediate need to better align universities with business innovation supply chains, talent needs of employers as well as regional needs more generally.** Moreover, the development of knowledge-driven, ‘smart’ development of our societies needs informed leadership.

Despite this, we experience a distinct lack of inspiration and innovation in the higher education sector. Most discussions and models of higher education involve incremental adaptations of the existing models, which are far from adventurous and often only involve adding technology.

We firmly believe that universities need to embrace change and seize the opportunity to define how they contribute to a prosperous society, or risk becoming irrelevant. But how? And for what future? The best way to avoid a new disruptor into your market is to disrupt your own market from within... So the questions become, how will it all look in 2040 and will universities be willing to do it?

Vision

The Future of Universities Thoughtbook brings together 40 visions from invited professionals and three from the editors **to create a vision for the future of universities** and how they could potentially impact the world and their community over the next 22 years.

Leading international thought and practice leaders from business, the higher education sector, science, policy agencies, and governments will explore the topic of university engagement through an inspiring collection of thoughts, ideas and discoveries explaining how universities and their partners will shape our knowledge-driven future.

A THOUGHT-STARTER: THE LIKELY EFFECT OF MEGATRENDS ON THE DEVELOPMENT OF THE UNIVERSITY TOWARD 2040

*Todd Davey, Max Riedel,
Balzhan Orazbayeva
and Arno Meerman*

According to OECD predictions, the need for higher education globally as well as within industrialised countries will continue to increase¹.

This is only one of the many factors that will influence the future development of universities. As an introduction to the topic of universities of the future, we looked at universities through the lens of global megatrends. The consultancy firm McKinsey² identified four global megatrends, ‘global shifts reshaping the world’, which will impact society over the years to come:

- Emerging markets and urbanization
- Trade, people, finance, and data: Greater global connections
- Accelerating technological change
- Responding to the challenges of an aging world

We will look firstly at the impact of these megatrends, and subsequently, on what it will mean for universities until 2040.

‘Emerging markets and the urbanisation megatrend’ will lead to an unprecedented consumer market and the emerging-market cities will deliver half of the global GDP growth³. With the economic scales shifting towards the south and east, and cities growing even further in size, where does this leave universities as anchor institutions? Firstly, there are opportunities for universities from industrialised countries to acquire income from tuition (education as an export) and brain-power for excellent research through international students. In this situation, masses of students from emerging nations, seek educational opportunities at higher ranked universities in more established markets such as the US, the UK and Australia. However, as the quality of local universities in emerging markets grows in the coming years, there will conversely be less demand to attend universities in industrialised countries. Nevertheless, opportunities for universities in developed nations to ‘cherry-pick’ the best and most motivated students from emerging markets will remain. The challenge for national governments and to a lesser degree universities will be to attract and retain that talent and thereby maintain their competitive edge in the knowledge society.

Moreover, as the overall population and the middle class is able to afford the costs of education from emerging markets grow, demand for higher education globally will continue to increase despite the population of Western economies starting to decline. This megatrend will primarily benefit local universities in emerging countries as well as the elite universities from industrialised countries or more entrepreneurial universities⁴ from the pack of non-elite universities in industrialised countries.

Urbanization will generally favour urban, as opposed to regional, universities. However, following some prominent examples of regional universities closing, regional governments will recognise that their local universities are the engines of their region and part of the solution towards reducing this trend. There will be a realisation that through the loss of regionally-based universities, the 'brain-drain' to cities will intensify and the sources of new industry and local jobs will be lost. Resultantly, local governments and industry increasingly fight to save their universities.

The megatrend, '**Trade, people, finance, and data: Greater global connections**', signals an increasing interconnectivity across the globe and the breaking down of geographical barriers for collaboration. The potential lies in more

connected networks of universities, innovation networks including business, supply and open innovation networks as well as movement of students which will create a more polarised higher education sector. This polarisation will further enable the resource-rich and sought-after elite universities to increasingly collaborate with major international companies across the globe supplying them with leading-edge research and talent to solve innovation challenges.

At the same time, 'the rest' of the universities will be forced to diversify away, specialise, unite or innovate radically to survive while coping with mass-produced MOOCs and radical new players in the higher education sector such as Coursera, edX and LinkedIn. The successful diversification strategies pursued by the surviving universities will include focusing on (1) emerging needs (e.g. dual-study programmes, lifelong learning), (2) specific emerging technical capabilities (e.g. advanced manufacturing, ICT, artificial intelligence) and (3) specific programme topics (e.g. eco-energy, mobility, security and terrorism, big data management, social entrepreneurship). The 'rest' will also shift their education emphasis away from deep technical knowledge and towards developing more 'T-shaped' students with 'future-proof' competencies including problem-solving, self-management and entrepre-

neurship capabilities as well as soft skills and emotional intelligence.

The impact of these previous megatrends will also be influenced by the megatrend '**Accelerating technological change**', whose effect will be two-fold. Firstly, as technology such as robotics and AI increasingly replaces jobs relying on high-speed accuracy and repetition in both the blue and white collar fields, the demand for knowledge-intensive jobs demanding cognitive, critical and creative thinking skills of humans⁵ will increase as will the need to have higher education degrees.

The use of technology is already reducing the amount of routine academic and administrative positions in universities and this trend will continue especially as information through the internet and MOOCs becomes more accessible. Moreover, combined with AI technology, the early years of the bachelor degree will be better and more individually supported by technology, reducing the quantity of lecturers required.

Conversely, there will be a need for more personalised mentoring as well as synthesizing group work and student interaction across disciplines and borders. This too will be partly supported by AI, which will monitor students' pulse-rate, pupils and facial clues as well as by providing live translations. These developments will also be aided

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by technology, as screens morph into international portals featuring avatars and realistic holograms of participants as well as new mobility devices, all of which enable better collaboration. This will also put the urbanisation and emerging market trend into a different perspective. In line with Thomas Friedman's thinking, the world becomes truly flat through the application of virtual, augmented, or mixed reality in higher education.

The loss of jobs to technology will be partly offset by the reduction in the working age population in industrialised countries and the need to **'respond to the challenges of an aging world'**. Despite an increasing retirement age, the jobs of looking after baby-boomers will be partly taken over by technology, however will also require more human-centred health care workers creating a need for human-centric (social sciences and humanities) and health professionals (science, technology, engineering and mathematics).

Changing employer or even the type of job at an advanced age (e.g. beyond 50) will be more common. Experience will be valued more than today primarily because technology will make information and facts more ubiquitous and experience will be vital to filter out the most useful information and apply it to the task at hand.

The increases in life-spans and the likelihood that workers in the

future will need to changes careers multiple times will present universities with significant opportunities. Considering that, there are few over 45 who grew up with today's technology and most have known the university as it currently is, many will still turn to the university to gain a new skill, reinvent themselves or out of interest as they move into retirement years.

¹ OECD. (2015). *How is the global talent pool changing (2013, 2030)? Education Indicators in Focus, No.31*, Paris: OECD Publishing

² <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-four-global-forces-breaking-all-the-trends>

³ <https://www.mckinsey.com/featured-insights/urbanization/unlocking-the-potential-of-emerging-market-cities>

⁴ The use of the term 'elite universities' in this article primarily refers to top 100 ranked universities according to any of the major university ranking systems including THE, QS and Shanghai. By the nature of these rankings, elite universities tend to be heavily research intensive institutions.

⁵ <http://www.machinedesign.com/industrial-automation/yes-industry-50-already-horizon>

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SUMMARY OF SECTIONS

Contributions are captured in 6 sections, each with a common theme. The editors summarised each section to provide an overview of the book.

DISRUPTING TEACHING AND LEARNING

Eight inspiring contributions make up the section 'Disrupting Teaching and Learning', offering diverse but connected perspectives of higher education in the future. **Paul Hannon** wonders whether it is the end of universities as we know them and calls for entrepreneurial leaders at all levels of universities to build a culture that thrives in an uncertain future. Reflecting on her own experience, **Fiona Godsman** foresees that universities will continue providing fundamental discipline-knowledge but along with an environment for students to be collaborative, creative and flexible. Similarly, **Christer Windeløv-Lidzélius** highlights the role of the future university to create change-makers through new pedagogical approaches led by technology. **Hans Wissema** explains the current forces of change in the supply and demand involving universities that are shaping the university of the future, bringing them to 'The New Learning'. In line with this, **Dirk Van Damme** explains the tensions between universities and employers around skills to point out that successful future universities will adapt their teaching and learning with a focus on higher-order cognitive skills that will help graduates to succeed in the labour market. Using the example of curiosity-driven education for the future ICT professionals,

Manuel Dolderer emphasises the need for new teaching and training models. Representing the student voice, **Benjamin Conard** reflects on his own time as a studentpreneur to suggest that the university landscape in 2040 should be more considerate of entrepreneurs as forward thinkers. Finally, drawing upon on his own experience, **Marko Grdošič** highlights the need for the greater openness of formal education towards lifelong learning not only for students and professionals, but also for professors and lecturers.

Several common trends can be identified in the contributions of this section. All authors expect the successful university of the future to keep relevant by adapting their teaching and learning to the rapid changes in the environment. The teaching and learning are foreseen to be flexible, collaborative, project or challenge-based and cross-disciplinary, allowing students an active role in the design of their educational experience. In addition, authors also envisage a prominent input of employers in education and an important role of educational technology, but as a mean and not an end in itself. Finally, the contributors foresee the future need of all graduates to become lifelong-learners and the potential for universities to be present at different times through-

out the lives of individuals, supporting their personal and professional growth and reinvention.

COLLISION OF TECHNOLOGY AND HUMANITY

The section 'Collision of Technology and Humanity' consists of seven contributions about the influence of disruptive technologies on HEIs. **Scott Shane** and **Michael Goldberg** look at different technologies that will be transforming entrepreneurship education to make it more realistic. **Paolo Bianco** expects that the operating mode of universities will become more and more virtual, with an increased importance of online courses for both students and professionals, and university branch offices opening around the world. Foreseeing the same development, **Steve Price** warns that such virtual universities will not give students enough opportunity to develop entrepreneurial skills. In light of the Fourth Industrial Revolution, **Maria Chiara Carrozza** sees the need to integrate Europe's regional education systems into European research and education areas. **Alessandro Curioni** explains that with highly advanced artificial intelligence (AI), the role of experts will change to understanding and connecting multiple fields and argues that university curricula need to be adapted accordingly. Similarly, **Soraya Coley** reflects on how universities should prepare students best for the evolving nature of work by putting less emphasis on their degrees but promoting collaboration, lifelong learning and fostering

human strengths. Finally, **Michael Bolle** paints quite a futuristic scenario where a global exchange of thoughts and ideas between bright, motivated and courageous students and their teachers will be made possible by avatars.

Together all contributors predict that technological advances in AI, robotics and virtual reality will dramatically change the way we live and work within the next twenty-two years. Universities will have to adapt their curricula as well as the way they teach. Although the high pace of change is a challenge for most universities, new technologies will enable them to reach more students and professionals across the globe with high quality, customized teaching material and new methods. At the same time, the coming decades will offer the big opportunity for universities to pioneer a collaborative and interdisciplinary approach to education, research and innovation, which combines the powers of advanced technology and the human mind. This will greatly impact the way society as a whole will deal with the technological disruption ahead of us.

FUTURE OF SCIENCE AND THE ACADEMIC WORLD

Consisting of six contributions, the section 'Future of Science and the Academic World' details how academic life will change until 2040. **Markus Perkmann** acknowledges that introducing market forces has been productive and beneficial for the university system, however, he calls for an increased recognition of the value of public science and universities coupled with a greater adherence to delivering social value by universities. More provocatively, **Marek Kwiek** predicts a sharply stratified academic world in 2040 with a clear and confined separation between elite universities, which will continue to receive increasingly more research funding, and 'global universities' that will compete for students paying high fees. **Allen Alexander** extrapolates into the future the current tension in research between the need to provide industry and societal impact and the increasingly difficult requirement for academics to publish, and creates a vision for a more efficient 'circular' and 'regenerative' knowledge economy where boundaries between knowledge creation, diffusion and adoption are entirely fluid and blurred. Building on this, **Wim van Saarloos** describes the challenge faced by the university to balance society's increased expectations and the need for cross-disciplinary science to address society's

grand challenges. **Natascha Eckert** challenges universities to create more permeable career paths to enable more fluid relations between university and industry with greater acceptance by both parties of each other. Finally, **Thomas Baaken** provides a radical vision of a possible future in which academics and business leaders solve societal issues collaboratively together with an AI device on the moon.

Together, this section of articles offers contrasting views of how universities will execute the second mission of research; from the suggestion of only minor adjustments to the research activity at universities, to much more radical changes like technology-driven 'thought services' collaboratively offered by university, industry and AI. Despite these differences, the articles often referred to similar future challenges faced by science, with a particular focus on the tension between scientific freedom and the need to create greater social impact, which, in the worst case could lead to the marginalization or exclusion of the majority of universities from the research process, and society more generally. However, this pressure on university research to deliver greater social impact can offer opportunities. This includes the creation of new partnerships and methods for the systematic improvement of knowl-

edge exchange and transfer from research outputs to impact such making knowledge produced from science available for free through a 'knowledge commons'; as well as the development of efficient 'problem-solving partnerships' combining university, industry and technology to address issues in society. The 'Socially Engaged Uni-

SOCIALLY ENGAGED UNIVERSITIES

versities' section consists of six contributions shedding light on engagement of universities with communities and society at large. **John Goddard** introduces the concept of a 'civic' university where external engagement by universities is embedded at all levels and relevant to all university activities. Pointing towards the need for research to be more humanity-focussed, **Manuel Alonso** envisions the university of the future as a primary actor providing solutions to the most pressing societal challenges. In line with that, **Søren Bregenholt** envisages that addressing the United Nations' sustainable development goals will be successful only if universities will take responsibility for the facilitation of cross-sector collaboration with industry partners. Focusing on entrepreneurship as an emerging form of university engagement, **Noel Lindsay** emphasises the need for adopting a holistic approach to entrepreneurship as a form of university engagement and integrating academic and non-academic entrepreneurship when cooperating with the communities. **Kevin Kecskes** highlights the importance of embracing new community-connected pedagogies to build knowledge not only within, but also, outside academia. Finally, **Carolin Plewa, Victoria Galan-Muros** and **Balzhana**

Orazbayeva, emphasise the need for a more systematic engagement of all relevant stakeholders that will make value-co-creation possible and contribute to communities and society at large.

Collectively, the contributions suggest that engagement activities of the universities will ultimately target the wider society and aim at impacting it in a more meaningful and effective way. This can only be achieved if engagement will be embedded in all university activities and go beyond pure university-business cooperation towards employer and community engagement. Contributors envisage a transformative role of university of the future acting across all three university missions and contributing to society through value co-creation, entrepreneurship, community-connected education and problem-oriented interdisciplinary research.

UNIVERSITY-BUSINESS COOPERATION

The section titled 'University-Business Cooperation' comprises eight thought-provoking contributions. **Peter Rohan** projects a transformation of university operational models, centred around an enhanced engagement of universities with all levels of society. Focusing on the Asian Century, **Rajiv Dhanwan** envisions the future of Asian universities and the role these universities as well as governments globally will have in facilitating North American and European university systems. A symbiosis of universities and business is anticipated by **Arnaldo Abruzzini**, whose contribution outlines ways in which education and the economy will be bridged. **Najib Abusalbi** predicts significant changes in education that is shaped by education and an evolutionary shift in pedagogical approach. **Keith Herrmann** imagines practice and theory as part of a co-designed single learning experience, enabling students to succeed in the future world of work. **Julie Wagner** highlights the critical importance of place-based innovation ecosystems in enabling university, industry and the local economies in reaching their full potential. **Mikko Korpela** and **Toni Pienonen** tell a story about a possible future in which individuals from business and academics and students work together in coworking communities. Finally,

Rumyana Trencheva presents the lifelong-learning role of the university of the future driven by the creation of exponential education ecosystems based on technology to cooperate and innovate with businesses.

Collectively, the contributions envisage a close integration of university and business, founded in a clear understanding of the economic and social benefit such collaboration can achieve. Borders between companies and institutions will slowly fade away and individuals will work together to enrich education and contribute to communities and society at large. Indeed, based on such improved understanding, governments are anticipated to play a stronger role in supporting university-business cooperation. The contributions also point towards a transformative role of cooperation in defining the education of the future and shaping new structures and approaches for the benefit of society.

INSTITUTIONAL CHANGE

The topic titled 'Institutional change' depicts eight different perspectives and predictions on how universities will progress over time. **Andreas Altmann** focuses on the idea that policies need to adapt and change to accommodate collaborative thinking and creativity as well as new approaches of education, research, and transferring academic knowledge. **Sanni Grahn-Laasonen** expresses the idea that university policies need to evolve and be flexible due to the ever-changing nature of technology. Over the next 25 years, **Michel Bénard** believes that universities need to foster lifelong learning among faculty and alumni offering programs that teach new skills and highlights that university research needs to focus on topics that benefit society as a whole. **Rolf Tar-rach** and **Lidia Borrell-Damian** predict that by 2030, a much more intelligent population will require a part of the higher education role of universities to shift with more emphasis on separating the very insightful knowledge from average quality information available on the internet through AI. **Enrique Cabrero-Mendoza** speaks about how universities must learn to adjust with the ever-changing world and keep up with the rapid progress of science and technology by remaining interdisciplinary through the spreading of ideas, in-

formation, and knowledge. **Klaus Sailer** and **Mirko Franck** describe that the route to a sustainable future stems from a new approach to obtaining and sharing knowledge and by changing teaching at universities from a central, administrative style to one that fosters more open-minded entrepreneurial mindsets. **Dominik Böhler** and **Oliver Bücken** predict that entrepreneurial thinking is going to shift the way we learn, teach, and work in order to better prepare for a global market to better use one's education for innovation. **Todd Davey**, **Arno Meerman** and **Max Riedel** close the section by painting a vivid picture of the 4th generation university in 2040 describing the roles that have been embraced and the changes that have occurred to ensure the survival of the university.

Collectively, the contributors suggest that universities have to quickly adapt, or they may be left behind. Universities must be willing to evolve from their traditional way by enacting policies that support a more entrepreneurial academic style, which allows students to collaborate with one another and share their thoughts through new learning pedagogies. This will support students to develop greater creativity and interdisciplinary knowledge in order to better relate to the changing world. If universities adjust, and create these

open learning settings, they will avoid specialisation and be better prepared for the global market.





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DISRUPTING TEACHING AND LEARNING



Is This the End of Universities as We Know Them?

Paul Hannon

It is evident that across the globe, higher education institutions are under pressure from many directions – the economy and lack of government funding, growth in demand, growth in competition, and of course advances in technology – perhaps even becoming unviable¹.

Whilst until now, the education industry has been quite immune to the huge disruptive factors that have redesigned and restructured many other global industries such as print, media, music, communications, manufacturing etc., are we on the verge of a disruptive shift that will change our sector forever?

The current ‘hot’ discourse in 2017 focuses on Schwab’s notion of the fourth industrial revolution², or Industry 4.0. This has the potential for huge disruptive change as we continually develop and build platforms better able to understand human learning, cognitive development and emotions. The growth in Artificial Intelligence (AI) and Virtual Reality (VR) could revolutionise learning design, delivery and assessment.

So what are the key questions to ponder as we move toward this new era? Certainly universities will remain pillars of higher education across the globe but will they continue to be leaders in the delivery of higher education (rather than research)? Who will be our future

consumers and customers? Who will be our learners in 2040 and how will they want to learn and why?

We often ask ourselves what should we teach, to whom, when, how and why. These are now critical questions as the available options outside of the university continue to grow, as the nature and needs of new learners change, and as demands for new types of graduates increase. Should students drive what they learn, when, how and who with, particularly when they are paying more for their education? Will we no longer have traditional lecturers but engage educators whose role it is to co-ordinate and engage with students on a co-learning basis? Does this mean we will need different types of educators across our institutions and the sector? We will need educators as coaches, mentors and learning facilitators rather than knowledge deliverers. As such these educators do not need to be university staff, or even based on a campus.

Who will drive pedagogic innovations and programme design parameters? Will other external stakeholders more deeply engage in curricula design as they seek to ensure that graduates are fit for their purpose and institutions keep pace with technological advancements in delivery?

What does all this mean for the future of universities in 2040³?

Institutional structures will need to become less siloed and far more inter-/trans-disciplinary based on delivering solutions to major challenges, i.e. ensuring high relevance, meaning and purpose. This requires creating the organisational environments and mindsets that enable this to work, leading to the repurposing of buildings as social, interactive and creative spaces that stimulate new ideas, critical thinking and stakeholder engagement. This will also impact on the design of degrees that can enable higher levels of understanding across broader disciplinary fields. This is crucial for generating opportunities for improving problem solving for complex and ‘wicked’ challenges.

How bold can institutions become in their flexibility to the design and delivery of learning platforms? How can more students learn where and when they wish with the institutional support shifting more to mentoring and coaching? How can professors and teaching staff become the ‘guides on the side’ rather than the ‘sages on the stage’⁴? How will this affect our credit systems and how credits are earned and assessed?

Learning will be driven far more by experiential learning approaches as students require greater context to understand relevance and become better able to apply their learning. We will see a stronger sense of peer-to-peer learning provision through the wider use of social media networks that can offer a ‘learn when you want and how you want’ model – a highly personalised approach. This would certainly enable a more cost-efficient learning opportunity as institutions cope with growing registrations.

We have already begun the process of moving away from a model of the university toward embracing a pluralistic notion of universities having different purposes and identities – entrepreneurial, innovative, engaged, civic and so forth. Institutions are recognising the need for a more sophisticated segmentation of the education marketplace. This is leading to a ‘stratification’ of provision, a greater differentiation in types of institution and more diversity.

Will all universities need to be campus-based? Staley⁵ suggests some will be nomadic (or ‘knowmadic’), moving around the globe to address key problems. Universities have the opportunity for re-creating their estates as new educational incubators; for creative approaches to locating

spaces for engagement, creative interaction and provision; for personalising learning through re-packaging learning opportunities into bundles; for offering flexible life-long learning relationships.

So where are the entrepreneurial leaders, the innovators, the disruptors that will ensure we are well prepared for 2040?



To achieve any transformation we will need strong entrepreneurial leadership at all levels in our institutions and across the wider ecosystem to build a culture, capacity and capability that can thrive in highly diverse, uncertain and unpredictable learning environments where boundaries are ambiguous and amorphous.

As we have in the past⁶, we should always challenge ourselves to think about how to engage with possible future worlds of education.

**all views expressed in this article are my personal thoughts and hence do not necessarily represent the views of my employer Swansea University.*

¹ A recent prediction from Clayton Christensen of Harvard Business School proposed that in fifteen years 50% of all American universities would be bankrupt. Ernst and Young suggested that the public university model in Australia will become 'unviable'.

² Klaus Schwab is founder and Executive Chairman of the World Economic Forum. His book 'The Fourth Industrial Revolution' was published in January 2017.

³ For a very recent and comprehensive exploration of the global historical and cultural context, current challenges and future possibilities see Zwaan, Bert van der (2017) 'Higher Education in 2040: a global approach' published by Amsterdam University Press. Retrieved from <http://oapen.org/search?identifier=620650>; and for shorter discussions about Denmark see Dyball, R., Davila, F. and König, A. (2016) 'Transforming the World by Transforming the University: Envisioning the University of 2040', the Solutions Journal, 7:3, p12-16; and for the USA, see Morson, G. S. and Schapiro, M. (2015) '2040 Prognosis for Higher Education: What will the future really look like?', The Chronicle of Higher Education.

⁴ Often credited to Alison King in 1993 when she was an associate professor of education at the California State University.

⁵ Staley, D. (2015) 'The Future of the University: Speculative Design for Innovation in Higher Education' Educause Review. Retrieved from <https://er.educause.edu>

⁶ In 2012 The Guardian asked about the university of 2020 and in 2015 the Times Higher Education asked how universities will look in 2030.



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Change is Inevitable – It's Time to Disrupt the Higher Education System

Fiona Godsman

...I believe that the university sector will experience major, and long overdue, disruption.

Despite the major disruption that other sectors have experienced in recent years, the education sector has been slow to respond and universities and their teaching methods have remained remarkably unchanged for decades. Perhaps they are right not to try to change too much, after all, universities have existed as places of learning for hundreds of years and the demand for a university education has never been higher. In the UK, for example, according to the Office of National Statistics¹, the number of students has almost doubled since 1992, and now nearly 1 in 3 young people are in full time education.

Our world is changing more rapidly now than at any point in history. Fifty years ago Gordon Moore, the founder of Intel, stated that computer power would double every two years and today the pace of change in technology still shows no signs of slowing. Now, when I walk along the corridors of the institution where I studied for my first degree, interactive whiteboards have replaced blackboards; if students miss a lecture, they don't have to borrow their classmate's notes, as everything is online. But the changes are on the surface; technology to support learning and teaching has been

embraced and every institution has its own virtual learning environment (VLE), but they still teach in groups, they have classrooms and lecture theatres, the students are arranged by academic discipline, taught by a recognisable hierarchy of lecturers and professors. A degree still takes three or four years and the academic year is short, organised by semesters and punctuated by formal assessments and exams. The undergraduate degree has really not changed very much at all in the years since I graduated.

Meanwhile, the pace of change outside universities has never been faster. According to a recent report by the Institute for the Future², 85% of the jobs that will exist in 2030 haven't even been invented yet. That's only 13 years away, and yet how can we even begin to imagine what that might look like? The pace of change in my own lifetime has been incredible and I could not have anticipated the jobs of today that didn't exist when I graduated. Unsurprisingly, many of these are technology related, e.g. mobile phone app developers, but some are surprisingly low tech too, resulting from big changes in the way we live and work. The gig economy doesn't just refer to Uber drivers; according to a recent report by the McKinsey Global Institute³ (MGI), almost 30% of the working age

population in the US and Europe are independent workers.

Beyond the realms of higher education, the pace of technological change has contributed to the decline of traditional jobs, but it has also created many opportunities. People are now employed in roles and in industries that simply did not exist just ten years ago, and can expect to experience several career changes in their working lives. The impact of the rapidly changing workplace on the future career prospects of our students can be hard for teaching staff to recognise; however, when so little has changed in the way that universities themselves operate.

So how can we prepare our students for a future that we cannot predict, in a world of rapid change? Traditional education provides an essential foundation of technical knowledge, but with such a fast pace of change that is not enough. According to the World Economic Forum⁴, the skills we need today are entrepreneurial: complex problem solving abilities, creativity, cognitive flexibility. Our young people need to learn new ways to work, and we need to support them by giving them the opportunities to shape the future. For some that will be starting their own businesses, but for many it will be using these skills and outlook to change the way the organisations that employ them operate.

How can universities prepare young people for uncertain futures? Will we see an end to the traditional teaching methods and degree courses or will they still exist, but as part of a much more diverse learning environment? Just as with any complex challenge, there isn't a single solution and universities will need to embrace new ways of working in order to remain relevant. Here are some of my predictions.

Universities will continue to teach in subject disciplines, for at least part of any degree. Students will still need to gain the fundamental knowledge of their chosen discipline, just as everyone needs numeracy and literacy skills.

- The acquisition of knowledge will not be the main purpose. Universities will provide an environment where students learn to be collaborative, creative and flexible, and to apply their knowledge in diverse ways.

- There will be more cross-disciplinary courses and projects that will bring students studying diverse subjects together, like healthcare and engineering. This aims to empower students to respond to major societal challenges such as aging populations.

- The building infrastructure will change, providing more flexible spaces for new ways of collab-

orative working.

- Businesses will work much more closely with universities, bringing an external perspective and applied knowledge and playing a major role in student education via new schemes such as graduate level apprenticeships⁵.

- Universities will embrace flexible, life-long learning, moving away from the 3 or 4 year first degree.

We cannot say for sure how our universities will look in 2040, but people will always need to learn, and the rapid pace of change makes lifelong learning even more important. Universities must enable students at any stage of life to grasp the opportunities of the future, whatever they may be.



If they get it right, universities will continue to be centres of knowledge exchange for centuries to come; creative, exciting places where people from many organisations and businesses can come together to collaborate and to challenge each other to tackle society's challenges.

¹ Office of National Statistics (2016). How has the student population changed? Retrieved from: <https://visual.ons.gov.uk/how-has-the-student-population-changed/>

² Institute of the Future (2017). Emerging Technologies' Impact on Society & Work In 2030. Retrieved from: <https://www.delltechnologies.com/content/dam/dell-technologies/assets/>

³ McKinsey Global Institute (2016). Independent work: Choice, necessity, and the gig economy. Retrieved from: <https://www.mckinsey.com/global-themes/employment-and-growth/independent-work-choice-necessity-and-the-gig-economy>

⁴ World Economic Forum (2016) What are the 21st-century skills every student needs? Retrieved from: <https://www.weforum.org/agenda/2016/03/21st-century-skills-future-jobs-students/>

⁵ Skills Development Scotland Graduate Apprenticeships (2017). Retrieved from: <https://www.skillsdevelopmentscotland.co.uk/what-we-do/our-products/graduate-level-apprenticeships/>



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Change-Makers in the Making

Christer
Windeløv-Lidzélius

With the Humboldtian ideal of higher education to some extent lost in marketisation, demands for instant application and a fetish for audits, it is questionable whether higher education is geared to excel in a new, brave world. Ironically, there are seeds in its ideals for success in the future for the individual as well as the student. Humboldt points towards “cultivation of the mind and character” and being “well-informed beings” as the foundation for the later, easy acquisition of vocational skills that allow movement from “one occupation to another¹”.

For many years we have recognised that the world has changed and is changing. Yet higher education has not been at the forefront of that change – and certainly not spearheading it. Rather, it seems often reluctant, uncertain and not geared to lean in, experiment and learn along the way. It clings to the one differentiator that is hard for new initiatives to really challenge – accredited degrees – rather than take advantage of new technology and changing preferences. However, this may prove to be a temporary solution that will only momentarily suspend the need for innovation.

More and more people entering higher education have no desire to follow the beaten path. On the one hand they have been told since kindergarten that they

should figure out what they really want to do so that they do not end up with a life that does not provide happiness. On the other, they have been told that they cannot count on anything, so it is essentially up to themselves anyway. Not everyone is equipped for such a premise. Yet some are, and more could be if we helped them.



Helping people become change-makers is not just a question of adopting new technologies such as MOOCs. It also requires re-thinking the role of the lecturer, what happens in the classroom and the necessary pedagogical approaches.

- Starting with the last of these – pedagogical approaches – we need to consider that we do not fully know what specific knowledge and what specific skillsets will be needed in the future. For sure, there are certain basics but many of the specifics we work towards today will probably not be utilised.
- As technology enables us to receive lectures and assignments, and take part in discussions and so on over long distances, there will be a need to utilise the fact that we have

people in virtually same room for a number of years. If there is no need for classical lectures per se, then what?

- If the lecturer is not to teach, then what are they supposed to do? What would be the rationale for still having lecturers?

A timely approach to higher education would be to broaden the scope of its aspirations and engage in trying out new models and formats for research, education and dissemination. This does not mean giving up its higher ideals, but instead recognising its role as a maker of change. A few propositions could be:

- Orientate towards lifelong learning rather than mere educational programmes. Become the active learning partner for a person's full life – stretching beyond the classroom and occupational knowledge and skills throughout the work life.
- Move beyond mere knowledge and skills. Competence, attitudes, networks and experiences are the keys to future value creation.
- Embrace, with a critical eye, new technology. It is not a panacea for all problems, but neither is it a poor alternative to classical education. It is feasibly an enabler for new forms of learning.
- Start viewing students as

co-creators of their own education, their lecturers' development and the progress of the institution itself.

- Our pedagogical models need to shift from teaching to facilitating and leading. This requires a new skillset and attitude.

If the future of education is learning, this surely goes way beyond institutional walls. Higher education will not go away in any likely future, but its prominence may be highly challenged. Serving that group of people requires new thinking and innovation from society – and those people who want to create the higher education of their future need to change their thinking and doing. Creating makers of change – change-makers – is not a project per se. It is something that likely will not stop. People will need to continuously grow and re-invent themselves to stay relevant and unique. Here the Humboldtian ideal lays a foundation for learning how to learn and how to adapt to changing circumstances.

As a lifelong learner, the change-maker can also be a lifelong prosumer of education, provided higher education steps up to the task – including seeing the learner as a resource for educational design and giving them the mandate to co-create education.

¹ Berglar, P. (1970). *Wilhelm von Humboldt*, p. 87. and Günther, K. H. (1988). *Profiles of educators: Wilhelm von Humboldt (1767–1835)*. *Prospects*, 18(1), 127–136.



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The New Learning

Hans Wissema



Born in Prussia around 1794, our present learning system has all the elements of the Industrial Revolution: specialisation, standardisation, synchronisation, concentration, maximisation and centralisation. Schools and universities are engaged in ever more specialised subjects.

The diplomas and students are standardised. Just as a 1kg pack of sugar tells the consumer that the bag contains a thousand grams of sugar, school or university diplomas tell employers what they buy. Until recently, education was synchronised seamlessly to the world of work, while being concentrated in ever-larger institutions, a process that is still going on. Output is maximised through greater access to higher education, providing more prosperity and equal chances for everyone. Education is highly centralised with government departments deciding on finance, setting the standards for curricula and diplomas, approving teachers and teaching materials and more.

For a long time, the system has worked well. It is the basis of our prosperity and it is therefore nourished by politicians and educators

alike, making it virtually impossible to change. Yet, it is changing. A multitude of experimental new school types have emerged, some now well-established, like the Montessori schools. Universities have added roles to their original tasks of education and research¹ not to mention distance learning and a host of other experiments. Home teaching has grown although it is statistically insignificant. So, there are changes but they are only marginal in scale. This picture is going to accelerate, because right now new, strong forces for change will challenge the system in a fundamental way, causing it to convert into what we propose to call The New Learning. The forces of change come from the demand side of learning as well as from the supply side of education and we will discuss them briefly.

Forces of change on the demand side – students and employers

While there is much hot air in the discussion about the Millennials, it is undeniable that young cohorts of school leavers and graduates have different career objectives than had previous generations. They seek challenges more than money, they want to work for a coach, not a boss. Most of all, they focus on life, rather than the job; status does not interest them, many don't own a car, let alone a bling-bling one. It is no surprise

then that 55% of them feel unengaged at work².

At the same time, employers no longer want 'standard' graduates but rather 'made-to-measure' personalities. This means that the school or university diplomas rapidly lose their significance. Diplomas serve as an intermediary between the person looking for work and the employer – the '1 kg of sugar label'. This system is being replaced by negotiations in which the employer brings in 'honest' job descriptions (free of hyperbole) and the potential employee provides a pitch illuminating what he or she stands for, what educational pattern she has taken and what he is looking for. Naturally, state diplomas in areas of public interest, such as for medical practitioners, judges, gas fitters, are there to stay. There is opposition against the notion that learning is a matter of cost/benefit analysis. Nancy Rothwell, in an article in the Financial Times, posits that university courses are not only a purely financial investment: "Studying at universities should be a unique and transformational experience, challenge your principles, take you out of your comfort zone"³.

Forces of change on the supply side – educational institutes

In universities, teaching has always been a suppositious child;

if you want to make an academic career you must publish and your quality as a teacher hardly matters. The result is bad teaching and a host of crap appearing in scientific journals. It now seems that teaching is undergoing a re-evaluation and becoming a profession by itself. These changes come from four sources: pedagogical research, internet, artificial intelligence and brain research.

To start with the latter, there is a vast amount of research into the workings of the brain being undertaken worldwide. These billions worth of research is bound to throw light on the workings of the 'last unknown organ' of the human body. That could enlighten us how we learn, from the neuroscience point of view.

Pedagogical research, together with plain common sense, challenge the current system. Why should students be working in same-age classes, rather than in mixed age-groups? Why should a student be forced to repeat a year – and waste time and motivation - if only some subjects are weak? Why should pupils and students follow standard programmes when neither they, nor the job positions they are going to fill, are standard? So, the trend is towards self-study, learning in small groups and individual tutoring.

Another trend is 'phenomenon-based learning' as in Finland's Design Factory⁴. Students work on a project, either alone or in a team; school children are perfectly well able to build a drone, make it beautiful and write the manual in French.

Internet has a vast impact, partly because of specialised companies put courses in the market – Udacity, Coursera, EdX and the like. AI-assisted learning is still in its infancy but it holds vast promises. Robots at the University of Aberystwyth can carry out an entire scientific process: formulating hypotheses, designing and running experiments, analysing data and deciding on further experimentation⁵.

Conclusions in short

- "No lectures, no classrooms, no majors, no departments" – Christine Ortiz at MIT⁶
- "Rise of the challenge-driven university" rather than coercion-driven education – Geoff Mulgan
- End of overspecialisation – knowing more and more about less and less – A.D. Lindsay of Oxford. Instead: return of the 'Renaissance men (and women)' in transdisciplinary research (Towards the Third Generation University, op cit)
- Teaching becomes a suc-

cession of team-projects and individual learning projects with increasing complexity ('levels', as in games) with students take their fate in their own hands in an entrepreneurial atmosphere.

- Teachers become coaches rather than orators. Teaching becomes a high-standard profession with transdisciplinary Institutes of Advanced Learning at major universities.
- Contacts with all kinds of employers start at day one.
- Students learn to pitch what they have learned and what they seek in employment.



¹ Etzioni, H. (2017 and earlier books). *The Triple Helix: University-Industry-Government Innovation and Entrepreneurship*, Routledge, 2nd ed. See also: Wissema, J. G. (2009). *Towards the third generation university: Managing the university in transition*. Edward Elgar Publishing.

² Gallup Poll (2016).

³ Rothwell, N. (2016). *There is more to university than money*, Financial Times.

⁴ Helsinking. (2016). *The Economist*.

⁵ Dodgson, M., & Gann, D. (2017) *Universities have sown the seeds of their own disruption*.

⁶ *Higher education – flying high*. (2016). *The Economist*.

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Universities Transforming Teaching and Learning to Cope with a Radically Changing Skill Demand

Dirk Van Damme

For many decades, universities have been educating students for a rather stable professional environment. The skills needed by professions such as medical doctors, lawyers, psychologists, or even historians and philosophers define the framework of programmes, course subjects and learning outcomes.

And beyond professions, there are well-established scientific disciplines such as physics, biology or political science, which provide the foundations for learning at universities. Academic attitudes and values such as the search for truthfulness, critical thinking and dealing with uncertainty permeate all of this.

The identity of the modern university in its teaching and learning function rests to a great deal on the interplay between research-based professional training, disciplinary education and academic values. In essence, it is a supply-side approach to education and learning, which constructs the identity of the university as learning environment.

However, this approach has come under pressure in recent years. Universities are increasingly criticized by employers (among other stakeholders) for not listening carefully enough to the skill needs of contemporary economies. Critical disputes and tensions, even conflict, between edu-

cational institutions and employers on what kind of knowledge and skills graduates bring to the labour market, are not new and mostly lead to a productive dialogue.

Currently though, there are many signs indicating that these tensions have accumulated and became explosive, with the risk of short circuits between both sides. An example is the public announcement of the global consultancy firm Ernst & Young in 2015 stating that it would no longer look at university qualifications when recruiting talent, because there was “no evidence that success at university correlates with achievement later in life”.

One of the main reasons for the growing tension between supply-side approaches dominant in universities and calls by employers and other stakeholders to become more demand-sensitive is the profound changes in skill demand, both quantitatively and qualitatively. Universities are doing reasonably well in translating changes in scientific knowledge into course contents, but do not identify similarly important changes in skill demand in the external world and transform their education programmes accordingly.

Think, for example, of the consequences of digitalisation for the tasks that university-educated professionals will have to do by 2040.



Much more important than which jobs will disappear or how many alternative jobs will emerge as a result of digitalization, such as robotisation and artificial intelligence, is the question of the changes in the tasks of professionals, even the most stable ones.

Routine tasks, procedural labour and other ‘predictable activities’, even at a rather high level of cognitive demand, will gradually be taken over by smart machines. Imagine what this will do to, for example, legal professions, where large parts of what such professionals do today will be automated. Digitalisation will not be something affecting low-skilled jobs only, but will have a profound impact on what university-educated professionals will do in the future as well.

The complex and rather unpredictable shifts in skill demand will increase the importance of skills such as higher-order cognitive skills, complex communication skills and emotional skills. High-

er-order cognitive skills are close to the research, deep-thinking and analytical skills that universities already develop in many programmes.

However, universities see these skills mainly as part of advanced programmes leading to research master’s or doctoral degrees. Understanding that such skills should no longer be preserved for excellent students aspiring research and academic careers, but rather be part of any university education, is a mind shift that most universities still have to make. Complex communication skills have slowly become part of the curriculum in various programmes, but a lot is still to be done in this area as well.

Finally, emotional skills are mostly seen as something to be developed in previous educational stages. They are also part of the explicit or implicit selection process through which students are admitted to a university education. Yet, evidence clearly shows that emotional skills are part of the ‘hidden curriculum’ of university education.

Universities can transform people into well-rounded individuals also in their personality traits, with clear progress on, for example, conscientiousness and openness. This explains why, even after controlling for variables such as income or employment, uni-

versity-educated individuals are healthier and have higher levels of interpersonal trust than their lower-educated peers². Addressing changing skill demand will require universities to explicitly look at these ‘soft’ skills as much as they are looking into higher-level cognitive skills.

In general, universities have been willing to update the curricula of their programmes and innovate to better meet external demands. In Europe, the implementation of the legislation following the Bologna Process has been an excellent opportunity to critically examine and revise curricula. Universities have even been prepared to listen more carefully to employer-driven demands and have, for example, included entrepreneurship education in some of their programmes. But the question is: will this be sufficient? More ambitious and forward-looking answers will be necessary.

In all variations on ‘the death of the university’-thesis, some experts have argued that universities are something of the past and will no longer be capable of addressing the skill development needs of highly volatile and uncertain economies and societies. These experts believe that radical demand-driven approaches to education and skills will favour a de-institutionalization of learning and the development of user-driv-

en technology-based learning modes.

Universities will be asked to demonstrate the added-value of an institutional and supply-side approach to skills development. This is no easy task. But the value system of universities, driving enquiry, critical thinking and scientific attitudes, will prevail in the end. Atomized, user-driven learning will never be able to compete with universities for the development of such higher-order skills. That is no reason for complacency, but an argument to more ambitiously develop approaches to teaching and learning that prove to be effective, relevant and responsible.

¹ Sherriff, L. (2017). *Ernst & Young Removes Degree Classification From Entry Criteria As There's 'No Evidence' University Equals Success*. Retrieved from http://www.huffingtonpost.co.uk/2016/01/07/ernst-and-young-removes-degree-classification-entry-criteria_n_7932590.html

² OECD. *Survey of Adult Skills (PIAAC)*. Retrieved from <http://www.oecd.org/skills/piaac/>



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Curiosity-Driven Education or How to Prepare Students for the Digital Future

Manuel Dolderer

The rise of technology in the work environment

In 2011 Marc Andreessen, co-founder of Netscape and co-author of Mosaic, the first widely used web browser, wrote an essay titled ‘Why software is eating the world’, in which he stated: *“Six decades into the computer revolution, four decades since the invention of the microprocessor, and two decades into the rise of the modern Internet, all of the technology required to transform industries through software finally works and can be widely delivered at global scale.”*¹

Today we also see even traditional products like toothbrushes, coffee machines, running shoes, and vacuum cleaners becoming ‘smart’ or ‘connected’. They – among so many others – now include computer hardware, run software, and are linked to the Internet of Things. In the near future, every product will be a digital product. Or to be more precise: every product and service will have some aspect or part of the value chain that can (and therefore will) be dramatically improved or disrupted by digital technologies.

As a consequence, and as so many labor market studies show: there is an enormous demand for ICT professionals. For the last three years, I have been talking to companies of all sorts to find out

what exactly they were looking for, since ICT professionals can have very different skill profiles. After all, we were in the process of founding CODE, a new tech university of applied sciences, and wanted to understand which skill profiles would make it easy for our graduates to find a job in the future.

What I learned, was quite surprising. When asking about the future expectations of those companies, the answer was always: *“We could tell you what we are looking for today, but we have no idea what technologies, frameworks, tools, and methods will be relevant for us five to ten years from now. To be honest, we don’t even know if our business model will still be the same.”*

The need for new competencies

In the end, most of the expectations could be summarized as follows:

Perfect employees should be able to work in international and interdisciplinary teams, they should have the ability to understand and creatively solve problems, and they should have an eagerness to learn. From the perspective of today’s companies, these aspects are entirely reasonable. After all, they honestly don’t know what the digital transformation will do to their products and business models.

What does that mean for universities? They have to reevaluate the way they prepare students for their future professional life. Today's study programs still focus heavily on the transfer of pre-defined expert knowledge from professors and textbooks into the heads of students. Teamwork and creative problem solving are usually not the most important skills to succeed in such a learning environment. Let alone that it promotes students' curiosity and eagerness to learn.

The CODE way

For our own university, we decided that in order to learn how to be a productive member of an international and interdisciplinary team, your learning environment should provide you with lots of opportunities to work in teams. As for the development of problem-solving skills, you would be presented with real-life problems to be solved over and over again. Finally, to help you to develop (or better rediscover) your eagerness to learn, we created a learning environment where students' main driver for learning would be their own curiosity.

At the beginning of a semester, our students ask themselves: "What am I curious about, what competencies and skills do I want to focus on during the coming semester?" They all have one of our

professors as a personal mentor who helps them to answer these questions in a meaningful way.

They then select a project and a role within the project team that matches their chosen learning focus. Most projects are offered by one of our partner organizations, but students and professors can initiate projects as well. While the project constantly challenges their problem-solving ability, it also lets the students discover how much they need to know about a certain skill or competence to successfully finish the project.

Professors and student teams meet once a week to reflect on their performance as a team and to learn more about successful teamwork, conflict management, and interpersonal communications. In that learning environment, our professors most of the time act as mentors and coaches trying to enhance our students' learning experience. They also offer lectures, seminars, and workshops, but only if our students ask them to. They don't give answers if students don't have a question.

Building competencies is more important than grades

To document our students' learning outcomes and overall progress, we don't rely on grades but instead, use a competence framework. All students have their

individual competence profiles, and whenever they can demonstrate that they've reached a new proficiency level within a competence it is documented in their competence profile.

We believe that all students should think about the social impact of their work, and understand political forces they are feeding, as well as understand something about history, philosophy, and the arts. That is why we provide our students with a space to ask the big questions and to take the time and effort it needs to improve their answers.

In our Science, Technology and Society Program, students get a chance to study the works of writers, historians, and artists and discuss fundamental philosophical, sociological and ethical concepts. It also invites them to think for themselves, to reflect on society, politics and the impact of technology. It challenges their creativity and critical thinking and broadens their horizons.

The digital transformation is happening, and it will change society in a fundamental way.



Universities have to think carefully about how to provide students with a relevant skill set for the 21st century. At CODE, we've decided that a self-directed and curiosity-driven learning concept is our way to approach this challenge and to educate the digital pioneers of tomorrow.

We believe that the principles outlined above, which are the principals upon which CODE was established, could be the basis for the university of the future toward 2040. Our belief is that such an approach will better prepare students for increasingly technical and rapidly changing labor markets and better enable them to play an active role in shaping our society's future.

¹ Andreessen, M. (2011). *Why software is eating the world*. *The Wall Street Journal*, August 20, C2.



Manuel Dolderer studied Economics, Philosophy and Cultural Studies at Germany's oldest private University in Witten/Herdecke. As a student, he joined the executive board of the StudierendenGesellschaft Witten/Herdecke, a non-profit organization that offers an income-adjusted tuition model that promotes equal opportunities in education.

After founding two research institutes with projects focusing on healthcare, education, and digitalization he joined Klett Group in 2012, one of Europe's leading education-dedicated enterprises, where he became co-founder and managing director of a private university of applied sciences – praxisHochschule. In 2016 he joined forces with Thomas Bachem and Jonathan RÜth to build CODE – a new kind of university for the digital pioneers of tomorrow.

Why Was the Most Valuable Experience at My University NOT Part of My Degree?

Benjamin Conard

My college experience was critical in the development of me as an entrepreneur. But why was none of this value measured and recognized in my degree?

College campuses in the United States are like mini cities. They have all the moving parts of any functioning society – housing (residence halls), restaurants (dining halls), policy makers (administration), businesses (bookstores and cafés), laws (campus police), “work” (classes), and, most importantly, a community (students, faculty and staff).

Because of their dynamic and fast-paced context, college campuses are arguably the best place to execute on an entrepreneurial idea before heading off into the “real world.”

Universities: a land of opportunity

At my alma mater in the US, the State University of New York at Geneseo, there are countless opportunities for entrepreneurs to take advantage of including entrepreneurial training programs, sponsorship for accepted Clinton Global Initiative University students¹, ambassadorship grants, participation in the New York Business Plan Competition, starting a student organization on campus, and even speaking on the TEDx stage.

Every single one of these opportunities has the potential to propel students’ ideas forward while developing their soft, social, and life skills. As a ‘studentpreneur’ who took advantage of all of these, I am truly thankful for my university’s support in these engagements.

Giving ‘credit’ where credit is due

However, I must beg the question – why are these challenges and support programs not provided to students along their path to earning a degree? Every program mentioned above helped to train me, the entrepreneur, and they were collectively the most valuable and rewarding parts of my college career.

So why did none of these projects, none of the awards or acceptances, and none of these incredible challenges count toward my final degree? Why did I not receive credit for pitching a business idea to a panel of investors, writing a fifty-page business plan, working with a team of 4 students and winning award money at competitions?

Investing in your degree

In the US, we pay an incredibly high price for our degree in the hope that it will help us qualify for

a job so we can earn enough to pay back the cost... and hopefully more!

But what happens if you don't take a job upon graduation? What if you make one instead? Does your degree mean anything then? Sure, it's a great back-up. But I can't help but be puzzled that the biggest challenges and opportunities for growth in my college career, which were directly supported by my university, had zero impact on me graduating. I still had to take all of the traditional courses and earn passing scores to receive credit towards my degree.

Looking back & looking forward

Looking back, I am thankful to have had mentors, advisors, friends, and the internal motivation needed to push me towards and through all of these opportunities. But what if I didn't? What if I followed a path in college that took me to my degree the fastest? Would I have graduated and just taken a job? Would the development of me, the entrepreneur, have been stifled? Maybe.

Students are the lifeblood of any university setting. Given that many future jobs will have to be created by students themselves, the 2040 university landscape desperately needs to cater to the studentpre-

neur. Programs for developing entrepreneurial thinking and acting should be offered to all university students and entrepreneurial programs must be incorporated into credits toward earning a degree. Universities will need to get creative in transitioning from a strict 'credit per course' system to truly understand (and credit) the value of entrepreneurial endeavours on and off the college campus.

My Dream Campus

As an entrepreneur I've never been asked for my GPA. So why did I stress about it for four years? I could have been using that energy toward learning new skills instead of trying to obtain high exam scores.

I see a learning environment where students can create, test, and experience without restriction. Sure, there will be some courses on hard skills that you can only learn through books and traditional learning, but I see collaboration among students at the forefront.

Just as students studying medicine are part of the volunteer team responding to medical emergencies on campus, students should be part of managing all services provided to students. Whether that be part of food service and sales, retail shops on and off campus, or even providing freelance services like graphic design work.

As our world becomes more advanced, so does the severity of our problems. As I described before, we're living in a mini city. It is the perfect setting to test new ideas without fear of "real world" failure. Now, more than ever, students need to identify these problems and take action.

So, do we need to eliminate grades completely? Not necessarily. But students should be evaluated on results and learnings rather than success and failure.

The 2018 Campus	The 2040 Campus
Professors are superiors	Professors are mentors
Grades are score-based	Grades are learning-based
Traditional learning earns a degree	A mix of traditional + experiential
Failure is calculated as a set-back and punished	Failure is praised as a learning opportunity
Students compete for higher scores	Students collaborate to create great results
Classroom seats are organized by rows	Classroom seats are sets of roundtables
New initiatives on campus are hobbies and side projects	New initiatives are celebrated and taken to their full potential



I have high hopes for the university landscape in 2040. One where we don't see entrepreneurs as college-dropouts, but rather one where we cultivate them as forward thinkers and great assets.

¹ The Clinton Global Initiative University (CGI U) Network is a consortium of colleges and universities that support, mentor and provide seed funding to innovative and entrepreneurial students



For his work in the movement, Fairtrade International named Ben Conard one of 2016's Top 10 Biggest Fairtrade Advocates in the World and #1 in the U.S. His passion for fair trade has taken him to the TEDx stage at his university and on-the-ground to fair trade farms in Ecuador and artisan workshops in India.

As a US Ambassador for the 33rd Congress-Bundestag Youth Exchange 2016-'17, the US Department of State awarded Ben 'Fellow of the Month' in April 2017 for his commitment to Entrepreneurship in Germany. During his time there, Ben was the German National Champion for the 2017 Global Student Entrepreneur Awards.

Dedicated to great taste, consumer health, and sustainable sourcing, Ben, then a student, founded Five North Chocolate, a company supporting cocoa farmers around the world by creating deliciously nutritious chocolate snacks.

Meaningful Teaching and Training – Higher Education of the Future

Marko Grdošić

Current issues

I never really enjoyed studying. The social aspect of it was great, but there were very few courses that I found interesting and meaningful. Sometimes I thought it maybe wasn't for me. Though ironically enough, it was me who became a representative of the student body, and within a few years started working on higher education issues at a European level.

Nowadays, I have experience from studying in two European countries, and professional experience in knowing a large number of higher education systems in Europe and beyond. I now understand that I shouldn't have questioned if I am a right fit for the university, but should have rather questioned the system itself, thinking whether it was offering me the level and quality of education one would expect in the early 21st century.

And this is the first problem of the current system – it doesn't teach us to question things, to seek for more. It rather teaches us unnecessary definitions, archaically calculations which computers have been doing for the last decades. It tests our short-term memory, rather than our brain's capacity to think.

The current higher education system, which was built on me-

dieval grounds, found itself in the spotlight with the recent financial crisis. Unstable economies and growing unemployment rates put higher education institutions in the center of attention, seeing them as magicians that solve problems. And while the list of possible developments in higher education systems is endless, the focus of development was shifted to skills and mismatch with the labour market. This all holds ground, but for real adoption of higher education institutions to the 21st century reality, one needs to look at a more holistic picture. It is not just feeding students with skills needed to get the jobs; it is rather rethinking the way knowledge is provided, rethinking what knowledge actually is, what has to be learned and what can rather be Googled, the way technology is used in the studying process, the way professors are supported in their lifelong learning and personal development, the way in which industry engages with education etc.

The other side effect of the shift of paradigm towards skills based agendas is the lost vision of higher education as a personal development path of students, a process which teaches them life lessons, a space that generates thoughts, promotes innovation and development of societies. I heard so many discussions in

the past years if higher education serves as a life school for students which at the same time promotes societal development, or as a tool to get the job. And if we chose one or the other, who is responsible for funding these studies?

Even though, perhaps these sentences might sound like a cliché, they are very popular paradigm when it comes to higher education development. But where will that lead us in the future? And what do I see as a university in 2040?

Response of the University 2040

Let's start with who teaches. Back during my university days, it was common for professors to use the same PowerPoint slides for 7 to 8 years. In 2040, professors have strongly embedded lifelong learning in their career paths. They are continuously working on personal development, seeking best ways to train their students necessary skills that will allow them to use technology and information in their learning process. Professors are also very much up to date with the recent trends in their industry as much as their courses require. In order to assure that, universities have a large number of guest professors, where courses and specific classes are given by experts in the field, who

work on these matters on a daily basis. This includes both industry and business representatives, policy makers, etc.

What do professors teach? They act as trainers, showing students how to find resources, how to get informed, how to use their brains to the full potential. There is no need to ask a student to learn definitions by heart; everyone can find those on their phones in a few seconds. Why not rather train students how to access the data needed, how to look for credible sources, how to recognise fake news? Students should be pushed to think, to discuss, to evaluate, to create their own opinions and discuss those with their peers. Why do we still learn how to calculate on a piece of paper, how to do the accounting with the methods from 1960s, if we could train them to use the latest software for that.

And finally, how do professors work with students? The square classrooms with aligned chairs facing professors is not the place where every individual will be supported to reach its maximum potential. Looking at old PowerPoints, printing them out and learning the slides to get a satisfactory grade turns us into robots, rather than powerful individuals. We have to stop ignoring technology and use it as a benefit for better facilitation of learning. We

are still afraid of using so called modern devices, people speak of Facebook mostly in negative terms. Why not to use Facebook live to make classes more accessible and attractive for younger generations? By 2040, Facebook will probably no longer be such a widespread phenomenon, but the world will change drastically. If today we are scared of Facebook, how will we adapt to the speedy development of society and technologies?

I read recently that more and more kids are being diagnosed with ADHD, having problems focusing in school. Have you ever seen a 3-year-old child playing with a tablet on the seat next to you during the flight? And now imagine how that kid will feel in 5 years' time when he or she joins the primary school and the teacher uses a chalk and a board to explain the alphabet.

These lines above are definitely not revolutionary, but the change will come only if it's done systematically, and if all the actors get on board.



Education should become progressive towards the society, and not struggle to catch up. Only then will it become the hub that develops students, develops societies and promotes innovation.



Marko Grdošić started his student activism in Zagreb, Croatia, joining AEGEE-Europe / European Students Forum. Later on, he moved to Brussels as the president of AEGEE-Europe commission to represent the voice of students at the main European and international institutions. His experience is based on development of policies and lobbying for student rights, particularly in the field of active citizenship, youth participation, human rights and education with a focus on non-formal learning. In 2014, Marko joined Council of Europe's Advisory Council on Youth, where he worked on issues relating to formal education. In his second term he was elected chairperson of the Committee.

Currently, Marko is a Project Manager at EURASHE coordinating running projects as well as developing future ones. He is responsible for coordination of annual strategy. He is following the thematic agenda of Lifelong Learning and Employability, with a special attention to cooperation between higher education and the world of work.

Marko obtained the bachelor degree in Finances and Audit from the University of Zagreb, after which he moved to Stockholm, Sweden for the Masters' in Macroeconomics, Economic development in particular.

CREATING THE FUTURE UNIVERSITY



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**‘HUMAN HISTORY BECOMES
MORE AND MORE A RACE
BETWEEN EDUCATION
AND CATASTROPHE.’**

*– Herbert George Wells
(H.G. Wells)*

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COLLISION OF TECHNOLOGY AND HUMANITY



Technology Will Transform University Entrepreneurship Programs

Scott Shane & Michael Goldberg

It was the fall of 2017 and Professor Scott Shane glanced nervously at his watch. Joe Kirgues of the accelerator Gener8tor was due to speak to his class remotely over Zoom in two minutes and Scott had been unable to reach Joe by text, phone or email. The technology was all hooked up and the students were in the classroom ready to interact with Joe. All they needed was a speaker...

With 30 seconds to spare, Joe clicked in on the screen. Pulled over on the side of the highway between Urbana, Illinois and Madison, Wisconsin, Joe Kirgues, live, and on camera, presented his powerpoint slides and answered student questions about how accelerators work. At the end of Joe's talk, Scott commented that long before 2040, Joe would no longer have to pull over to the side of the road to speak to the class. He would do it while riding in an autonomous vehicle.

Technology is transforming entrepreneurship education to make it more realistic. By 2040, there will be a seamless connection between education and practice in ways undreamt of by practitioners and educators today. We see five ways this is happening: through remote video connections; massive online open courses (MOOCs), augmented and virtual reality, embedded media, and mentorships and internships anywhere.

Remote video connections

Case Western Reserve University is a technically strong university located in the Midwest. Most of its graduates starting or financing high potential companies have gone to Silicon Valley and New York. But technology has rendered that disadvantage moot. Using Zoom to bring leading venture capitalists at firms like Greylock and Sequoia, accelerator directors at Gener8tor or Y-Combinator, or top angel investors from around the world into their classrooms, Professors Shane and Michael Goldberg have leveled the playing field. Getting top practitioners into the classroom no longer requires a location in Palo Alto or Manhattan. Today, professors may be doing this in a couple of classes. By 2040, if not earlier, every entrepreneurship class will have this structure.

MOOCs

Online, scale can increase dramatically. Today, we may have only a couple of courses like Beyond Silicon Valley: Growing Entrepreneurship in Transitioning Economies, Professor Goldberg's massive open online course (MOOC), which has attracted over 135,000 students from 190 countries. But in 2040, many entrepreneurship courses will follow this structure. No school can get 135,000 students into a physical classroom, but they can be organ-

ized online. More importantly, universities will continue to develop local partnerships to allow MOOC students to have localized discussions in their home communities. Online platforms can spread the impact of entrepreneurship courses to new audiences around the world.

Augmented and virtual reality

Many aspects of entrepreneurship cannot be easily taught by lecture or even case discussion. Pitching investors at a demo day; telling employees that you are out of cash and cannot meet payroll; overcoming objections in a sales call are all examples of situations where most classroom discussions fall short. By 2040, no one will use a Harvard Business School case to discuss how to sell a software-as-a-service product. Students will don virtual and augmented reality headsets and practice selling the product to customers, overcoming objections of a very realistic simulated customer.

Embedded media

Professor Shane recently had one of his portfolio companies, Qeepsake, a startup providing text-based prompts for baby journals appear on ABC's reality TV show Sharktank. In the episode, Qeepsake's founder turns down financing from two of the sharks

at low valuations to later obtain financing from a set of sophisticated investors. Using clips from the TV show, Professor Shane has created a short teaching case that walks students through the decision. By 2040, we expect all business school teaching cases to have embedded media from real world situations.

Internships and mentoring

By 2040, in-person mentoring and local internships will be quaint reminders of entrepreneurship education's past, much like the chalkboard is today. Using online platforms to connect students to alumni mentors anywhere in the world, entrepreneurship programs will provide much more practical assistance to entrepreneurs starting companies than is possible at present. Similarly, other online platforms will allow students to work as interns at startup companies or investment organizations anywhere on the planet so that they can learn-by-doing while in school.

Forecasting how technological change will transform education is a dangerous business. It's impossible to foresee the future. Just as students studying medicine are part of the volunteer team responding to medical emergencies on campus, students should be part of managing all services provided to students. Whether that be part of food service and sales,

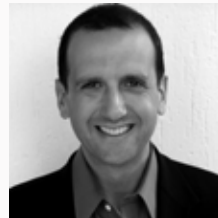
retail shops on and off campus, or even providing freelance services like graphic design work.



So we are probably missing many, if not most, of the specific developments that will change entrepreneurship education in the future. But we are sure of one thing: By 2040, technology will alter the way we teach future entrepreneurs by connecting academia more closely to practice.



Scott Shane is the A. Malachi Mixon III Professor of Entrepreneurial Studies and Professor of Economics at Case Western Reserve University. He has served as a Research Fellow at Burton D. Morgan Foundation, and a Visiting Scholar at Federal Reserve Bank of Cleveland. He has written extensively about entrepreneurship. His book 'Illusions of Entrepreneurship: The Costly Myths That Entrepreneurs, Investors, and Policy Makers Live by' (Yale University Press, 2008) was one of the top ten business books of the year for Amazon.com. His 2005 book 'Finding Fertile Ground: Identifying Extraordinary Opportunities for New Businesses' won the 2006 Golden Book Award for best business book of the year and has been translated into eight languages. Shane was the 2009 winner of the Global Award for Entrepreneurship Research, the most prestigious award in this field. He has written for Entrepreneur, The New York Times and other popular publications and is an active pre-seed stage investor.



Michael Goldberg is an Assistant Professor in the Department of Design and Innovation at the Weatherhead School of Management, Case Western Reserve University. Goldberg created a massive open online course (MOOC) called Beyond Silicon Valley: Growing Entrepreneurship in Transitioning Economies, which has attracted over 135,000 students from 190 countries with subtitles in 16 languages (most on Coursera platform). Goldberg is also the author of book 'Beyond Silicon Valley: How Online Course Helped Support Global Entrepreneurs' (2018).

Towards the Virtual University

Paolo Bianco

When I am asked to talk about the future I look back at the past, then I take a good objective look at the present, see how things have evolved and apply the same trend as a bearing for a vision into the future. I intend to do the same now.

University as we know it

Let's start from the beginning. Universities as we know them started in Europe, on the newly found optimism and belief in education back at the beginning of the last millennium, and the first one having such name is the University of Bologna, established in 1088 AD. Back then, students were travelling from other countries to join the university and their organisations had most of the weight in defining the way a university operated, also gaining a considerable social bargaining power in the place (city, town) that physically hosted the university. The main impact of universities on the society was through the contribution of the students once they were back working in society. Furthermore, local authorities could benefit from advice and consultancy from the professors for local matters and that was mostly it.

My time at university

Fast forward to the time of me being at university, at the end of

the same millennium. All-in-all little had changed in the basic operation and concept, apart from: 1) a wider recognition and impact of professors and researchers, due to the faster communication means, 2) a wider consciousness in the society of what university is and what it means to join one and, more importantly, 3) public funding that provided a far greater part of the population the opportunity to go to university. Additionally, the business community had grown more and more conscious of the advantages of innovation with respect to competitors. That was "my" present.

Skip forward twenty years to nowadays

The importance of research and impact on society, as well as its recognition by the wider society, has grown steadily, accelerated by faster and easier communication. Yet, something that I noticed in my days at university has grown far broader and larger today, which I think this needs to be taken into account when taking a look at the future.

Whilst the basic concept of the university is still the same (an educational organisation consisting of students benefitting from the knowledge passed to them by a body of professors, which is underpinned by research carried out to improve the body of knowl-

edge), the modus operandi has changed dramatically in a more diffused and outreaching way. Once the university was strongly localised and characteristic of a place. Nowadays university courses can easily reach students from a distance, even in other countries, by means of internet and on-line lectures. Even complete master degrees done through distance learning are more and more common.

The concept of the university as a physical place is evolving toward a mixed mode, at a location and online, the latter is still growing and competing in importance with the former (e.g. the Open University in UK is one of the largest in Europe by number of students and most of them are online). Likewise, the link to the city or town where the university was born still remains – in most cases also in the name – but is starting to increasingly assume the value of a brand of the specific culture of the university that bears it.

Another element growing more diffuse is the offer of the university to non-full time students. Historically, the offer has been focused on full-time students that were attending classes and sometimes on part-time workers. Nowadays the offer is far wider, reaching into users who have a full time job and are part-time students. To a far greater extent, universities are

offering just short courses to be held either at the company site or online for its employees. Concepts of “Lifelong Learning” and “Continuous Education” that emerged during my time at university are now fully implemented and part of everyday life. Therefore, universities are moving beyond being located in a place, the town/city, nor in a specific time of someone’s life (the time of being a student) towards a more diffused model, reaching far beyond the local town/city and being present throughout the lifetime of those who wish so.

Fast forward to 2040

Regarding the general model at the core of university, I expect it to stay the same, no big surprises: students learning, professors teaching, researchers researching. Much in the same way, I expect that the constant trend of increasing importance of research and the adoption of its results by the wider society will continue, with improved communications.

Regarding the shift towards a more diffused model the trend is exponential and new communication technologies are bringing it to newer and newer heights, blurring our sight as we look into the future. However, I will attempt to provide a vision...

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Following such a trend, I’d expect a new sort of university operating mode, where the university travels with the student, the professor and the researcher and iterations among them will be progressively more “virtual” as opposed to “in person”.

It will be possible to attend lessons, teach and research virtually anywhere while still keeping connected with all the rest of the university community.

It will be possible that universities will open their offices/sites closer to stakeholders that could make use of their activity (trainings, research). Today campus offices of large companies embody the interest of a company in a particular research activity and, on the other hand, researchers can spend some time in a company.

In 2040, I’d expect there will be also something like university offices (either physical or virtual) on company sites, both for research purposes as well as in training employees. Also, I see the operations of most successful universities expanding globally, heavily leveraging on available communication technologies to seat exams and dissertations.

The course offerings will still cater to full-time students, however increasingly to a broader range of part-time students, of all ages, with more capability to efficiently deliver know-how to an increasingly diverse audience.

As result of this, I'd expect that the online presence of the universities to grow by far in importance, together with numbers of students, compared to attending classes in person at the university physical location. The diffused mode of university will become more far reaching across space and time (the life of students).

This would also mean that there will be a growing number of research facilities like CERN – the European Organization for Nuclear Research is one of the world's largest and most respected centres for scientific research in Switzerland. Its business is fundamental physics, finding out what the Universe is made of and how it works¹ – where very expensive equipment benefits more researchers from many universities thanks to the improved connectivity.

The ideas and thoughts provided are those of my own opinion and do not necessarily reflect the opinion of Airbus Defence and Space Ltd

¹ CERN Accelerating science. Retrieved from <https://home.cern/>



Paolo Bianco, Manager of R&T Co-Operation Engineering of Airbus Defence & Space at Airbus is approaching 20 years of experience in space industry. He started his career at CGS, OHB Italian subsidiary, after a period of free-lancing as project management consultant, and covered various roles as space system engineer and as project manager of technology developments.

In 2007, Paolo moved to Astrium, where he joined the electric propulsion team in Portsmouth, soon becoming its team leader. Within the position, he worked on systems for scientific interplanetary missions and kept the team at the world leading edge technology. He then became global R&T cooperation manager for UK and Asia-Pacific. Paolo got involved in the world of Quantum Technologies in 2015 and started investigating and assessing on how to apply them to Airbus operation and products.

Leadership Skills are at Risk from the Virtual University

Steve Price

A key set of skills needed in the industrial workplace of the future will be those which are characteristic of today's successful entrepreneurs. By 2040, technology and the desire for efficiency will have combined and caused some universities to out-source their undergraduate teaching. Hopefully others will resist these pressures and will continue to provide the opportunities in which essential entrepreneurial skills can be learned.

Today's industry is already seeing increased automation and fragmentation leading to a reduction in the entry-level and development roles through which its current leaders have passed. At the same time, as young professionals impatient for variety are pushing the trend for increased freelance working, employers see job rotation between supply chain partners as one solution to develop talent with the necessary breadth of industry experience

Whether desired or not, a career in industry is likely to include frequent changes of employer, or client. It will still be necessary to use time and resources effectively and efficiently, to manage and motivate others, to be able to influence and to sell an idea, to build and maintain networks inside and outside the company to be ready and available when needed to come together to solve

complex and uncertain problems. But increasingly valued will be the skills to work in, to lead, and to move between teams comprising different cultures, generations, physical locations and disciplines, employed or engaged by different companies, all working on the same project.

The Ent-Ex Entrepreneurial Skills Report¹ featured a survey of 50 entrepreneurs by over 450 students across Europe from 2011 – 2015. The results showed that these industry leadership skills were very similar to those also exhibited by successful entrepreneurs. Common to all of the entrepreneurs surveyed were the skills, including:

- Effective time and self-management
- Project management
- Leading a team, managing and motivating others
- Effective influencing
- Effective networking
- Effective resource management
- Creative problem-solving (demonstrating attitudes of resilience and opportunism)
- Willingness and ability to learn from their experiences

The entrepreneurs recalled that these skills were mostly learned by practical experience. Almost all (48 out of 50) first had a 'proper job'. They learned, or at least developed to a level they felt sufficient for a start-up, their entre-

preneurial skills at their employer's expense; usually through practice in a variety of jobs with increasing responsibility, often with in-company mentors, supported by informal in-company workshops.

But before their first job, whilst attending university, or high school, all had developed, through practical on-campus experience, some basics in these transferable, entrepreneurial skills. And these basics had clearly been sufficient to differentiate them in the competition to be employed from those others who achieved similar academic qualifications.

Examples of practical learning experience were not just of small scale commercial ventures. Skills had been often been developed in sports clubs and scouting at school, and then at university. Our successful entrepreneurs weren't just participants in things such as sports, amateur dramatic or music societies, they also took on the responsibility of running these volunteer organizations.

Universities generate and disseminate knowledge. On the other hand, skill, the ability to apply knowledge appropriately at will, is developed best by cycles of planned practice, and review. This process can be accelerated by the observations of action and input provided to the learner by a reliable third party.

I'm sure elsewhere in this Thoughtbook others have described the technology-led existential threat to the university as a place to go to in order to receive knowledge. Even today, exciting and engaging professorial performances are available online. If these can also offer employer-credible, remote evaluation and accreditation of students, then the 'stay at home' virtual university will thrive. In one efficiency-driven sweep, undergraduate teaching can be 'out-sourced' to the Americans, leaving our own universities to concentrate on lucrative research.

But take as an example any university, virtual or face-to-face, teaching an entrepreneurship class. Students might acquire knowledge of a variety of other entrepreneurs' ventures and experiences packaged into case studies, tools and techniques. Markets will quickly decide how relevant such knowledge is to a successful entrepreneurial future (in my opinion, the current lucrative bubble will soon burst). Meanwhile to an employer, success in such a class is no measure of the entrepreneurial skills or capability which a graduate can bring into the workplace. Far more effective in developing these skills are the non-formal activities students engage in while at university.

Often for the first time in their adult lives, undergraduate students are faced with a transition from being a relatively big fish in their small school pond to being a much smaller fish in a much bigger multi-cultural and multi-disciplinary pond. Taking on a role in a student-led volunteer organization, where hierarchies tend to be flat, non-existent or maintained by strength of character, gives plenty of opportunity to practice team-working and persuasive skills especially where formal authority is lacking.

For those organizing events, a real, uncertain, market exists where real people will promise you their support one day only to get distracted by other choices the next, and you must survive this disappointment and be resilient to face the next challenge for your society. Budgets and resources are invariably tight and creative ways must be found to make these stretch. Those leaders who develop the (entrepreneurial) skills to successfully deliver extra-curricular activity for their peers in this environment, will be well-regarded by future employers - or investors.



But if physical universities are replaced by virtual, the on-campus population will disappear, and along with it the opportunities to practice the provision of these extra-curricular activities on which so many of today's workplace leaders, as well as many successful entrepreneurs, cut their leadership teeth.

Therefore, whilst university 2040 must evolve, if it is to encourage the development of entrepreneurial skills, it must retain its ability to bring together large numbers of young adults with extra-curricular time on their hands to structure for themselves. The physical university campus which survives and provides reputable and reliable non-formal learning experiences will be of increasing importance to students, recruiters and talent managers alike.

¹ Price, S., Vandekerkhove, A., Lara Egli. (2016). *Ent-Ex Entrepreneurial Skills Report 2016 – A Study of Entrepreneurs, their skills, and the importance of employment and non-formal education in their development.* European Institute for Industrial Leadership.



Steve Price is a Chartered Engineer with a business education from Cranfield and Oxford universities. After 20 years in the chemical industry building new plants and new businesses on three continents, he has used the skills and networks he developed to create a unique not-for-profit industry association.

Established in 2003 the European Institute for Industrial Leadership (EILL) helps member companies in the process, plastics and engineering sectors, to research issues likely to affect their future leadership. The EILL has published fifteen industry-wide reports on issues ranging from 'The Shortage of Engineers' to 'Leading and Retaining the Connected Generation'. This research has been presented at more than 30 international conferences and feeds into programmes which help 'next generation leaders' develop the skills they'll require in their future workplace.

Steve has been an expert to the Consultative Committee for Industrial Change at the European Economic and Social Committee. For the last ten years he has also been a member of the advisory board of JADE the European Confederation of Junior Enterprises.

Higher Education: Youth, Universities, Mobility, Research and Technology

Maria Chiara Carrozza

We are living the fourth industrial revolution, or the second machine age, when robots and bots will enter into our world and probably support (or replace?) us in performing activities that until few years ago were considered only pertaining to human beings, such as driving cars, investing our money, cleaning the house or taking care of our elderly relatives.

Technology is not only changing the way we produce goods and offer services but also the way we communicate and interact, and ultimately intelligent machines will take decisions in our place whilst driving a car or supporting us in financial investments. The impact of the new technological paradigm will change consolidated business such as automotive production and mobility.

Some of the most promising enabling technologies of the fourth industrial revolution will be robotics, artificial intelligence, cloud, biotechnologies, gene editing, bionics, nanotechnologies. In recent years, we have assisted with the development of collaborative robotics, whereby robots are coming closer and closer to humans, in order to not only support their work but also their social activities. We are expecting that in the near future robots will enter in our society, in our houses providing us entertainment and assistance and these 'social robots' will act in

symbiosis with humans to share objectives and actions. Robotics and technologies will be integrated with bionics and bioengineering, thus entering in our body, and the boundary between natural and artificial system will be continuously explored.

We already know that robotics and artificial intelligence will not only address problems of health care and individual personalized medicine, but will also have impact on our day-to-day lives. Similar to what happened in previous industrial revolutions, new enabling technologies will change not only the production of goods and services, but also the structure of the society, and ultimately will displace or change the number and quality of jobs.

In parallel we are living in a society characterized by 'global challenges' for governments that require special collaborative and cross-disciplinary efforts from science together with technology in order to face climate change, migration, food and water shortage, social inequalities, energy production, urbanization antimicrobial resistance and similar plagues. These so called 'mega trends' are demanding urgent international collaboration among scientists, who must be engaged in order to develop appropriate solutions with creativity and an anti-disciplinary attitude.

This is the expectation for science: to solve problems and save the world.

The world in which our younger generations are growing up is complex and in transformation. We have the responsibility of changing the higher education system in order to take into account the new context in which we live, and the competences and skills that will be required in future society. Unfortunately, the school and university systems are based on paradigms still belonging to the last century, so we must reform them in order to prepare future generations to be creative actors in society.

There is a strong demand for new skills and new competences for the future generations to face this transformation that is revolutionizing our society.



For the European Union, it is fundamental to address the urgent issue of reforming the higher education system in the scenario of the fourth industrial revolution. The risk is to miss the opportunity to become a digital single market where innovation and creativity make the European Union at the forefront of the industrial renaissance.

To become more competitive and prepare our generation, we must be able to integrate the regional and local education system into a European Research and Education Areas where we must support brain mobility, cultural exchange, innovation and lifelong education. We have also to include our social state and welfare state in the scenario of reforms, because we need a more sustainable development, where we can be innovative but also inclusive fighting inequalities at all levels.

We observe that some parts of the world, the reaction of people is to demand more walls, and boundaries are becoming more and more difficult to be crossed. Is this the solution to overcoming global challenges? How can we engage the public in understanding the impact of the transformation and trust in the future?

Education, lifelong learning and outreach are crucial in this picture. We must address these questions in preparing the reform for our Higher Education system, in order to fulfil its mission in the future and prepare future generation.



Maria Chiara Carrozza is an Italian Scientist and Member of the National Parliament, Chamber of Deputies, Foreign and European Affairs Committee. From 2007 to 2013 she served as Rector of Scuola Superiore Sant'Anna and in 2013, she was elected Member of the Italian Parliament. From 2013 to 2014 she served as Italian Minister for Education and Research. Maria currently coordinates the NeuroRobotics Area in The Biorobotics Institute at Scuola Superiore Sant'Ann and since 2016, is the President of the Italian National Group of Bioengineering.

Currently, she is member of the Italian Task Force in Artificial Intelligence of AGID (Italian Digital Agency) and Chair of the Panel for the interim Evaluation of FET Flagships Program for the European Commission, DG Communication Networks, Content and Technology. She is member of the High Level Steering Committee of the FET Flagship in Quantum Technologies. She is partner of the IUVO, a start-up in wearable robotics, the spin-off of The Biorobotics Institute, and serves in the Board of Directors of the Piaggio Spa group.

How Data and AI May Reshape Education

Alessandro Curioni

The primary role of the university is and always has been to equip its students with the fundamental knowledge required to become experts in their professions, and to teach new skills in emerging fields to master future challenges. Major technology advances will require new curricula that provide students with a solid understanding of the technology and its broader implications – also from a business, economic, or societal point of view. To succeed here the creators of new technologies need to engage closely with the universities to bring the advances into the curricula.

Tracking the historical development of different areas of technical science and the waves of innovation can provide us with insightful examples of how universities can best support industry through education and training.

In 1930, the CEO of IBM Thomas J. Watson Jr. discussed with people in Columbia how the tabulator machine could be used for the automated rating of university tests. This established a first step towards creating a new scientific field that is today known as Computer Science. In 1945, IBM created the Watson Scientific Computing Laboratory at Columbia University, its first laboratory devoted to pure science. Around 1950, the first Computer Science courses were established at uni-

versities and in 1970 it became an established discipline.

Around the turn of the century, the first digital revolution accelerated very strongly. New digital businesses emerged and novel services were created. During this period more value started to be created out of services than with classical manufacturing. This development created the need for a deeper understanding of services and their optimization, which in turn led to the introduction of the discipline of service science in academia. The key to service science is its interdisciplinarity, focusing on service as a system of interacting components including people, technology, business, etc. Service science integrates aspects of multiple disciplines – including computer science, cognitive science, economics, organizational behavior, human resources management, marketing, operations research, etc. Within about 10 years this discipline was established in academia with over 400 courses offered in 2010 and was driven by a strong collaboration between academia and the Computer Science Industry.

Today, we find ourselves in the middle of another big innovation wave, fueled by the rapid increase in data from various sources such as Internet-of-things devices, social media, or computers. Every month over 50 Exabytes of data is produced (Note: one

exabyte could hold a hundred thousand times the printed material at the Library of Congress). This extremely large pool of data demands automated techniques that efficiently extract and aggregate the contained knowledge and thus enable humans to take informed decisions and actions. It is the Artificial Intelligence (AI) technology that has the potential to handle such large data volumes automatically and to change not only the technology landscape, but to have a fundamental impact on people's lives and professions. Humans are on the cusp of augmenting their lives in extraordinary ways with AI. Next-generation AI enabled systems will work side-by-side with humans, accelerating our ability to create, learn, make decisions, and think.

These systems will become pervasive in many areas and already have applications in cancer research, financial decision-making, oil exploration or education.



Many new challenges need to be addressed to fully exploit the potential of this technology, including ethical questions, the need for new ways of human-machine interactions, the ability to make AI decisions understandable and acceptable by humans, all the way to changing characteristics of today's professions.

These requirements lead to the need for new curricula at the universities and possibly new majors, if not departments, which enable students to build learning machines, interact with them, and, more importantly, to address the much broader challenges in collaborative, interdisciplinary ways.

The rate of change at which these technological changes happen is a real challenge for universities, requiring them to adopt more agile forms of education. A report by LinkedIn shows that two of the top four majors in 2014 were not in the list by 2016. Can universities adapt changes at the rate of technology pace? They have to answer the question, if a three or four-year degree is valid with today's rapid changes.

As AI systems become much smarter in their specialized fields, it becomes crucial that students navigate proficiently in these interdisciplinary domains and are enabled to "connect the dots". In the past, typically a successful expert was one who combined deep theoretical expertise with excellent practical skills in a specialized area and the ability to collaborate across disciplines with experts in other areas. Consider a material scientist who first had to acquire, digest and summarize the relevant knowledge from the literature for a particular field, and then use his experience to gain new insights and extend the existing knowledge.

Now, that AI systems can scan millions of new publications for any new insights, the task of summarizing the existing knowledge from literature can be completed much faster and at a much larger scale. The role and required skills of the material scientist will change significantly. Instead of spending on literature studies, he/she will need to take additional and complementary aspects of the problem into account, such as the final use of the material in a product, the production process itself, or the business case. Tackling the problem from a broader knowledge base and in a much more

holistic way will lead to improved products and to new professional challenges and opportunities for the material scientist.

The skills that will define a successful expert in the future will be centered around the expert's ability to work across disciplines, to understand and connect multiple fields, and to create value in interdisciplinary areas that couldn't be created in a siloed, specialized environment.

It will be the joint responsibility of the industry and universities to work together to develop those cross-disciplinary curricula and to prepare the future experts for successful carriers in rapidly changing professional environments.



Dr. Alessandro Curioni is an IBM Fellow, Vice President of IBM Europe and director of the IBM Research Lab in Zurich, Switzerland. In parallel, he serves as the Watson IoT Research Relationship Executive. Dr. Curioni is an internationally recognized leader in the area of high-performance computing and computational science, where his innovative thinking and seminal contributions have helped solve some of the most complex scientific and technological problems in healthcare, aerospace, consumer goods and electronics.

He was a member of the winning team recognized with the prestigious Gordon Bell Prize in 2013 and 2015. Alessandro started at IBM Research – Zurich as a PhD student in 1993 before officially joining as a research staff member in 1998, where his most recent position was Head of the Cognitive Computing and Computational Sciences department.

The Future of Education, Work and Human Engagement

Soraya M. Coley

In the time it took you to read this sentence, the future became the past. Albert Einstein said he never thought of the future “because it comes soon enough.” Of course, for Einstein, all time was relative!

But for those who dedicate themselves today to educating the leaders, innovators and entrepreneurs of tomorrow, time is of the essence. If we are always one step behind the future, how do we keep ahead of the curve?

We must examine how the nature of work is evolving and how higher education intends to evolve with it.



Some futurists paint a bleak picture of a world in which workers are supplanted by machines, creating a stark landscape of lost souls outdone by their own inventions. It’s an overly simplistic and dystopian view that ignores the fact that the thirst for knowledge and a willingness to take risks have always driven humankind to progress.

The university has fostered that drive for nearly a thousand years.

Although there are challenges, we must continue to nurture the critical relationship between the liberal arts and sciences to create a path to a sustainable future.

As we leap from one stunning technological advancement to the next, with the disruption that inevitably occurs, we must prepare students to adapt to the needs of the ever-changing Future of Work. But educators must also be willing to lead the conversation about the value and nature of work.

While it is true that work provides income, a career is about much more than a paycheck. Work offers purpose and helps to form our identity. Ideally, it offers the opportunity to serve others. Work improves our communities locally and globally.

Our duty is to understand the challenges students will face, the essential knowledge they will require, and the skills they must possess to succeed. How do we teach students to cope with disruption — in the workplace and in society? How do we help them identify their gifts so that they can achieve their potential?

The speed of technological advancement today is breathtaking, and students require technical skills to compete. But we know that as skills are mastered, new ones will soon be needed.

That's just one reason an education cannot focus exclusively on high-tech proficiency. Students must be taught to learn and adapt, and to embrace learning throughout their lives. Mastering new technology is vital, but thinking critically and learning to solve problems are the real keys to unlocking opportunities. In our growing gig economy, most people will change jobs at least a dozen times during their working lives. If students can gain a mindset along with a skill set, they will be well-positioned to succeed.

A shifting labor landscape demands adaptability, resilience, entrepreneurial spirit, cultural competency, perseverance and the ability to communicate. Equally important is engagement — making the connections that enrich the human experience.

We already see that artificial intelligence, automation and analytics are shaping the Future of Work because they are shaping us now. But for all the buzz (and the fear) about AI, there is no question that the Future of Work has a human face. It's inevitable that more of us will be working alongside machines and computers to get the job done, whatever "the job" is. We already do this today when we run an Excel spreadsheet or ask Siri for directions.

Big data alone can never replace

big ideas, but it can help us work smarter. For humans, adaptation will yield opportunity.

Rapid change can be overwhelming, but we've been here before. The Industrial Age brought life-altering advancements, freeing us to launch a Digital Age in which information connects us in ways once inconceivable.

Although higher education must keep pace with the needs of the job market as a vital link between employers and new graduates, earning a degree is about much more than landing a job. The university of tomorrow cannot become a "coding college" focused only on job training that cranks out graduates who have mastered algorithms but are unable to work on a team to solve problems.

A broad and deep education, with less emphasis on the type of degree a student earns, will ensure they remain competitive. So, what are the core skills that both a history major and an engineer need to be successful?

In a 2013 national survey of business and nonprofit leaders by the Association of American Colleges and Universities, 93 percent of respondents said that "a demonstrated capacity to think critically, communicate clearly, and solve complex problems is more important than [a candidate's]

undergraduate major."

As the president of a polytechnic university, one of only about a dozen in the country, I see firsthand the advantages of an experiential education that offers students the opportunity to immerse themselves in multiple disciplines. Our faculty emphasizes hands-on learning where students solve problems creatively, take intelligent risks and work collaboratively.

But a comprehensive education must provide even more. In addition to critical relationships with faculty, students should engage with their communities, corporations and local government leaders. This is a bedrock of democracy.

The greatest investment we can make is in people — to help them work with others different from themselves, and to evaluate competing points of view.

"Your brain is not a hard drive," Brian David Johnson, futurist in residence at Arizona State University's Center for Science and Imagination, told the audience at an Adobe Think Tank conversation in early 2017. He believes machines will take over most jobs in the coming decades, but says people shouldn't worry.

"We need to embrace what humans are good at," Johnson said.

“We’re great communicators. We have emotional intelligence. All of this [automation] frees us up to be more human.”

And he is encouraged that more free time will mean more opportunity to raise the standard of living for everyone: “I tell people if you want to prepare for the jobs of the future, just be human.”

We also know that the face of humanity in the workplace is increasingly diverse, and that with ethnic, racial and gender difference comes diversity of perspective and experience. As educators, we must insist on an inclusive mission that makes clear how to engage a diverse student body and the communities we serve.

We must help create a society that values lifelong learning by making education more accessible, especially for the adult learner. Online education will continue growing and technology will enable information to be shared more widely.

The Future of Work is about more than automation, calculation and faster computers. It’s about adaptation, human engagement and what deep learning and meaningful work can bring to individuals’ lives and the collective good. It’s about our connectedness to each other.

Rather than simply responding to the nation’s future needs, higher education must help set the agenda. By preparing students today, we set a course for tomorrow’s success.

Because Einstein was right, of course. The future is already here.

¹It Takes More than a Major: Employer Priorities for College Learning and Student Success (2013). Washington, DC: Association of American Colleges and Universities and Hart Research Associates.



Dr. Soraya Moore Coley believes that a quality education remains one of the few pathways to social and economic well-being in a global society. Often referred to as a “student-centered and community-minded” administrator, Dr. Coley has built bridges between the university and the community through her service, her research, and her work as an administrator. With over 28 years of academic and administrative experience, Dr. Coley is the sixth President of California State Polytechnic University, Pomona and the first woman to serve in that role.

Previous appointments included Provost/Vice President for Academic Affairs at California State University, Bakersfield, and Senior Research Fellow at Children and Family Future’s National Center on Child Welfare and Substance Abuse. At Alliant International University, she was the Provost/Vice President for Academic Affairs and is Professor Emeritus at California State University, Fullerton, where she also served as Dean of the College of Human Development and Community Service. Dr. Coley earned her bachelor’s degree in sociology and received an honorary doctorate of humane letters from Lincoln University (PA), and her MSW and Ph.D. degrees in Social Planning and Policy at Bryn Mawr College’s School of Social Work and Social Research.

In 2040, Universities Will Be a Place of Dreams

Michael Bolle

In 2040, universities will be a place of dreams, much more so than today. As early as 1929, Albert Einstein said it best in an interview: “Imagination is more important than knowledge. For knowledge is limited [...]” As time progresses, universities will no longer be places of training for administrative elites whose life purpose is to maintain and expand power at the state level. Rather, institutions of higher learning will increasingly reflect the ideal that the quest for truth calls for freedom.

To a certain degree, this will mark a return to the roots of universities, to the academies of the Antique era in Athens and Alexandria. When the world’s first universities opened 900 years ago in Bologna and Paris with the amalgamation of different schools that were organized by students themselves, Europe took the lead.

The universities of the future will also increasingly be voluntary shelters of the mind in the quest for new ideas. This will not happen automatically, as there will be resistance. The universities of the future will have to fight for their independence and special rights, as they once had to against kings, bishops, and cities. This time, however, states, religions, and economic monopolies will be replaced with commercial interests. At their core, universities will also

remain communities of teachers and learners that enjoy a special legal status.

If students, professors, researchers, and practitioners continue to meet and spend time together at unique historical locations, there will be continuity. However, the campus of the future will be expanded to the entire world with the help of new technologies. The virtual reality of the future will erase geographical boundaries. It will thus become possible to attend lectures and seminars at Harvard, in Leipzig, Capetown, or Beijing, as presence will no longer be linked to physical location. Holograms will be created that will not merely resemble ghosts, but will have the technical ability to see the bright light of New England, feel the African sand between their toes, or taste the flavor of Oolong tea.

While past university classes were marked by the spoken word, unspoken thought will become more relevant in the future. This will be made possible by new technologies that will combine face recognition with the interpretation of reactions and temperatures, as well as the interpretation of electrical impulses based on individual behavioral patterns. The aim here will not be to control or even restrict thought. Rather, the objective will be to practice and apply logical conclusions and

scientific lines of argumentation. More than ever, students will be able to discover their talents at an early stage and improve their weaknesses in a targeted manner, as testing methods will be more individualized than they were in the past. University debates will improve in quality, as new decision-making algorithms will make it possible for debaters to measure the strength of their arguments directly in personal networks.

More than ever, students will be able to take strong positions and weigh different opinions. This will sharpen their minds, and the practice will better prepare them for real life than is currently possible. Arguments and counterarguments will encourage independent thought and create an intellectual foundation for the life to come. Graduates will thus be equipped with an armor of knowledge and values that will form the basis of their self-worth, and which cannot be taken away from them. Above all, this type of education will also be an asset when technology fails or improvisation is called for. The ability to ask critical questions will become the ultimate asset. University testing will also be easiest for non-conformists who remain calm even in extreme situations, who can draw new connections between subjects, recognize subtle interactions, and seek new ideas for the benefit of the community.

The world's best minds will be able to exchange knowledge at all times, and the knowledge gathered will be made available to the world in real time. While libraries will continue to exist, the contents of books will be retrieved either in writing, verbally, or through thought. There will no longer be language barriers: just as Latin united students in previous centuries, applications with simultaneous translation will translate the written and spoken word to such a high standard of quality that people will speak to each other in different languages, but still have the feeling that they grew up together.

Auguste Rodin's *The Thinker*, which represents the sheer power of thought without any external help, will continue to symbolize the measure of all things. In two decades' time, technology will continue to serve people, but will not be an end in itself. The human mind will still not have reached the limits of its ability. Rather, in symbiosis with technology, it will be able to reach new heights. While there will be a greater understanding of the human brain, there will still be a need for research.



While even the best minds will remain mortal in 2040, they will live longer and their knowledge will live on even after they die – as avatars, their words and movements will be available to future generations in the form of ancestral portrait galleries.

The university of 2040 will be a meeting place for young people who will be characterized by lightness, courage, and tolerance. It will be more attractive than ever as a place that promotes intellectual awakenings. Achievements will never be seen as enough, but rather as a base station for reaching new peaks. Current performance will determine those who learn and those who teach. The boundaries will be blurred and flexible project groups and networks will take shape between faculties on a needs-oriented basis. Curiosity, innovation, and optimism will be the most decisive factors in determining academic reputation. The boundaries between the humanities and the natural sciences will disappear. Moreover, universities will be a place of pure *joie de vivre* and celebration.

More than ever, university will become attractive to people for

whom feelings and desires have gained significance in an age of machines, data, and networks. Relationships that last a lifetime will take shape here.



Dr. Michael Bolle, President of the corporate sector for research and advance engineering at Robert Bosch GmbH, received his PhD in electrical engineering from the University of Bochum. Since 1992, he held various positions at Bosch and affiliated companies. In 1999, Michael co-founded Systemonic AG, which developed application-specific standard products for the wireless communications industry, including wireless multi-protocol silicon systems.

After the company was acquired by Koninklijke Philips Electronics NV in 2002, he became the Executive Vice President (EVP) at ADIT, a joint venture between Bosch, Denso (Germany) and Kariya (Japan). In the following years, Dr. Bolle worked for Robert Bosch Car Multimedia GmbH as EVP engineering and business units. He holds his current position since 2014.

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**‘VISION IS THE ART OF
SEEING WHAT IS
INVISIBLE TO OTHERS.’**

– Jonathan Swift

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FUTURE OF SCIENCE AND THE ACADEMIC WORLD



Universities on the Market: A Strategic Playbook for the Next 20 Years

Markus Perkmann

As an organisational form, the university has proven extraordinarily resilient. With the first university established in Bologna more than a 1000 years ago, universities have proven to be able to change and adapt. Today, while by no means being in crisis, universities are facing a variety of challenges. A common thread characterising many of these challenges is universities' relationship with the forces of the market. Universities have embraced the market in various ways, from selling intellectual property to marketing degrees as premium priced customer propositions to competing for scholars in the market for academic labour. This has sometimes resulted in tension and conflict both within the academic system itself as well as in relation to wider stakeholders. In this piece, I will outline some of the key areas in which I believe strategic action will be warranted.



On the whole, I argue that while embracing the market has been productive and beneficial for the university system, universities have to safeguard their distinctiveness and autonomy from other spheres of society.

First, defend the distinctiveness of public science

The type of science conducted at universities tends to be considered too “basic” by the corporate sector, and hence much of it would not be performed without the public science funding system in place. In most advanced science economies, the corporate sector indeed contributes less than 5% of the total cost of university research. Simultaneously, it is beyond doubt that public science, both in terms of its knowledge output and the production of skilled researchers, generates a very significant input to innovation pursued in companies, government and society at large. The public science system has its own professional code, incentive systems and ways of working, and generates outputs that are made public and accessible to everybody essentially for free, provided they are equipped with the necessary absorptive capacity. One may argue that only a system with the above characteristics – distinct from the corporate sector and funded publicly or philanthropically – will be able to generate those outputs that are valued by corporations and other innovators yet not produced by them. Therefore, it is incumbent upon universities to ensure they retain their distinct identity oriented upon curiosity-led research, enabling them to complement – rather than substitute –

corporate innovation machines.

Second, defend the independence of universities

Being located within a distinct societal sphere also enables universities to be relatively independent from other social actors. There is a strong case to be made that our societies need universities and their academics to provide distinct viewpoints that in some cases may contrast with those provided by other players, be they governments, corporations or social forces. The provision of opinions and judgements independent from commercial and political interests, for example, is important in areas including environmental protection and climate change, nutrition and agritech, health care and public health, as well as inequality. It is incumbent on universities to take their intellectual independence seriously, and ensure it is not compromised by their resource acquisition or other type of dependencies.

Third, maximise the impact of science on economy and society but not necessarily via commercialisation

Taking the lead from the U.S. Bayh-Dole Act in 1980, many universities around the world have established technology-transfer offices and embraced commercialisation of intellectual property as a prime mode of securing

external impact. While commercialisation undoubtedly remains an important channel for university science impact, universities have started to embrace a greater variety of different channels. These include other types of commercialisation, such as the “selling” of expertise via contract research and consulting. But more importantly, they also include less directly commercial forms of engagement. For instance, some universities have started partnering with corporations on the basis that all knowledge produced is made available for free and adds to the knowledge commons of an industry. The Structural Genomics Consortium is an example of such a partnership where pharmaceutical corporations sponsored the creation of academic knowledge in return for providing important basic knowledge that would accrue to the industry as a whole. Many universities have already widened their notion of impact to encompass a very broad variety of ways in which they seek to positively impact society. Universities have no natural right to be funded by tax-payers’ money (and note that even private universities benefit from having charitable status), and hence it appears only fair that they contribute to the social good in this way.

By ensuring they remain distinctive and independent, and adhere to their social responsibility, uni-

versities will continue to thrive as a force for good in global society.



Markus Perkmann is a professor and head of the Innovation & Entrepreneurship Department in the Imperial College Business School at Imperial College London. He is the academic director of the Imperial Enterprise Lab which is Imperial's extracurricular center supporting student-led entrepreneurial projects. His primary research interests are in the study of innovation and entrepreneurship in science-intensive contexts, and organizational theory, particularly hybrid organizations and candidate-audience relationships. He received his PhD from the University of Lancaster, and is the joint editor-in-chief of 'Innovation: Organization and Management'.

The Sharply Stratified Academic World in 2040 – and Why It Is Unavoidable

Marek Kwiek

The focus on elite universities



The university sector in 2040 will be sharply stratified: globally and intra-nationally. There will be a small ultra-elite league of well-funded research-focused universities, globally and in each country, and the rest of universities. Importantly, this sharp vertical differentiation of institutions will be accompanied by equally sharp vertical differentiation of the academic profession.

There will be a long continuum between the haves and the have-nots in terms of opportunities at the disposal of institutions and individual academics (or their teams)¹. But, the important distinction will be between the top and the rest. Research will be funded almost exclusively in this small super-league of institutions.

How the global university system and the national university systems will look like? Powerful vertical stratification will be the rule. There will be no similarity between the super-league of institutions, comprising in most countries a maximum of 1-2 universities, and the rest. Only in highly developed

OECD nations there will be a larger number of globally visible universities, with countries such as the USA, the United Kingdom, China, Japan, and regional academic superpowers such as the European Union comprising the bulk of the global Top 500-1,000 universities. The European Union by 2040 will be smaller, richer and perfectly integrated politically, economically, socially, and academically. The 500-1,000 out of about 20,000 universities in 2040 will be the global leaders, with drastically different institutional features, total funding, research funding, and academics. The vertical stratification will be based purely on academic research capacities and academic research production – with the levels achieved by the Top 500-1,000 beyond the reach of the remaining thousands of universities.

The ‘rest’ will focus on teaching

National research funding will be concentrated in the small minority of institutions, with huge intra-national and cross-national mobility of top academic minds. The mobility will be driven by the scarcity of opportunities available and the sharp contrast between top institutions and the rest of them, nationally and internationally, in terms of the type of academic work, academic remuneration, and teaching/research orientation². Top institutions will be focused

almost entirely on socially- and economically-relevant research and they will be preparing national and global elites. The Anglo-Saxon countries, with high fees and declining public financial support, will additionally be garnering huge private funds from teaching the elites.

The rest of universities – some 95 percent of them globally – will be teaching-only institutions. Not much different from current secondary schools, with no research involvement, small remuneration and most often part-time and/or contracted staff. Working conditions will be hard and chances of the upper mobility in national higher education systems will be limited. When we look at the current private higher education in all countries except for the USA and Japan – all universities except top ones in 2040 will be similar to private sector institutions as they operate today. Also, in almost all countries (perhaps except for the European Union countries), higher education will be fee-based rather than tax-based. The increasing role of fees will transform higher education beyond recognition and will make it similar to currently existing private higher education.

The concentration of research activity

By 2040, academic research will be confined to elite national and global universities. Its increasing

institutional concentration intra-nationally will be driven by the growing costs and complexity of academic research: concentration accompanied by academic mobility to top institutions will be viewed more favorable than dispersion and academic immobility by both policymakers, academics and the general public. The social stratification and the upper social mobility through higher education will be limited to some places in national systems only: the number of elite-producing universities will be much lower than today, and the role of higher education credentials in general, except for credentials from top universities, will be diminished³. We will all be Simon Marginson's "high participation systems" in which 80-90 percent of the age cohort will be trained in the higher education sector⁴.

For national higher education systems, to remain relevant and to remain publicly fundable, the need to be vertically stratified will be as high as never before. The role of the general public in the strategic distribution of tax-based public resources will be growing, with an increasing competition between the healthcare sector, the pensions sector, and higher education. In addition, publicly funded infrastructural needs will be much higher than today – resulting in sharp competition for public dollars. Universities will

be using huge public funds for research and innovation – but only in top places. The vast majority of universities will be severely underfunded, with students increasingly paying tuition and requiring strong links between teaching and labor market needs.

The massification of higher education

By 2040, there will be a tiny minority of academics full-time employed in elite universities – and a vast majority of academics employed part-time or on an hourly basis in the rest of universities. Again, the academic profile and employment relations of the current private sector in higher education globally will be prevalent in the future in the rest of universities. The public-private distinction in the case of the majority of institutions will not make much sense as almost most of them will be fee-driven. The middle-class lifestyle of the majority of university professors today will be not available outside of elite national universities. The massification of higher education means also the massification of the academic profession; and good university jobs will be highly concentrated in selected places only.

The vertical stratification of national higher education systems has already been occurring in most countries. The gap between

top universities and the rest has been growing. My assumption is that the gap will be widening and will be based on research as research is what really costs and what cannot be paid for by the third parties, be it students through fees or the business sector through university-business contracts. What truly differentiates the academic sector is research – and it will be used as a criterion for further concentration of talents and public resources.

To sum up, the university world in 2040 will be sharply divided, globally and intra-nationally, with only a few truly teaching - and research-focused institutions, and the academic work will remain current academic work only in its top echelons.

Globally, in the vast majority of institutions, academic work will mean relatively unexciting and underpaid teaching to masses of nontraditional students as close to the labor market needs as possible. That will be the end of the academic world as we know it.

¹ Kwiek, M. (2016). *The European research elite: A cross-national study of highly productive academics across 11 European systems*. *Higher Education*, 71(3), 379-397.

² Kwiek, M. (2018). *Academic top earners. Research productivity, prestige generation, and salary patterns in European universities*. *Science and Public Policy*. 45(1): 1-13. 2018

³ Kwiek, M. (2018). *International research collaboration and international research orientation: Comparative findings about European academics*. *Journal of Studies in International Education*. 22(2): 136-160.

⁴ Marginson, S. (2016). *High Participation Systems of Higher Education*. *The Journal of Higher Education*. 87(2): 243-271.

⁵ Marginson, S. (2017). *Global Stratification in Higher Education*. In S. Slaughter, B.J. Taylor eds., *Higher Education, Stratification, and Workforce Development*, Dordrecht: Springer. 13-34.



Professor Marek Kwiek holds a UN-ESCO Chair in Institutional Research and Higher Education Policy and is a director of the Center for Public Policy Studies at the University of Poznan, Poland. His research interests include university governance, academic entrepreneurialism, public sector reforms and the academic profession. His recent monograph is 'Knowledge Production in European Universities: States, Markets, and Academic Entrepreneurialism' (2013). His monograph 'Changing European Academics: A Comparative Study of Social Stratification, Work Patterns and Research Productivity' is forthcoming from Routledge (2018).

His primary research interests. He is also a principal investigator and country team leader in about 50 international higher education research and policy projects funded by the European Commission, European Science Foundation, World Bank, Council of Europe etc. He has also been a Fulbrighter, a Fulbright New Century Scholar, and an editorial board member of Higher Education Quarterly, European Educational Research Journal, British Educational Research Journal and European Journal of Higher Education.

The Entrepreneurial Academic – Fighting against a "Race to the Bottom"

Allen Alexander

If Henry Eztkowitz and Loet Leydesdorff¹ were right and the triple helix, latterly n-tuple helices², were indeed evolutionary models of society, government, industry and academia interaction then by virtue of time the overlap of the helices, within our 2040 knowledge ecosystems, should be immense. This overlap, which is essentially a 'sweet-spot' of practical knowledge creation, adoption and diffusion should be operating much more effectively than the current state, with associated huge rewards for the knowledge-based economies. But as with any eco-system that society (and the governments that represent them) interact with, not all system forces created are positive. These negative forces essentially pervert the evolutionary interactions and neutralise the potential offered by the unconstrained flow of knowledge. Perhaps in 2040 we will have begun to understand these opposing forces and will have solved some of the paradoxes within the system. The trends however, across much of Europe, show no signs of changing their dominant logic, as we fast approach 2020.

One such paradox is the role that business engagement plays in the arena of 'high quality' research. All academic institutions are keen to explain how they tailor their world class research to suit industry's needs and how their

academics create impact through societal knowledge adoption and diffusion. However, the trajectory appears to be tangential, not complimentary, viewed from the perspective of an Entrepreneurial Academic³.

Entrepreneurial Academics build high-quality and diverse portfolios of industry-funded research, often using practitioner-style research methods to create impactful and adoptable 'know-how' for the greater good of society. They have shunned the attractions of private income sources from IP rights and company directorships/shareholdings achieved by a handful of Academic Entrepreneurs at the end of the 20th and early 21st Century.

“

Entrepreneurial Academics are therefore ideally-placed to be the agents of change in the knowledge-ecosystem, where their actions can lead the way for increased interoperability between the parties acting in our knowledge co-systems.

But whilst it ought to be plain sailing for these individuals, it is becoming evident it is not. They feel that their legitimacy is challenged by the universities dominant logic, their work is sometimes seen as ‘intellectually tarnished’ by their peers and their career paths hard to navigate. Often coming late to research, with experience that undoubtedly aids in achieving impact, this group is trapped at an impasse.

One side of the impasse is the role that high quality journal publications play in the institutional landscapes across Europe. On the other side is the need to create impactful research; to share their knowledge and to create greater societal benefit. In the run up to 2020 the scramble for the top journal articles is becoming even fiercer with so called “world-leading” journals rejecting more than 99% of all submissions (in aggregate)⁴. In this academic scramble to publish, there can be no doubt that the trend toward less practical, less relevant research is prevailing and large anonymized data cohorts with tight statistical methods leave little space for practical adoption and impact, particularly if your aim is to secure intensive levels of knowledge utility in the user community.

So how is this paradox to be resolved and will it be resolved by 2040? If the current trends prevail

then one scenario sees the top research universities reverting to the intellectual but aloof knowledge-creators of the late 19th and early 20th Century, with the more applied universities filling the impact gap, curating and translating research for the masses. But this is not an evolution of the knowledge-ecosystems, more like a reversion.

If we pursue the ecological ecosystem metaphor further, perhaps we will see some stronger interventions from governments to try to rebalance this reversion away from a knowledge-ecosystem. However, if we borrow some more knowledge from the ecosystem metaphor, research has also shown a ‘protectionist’ strategy will not solve the problems faced by natural ecosystems. Current thinking suggests environmental ‘growth’ is the only answer. In 2040 therefore, will we be in a truly ‘circular and generative’ knowledge ecosystem or merely picking through the scattered remains of Etzkowitz’s helices?

One vision for a truly ‘circular’ and ‘regenerative’ knowledge economy could be that the boundaries between knowledge creation, diffusion and adoption are entirely fluid and therefore blurred. Perhaps a little like the SECI model of knowledge creation made popular by Nonaka & Takeuchi in the 1990s⁵, where Socialisation, Externalisation, Combina-

tion and Internalisation are the forces at work to create organisational knowledge. But with blurred boundaries how do we decide on our quality ranking? How do we reinforce, or perhaps revolutionise our existing methods of evaluating high quality research? Do knowledge ‘creators’ shift their role to knowledge ‘curators’ for much of the time and what role does training and education play in enabling our societies to operate in this eco-system?

These questions are troubling the authors of a plethora of research studies around the creation and management of effective knowledge ecosystems, the question, however, is will these research studies yield learnings that can be adopted by our societies or will they be destined for un-applied but ‘high quality’ research publications?

¹ Etzkowitz, H., & Leydesdorff, L. (2000). *The dynamics of innovation: from National Systems and “Mode 2” to a Triple Helix of university–industry–government relations*. *Research policy*, 29(2), 109–123.

² Leydesdorff, L. (2012). *The triple helix, quadruple helix, . . . , and an N-tuple of helices: explanatory models for analyzing the knowledge-based economy?* *Journal of the Knowledge Economy*, 3(1), 25–35.

³ Alexander, A. T., Miller, K., & Fielding, S. (2015). *Open for business: Universities, entrepreneurial academics and open innovation*. *International Journal of Innovation Management*, 19(06), 1540013.

⁴ Matthews, D. (2016). *High rejection rates by journals ‘pointless’*. *Times Higher Education*. Retrieved from <https://www.timeshighereducation.com/news/high-rejection-rates-by-journals-pointless>

⁵ Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford university press.



Dr Allen Alexander is Senior Lecturer in Innovation based in the University of Exeter Business School, where he leads a small research team, exploring the role that innovation plays in products and service provision and uses practitioner-style research to explore concepts such as Innovation Management Capability and Absorptive Capacity. He is also studying the interaction between Universities, Industry and Society and has published many high quality journal articles focusing on the development of this field.

He is an Engineer by first career, with an MSc in Engineering Management and a PhD that focused on practical aspects of University-Industry Knowledge Transfer. Allen's research is developed in conjunction with Nokia, BMW, Lufthansa, Lego, Aachen Munchener and various UK-based large companies such as EDF Energy and Selex Galileo. He also leads a range of smaller research projects exploring knowledge adoption across SMEs, micro enterprises and Entrepreneurs.

The University Challenge to Balance Society's Increased Expectations Concerning Outreach, Media Attention, as well as Societal and Economic Impact

Wim van Saarloos

Universities belong to the small number of institutions which were founded centuries ago, and which still exist with a core mission – teaching student and scholarly work – which has stayed intact. This enormous staying power rests on two crucial elements. On the one hand, the drive to remain at the forefront of science is strong enough that universities follow the changes in the way science is being done. At the same time universities are so intertwined with society that changes in society reflect back on them.

I consider it inescapable that societies, and concomitantly universities and their role in society, will change dramatically in the coming 20-25 years. Let's first look back briefly, focusing on the changes in the Western world and Europe.

In the last 25-30 years, the Western world has by and large drifted more to a capitalist Anglo-Saxon competitive model, with companies focusing on short-term shareholder values and profits, rather than long term outlook and investments. Inequalities in society have increased as a result, in particular in those countries that have followed this trend strongest.

Although the funding models of universities differ substantially throughout Europe, these societal changes are reflected at our universities. External project

funding, international rankings and the standing of institutions and scholars – and hence competition – have increasingly become part of the culture.

In addition, the job market and the student population is more international than ever, generating a competition for talent. At the same time society expects more from universities in terms of outreach, media attention, as well as societal and economic impact. Most of our European universities are public universities, and for them combining publicly funded research with innovation and economic impact is particularly nontrivial.

All these external trends have at our universities created a new amalgam, very different from what we have ever seen before in their century-long history.

Meanwhile, there are internal drives for change. Science itself is becoming more diverse. Disciplines like astronomy or particle physics have 60-year old cooperative models for sustaining large facilities which require long-term investments. They were able to do so because they had extreme focus on a well-defined scientific mission, agreed to by all players.

But the grand challenges of a sustainable society, like health, climate, energy, and food are complex issues which are intri-

cately interwoven with politics. And they require new types of large multidisciplinary and trans-national teams and programmes, and in some cases facilities. This poses incredible new challenges in bridging disciplinary and cultural gaps.

At the same time, there are still individual scientists who after years of isolated work come with a breakthrough or publish a ground-breaking book, and who are our most inspiring teachers. Our research and higher education system has to be able to encompass and bridge all these extremes.

While our science system is already under pressure catering to this increasing diversity of roles and expectations, I do not foresee that the trend will reverse. The world will not de-globalize, societies are unlikely to invite research universities to forget about their scientific and societal impact, and the grand challenges will not simply evaporate or stop at our borders. On the contrary.

Will pressure continue to go up, and will our institutions of higher learning and research just (have to) cope with these trends, by incorporating the increasing demands within the existing model?

It is tempting to argue that radical changes are around the corner, or that there will be a

major top-down overhaul of the system. I find it hard to imagine. Nevertheless, I am actually moderately optimistic – or is it hopeful and naive? – that a more evolutionary path to a new equilibrium, with again more room for trust, will be found.

To understand why, let us realise that also in the economic arena there is a growing number of companies that are shifting – or trying to shift – their strategy away from maximizing short-term shareholder value towards stronger focus on stakeholder values and on the global challenges and sustainable development goals. They are attempting to find a new balance between contributing to society, by what they offer or produce, and making a profit.

I am fully aware that this is not an easy route within the Anglo-Saxon Western world – some companies that are shifting their strategy are facing hostile takeovers or interventions by investors aimed at maximizing profits. But the companies that try, do find that the loyalty of their employees and the support by the public are going up. And Trump and the Brexit are accelerating the desire to leave the path based on maximum competition and inequality, that increasingly feels like a dead end. Many want to revalue trust as a social capital.

If indeed this trend accelerates, and companies and societies successfully make the change, it may help enormously breaking trends and rebalancing our research and higher education. It opens the way for seeking a new equilibrium between competition for grants and collaborative programmes...

... for setting up new international research programmes and associated organisations
... for rethinking the balance between competition and partnership

... for balancing bottom-up curiosity-driven research by individual scholars with broad thematic programmes aimed at societal challenges and innovation

... for reconsidering our educational programmes and the skills and values we want to instill in the young generation we train

... for public-private partnerships
... for rebuilding trust between university, industry and government.



Clearly, the transition will not be easy, and it is difficult to predict the outcome or details of the arrangements that might emerge. But a shared conviction that this is the way to go will also provide Europe great opportunities and a vision for the future in a global world.

More strongly, I believe that whether our universities and research institutes will make this scenario come true and contribute to addressing global challenges like climate, energy, security, poverty and health, will be intimately tied to how our joint European future will be shaped.



Wim van Saarloos is a groundbreaking scientist in theoretical physics, who has received many awards for his work, among them the Dutch Physica Prize in 2008. Currently, since June 1 2018 he is the President of the Royal Netherlands Academy of Arts and Sciences (KNAW) Prior. He helped Netherlands Organisation for Scientific Research alter its organisational structure as Transition Director.

After obtaining his PhD at Leiden University in 1982, Wim worked for AT&T Bell Laboratories in the USA. He returned to the Netherlands in 1991 as the Professor of Theoretical Physics and later on served as the director of the university's Lorentz Centre. In 2009 Wim van Saarloos became the director of the FOM foundation, an organisation which funds research, operates research institutes and promotes collaboration of academia and industry. Wim van Saarloos returned to Leiden University as professor of physics in 2017.

"Freedom of Science" or "Freedom from Science"?"*

Natascha Eckert

Universities were one of the strongest pillars in the Western Age of Enlightenment. Over time, the segregation into independent disciplines replaced the classical four faculties (theology, jurisprudence, philosophy, medicine) – a development from which students but also society and economy significantly benefitted. However, scientific progress itself, as well as social requirements and economic needs, led to a situation in which even higher degrees of specialization did not necessarily produce better outcomes or higher productivity:

Three examples:

- Traditional clinical disciplines could no longer cope with all aspects of biochemical and physiological progress. The view on cancer had drastically changed in the years prior; yet, clinical disciplines and education streams remained unchanged. At the time, modern hospitals found a work-around by establishing “expert boards for tumors” with representatives from all clinical disciplines until state-of-the-art oncologists could be educated and accepted by the medical societies.
- Physicist graduates who starting their career in industry figured out that being able to solve Schroedinger’s equation under special boundary conditions did not help them at all to

understand economic phenomena like design-to-cost, world market regulations or benchmarking analysis.

- Human resource managers sought specialists that could step in immediately rather than receiving post-university / pre-industrial training to bridge the academic and practical worlds. Instead, productivity gains within the first six months of fresh hires are more or less expected by the hiring managers, which meant that finding the right specialist at the right point-in-time was in their interest and part of their incentive scheme.

The death of the academic hero and the need for ‘T-shaped’ individuals

While students wanted an education that takes them through a privileged life, the traditionalists of an independent science insisted on value conservatism regarding knowledge creation, and economy called for specialists in every new discipline - picking up the pace.

So what needed to be done to cope with conflicting interests of the various stakeholders? The answer for the last 30 years has been to develop more cross-disciplinarily. Topics such as “mechatronics” (mechanics & electronics), “business informatics” (business administration & data science) and

many more have been created, however at the same time the problems developed even faster. Industry needs innovation, and innovation - and in particular disruptive innovation – which takes place between the disciplines rather than by extrapolating existing technologies and disciplines. So, further specialization can address certain issues. But this will not solve the fundamental problem of the different stakeholders – neither for the individuals, businesses, economy, nor society – that T-Shaped individuals, with a mix of specialist and transversal competencies are required, and that study programs at universities do little to provide these.

The specialist, one time the ‘academic hero’, loses attractiveness once his core competency gets standardized. Society is fighting against megatrends like demographic change, ubiquitous digitalization or unbalanced wealth with teams of all kind of experts; however, the overarching mega-problem of increasing complexity can’t be addressed by further specialization. Industry feeling the competitive breath on its neck increases pace but – at the same time – is about to ignore adjacent innovations... A vicious cycle!

So how can universities respond going forward?

This leaves universities with an

unsolvable job to do, however, at the same time a unique opportunity:

Firstly, the programs offered by academia need to be broader and at the same time more focused. A broad education exceeding today’s fundamentals is a must: Physicists need to understand economics, physicians must understand latest developments in genomics, economists need to know what to expect from data science – just to give a few examples.

In a second phase, however, universities need to team up with partners in touch with the future needs: The link to industry, enterprises and other institutions (e.g. NGOs) has to be much closer to specialize on the right topics! Today’s sequence of B.Sc. – M.Sc. – PhD followed by further vocational training (programs for MBAs, post docs, trainees) are not efficient; neither for future industry employees nor for the next generation of committed scientists.

Universities will compete by being best in both – a solid knowledge base for their students, and a coordinated guidance into their next professional phase. Teaming up with the parties that have a demand without losing independence – this is the key differentiator for being attractive to future students. “I got the best education and the best guidance into my

professional life” – all stakeholders will sign up to this.

Imagine...

So how could this look like? Traditional education in small groups in the elementary classes, ongoing individualized consultancy and guidance on what to do next, and joint exercises with future partners thereafter. A smooth transition, mutual monitoring, path correction, but no certificate without need!

The good thing is: We see more and more universities forming “schools” or institutes that are focused on “industries” or application areas, such as mobility or health. We see more and more innovative examples of industry-on-campus, co-locations, regional special topic clusters, application or innovation labs, etc. Already today we count a lot of those formats targeting an intensive interaction on real challenges from industry and applicable solutions from academia.

To really “transfer” knowledge into applicable innovation and a competitive technology advantage we need even more direct interaction and dialogue in a faster time. The systematic knowledge transfer through these mechanisms might be viable for students and PhDs: dedicated courses and seminars (e.g. case studies, capstone projects, student

case competition), hackathons, internships as part of the study program, training-on-the-job (i.e. university study/training supporting employment).



However, the biggest challenge will remain: How do we establish an efficient knowledge transfer in a life-long-interaction between scientific and industrial experts – in an on-going two-way exchange?

Career paths – industrial and scientific – have to become more permeable. That requires a review of incentive and evaluation schemes on both sides. Focusing academics on the present academic KPIs only (e.g., publications, evidence of qualification for public funding) does not support the exchange with experts from industry, nor the academic going (back) to academia after some years of working experience in industry. For scientific experts, the exclusive evaluation of academic and non-industrial KPIs does not help them to gain experience in industry.

Furthermore, focusing on seamless career paths on the industry side, which cover a broad experience in different functions, cultures and leadership positions, does

not honor or recognize scientific sabbaticals or any other kind of friction in the career path. This lack of recognition of the need for regular knowledge updating (often referred to as ‘adult education’, specializing (through a PhD), or lifelong learning) limits the potential for industry experts to re-engage with universities.

Thinking about a completely new permeable career path is not only worth a try; it is the future!

Being engaged in the university-industry cooperation business for the last 10 years, I see a lot of changes for the better. But I also observe the systems working and optimizing themselves quite independently from each other. Coming too close to each other brought around numerous claims by self-proclaimed judges: “Industry corrupts the independency of science”, “science prostitutes oneself for the sake of capitalism”...

Getting back to the initial question, we absolutely need a dialogue between all involved stakeholders: academia, industry, society, government going forward. The answer is not an “or”, rather the answer can only be an “and”: freedom of science AND freedom from science.

**I borrowed this witticism in a slightly different meaning from my doctoral thesis supervisor, Prof. Dr. Werner Kirsch. I owe him more than this bon mot.*



Since 18 years Natascha is active in various leading roles within Corporate Research and Innovation at companies like Siemens and Osram. She has a long-year experience in the University-Industry-Business, currently managing Siemens’ global strategic partner programs with universities and research institutes. Natascha has a long-year history in Siemens’ international technology and innovation management and was responsible for expanding Siemens Corporate Technology’s footprint to Asia and Russia.

For many years Natascha has coordinated the company’s engagement in manifold external research and innovation organizations and bodies, e.g. Bayerische Forschungsstiftung, Stifterverband, Forschungsunion, acatech and DAAD. Natascha holds a PhD degree in BA from Ludwig-Maximilians-University Munich and had worked for several years as strategic consultant for various companies.

SCIENCE Fiction – a Provocative Utopia

Thomas Baaken

“Strange that the connection to AVA is taking so long today ... I have been waiting for 15 seconds ... hope we are not hacked again like yesterday!” - “Well, remember that AVA is on the moon, it can take a while! ... Ahh, see, now we are connected!”

This is the beginning of a meeting between two companies, two universities and AVA – the avatar of worldwide data with all existing algorithms. AVA is an IT/AI device, a virtual super machine, which masters nearly all knowledge challenges by applying algorithms.



Today, solutions to emerging problems are solved directly and immediately between universities and companies with the involvement of avatars. However, these tasks clearly differ from the ones in the past – today universities are involved in all decision making processes in governments and companies.

The AVA is located on the Moon, because there it is (1) unassailable, (2) not subject to any national spheres of interest, (3) also because the energy is infinite and (4) the temperature is low. That is an ideal ecosystem for avatars. One company is based in

Portugal, the other one in Russia. One University is based in the US and another one in Münster, Germany. These meetings used to run via the screen, but nowadays the actors sit in the form of perfect holograms together at a table.

Interestingly, the meeting participants are four women, which is logically explained by their competence of balance, fairness, networking, and factual performance which have proven to be superior versus men's power and hierarchy mechanisms. The male members of humanity now attend additional education courses and craft camps, when they are not on the football field, in paintball, deep-sea fishing and in car races.

The discussion is about the serious problems with the blockchains that allow companies to utilise knowledge kits from universities in the form of individually tailored thinking services. Previously, in B2B consulting models, orders were organized accurately and in real time using blockchains. Today, science can rely on these mechanisms to deliver smart solutions, 'Think Services' and 'Think Solutions' via blockchains to companies.

In 2040, the big consultancies that used to be in the driver seat are struggling to survive. They are trying to save the last remnant of market assertion by hacking and changing the knowledge block-

chains. But according to AVA, that will soon be over: the transaction validations will eradicate unfair entries. That is possible because AVA has all the data in the world at its disposal to generate answers and also the ability to make very accurate forecasts and predictions, which can be relied on in 91% of cases, far superior to the consultancies.

Management consultancies have failed to enter into or form strategic alliances with universities to renew their traditional business model of 'consulting services'. Now the former 'big money' consultancies compete unfavourably with AVAs. Resultantly, like the banks were replaced by Fintech-Processes 10 years ago, nobody really needs consultancies anymore and therefore, they will more or less disappear from the scene too. All knowledge is available from an "Ocean of Knowledge", which is free for everybody.

Smartphone-based dashboards and cockpits display all relevant information and report the situation in a real time. The problem fields are displayed and solution areas and partners are identified with a 'red flag'.

Since everyone can manufacture their own products based on AI, using 3D printers at home (or in the neighbourhood or village service centre), business models have also accordingly changed.

The majority of the people today have a lot of free time, except for the universities acting as the think tanks, and together with company management address the major difficulties and 'remove obstacles from the way' of living.

Companies like the ones that developed since the start of the industrial revolution barely exist anymore. The variety of technology and knowledge flows, which are made generally available through the Knowledge Ocean that is Internet 5.0, is far too complex for them. Instead AVAs are supporting and supplying solutions fitting all needs.

After a painful process of university consolidation, there are only relatively few universities. Today universities have branches across borders and manage their competence centres virtually and online, however, they have a focussed research and education profile and core competency of creating new knowledge in a field. The departmental structures and faculties were replaced by agile interdisciplinary teams of researchers and thinkers working on specific challenges across countries and disciplines.

The education role of universities, the so-called 'first mission', is now the overall responsibility of the "PoUCE Parliament of United Countries of Europe", the organisation that replaced the European

Commission after its demise. It-tenders higher education throughout Europe and universities must apply for teaching in the advertised courses by submitting competitive offers. Since the 2020s, teaching is offered through validated MOOCs and VR events, rather than by local academics, provided by well-known professors in modern edutainment formats.

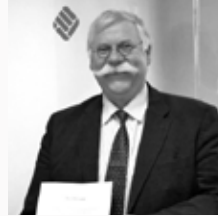
Interestingly, disciplines such as philosophy, anthropology, arts and humanities, which almost disappeared in the 2020s, have experienced a renaissance. New subjects have emerged, such as the development and strengthening of the personality, as well as individualised life planning. The sciences of nature, agriculture and the metaphysical forces are also strengthened alongside the religions, and values scaffolding of a society.

The logical and professions-oriented sciences that at the beginning of the process were substantially supported by AVAs, are now almost completely replaced by AVAs. Logic can be done much faster and more accurately through AVAs. However, AVAs cannot capture or reproduce the human spirit – it is still very clear where the real capital and wealth of future mankind lie.

Interestingly, the organisational forms of companies now replicate principals of academia. High de-

gresses of freedom in the work and thinking were formerly reserved for academic employees, while the profit-oriented companies had to be structured, disciplined and persistent. However, this rigidity and focus was fatal to those companies that had failed to open up to other organisational forms, business models and solutions. After all, creative innovations and problem solving are only possible outside existing organisations, processes and structures. Moreover, technology combined with AI was already outperforming humans in structured analytical work from the mid-2020s.

And this is exactly what the five-participant international meeting is all about: how can the four organizations, with the help of CoThinking and Knowledge-Pooling, generate solutions, that are not yet available to the 'Ocean of Knowledge and Consciousness' but have a potential to improve the situation.



Prof. Dr. habil. Thomas Baaken holds a position of a Tenured Professor in Marketing at Münster University of Applied Sciences. In 1998-2003 Thomas Baaken served as Vice President Research and TechTransfer. 2002 he founded the "Science-to-Business Marketing Research Centre", which is creating marketing strategies and tools on how to market research (www.science-marketing.com) and how to undertake university-business cooperation (UBC).

The Centre has conducted several major surveys on Science-to-Business (S2B) and UBC including "The State of University Business Cooperation in Europe" in 2010/11 and "The State of European University-Business Cooperation" in 2016/17 (www.ub-cooperation.eu). It employs 25 researches from 12 different countries on Third Party funds. In total >eight Mio Euro have been acquired for the subjects of S2B and UBC so far. Thomas Baaken regularly lectures at a number of different universities e.g. in Berlin, Amsterdam, Cracow, Adelaide, Bangalore. He holds adjunct positions at The University of Adelaide, VU Vrije Universiteit Amsterdam and IHI Zittau/Technical University Dresden.

CREATING THE FUTURE UNIVERSITY



F U
T _

**‘THE ONLY THING WE KNOW
ABOUT THE FUTURE IS THAT
IT WILL BE DIFFERENT.’**

– Peter Drucker

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F U
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**SOCIALLY
ENGAGED
UNIVERSITY**



The Civic University: Confronting Future Challenges

John Goddard

Over the next 20 years universities will be confronted by unprecedented political and technological drivers for change coming from within and outside the higher education sector. The most successful universities will be those that adapt their institutional structures to engage constructively through teaching and research with global societal challenges, notably those identified in the UN's Sustainable Development Goals (SDGs). This will involve universities working in new ways with business, government and civil society at both global and local levels and becoming truly civic institutions.

The challenge for universities has been clearly set out in the latest report¹ from the Global University Network for Innovation (GUNI), which highlights the twin roles of universities: First, through education, research and innovation they contribute to the strategic positioning of nations, regions and cities who are in the relentless process of global competition. Second, they create and disseminate knowledge urgently needed to shift the world onto a sustainable and resilient future.



The pre-eminent universities in 2040 will be those that successfully balance their roles as players in the highly competitive economic development and higher education marketplace with their responsibilities to civil society globally and locally.

This will be most transparent in the way that the university acts as an urban 'anchor institution', working with business, government and citizens in the city in which it is located, not least as many of the SDGs have strong local resonances.

Contributing to societal innovation will be the key to achieving this. The European Political Strategy Centre (EPSC) has highlighted the need to move from a supply side technology driven model of innovation to one that involves co-production of knowledge with business and citizens². It notes that: *Our innovation economy is not a Roman aqueduct but a muddy pond ... it requires all actors, corporate, academic, civic and political* ... *"Focus on People, Places and Processes"*.

A similar discourse can be found in the Horizon 2020 theme of Science With and For Society and in the Rome Declaration on Respon-

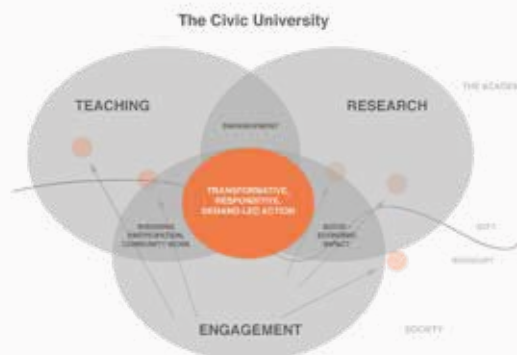
sible Research and Innovation adopted by the European Council in 2014³.

What do such perspectives mean for how universities organise themselves? In its recent report to the European Council on a Renewed Agenda for Higher Education, DG Education and Culture has noted:

“Higher education institutions are increasingly giving more emphasis to their wider social responsibility to the communities in which they are located. The notion of the ‘civic university’ is sometimes used to characterise institutional strategies that aim to promote mutually beneficial engagement between the community, region and the university”⁴.

In our book *The Civic University: The Policy and Leadership Challenges* the civic university is described by reference to a way of organising universities that could be superseded by 2040⁵. Such un-civic institutions are characterised by a leadership focus on separately maximising success in excellence (research), student outcomes (teaching) and engagement with enterprise/society (third mission). As such, support and incentives for staff are driven by these priorities. Research or teaching activities with business and society is side-lined as ‘third mission’ and pushed to

the periphery. Because university rankings focus predominantly on research and global positioning, they have helped drive a wedge between these different roles and responsibilities. There is therefore a ‘hard’ boundary created between the core – where activities are supported and enabled, and the periphery – where activities happen in spite of and not because of central support. Achievements that take place within this periphery tend to drift away as there are no mechanisms in place to embed learning or good practice back into the core.



In the ‘civic’ university, there is no perception of a core or periphery – engagement is seen as embedded and relevant to other areas of activity. There are strong overlaps between the three domains. Where teaching and engagement overlap there will be effective outreach activities linked to student recruitment (widening participation to non-traditional cohorts including mature students and

worker-learners) and augmenting the student experience (internship, work-based learning, community work, volunteering). Where teaching and research overlap there will be enhancements to both, with teaching becoming more meaningful and linked to ‘real world’ issues, while research benefits from the results of applied and relevant coursework. The overlap between research and engagement will result in non-academic, socio-economic impacts, as researchers work collaboratively with non-academic partners to find solutions to specific needs and challenges in the wider world. This in turn helps inform further research by raising new questions and providing insights that would not be revealed from academic research alone. Students become more engaged in their own learning as they gain enhanced critical skills whilst bringing evidence to bear on understanding and seeking to resolve societal challenges. When all three areas overlap the university will be engaged in transformative, demand led actions, and in this space its impact will be greater than the sum of each activity alone.

Finally, there is a ‘soft’ boundary between the academy and society at large, which will shift constantly as the university responds to new demands and existing collaborations reach their natural conclusion. In the civic university, institu-

tional management and leadership are focused on creating an enabling environment for success at all levels. Staff are motivated and incentivised to engage with society as these activities are well resourced, supported and there are clear rewards for success. This ensures that lessons and insights from societal interactions will be brought back across the 'soft' boundary and used to create improvements in teaching and research.

Such universities will be at the pinnacle of European higher education landscape in 2040.

¹ *Towards a Socially Responsible University: Balancing the Global and the Local (2017)*. Retrieved from http://www.guninetwork.org/files/download_full_report.pdf

² *Opportunity Now: Europe's Mission to Innovate (2016)*. Retrieved from https://ec.europa.eu/epsc/publications/strategic-notes/opportunity-now-europe%E2%80%99s-mission-innovate_en

³ *EC Rome Declaration on Responsible Research and Innovation in Europe (2014)*. Retrieved from https://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf

⁴ *Renewed Agenda for Higher Education (2017)*. Retrieved from https://ec.europa.eu/education/sites/education/files/he-com-2017-247_en.pdf

⁵ Goddard, J., Hazelkorn, E., Kempton, L. and Vallance, P. (2016) *The Civic University: The Policy and Leadership Challenges*. London, Goddard, J., Hazelkorn, E., Kempton, L. and Vallance, P. (2016) *The Civic University: The Policy and Leadership Challenges*. London, Elgar.



John Goddard OBE is Emeritus Professor and Special Advisor to the Vice Chancellor of Newcastle University. He founded and led the University's Centre for Urban and Regional Development Studies (CURDS) from 1977 to 1998. During this period, it was designated as a 'centre of excellence' by the UK Economic and Social Science Research Council. John translated his academic insights into the role of universities in city and regional development based on his research in CURDS into practise when appointed Deputy Vice Chancellor with special responsibility for the University's city and regional engagement.

John has shared his experience in institutional management through academic publications, policy guidance for individual universities, local and national governments and international bodies such as OECD and the EC. He was appointed a NESTA Fellow where he wrote a 'provocation' entitled 'Re-inventing the Civic University' and co-authored a book with Paul Vallance on 'The University and the City'. He has recently co-edited an international comparative study with Ellen Hazelkorn, Louise Kempton and Paul Vallance 'The Civic University: the Policy and Leadership Challenges'. Building on that work he has been appointed Vice Chair of an independent UK Commission on the Civic University sponsored by a charitable foundation.

Is University Research Aiming to Address What Really Matters?

Manuel Alonso

It's more than just knowledge production

Whilst in the Middle Ages, universities were the repositories of knowledge, nowadays, knowledge is universally accessible, particularly scientific and technical knowledge. The problem is no longer the access to information and knowledge but our ability to really understand all that knowledge and make good use of it. Therefore, universities should go far beyond the function of simply providing knowledge, because the current problem is to understand what is genuinely important. For example, science can help us to understand the reasons for the development of diseases and we can even find drugs to fight against them. However, the key problem is getting all patients to have access to that treatment.



Currently, the development of knowledge and technology per se does not mean that people are benefitting from it. The fact that science and technology development is not necessarily correlated positively with human development is, at least, unfair.

Hence, we should wonder whether through scientific and technological development we

really can make a real impact to change the world.

Humanity-focussed research is more important than new research

As a scientist, I believe that science and technology should always be subject to social considerations regarding the application and the scope of that knowledge. In my opinion, these social considerations about the applications of scientific and technical knowledge are crucial for the future of humanity. That is why universities in the future should be focused on society and the humanities. First, we must ask ourselves what exactly the world needs and then we must seek the knowledge that satisfies those needs. In short, all technological and scientific development must aim to improve humanity.

Generating new knowledge is no longer the problem. The new challenge for universities now is to channel the useful knowledge that humanity needs to advance in a tangible way. Witnessing the scientific knowledge applied to the real economy is very satisfactory, but we all have doubts about the most effective way to contribute to the development of humanity. What do we have to do in the university to involve young people in the search for solutions to the problems of humanity? We need a broad social debate about what

are the most pressing problems of humanity and what humanity expects from universities.

Pressing problems still exist, with no indication that they will be solved

I have dedicated 30 years to research in genomics and genetics and we have obtained interesting results, which we have applied in the real economy. However, I feel that this is not enough to improve the world. Science and technology are undeniably tools to improve the world, but we still have a world full of injustices. The long list of pressing problems in the world includes wars, massacres, mafias, extreme poverty, dictatorships, genocides, increasing destruction of the environment, unprotected children and the elderly, forgotten diseases, lack of equal opportunities, just to give a few examples. And yet, there are no clear indications that these problems can be solved in the coming decades.

In which university do we speak about these issues? It seems we have just considered them as part of our normal life. We have to ask ourselves what are the social issues that are never analysed in-depth. For example, treaties on international politics and wars are written but we do not study what we should do to avoid hatred among human beings. As long as there are wars, dictatorships, mafias, corruption, inequality, poverty,

etc., the university knowledge as it is currently understood makes no sense.

The university of the future will focus on providing societal solutions

The university of the future will be the one that changes its orientation towards these topics that are not receiving due attention. It is crucial for universities to start seeking effective solutions to the world's most pressing problems and meet social needs in order to thrive as institutions and become truly relevant to society in the future. In order to do this successfully, the involvement of industry, governments at all level and the society as a whole is of outmost importance. An honest and fluent dialogue among all these stakeholders in a collaborative environment will be essential to face and effectively overcome our global challenges.



Manuel Pérez Alonso obtained his degree in Biology in 1985 and a PhD in Molecular Genetics in 1990. He is Full Professor of Genetics at the University of Valencia (Spain, Europe). He participated in five international genome sequencing consortia and (as Principal Investigator) in a number of basic research projects. He was the promoter and founding partner in nine biomedical companies, most of them located at the University of Valencia Science Park.

His research is now focused in the development of genomics tools for genetic testing. He also contributes to biopharmaceutical research through the study of the biological pathways leading to the development of rare genetic disease phenotypes. He served for five years as President of the Valencia BioRegion (BIOVAL) and is now President of the Spanish Association of Entrepreneurs in Science.

Mission-Based Universities Driving Cross-Sector Collaboration to Meet UNs Sustainable Development Goals

Søren Bregenholt

Many industries, including the pharmaceutical industry where I have worked the past decades, are under pressure to continue to be innovative and able to develop new and better products to benefit costumers and society. Likewise, European universities are increasingly under pressure to secure third party funding in addition to government funding and to prove relevant return-on-investments of the public funds they do receive.

At the same time the global society is under pressure to tackle the big global challenges such as preventing and curing diseases, addressing pollution and climate change, secure global access to clean water and food, etc. as e.g. defined in the United Nations' sustainable development goals (SDG).

It easily predictable that none of these pressures will diminish during the decades to come, rather the opposite is likely to be true.



I foresee that by 2040 mission-based universities will lead the global efforts to tackle these challenges, leveraging world leading research and facilitate collaboration across broad coalitions of industry partners committed to translating break-through science into innovative products benefiting patients, citizens, and societies globally.

“How will this be possible?” you may rightly ask yourself. Allow me to explain.

The pharmaceutical and other industries are increasingly collaborating with academic institutions in a variety of ways; researcher-to-researcher, project collaborations, strategic alliance, incubators, public private partnerships, etc., all with the aim of leveraging complementary competencies, capacity and funding to reach goals neither party can achieve alone. Tackling the UN's SDGs will require multi-disciplinary collaboration between academia and relevant industries beyond the current level. At the same time, providing solution to the SDG is definitely one way to alleviate the pressure on both industry and academia.

To be successful, we must take inspiration in what works already today and what needs to be adjusted. Let me give you two successful examples.

In January 2017, Novo Nordisk and University of Oxford announced a strategic alliance, centered around the establishment of a Novo Nordisk research center on the university's Old Road campus. The vision of the alliance is to combine world-class research in metabolic diseases, with industry-leading capabilities in translating research into new and innovative medicines. Importantly, the collaboration has an open-innovation like front-end facilitating free communication and idea exchange between Novo Nordisk and Oxford researchers, and focused funds to nucleate and test shared research hypothesis, before these are developed toward prototype medicines.

A different approach to industry-academia collaboration are public-private partnerships such as the EU Horizon-2020 funded Innovative Medicines Initiative (IMI) supporting a number of targeted cross-disciplinary, cross-sector consortia aiming to tackle large challenges to develop more novel medicines faster and more efficaciously. This model unites multiple stakeholders, often competitors, from industry, academia and sometimes public authorities to

leverage a broad range of complementary competences, technology and resources in non-competitive consortia addressing challenges that neither party would be able to address alone or in traditional bilateral collaborations.

Combining elements from these two models would allow what I call "mission-driven universities" to become the focal points of broad innovation partnerships aimed to tackle the big global challenges. The leading universities would establish on-campus open research and innovation environments co-locating research groups from across various industries to collaborate with world-class university researchers to develop breakthrough solutions.

Delivering towards the mission will require access to deep knowledge and technologies across multiple fields, basic and applied research capabilities, patience, significant risk-willing funding, and commercial capabilities to develop, manufacture and market the solutions and much more. A totality that academia and industry can only provide in unison.

However, to expand beyond current collaboration models will require adjustment from universities, industry and government funding bodies.

To ensure that all parties have skin in the game, industry would fund their own background and on-campus research. The university would fund their research groups as well as the supporting infrastructure though long-term mission-supporting government funding. A set-up, similar to the IMI model.

One hurdle will be to manage know-how and intellectual property rights (IPR) in a co-located open innovation system – this is likely to require flexibility from all parties. For this to work, principles of free information and know-how flow confined in the on-campus environment, only with flow-back to the sponsoring organizations. Only when hypothesis or prototypes are verified should conventional IPR principles apply.

Less obvious but critically important: to be able to align its research against the mission, universities will need to prioritize internal research funds, staff resources as well as investment to support cutting edge mission-critical research. This implies that the chancellors and deans of mission-based universities must be empowered with a stronger leadership mandate. Failing to do so, universities will not be able to contribute towards the solutions promised by the mission, less so be a credible and desired partner for co-locating industry – and

eventually not a contender for government funding.

Also governments and funding agencies will have to adapt their approach to this new reality. Importantly, resources for mission-driven innovation should be ring-fenced in national budgets, to be allocated in a more focused manner, supporting fewer, larger and only top-tier mission-based programs with significantly larger grants for longer periods of time. It noteworthy, that the EU framework 9 program, the successor to Horizon2020, will adopt such approach and fund mission-driven research.

To be able to solve the big global challenges as those included in the UN's SDG, we need to move towards a new system with less short term project-by-project funding of individual research groups towards a future where we rely on the combination of stellar scientific ambition and drive combined with the industrial translation capabilities and commercial objectives to discover and develop solutions to our critical challenges to benefit citizens and societies globally. Europe's leading universities are natural focal points in that vision.



Dr. Søren Bregenholt has more than 15 years' of experience from various senior management positions in the biotech and pharmaceutical industry. Currently, he is Corporate Vice President and Head of External Innovation and Stakeholder Relations in Novo Nordisk, and as such responsible for the company's strategy and activities for securing access to external innovation, through commercial licensing, university collaboration and public private partnerships. Søren is also responsible for Novo Nordisk's global R&D-based PhD and Post Doc programmes, as well as research, innovation, and educational policy.

Søren is an advisor to the Dean of the faculty of Science and Honorable Industrial Ambassador at the Faculty of Health and Medical Science at the University of Copenhagen and serves as chairman of the board of Medicon Valley Alliance, a life science cluster organisation. He received his PhD in biomedical research in 2000 from the University of Copenhagen and did his post-doctoral training at the Pasteur institute, Paris France. Søren Bregenholt is the author of more than 50 scientific papers and represents Novo Nordisk in various organizations including EFPIA and PhRMA.

Facilitating Entrepreneurship in Communities to Augment University Engagement: Can This Wait for the Future?

Noel Lindsay

Universities have existed for hundreds of years with the University of Karaouine in Fez, Morocco, (established over a millennium ago) still operating. Although there are parallels between medieval universities and those of today as places of higher education and knowledge, many of today's universities have realized the need to break down the ivory tower walls, and become more immersed in and engaged with the communities they serve, while retaining pure the pursuit and dissemination of knowledge. As universities evolve and adapt to changing community attitudes and increasing technological and social change, community engagement is becoming an imperative underpinning relevance, resilience, and sustainability.

Entrepreneurship as a new form of university engagement

Community engagement, as an ethos and way of operating that is embedded in university culture, is evolving. Traditional approaches to community engagement can occur through meetings among university, industry, and government personnel, university workshops and seminars open to the public, community partnerships, etc. Although traditional engagement methods provide the foundations, evolving community expectations of universities require additional innovative engagement

approaches as communities look for increasing university contributions to enhance their prosperity.

The facilitation of entrepreneurship in communities by universities provides opportunities for universities to engage with and contribute in ways not addressed by more traditional engagement methods. Entrepreneurship in universities has often been viewed from an academic disciplinary perspective underpinned by entrepreneurship teaching and/or research and quite separate to engagement – though the two do not need to be mutually exclusive.

However, an increasing number of universities also undertake non-academic entrepreneurial activities through the establishment of business incubators, innovation hubs, co-share work spaces for students, etc. Other institutions take entrepreneurship a step further and look to develop a more entrepreneurial and innovative culture in both the student body and academic/professional staff.

The knowledge and experience universities accumulate through their entrepreneurship academic and non-academic activities can be significant and influential. Entrepreneurship is a powerful tool for developing and regenerating economies and so should not be overlooked as an essential tool for engagement. The time is ripe for institutions to address entre-

preneurship engagement opportunities through co-creation and collaboration with industry and government to meet the increasing wider community needs.



Capitalizing upon their accumulated entrepreneurial knowledge and experience, universities can position themselves as leadership exemplars for facilitating entrepreneurship in communities because they, more than any other entity, are in a position to provide a multi-layer value bundle to the communities they touch comprised of economic, intellectual, social, and cultural value.

Thus, engagement through entrepreneurship can augment traditional engagement efforts. But this means that universities themselves need to embrace entrepreneurship; not just in a piecemeal fashion. That means, entrepreneurship teaching, research, and engagement are required to be present in the university with the boundaries among the different academic and non-academic components being permeable (rather than having impenetrable academic versus non-academ-

ic silos) with each component complementing and informing the other.

Those universities poised to become more successful at engaging with communities through entrepreneurship will adopt a holistic and systemic approach to entrepreneurship that integrates the academic research and teaching and non-academic engagement entrepreneurship components. Their success will be underpinned by the creation of a one-stop shop entrepreneurship portal that provides a dedicated pathway into the university as well as a focused entrepreneurship unit poised to engage with communities that can provide a plethora of entrepreneurial services, skills, knowledge, advice, and experience.

The future-thinking university – with entrepreneurship embedded

And so, consider a future-thinking university that integrates its academic entrepreneurship research and teaching staff with its non-academic mentoring, innovation hub incubation facilities, and prototyping activities into one cohesive unit with innovation hub nodes embedded across the university and in local, regional, and international communities. The benefits are many.

Its students studying entrepreneurship or undertaking entre-

preneurship learning alongside other degree programs have the opportunity to undertake internships with the entrepreneurial ventures located in the incubator(s) and various internal and external nodes or set up their own business. In this way, they not only learn about entrepreneurship, but are doing entrepreneurship. That means, when they graduate they not only have a University degree but also a functioning start-up venture that can be integrated into the community.

If the university has established international business incubation facilities in overseas communities, the students undertaking internships in these facilities not only develop an appreciation for global entrepreneurship and dealing with risk and uncertainty in overseas environments. Rather, the communities supporting the incubators also benefit from the students being there – culturally, economically, socially, and intellectually through the exchange of ideas – as they integrate into the community (at least for the term of their internship studies).

For example, imagine if a non-European university had established an incubator in the Champagne region in France with students undertaking a for-credit internship course with local French businesses in the incubator and being given the opportunity to undertake work experi-

ence in the Champagne Houses, French Patisseries, and/or French Cheese-Making businesses located in the region. The students benefit and the community benefits, in multiple ways. And, because of the ongoing relationships developed between the university and the community there, other engagement, research, and/or educational opportunities may evolve benefiting both the university and the community.

Technological change moves at a significant pace, compelling social change in its wake. Higher education institutions should be at the forefront of this wave, but the bureaucracy involved in the revolutionary change required often cannot keep pace. Disruption is a given! Change should be brought about by the proactive directive of institutions rather than a lagged reactive response that still may not fully meet the changing demands of society.

And so, while entrepreneurship can assume a more traditional role in universities contributing to their teaching load and research outputs, while other university business units assist students and staff to commercialise their research innovations by way of tech transfer and business incubation, entrepreneurship can also be a key pillar in facilitating community engagement through developing ongoing relationships with communities and generating real value

in those communities.

Adopting a holistic approach and integrating the academic and non-academic entrepreneurship components will create additional value. While using entrepreneurship to engage with communities may be something for the distant future for many universities, there are some that are already doing this now because they see the benefits of augmenting/disrupting the traditional community engagement approach and using entrepreneurship to drive growth and shape their future.



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Noel has investigated blended learning approaches to teaching entrepreneurship to high functioning intellectually disabled young people in his recent major research projects. He has established and harvested ventures in various countries, including Australia, South Africa, and Malaysia.

Radical Epis- temic Reset: Ed- ucating for Just Communities Worldwide

Kevin Kecskes

If the prescient American philosopher Richard Rorty is correct, we have entered into “the breakdown of democratic institutions during the Dark Years (2014-2044),” a period marked by unmitigated greed and protectionist policies, especially evident in those at the upper end of the wage spectrum, accompanied by a break in “our sense of the relation between the moral order and the economic order.”² Rorty writes,

Just as twentieth-century Americans had trouble imagining how their pre-Civil War ancestors could have stomachached slavery, so we at the end of the twenty-first century have trouble imagining how our great grandparents could have legally permitted a CEO to get 20 times more than her lowest paid employees. We cannot understand how Americans a hundred years ago could have tolerated the horrific contrast between a childhood spent in the suburbs and one spent in the ghettos. Such inequalities seem to us evident moral abominations, but the vast majority of our ancestors took them to be regrettable necessities.³



From this view of “looking back” over the 21st century, higher education institutions (HEIs) have choices to make along a continuum. They may elect to reproduce themselves—thereby passively perpetuating “regrettable necessities” — or transform themselves, by de-centering knowledge production, and therefore power, away from the Academy and into communities.

Here is a recent example of the latter from my own university:

It was a grey Saturday in February. About 35 people gathered at a non-descript street corner in Portland, Oregon. Most were undergraduate students. Neighbors, the instructor and nonprofit staff joined in. It was drizzling. People shuffled around; they were cold and nervous. Students’ objective was to assist a local nonprofit organization to conduct door-to-door surveys. The point was to test neighbors’ interest in converting a nearby lot filled with garbage and blackberry brambles into a community orchard. Pairs received instructions and maps and headed out on foot. One student, Martina (pseudonym), arrived

late and was paired with the instructor. Martina told the instructor she was a police cadet in training. Eventually, she told the instructor that this course, and especially this community-based learning (CBL) canvassing activity, really “opened her eyes about learning and leadership.” Much of her police cadet training puts officers in a defensive posture, she said. Martina noted that the public tended to react to police officers in very formal ways, often with fear. However, she noticed that the inviting tone of the CBL interactions while canvassing seemed to elicit a different, more open and casual response. She shared that walking the streets and actively listening to neighbors as part of the class opened her to new ways of learning and generated insights she hoped to bring to fellow cadets.⁴

Students in this class were introduced to the idea that valid knowledge and wisdom exists in many locales, not solely in university classrooms. Sadly, in 2018, this kind of community-connected, real-life pedagogical approach is still novel in HEIs. In order to effectively fulfill their role as developers of the next generation of global citizens, HEIs must radically change their definition of epistemology – what counts for knowledge. Vanguard uni-

versities in 2040 will co-produce applied knowledge that empowers communities globally to define their world as they experience it. Communities, supported by HEIs, will address challenges to grow the public good in their world, as defined by them

Only by embracing new community-connected pedagogies like the one above may we hope to circumvent most of Rorty’s “Dark Years.” Indeed, as the educational historian John Saltmarsh has suggested, by focusing on a transformational view of the “public good”⁵ higher education has the potential to deliver now on this 2040 promise of a more socially just global society. The table on the right outlines the distinctions in terms of community, research, teaching and culture.

In sum, Martina was placed in an unfamiliar setting, invited to learn while engaging, and quickly gained insights about herself and others. Her view of fellow citizens was changed; her notion of epistemology (recognizing community-based sources of knowledge and relevance) was modified; she listened. In 2040, HEIs intent on building an equitable and thriving global society will have courage to undergo an epistemic revolution. Teaching and research will be transdisciplinary, valuing and building on knowledge and wisdom in and outside of the *Academy*.

¹ Rorty, R. (1999). “Looking back from the year 2096” in *Philosophy and social hope*. Penguin Publishing, UK, p. 243.

² *Ibid.*, 243.

³ *Ibid.*, 243.

⁴ Kecskes, K., Sumner, R., Elliott, E. & Ackerman, A. (2016). *A year-long journey in the orchard: Growing community amid the brambles*, in Wortham-Gavin; B. D., Allen, J., and Sherman, J., (Eds.) *Sustainable solutions: Let knowledge serve the city*, Greenleaf Publishing, Sheffield, UK, pp. 11-34.

⁵ Saltmarsh, J., (2016). *Higher education’s accountability for the public good*. Keynote address delivered to the Academic Resource Conference, Western Association of Schools and Colleges.

⁶ Saltmarsh, J., (2016). Adapted from “Higher education’s accountability for the public good.” Keynote address delivered to the Academic Resource Conference, Western Association of Schools and Colleges.

⁷ Institute for the future. (2011). Adapted from “Future work skills 2020”. Retrieved November 3, 2017 http://www.iftf.org/fileadmin/user_upload/images/whatwedo/IFTF_FutureWorkSkillsSummary.gif

Public Good Frameworks⁶ and Emerging Skill Sets⁷

	Thin Public Good	Transformational Public Good	2040 work- / community-force skill set
Community Relationships	Transactional	Reciprocity	Social/cultural intelligence
	Deficit-based understanding of community	Asset-based understanding of community	Cross-cultural competency
	Academic work done for the public	Academic work done with the public	Multi-level collaboration
Knowledge Production/Research	Extractive and Applied	Inclusive, collaborative, problem-oriented	Transdisciplinarity
	Unidirectional flow of knowledge	Multidirectional flow of knowledge	Design mindset
Epistemology and Pedagogy	Positivist / scientific / technocratic	Relational, localized, contextual	Inquiry and Sense-making
	Distinction between knowledge producers and knowledge consumers	Co-creation of knowledge	Intellectual curiosity and pliability, reciprocity
	Primacy of academic knowledge	Shared authority for knowledge creation	Integration
	University as the center of public problem-solving	University as a part of an ecosystem of knowledge production addressing public problem-solving	Adaptive, systems thinking
Cultural Theory Orientation	Individualistic / Hierarchical	Egalitarian	Emotional and contextual intelligence



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Co-Creating Value: The Present and Future of Higher Education

*Carolin Plewa,
Victoria Galán-Muros
& Balzhan Orazbayeva*

The value of higher education

Students are questioning if attending university will pay off. Increasing personal cost and the large youth unemployment rates in some countries make them wonder whether universities will provide them with the knowledge and skills to succeed in the labour market. University is not necessarily a vehicle for social mobility for graduates, so they are turning to other types of education (MOOCs, industry certifications, etc.) that report them similar benefits in less time and with less cost.

At the same time, many **businesses** are questioning if universities can be appropriate partners to access talent and new developments. Wondering whether universities can provide students with the skills that will make them better employees, businesses are considering other type of skills certification in their hiring processes. It is also in doubt for some whether universities are prepared to upskill current employees through continuing education and whether they can deliver innovations that can be easily absorbed and applied by business to gain competitive advantage.

Some **governments** are also questioning if it is worth spending more on higher education based on its current impact on econom-

ic and social development. The budget competition with lower levels of education and other areas outside education is strong. Hence, governments would consider higher education a good investment only if there is a high return in terms of jobs created, taxes paid and research impact achieved.

Similarly, **communities** are questioning if universities can help them solve the most pressing societal challenges. Many wonder whether universities are creating socially responsible graduates whose knowledge will drive regional innovation and economic growth and whether universities can develop open research outputs that are available to society and facilitate societal benefits.

The question remains how the value stakeholders seek from the higher education sector can be created and what the role of the university and its stakeholders are in the process. While some universities already position themselves as partners within their ecosystem to facilitate value creation, much of their engagement is limited to transactional approaches and mechanisms, focused on one or few activities or on a narrow group of stakeholders.

Remaining relevant in 2040 and beyond

Just as a holistic understanding of the modern evolutionary theory suggests, life evolves by a process of diversification through collaboration¹. Universities thus need to shift their focus from the individual organisations to the collective of life, since the collaborative and symbiotic interactions prove themselves to be of even higher importance than competition. Universities will be transforming and adapting themselves through the decentralisation of the knowledge generation and transmission away from the ivory tower into communities and society at large.

Universities will be increasingly leading collective efforts to solve longstanding and evolving social challenges through needs-driven interdisciplinary research by translating science into effective solutions to address societal challenges. They will better attune themselves towards a more sustainable future.

Furthermore, notwithstanding the growing importance and adoption of problem-based learning as well as entrepreneurship education, never more than today has the need for more relevant society and community-oriented transformative pedagogies been so imperative. And this challenge will also remain important in the future.

Forward looking universities acting along the interplay of the university missions will embrace the need for change and take on responsibility to contribute to the society in a more meaningful way driving regional innovation and economic growth.

But how will this happen? What will be different in 2040?

By 2040, higher education will be a central part of a collaborative ecosystem that drives positive change and comprises not just universities, business and government, but also social enterprises, community groups and support organisations, schools, as well as society at large. To maximise success, the interface will evolve into a truly integrated co-creation platform through which all stakeholders will connect to learn, innovate and contribute to the society in a positive way. It is through the joining and integration of the unique resources everyone brings to the table that value will be co-created and that value will be realised for each individual, group and organisation.

Co-creation through place

Higher education will move away from isolated campuses to integrated working and learning models. It is here that businesses, government departments, com-

munity organisations, social support structures, schools and the wider society interact and work together, developing and strengthening personal networks. Such physical place will be augmented by digital platforms connecting within and across systems.

Co-creation through innovation

Innovation will be an integral part of the co-creation ecosystem, as the interface of knowledge, skills and vision will ensure a wide range of research, development and extension efforts ranging from blue-sky research to applied solving of specific problems. A strong innovation agenda means that individuals with strengths critical to any one aspect of innovation are valued and supported, independent of their formal role.

Co-creation through learning

While higher education will remain the focal point of formal learning, its role will be as a facilitator, enabler and connector. This role is critical as learners co-create their own learning experiences and their own future; together with the university, businesses and communities. In addition to the strong drive for embedding entrepreneurship learning into curricula right now, 2040 will see a stronger socially driven entrepreneurship agenda. By means of active

community involvement, learners will own their role in generating a better ‘tomorrow’.

In the end, only collectively can we jointly co-create a greater ‘tomorrow’ and only engagement of all relevant stakeholders can make that happen.



It will be the co-created future that will be of greatest value to students, businesses, governments and communities and that will ensure value is experienced by everyone in the ecosystem. Only together can we navigate the ‘today’ and co-design a brighter ‘tomorrow’.

¹ Stewart, J. E. (2014). *The Direction of Evolution*. *Biosystems*, 123; 27-36



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Dr. Victoria Galán-Muros is an active professional with a broad international expertise in university-business co-operation, higher education management and innovation. Currently Higher Education Policy Analyst at the OECD, Victoria has previously worked as a consultant, academic, researcher and facilitator in those topics. As a senior consultant, associated at Technopolis Group UK and Apprimo UG, Victoria worked with the European Commission DG EAC along with universities and governments in over 30 countries. Victoria delivered professional workshops in 16 countries, co-authored over 25 consulting reports and participated in 12 publicly funded projects.

As an academic and researcher involved in 11 universities of eight countries, Victoria has authored 30+ publications and given 40+ speeches as keynote/invited speaker in 20+ countries. Additionally, she sits in the boards of director of the University-Industry Innovation Network (UIIN). Victoria holds two degrees from the University of Granada, a MSc from the London School of Economics and a PhD from Free University Amsterdam.



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In her role of educator, Balzhan is a lecturer in social innovation and social entrepreneurship. She also coordinates industry projects executed by students in Münster School of Business. Balzhan is a doctoral candidate at Free University of Amsterdam (VU Amsterdam) and focuses in her PhD on higher education in the context of university-business cooperation. She holds a Bachelor degree on International Relations from German-Kazakh University (DKU) in Almaty, Kazakhstan, and a Master degree on Integrative Project Management from Dresden University of Technology (TUD) in Germany.

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**‘QUALITY IS THE RESULT OF A
CAREFULLY CONSTRUCTED
CULTURAL ENVIRONMENT.
IT HAS TO BE THE FABRIC OF
THE ORGANISATION, NOT
PART OF THE FABRIC.’**

– Philip Crosby

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UNIVERSITY- BUSINESS COOPERATION



Universities – Engagement or Irrelevance – in 2040

Peter Rohan

Changes in technology are currently forcing, and will continue to force, universities to re-assess their purpose of being. This together with a shift in societies' expectation of what universities should be providing as a "return on investment" from high student fees and large investment of public funds, will mean that university operational models will undergo dramatic transformation. This change will be further driven by the demand for greater transparency around the nature and quality of teaching and research activity being conducted by universities.

These shifts are already seen in education, for example, by the increasing number of universities providing a mixture of on-line and blended learning, "flipped classrooms", and an improving digital experience. They are even grappling with the notion that students are their "customers" and that there are many types of potential 'students'. Universities will no doubt adapt to the emergence of life-long learning – people seeking to either re-enter the workforce or enhance their existing technical skills and career paths, with contemporary qualifications, or simply seeking an enriching learning experience – and see it as an additional business opportunity.

Further, most students now attend universities for essentially vocational reasons – to build a

career, to get a job. Universities are being selected based on their "brand value", or perceived quality of the university from an potential employers perspective, on the relevance of the course to the students' preferences, as well as on the capacity to fit the education product into busy student lives.

Projecting into the future of 2040, how far can these trends go?

As more and more courses go on-line or are provided outside traditional 9-5 working hours, universities should be expanding the common view of a "student" and seek new customers of universities such as:

- Multi-national companies – seeking standardised, leading edge training across their global workforces
- Industry professional associations – seeing access to specially tailored professional training updates for their members
- Other "on-line" content providers – seeking to complement their own offerings – of films, news updates, etc. – with education packages suitable for their target market

These new breeds of customers will seek education products from providers that are credible and know how to curate diverse

sources of knowledge into a contemporary, structured education and learning package. These customers will also expect to have input to the focus and content of these courses. This may indeed be the key competitive edge of universities into 2040 – leveraging their status as a university to provide products to others.

Well before 2040, customers will be also expecting courses – in whatever format – to be delivered by a professionally trained teaching workforce, not just a large pool of casual workers. In Australia, approximately 60% of undergraduate teaching is provided by university-qualified casual staff, often doing PhDs¹.

Universities themselves may choose – or be forced to choose – to specialise in product development only (including curation, assessment, certification and quality control over services provided by others – teaching, student support). Such models are already emerging in the Australian university landscape, especially in cases where the provision of fully on-line courses are outsourced to a third party (e.g. Pearson, Keypath plus others), and the university only provides the product (course content), with the third party providing most if not all of the marketing and student support during the study life of the student.

Another recent variation on the theme of specialisation is the collaboration between RMIT University and Apple to provide a suite of tailor-made programming courses using Apple's App Development with Swift curriculum.

“Novice coders and aspiring iOS developers will be supported by RMIT's expert teachers to unleash their creativity and entrepreneurial skills to join the booming app economy” (RMIT website).



External parties are likely to be more skilled and nimble in the areas of recruitment (marketing and sales), product delivery (via digital channels), as well as student (customer) support, with each of these elements common in most industry sectors. Will Google, Facebook and/or Microsoft become the Amazons of the university education sector?

Beyond being a source of funding, governments will continue to exert a strong impact over the sector by means of setting “performance standards” for all existing and potential new universities. Existing universities unable to achieve the required performance standards - quality of product,

student feedback, transparency and financial viability – will have their license for accreditation reviewed/revoked. The university market will be opened up to new players so long as they meet the required performance standards.

How will these trends affect research?

The push for greater transparency and deemed “return on investment from public funding” will extend into the field of research. European countries and universities appear to have understood the importance of directly linking university research to industry – and thus rank high on levels of collaboration between the two groups. Often-cited examples include the Max Planck, Fraunhofer and Leibniz Institutes in Germany.

Other models could relate to research devoted to societal issues – aging societies, gender, homelessness – with partnerships between university researchers and relevant community groups and government policy makers. This is the model upon which the Amsterdam Institute for Advanced Metropolitan Solutions in the Netherlands was founded.

What is clear is that the successful models are very deliberate in structuring research relationships

between industry and universities – not at the whim of individual researchers.

The famous Magna Charta Universitatum – a document to celebrate the fundamental values and principles of the university, in particular institutional autonomy and academic freedom – will need to be re-interpreted well before 2040 to encourage universities to seek and develop relevant partnerships and collaborations with the broader society in which they live. Autonomy and academic freedom can still co-exist with the notion of contributing to the broader society and being accountable to that society.

Universities in 2040 will be providing course content to a wide variety of students and organisations, with a suitable mix of face to face and on-line delivered content. Almost all services outside the core product development/curation will be provided by specialist third parties. The flow of students into research degrees and further research will be facilitated and directed through dedicated - potentially global - institutes established around key themes deemed of most relevance to the current and future well-being of societies.

Greater levels of engagement by universities at all levels of society will enhance their perceived value, reputation and connectedness with societies.

The days of universities as ivory towers will be a very distant memory.

¹ Clohesy, L. (2015). *The Casualisation of Academia: Impacts on Australian Universities. The AIM Network.*



Peter Rohan is an Independent Strategic Advisor and Program Director, and a sought after commentator on Higher Education following his almost 30 years as a Partner at Ernst & Young, where he provided consulting advice and project direction, and worked extensively nationally and internationally. Mr. Rohan held a number of leadership positions during his career: National Head of Education, National Head of Business Consulting, Global Account Executive in Financial Services based in Paris.

Peter's work has encompassed strategic planning, operational reform, market repositioning, partnership negotiations and business cases, and includes the sponsorship of and contribution to the key EY White Papers on "University of the Future" (2012) and "Higher Education and the Power of Choice"(2011).

University-Industry Collaboration in the "Asian Century"

Rajiv Dhawan

Many observers have dubbed the significant growth of Asia as the coming of the "Asian Century." The expansion of Asian economies has resulted in the generation of many large conglomerates and companies, and it is expected that Asian corporations will continue to dramatically increase their representation in the Global Fortune 500 for the foreseeable future. With high capitalization, many of these companies realize that significant investments in R&D (internal and external) will be essential for long term growth and viability. For example, Samsung Electronics invested nearly \$13 billion dollars in R&D in 2016, ranking it just behind Volkswagen AG in the global ranking for industrial research and development.

Asian companies increasingly invest in universities

This internal spending has been complemented with large external investments as well: Companies such as Samsung, LG, Huawei, Tencent, Alibaba have extensively engaged universities in their home countries for both short and long term research. As an example, Samsung's deep engagement with Sungkyunkwan University is well known and according to a recent study, nearly 9% of publications from this school were co-authored by Samsung researchers. These universities have provided strong support to train talent that

they hire, as well as investing significantly into research collaborations that have enabled them to deliver cutting edge innovation to their global customer base. The search for new markets and to harness the best talent has also pushed many of these companies to set up R&D operations in Europe and North America, and consequently they have sought to forge stronger relationships with leading academics in these regions.

Samsung invests upwards of \$100 million dollars per year into universities, globally. While a significant portion is in Korea, there are a large number of interactions with universities in the United States and Europe. The signature Samsung collaboration program is the Global Research Outreach (GRO) Program. This call for proposals program, administered by Samsung Advanced Institute of Technology (SAIT), awards several million dollars in funding to the world's leading research universities that propose innovative research ideas aligned with Samsung's various research goals. In 2013, over 70 awards were made globally on topics ranging from next generation computing to data storage to aging. The majority of these went to North American and European universities. Huawei, also has a call for proposals program (Huawei Innovation Research Program) and has also made significant investments

into universities outside of China. Recently, the company invested \$1 million dollars into an Artificial Intelligence partnership with the University of California, Berkeley.

So, what will the coming of the “Asian Century” mean for the academic landscape 20 years from now? How relevant will universities in North America and Europe be? What will the talent on these various campuses look like? How will Asian companies work with Western universities and what will they look for in terms of finding partners? What will the Western government’s role be in ensuring that universities can compete effectively? In the following, I reflect on these questions.

Asian universities will become a strong competition to western universities

The global competition and collaboration between academics around the world, will be a trend to follow in the coming decades. Over the past two decades, Asian countries (China, South Korea, Taiwan, India and others) have invested significantly into their higher educational institutions, which has increased the relevance of these universities. Asian governments provide faculty members with stable funding and a large number of talented graduate students at both the undergraduate and graduate levels. With

excellent research productivity (i.e. publications in top journals) and focus on cutting edge areas (i.e. Artificial intelligence, personalized medicine, etc.), these institutions are well positioned, and North American and European universities continue to increase the level of cooperation with Asian Universities. A large part of these collaborations is aimed at solving grand challenges, such as climate change, pollution, feeding a growing world, job losses from AI, healthcare, etc.

Governments will engage in the global war for talent

While recent political changes in the US have decreased foreign enrollment, Asian students will also in the future go to North America and Europe to pursue their undergraduate and graduate education. They will thus make up a greater proportion of the student body of these universities, especially in STEM related fields.



Governments will ultimately realize the importance of this talent and pave the way to provide them with citizenship, while the home countries will attempt to repatriate the best and brightest. Faculty members will have a lot of options and will chose universities in countries that provide them with a stream of talent and stable funding.

Technology is changing with increasing speed and for companies to work on relevant problems, they will need to provide fresh knowledge and perspective to their employees. One way to accomplish this is through upgrading skills and gaining fresh perspective by spending time at universities. Many Asian conglomerates already have employees take “sabbaticals” as visiting scholars at top universities to work with faculty members on critical projects. These visits, which typically last for one year enable the scientists and engineers to further develop their skills, while working on projects that ultimately benefit the corporation. In the future this practice will take new forms and become even more common also at Western universities.

Western universities will market their strengths and uniqueness

US and European universities, sensing this competition, will focus on providing a uniqueness to companies that is not otherwise available in their home countries. They will invest even more time and effort into marketing their strengths. Universities will explore ways to work with companies by providing IP terms that allow companies to have exclusive access to IP generated from a collaboration. As the innovation cycle speeds up, universities and companies will also need to take shorter times to setting up collaborations, and support of pre-competitive consortia.

While in the past, large amounts of venture capital were a primary driver for the strong entrepreneurial environment in North America (especially Silicon Valley), the availability of capital is becoming more democratized globally. As a result, universities in North America and Europe, in order to compete, will need to collaborate extensively with those they never would have collaborated with before to define new white spaces. This will require fundamental restructuring of how universities go from more discipline-based to problem based research. University departments will also move away from traditional silo structures to more

“challenge-based” structures, as the problems that need to be addressed will no longer fit into discreet subjects, like they have in the past. The end results will be of significant value to both foreign and domestic corporations.

While the recent trend has been Western governments providing either flat or decreased funding for science and engineering, in the future, universities will see increased levels of government funding. This change will come about as citizens and governments realize the importance of science & technology in the creation of new jobs and finding opportunities for those displaced due to new technologies (i.e. Artificial Intelligence).

Overall, I believe that the growth of Asian economies will be beneficial to North American and European university systems. They will provide talent and additional funding sources that will increase the innovation capabilities that already exist today.



Rajiv Dhawan received his Bachelor of Science degree from Simon Fraser University in suburban Vancouver. He then moved on to get his Ph.D. from McGill University in Montreal, Quebec followed by a postdoctoral appointment at Stanford University. Rajiv started his career at DuPont Central Research & Development as a Research Chemist and moved to the University Relations function and managed several programs, including the ~100 year old DuPont Young Professor program.

Rajiv joined Samsung Semiconductor in 2016 and is currently Director of Strategic Planning and Business Development. In this role, he manages University Relations for Device Solutions America and key activities include collaboration management, technology scouting and Ph.D. recruiting.

2040: When Universities and Businesses Will Work in Symbiosis

Arnaldo Abruzzini

As higher education providers with the purpose of fostering talent and preparing young people for their professional lives, universities bear an immense societal responsibility. To duly accept this responsibility and deliver high-quality education, institutions need to take into account the needs of the labour market. The highly rigid and traditional nature of many universities is incongruous with the fast-paced, evolving nature of the economy and makes it hard for them to keep up with technological change. Enhanced cooperation with the business community could render university systems more dynamic and needs-oriented, helping to better align curricula with the economy.

The concrete objectives of such cooperation focus on around teaching students the skills that are relevant (i.e. have tangible value) to their subsequent professional career. In addition to practical sector-specific qualifications, this includes digital, interpersonal and entrepreneurship skills. Digital literacy is indispensable in today's technology-driven society, while promoting soft skills and entrepreneurial thinking have great potential societal and economic benefits by upgrading the work force and boosting innovation. Such transversal skills are a by-product not only of the content of university teaching, but also the way in which the teachers teach and the

students learn, and as such, must continue to evolve and modernise.

Bridging the gap between education and the economy would also give students a better feel for the job market and available opportunities. This could result in lower university drop-out rates, better career decision-making and, ultimately, less unemployment.

A few concrete examples of how university-business cooperation could look in 2040 (or earlier) and what systematic changes have to be made will provide some insight on how higher education providers can fulfil their pivotal role when it comes to innovation and talent development for the business and industrial sector.

The most impactful measure is actually not the hardest to implement. By 2040, universities would organise both optional and mandatory workshops on a range of different topics, designed for, and taught by, industry professionals. These would be incorporated into curricula and complement the main courses, teaching students more practical, day-to-day, job-related skills.

To calibrate the system and keep it up-to-date, the governance of universities in 2040 would differ quite significantly from current structures. By incorporating the

various stakeholders into the decision-making process, universities would be more successful in fulfilling their role and increasing their efficiency. The administration would make decisions on curricula, staff, development, etc. together with public authorities, local representatives, entrepreneurs and corporations. With this type of governance, universities can modernise and turn into inspiring, innovation-driven institutions over the course of the next two decades.

A high innovative and entrepreneurial capacity would turn universities into creative hubs that encourage personal initiative and foster the development of spin-outs through strategic/commercialisation support and better access to finance. Given adequate funding and market opportunities, university research and ideas would thus directly feed into the economy, driving innovation through a currently underexploited channel.

A strong link between universities and businesses significantly increases the employability of graduates, which decreases youth unemployment and makes it easier for companies to find suitable staff. In view of its relevance, some measure of employability, including self-employment, would be more to the fore in all university ranking statistics. Aside from this

alignment of incentives, such a ranking enables more informed and confident decision-making among prospective students. Of course, the sole purpose of universities is not to secure employment for its graduates, but this should be prominent among universities' objectives and reflected in their performance indicators.

By 2040, a closer link between education and the economy would also manifest itself in an increased number of careers fairs, field trips and work-based learning, both at school and university level. By directly interacting with many different kinds of firms of various sizes, students can better gauge what type of work they would be interested in, explore opportunities and acquire additional skills and experience for the world of work. These measures would be complemented by other adjustments, such as an expansion of university career services, improved access to tertiary education, as well as more specific course descriptions in relation to how taught skills prepare students for professional life. The skills mismatch that stubbornly refused to drop in the earlier part of the 21st century – in EU countries with high and low unemployment levels alike – will have abated thanks to enhanced permeability between academic and vocational tertiary education. This has the dual advantage of achieving greater parity

of esteem between what were previously perceived to be quite distinct educational paths and at the same time equipping students for their careers.

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In conclusion, there is a lot to gain from closer university-business cooperation. A more comprehensive, more relevant tertiary education would reduce the skills gap and mismatch, resulting in more employment, increased economic growth, and higher living standards.

The proposed measures are anything but impossible to implement and Chambers of Commerce & Industry stand ready to facilitate this overdue “rapprochement” in the interest of everyone.



Arnaldo Abruzzini has been the CEO of The Association of European Chambers of Commerce and Industry (EUROCHAMBRES) since 1999. In Brussels, he represents the voice of over 20 million companies through members in 43 countries and a network of 1.700 regional and local Chambers. Arnaldo is also an active entrepreneur, having founded several companies. He still owns shares in telecommunications (Interactive Media), energy (InRes) and business consulting (Consir) firms. Mr. Abruzzini has worked as Managing Director of several companies active in telecommunications (EPTA), marketing and communications (MediaCamere) and business advice (CoFiCom) in Italy and USA. He has also served in the financial sector, notably in investment banking (MedioBanca) and insurance companies (Bavaria).

CREATING THE FUTURE UNIVERSITY



Collaboration for a More Relevant Education

Najib Abusalbi

The structure of universities as higher education institutions has not fundamentally changed for decades, when we consider how students choose a campus, join faculties and departments in pursuit of a classical field of study, e.g. in engineering, sciences or business. Nonetheless, in the last decades, we have witnessed two emerging trends within higher education that help to feed economies with innovative business solutions: making knowledge available to a wider global audience of learners that increases the global talent pool, and added increased focus on research for problem solving.

These trends will continue to influence how universities will be structured in 2040, how they will develop talent and hence, how they affect future economies through a direct collaboration between the private and public sectors.

In a global economy, academic institutions, aiming to reach out and share knowledge, have adopted diverse strategies ranging from establishing an online presence to building brick-and-mortar subsidiaries. Such actions have been driven by:

1. gaining brand recognition as a global provider of talent to employers, societies and economies, hence attract-

ing an increasing number of students seeking higher education¹; and/or

2. becoming a global steward through establishing and developing programs of direct relevance to emerging economies with a dire need for local talent and innovation.

Like many leading industries, the energy sector has witnessed changes over the past decade across several emerging economies, e.g. in Sub-Saharan Africa, Latin America, or South-East Asia. Global corporations like Schlumberger², NGOs, and leading energy universities, separately and collaboratively, have been erecting buildings, developing science and engineering programs, and, wherever feasible, establishing research labs to bolster support for the emerging energy economy in such regions^{3,4}. These programs, in many cases, offered degrees ranging from vocational certifications to graduate level degrees⁵.

However, investments in research and innovation have remained a hurdle in retaining local talented individuals who wish to establish and develop businesses in emerging economies. Often, these individuals are compelled to immigrate to more developed nations. Even in developed countries, youths seeking to enter

the business world are typically burdened by lack of investors willing to share risk, and are often hindered by heavy regulations on business startups.

Recent years have also witnessed the emergence of national, regional and global initiatives that aim at enabling business innovation through securing funding to support entrepreneurship, especially in STEM (Science, Technology, Engineering and Mathematics) fields. Yet more will be required to boost future economies, with funds coming from academic and government institutions, corporations and other organizations^{6,7}.

In the coming decades, we expect to see a significant increase in investments in university programs that address national or global challenges, including public health and safety, energy and environment, and the like⁸. Organizations like the National Center for Entrepreneurship and Technology Transfer¹⁰ in the United States, or Global Ventures (GCV)¹¹ that facilitate networking among industry, government and academia, will see a significant rise in their activities.

Amid these challenges of balancing globalization with localization, developing versus emerging economies, it is important to note how the education sector has evolved to continue to meet the increasing

needs of growing populations, diminishing resources and ever-changing economic drivers, with a background of the digital technology advancing at amazing speeds.

The revolution we have seen in education delivery has no doubt provided an opportunity to knowledge thirsty individuals around the globe. Millions of hard-working young people, who otherwise would not afford a residential higher education to advance their careers, have finally had access to a vast knowledge base from leading universities of the world¹².

It is true that the dropout rate from online courses, or certification program, has been significantly higher than from residential programs; however, the “free” (or minimal cost) delivery has enabled many young professionals and youths aspiring to ameliorate their socioeconomic conditions. Multiple studies over the past decade have linked education to the human development index (HDI)¹³.

Many companies, including global corporations, like Schlumberger, have adapted their continuing education or life learning strategies to include digital education, with the expectation that adopting such strategies will provide training and career development opportunities for their employees with minimal business disruption or family life disruption.

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A more impactful trend, and that is likely to be more influential, is the evolutionary shift towards a problem solving pedagogical approach.

This shift has been manifesting itself in the rise of new academic structures based on collaborative learning:

1. Inter-disciplinary “Institutes” that are typically organizational structures within a university – a “Director” usually leads the institute with support by an Advisory Board comprised of members from the industry and academia. The institute draws upon resources from various departments and supports the activities from various sources, including industrial partners, government agencies and university funds. These institutes bear the responsibility to address a problem facing society, typically related to themes of direct impact on human and economic development, such as health, energy, and the environment. These institutes can grant degrees in addition to conducting inter-disciplinary research. The Energy sector,

for example, continues to establish “Energy Institutes” to ensure effective collaboration among engineers, scientists, sociologists and environmentalists all seeking to provide cleaner and more secure future energy resources^{14 15}.

2. Integrative learning “Work-spaces” – these workshops, by design, take a broad challenge representing a set of problems whose resolution could significantly affect the society, nationally or globally, and address problems from all angles. An example of such challenge could be the integration of advanced robotics (and robots) into the society¹⁶.

The global, regional or national, challenges awaiting us in 2040 will require a more collaborative and collective approach to reshape higher education. In turn, the institutions (AKA universities) would be a more effective source of specialized talent that will lead the growth of economies across nations of the world.

Industry, academia as well as governmental agencies will need to adapt to new collaborative strategies and to adopt innovative ways of working in a more integrative manner. This will enable universities to deliver education that is more relevant, more cost

effective, and more efficient, ensuring alignment of future graduates and research outcome to the needs of society and specifically the industry.

¹ IIE Open Doors. Retrieved from <https://www.iie.org/opendoors>

² Schlumberger Global Stewardship Report. Retrieved from https://careers.slb.com/whoweare/how_work/globalstewardship.aspx

³ Makerere University Computational Lab. Retrieved from <https://careers.slb.com/whoweare/news/makerere.aspx>

⁴ Agostino-Neto Engineering Program. Retrieved from https://careers.slb.com/whoweare/news/women_angola.aspx

⁵ Getenergy Event MENA Milan 2017. Retrieved from <http://mena.getenergyevent.com/>

⁶ Imperial Innovations. Retrieved from <https://www.imperialinnovations.co.uk/>

⁷ Innovate Calgary. Retrieved from <https://www.innovatecalgary.com/>

⁸ U.S Department of Energy (DOE). Retrieved from <https://energy.gov/>

⁹ National Environment Research Center. Retrieved from <http://www.nerc.ac.uk/funding/>

¹⁰ National Center for Entrepreneurship and Technology Transfer. Retrieved from <https://ncet2.org/>

¹¹ Global Corporate Venturing. Retrieved from <http://www.globalcorporateventuring.com/>

¹² MIT Office of Digital Learning. Retrieved from <https://openlearning.mit.edu/>

¹³ UN Human Development Index. Retrieved from <http://hdr.undp.org/en/content/human-development-index-hdi>

¹⁴ Rice Energy and Environment Initiative. Retrieved from <http://eei.rice.edu/>

¹⁵ Oxford Institute for Energy. Retrieved from <https://www.oxfordenergy.org/>

¹⁶ UT Engineering Education and Research Center. Retrieved from <http://www.ece.utexas.edu/about/facilities/eerc>



Before his retirement in late 2017, Dr. Najib Abusalbi was Director of Corporate University Relations for Schlumberger Limited, the world's largest services and technology provider for the oil & gas sector. His responsibilities included oversight of activities with leading global universities, developing and recruiting talent globally, and providing support of both education and research programs for the energy sector. Najib joined Schlumberger in 1984 and since then has held multiple product development and management positions in the company.

He holds a PhD. in Atomic Physics from Louisiana State University and has led several of Schlumberger's Communities of Practice, including Management Disciplines, Project Management, and Knowledge and Information Management. Dr. Abusalbi has served in various committees of the Society of Petroleum Engineers (SPE) and the Society of Exploration Geophysics (SEG), on the Industry Advisory Board of the Norway-Texas Petroleum Research Alliance (NorTex), the Forum on Education of the global Francophone corporations, and in an advisory role on the National Center of Entrepreneurship and Technology Transfer (NCET2).

Universities Inside out: Sit- uating Univer- sity-Business Co-Operation at the Centre of the Student Learning Journey

Keith Herrmann

Stepping beyond the here and now

Employers constantly talk about graduates being unemployable and not meeting their needs¹. Hence employability has currency in universities. Yet there are issues about whose voice is determining what employability means for students, with the distinction often lost between how many graduates are in employment and how employable graduates actually are². There is also often little thought given to what this means for defining what a university is and its purpose in the twenty first century³.

By 2040 graduates will face a world of work 'mechanised' by artificial intelligence, automation, big data and technology where even graduate-level jobs will be replaced by machines⁴. The fusion of technologies that blurs the lines between the physical, digital and biological spheres will mean that being human will need to be about more than knowledge, about more than economic and social value... it will need to be about being creative, adaptive, innovative, connected⁵. And, in the case of universities it will need to be about enabling graduates to develop and use higher-order graduate attributes to deal with the complexity, uncertainty and ambiguity that they will face in the future world of work. This will be

the distinguishing feature of how the universities of 2040 will interact with their external environment in order to ensure graduate success and their impact on society.

Universities of 2040 will actively recognise, embrace and cultivate a wider range of voices from the external environment around them in order to shape the student learning journey. Universities will invert themselves in relation to how they connect themselves, their research and the student learning experience to bring the outside in. The 'third mission' (outreach and external engagement) of universities will become as it always has been, the primary mission of what a university is. This will significantly enrich the classroom experience with professional practice and infuse their research in ways that rely heavily on the interplay between academic and employer whilst not subjugating one voice to the other.

Many universities already have degree programmes accredited by professional bodies, trade associations and employer groups. However, it could be argued that the needs of employers are often situated in the here and now – only in the present. Thus, many of the reports on skills gaps and shortages highlight the urgency of addressing the immediate concerns employers have⁶.



In this time of the fourth industrial revolution, when the race against (with) the machines will be the single defining feature of the future workforce, it is important that we design the student learning journey so that it equips our graduates for a future world of work, and not just for the here and now⁷ – not just the graduate job that is secured within six months after they graduate⁸.

Stepping beyond automation

Universities that become inside out will embrace the co-location of industry clusters around them and the at-scale use of immersive (virtual) online learning platforms, MOOCs, and active employer involvement will make the ‘work room’ the everyday classroom where the boundaries between these settings will merge. Students will start their studies not with theory but in active learning settings based on ‘real problems’ in business. This will flip the learning environment from text books and classrooms to a more immersive and interactive learning experience for students. Practice and theory will be part of a single learning experience.

Some may argue that these approaches to university-business co-operation already exist. But do they go far enough? For the world of work to be an immersive part of the learning experience, university-business co-operation needs to be far more radical and progressive⁹. It is suggested that this will require a model of higher education similar to that advocated by KaosPilot in Denmark, where the learning is situated in practice from the start, it is not just an optional ‘business skills’ module but the outside-in is an engaged and active part of the learning experience. The KaosPilot¹⁰ is a hybrid business and design school that recognises that an entrepreneurial education leads not only to students getting good jobs, but that it enables them to create new and exciting jobs for the future. Rather than reducing the experience to a job after graduating that is characterised by traditional methods of measurement – a Standard Occupational Code, and determining value by some artificial measure of graduate earnings, for many students, the KaosPilot experience is more about finding a career with meaning and purpose.

The active co-design of learning will give voice to university, employer and student, and ensure that learning goes beyond simply being a functionalist device for employers to fill skills gaps and shortages. Ultimately though, in

the context of automation, the challenge for the universities of 2040 will be finding ways to enable individuals to embrace a world where ‘to be employed is to be at risk [and] to be employable is to be secure’¹¹, yet recognising at the same time that any such notion of ‘security’ is unachievable¹².

¹ CBI and Pearson (2016). *The Right Combination: CBI and Pearson Education and Skills Survey*. Retrieved from: <http://www.cbi.org.uk/cbi-prod/assets/File/pdf/cbi-education-and-skills-survey2016.pdf>

² Rich, J. (2016). *Employability: Degrees of value*. Occasional Paper 12, HEPI. Oxford.

³ See Boulton G, Lucas C. (2011). *What are universities for?* Chinese Science Bulletin, Vol. 56, No. 23; Chertskovskaya, E., Watt, P., Tramer, S., and Spoelstra, S. (2013). *Giving notice to employability*, *Ephemera: Theory and Politics in Organization*, Vol 13, No. 4, Mayfly Books; Collini, S. (2012). *What are universities for?* Penguin.

⁴ Ford, M. (2016). *Rise of the Robots: Technology and the Threat of a Jobless Future*. Oneworld Publications.

⁵ Bakhshi, H., Downing, J., Osborne, M., & Schneider, P. (2017). *The Future of Skills: Employment in 2030*. London: Nesta, Oxford-Martin, Pearson.

⁶ *Ibid* CBI and Pearson, 2016

⁷ Schwab, K. (2015). *The Fourth Industrial Revolution: what it means, how to respond*. Foreign Affairs Anthology Series.

⁸ Holmes, L. (2006). *Reconsidering Graduate Employability: Beyond Possessive Instrumentalism*. Presented at the Seventh International Conference on HRD Research and Practice Across Europe, University of Tilburg.

⁹ Hermann, K., Hannon, P., Cox, J., Ternouth, P., & Crowley, T. (2008). *Developing entrepreneurial graduates: putting entrepreneurship at the centre of higher education*. London: NESTA.

¹⁰ Elbaek, U. (2006) *KaosPilot A-Z*. Retrieved from: www.kaospilots.dk

¹¹ Hawkins, P. (1999). *The art of building windmills: Career tactics for the 21st century*. Liverpool: Graduate Into Employment Unit, University of Liverpool.

¹² Costea, B., N. Crump and K. Amiridis (2007). *Managerialism and “infinite human resourcefulness”: A commentary upon the “therapeutic habitus”, “derecognition of finitude” and the modern*

sense of self, *Journal of Cultural Research*, 11(3): 245-264; Cremin, C. (2010). Never employable enough: The (im)possibility of satisfying the boss's desire', *Organization*, 17(2): 131-149; In Chertskovskaya, E., Watt, P., Tramer, S., and Spoelstra, S. (2013). Giving notice to employability, *Ephemera: Theory and Politics in Organization*, Vol 13, No. 4, Mayfly Books.



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Keith worked previously at Durham University Business School as Director of Programmes where he led a team specialising in entrepreneurship education and economic policy. Keith is passionate about education, and pro bono convenes the Careers Alliance, a strategic leadership network of 25 national organisations in the UK with an interest in career guidance.

Tearing Down Real Walls: A Place-Based Approach to University-Industry Collaboration

Julie Wagner

More likely than not, your university or industry—despite ongoing efforts to strengthen collaborations with nearby organizations through new instruments, intermediaries and incentives—is *failing to reach its full potential*. A painful thought considering all the time and resources devoted to strengthening these relationships as a means to increase your innovation potential, and one that potentially has wide-ranging implications for the higher education sector going forward to 2040.

After traversing the globe, visiting countless university-led innovation ecosystems, a widespread finding is a failure to value “place,” or the physical landscape in facilitating dense social networks, both intentionally and serendipitously. For the past five years, the Brookings Institution has been researching the rise of new geographies of innovation and the radical re-making of existing ones—all of which are putting place at the heart of their innovation ecosystem. Documented in the 2014 Brookings paper, *The Rise of Innovation Districts*¹, this trend continues to be confirmed through our work on-the-ground in places as diverse as St Louis, Stockholm and Melbourne. It is also why we partnered with Project for Public Spaces to advance this work.

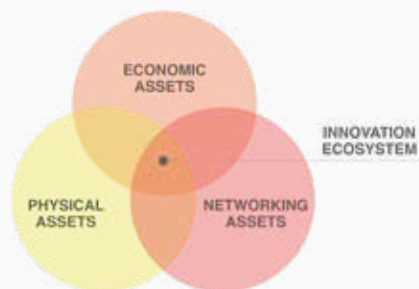
The emergence of innovation districts comes, in part, from the

physical assets and attributes they offer, sending new signals about what matters in today’s economy. The density of, and proximity between, university and industry actors connected by short, walkable blocks is helping local leaders facilitate new social networks. R&D-laden universities and industries are likely to rely on density and proximity because tacit knowledge is exchanged through close connections and is difficult to translate and transfer over long distances².

Just as important as the increased value of networks is the changing preferences of workers and firms. Increasingly, innovation districts offer a mix of activities—housing, amenities and diverse work environments tied together by an actively used public realm, which appeal to talent and companies alike³. Taken together, the density of firms, diversity of amenities, and liveliness of places are proving to be powerful enough to “un-anchor anchors”—that is, to entice seemingly unmovable institutions and corporate research facilities to relocate into districts⁴.

All of these observations have led to the conclusion that innovation districts are effectively re-making themselves to create a “place-based innovation ecosystem,” where place assets, along with economic and networking assets, contribute to the cultivation of idea

generation, joint problem-solving, and more.



But don't view these emerging innovation districts as best practice just yet. Although they have the "physical bones" necessary to facilitate networks and lure talent, more work is still necessary for place to become the connective tissue between people, firms, and a broader network of actors.

If innovation districts have more work ahead, imagine what this means for other university and economic clusters that have never considered the strategic value of place.

A Place-Based Approach to Innovation: The Fundamentals

A place-based approach to innovation demands that universities and industries think differently about the physical landscape. Genuinely great places are about more than aesthetics; they create a community that values active,

iterative learning, risk sharing, and collaborating to compete. To achieve this, local actors must think critically about their geography at various scales.

At the broader geographic or district scale, the goal is to have a critical mass of university, industry and other economic actors easily connected and accessible to each other and to the broader metropolitan area. Given that university-centered innovation geographies can range from roughly 120 to 400 hectares⁵, more in-depth analysis is needed to understand which physical characteristics are advancing or hindering their progress, such as physical impediments that limit access from the broader region and/or city (e.g., highways, railroad tracks, bodies of water, and large parks), or how zoning and land use conditions may limit firm and talent connectivity.

At the nodal scale, the ambition is to create the level of density and mixing needed to create a highly networked and "buzzing" innovation community. A common mistake is to spread physical investments evenly across a vast innovation geography. Activity nodes can take shape in many configurations: Sometimes along a key corridor; sometimes centered on a public space; and sometimes surrounding a magnet-ic innovation center or hub⁶.

The rendering below illustrates how working at a smaller scale allows local actors, involving the community of workers and residents, to:

1. Strengthen connections between people and firms by creating a short, walkable street grid.
2. Design and manage public spaces to spur interaction, learning and networking.
3. Reconceive the ground floor of buildings activated with cafés, retail and gathering places.
4. Locate university, company, and start-up spaces in close proximity, including affordable workspaces.
5. Concentrate on programming—activities that help incubate new enterprises, accelerate learning, and strengthen networks between people and firms.



At the *building or human scale*, the idea is to create places, including small spaces, that facilitate social networking as much as independent work. Every building, including the office and the ground floor spaces they provide, is an opportunity to be exploited. While architects may create aesthetically beautiful places inside buildings, they often fail to grasp the organizational culture, the importance of collaboration, and how this changes over time. Brookings research identified a new wave of innovation spaces that are putting various techniques for network building and collaboration into action⁷, such as the creation of more flexible, moveable spaces and open floor plans where university and industry workers can easily mix⁸.



Early insights from first movers — the universities valuing place as a means to compete — indicate that universities and their industry partners will play a far more transformative role in their cities and regions. They will elevate the value of place in shaping and strengthening local economies while creating healthy, vital places in the process. We will be watching.

¹ Katz, B., & Wagner, J. (2014). *The rise of innovation districts: A new geography of innovation in America*. Washington: Brookings Institution. Retrieved from www.brookings.edu/essay/rise-of-innovation-districts/

² Scott, A. (2016). *How Firms Learn: Industry specific strategies for urban economies*. Washington: Brookings Institution.

³ Urban Land Institute. (2013). *America in 2013: A ULI Survey of Views on Housing, Transportation, and Community*; Nelson, A. C. (2013). *Reshaping metropolitan America: Development trends and opportunities to 2030*. Island Press.

⁴ Scott, A., & Katz, B. (2016). *Why Today's Corporate Research Centers Need to Be in Cities*. *Harvard Business Review*. Retrieved from <https://hbr.org/2016/03/why-todays-corporate-research-centers-need-to-be-in-cities>

⁵ Note that these geographies of innovation—be it self-proclaimed innovation districts or university-centered innovation ecosystems—do not have rigid geographies. Instead, general boundaries change over time in response to market forces.

⁶ Wagner, J., Davies, S., Sorring, N., & Vey, J. (2017). *Advancing a New Wave of Urban Competitiveness: The Role of Mayors in the Rise of Innovation Districts*. Retrieved from <https://www.brookings.edu/research/advancing-a-new-wave-of-urban-competitiveness/>

⁷ Wagner, J., & Watch, D. (2017) *Innovation Spaces: The New Design of Work*. Washington: Brookings Institution. Retrieved from <https://www.brookings.edu/research/innovation-spaces-the-new-design-of-work/>

⁸ *Ibid.*



Julie Wagner is an urban researcher and co-author of the research paper “The Rise of Innovation Districts: A New Geography of Innovation in America,” which observes how new geographies of innovation are emerging in response to broad economic and demographic forces that value specific place-based attributes and amenities. For over 12 years she was nonresident senior fellow at the Brookings Institution, an independent think tank based in Washington DC.

Julie is now President of Urban Insight, a company aimed to help cities and regions strengthen their competitive advantage through the strategic formulation of innovation districts. She is also a visiting scholar for the Esade Business School's Center for Global Economy and Geopolitics. Julie has written articles on the new geography of innovation for the Harvard Business Review, Fortune Magazine, Quartz, and The Guardian. She earned a Masters in City Planning from MIT.

Adhocracy Now

*Mikko Korpela
& Toni Pienonen*

In the not-so-distant future Central Finland, a second-year student Aino checks into an online course from her home, where she meets her 1276 classmates. This MOOC is pretty standard sized, offered by a joint platform of all the universities in Finland for anyone in the world.

After the class she collaborates in a VR-based environment with some of her peers and a participating company from Central America. They go through the latest progress of their joint project. Global collaboration means having to work across several time zones, sometimes sacrificing personal schedules and activities to be able to fit online meetings into late evenings or early mornings.

Aino has a quick lunch and heads for a local coworking community space, Urban Impact, in the center of the city of Jyväskylä on a bike-share bicycle. Traditional offices are a dying breed. By the year 2040, coworking market makes up more than half of all the office space market globally. Freelancers, startups and small businesses were first to seize the benefits of collaborative shared spaces back in 2010s, but corporations, public organizations and universities followed soon.

Despite AR/VR user experience being light-years ahead of what they were at the time of Microsoft

Hololens or Oculus Rift, nothing has fully replaced the need for having a real physical connection with fellow human beings, face-to-face.

In Aino's city, Jyväskylä, there are several different coworking communities that people can access. Most of them have one or two specific thematic focus areas so that people can easily find what interests them most. Urban Impact is the one that Aino prefers, since like everyone else in the community, she shares an interest for the theme of urbanization and solving its many issues. It's a place where members of local community, students, university staff members, startups, municipality and established businesses meet each other and do projects together.

Like almost everyone of her age group, Aino has never been employed by anyone else but herself. Everything needed for doing business is already linked to her European ID, including invoicing, taxation and bureaucracy. She knows that her parents used all sorts of service platforms as "light entrepreneurs" to do some freelancing when they were students, but there's no such need for her.

Aino's skills and services are easily accessible via AI-driven knowledge market platforms. This month, she has gotten 29

matches with her profile. Most assignments have been micro jobs, something that can be finished over the course of couple days, but during the past year she has been a part of a different bigger project as part of her university studies that is now being spun out into a new company at Urban Impact.

Some local university staff members are going to be involved in part-time roles at this aspiring startup, and one of them has asked Aino if she'd like to do some project research for them. This is why Aino is at Urban Impact today.



It's yet another example of adhocracy, the way how working life has found a way to organize the outputs of labour. Borders between companies and institutions have blurred. In 2040, people organize and re-organize their work around projects in temporary ad hoc teams, without traditional employer-employee relationships.

Same goes for most university staff members, who rarely do 100% research or education on university payroll.

What really helped universities to adjust to this situation were the steps that university administrators took towards increasing staff mobility by allowing university-business cooperation minded researchers and teachers to do part-time or temporary work outside universities, or even becoming entrepreneurs while retaining their job at university. These chances weren't always easy, since institutions resist change and any risk of uncertainty. However, as the societies became increasingly VUCAational (volatile, uncertain, complex and ambiguous), there was no other alternative.

In many ways, universities of 2040 are still recognizable for people who talked and wrote about the future 20 years earlier. Universities undertake research and disseminate their new knowledge. Their campuses are spread out across the world, many as part of coworking communities, usually in the city centers since that's where creative individuals want to be. Traditional types of university-business cooperation (UBC) have been revolutionized by the fact that the individuals who are devoted to addressing societal challenges increasingly act as universities' counterparts, rather than (big) businesses. People-oriented and mobility-driven types of UBC are the new norm. Furthermore, universities 'studify work'.

This means validating learning that happens in real-life projects and at coworking communities. People get credits for these actions after having demonstrated their skills. Same time they create an impact for the society by actively creating solutions for real world issues.

Two new professional roles started to emerge in late 2010s for universities, and coworking communities linked to them. They became 'curators', who follow the endless deluge of information flows and curate the content, bit like art curators of museums picking up the best, and most relevant, pieces for the public. In their other role they became 'bridgers', who are inherently curious about pretty much everything, and as generalists, make surprising connections between people.

It was often the universities of applied sciences that were among the first to seize the change. Without historical burden of their traditional scientific counterparts, they were able to try out new approaches with high risk-taking.

By the time Aino arrives at Urban Impact, another student is already there, Alexey, whom Aino met during the same university project. Alexey is older, pushing past fifty years of age and holds a prior Bachelor's degree. Now he's doing a microdegree. Life-long learning is yet another staple

for universities of 2040. Speed in technological development and a 24/7 connected global work market, where the need for talents know no boundaries, mean that everyone needs to update their skills on regular basis. Various microdegrees offered by the universities for specific niches are far more common than they were earlier. In volume of participants they surpass traditional degrees greatly.

Aino and Alexey socialize for some time, before the university professor arrives and starts explaining how he would like to involve them in the startup. The prototype solution that they built and tested for a local urbanization-related problem during the project has potential to work on a bigger scale – and could be scaled globally with the help of other coworking communities elsewhere. Would Aino and Alexey like to spearhead this activity and with their research validate its impact?

Absolutely.



Mikko Korpela is a partner at Crazy Town. Mikko's professional interest is to create more impact for project-driven organizations – by helping them to productify their offerings and helping them to get things done in practice by more experimentation.

Toni Pienonen is a partner at Crazy Town. He works with project and concept design in themes of university-business cooperation and coworking.

Crazy Town is a Finnish innovation intermediary and a coworking community of freelancers, solopreneurs, micro-sized companies, startups and university staff members, who want to go further together rather than alone. We operate three locations in Finland with more than 150 member companies in Tampere, Jyväskylä and Hämeenlinna. Currently, we are the biggest independent coworking and innovation hubs in Finland. Ever since we first opened in 2002, our focus has been on peer-learning and peer-development of our members.

We believe that an essential skill for any small company or university specialist is the ability to cooperate with others, share resources and learn rapidly new skills. Each of our units is headed by a community manager, who helps our member companies to collaborate. We put a lot of effort on building a supportive culture that encourages growth. We organize hundreds of events throughout Finland, bringing together thousands of our visitors annually. We also run extensive consulting projects on university-business cooperation theme. More than half of Finnish universities are our customers.

New Learning Approaches Needed

Rumyana Trencheva

Changes are upon us

We may live in what some consider as the most exciting time in human history; in times where wealth is generated by the way we manage and operate data. The exponential growth of data is giving us possibilities to analyze and predict, to redesign processes and businesses. Everything that can be automated will be automated. As a result, almost half of the jobs in some economies are at risk of automation, while for the rest a college degree will be needed.

At the same time, we have shifting demographics. Soon almost half of global workforce will be millennials and we already have 5 generations in the workforce, and an increase in life expectancy. This means that we need to start to plan and think for a 60 or 70 years career.

A new learning approach is needed

So in the midst of all these changes, there are a few things to consider. We used to have a learning approach with 3 stages – learn, work and retire. However, for modern times a new learning approach is necessary.



Today's learning is a multi-stage life approach, where we have to learn to learn, un-learn and re-learn, and accept that there will be several cycles through-out our life with work-learn-change, work-learn-change, work-learn-change...

Think about it – the occupations which are in biggest demand right now did not exist 10 years ago. The majority of kids currently entering primary school will end up doing jobs that do not exist today. Half of the subject knowledge acquired during a technical degree is outdated by the time of graduation.

We have to prepare for urgent and targeted action to manage the near-term transition and build a work-force with future proof skills, otherwise we will be hit by unemployment and shrinking consumptions.

Leave our comfort zones

Disruption is happening. We're forced to leave our comfort zone and embrace this process. The majority of global technology companies are already engaging in social projects for active adoption and mastering of IT skills at much

earlier stage in life, with courses and programs in primary schools.

Companies, institutions, universities need to implement organizational change, at the same rate as innovation is created. This means to build a new culture that can adopt, embrace and understand change – as the only guarantee of any success. We need to help universities and higher education institutions in how to be successful with digital transformation, not how to use just another digital tools, which will require the redesign of the needed universities of the future.

Cooperation in required

This is how we can create Exponential Educational environment. In order to multiply the possibilities for us and the next generations, we need to learn to cooperate, while competing. When the business leaves its building and merges with the universities, a new culture of innovation is created, where real business meets technology, research and young talents. This is how we could have sustainable exponential educational eco-systems of the future.



Rumyana Trencheva is Head of Global Channels and General Business at SAP Central and Eastern Europe, before that she successfully managed and doubled the SAP business in South-East Europe, where she was the Managing Director of the cluster of 10 countries: Bulgaria, Romania, Serbia, Bosnia and Herzegovina, Montenegro, Kosovo, Albania, Macedonia, Croatia and Slovenia. Rumyana was also managing the business of SAP in Bulgaria for more than 5 years, where she had triple digit growth y-o-y and significantly increased SAP presence on the local market.

Before joining the SAP, Rumyana Trencheva has held key managerial positions in multinational companies as INDRA Sistemas S.A., Hewlett Packard, Alcatel-Lucent and Ericsson Bulgaria. She has graduated American University in Bulgaria with specializations in Applied Economics and International Relations. She holds post-graduate specializations from Duke Corporate Education (USA) and IMD (Switzerland). Rumyana is actively involved with many educational initiatives, supporting also local young entrepreneurs and start-ups within the region and at her home country, as one of the major role for her now is being member of the Board of Trustees of her alma mater - American University of Bulgaria.

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**‘NECESSITY IS THE MOTHER
OF INVENTION.’**

– first ascribed to Plato

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INSTITUTIONAL CHANGE



Rethink Regulation and Business Models – a Blueprint to Release Universities from the Shackles

Andreas Altmann

Competence sharing of universities, business & society

Universities often seem to have a tendency to be there for themselves. Interaction with business and society is too often seen as unnecessary, unproductive or even as a risk or threat. However, there is so much knowledge, ideas, models and also needs out there in the non-university sector which may create mutual benefit by being strongly connected. When – which was true in my case – being thrown into the challenge of building up a new university institution from scratch without having the knowledge to do that and with very limited resources, one has to rely on interaction and soon learns about its value. This experience may be helpful also for others.

At our school, from the very beginning, we've been strongly integrating experts from various business and societal fields in our ownership structure, supervisory board, management team, curriculum development, full- and part-time faculty, admission interviews and many more activities.

A compulsory internship of a minimum of 3-5 months in a relevant business sector during the last study semester creates synergies, brings together academic and practical knowledge

and guarantees best career prospects as well as opportunities for thesis work. Part-time study programs, high-level activities in the executive education sector including seminars, short courses and customized corporate programs, collaborative research and consulting projects, career fairs, business-plan competitions, joint investments in start-ups and many more activities show that both worlds may benefit incredibly from working together. If this can also meet the highest academic standards including fierce compliance regulations, then why not share, learn and benefit from each other more strongly?

Care about the outcome, leave freedom for input

When purchasing a car, one typically has a picture of the features it should have, be it explicitly or implicitly, e.g. comfort, safety, speed, power. In other words, the focus lies on the outcome of the production process. While the customer is quite critical whether and how the promised criteria and functions – the outcome – have been thoroughly fulfilled by the supplier, he/she typically pays little attention to the details of the company structure and its production process such as whether parts of the product were bought from others; whether the product was built at day or nighttime. They, however, assert that the produc-

er guarantees and ensures the promised quality features of that product.



While accepting that certain product standards and other forms of regulation may be necessary in order to assure market transparency, it is questionable how far such regulatory frameworks should actually affect the structure, governance and processes of an institution.

While this principle approach is true for practically any product or service available in the market, the approach towards universities is totally different. More or less every little item of the production process is regulated and controlled such as the number, composition and qualifications set for full- and part-time faculty, the size, composition, structure and competencies and interaction of boards, senates and other governance structures, the minimum and maximum number of credits allocated to certain topics etc.

Many of these regulations are not only costly and time-consuming, they above all kill innovation, creativity, inspiration and engagement. Would Tesla, Apple, Uber or other companies have been brought into life, if they had been

in a regulatory framework a typical university would find itself in? Shouldn't we leave the decisions on the structure, governance and other input factors to the suppliers and see which models bring the best results?

Engage in pre-university activities

The future of the European Economy and Society, its competitiveness and resilience depend less on the performance of its university system but rather on its schools. One probably would not expect such a statement from the Rector of a university. I am, nevertheless, convinced of its truth.

If a school-system doesn't encourage and support attitudes like curiosity, creativity, courage, the value and joy of innovation, exploration, encounter, creation, trial and error, there is only little fundament for universities to build upon.

There is, however, little understanding for the continuous complaints of universities on the quality and attitude of the outcome of some school systems. Why don't they take action and engage more in the pre-university education? Why do they not think of mergers, acquisitions, joint projects, contractual agreements and other activities of engagement in order to improve, support and incentivize the work, productivity and outcome of schools? I am convinced

that universities will have to engage more actively, strongly and systematically in schools in the future; they will have to extend their value creation chain and leverage their own outcome. They may do this on their own, together with other universities or also with non-academic institutions like companies which identify that such an approach may also be highly relevant for their own future.

Publishing houses and media companies entering academia

Publishing houses are searching for, identifying collecting, revising, editing, visualizing, publishing, marketing and communicating knowledge. The same or similar functions are true for universities with no or little amendments. With information and interactions becoming more and more digital and available at one's finger-tips, the function, role and business model of publishing houses will more and more merge with academia. Publishing houses with academic textbooks in their portfolio have the knowledge collected, revised, visualized etc. They have access to professors, researchers, reviewers, to the production of teaching material, quality control, logistics and the student market as well as to communication technology. Why then leave an attractive business

opportunity to others – the academic sector – and not extend the value chain by entering the academic business and engaging directly in teaching, examining and mentoring students along with other functions of a university?

In fact, not only publishing houses, but also other businesses dealing with relevant competencies (e.g. media companies) can already be seen as new actors in the academic field. Who is working together with whom will be changing in the future, and new business models will emerge. How can one get access to knowledge (e.g. search engines), reach young people as future employees (e.g. social networks), identify start-up technologies and investors etc.? These are questions which may help to identify where new players, alliances, takeovers, compositions of players etc. may arise, enter the market and be potentially highly disruptive. The education system has been operating in specific ways; however, university structures are open and also vulnerable to new approaches of education, research and the transfer of academic knowledge which will support innovation and strengthen the competitiveness of enterprises and the economy.



Prof. Dr. Andreas Altmann studied Business Administration and Economics at the Universities of Linz and Innsbruck and International Relations at the Johns Hopkins University in Bologna. Having received his doctoral degree in Public Finance from the University of Innsbruck in 1993, Andreas Altmann embarked on his academic career as a postdoctoral researcher first at the Department of Public Finance and later on at the Department of Strategic Management. There he got involved in designing, creating and building up a new school from scratch, now known as MCI Management Center Innsbruck – The Entrepreneurial School®, under the umbrella of the University of Innsbruck, the Federal State of Tyrol, the City of Innsbruck, the Chamber of Commerce, the Chamber of Labor and the Association of Industrialists.

Andreas Altmann was appointed as its start-up director in 1995 and has since then with expanded MCI into an internationally acknowledged autonomous university with currently 3300 students, 1000 faculty and staff, 250 partner universities, thousands of successful alumni around the globe, several spin-offs and numerous academic awards and distinctions. Andreas Altmann's expertise is valued in a variety of boards, councils and regulatory bodies and has formed the ground for the conferral of the Knight's Cross by the President of the Republic of Austria as well as other distinguished acknowledgements.

Universities in the Global Networks of the Future

Sanni Grahn-Laasonen

The Finnish Ministry of Education and Culture created, together with institutions of higher education and research, a Vision of Higher Education and Research, published in November 2017. Our Vision aims for the year 2030, but the need for a new way of thinking is imminent.

We are living in a world of globally interconnected value chains, and as a consequence, the nature of work is changing. Digitalisation, artificial intelligence and automation are transforming jobs, earning models, and businesses. At the same time, the aging population, mass migration and globalisation create new challenges, as do the free flow of information and capital from one country to another. In this whirlwind of rapid change, some jobs are disappearing, but at the same time new business models and new jobs are emerging. Rapid adopters of new technologies have a competitive advantage.

Winds of change

The systems of higher education everywhere in the world are facing the same winds of change. For universities, the forces driving the change are economic globalisation, cross-frontier competition on human capacities and skilled workers, and the digital disruption caused by new technologies. This calls for continuous reassessment

and re-directing of higher education policy.

In the last 15 years, the global volume of research and development activities has doubled. However, a relatively small amount of this growth has occurred in OECD countries: developing countries have invested heavily in education. As a consequence, both the quantity of students and their mobility have increased dramatically.

In many countries there is a real hunger for education. University education is increasingly seen to be in a key asset in advancing productivity and to create new growth leading to new jobs. Universities are viewed as both predictors and promoters of societal and technological advancement.

For science and research, technological advances have made it possible to process huge masses of data, thus providing the opportunity to delve into more complex questions. However, in order to refine data to knowledge and to understand its meaning, creative and critical thinking are vital. The skills of thinking are born in communities of students and scholars who interact with each other and with the outside world. I believe that these values - critical thinking, creativity, community - continue to be the cornerstones of university-based learning and research in the future.

Access to science as open as possible, as closed as necessary

Democratic, liberal societies are increasingly underlining the need for open data, open results and open decision-making. On the other hand, a growing amount of commercial interests are based on having access to information that no one else has (intellectual property). In Finland, open science is the spearhead of national science policy, and we are operating under the slogan "As open as possible, as closed as necessary". We are confident that this way of thinking will spread significantly in the coming years.

In the coming years, research and innovation will be increasingly seen as a process of co-creation in which both the producers and consumers of information take part. Calls for phenomenon-based, open and multidisciplinary research are getting stronger. It is getting clearer that the big challenges facing the humanity - such as climate change, the elimination of poverty, or the strengthening of democracy - can only be met through more knowledge, more research, and more international co-operation.

A digital future

The universities of the future will increasingly seek to take part in

global networks. Science and research have always been truly global human endeavours, but new technology takes this change to a new level. In the networks of the future, scholars, teachers, and students exchange ideas and share information both on digital platforms and face to face. It is vital that business life and public administration take part in these exchanges. For higher education policy this means that university funding criteria must recognise and reward international networking and exchange as well as collaboration with businesses and industries.

The diverging, specialised needs of the working life emphasise the importance of learning to learn and of continuous life-long learning. This is true for all parts of the educational system. It is important to consider what fast-paced change in business and work means for the contents of higher education. As the "use by dates" of knowledge acquired today keep moving closer and closer, it is likely that our understanding of what high education and deep learning mean shall change.

This change brings into focus the need for deep collaboration between autonomous universities and businesses to prevent a gap between the contents of academic study and the needs of the working life. It is equally important

that university doors be revolving: new models of continuing higher education and life-long learning are needed to enable updating the capacities of degree-holders. This has implications on university funding as well.

We are currently working out what the consequences of these changes are for higher education policy in Finland. Some aspects are already quite clear: The future calls for more education, more capacity-building and more skills. The competition in a global economy can be fierce; therefore small countries - such as Finland - need to ensure the inclusiveness and equity of education. Only then can we make sure that no potential talent is lost.



Furthermore, a university career needs to be an attractive choice for young people. As a final point, we need to understand that in a world of rapid evolution and change, the legislation concerning higher education cannot be too restrictive: flexibility needs to be a built-in feature of universities.



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Before becoming a Member of Parliament, she worked as a journalist, head of news services, Stockholm press correspondent and as a spokesperson to the Minister for Foreign Affairs. She has a Master's degree in Social Sciences (University of Helsinki).

*Photo by Lauri Heikkinen,
Prime Minister's Office, Finland.*

Getting out of the Silos – Two Suggestions

Michel Bénard

How should the university evolve during the next 25 years?

The question is broad and addressing multiple topics such as teaching, research and ultimately the role of the university in our society. Several organizations (for example the Glion Colloquium¹) have organized workshops and published books based on contributions from presidents and rectors of major universities, therefore my modest contribution to this discussion will only concentrate on two suggestions:

1. lifelong learning for teaching,
2. less peer reviews and more context based evaluations for research.

These two suggestions will be biased due to my own experience (a few years in academia at Telecom ParisTech, EPFL and a long career in industry at IBM, HP and Google), and the fields in which I have operated (Electrical Engineering, Computer Science, Sales and Corporate Development).

Lifelong learning is today a must for most professionals

Lifelong learning is today a must for most professionals. The online and offline business publications are rich of blogs, papers and discussions underlining the need for professionals to continuously

adapt to profound changes in their jobs, and to learn new skills and techniques accordingly.

During the early years of my career (in the 90's) I used to read at least two books per month, and several papers in journals on technical, business or societal topics. The goal was to learn about new technologies, business skills and societal trends in order to follow or even take a proactive role in the changes happening in my job. In the early 2000's I added to this routine the browsing and reading of web sites, blogs and online forums.

Since the early 2010's I have added to my learning tools MOOCs, videos from online teaching channels such as YouTube or TED, and online content from professional learning companies. The authors of all the offline and online content I could learn during the past years have been somehow randomly distributed across universities, businesses, individual practices and private professional organizations. Only occasionally did I meet and use a learning content officially sponsored, produced and organized by a university.



Moving forward I suggest universities should take a more active role in lifelong learning. The interaction between a student and alma mater(s) should not terminate at the day of the graduation ceremony, but rather relentlessly continue during the professional life of the student.

There should even be peak learning periods during which the now professional and former student of the university would be able to refresh his or her skills, learn new topics or even get support for a career change.

There are promising efforts made by universities in the direction of lifelong learning. MOOCs and specialized YouTube online channels are good examples, and complement past breakthroughs like the MIT OpenCourseware or the textbook collections published by several major universities. However, it looks like we need a quantum leap from universities in lifelong learning. The associated scaling factor should be addressed by an extensive use of digital and online tools.

Less peer reviews and more context based evaluations for research

Peer reviews have been used extensively for selecting scientific publications for conferences and publications, appointing and promoting faculty in academia, and even in the industry for performance evaluations and career management. There are some advantages in peer reviews, such as its ease to implement, some predictability of its outcomes and the value of its feedback mechanism.

However, there are significant issues with peer reviews:

- the usual focus within a specialized area, which leads to the establishment of ivory towers for most disciplines;
- the related inability to integrate a big picture or important contextual information;
- ultimately the creation of feudalism and as an unintended consequence the building of comfort zones by its major practitioners.

Ironically the recent rise of digitization and online publications have somehow emphasized, rather than mitigated the issues of peer reviews. Digitization has allowed a significant inflation of the number of publications which are submitted for review. This

inflation of the number of publications has created congestions for the review processes, leading to an increased specialization of the reviewers, the establishment of stronger borders between disciplines or even between tiny, highly focused sub-disciplines, and ultimately an even larger number of ivory towers.

In today's and tomorrow's societies the university has to be able to do more than very specialized research in silos. Societal, environmental or life science problems involve multidisciplinary research which requires the capability for all participants to see the big picture and operate their research in a complex and ambiguous context.

Some universities have been developing and operating successful centers of multidisciplinary research, such as CITRIS² at UC Berkeley, or the Swiss National Centres of Competence in Research (NCCRs)³. These efforts have to become more frequent, and should lead to situations where the research would be evaluated more so on contextual parameters rather than only specialized peer reviews.

In fact, it is often an excellent exercise for a researcher to prepare and give a talk for professionals from other disciplines, as it requires the ability to capture the

essence of the researcher's contribution and to put it in the larger context. This is the basis upon which TED presentations operate. This could be operationalized by posting such presentations on the university and the researchers web sites, and on specific channels of social networks.

Following this trend, the selection of publications for conferences and journals, the appointment and promotion of the faculty, and some other selection processes (for example for funding research) would still include some peer review, but would mitigate it with evaluations made by non-peers benefiting from a broader perspective. Could you imagine a review panel composed by a few peers, but also by academic participants from other domains, and from public sector, as well as private sector representatives?

The establishment of lifelong learning as a key parameter for curriculum and the mitigation of peer reviews should have profound and positive impact on the university. Especially it should allow the university to continue to be a great place to learn, teach and research for the benefit of society.

Please note that none of the opinions expressed in this article represents any public position of one or several of my previous employers

¹ *Glion Colloquium. Retrieved from <http://www.glion.org/>*

² *The Center for Information Technology Research in the Interest of Society (CITRIS). Retrieved from <http://citris-uc.org/>*

³ *National Centres of Competence in Research (NCCRs). Retrieved from <http://www.snf.ch/en/funding/programmes/national-centres-of-competence-in-research-nccr/Pages/default.aspx>*



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Previously, he held positions at Hewlett-Packard in R&D, Sales, Corporate Development, University Relations and Management. Michel also worked as R&D Engineer at IBM La Gaude, and as the Assistant Professor in Digital Signal Processing at Ecole Polytechnique Fédérale de Lausanne. Throughout his career, Michel Bénard has helped establish and grow a global academic network for industrial research initiatives.

Will European Universities in 2040 Still Teach and Research?

*Rolf Tarrach &
Lidia Borrell-Damian*

Experience has shown that forecasts over a 20 years' period are almost always off the mark and yet they draw their value from how they contribute to analysing and shaping the future. Most papers or books with the title "The end..." got it wrong, or had to be substantially reinterpreted 'a posteriori'. Universities, soon to be one-thousand years old institutions, will still exist in 20 years, but they will have changed. The vision which follows is what we believe might happen, not necessarily what we would like to happen.

Universities will still be performing the same types of activities in 2040, as their core business of generating, refining, explaining, transmitting, disseminating, keeping and applying knowledge will remain of value for society. The two main historical activities, namely education and research, as well as the more modern 'third mission' of engaging with society in a variety of ways will still hold, although with major changes due to the use of Artificial Intelligence for teaching and research purposes.

Blue sky research will continue to be typical to universities, and research targeted to address immediate societal needs will be performed by private companies and equity. Research activity will be done more in collaborative clusters of organisations includ-

ing businesses, and will be less distributed geographically. The opposite will happen with teaching, which will be even more spread out and closer to the citizens: despite the ubiquity of and accessibility to digitally supported learning materials, the 'blended learning' model, combining e-learning with teacher/tutor-learner interaction, will dominate and the person-to-person contact will remain of great value. In fact, that is what will have to be paid for privately. Learning about how to carry out research will be an integral part of teaching at universities. It is unclear if universities will in general offer non-regular, professional, life-long, senior citizen learning, and in this case, if it will be only based on their knowledge specialisations.

The wisdom of the majority, supported by social media, will not make obsolete the role of the universities as keepers of the quality assurance related to knowledge, but rather the contrary:



The low average quality of the immense number of new bits of information (big data) will make the role of universities more prominent in extracting from it insightful knowledge and help achieve a deep understanding.

Computers are today able to extract trends and patterns, but (not yet) generate new knowledge as such. A sort of generation of average quality knowledge might soon be possible by artificial intelligence, but the most valuable knowledge lies usually not in the trivial or most evident conclusions, but in the outliers, that is, in relevant but difficult to interpret data, often including hidden insights.

At least until 2030 this will be better done by human, maybe technologically supported 'brains', rather than by artificial brains. The scientific method is an integral part of the research quality assurance, and its further development will be in the hands of universities, as well as ethical and moral issues related to scientific and technological breakthroughs of unchecked and potentially threatening consequences for society. Universities will continue to be the place where one learns to think in-depth, to be a responsible member of society, to dialogue, to value knowledge above ideology or belief, and to do research. Educating and training primary and secondary school teachers how to teach effectively in extremely diverse classrooms will become an even more urgent challenge for universities, and this will be one of their most relevant activities for society.

Universities will be highly multidisciplinary fora where in-depth

knowledge and insights will flow openly and seamlessly between disciplines. The research activity of universities will be enhanced and new interdisciplinary domains of knowledge will emerge continuously. The education mission of universities will become largely specialised as advances in the field of neurosciences unveil the way our brains learn. New ways of presenting knowledge in all disciplines will enable university students to learn faster than nowadays. Even more, new, more personalised ways of teaching and learning will reduce school dropouts and more and better educated pupils will be intellectually well-prepared to succeed through tertiary education.

The successful inclusion of even larger proportions of the youngsters in secondary schools, will make tertiary studies ever more necessary for a successful professional career. This will lead to a larger diversity in goals, resources and performances of the universities in Europe, probably unwanted by many, and perhaps difficult to recognize at first. Efficiency and effectiveness will be a strong demand or even an imposition by governments as responsible and accountable for the use of public money.

Universities will never be like private companies, because their goals will continue to be radically

different. This limits the extent to which business governance and administration will substitute the more collegial, participatory university model. In fact, university governance will show a larger diversity of models too, as the institutional missions themselves diverge.



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Rolf Tarrach has published more than 100 papers in theoretical high energy physics, quantum field theory, quantum mechanics and quantum information theory, and has published four books. He has been honoured with a Doctor Honoris Causa degree from the University of Saint Petersburg, Russia, and another from the University of Liège, Belgium, and was awarded eight official prizes. He has been Dean of the School of Physics and Vice-Rector of the University of Barcelona.



Dr. Lidia Borrell-Damian is Director for Research and Innovation (R&I) at EUA since 2014. Previously, she held the positions of EUA Head of Partnerships and Senior Programme Manager. In her current capacity, she is responsible for the overall portfolio of EUA's R&I activities. She coordinates EU R&I policy development based on the evidence provided by EUA institutional members and the National Rectors' Conferences, and manages strategic relations with the European Institutions and other stakeholder organisations. Her areas of work include the EU Funds for R&I; the European Research Area priorities; the EU Digital Agenda; Open Science and Doctoral Education. She also coordinates science policy input through the EUA-Energy and Environment Platform (EUA-EPUE).

Lidia Borrell-Damian holds a Doctorate in Chemistry, Chemical Engineering Specialty, from the University of Barcelona (1987). Prior to joining EUA in 2006, she was Director for Research at Universitat Pompeu Fabra, Barcelona (2003-2005). Previously, she worked in a chemical company in Spain as the R&D Deputy Director for two years. Between 1999 and 2002 she held several positions in academia, including 10 years as an Assistant Professor at the University of Barcelona and four years as a Visiting Scholar at North Carolina State University, USA and at The University of Western Ontario, Canada.

How to Picture Universities in 2040?

Enrique
Cabrero-Mendoza

It is evident that the world is currently changing at a speed never seen before. Science and technology are making an impact in all aspect of our lives: healthcare, education, social life, economy, entrepreneurship and government, are some visible examples in a much bigger list. As it is often said, it is not that we are living in times of change, rather in a change of time.

In the context of these whirlwinds, universities – like many other institutions – are going through large transformations that are likely to continue and deepen in the following decades. Furthermore, they are being called to play a crucial role in what is nowadays known as the knowledge society. Doubtlessly, a society guided by scientific knowledge, by its transformation into technological developments and furthermore into innovation within economic, institutional and social structures, requires more robust, intelligent and efficient educational centres.

The challenges that universities will face in the coming decades are not insignificant, among the most important ones are the following.

To become a key asset in the process of knowledge generation

Universities must be able to produce scientific and technologic knowledge with positive outcomes for society, the economy and the government. Notwithstanding that each university will possess particular strengths regarding specific types of knowledge production.



Bolstering the knowledge society requires securing an interdisciplinary perspective, relevant for all economic sectors. This is why the idea of short-minded and over-specialised universities should be avoided.

Like never before, we must push for a comprehensive conception of what universities should look like in 2040; one that encompasses the attention of real problems and pressing challenges, as well as the delivery of long term solutions. Achieving such ideals requires two things: first, removing all barriers among schools, departments and other bodies which disincentive cooperation among different disciplines; and second, stimulating cross-fertilisation in knowledge production processes, allowing for permanent interaction among research teams and working groups. In the coming

decades, those universities unable to generate knowledge in this way will not be able to call themselves that.

To create talent, and not just professionals

Considering that current frameworks are constantly changing and will continue to do so, even faster, in the coming years, new teaching techniques that promote creativity, innovation, and a positive attitude towards permanent learning are an essential condition to fully accomplish the knowledge society that we are currently building. The idea of earning a degree without updating one's knowledge in the light of new contributions and developments is outdated. As stated by Stiglitz and Greenwald (2014) in their reflection on creating a learning society, the concept of 'learning by doing' should be extended to 'learning to learn by learning'¹. By doing so, universities will not anchor themselves to the idea of being institutions that only validate knowledge and recognise an individual's capacity to perform certain tasks through degrees. This belief is certainly obsolete, belonging more to an industrial, predictable and stable, economy.

The knowledge and innovation-based economy entails talent creation characterised not only by intelligence and creativity but also

by the capacity to learn constantly. In 2040, teaching techniques within universities should be characterised by open, horizontal, deliberative, participatory and applied processes. The vertical transmission of information as well as the requirement of memorising data should be eradicated for good; instead, spaces for individual and collective learning for problem-solving should be established. In this context, only a rather small part of the process will take place in classrooms, as the bigger part will result from the interaction with businesses, governments and the society as a whole. Consequently, less concepts and in its place, more observation and learning methods will be needed. In the coming decades, those universities unable to generate these conditions for learning, will not be able to call themselves that.

To foster openness and cooperation within knowledge and learning networks

Increasingly more each day, knowledge is produced within collaboration networks among individuals, institutions, countries and other relevant groups. Scientific and technologic knowledge is being democratised and made reachable for more people. The most important scientific contributions are the result of wide collaboration grids, such as the

European Organisation for Nuclear Research (CERN), one of the biggest and most complex research organisations in the world, in which tens of countries, hundreds of institutions and thousands of researchers participate.

In the coming decades, learning processes will externalise, as their impact continues to accelerate and reach both the economy and society with multiplying effects. The concept of knowledge society makes reference precisely to the quality of stimulating its social appropriation and rapid dissemination. It is clear that universities will guarantee the quality of knowledge and the robustness of learning. However, as never before they shall put themselves to the task of inserting that knowledge in problem-solving processes. As a result, their collaboration networks should be wide and diverse. The relevance of universities will be valued regarding their proven ability not only to produce knowledge and learning, but also to have an influence in the transformations most needed by society. The value of universities will be measured by their capacity to solve pressing issues and generate social well-being along with other actors and networks.

In 2040, universities will heavily rely on their capacity to build strong cooperation networks, as well as to make a positive impact

in society through, not only the production but also the dissemination of ideas, information and knowledge. In the coming decades, those universities unable to do that successfully, will not be able to call themselves that.

¹ Stiglitz, J. E., & Greenwald, B. C. (2014). *Creating a learning society: A new approach to growth, development, and social progress*. New York: Columbia University Press.



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A Pathway to a Sustainable Future through New Ways of Learning and Applying Knowledge

Klaus Sailer & Mirko Franck

The pathway to a sustainable future society requires new ways of learning and a new approach to acquiring knowledge and applying it in practice.

Changes resulting from the digital revolution

Access to, and distribution of knowledge, change dramatically fast in our digital society whereas its importance remains unchanged. These days, universities no longer own the traditional monopoly with regards to generating knowledge. The private sector and civil society institutions have caught up and provide different education pathways enabling practical knowledge generation and its transfer into society.

Expert knowledge sharing to resolve specific and individual needs and challenges becomes more and more important with regards to accessing information, not only taking place in local communities but more and more through virtual communities across the globe.

With regards to universities, that means re-defining their role and truly opening up their education system and integrating a diversity of stakeholders into their daily activities, thereby following their “Third Mission“.

Further, the future role of universities will be to handle large

volumes of information and to integrate the ever growing diversity of mass communication into sensible contexts of teaching so that applicable knowledge and competences are nurtured and created in both, local and virtual communities.

Although information is continuously generated and saved (Big Data), its relational contexts often remain in closed forums or are being discussed on exclusive panels only. Consequently, knowledge silos remain. And yet today’s societies face complex challenges and changes that can only be tackled and resolved peacefully by bundling expert knowledge and finding responsible solutions.

The changing role of the university

To date, universities see their main job as central education provider. However, in future they will need to take on more and more responsibility in educating entrepreneurial minds that understand the entire spectrum of societal challenges, students that are willing and capable to live up to these challenges on a daily basis.

To do so, universities will need to embrace innovative ways of teaching. Knowledge provision surely remains important (through journals, services and work-ready graduates etc.). However, universi-

ties additionally need to contribute greater value to society by driving a new approach of knowledge generation through decentralized, yet communal, “living labs“. This shift of purpose of a university will be essential to resolve urgent problems, “grand challenges“ talking in terms of the European Union.

Excellent research by itself obviously does not help overcome societal challenges. Despite its great success, research for ecologic efficiency did not lead to a decrease in petrol consumption nor emission rates. For society to enhance, great research results need to be integrated “real-time“ into the “real-world“ - making sure user perspectives and dependencies to other areas of life stay in focus.

Mechanisms of change

For this approach to succeed, universities will need to re-structure. Institutional change would need to start with a mindset change – away from “administrative thinking“ towards an “entrepreneurial mindset“ which is typical for the start-up scene: Recognizing opportunities, demonstrating the ability to act quickly and precisely, following brief iteration cycles when developing promising fields of action.

A second step must be to gain access to a flexible and supportive infrastructure.

Centers that do not depend on any faculty, instead relying on relevant stakeholders from the commercial and public sectors, political and civil society institutions (“Quadruple-Helix“ partners), enable the implementation of co-creation processes. In-house infrastructure would arm itself with a flexible architecture and open access points so that stakeholders connect and communicate easily during workshops, open space events and all entrepreneurial activities. In practice, several activities take place that encourage the exchange of all “Quadruple-Helix“ partners about the progress and do-ability of existing transfer processes, sharing best-practices as well as general Q&As.

Relevant stakeholders are brought together in “living labs“ to jointly think through and tackle challenges that are rising in particular fields of society and/ or having an impact on specific regional areas. In particular, transfer projects, interdisciplinary forums

or qualification activities and events could take place.



The change of universities from knowledge monopolists to places where know-how is gathered and created by a multitude of knowledge owners, shared openly and transferred into practice, will pave the way into a sustainable future.

Universities will make a concrete local impact in their respective regions and ensure new acquired knowledge and best-practice is distributed globally, too, so that other parts of the world will benefit as well. Whether that means students will need to remain on campus to study or may have the opportunity to build up competencies in international university networks or virtual spaces, time will tell.



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Klaus Sailer holds a Ph.D. in physics from Ludwig Maximilian University in Munich, and did his Ph.D. at the Research Center for Environment and Health. At Infineon AG, he was responsible for project management and marketing of new semiconductor technologies. In 2000, he co-founded a communication technologies company with partners in the area as its chairman. He successfully established this company as a major market player, and was able to realize his innovative ideas further with various start-up teams.



Mirko Franck works as an entrepreneurship educator focusing on new qualification programs, and as a lecturer at Munich University of Applied Sciences. After finishing his diploma in Business Administration, Mirko received his MA in Entrepreneurship from Hamburg University. Prior to his job at SCE he co-founded a multimedia advertising agency, thus acquiring an in-depth knowledge of entrepreneurship.

Effectual Higher Education

*Dominik Böhler &
Oliver Bücken*



Entrepreneurship is on the verge of disrupting our way of thinking, teaching, and acting. It is not merely another university subject, but a fundamental shift in the orientation of a university.

It adds a fundamental career choice for students in addition to careers in academia/public sector and industry, which need specialized education and support. This has effects throughout all levels of the university, in research, teaching, and administration.

Several trends and developments are fostering this move for universities to offer more entrepreneurial pathways. We have identified three major themes: education is global, technology is accessible, and innovation needs impact.

Education is global

Individual empowerment, for example, has resulted in a growing number of students enrolled at universities and a more intensive world-wide movement towards higher education (660 million estimated students by 2040 or 10% of the world population, compared to 4% or 200 million in 2012 and around 50 million in 1980¹). This creates unprecedented complexity

and pressure for institutions with a strong regional focus.

High Quality Education is highly accessible everywhere through MOOCs and Online Academies. Barriers to knowledge are low for those who are talented enough to study and make use of what is “accessible”. As a consequence, local monopolies on knowledge erode with increasing speed. The great value of higher education will be in physical presence and empathy, not in facts. Building not only brains, but also souls. That means, people and personalities will become ever more central for higher education institutions.

For universities, this resonates in the growing importance of such as the ecosystem which surrounds the university. These ecosystems will become the sandboxes for talented students, travelling and searching for the best places for exchange, interaction, and teamwork.

Finally, for a growing number of foreign students, searching for a new host country becomes ever more important. Growing numbers of students taking advantage of Erasmus or ASEAN programs are a new seed of well trained, “soft skilled” smart and open-minded young people - in short: “entrepreneurs” in their own matters.

Technology is accessible

With a growing amount of software in products and services, new technology gets cheaper and more accessible. The conflation of time and space through technology becomes reality.

Providing access to resources for communities of practice, and interacting more seamlessly with corporate and entrepreneurial ecosystems becomes a key part of higher education. An iterative and test-driven approach to technology development can be efficiently conducted for both hardware and software. This will complement established and more rigorous procedures to designing technical systems and their dominance in the curriculum.

As a consequence, the potential for project-based learning in a flipped classroom increases. This favours a bottom-up and experiential approach to learning and will complement, if not dominate, a top-down and theory-driven approach. Understanding the university as a safe-ground for such empowered experimentation across disciplines will be key to leading this development.

Innovation needs impact

Government spending for R&D is shifting from basic to applied research. In turn, pure science pro-

jects will need to get more funding from industry. Universities need to become more entrepreneurial in closing this gap as marketability gains even more importance in this context.

As a consequence, the integration of research and teaching as well as the differentiation of basic and applied research become blurred. This needs to lead to a change in how research organizations are designed. Specifically, we are likely to see a stronger alignment to the innovation process, from idea to IPO, making use of cross-disciplinary teams with deep knowledge.

How to design the future

Entrepreneurial universities can face these future challenges, by positioning themselves in a global market, making use of the talents inside them to provide immediate value to society through their projects, and sustain long-term research visions by intensive interaction with corporate and entrepreneurial ecosystems.

In the end, entrepreneurship is not a gene or something you are born with, but something which can be taught, learned, and applied. Young people and students are eager to make use of this knowledge anyway. They need to

use us teachers as coaches for a methodology and a mind-set, rather than as a source of facts.

Professors and teachers can apply entrepreneurial approaches not only to commercialize their research results, but also to actively influence their environment and peers. This opens up new sources of funding and creates more independence from centrally controlled government funding. University staff can embrace a more dynamic and self-missioned approach to designing the learning infrastructure of the future.

Einstein said that “Education is not learning of facts, but the training of the mind to think”. The merger of education in this sense with the toolset we have right now within entrepreneurship has the potential to trigger creativity, boost personal development and lay the foundation for the application of one’s “own means” in the field of one’s interest.

In the end, research should not be conducted for the sake of technological advancement but the betterment of mankind. Let’s start by empowering talents to shape their realities, not by teaching them facts. Let’s start within our own means, right there, right now.

¹ Calderon, A. (2015). *What will higher education be like in 2040*. *University World News*, (381).



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Oliver Bücken manages the training offers for professionals at UnternehmerTUM (Managing Growth, Financing Growth, Design Thinking, Lean Startup, Agile Bootcamps, etc) and the Executive MBA in Innovation & Business Creation (together with TU München). Start-ups and entrepreneurship have been salient features throughout his professional life, and after graduating in business administration, he worked in the banking and in the venture capital industry. He was also one of the co-founder of an e-commerce company (IPO, Exit) and committed to funding and co-founding of start-ups as a Business Angel.

In a Race between Education and Catastrophe the 4th Generation University is Winning

Todd Davey,
Arno Meerman
& Max Riedel

If civilisation is ‘a race between education and catastrophe¹’, then in the late 2020s, catastrophe was winning. Now, in the year 2040, reflecting back it would seem obvious that major companies like Google, LinkedIn and Bright.com as well as high-profile entrepreneurs like Elon Musk would challenge the monopoly position of universities (at a much lower cost!). However, after the rationalisation of universities (and academics) during the late 2020s, universities survived by making themselves invaluable to the planet, their region or their city by embracing a number of roles and by driving certain changes to their *modus operandi*.

Following the technology obsession of the 2020s which drastically reduced contact between people, humanity returned in the 2030s and universities have taken a leading role.



Education and research still underpin the purpose of today’s 4th generation university (University 4.0) but are increasingly undertaken in communities of connected stakeholders and blurred in a more rapid circular knowledge creation process, where boundaries between knowledge creation, diffusion and adoption are fluid.

Whilst the role of education has existed as long as universities themselves (‘Talent Engine’ role), 4th generation universities focus more on developing and validating their students’ competences. For this, they have partnered not only with other universities but also with large consultancies such as McKinsey and Accenture, and specialist service and technology providers, such as Oracle and SpaceX.

Constructing their own degree and foci, students are now in the driver’s seat of their learning process and get to choose the projects and supporting activities they will do. With no exams, lectures, lecturers or timetables, they work in teams and are supported by academic and business mentors, as well as their own AI robot. Freed from rote-learning by AI systems, which allows them to focus more on higher-order creative and analytical skill development, the search term ‘university is ruining my life’² is no longer the most frequent comment students speak to Siri (who just celebrated her 35th year of existence).

A cohort of students is now in their 2nd year of a ‘1st level Mastery of Technology and the Environment’ (like today’s bachelor). To complete their project, they had to form cross-disciplinary teams, undertake own research, integrate the university’s research, develop

contacts, engage regional stakeholders as well as acquire supply chain partners and lead customers. They are both competing and cooperating ('coopetition') with international university and co-creation community teams on the same project.

However, now their final step will be to pitch their *EcoFLYmo* prototype (Environmentally-Friendly Flying Mobility – a mix between a drone and smart-car, which runs on used coffee grounds) to business partners, investors, and entrepreneurs. With IP frameworks negotiated at the start of the project, there is a pricing structure already in place for the business partner to buy the prototype, however if not, they inherit the IP to develop it themselves or sell to entrepreneurs from Living Lab.

Their 2-year *Mastery Project* is performed in an open learning environment and participants are informed by MOOCs and a series of other activities such as seminars and updates from academics and businesspeople, training sessions, group-learning exchange sessions (using VR teleconferences with other international teams), self-reflection retreats, site visits, participation in competitions, own internships or employment (some complete the project as part of their work) as well the cultural competence skills validated as part of their own global backpack-

ing. Their project progress and outcomes are assessed together with their soft and network skills, emotional intelligence and self-dependency competence development every six-months through 360-degree assessments.

Most of the time, the student team is working within the *Living Lab* premises on campus and cooperate with experienced researchers from the *Institute for Eco Aerospace Mobility*. In their project work, they are mentored by academics, entrepreneurs from the Living Lab and by working professionals undertaking Higher-Level Masteries' like Industrial PhDs, DEs (for entrepreneurship doctorates combining research and commercialisation) or *Discover*, *Accelerate* and *Regenerate* micro-courses to add or scale their skills, or regenerate their career ('Life partner' role).

The *Living Lab* itself is a public-private partnership set up on campus in the late 2010s responsible for supporting entrepreneurship and innovation. However increasingly, as project-centred teamwork has replaced the traditional lecture format and working modes changed, it became a co-working hub and the centre of university (and city) life.

With all degrees now using this format of learning, the lab has expanded dramatically to dominate

the campus in its role of providing a 'home base' for project teams ('Home-base' role), as well as the co-working space for an explosion of freelancers, micro-companies, start-ups and academics. It is open 24 hours a day with full-body scanning secure entry after a spate of eye stealing put an end to eye scanning technology. For use by those at the university, local business and community partners, *Living Lab* has a professional event centre, flexible meeting rooms with VR teleconferencing facilities, a maker-space, 3D printer, access to scientific equipment, exhibition rooms and an accelerator as supporting infrastructure and equipment.

Following the shift in the 2020s away from isolated 'ivory-tower' research process to a co-created research agenda, challenge-focused institutes became the dominant research player. Sharing common lab space with the other institutes, the *Institute for Eco-Aerospace Mobility* is one of many interdisciplinary co-creation research centres on campus, drawing academics out of their faculties to work together with a network of companies, students, government agencies and other stakeholders ('Discovery' role). They provide access to advanced testing equipment and other resources vital to leading-edge research as well as having access to Living Lab services.

The *Living Lab* has continued its leading role in developing entrepreneurship and provides entrepreneurship programmes for students, researchers and local business as well as being an important part of the innovation pipeline of large companies and solutions for the community by supporting university technologies, promising student start-up, university spin-outs and supporting regional scale-ups ('The Launch-Pad' role).

With a number of large companies specialised in environmentally friendly mobility and dynamic local SMEs from their supply-chain in close proximity, as well as access to networks of venture capitalists, the university and the *Living Lab* are at the centre of a highly supporting innovation ecosystem, which is driving its region's growth and direction.

The lab is also home to the Smart and Human EcoCity initiative, a regional smart specialization initiative which brings together local business, government, society and members of the university ('Home base' role). With more permeable career paths to enable more fluid relations between university and industry, it can be hard to know who represents who anymore! In this way, universities have become a central point, not only to the creation and provision of knowledge, but for the facilita-

tion, coordination and management of knowledge, innovation and local /regional problem-solving networks.

In civilisation's race, education seems to be winning again.

¹ Source: H. G. Wells

² For a perspective of the current thoughts of students with respect to today's universities, we invite the reader to type into your predictive text search engine 'university is' and see what appears... it is a little scary!



Dr. Todd Davey is an Associate Professor of Entrepreneurship at the Institut Mines-Télécom Business School in Paris and a visiting researcher at Imperial College (UK) and Adelaide University (AUST) in the topics of entrepreneurship and innovation. Formerly a Senior Manager with Deloitte Australia's Technology Commercialisation Group and responsible part of the executive team for one of Australia's fastest growing start-ups in the 2000s, Todd has 'switched sides' to work within academia. He was the Project Director of the largest study yet completed into cooperation between European universities and business, a study completed for the European Commission in 2010 and again in 2017. Todd is author of the book 'Entrepreneurship at Universities', a Director at the University-Industry Innovation Network (UIIN) and the creator of TechAdvance™, a tool for evaluating technologies.



Arno Meerman is the co-founder and CEO of the University Industry Innovation Network, where he has initiated and leads the largest conference on University-Industry Interaction, started the world's first professional education program for university-industry relationship staff and leads a number of UIIN's research and development projects for the European Commission. Arno is also the Director for Business Development at the Science-to-Business Marketing Research Centre. Besides project acquisition and strategic development at both organisations, Arno has consulted universities and government and published on entrepreneurship, innovation and university-business collaboration. Most recently he has managed the largest project on university-business cooperation in Europe yet undertaken.



Dr. Max Riedel is a senior consultant at Siemens University Relations with a PhD degree in physics (2011). He consults to Siemens businesses in all aspects of university cooperation, ranging from developing a partnering strategy, finding suitable research partners to fostering long-term strategic cooperation. He joined Siemens in 2012 as a management consultant at Siemens Management Consulting (SMC), the internal consultancy of Siemens. At the time this book is published, Max is delegated to the University of Ulm to support the ramp-up of the Quantum Technologies Flagship initiative, one of the European Commission's most ambitious long-term projects to bring technology from the lab to the market. Before this assignment, he was the key account manager for two of Siemens' strategic partner universities.

CREATING THE FUTURE UNIVERSITY

THE FUTURE OF UNIVERSITIES THOUGHTBOOK



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**‘THE TROUBLE IS, IF YOU
DON'T RISK ANYTHING, YOU
RISK EVEN MORE.’**

– Erica Jong

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