



# Hélice

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SPECIAL ISSUE

2017

## The International Triple Helix Summit

Theme: Accelerating the attainment of SDGs through ICT + Data



**Karibu!**  
Nairobi, Kenya

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The Triple Helix Association Magazine, *Hélice*, is published quarterly: March, June, September and December. Contributions are invited:

**ARTICLES/ESSAYS** dealing with aspects of the interaction between academy-industry-government (Triple Helix) for fostering research, innovation, economic competitiveness and growth. Contributions should be in MSWord, 2500-3000 words, **Contact:** devringoktepe@gmail.com and sheila.forbes@strath.ac.uk.

**BOOK REVIEWS** from publishers and writers/reviewers on new publications relating to Triple Helix themes. Reviews should be original and interesting, should be written clearly and concisely, and 1000-1500 words in MSWord. **Contact:** brancaterra@gmail.com.

**NEWS ITEMS** related to conferences or events, call for papers, projects, job posting, and any other activity relevant to Triple Helix interactions you/your organization is organizing/have organized. Articles should be in MSWord, no longer than 1000 words, and include web links to any related activity. **Contact:** devringoktepe@gmail.com and sheila.forbes@strath.ac.uk.

**Deadlines for submissions to be included in related quarterly issue:**

**28 May 2017** for June 2017 issue.  
**29 August 2017** for September 2017 issue  
**28 November 2017** for the December 2017 issue  
**28 February 2018** for March 2018 issue

## EDITORIAL

Welcome to the 2017 Spring Edition of Hélice:

In this issue, the Triple Helix Association is pleased to collaborate with I Choose Life - Africa to present the First Triple Helix International Summit to be held in Nairobi, Kenya from 4-6 April 2017.

The Summit, as a new venture by the Triple Helix Association, will act as a 'Laboratory' to ignite and further develop the scientific and practical debate on new/emerging specific Triple Helix dimensions/trends.

The objective of the Summit is to be international in scope, while being regional in reach, and offering a thematic focus related to a specific aspect of Triple Helix dimensions and trends.

The TH International Summit in Kenya, hosted by the I Choose Life - Africa, a keynote charitable organisation - will be held in Nairobi from 4-6 April 2017, and in line with the objectives of the THA, carries the theme of 'Accelerating the attainment of the UN Sustainable Development Goals through ICT and Data'.

I Choose Life - Africa has been instrumental in promoting the Quadra Helix approach in Kenya - reflecting the fourth arm of civic society, and is aimed at seeking new directions for addressing the Sustainable Development Goals (SDGs) for Kenya.

The Conference is co-hosted by the Government of Kenya, the UN branch of Kenya and the Triple Helix Association.

In this issue we highlight the key elements of the Kenya Summit, including special directions and sessions, and urge our Readers to attend this singular event.

We include an enlightening President's Column written by Mariza Almedia, the THA Vice President, on *Implications of the Brazilian Development Experience for Kenya*.

We have two book reviews, by Tatiana Pospelova and Henry Etzkowitz, on *Chaos Monkeys: Obscure Fortune and Random Failure in Silicon Valley* by Antonio Farcia Martinez.

We bring to your attention the Association Working Papers Series, we would urge those interested in being contributors and mentors, to please contact the Series Chair, Maria Jose Herrero Villa.

In this issue you will also find New Publications, recent activities of our THA Chapters, details on our Webinar, a warm welcome to our new THA organizational and individual members, as well as THA New from around the world, and current Call for Papers.

As always, we hope you enjoy this issue and will share your comments with us. We welcome articles, essays, opinion papers on the Triple Helix, innovation policy, technology entrepreneurship, innovation management, and other topics relevant to solving the crisis that countries, organizations and individuals are facing. Potential topics, special issue suggestions, and submissions would also be appreciated. As Editors, we are happy to share your updates and news, and make your valuable research visible via Hélice.

For further information, please contact Devrim Göktepe-Hultén (Editor in Chief) at [devrimgoktepe@gmail.com](mailto:devrimgoktepe@gmail.com), or Sheila Forbes (Managing Editor) at [sheila.forbes@strath.ac.uk](mailto:sheila.forbes@strath.ac.uk).

We look forward to seeing you in Nairobi.

*Devrim Göktepe-Hultén, Editor in Chief  
Sheila Forbes, Managing Editor  
March 2017*

## CALL FOR PRACTICAL CASE STUDIES

Hélice is looking for organizations from its membership constituency and beyond, including governmental institutions, innovation intermediaries or companies, interested in having their Triple Helix interaction experience presented as a case study in Hélice.

Those interested should submit an abstract of 1-2 pages by email to the Hélice Editor in Chief, Dr Devrim Göktepe Hultén ([devrimgoktepe@gmail.com](mailto:devrimgoktepe@gmail.com)), from whom further information can also be obtained.

### SHARE YOUR THOUGHTS

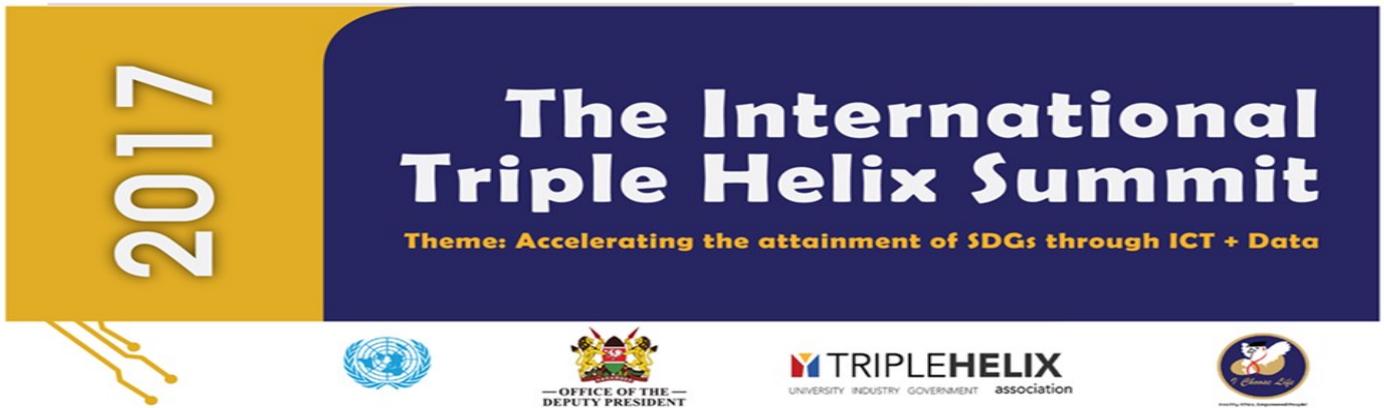
#### *Letters to the Editor*

**Readers are encouraged to share their views on matters related to Triple Helix issues.**

**Please send contributions to**

**Devrim Göktepe-Hultén  
Editor in Chief  
[devrimgoktepe@gmail.com](mailto:devrimgoktepe@gmail.com)**

**Letters may be edited for publication.**



## WELCOME TO NAIROBI, KENYA

### VENUE FOR THE FIRST INTERNATIONAL TRIPLE HELIX SUMMIT

I Choose Life - Africa, in partnership with the Triple Helix Association, is honored to host the First International Triple Helix Summit in Nairobi, Kenya from 4-6 April 2017.

The theme of the 2017 Summit is: **Accelerating the attainment of SDGs through ICT and Data**. The Summit will introduce the Quadra Helix approach of working with Government, Academia, the Civil Society and the Private sector to accelerate the attainment of Vision 2030 and the SDGs in using ICT and data.

On behalf of all our partners and sponsors, I extend a warm welcome to you and look forward to seeing you in Nairobi in April 2017.

**Eng Mike Mutungi**  
Chief Executive Officer  
I Choose Life - Africa



For the first time in Africa, the world is coming to Nairobi! Kenya, to discuss the contribution of **ICT + Data in accelerating the attainment of Sustainable Development Goals (SDG)**. Hosted by the Government of Kenya, the United Nations, the Triple Helix Association, and I Choose Life - Africa amongst other partners, and with a lineup of international, regional and local keynote speakers, plenary sessions, ten convened workshops and over twenty-four-track and sub-track sessions, the Summit offers a rich mix of experience on how to accelerate the attainment of the SDGs.

While here, take advantage of being in Nairobi, the city in the sun, to visit the National Park, Snake Park or Giraffe Center all within the capital city.

[www.triplehelixsummit.org](http://www.triplehelixsummit.org)

## ABOUT KENYA

The East African country of Kenya rises from a low coastal plain on the Indian Ocean to mountains and plateaus at its center. Most Kenyans live in the highlands, and Nairobi, the capital, is here at an altitude of 1,700 meters (5,500 feet). Even though Nairobi is near the Equator, its high elevation brings cooler air. To the west of Nairobi, the land descends to the north south running Great Rift Valley - the valley floor is at its lowest near Lake Turkana in the deserts of northern Kenya.

Kenya has diverse attractions to offer. It is one of only a few countries around the world where you can relax on pristine

sandy beaches and be able to see wildlife in all forms within a short distance. Kenya has sixty National Parks and Reserves all with abundant wildlife. The spectacular wildebeest migration that occurs every year in Kenya's most visited Maasai Mara National Reserve is referred to as the seventh new wonder of the world.

The scenery of Kenya is unique, the Great Rift Valley and the snowcapped Mount Kenya, lying astride the equator, are breath-taking. There are myriad of activities, to enjoy including rock climbing, white water rafting, bird watching and adventure. Kenya is also a land endowed

with cultural diversity, pleasant weather all the year round, and more importantly, hospitable people.

The diversity of Kenya further includes, ecotourism, sports and water based tourism, conference tourism and home stay tourism. In the northern part of the country, we have the cradle of mankind from where we all originated, making Kenya a leader in heritage tourism. Kenya is, therefore, the ultimate destination offering an unparalleled variety of travel experiences. As our visitors tell us, it is indeed a magical destination.

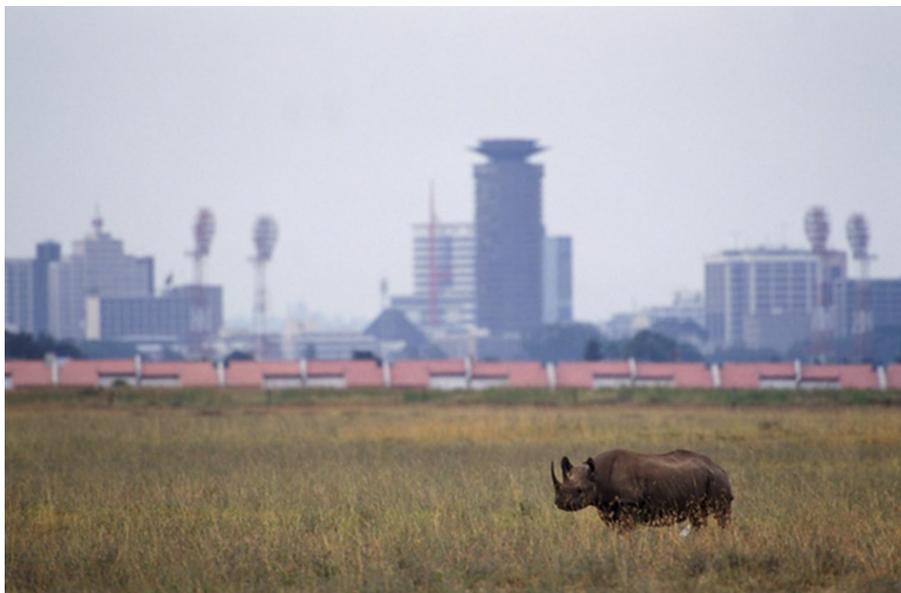
## NAIROBI: THE HOST CITY

The International Triple Helix Summit will be held in Nairobi, the capital City of Kenya and one of Africa's key financial, business, transport, communication, non-governmental organization, and diplomatic capitals; it is also known as the **safari capital of the world** thanks to its globally known wildlife tourism industry.

Nairobi is a premier city and one of the most important cities in the East African region. It has an estimated population of **3.36** million and a land area of **695** square kilometers.

A city full of contrasts, Nairobi is **old – so you can feel it's past, and multi-ethnic - and you can experience the Kenyan culture, yet it is modern enough like any city in a middle income country. You can access the world from Nairobi.** It is a city that blends all cultures and occupations. Adorned with modern skyscrapers, world-class restaurants, fully equipped hospitals, modern shopping malls, schools, abundant private and public transportation, and universities and colleges that provide local and international curriculum, you can find it all in Nairobi.

Today, the City of Nairobi is a truly cosmopolitan, multicultural, lively and modern city with an ever-growing skyline. It is a **gateway to Kenya** and embraces people from all walks of life. From local Kenyans to Asians, Arabs, Europeans, tourists, diplomats and businessmen, you will find a good mix of people. It bustles with activity. It's a city that never sleeps; the rhythm is fast, day and night. There is always something to do and see in Nairobi and its people are friendly and hospitable.



## SUSTAINABLE DEVELOPMENT GOALS

Kenya's progress towards the attainment of the Millennium Development Goal (MDG) targets realized mixed results. The country managed to reduce the population living below the poverty line from 52.3% in 2000 to 45.2% in 2009. On universal primary education, the net enrolment rates improved to 95.9% in 2013. The number of pupils completing the primary course rose to 83.2% as compared to 57.7% in 2000. Although the proportion of under one year olds immunized rose to 85%, the country continues to lose 74 infants for every 1,000 live births. The rate of maternal mortality was 488 for every 100,000 live births higher than the continental average.

Although the literacy rate in Kenya is far better than in most other African countries, quality education is something

hard to come by in Kenya. So at the end of the day, most students graduate from school with degree upon degree but are unable to apply what they have learned in school to help better their living conditions.

About 50% of the entire Kenyan populace live below the poverty line according to the new multidimensional poverty index with the unemployment rate around hovering around 40%.

Like in most African countries, about 75% of the total population of Kenya are subsistence farmers who grow crops and rear animals just to feed themselves and their families, and in times of crop failure, most of these families go starving. The unpredictable climatic conditions in Kenya sometimes worsen the situation. From the

tropical regions along the coast to the arid interior regions, natural havoc such as recurring drought and unpredictable flooding during the rainy seasons sometimes put many rural families in nothing but absolute poverty.

The Triple Helix Summit will seek to catalyze the overall attainment of the SDGs, which call for Global Partnership to ensure their achievement. The Summit proposes the use of a Quadra Helix approach that incorporates the government, the private sector, civil society, and academia in exploring the use of ICT and Data in accelerating the attainment of SDGs.

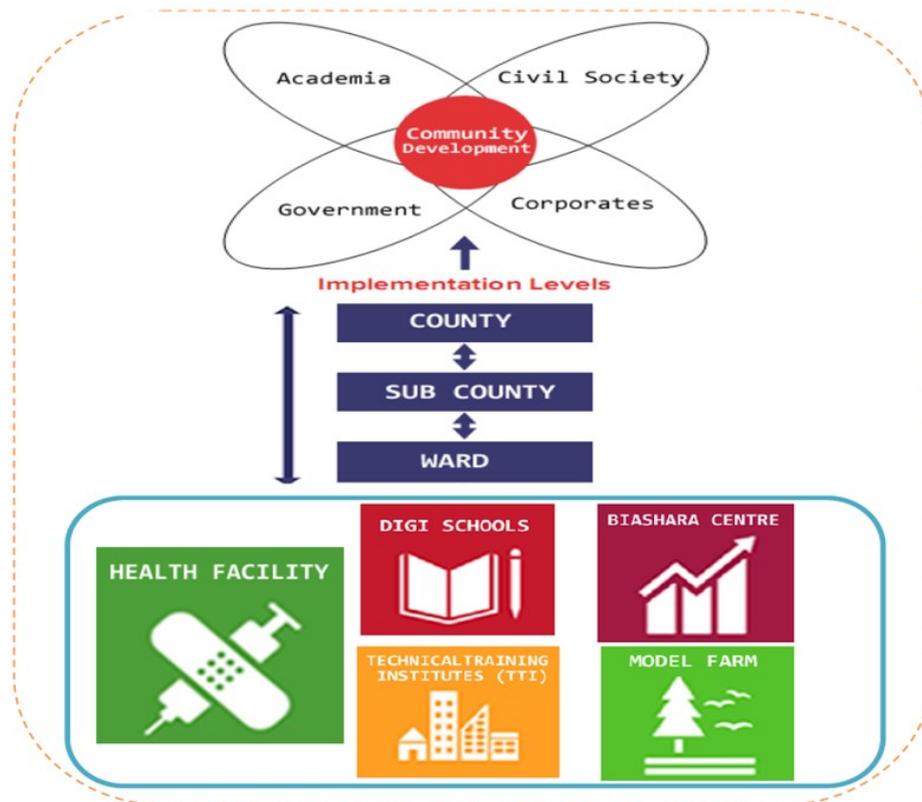
### I CHOOSE LIFE - AFRICA (THE SUMMIT HOST)

I Choose Life –Africa (ICL) is one of the leading youth focused Non-Governmental Organizations in Kenya. The organization works across four sectors: Health, Education, Economic Empowerment and Leadership and Governance. ICL's vision is 'Healthy Africa, Empowered People' while her mission is, 'To create a movement of individuals that enhance the quality of life for communities through health initiatives, education, economic empowerment, and improved leadership and governance'. The organization works closely with the Government, Universities, Business community and other CSOs in a development approach known as the Quadra Helix in order to bring about high developmental impact among communities. ICL has programs in over 234 Academic institutions including primary, secondary schools and tertiary institutions across twenty-three counties in Kenya. The organization reaches over one million youth annually with various strategic interventions.



The programmatic areas of work for ICL

## THE QUADRA HELIX: DEVELOPMENT APPROACH BY ICL



ICL has focused on the Quadra Helix approach to development using the sub county model. We use the smallest units of the Kenyan devolved government structure to stimulate synergistic relationships between the actors in order to break the linear relations that have traditionally existed and to establish more nonlinear roles to stimulate internal transformation.

### Why Quadra Helix?

The need for convergence of minds amongst the four most critical players in any economy and appreciating the crucial role played by each where:

1. Government puts in place the right systems, structures, and environment for development to thrive.
2. Academia conducts the relevant research to inform solutions to specific issues affecting a particular community. In addition, they prepare the manpower with the right skills, knowledge, and attitudes to develop innovative solutions to challenges in their communities
3. Businesses invest in developing profitable and sustainable model solutions that are replicable amongst different communities and that can be scaled up making life and work easier.
4. Civil Society on the other hand plays the key role of ensuring that there is accountability among key stakeholders. The Government is accountable for the systems and fair regulations, that business does not exploit the community driven by profit, and that academia is ethical in research and manpower building. The Civil Society is also mandated to educate the community on their rights and responsibilities for the good of their own community. In addition, it has a responsibility to ensure that the community and its people are led and governed by values and ethics that uphold human dignity.

## THE FIRST INTERNATIONAL TRIPLE HELIX SUMMIT 2017

Nairobi - Kenya | The University of Nairobi | April 4th - 6th, 2017 | [www.triplehelixsummit.org](http://www.triplehelixsummit.org)



### ACCELERATING THE ATTAINMENT OF SDGS THROUGH ICT + DATA

#### - Location -

The summit will be held at the University of Nairobi Towers, and will include a high-level strategic networking dinner hosted at the Norfolk Hotel.

#### **The Summit Management Structure**

The Triple Helix Summit has three main organizers: the Steering Committee, the Scientific Committee, and the Secretariat:

- The Steering Committee is chaired by the Office of the Deputy President and has representatives from the various ministries, Private Sector, Academia, Civil Society and the Triple Helix Association.
- The Scientific Committee is led by various universities with a goal of ensuring the implementation of the SDGs is based on research and evidence. The Secretariat's role is to ensure a timely execution of the Summit deliverables.
- The Secretariat is hosted by I Choose Life - Africa.

The Organizing Committee of the Summit have prepared an interesting programme, which includes the followings:

### PLENARY SESSIONS

<b>HEALTH</b>	Universal Health Coverage (UHC) in a devolved government for sustainable development.
<b>EDUCATION</b>	Inclusive and equitable quality education that promotes lifelong learning opportunities for all.
<b>ENVIRONMENT</b>	Take urgent action to combat climate change and its impacts.
<b>AGRICULTURE</b>	End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
<b>ICT + DATA</b>	Global partnerships, ICT and data for the attainment of SDGs.

## SUMMIT TRACKS AND SUB-TRACKS

<b>1.0 HEALTH TRACKS</b>	<b>2.0 EDUCATION</b>
<p><b>Boosting innovation and growth through university-industry co-creation</b></p> <ul style="list-style-type: none"> <li>• Service delivery for sustainable development</li> <li>• Healthy workforce for sustainable development</li> <li>• Leadership and governance in health care</li> </ul> <p><b>Innovations and technology for health systems</b></p> <ul style="list-style-type: none"> <li>• Health financing</li> <li>• Health research</li> <li>• Health commodities and technologies</li> <li>• Triple Helix for health service delivery support</li> </ul> <p><b>Innovation for delivering community health</b></p> <ul style="list-style-type: none"> <li>• Best practice and innovation for increasing access to Reproductive, Maternal, Neonatal, Child and Adolescent Health (RMNCAH)</li> <li>• Refocusing on prevention of Non-Communicable Disease (NCD)</li> <li>• Sustainable implementation of community health service</li> </ul>	<p><b>The Entrepreneurial University - from access and curriculum to regional innovation systems</b></p> <ul style="list-style-type: none"> <li>• Education workforce competence analysis</li> <li>• Curriculum reforms for sustainable development</li> <li>• Improving education relevance and pathways</li> </ul> <p><b>Innovation and technologies for education systems</b></p> <ul style="list-style-type: none"> <li>• Improving quality of education through teacher performance management</li> <li>• Improving learning outcomes through ICT and innovation</li> <li>• Establishing global innovation hubs</li> <li>• University led Triple Helix in Pakistan</li> </ul> <p><b>Education system responsiveness and resilience</b></p> <ul style="list-style-type: none"> <li>• Leadership, governance and accountability for development</li> <li>• Improving equity and inclusion through integration</li> <li>• Financing models for quality education</li> </ul>
<b>3.0 ENVIRONMENT</b>	<b>4.0 ICT + DATA</b>
<p><b>Environmental sustainability, climate change and information systems</b></p> <ul style="list-style-type: none"> <li>• Climate change information system</li> <li>• Climate change commodities and research</li> <li>• Financing of interventions for combating adverse climate change</li> </ul> <p><b>Innovations and technologies for climate change</b></p> <ul style="list-style-type: none"> <li>• Winning business models and partnerships</li> <li>• Renewable and green energy solutions and Triple Helix facilitation</li> <li>• Civil society's actions in safe guarding climate resilience and reduction of CGS emissions</li> <li>• Climate Change affects health, water and food security in Africa: Risk to SDGs, policy gaps and mitigation measures</li> </ul> <p><b>Climate change and resilience</b></p> <ul style="list-style-type: none"> <li>• Food security and climate change</li> <li>• Production competitiveness of small-scale farmers</li> <li>• Technology commercialization in production, value addition and marketing</li> </ul>	<p><b>Data roadmaps for sustainable development and Triple Helix responsibilities</b></p> <ul style="list-style-type: none"> <li>• Data for public and private decision-making</li> <li>• Knowledge translation platforms</li> <li>• Innovations in civil registration and vital statistics</li> </ul> <p><b>Innovation and technology ecosystems and Triple Helix</b></p> <ul style="list-style-type: none"> <li>• Innovations and technologies for citizen generated data</li> <li>• Frontiers in open data for sustainable development</li> <li>• Improve data quality for sustainable development</li> <li>• Deriving, developing and delivering value from SDGs</li> </ul>
<b>5.0 FOOD SECURITY AND HUNGER</b>	
<ul style="list-style-type: none"> <li>• Food security and climate change</li> <li>• Production competitiveness of smallholder farmers by 2030 and beyond</li> <li>• Technology commercialization in production, value addition and marketing</li> <li>• Waste Management and recovery</li> </ul>	

## CONFIRMED WORKSHOPS

- Entrepreneurial universities for sustainable development
- Science and engineering education for sustainability,
- Establishing science parks and incubators in Africa
- Triple Helix and drivers of regional development
- Green business, green jobs and green economy
- Big data for sustainable development
- Corporate responsibility for business good and SDGs

## SOCIAL EVENTS

In Kenya for the first time, or for the love of the bush, the jungle, and the wild, you can either choose to take a short drive out of Nairobi's central business district to Nairobi National Park, or a Safari to the Maasai Mara.

### **Nairobi National Park**

Kenya's first national park, Nairobi National Park is a haven for wildlife and is only a seven-kilometer drive from the skyscrapers of Nairobi's city center.

The park is a rhino sanctuary, which protects more than fifty of these critically endangered creatures. In addition to the rhinos, visitors may spot lions, gazelles, buffaloes, warthogs, cheetahs, zebras, giraffes, and ostriches, and more than 400 species of birds have been recorded in the wetlands.

### **Nairobi National Museum**

The park is a rhino sanctuary, which protects more than fifty of these critically endangered creatures. In addition to the rhinos, visitors may spot lions, gazelles, buffaloes, warthogs, cheetahs, zebras, giraffes, and ostriches, and more than 400 species of birds have been recorded in the wetlands.

The National Museum in Nairobi is an educational way to spend a few hours on a city stopover. The museum displays diverse cultural and natural history exhibits including more than 900 stuffed birds and mammals, fossils from Lake Turkana, ethnic displays from various Kenyan tribal groups, and exhibits of local art.

In the Geology Gallery, visitors can explore an impressive collection of rocks and minerals and learn about tectonic plates and the life cycle of a volcano. The Hominid Vault contains a collection of prehistoric bones and fossils, including the preserved fossil of an elephant. At the museum, visitors can purchase combination tickets, which include entrance to the adjacent Snake Park with live specimens of Kenya's most common reptiles.



### **Beach**

The coastal city of Kenya has some of the best beaches in the world. Kenya's tropical beaches have a lot to offer everyone, from unspoiled resorts to beautiful white sandy beaches, which are perfect for the ultimate relaxation.

Mombasa beaches brag of the best local reefs, clear water and soft white sands; they offer a great swimming opportunity, gives a delightful feeling coupled with and an alluring ocean that offers an amazing sight.

The beaches also offer you an opportunity to engage in some beach activities such as surfing, sunbathing, or a long walk along the shores.




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## SELECTED ARTICLES

### Empowering Teachers and Students with Comprehensive Digital and Technology Literacy for the Twenty-First Century Knowledge Economy (Using Helix Interactions to bring ICT Core Skills to Teachers and Students in Kenya)

**ANNE GATENDE**

Executive Director  
Virtual Learning Solutions  
I Choose Life - Africa

Digital Literacy is vital to the future of Africa. Kenya's Vision 2030 earmarks the ICT sector for wealth and employment creation. The target is to propel Kenya's economic rate to ten percent annually with ICT taking a lead with an estimated GDP growth rate of eight percent; creation of 180,000 jobs and fifty regional ICT companies by 2017. This makes ICT one of the foundations for economic development. The proposed Konza Technology City represents a strategic opportunity to invest in the growth of the ICT sector in the county as well as the country's overall economy. Upon completion, Konza City is expected to create over 200,000 jobs and create an enabling environment for world-class research, education, and business to encourage innovation. Phase one will create about 18,000 jobs.

This is a strategic opportunity for a social enterprise like ours to look for partners who want to invest in ICT skills development so that the young people benefit through employment and job creation.

At the global level Ministers of Education, high-level government officials and representatives of civil society organizations, teachers' organizations, United Nations (UN) agencies, development partners, and members of academia and the private sector (note the Helix interactions), gathered at the International Conference on ICT and Post-2015 Education from 23 to 25 May 2015 in Qingdao, the People's Republic of China. This meeting was held to further their collective understanding of how to

unleash the full potential of ICT for education. They came up with a new vision for education by 2030, as articulated in the final Declaration, titled 'Towards Inclusive and Equitable Quality Education and Lifelong Learning' (Qingdao Declaration). This declaration was later adopted at the World Education Forum in Incheon, Republic of Korea. In this declaration, the stakeholders further affirmed that the remarkable advances in information and communication technologies (ICT), and the rapid expansion of internet connectivity have made today's world increasingly interconnected, and made knowledge more accessible for every girl and boy, woman and man. According to their conviction, in order to achieve the goal of Inclusive and Equitable Quality Education and Lifelong Learning by 2030, education systems need to integrate technology across the pillars of access, equity and inclusion, quality and learning outcomes within a lifelong learning perspective. They understand that technology alone will not bring the necessary transformation, they are well aware that it offers unprecedented opportunities.

There is also great awareness that the uneven access to technology and online content is widening the long existing learning divide. Their commitment is to ensure that by 2030 all girls and boys have access to connect to digital devices and a relevant digital learning environment that is responsive to learners with disabilities. They recommend that all education stakeholders recognize the enrollment in quality-assured online courses as an alternative or a complementary means to the regular programs of study when

striving for the objective of universal access to basic education and skills development.

With this understanding of the role of ICT in achieving education goals, an interaction between Virtual Learning Solutions, an education social enterprise, and a Civil Society Organization, I Choose Life Africa (ICL), has been playing out during the last year. This interaction has proved of great use in an attempt to close the digital divide by bringing aspects of digital literacy and teacher training to ICL's education programs in their three counties of operation. This has happened in sixty schools in Kenya where about 10,000 marginalized girls have been targeted for various interventions through a DFID program. One of the key interventions has been integrating ICT to improve learning outcomes. The schools have been equipped with laptop computers that have been installed with teacher training materials and learning software to enable the teachers to use technology to teach.

Virtual Learning Solutions has partnered with Microsoft to offer the Microsoft Certified Educator program that trains the teachers in six core competency areas aligned to the UNESCO framework recommended for governments in the new dispensation of teaching and learning with technology. The six competency areas are core to teachers aligning themselves the twenty-first century learning design. It is envisaged that their learners will be better equipped to succeed in knowledge economies that have become more and more reliant on technology and connectivity. In pursuing the educator program, the teacher is trained in aligning ICT to their pedagogy, organization and management, curriculum and assessment, understanding policy, teacher professional learning and ICT itself.

The teacher training aligns to the four-stage learning pathway for the teacher:

1. Digital literacy where the core competencies of computing applications and living online are made available through the IC3 digital literacy curriculum recommended by the global digital literacy council (GLB). The three core competency areas are tested using the Learn Practice Certify learning pathway. The course is delivered as a TV content with ITPRo TV, Wiley and ICL, with a local University of Nairobi ICT Lecturer, and implemented by Virtual Learning Solutions for the development of digital skills for in and out of school youth and their teachers. The course has been designed to provide knowledge on the basics of computing giving comprehensive coverage of the full range of entry level computer skills, where students learn at their own pace using their own device in their home or anywhere with an internet connection. All the TV episodes are transcribed for optimized content and keyword search, giving the students easy access to specific IT knowledge when it's needed.
2. Teacher professional development is the technology literacy and the Microsoft course is administered the course is dubbed as the 'technology literacy course for educators' and is expected to give about thirty-six notional hours of learning and be examined in a single proctored online exam. As the teacher prepares their student for the twenty-first century learning design they themselves are subjected to that

unfamiliar mode of learning. The observations are quite interesting as the teacher come to terms with how much they need to change and learn in order to support their learners. 12000 teachers have gone through this course countrywide in preparation for the digital literacy program being rolled out by the government across all primary schools. The training has been offered to all Standard One teachers. The gap for training remains huge and we will need to keep investing in teacher training if we really want to see the dividends of ICT in our education systems.

3. Knowledge deepening where we have partnered with Concordia University in Canada and Agakhan Academies to introduce the Learning toolkit software. Teachers are trained on how to embed this toolkit for learning and assessment as part of their daily work. They use it to teach reading and mathematics in the lower grades and deep and critical thinking, as well as goal setting and self-regulation in the higher secondary classes. The teacher looks at how to teach thirty-two skills with software that is connected to seventeen books. The toolkit is designed in such a way that the child cannot master the logarithm and will not master it and therefore get bored after figuring it out.
4. Media information literacy has yet to be introduced for teachers to then go ahead and be more innovative and creative with technology to start authoring their own content and using technology to directly use their own material more and more after they have acquired the skills for learning

As a result of using this training, teachers who come from very remote schools have come to appreciate that technology can be used in the classroom for their own subjects. Where they thought that the use of computers was for the computer teachers, they have come to see its relevance to their own profession. They feel changed and ahead of their peers and want to change even more to keep abreast with new methods of content delivery. They feel more skilled and upgraded and are proud to use the new methodologies. Their fear that technology use is an interference and a waste of time is abated as they see how machine learning can improve their time management skills.

The training of the teachers has proved to be a good and worthwhile investment. Self-regulated learning helps the teachers to internalize the kind of work required in the twenty-first century. Learners with high levels of self-regulation have a good control over attainment of their goals. They can focus on the processes of how to acquire these skills

This technology enabled learning style prepares students for the real world. It provides ownership over learning. It provides teachers with a deeper understanding of the student experience. This is what creates the lifelong learners - from the cradle to the grave.

More will be presented during the Summit.

## Solar Lights to Increase Income

NICK LUSSON

I Choose Life - Africa

Kenya is a dynamic country of approximately 45 million people. It has become the regional hub for commerce and development. However, the power supply in Kenya is expensive and erratic. Kenya has facilities to generate over 50% of its power supply from hydro dams, but in severe drought conditions like we are seeing now (and that have been recurring for more than a decade) the electricity supply goes down and the price goes up. The power companies rely on quick and expensive coal and diesel to meet the need, and then pass the cost on to the customer. Recent investments in geo-thermal power and wind power have not been enough to meet the growing demand.

Even when power supply meets the demand, the grid distribution in Kenya leaves most of the population without electricity in their homesteads. Estimates of the percentage of people who have access to electricity vary depending on the source, and the definition they are using of 'access to electricity'. The World Bank states the electrification was 23% as of 2012 (The World Bank Group, 2017) but government estimates are higher.

What is clear is that grid tied power is currently leaving millions of rural Kenyans in the dark.

Poverty is a big issue in Kenya, with 51% of the population living in absolute poverty (Chigozie, 2016), defined as lacking basic human needs long enough that it causes harm.

While it's true that innovation and technology have found a home here, agriculture contributes 25% of Kenya's GDP, and over 75% of that is from small-scale farming and livestock production. Around 80% of Kenyans engage in farming activities at least part-time. (CIA, 2017)

It is clear that in order to boost the quality of life of Kenyans, it must start with agriculture and address the shortcomings of the energy industry.

### Enter HiNation

HiNation is a Swedish producer of high quality solar lighting products. HiNation entered the Kenyan market late 2016 with unique solar powered lighting solutions designed and tested for the rural Kenyan population. The product is called "AngazaBoma" which is Swahili for 'Light your home'. The product is unique because it is very portable and powerful. The solar panel is foldable and is built into a polyester case that can fit in a purse, and the power bank is pocketsize, and each of the three LED lights put out 150-230 lumens!

But this alone isn't what is setting HiNation apart. HiNation wants to change the lives of millions of rural Kenyans, and to do this they are partnering with local and international researchers. HiNation is asking the question: can our high output solar lights be used to increase farm production cost-effectively?

The existing data points to yes.

There have been many studies showing the effects of photo period manipulation on livestock production. Photo period is defined as the amount of time each day during which an organism receives light. In animal husbandry, photoperiod manipulation has been used for many years as a means to stimulate production, and it has become a widely accepted practice in the Western world, especially in dairy production and egg production among others.

The research on photoperiod manipulation in dairy cows shows that use of long-day photo period (LDPP) increases milk production by about 15% (Meier Sandra, 2015) (Dahl, 2001) The response is gradual and repeatable (House, 2011). Studies have shown that the increase in milk production can range from 5%-16% but are most consistently in the 8%-10% range (House, 2011).

It has long been known that chickens respond to light in a variety of ways including growth and reproductive performance. The value of regulating the photoperiod has been recognized for many years and is used regularly by commercial poultry farmers, especially in mid to high latitude areas where the duration of the day can vary significantly from summer to winter (UCONN, 2016).

However, there are several limitations to these studies. Most of the studies focus on dairy cows and milk production in large barns that house dozens of cows, and a few studies additionally recorded growth of heifers (young female cow that have not borne a calf yet.) Poultry studies on photo period manipulation are usually measuring against the seasonal changes in the natural photoperiod from regions at high latitudes where daylight decreases significantly during the winter season compared to summer season.

Additional studies focus on the economic viability of adding photoperiod manipulation capabilities to existing farms based on the yields predicted from studies measuring the production increases.

All of the studies, whether focused on dairy cows, egg-laying chickens or economic minded are from developed countries and do not take into consideration the climate or typical farming conditions found among small shareholder farmers common in the developing world.

Missing from the existing knowledge base are studies pertaining to the specific challenges facing farmers in developing countries. Most farmers in these regions are small shareholder farmers. The climate in tropical and equatorial regions where many developing countries are found is very different from the climate in the mid-latitudes where many developed countries are found. Natural light varies little in equatorial regions.

The vast majority of farmers in these regions live without grid tied electricity. The existing economic studies have not measured the costs of electricity, equipment and feed in developing countries so they have little value influencing decisions in the developing world.

HiNation has partnered with the Swedish University of Agriculture Science, a local Kenyan NGO called I Choose Life - Africa, the Bio-Intensive Training Center in Meru Kenya, and other organizations to conduct the research needed to give a definitive answer to these questions.

*'We have been working with The Swedish University of Agricultural Science for many years and we know the impact and importance of light in animal farming' says Kristina Linhardt, CEO of HiNation. 'We are trying to reaching the farmers and involve them and show that it is possible to increase their incomes by using light, and at the same time get light into their homes'.*

*'We have studies showing substantial increases within several areas; chicken, pig and fish farming. Within milking it is possible to increase the liters to levels of 30-60 liters Kenyan farmers can increase their productivity with large numbers and even double it by using good light, and at the same time get light in their homes'.*

As costs come down for solar lighting products this appears to be a viable opportunity for Kenyan farmers. HiNation is working with SACCOs, Micro finance institutions to make these solar lights available on a payment plan. At only 10,000ksh (roughly \$100) the future is bright for rural Kenyan farmers.

But that's not all. Research has shown that there are even more far reaching benefits to having solar lights.

The most common form of lighting available to rural Kenyans is kerosene. Kerosene smoke contains pollutants such as fine Particulate Matter (PM), Carbon Monoxide, Carbon Dioxide, Formaldehyde, Polycyclic Aromatic Hydrocarbons, Sulphur Dioxide, and Nitrogen Oxides. (Climate and Clean Air Coalition, 2015).

Besides the green-house effect of these chemicals, breathing in this smoke is associated with asthma, lung cancer and acquired respiratory infections (The World Health Organization, 2016), which is the number one cause of infant mortality in Kenya (Kenya Ministry of Health, 2014). Replacing kerosene lamps with solar lights will have a positive impact on the health of members of households.

Kerosene lamps emit 20-40 lumens of light. This is not enough light for reading or studying without straining the eyes. Switching to a solar light like HiNation's gives the household useful hours of reading and studying which is directly linked to performance in school. Reports have even shown that students with solar lights at home have increased attendance, increased motivation for school, and an increased chance of transitioning from primary school to secondary school.

The solar lights also charge mobile phones, giving the user access to information, finances and security that is currently not available.

The Sustainable Development Goals are a worldwide agenda to transform the direction of the world to a sustainable and inclusive community. The work of HiNation has a significant impact on each of the following goals and more:

- SDG 1 No poverty
- SDG 2 Zero hunger
- SDG 7 Affordable and clean energy
- SDG 8 Decent work and economic growth
- SDG 9 Industry, innovation and infrastructure
- SDG 11 Sustainable cities and communities
- SDG 13 Climate action
- SDG 17 Partnerships for the goals

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## Biometric School Information Management System (BioSIM4Education) Student Enrolment Project using Unique Personal Identification

EVANS YEGON

I Choose Life - Africa

### BACKGROUND

The overarching goal of Kenya's vision is to turn the country into a globally competitive and a prosperous nation by the year 2030, as enshrined in the Kenya Vision 2030 and the Constitution of Kenya 2010.

To this end the government has given the education sector the right focus in terms of planning and resource allocation with the sector being allocated 6.4% of GDP within the international standards of 6%-7%. As a result of this heavy and sustained investment the sector has attained key achievements, but despite these successes, the sector faces challenges including regional disparities in access, equity and retention; quality and relevance, weak governance and accountability; low education performance outcomes and transition, weak linkages between education and the labour market, teacher development and weak synergies between the national and county governments.

**According to the Constitution of Kenya 2010, Article 53 (b)** every child has the right to free and compulsory basic education. While Article 55 (b) every person has the right to access relevant education and training.

To address the above constitutional requirements, the Government has developed the Nationals Education Sector Plan 2013-2018, a five year Education's sector plan (NESP) for delivering the reforms required by the Basic Education Act of 2013 among other major plans. NESP aims to deliver quality education for Kenya's sustainable development and to address the identified challenges with the overarching goal being Enhanced Quality Basic Education for Kenya's Sustainable Development. NESP clusters around four basic principles namely: inclusiveness; integrated and unified system; equitable school environment, and quality of learning. Consistent to these four key principles, NESP has identified six priority investment areas for grouping programmes and strategies: education sector governance and accountability; access to free and compulsory basic education; education quality; equity and inclusion; relevance and social competencies and values. All these priorities have been developed based on the recognition of current strengths, lessons learnt for Kenyan and international experiences, and making the overarching goal a reality.

### THE PROBLEM: CHALLENGES FACING THE EDUCATION

Despite the large investment in education, Kenya's education system has significant weaknesses including:

1. **Lack of Unique Personal Identification (UPI) and reliable, timely data for effective decision making**
  - a. Lack of **real time automated systems** to track the total number of learners in the education system.
  - b. Lack of real time data on students' **class attendance for decision making**.
  - c. Weak systems for **parent involvement** and engagement in education agenda enhancement.
  - d. Lack of a clear system to **track and trace students' academic and extra curricula progression** including radicalization.
2. **Weak teacher and school management**
  - a. Inadequate **teacher performance monitoring** and management system.
  - b. Lack of automated **quality assurance** and an integrated Management Information Systems to inform decision making.
  - c. Lack of coordinated, **real time engagement of parents** and teachers in student welfare and school development.
  - d. Lack of an automated system to enhance **parental involvement in the education of their children**.
3. **Lack of automated examination management**  
Even in an examination oriented system, there is impersonation of students in examinations, and sitting of exams in alternate centres to improve the chance of educational advancement.

## The Solution:

### BIOSIM4Education



The Biometric Student Information Management System (BioSIM®), is a web and mobile application-based School Information Management System that addresses the above challenges by automating, simplifying, and enhancing student and school management through real time improvements to performance, quality and security. The system provides a real time solution.

**Goal:** to enhanced Governance management and accountability in education for Kenya's sustainable development.

#### Specific Objectives

1. To improve the tracking of students through setting up a Unique Personal Identification (UPI) in Kenya's education system for reliable timely data for effective decision making.
2. To reduce resource wastage.
3. To strengthen teacher and school management through data for decision making.
4. To strengthen examination management against the impersonation of students.

## PRESIDENT'S CORNER

## IMPLICATIONS OF THE BRAZILIAN DEVELOPMENT EXPERIENCE FOR KENYA

### MARIZA ALMEIDA

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Innovation can make a difference in developing countries although sometimes the innovation climates in these countries can be difficult, characterized by low educational levels, poor infrastructure, and lack of experience in promote innovation policies.

Based on the successful experiences of some developed countries in promoting innovation policies, many have been engaged in copying similar experiences. However the effects on the countries' economies are different, due to their specific conditions, including the consequences of economic and political circumstances, priorities, education levels, and impact of the global market.

Nevertheless, the design and implementation of innovation policies in developing countries has been a challenge since the specific characteristics of their national innovation systems makes it difficult to transfer lessons from one country to another. This is due to: 1) the components of the system, related competences

and capabilities of the organizations within the system, a weak institutional framework and weak level of interaction; or 2) dynamics of the system arising from new capabilities, required by firms and institutions, that are not yet available in the system (Chaminade *et al.*, 2013).

Taking into account the above mentioned aspects, it can be interesting to reflect on a recent Brazilian experience in conducting an innovation policy, with their positive and negative outcomes. The main concern of the federal government in launching the policies for stimulating innovation, was Brazil's economic dependence on natural resources, mining and agriculture, and a foreign trade deficit.

Between 2003 and 2015, three development policies were implemented in Brazil. The first was the Industrial, Technology and Foreign Trade Policy (PITCE) from 2003-2006, and the second was the Production Development Policy (PDP), covering the period 2007-2010, which was followed by the Greater Brazil Plan from

2008-2011. The principal characteristic of these plans was a combination of innovation, trade and industrial policies.

The fact that the above policies were established in recent years, has led to a difficulty in evaluating the results and impact, since they relate to the phenomena of an inherently long-term nature; and the traditional indicators, such as percentage of GDP devoted to S&T, and number of patents, doesn't allow us to explain the internal changes arising from the implementation of the innovation policies. For this reason four other indicators were added to stress the changes in the internal context due to innovation.

Major trends resulting from innovation policy that have emerged after fifteen years of implementation are as follows. These incorporate actions encompassing the government, industry, and university, and reflect the changes during this period of experimentation:

1. The **increase of the resources for S, T & I** from 0.96% of GDP in 2004 to 1.24% of GDP in 2013 (MCTI, 2015). The stronger growth accentuated the proportional difference between public investment and the private sector, with the former growing faster than the latter. In 2013 these reached 0.71% and 0.52%, respectively, due to the innovation support policies.
2. The **number of patent applications** in Brazil by residents and non-residents has increased since the implementation of the innovation policies.
3. The **new legal framework** includes a set of laws proposed by the federal government and approved by Congress that completely changed the legal environment relating to innovation, university-industry cooperation and company R&D. The first was the Innovation Law, which the government proposed in 2000 but was only approved by Congress in 2004, and regulated in 2005. Subsequently, other laws were approved, like tax incentives for R&D, public procurement and research in specific areas, like stem cells. The states also began to propose and approve their own state laws in support of innovation, addressing local problems and other specifics related to the economic context.
4. **New instruments to support innovation policies** have been created over the years that have enabled federal and regional agencies to implement the policies. Some of them were connected with financial support for innovation in different formats: tax incentives for R&D, direct support to R&D and innovation in firms; stimulus to create a venture capital industry in the country, etc.
5. **The increasing role of SMEs in supporting and implementing innovations** is a consequence of the innovation policies; whereas previously R&D in the Brazilian production sector was concentrated in state-owned companies within strategic sectors, while the majority of the companies were characterized by a very low level of sophistication, technology intensity and R&D investment. In recent years, a total of 3,949 companies have received direct financial support from federal and state agencies to develop

innovation in products, services and processes in different industries. From this total, 2,767 are small, 173 medium, 138 large, while for 871 there is no information about the size.

6. The **transformation of universities** due to technology-based entrepreneurship, and indeed the transformation towards entrepreneurial universities are increasingly seen as an important element of regional competitiveness (Etzkowicz and Leydesdorf, 2000). This has been taken into consideration in the Brazilian innovation policy. Following the approval of the Innovation Law, various activities were conducted in universities to promote entrepreneurship, innovation, patenting and the creation of spin-offs. According to the annual report from the Ministry of Science Technology and Innovation, Intellectual Property Policy of Brazil's Scientific and Technological Institutions (Formict), published in 2015 and covering the 2014 activities, it showed that the number of Technology Transfer Offices (TTOs) increased from 94 in 2010 to 180 in 2014. The number of patent applications from universities increased by 96.57% with a total of 5,081 in the period 2003-2014. There was also an increase in technology university-companies contracts between 2009 and 2014, which were up by 69.13%.

Among the problems identified was the priority to increase the competitiveness of existing sectors, with a focus on commodities; with low emphasis on new areas. Note that for long-term sustainability, a country should create favorable conditions for achieving mastery in new areas. From this aspect, it is possible to conclude that for developing countries the greatest difficulty is not in defining the instruments or successfully put these into operation, but in analyzing the context, and the local problems that public policy is intended to address; or expending effort on problems that have been wrongly diagnosed. This seems to be the major limitation of the innovation policies developed in the country during the period under study.

Related to the learning process of the agencies that operated the innovation policy was the difficulty in the evaluation of the policy in order to assess economic and social impacts on the country. Nevertheless, the results of some partial studies indicated that there was growth in internal R&D in companies, investments in research, an increase in the number patents, inter-company revenues and participation in foreign markets. In the case of the universities there has been an enhanced number of patents, partnership with firms, entrepreneurial education and implementation of science parks.

Open opportunities for innovation by our researchers have been driven by the technological needs of developing countries that have been not addressed by institutions of developed countries. Examples include innovation in agriculture where Embrapa, a state owned company, developed research that has been contributing to agribusiness. Another important illustration is the work of the institution Fiocruz Foundation that has been studying tropical illness, and in 2015 identified the zika virus that has been an important source for the development of public policy in this area.

Internal conditions in Brazil changed markedly in 2015 due the economic and political crisis that affected the capacity for

investment and changed the priorities in public policy, with a decrease of resources for innovation, education and research. This is contrary to the assertion that an effective innovation policy is crucial for development in the long term.

Nevertheless, given the circumstances, this research contributes to the understanding of the methods for adopting and diffusing an innovation policy in a developing country. This study can help the organizers of the International Triple Helix Summit on 4-6 April 2016 in Nairobi, Kenya, to think about the opportunity to address local problems by incorporating the Triple Helix model in their public policies encompassing university, industry, and government to reach the sustainable development goals.

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## PUBLICATIONS

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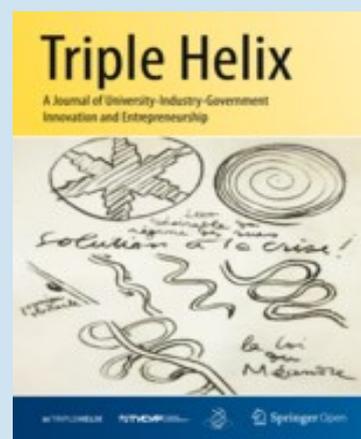
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### Recently published papers:

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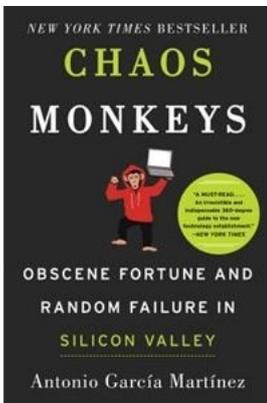
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### NEW BOOK

Henry Etzkowitz contributed the Chapter: *Wither the (Entrepreneurial) University?* to the recently published book **Higher Education, Commercialization and University - Business Relationship in Comparative Context** by Joshua Powers (Author), Edward P St. John (Editor).

AMS Press: [www.amspressinc.com/titles/64802.html](http://www.amspressinc.com/titles/64802.html) (ISSN 2325-6311)

## BOOK REVIEW



### Chaos Monkeys: Obscure Fortune and Random Failure in Silicon Valley

Antonio García Martínez (Author)

Reviewer:

**Dr Tatiana Pospelova**  
Lomonosov Moscow State University  
Moscow, Russia

Publisher: Harper Collins

As a person who has just finished my PhD degree, I reacted to the book 'Chaos Monkeys: Obscene Fortune and Random Failure in Silicon Valley' by Antonio G Martínez like a researcher. One day I found an interesting Facebook post by my friend from Silicon Valley:

*"As every new arrival in California comes to learn, that superficially sunny 'Hi!' they get from everybody is really, 'Fuck you, I don't care'. It cuts both ways, though. They won't hold it against you if you're a no-show at their wedding, and they'll step right over a homeless person on their way to a mindfulness yoga class. It's a society in which all men and women live in their own self-contained bubble, unattached to traditional anchors like family or religion, and largely unperturbed by outside social forces like income inequality or the Syrian Civil War. 'Take it light, man' elevated to life philosophy. Ultimately, the Valley attitude is an empowered anomie turbocharged by selfishness, respecting some nominal 'feel-good' principals of progress or collective technological striving, but in truth pursuing a continual self-development refracted through the capitalist prism: hippies with a capitalization table and a vesting schedule".*

After three years living in the heart of San Francisco I was totally agree! As a researcher I found the author's Facebook page, checked his public live story with both his corporate and start-ups experience and I understand that Chaos Monkeys will be among the top books on the 'need to read list'.

When I started reading it, I found a lot of real life things such as: "Before the American Revolution, half of the European immigrants to the British colonies came over as indentured servants. Poor children or young adults, with no passage to the America. Across the pond, employers would purchase these individuals from the captains who had brought them over, and they were pressed into service or apprenticed to craftsmen. Servants' child could be bought or sold, as with slavery. Also as in slavery, servants were subject to physical punishment, including whipping, they could not marry without permission. At the end of the contract, servants were given their 'freedom dues' (a small cash payment, and set free to seek their fortunes in their new homeland). Not much has changed in Silicon Valley".

After that Antonio describes the true stories about how immigrant engineers from different countries are trying to find loopholes in

the US Immigration Law and continue staying and working legally in the USA. That is a common topic for most of the international start-ups in Silicon Valley. The same story about real estate prices in the Bay Area and lifestyle. There are several books over the last fifty years about the Silicon Valley phenomenon, most of them scientific or business-oriented. Chaos Monkeys is modern, truthful, and about real life. The book is written in spoken language with slang, sometimes including profanity, simply and clearly. However, when you leave Stanford University campus into real life you will hear this slang at tech events.

Nowadays it is not easy to find this book in a shop, it sold like hot cakes. I definitely recommend reading this book to:

- 1) People from the Bay Area, to read about themselves and laugh.
- 2) Entrepreneurs, who are planning to come with their start-ups to Silicon Valley
- 3) Everyone who uses Twitter, Facebook, Google, etc every day, who wants to know how the tech world is arranged in a real, not virtual life.

I recommend Chaos Monkeys: Obscene Fortune and Random Failure in Silicon Valley by Antonio García Martínez because it is based on an actual story of a startup founder and not another general teaching material that you can find in several online courses about building startups. Plus it's funny and witty.

As a hashtag for future readers: during the time when I read this book I tried to find the answer to the question: why is this book called Chaos Monkeys?

The answer: "In order to understand both the function and the name of the chaos monkey, imagine the following: a chimpanzee rampaging through a data center, one of the air-conditioned warehouses of blinking machines that power everything from Google to Facebook. He yanks cables, smashes a box, and generally tears up the place. The software chaos monkey does a virtual version of the same, shutting down random machines and processes at unexpected times. The challenge is to have your particular service - Facebook messaging, Google's Gmail, your start-up's blog, whatever - survive the monkey's depredation".

# Innovation Causality: Silicon Valley and Other Experiments in Creative Reconstruction - a Review Essay

**Henry Etzkowitz**

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Komori, S. (2015) *Innovating out of Crisis: How Fujifilm survived and thrived as its core business was vanishing*. Berkeley: Stone Bridge Press.

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## Introduction

*Chaos Monkeys* are the PhD physics drop-outs, computer science graduates, and others from diverse quantitative backgrounds, who work algorithmically on Wall Street, turning mechanics equations to financial manipulation. Financial firm recruiters in recent years have emptied out physics departments to fill their need for highly skilled “quants”. Martinez, the author of this volume, is the prototypical financial quant, a dropout from the Berkeley physics department, after finally succeeding in passing the qualify exam after three tries. However, experiencing burn out and boredom, the lure of Silicon Valley drew our hero westward. Martinez skill set was motivational, organizational, and inspirational. In other words, he was an entrepreneur, oriented to blogging, “bulshitting” rather than coding. Thus, he returned to the Bay Area, finding employment in a start-up beyond the inception stage but prior to the take-off phase of customer revenue flow and serious investment.

Shigetaka Komori, CEO of Fujifilm Holdings Corporation, authored *Innovating Out of Crisis*. At the brink of creative destruction, Komori must navigate the innovation rapids with unerring foresight and bravery or see his firm die like its world class competitor, Kodak, the iconic American firm that lost courage. Fujifilm found that the way forward is to act like a nimble startup: rapidly downsize the heritage business, identify new business opportunities for the firms technological competencies, acquire firms to assist in developing these opportunities, and have the courage to stay the course even when the new businesses are not showing the same level of profit as the old ones still temporarily manage to produce. Whether startup, icon, or incumbent, innovative firms are committed to filling gaps in existing technologies and advancing the innovation frontier.

Taken together, several recent books delineate the stages and phases of innovation and entrepreneurship in contrasting societies and cultures, e.g. Silicon Valley, Boston and Japan. The state-of-the-art is exemplified by a Silicon Valley start-up struggling to attain momentum for take-off, a besieged Japanese technology firm, formerly dependent upon a single superseded product, averting impending “creative destruction”; a Silicon Valley social media multi-national, conglomerating itself to pre-empt ever having to face the demise; contrasting incubator and accelerator experiences in Boston and Silicon Valley, with weaker and stronger human capital attraction magnets. These comparative cases exemplify the moments of contemporary creative reconstruction, embodying an expanded vision of classic “creative destruction” that includes birth, rebirth, absorption, and renewal, as well as supercession and spontaneous combustion (Schumpeter, 1944).

## The Wisdom of the Start-up

*Chaos Monkeys* is a participant’s view of two moments of contemporary Silicon Valley life: the newly birthed start up as a hopeful business experiment, and employment in Facebook, an iconic firm, that was a start-up itself a decade ago. Martinez shares his personal and business experience and insight on Silicon Valley, occasionally drawing on traditional social science expertise like Leon Festinger’s theory of cognitive dissonance to help make sense of the scene. He is a scatological blogger who has scaled up to a traditional book format to gain a broader public. The book is well written, raunchy, with a major publisher, Harper Collins, matter of fact printing words, like “fuck,” that heretofore would have been asterisked or blank spaced if they were not entirely excised.

The author is out of Miami, via parents who left Cuba as teenagers. The grandparent generation included a Fidel Castro classmate at an

elite Havana law school. Proud of his forbears, including a stern father who pursued a safe career in Florida real estate, Martinez, from an immigrant background, clearly identifies with the “hardscrabble” ambitious persons who fought their way up rather than arriving in Silicon Valley, dropped off the “tour bus” of an elite background, his characterization of the upper class of Silicon Valley denizens, delivered from the womb onto the Harvard, Stanford conveyor belt. Martinez, doesn’t mention his undergraduate alma mater, at least to this reviewer’s recollection, but made it to the PhD program in physics at Berkeley, an elite academic scene. Finding himself at the low end of academic distinction, succeeding in his qualifying exam after three tries; he decamped from academia to try his luck as a quant in applying mechanics equations to financial problems at Goldman Sachs.

The central character of this memoir is Martinez’ macho geek persona that strains to burst loose from the chains of so called “political correctness,” otherwise known as civility. What comes through between the lines, if not on them, is emblematic of a culture in which women are constrained to look like men (wearing hoodies and jeans at Facebook, for example), while acting as traditional females, in order to fit in. The text has the feel of being either self-edited from the blogs on which it is based, or the author lightly admonished by an actual editor, to keep it from being grounds for feminist critique. Such attacks may appear in any event, if not against Martinez, but on the start-up genre that this work celebrates even as it provides a realistic depiction of self-abnegation and total task absorption. Martinez, himself, cites start-up exigencies as a reason to distance himself from his young child even as a male colleague maintains balance.

*Chaos Monkeys* is at one and the same time an advertisement for the Silicon Valley start-up scene, a guidebook to entry and the various personal characteristics that will enable success as well as a cautionary warning that all that glitters is not gold. Nevertheless, like many of the 49’ers of the original Gold Rush, who found ancillary occupations as grocers, assayers and bar keepers to service the gold panners or direct producers, the contemporary Silicon Valley start-up “gold rush” also requires supporting actors such as employment attorneys, public relations specialists, and others who constitute the ecosystem of the region. There are human resource specialists to debrief departing employees, maintenance personnel, and even artists, like the one who decorated the original Facebook headquarters and was paid in stock that eventually became quite valuable. Of course, had he painted a firm that failed, he would have been working without recompense.

### Entrepreneurial Experimentation

Seeing the writing on the wall of clients not sticking to the start-up where he was working; and the deadline of applications for Y Combinator, the premier Silicon Valley accelerator, a hybrid cross between higher education and business that offers nascent entrepreneurs access to key networks, as well as a financial stipend and collegiality of fellow start-ups for a limited period of time, was irresistible. Sensing that his employer is unlikely to traverse the valley of death, Martinez decides to start-up recruiting two fellow employees who agree with his assessment that they are treading water in a firm that is going nowhere. The push to start up is

impending unemployment; the pull an intriguing invitation. That is the view from the start-up entrepreneur side. From Accelerator Y Combinator’s side, it is a methodology of accessing people and ideas that can be capitalized as the next generation of Silicon Valley start-ups.

Silicon Valley is a laboratory for “business experiments” in the form of start-up firms that are temporary in nature, ready to be dismantled and closed down at the earliest sign of failure, or possibly redesigned and repurposed, in a so-called “pivot.” Achieving independent viability and long-term persistence, or even IPO, is not his vision. Bootstrappers like Conteneo, a six year old gamification consulting and software development firm, and Bell Biosystems, also view acquisition as a successful outcome. In the wake of significant technical and scientific success, they expect to be acquired by large firms to take their products to broader markets. In the event of modest success or hidden failure, they may still be acquired at a premium for their personnel whose worth has been enhanced by virtue of conducting even a failed experiment. This is a realistic view of start-up entrepreneurship. In business, as in science, only a very few experiments are Nobel or Facebook worthy of being scaled up to world class renown and/or financial efflorescence. Silicon Valley is thus becoming a mature economy characterized by a relatively stable set of major players.

*Chaos Monkeys* is a window on the recent Silicon Valley start-up scene, circa 2010-2015, written by a participant from the vantage point of a modestly successful start-up that he parlayed into becoming an employee of an iconic firm. Facebook is a charter member of the emerging Silicon Valley oligopoly, including Google and Apple that have the financial ability and technological foresight to purchase virtually any potential competitor. Thus, they may proactive, rather than retrospectively, like Fujifilm, avert the fate of creative destruction that lies in wait for any successful firm, like Kodak, afflicted with innovation hubris, the belief that they own their field and are immune to disruption. Facebook’s founder, to inoculate his firm against innovation hubris, retained the iconography of the previous inhabitant of his firm’s new campus, the former headquarters of SUN Microsystems, the workstation firm that in the 1980’s was a rising star, propelled from Stanford’s internal network infrastructure.

Blindsided by the emergence of servers and software that superseded its workstations, SUN whose acronym stands for Stanford University Network, succumbed to the Schumpeterian flu. Facebook, however, paid sixteen billion dollars, to head off its potential disruptor Instagram, and two billion dollars to acquire Oculus, a virtual reality firm whose technology is expected to reach commercial maturity in a half decade or so. No amount is too large, despite naysayer’s dire prophecies, if a newcomer has monopoly destabilization potential. Silicon Valley giants are gaining sufficient foresight capabilities to disrupt their expected disruptors. Nevertheless, the next new cool technology may still exceed their grasp. A colleague reports that his first year students consider Facebook passé and have migrated to novel social media sites, thus far out of the techno-Gulliver’s grasp.

A participant at the University of London, Birkbeck Innovation Policy Workshop (2017) mentioned in a personal communication that a speaker at a recent European Union innovation event, held

that the Garage is key to Silicon Valley, but who has the key to the Garage? He held that an uncomfortable working place is the secret sauce of the Valley, motivating start-up founders to achieve success (Vezzani, 2017). Perhaps there is something to the myth! Martinez describes his three person startup crew, cooped up in an inexpensive Mountain View apartment (when there was such a thing) working long hours at close quarters: feverishly coding, sharing the same toilet, becoming overly familiar with each other's shit, literally and metaphorically. The realistic motivation was to attain just enough success to be able to sell out to a larger firm and acquire well paid jobs with good equity terms, as an "acquisition hire."

### Veblen's Vision Recuperated

Martinez portrays a bifurcated Valley, with venture capital, tech firm founders, and large firm leadership equally sourced from elite and hard scrabble backgrounds. Some arrive from elite universities with strong networks, while others have fought their way up through technical talent and entrepreneurial cunning or some combination of the two. (We may assume that Martinez fits the latter category since we do not recall him mentioning his university of origin). The Silicon Valley start-up is depicted as a personnel evaluation mechanism for the larger firm to test the mettle of potential employees and perhaps acquire some relevant technology. Having successfully traversed this rite of passage, Martinez views the Valley from inside of one of its iconic firms. Engineer led, and managed, Facebook is the apotheosis of Thorstein Veblen's vision. In *The Engineers and the Price System (1921)*, the founder of Institutional Economics, sometime Stanford Professor, foresaw the emergence of corporations whose managers are subservient to, even superseded by, technical experts in charge of production processes that eschew waste. Veblen eviscerated with sardonic humor and conceptual bravura a society whose economy was driven by consumer status envy (1899). Contemporary algorithmic metrics, like those Martinez struggled to introduce into Facebook, sophisticate the influencing of consumers orders of magnitude further (Christin, 2017).

### The Networked Firm

A new generation of Silicon Valley firms, like Uber, Airbnb, have discovered the "strength of no ties" substituting algorithmically generated links through the Internet among people previously unacquainted and at the lower end of the proverbial six degrees of separation, well beyond either "strong" direct ties or "weak" indirect ties through a single intermediary. The reputation of the firm displayed on the web, through satisfied users, or at least not too many dissatisfied ones (who are immediately addressed and placated) is the basis of a business model that has turned underutilized resources (a spare room) an underutilized vehicle and an underemployed owner into multi-billion dollar firms.

Business opportunity of "no ties" the third element in a typology of "strong and weak" that is being filled by software algorithms and technology entrepreneurs who seek out these gaps in various areas of society, viewing them as business opportunities, begging to be filled. Indeed, the software constructions of virtual ties, may conceivably become as or even more prevalent than the previous two in an emerging social structure that is increasingly mediated by

social media rather than traditional social institutions, like churches, pubs and coffeehouses, where people traditionally assembled on the basis of shared belief and geographical propinquity.

### The Evolution of the Valley

An ecosystem of innovation and entrepreneurship (start-up entrepreneurs, angels, venture capitalists, accelerators, incubators and science parks) is built upon a substrate of university-industry-government interactions that paradoxically becomes less visible as the ecosystem become more successful and complex and more visible when it is less successful or new-born. The contemporary Silicon Valley start-up is a hermetic environment, inserted in a nutrient force field of accelerators, angels, employment and immigration lawyers, accountants, thought leaders and even "older" failing start-ups, some of whose employees realize doom is pending and depart for their own start-up, as well as successful firms, seeking talented people and projects that they can acquire to forestall their own failure and achieve greater success.

Y Combinator, StartX and its fellow accelerators, provide a reliable conveyer belt from start-up sources in failing firms and universities to venture capitalists and large firm acquirers of talent and technology. The commodification institutionalization of the start-up process as a kabuki dance between experienced and nascent entrepreneurs. The difference between earlier era when Jobs and Wozniak had to recruit an older successful entrepreneur, Mark Merkkula, as co-founder to give their nascent venture credibility; this important feature of start-up success can be outsourced to an organization like Y Combinator Accelerator that can simultaneously provide this asset to a large number of firms. Thus, "adulthood" does not have to be internalized within the firm; it can be accessed on an "as needed" basis when the firm is incorporated into a network.

The Silicon Valley oligopoly companies are recreating some of the characteristics of the Hollywood studio system, combining production of content with control over distribution. Before anti-trust proceedings forced them to divest their theatre chains, MGM and its peers both made and marketed films. Perhaps ironically, this separation was accomplished just as the rise of television was about to make them less relevant as distribution mechanisms. Just as the Hollywood classic studios, depicted by anthropologist Hortense Powdermaker, in her classic monograph, showing the workings of the Hollywood studio. The studio system produced a variety of motion pictures, having the human and physical resources of writers, hairdressers, sound stages, directors, musicians, etc.

These variegated resources, organized in-house, could be deployed in a variety of projects simultaneously. Contemporary Silicon Valley megacorps, like Apple, Google, Facebook (Alphabet) are studios that have developed similar in-house capacities to the classic Hollywood entities. Indeed, Google reincorporated as Alphabet, in recognition of its multiple, simultaneous project strategy. The main difference between the Silicon Valley and the classic Hollywood appears to be that employment contracts are less binding and long term, with even key employees expected to leave for competitors or to lead or join a start-up effort.

The Silicon Valley start-up has become a personnel evaluation mechanism for the larger firm to test the mettle of potential employees and perhaps acquire some relevant technology having successfully traversed this rite of passage Martinez views the valley from inside of one of its iconic firms. Facebook engineer led, and managed, Facebook is the apotheosis of Thorstein Veblen's vision in *The Engineers and the Price System* (1921), of corporations whose managerial class has been superseded by technical experts in charge of the production process that, he expected, would eschew waste and provide social benefit. Dropping the trappings of capitalism, without taking up the reins of socialism, they would in other words, create a munificent pro bono regime, much as the founders of Facebook and Google see and present themselves.

### The Silicon Valley Magnet

Silicon Valley has become a global magnet, attracting large numbers of technical personnel, trained in universities around the world, including from MIT, to work in its firms. Moreover, it has been noted that larger numbers of MIT graduates form firms in the valley than in Boston. Indeed, Facebook, incubated at Harvard, was attracted to the Valley at an early stage as a better scene to support its growth. Indeed, the Boston incubator start-up turned out to be no match for Silicon Valley Y Combinator or StartX, each incubating dozens of start-ups in each class. The 3-4 firms attracted were insufficient to achieve viability and the support staff resources internalized in the incubator, rather than accessed through networks as in Silicon Valley, were eventually put to use as a single start-up venture, suggesting the force of the Silicon Valley Virtual Magnet, lining up global entrepreneurial talent, IP and other inputs into the knowledge-based economy, like iron filings ordered by a physical magnet.

Tracy Kidder's biography of the rise of a Boston computer entrepreneur from humble roots in the computer science department of the U Mass Boston, tech firm employee to start-up entrepreneur, sale of high growth travel start-up and reinvestment in an incubator firm, expected to rival Silicon Valley's Y combinatory on the basis of MIT and Harvard's greater scale than Stanford, found itself with relatively few interesting candidates to invest in. The comparison to Silicon Valley had failed to take into account an essential feature of the Valley; its attractiveness to aspiring high tech entrepreneurs globally; the very reason that had pulled Zuckerberg to move his nascent firm to Silicon Valley. The 3-4 firms successfully vetted for entry to the Boston Incubator were insufficient to achieve viability for the project. Indeed, its support staff resources internalized in the incubator, rather than accessed through wide networks as in Silicon Valley, are suggestive of relative regional innovation capacity.

### Silicon Valley vs Boston

Comparing Boston and Silicon Valley, the east and west coast technology scenes, has been a recurrent theme since Fred Terman, later an iconic Stanford Provost, wrote to a colleague from his wartime perch managing the radar countermeasures lab, housed in the biological sciences building at Harvard that Stanford must follow the MIT model of large scale government-funded collaborative research in the post-war or be consigned to the oblivion of a Dartmouth status, then a relative small primarily teaching college

with a two year medical school, albeit with Ivy League status. Since Annalee Saxenian's (1994) iconic distinction between internally focused firms on Route 128 and communities of technologists sharing technical ideas in Silicon Valley watering holes; an academic industry of comparative regional technology conurbations has emerged and proliferated (Hall and Markusen, 1985).

The nascent post-war Silicon Valley ecosystem, when venture capitalists sought out potential clients in nondescript business strips is within the living memory of its senior practitioners, some of whom arrived from the mid-west or east coast. Draper presently mentors a developing country venture mentoring organization from a discrete Palo Alto location adjacent to the Hewlett Foundation. Draper wrote *The Startup Game*, comparing the early days of Silicon Valley venture capital financing, to Wall Street corporate underwriting, his family's original business and how his career progressed from business to public service as head of the US Export-Import Bank and back again to Silicon Valley.

Draper (2009) tells the story of how his iconic venture firm, achieved its initial funding with the support of a US government program sponsored by the Eisenhower era Small Business Administration, designed to expand venture capital nationwide, from its Boston birthplace. ARD (American Research and Development Corp), founded in 1946, led by Harvard Business School Professor General George Doriot and staffed by MIT and HBS grads as technology scouts and business advisors. The invention of the venture capital firm was the culmination of a regional renewal effort dating from the 1920's. This New England Triple Helix invention of "innovation in innovation," through systematizing the university spin-off process, is a work that is still in progress (Etzkowitz, 2002; Ante, 2008).

Silicon Valley has become a global magnet, attracting large numbers of technical personnel, trained in universities around the world, including from MIT, to work in its firms (Bank Boston, 1997).

Boston is also a magnet for international talent arriving at MIT and Harvard, but also Boston College, Boston University, Northeastern University, and Brandeis University exemplifies the nurturing of local talent, for example, Paul English, successful software entrepreneur, founder of Kayak, the protagonist of Tracy Kidders whose technical skills were nurtured in the computer science program of the University of Massachusetts, Boston. Tracy Kidders biography of a highly successful technology entrepreneur provides a longitudinal perspective on the start-up/large firm high tech scene in comparison to Martinez relatively brief career, to date. Finding his *métier* in the computer science department of a local university, English worked in one of the computer firms that AnnaLee Saxenian (1994) depicted in her comparison of Boston and Silicon Valley high tech scenes.

After a successful high tech career culminating in teaching entrepreneurship at MIT, English organized an incubator with a corps of internal advisors and a funding offer to successful applicants, higher than usual. He expected great success, noting that MIT and Harvard were larger than Stanford and therefore could be expected to produce a larger number of spin-offs.

However, when the incubator opened, there were only a few successful applicants. In the end, it was determined that the best use of the incubator's advisor corps was to do their own startup. The MIT Stanford size comparison was inappropriate as the Bank of Boston study earlier showed that MIT graduates contribute more start-ups to Silicon Valley than to their home region.

## Policy Implications

Like iron filings ordered by a physical magnet, the Silicon Valley Innovation Magnet, lines up global entrepreneurial talent, IP, and other inputs into the knowledge-based economy. Paradoxically, Silicon Valley has an inadequate academic base to support the vast and burgeoning scale of its high-tech economy (Etzkowitz, 2013). The Valley is a magnet for international technical entrepreneurial talent, much of it tied to the thin reed of the H1B Visa program of quasi-indentured servitude to large firms. The Obama Administration was amenable to the blandishments of the Valley elite but the importation of talent model is currently at risk of disruption, given the Trump Administration's immigration skepticism and worse (Etzkowitz, 2016).

Stanford sociologist, Dick Scott, and Michael Kirst, former California State University President, presently with the Stanford Graduate School of Education, presented a detailed empirical analysis of the mismatch between Silicon Valley universities and its major industry. Their seven fold typology of area academic institutions, includes everything from Chinese acupuncture schools to the University of California at Berkeley. *Connected but Conflicted: Higher Education and Silicon Valley* (Scott and Kirst, 2017), identifies a huge, expanding gap in "... a longitudinal study of 350 post-secondary institutions in the San Francisco Bay Area from 1970 to the present" (Times Higher Education, 2017).

In the 1990's software boom, De Anza Community College and its peers retrained high-school drop-outs and literature PhD's alike, to fill the coding maw of area firms. However, the conservative attack on the state through 1971's proposition 13 limits on both individual homeowner property and business taxation eventually constricted the heretofore resource rich Californian public education system of higher (and lower) education. In response, Silicon Valley's elite founded private schools to care for their children's educational needs and imported graduates from abroad to staff their firms. The Silicon Valley talent pool was increasingly, sustained and expanded exogenously through the lobbying efforts of Valley firms to expand visa programs, rather than endogenously through the areas universities and schools.

The California master plan formulated by Clark Kerr sixty years ago is still in place even though he only expected it to last a decade (Douglass, 2017). This procrustean academic bed limits San Francisco State and San Jose State to the masters level, in inhibiting the academic rise that their sister school, the University of Massachusetts, Boston, is experiencing, developing PhD programs in niche underserved local areas such as gerontology and marine science, and in computer science and biotechnology, where local demand exceeds the supply of Boston's universities. Silicon Valley has based its skill strategy on lobbying for visas to import its high-level technical workforce. Boston more relies on endogenously developing talents in a continually upgraded public and private

primary, secondary and tertiary system. California's k-12 public systems declined precipitously in recent decades and public higher education is stressed. This regional divergence, if not redressed, will vitiate Silicon Valley's innovation performance, especially if xenophobic pressures shrink the "political fix" of the H1B visa program, whose fast track was recently cut,

## Coda

Debate over the course and direction of societal change, influenced by technological change and vice versa, is the subject matter of *Innovation and Its Enemies* (Juma, 2016). Calestous Juma, Professor of Practice at Harvard's Kennedy School, jumped from TTC (Teacher Training College) graduation in Kenya to a SPRU PhD, after leading a Nairobi innovation development organization. A proponent of applying biotechnology to agricultural problems and opportunities, especially in developing countries like his own, Juma analyzes meta-STS value issues of technological, economic and social change through a series of historical case studies of international technology and cultural transfer e.g. coffee, margarine, printing the Koran, sound recording, etc, providing a frame for dealing with the author's key issue: transgenic crops.

Whereas the previous volumes focus, explicitly or implicitly, on technological advance, concomitant economic development and cultural shifts, Juma is interested in the converse question of why technological change is held back, even when it could advance human betterment. From either direction, technological issues are embedded in value dilemmas, with two philosophical approaches to technological innovation: risky until proven safe, and safe until proven risky. Concern over the appropriate course to pursue divides and unites proponents and opponents of innovation.

An ecosystem of regional entrepreneurship innovation mentoring and assistance has been constructed as a superstructure built upon a base of university-industry government interactions. The ecosystem is a second order construct on an underlying foundation of university-industry and university government interactions that set in motion the dynamic of Silicon Valley high tech firm formation decades ago. For Martinez, Silicon Valley is the zoo where chaos monkeys are kept, and their numbers only grow in time explosion of venture capital. The question for society, and the participants in the start-up game is "... whether it can survive these entrepreneurial chaos monkeys intact, and at what human cost" (Martinez, 2017).

To be continued ...

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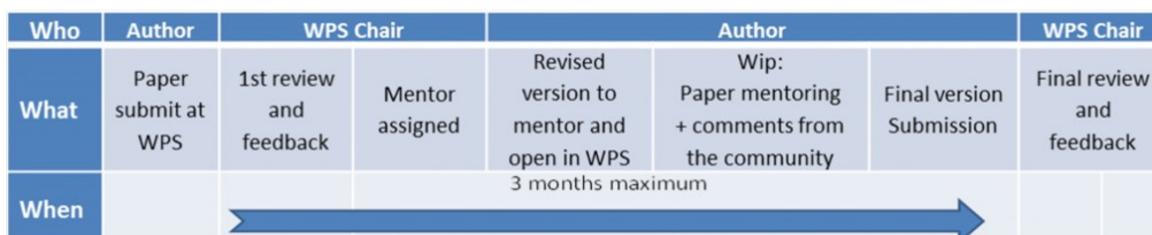
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The THA Working Paper Series (WPS) has a new website ([www.triplehelixassociation.org/the-working-papers](http://www.triplehelixassociation.org/the-working-papers)) where the new mission and delivery mechanisms are presented.

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## THEMATIC RESEARCH GROUPS



### NEW CO-CONVENER FOR THEMATIC RESEARCH GROUP ON KNOWLEDGE AND TECHNOLOGY TRANSFER

We are pleased to welcome Lucas Coelho (right), Partner at Nexta Innovation, as the new co-convener of the Thematic Research Group on Knowledge and Technology Transfer.



Lucas will complement Hester Tak in her efforts to advance our academic inquiries and practitioner engagement in this field.

Further information and details on the TRG Knowledge and Technology Transfer are available at:

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If you would like to join the Group, please send a request to the Group Conveners:

Hester Tak	<a href="mailto:gt@gunntwynmore.com">gt@gunntwynmore.com</a>
Lucas Coelho	<a href="mailto:lucascoelho@nextainnovation.com">lucascoelho@nextainnovation.com</a>

## WEBINAR SERIES



### Smart Specialisation - evidence based implementation in the EU

DELIVERED: 28 February 2017

Speakers: Dimitrios Corpakis and Lena Bologni

Moderator: Panayiotis H Kelikidis, Chairman of the South East European Research Centre and President of the THA Chapter of Greece

#### Objective

The Webinar will address the emerging concept of Smart Specialisation, a place-based growth strategy that has been now fully integrated in the European Union's Regional development policy and is already an ex-ante condition for all EU countries planning to get Structural and Investment Funds (ESIF) support for research and innovation investment. More than 120 Research and Innovation Strategies for Smart Specialisation are currently in place and being deployed on the ground. The Webinar will present the European experience so far, and will demonstrate the very successful case study of smart specialisation implementation in the region of Emilia-Romagna, Italy. It will attempt to reveal concepts, strategies, and expectations targeting innovation for local growth and jobs.

#### Expected Outcome

At the end of the Webinar, participants should:

- have acquired a working knowledge of the concept of Smart Specialisation and of the practical steps they need to go through to make it operational on the ground,
- be able to understand the European experience, identify key success factors and pitfalls, stemming from different realities in governance, regional, and national innovation systems as well as approaches in empowering local innovators, start-ups and clusters, and
- be able to outline a course of action for their own regional communities and adapt it to their economic profile and expectations.

#### Target Audience

Policy makers at all levels of government, with an emphasis on local planners. Cluster managers, corporate leaders, business innovators and academics, will all benefit from the webinar, while their feedback will provide important insights for further developing the concept and its relationship to the Triple Helix.

#### TALK I

#### THE EUROPEAN EXPERIENCE ON SMART SPECIALISATION: REINVENTING REGIONAL POLICY THROUGH THE ENTREPRENEURIAL DISCOVERY PROCESS

- The Knowledge Economy and its role as a game changer for national and local development.
- The concept of Smart Specialisation and its logic.
- Creating competitive advantage using unique growth drivers and integrating global value chains.
- Designing Strategies for Smart Specialisation: research, development and innovation spurring economic development.
- The implementation challenge: creating feedback loops for successful action and corrective interventions.
- Planning challenges for cities and regions.



**DR DIMITRIOS CORPAKIS**  
Former European Commission  
Brussels BELGIUM  
[d.corpakis@gmail.com](mailto:d.corpakis@gmail.com)

Dr Dimitri Corpakis, an engineer by training, has to date more than thirty years' experience in European affairs. Dimitri has worked in many EU policy areas including Education, ICT, Social Sciences and Humanities, and Regional Innovation Ecosystems with an emphasis on interactions and synergies between the Union's Research and Innovation and Cohesion Policies (European Structural and Investment Funds). In recent years, Dimitri led the European Commission's DG Research's Unit on the Regional Dimension of Innovation (now called 'Spreading Excellence and Widening Participation') managing the FP7 Programmes on Regions of Knowledge and Research Potential, building links with the Union's Cohesion Policy, with a strong focus on developing Research and Innovation Strategies for Smart Specialisation (RIS3), ensuring the Commission's link with the Joint Programming Initiative Urban Europe and managing actions on closing the innovation divide (new Horizon 2020 Part IV on Spreading Excellence and Widening Participation (Teaming, Twinning and ERA Chairs). Dimitri can be

reached at [d.corpakis@gmail.com](mailto:d.corpakis@gmail.com). He can be followed on LinkedIn (<http://be.linkedin.com/in/dimitricorpakis/>) and on Twitter (<https://twitter.com/gpstune>).

## **TALK 2 IMPLEMENTATION OF SMART SPECIALISATION STRATEGY IN EMILIA-ROMAGNA REGION**

The talk will describe the practical implementation of Smart Specialisation Strategy in Emilia-Romagna, Italy. The presentation will cover the following items:

- Research and innovation regional context.
- Regional Smart Specialization Strategy.
- Actions already implemented.
- Strategy monitoring system.
- Strategy evolution and mid-term revision.

Should you are interested in the complete THA webinar series, subscribe to the annual THA regular organizational membership (200€) for free access to all six titles.

Webinar video-record-recordings of the previous titles are available for THA members at the THA Repository, Webinars 2015 and Webinars 2016 webpages



**DR LEDA BOLOGNI**  
**Head of Unit Strategy of ASTER**  
**Coordinator of Technology**  
**Platforms and Projects**  
**Emilia Romagna**

Dr Leda Bogni holds a degree in Mechanical Engineering and a PhD in Robotics at the University of Bologna. Her skills concern especially innovation management and transnational R&D and technology transfer programmes. She is external expert, independent evaluator, and reviewer for the European Commission. In Emilia-Romagna she was in charge for the Regional Technology Foresight exercise and Entrepreneurial Discovery Process for Regional S3. She is responsible of the Technical Assistance Unit for regional S3 implementation and monitoring. Leda is also national expert in Italy for S3.

## CHAPTER NEWS

### CHAPTER OF GREECE

#### TH GREEK CHAPTER ON MEDIA

Professor Ketikidis was featured in the American-Hellenic Chamber of Commerce issue "Business Partners Online" as a thought leader on Triple Helix Interactions in Greece <http://bponline.amcham.gr/?p=4893>.

This issue oversees thought leaders, who offer ideas and proposals on developing new partnerships between the private sector and Greece's education institutions, creating a smart, dynamic, and effective growth model.

Professor Ketikidis, president of the THA Chapter of Greece, mentioned that: *"The THA Chapter in Greece intends to promote interaction between universities, firms and government by supporting the international exchange of scholars, by educating scholars in THA's mission, by organizing international symposia and assisting the education of students, scholars and practitioners, and by providing a common framework for triple helix actors to engage in the regional development of Greece through boosting innovation capacity, encouraging and supporting entrepreneurship and through building knowledge by fighting the national brain drain"*.

### CHAPTER OF SOUTH ASIA (PAKISTAN) SATHA

#### SATHA LEADS A MEETING FOR THE ESTABLISHMENT OF NETWORK OF POLICY INSTITUTES IN PAKISTAN

The meeting brought together fifteen participants - directors of the major policy institutes and think tanks in Pakistan. Pakistani policy research think tanks will no longer be working in silos and irreverent to society and industry.

They are now part of the SATHA network to produce policy research according to the Triple Helix framework.

More information at <http://satha.org/News/Upcoming-Meeting-on-Establishment-of-Network-of-Policy-Institutes.aspx>.

## NEW THA MEMBERS NOVEMBER 2016 - FEBRUARY 2017

We are pleased to welcome and present the new THA members joining our Association between October 2016 and February 2017.

The THA membership constituency is growing constantly and can now rely on an international base of more than 160 individuals and organizations, from five different continents including university, scientific-research institutes, incubators, science parks, private companies and governmental institutions representatives.

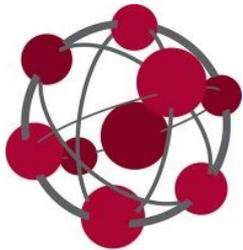
We are delighted to see that our Network is attracting not only individuals, but more and more organizations eager to fully exploit the learning, networking, and promotional opportunities that THA offers to its affiliates.

We hope maintain this momentum and see more universities, research centers, innovation intermediaries, companies and governmental institutions joining us as organizational members to sustain our open access policy and to share our efforts

in building, disseminating, and transforming into practical achievements the Triple Helix theories and models.

Visit: [www.triplehelixassociation.org/wp-content/uploads/2013/08/THA-Organizational-Membership-Levels-and-benefits.pdf](http://www.triplehelixassociation.org/wp-content/uploads/2013/08/THA-Organizational-Membership-Levels-and-benefits.pdf) for details on THA organizational membership levels and related benefits, and subscribe now by completing the form at: [www.triplehelixassociation.org/membership-request](http://www.triplehelixassociation.org/membership-request).

### Organisational Member



EFMD

**EFMD**

**Rue Gachard 88 - Box 3  
Brussels 1050 Brussels  
BELGIUM  
[helke.carvalho@efmd.org](mailto:helke.carvalho@efmd.org)  
[www.efmd.org](http://www.efmd.org)**

Contact person: Mrs Helke Carvalho Hernandes, Deputy Director General

EFMD is a global, membership driven organisation, based in Brussels. As the largest international network association in the field of management development, the EFMD network includes over 860 institutional members and reaches over 25,000 management development professionals from academia, business, public service, and consultancy across 86 countries worldwide.

## Individual Members

### **ATA-UL MUNIM**

McMaster University  
Ottawa  
CANADA  
[munima@mcmaster.ca](mailto:munima@mcmaster.ca)

I obtained my BA (Hon) in Economics and Political Science from McMaster University, and my Master of Public Policy (MPP) from University of Saskatchewan, specializing in Innovation Policy. I am currently pursuing a PhD in comparative public policy from McMaster University. My research focuses on innovation parks and centers of excellence in Canada, Australia and the UK.

#### **Areas of interest in TH research**

Innovation parks, university-industry linkages, networks, commercialization, superclusters, organizational decision making, and comparative innovation policy.

### **HAOYU ZHAO**

University of Massachusetts, Boston  
Boston  
UNITED STATES  
[haoyu.zhao001@umb.edu](mailto:haoyu.zhao001@umb.edu)

University of Massachusetts Boston, PD. in Public Policy from September 2014 to present. Northwestern University, MS in Project Management from January 2012 to June 2013. University of Science and Technology Beijing, BS in Economics from September 2007 to June 2011.

#### **Areas of interest in TH research**

Innovation and Bayh-Dole Act.

### **DR TONNY OMWANSA**

University of Nairobi  
Washington  
UNITED STATES  
[tomwansa@gmail.com](mailto:tomwansa@gmail.com)

Dr Tonny K Omwansa holds a PhD in Information Systems, and is a faculty member at the School of Computing and Informatics, University of Nairobi. He is the co-author of the book 'Money, Real Quick: Kenya's disruptive mobile money innovation'. Besides teaching, he coordinates the innovation activities at the University of Nairobi, including running a technology accelerator program, managing the annual Nairobi Innovation Week, and designing innovation courses. He is also the Director of the C4DLab, the innovation and incubation lab of the University of Nairobi. Dr Omwansa has conducted extensive research and consulting work on ICT, innovation, financial inclusion, mobile transactions and information systems in various countries resulting in numerous products, publications and reports. His research interests are in the design, adoption and impact of innovative low-cost appropriate technologies in developing countries.

### **PROFESSOR SIMONE ALENCAR**

UNIRIO - Federal University of Rio de Janeiro State  
Rio de Janeiro  
BRAZIL  
[simone.alencar@unirio.br](mailto:simone.alencar@unirio.br)

Chemical Engineer. MSc information Science. Dr Technology of Chemical and Biochemical Processes.

#### **Areas of interest in TH research**

Entrepreneurial university.

### **PROFESSOR TADEUSZ TRUSKOLASKI**

University of Bialystok  
Wiejska 74A m.25  
POLAND  
[tadeusz.truskolaski@post.pl](mailto:tadeusz.truskolaski@post.pl)

Tadeusz Truskolaski, economist, professor at the University of Białystok, and author of over 100 scientific works. Served as the adviser to the Minister of Regional Development. Within the Government Center of Strategic Studies, he worked on the National Development Strategy and on the Development of Eastern Poland Operational Program. He was in charge of the Regional Policy Department within Podlasie Voivodeship Marshal's Office. Since 2011, He has been a member of the Committee of the Regions in Brussels - the European Union's Assembly. In 2006 he ran for the office of the Mayor of Białystok for the first time. In December 2014 the Mayor was sworn into his third term of office.

#### **Areas of interest in TH research**

Science and technology parks; identification of indicators cooperations.

### **MS ANNA KARINA LOPEZ-HERNANDEZ**

INGENIO [CSIC-UPV]  
Valencia  
SPAIN  
[anloher3@doctor.upv.es](mailto:anloher3@doctor.upv.es)

International researcher in dynamic capabilities and collaboration for innovation in start-up technology base. The aim of the research is to know which elements are enabling dynamic capabilities for collaboration to develop, sharing knowledge collectively among involved actors for innovation development. The analysis of integration and creation of new knowledge in partnership with other organizations is based on dynamic capabilities framework. Degree in International Relations (Foreign Affairs) Universidad Nacional Autónoma de Mexico, Master International Marketing - Universitat de Girona. Over ten years professional background in international communication skills, technology entrepreneur thinking, Triple Helix in low carbon technologies projects and green business development. Experience in the private sector in activities related industrial marketing, public relations, environmental consulting, business development, and research field.

## THA NEWS



### NEW THA MEMBERSHIP FEES FROM FEBRUARY 2017

As agreed by our membership constituency during the THA General Assembly, held in Heidelberg on 26 September 2016 (minutes available at [www.triplehelixassociation.org/executive-committee](http://www.triplehelixassociation.org/executive-committee)), the Association annual membership fee for student, regular individual and organizational members, will be slightly increased starting from February 2017, as follows

Student	from 25€ to 30€
Individual Regular	from 50€ to 60€
Organizational Regular	from 200€ to 225€

For more information consult our Membership page or contact [mlaura.fornaci@triplehelixassociation.org](mailto:mlaura.fornaci@triplehelixassociation.org).

### THA WELCOMES APPLICATIONS TO HOST FUTURE MEETINGS



Do you want to host one of the next Triple Helix Meetings in your country?

THA can offer a wide array of meetings from small workshops to large events (TH Conference and TH Summit).

For more information on THA meetings features, please consult our THA Meetings Portfolio presentation in order to choose the event which best fits your agenda and check our Open Call for Proposals to learn how to submit your application. Both documents are available at [www.triplehelixassociation.org/call-future-conference-proposals](http://www.triplehelixassociation.org/call-future-conference-proposals)

For more information, please contact Mrs Maria Laura Fornaci ([mlaura.fornaci@triplehelixassociation.org](mailto:mlaura.fornaci@triplehelixassociation.org)), THA Executive Director, and Professor Tariq Durrani ([durrani@strath.ac.uk](mailto:durrani@strath.ac.uk)), Chair of the Future Meetings Committee.



### EFMD Excellence in Practice (EiP) Award 2017

The EiP Awards have developed into one of the leading global awards that recognise excellence in learning and development partnerships. In difficult times we need to reinforce the importance of investments in leadership, professional, talent and organisational development.

#### Come and show us your achievements.

Taking part in this Award helps the client and its provider(s) to develop and reflect on the **impact and value** of their L&D initiative and the contribution it has made to the client organisation.

*"The whole process allowed us to build up trust and commitment with our corporate partner, which form a great foundation for future projects."* (EiP participant 2016).

**Next submission deadline: 20 March 2017**

[www.efmd.org/eip](http://www.efmd.org/eip)



**VIRTUAL INCUBATION MODELS:  
THE OUTCOMES OF THE NETMIB WORKSHOP ARE AVAILABLE**

On 31 January 2017, 4-6 pm CET, in Rome at the Link Campus University, the NEWMIB partners (<http://www.netmib.eu/>) presented the preliminary results of the project to a group of students and stakeholders both attending on-site and in remote via Web-streaming.

**Presenters:**

University of Pécs (Leading Partner)  
 Fondazione COTEC (Event Hosting Partner)  
 North Carolina State University, US  
 Science and Technology Park of Jaume I University ESPAITEC, ES  
 South East European Research Centre – SEERC, GR  
 University of Tampere, FI  
 Professor Riccardo Viale, Fondazione COTEC

**Agenda**

Time	Presenter	Topic/Title
16:00-16:10	Riccardo Viale Fondazione COTEC	Opening and introduction of the project.
16:10-16:25	Zsolt Bedo, UP	The Hungarian practice: lessons learnt from Ohio-US and Victoria-Canada cases. Focus on ideation.
16:25-16:40	Kari Lohivesi, UTA	“Entrepreneurship education in Tampere, Finland and using Flipped classroom method in Business models course.”
16:40-16:55	Pavlov Gkasis, SEERC	Best Practices and hints from Greece
16:55-17:10	Juan A. Bertolin,, Espaitec	How Spanish Universities are dealing with Entrepreneurship Education and its Third Mission
17:10-17:25	Elaine Rideout, NCSU	Best Practices in US University Entrepreneurship Education
17:25-17:45	Q&A	
17:45	Event closing Fondazione COTEC	

The slides presented are available at: [www.triplehelixassociation.org/th-repository/educational-resources/netmib-virtual-incubation-dissemination-event](http://www.triplehelixassociation.org/th-repository/educational-resources/netmib-virtual-incubation-dissemination-event)

**2017 EFMD EXECUTIVE DEVELOPMENT CONFERENCE, MILAN, ITALY**

Technology has changed the way we work and learn. Companies and executive development providers alike are faced with digital transformation, bringing with it opportunities but also challenges.

The EFMD’s 2017 Executive Development Conference will take place on 18-20 October 2017 at the Politecnico di Milano School of Management (MIP) in partnership with IBM.

**Register Now** You will have the opportunity to:

- Learn about emerging technologies and top trends in the industry
- Discuss the impact of digital transformation on the future of learning in executive education
- Explore specific examples of technology that can be useful for executive education professional
- Discuss companies’ expectations towards business schools in preparing executives for digital transformation

Share your knowledge and experience and exchange ideas with over 100 delegates from executive development companies, alternative providers and business schools.



## CALL FOR PAPERS

### 2017 Triple Helix International Conference - CALL FOR PAPERS



#### *The Fourth Industrial Revolution, Design Thinking, and the Triple Helix*

Daegu, Republic of Korea

Thursday 14 September ~ Saturday 16 September 2017

Organized by the Triple Helix Association

Hosted by 2017 Triple Helix International Conference Organizing Committee

Sponsored by Daegu Metropolitan City

[www.triplehelix-korea.org](http://www.triplehelix-korea.org)

#### IMPORTANT DATES

**Abstract Submission 1 May 1 2017**

**Decision Notification 30 June 2017**

#### REGISTRATION

**Early registration 5/15~6/30**

**Regular registration 7/1~8/30**

**On-site registration After 8/30**

Beginning in 1996 as a small workshop of scholars, experts, and policymakers interested in the dynamic relations of universities, government, and industries in the ecosystem of innovation, the International Triple Helix Conference has grown into a major venue of discussion, research, and policy development for the roles of tripartite innovation agents.

The 2017 conference will be held in the City of Daegu, fourth largest city in the Republic of Korea, accessible in two hours from Seoul by fast train. Well-known for the key industries that led South Korea's fast-track industrialization such as textiles and electronics, it has been re-emerged as a city of high-tech driven culture and innovation including fashion and medical tourism.

The conference touches on the so-called Fourth Industrial Revolution (4IR) driving up-to-date innovation at the techno-human interfaces, examining the Triple Helix institutions are adapting themselves to these new challenges.

Surrounded by technologies effacing techno-human boundaries such as artificial intelligence (AI), robotics, virtual/augmented reality (AR/VR), drones, and the Internet of Things (IoT), we are witnessing an unprecedented surge of Fourth Industrial Revolution (4IR). These 4IR technologies and various technical, industrial, and social innovations neatly called the changes induced by them are increasingly casting doubt on the adaptive capacity of individuals and institutions with the threats to human identity, social stability, and economic security. When machines replace not only repetitive labor but advanced intellectual work, what is left for humans? How can existing institutions of the Triple Helix tackle techno-human challenges? We invite the Triple Helix community to rethink the role of the government, industry, and universities in the era of the Fourth Industrial Revolution.

We welcome papers addressing but not limited to the following topics: (i) policies and programs for 4IR technology development and management in Triple Helix institutions, (ii) modes of solutions or alternative approaches to innovation in the face of blurring techno-human interfaces (design thinking), (iii) risk governance for 4IR technologies in Triple Helix institutions, and (v) measurement of 4IR-driven entrepreneurship of Triple Helix actors.

In addition to thematic sessions, we invite papers to regular sessions within the traditional scope of Triple Helix research. Papers are considered in two formats: classical scientific papers and case reports/studies. Please submit an abstract of 2,000 words for the former, and an abstract of 700 words for the latter, **by Monday 1 May 2017.**

Detailed information on the registration schedule and fees are available on the registration site.

#### CONFERENCE SESSIONS

##### Thematic Sessions

- Innovation and Design Thinking in the Age of the 4<sup>th</sup> Industrial Revolution
- University-Industrial Collaboration for the 4<sup>th</sup> Industrial Revolution
- Managing Technical and Social Risks of 4<sup>th</sup> Industrial Revolution Technologies
- Technology Foresight in the 4<sup>th</sup> Industrial Revolution

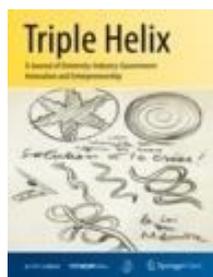
##### Regular Sessions

- Entrepreneurial University and Its Impacts
- Science Parks, Incubators, and Innovators
- Regional Dimensions of the Triple Helix Model
- Triple Helix in Developing Countries
- Triple Helix and Knowledge Creation
- Triple Helix and Socially Responsible Innovation
- Triple Helix, Diversity, and Creativity
- New Tools and Models for Knowledge Transfer
- Measuring the Strength of the Triple Helix
- New Roles of Government in the Triple Helix
- The Global Entrepreneurial University Metrics Initiative (GEUM)

#### CONTACT

Please send your abstract to [triplehelix.korea@gmail.com](mailto:triplehelix.korea@gmail.com).

Please contact [triplehelix.korea@gmail.com](mailto:triplehelix.korea@gmail.com) for any inquiry



## TRIPLE HELIX JOURNAL

Triple Helix, the Official Journal of the Triple Helix Association, is Triple Open access: \* Open to diverse innovation perspectives, \* Free to authors, \* Free to readers. Make your work freely available online and accessible to a global readership in English with abstracts also provided in Chinese, French, Russian, Spanish, Portuguese, and Arabic ([www.springer.com/economics/r+%26+d/journal/40604](http://www.springer.com/economics/r+%26+d/journal/40604)).

### CALL FOR PAPERS

The Triple Helix of university-industry-government relations is an internationally recognized model for understanding cross-sphere entrepreneurship and the changing dynamics of universities (especially the advent of entrepreneurial universities), innovation and socio-economic development. The contemporary era of knowledge economy demands further enhancement of the Triple Helix of university-industry-government relations (Etzkowitz and Leydesdorff 1995) within innovation systems at various dimensions, such as National Innovation Systems and Sectoral Innovation Systems. Among various actors, universities, industries, and governmental agencies can be considered as the three most crucial, becoming increasingly interconnected in innovative activities, which lead to the formation of Triple Helix relations (Etzkowitz and Leydesdorff 1997). Therefore, the Triple Helix of university-industry-government relations has naturally become the de facto core subsystem of an innovation system.

#### This article collection focuses on the following questions:

- How the Triple Helix model can help solve social, economic, and even political problems at various levels in case studies?
- What kind of indicators should be adopted for measuring Triple Helix synergies?
- How to measure Triple Helix synergies in countries/territories' innovation system?
- What are the important concerns in measuring Triple Helix synergies and innovations through Scientometric, Technometric, Informetric, Webometric, and Altmetric Data?
- How has Open Data been applied to facilitate Triple Helix synergies or innovations?
- What are the identified barriers to facilitate Triple Helix synergies or innovations?
- What are the ways to strengthen and improve the communicative relationships among entities of the Triple Helix to maximize the synergies?
- How can the information flow of institutions of Triple Helix be measured to assess the effectiveness of collaboration?
- What are the ways to measure the effectiveness of data exchange between cross-sector institutions?
- How can cross-sector collaboration be measured?
- What are the best ways to share ongoing Triple Helix projects and successful cases in a global scale to collectively enhance the Triple Helix agenda?

We would like to invite you to address these questions or pose your own. An ideal article combines the theoretical, empirical, and policy elements, although the balance may differ. We are also open to non-conference submissions to the special issue. However, the priority will be given to papers presented at its associated seminars.

**Abstract submission** Authors should submit their abstracts directly to the guest editors by 30 June 2017.  
**Full paper submission** Full papers should be submitted using the submission instructions below by 31 December 2017.

**Lead Guest Editor** Professor Han Woo Park, YeungNam University, South Korea  
**Guest Editors** Dr Jiang Li, Zhejiang University, China, and Miyoung Chong, University of North Texas, USA

**Submission instructions:** Before submitting your manuscript, please ensure you have carefully read the Instructions for Authors for *Triple Helix*. The complete manuscript should be submitted through the *Triple Helix* submission system. To ensure that you submit to the correct article collection, please select the appropriate section in the drop-down menu upon submission. In addition, indicate in your cover letter that you wish your manuscript to be considered as part of the article collection on 'Measuring Triple Helix Synergies and Innovations using Scientometric, Technometric, Informetric, Webometric, and Altmetric Data'. All submissions will undergo rigorous peer review and accepted articles will be published within the journal as a collection.

**Additional information:** Submissions will also benefit from the usual advantages of open access publication:

- Rapid publication: online submission, electronic peer review and production, make the process of publishing your article simple and efficient.
- High visibility and international readership in your field: open access publication ensures high visibility and maximum exposure for your work - anyone with online access can read your article.
- No space constraints: publishing online means unlimited space for figures, extensive data and video footage.
- Authors retain copyright, licensing the article under a Creative Commons license: articles can be freely redistributed and reused as long as the article is correctly attributed.
- For editorial enquiries please contact [triplehelixjournal@springeropen.com](mailto:triplehelixjournal@springeropen.com).

Sign up for alerts to keep updated on articles published in *Triple Helix* - including articles published in this article collection!

The CfP can be reached at: <http://triplehelixjournal.springeropen.com/synergies-and-innovations>.

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## TRIPLE HELIX JOURNAL

### SPECIAL ISSUES

Several Special issues are underway, and the calls for papers will be shortly announced.

If you are interested in proposing a special issue, we invite you to consult the Guidelines for Guest Editors of Topical Article Collections at [www.triplehelixassociation.org/triple-helix-journal](http://www.triplehelixassociation.org/triple-helix-journal).

Please send your proposal to the THJournal Managing Editor (Anne Rocha Perazzo, [rochaperazzo.anne@gmail.com](mailto:rochaperazzo.anne@gmail.com)).

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## HÉLICE MAGAZINE

This is a reminder that the closing date for papers to be published in the **June/Summer issue** of the THA Hélice Magazine is **28 May 2017**.

We are inviting practitioners and scholars to submit papers, articles, or essays, providing a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of any or all aspects of the interaction between academy-industry-government (Triple Helix) for fostering research, innovation, economic competitiveness, sustainability and growth.

Articles should adhere to the following requirements: 2500-3000 words, in MSWord, and can include figures/tables/images. Submissions should be made by email to the Editor in Chief at [devrimgoktepe@gmail.com](mailto:devrimgoktepe@gmail.com), and the Managing Editor at [sheila.forbes@strath.ac.uk](mailto:sheila.forbes@strath.ac.uk).

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### And Finally . . . .

We are looking for iconic representations for the cover of Hélice.

Readers are invited to contribute relevant photographs, sketches, and drawings that reflect the spirit and substance of the 'Helix' concept.

Please send these to:

Sheila Forbes  
Managing Editor  
[sheila.forbes@strath.ac.uk](mailto:sheila.forbes@strath.ac.uk)

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