THE TRIPLE HELIX ASSOCIATION MAGAZINE

www.triplehelixassociation.org

Hélice

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EDITORIAL WELCOME

SPRING GREETINGS

Welcome to a special double issue of Hélice: the Triple Helix Association Magazine. We now present volume 2(4) 2013, and volume 3(1) of 2014.

This combined issue addresses the Triple Helix Framework in a context of global change, whether continuing, mutating, or unraveling, as it was presented and discussed at the Triple Helix 11th international conference on 8-10 July 2013 in London, UK.

The 2013 conference was organised by the Big Innovation Centre, Birkbeck, University of London and UCL Advances, and UCL University of London. It was held in historic Bloomsbury at Birkbeck, UCL, and Senate House, University of London. The conference organizers and hosts have earned special thanks.

The event integrated highly topical contributions from world-class academics and researchers, with business and policy forums to address the key question: 'How can the Triple Helix approach build 'the enterprising state' in which universities, businesses, and governments co-innovate to solve global economic, social, and technological challenges?

The answer to this question, the context of the conference, as well as short introductions to the sub-themes and papers, are found in the conference summary by two of the organizers - Birgitte Andersen and Will Hutton from the Big Innovation Centre. Helen Lawrence, the Conference Manager, was a great host and has provided an overview of the social events and the technical visits. For the first time, evaluation forms were distributed to delegates, and the responses have been summarized and are included in this issue.

There were many interesting papers and discussions that became instrumental in the fulfillment of the purpose of the conference theme, as well as in the development of new research questions. For this combined special issue, we have compiled papers from various countries, representing the application and utilization of Triple Helix framework in pursing different theoretical and empirical questions. The variety of themes and cases show the interest in Triple Helix concept is still integral in innovation research all round the world among scholars, policy-makers, as well as practitioners. Featured papers include: The contribution of venture capital to innovation (Matteo Rossi); Technology-enabled innovation strategy - a practitioner's approach (Antony Hurden, Dave Rimmer); Assessing the impact of university-industry collaborations: a multi-dimensional approach (Federica Rossi, Ainurul Rosli, Nick Yip, Ewelina Lacka; Unzip the Triple Helix application of regional Triple Helix in Japan (Kazuhiro Nozawa); Exploring the regional Triple Helix through design knowledge exchange (Kathryn Burns); Innovation ambidexterity: addressing gaps in theoretical and empirical interpretations (Olga Fernholz, Mathew Hughes, Robert Dingwall); Understanding university-government interaction from the perspective of academic researchers in the Buffalo Niagara Medical Campus (Sharmistha-Bagci Sen, Changho Lee, Jessie P H Poon)); Renewing the Triple Helix in a context of smart specialisation (Markku Markkula); Examing the use of peer review in the development of regional research and innovation strategies for smart specialisation. (Ruslan Rakhmatullin); and Triple Helix and the city (Christiane Gebhardt, Harald A Mieg).

We also include an interesting President's Column; an invitation to the forthcoming Triple Helix conference in Tomsk in September 2014; a call for papers for the inaugural and special issues of the Triple Helix Journal; THA special events; details of new members; and THA news and announcements.

Articles for Hélice Magazine are always very welcome. They can be papers from Triple Helix conferences, other conferences and workshops, or from local presentations. Should you be interested in editing a special issue of Hélice as a guest editor(s), or organizing a Triple Helix event, we would also be delighted to hear from you. We can be contacted via email at: devrimgoktepe@gmail.com, or sheila.forbes@strath.ac.uk.

We wish you all a pleasant and warm spring!

Devrim Goktepe-Hulten
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XII TRIPLE HELIX CONFERENCE 2014 : TOMSK, SIBERIA, RUSSIA 11-13 SEPTEMBER 2014

The XII Triple Helix International Conference will take place from 11-13 September 2014 in Tomsk, Russia. The Conference is organized by the international Triple Helix Association, TUSUR University, and the Association of Russian Entrepreneurial Universities.

THE TRIPLE HELIX AND INNOVATION-BASED ECONOMIC GROWTH: NEW RRONTIERS AND SOLUTIONS

The Conference is devoted to one of the most important issues that many countries faces - the search for new sources of economic growth, together with creating new workplaces and combating unemployment, productivity and efficiency improving, improving quality of life - all the issues which tackle researchers, analysts, representatives of public sector throughout the world.

CONFERENCE THEMES INCLUDE:

- Role of innovation theory in spurring innovation-based economic growth
- Triple helix for developing countries
- Diffusion of innovations (How does it happen? What new mechanisms and conditions appear?)
- University economic impacts
- The Triple Helix model as the source of new solutions to exit from the economic crises
- Models of entrepreneurial university
- New research funding schemes and outcome of research
- Entrepreneurship as the key element of innovation-based economic growth
- The Triple Helix model and the society
- Building an innovation friendly financial system
- Social entrepreneurship and social capital in the Triple Helix model
- Interaction between universities, industry and small innovation business
- Gender Gap in research and innovation

TRIPLE HELIX XII
INTERNATIONAL CONFERENCE

CONFERENCE FORMAT

Parallel Open Sessions

First of all, researchers and practitioners who have submitted abstracts will give a report and present their experience in the area of interaction between universities, business, and government. The deadline of abstract submission is closed.

Over 100 professors and leading scientists of world universities (including Top-100), representatives of research groups, chiefs of development funds, innovation companies and scientific research centers from thirty-two countries have submitted their abstracts. The next stage will be the evaluation of abstracts by the Conference Scientific Committee. The Chairwoman of the Scientific Committee is Dr Irina G. Dezhina, the Head of the Research Group on Science and Industrial Policy at Skolkovo Institute of Science and Technology, Moscow, Russia.

Panel Discussions

The second key format of the Conference is the panel discussion, where prominent researches from top universities. and practitioners from government and business. will define theoretical and practical contexts and challenges for economic development based on innovation. These will include:

- **Henry Etzkowitz**, the author of the Triple Helix model and Professor at Stanford University;
- **Solomon Darwin**, Executive Director of the Center for Corporate Innovation at the University of California Berkeley;
- **Dr Anttiheikki Helenius**, Visiting Fellow at the European University Institute (Department of Law);
- **Dr Martha Russell**, Executive Director of MediaX at Stanford University;
- **Professor Andrzej H Jasinski**, Head of the Unit for Innovation and Logistics, School of Management at the University of Warsaw;
- **Ilia Dubinsky**, Director of the Center for Entrepreneurship and Innovation, Skolkovo Institute of Science and Technology (Skoltech); and
- **Ruth Graham,** Director of R H Graham Consulting Limited lab and author of Technology Innovation Ecosystem Benchmarking Study (initiated by Skoltech together with MIT)

They have given official agreement to come to Tomsk as speakers in panel discussions. Besides that, there will be representatives of the Russian government, the Russian Ministry of Economic Development, and the Russian Ministry of Education and Research..

Workshops

At present, the following proposals have been submitted:

- **Open innovations: trends, agenda, impact**
  Chair: Tatiana Schofield, the Founder and Managing Director of Synergy Lab, United Kingdom
- **Using data driven network visualizations to create insights for shared vision**
  Chair: Martha Russell, Executive Director of MediaX Research Group, Stanford University, US
- **Entrepreneurial University (MIT/Skoltech report)**
  Chair: Ruth Graham, Director of R H Graham Consulting Limited lab

We also plan to include Workshops devoted to cluster development and innovation districts and social entrepreneurship.

Proposals to hold workshops will be accepted until June 15 2014.

REGISTRATION

THA members could benefit from a special discounted conference registration fee, as follows:

- 20€ discount for THA individual members
- 25€ discount for THA organizational members

In order to obtain the THA membership discount, please contact:

Evgeniy Perevodchikov
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ORGANIZERS

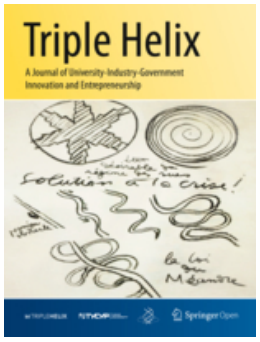
- **Alexander Uvarov**, Chair of the Organizing Committee
  Vice-rector of TUSUR University, Chairman of the Russian Chapter of the Triple Helix Association, Ambassador of the Association to Russia
- **Liana Kobzeva**, Vice-Chair of the Organizing Committee,
  Head of the Center of Strategic Development, TUSUR University

The conference is included in the official annual series of joint events and initiatives to promote EU-Russia cooperation in the field of scientific research, higher education, and innovation. The EU-Russia Year of Science 2014 is held under the auspices of the European Commission and the Ministry of Education and Science of the Russian Federation.

To learn more about the Conference, participants, and themes, and to register to participate in the Conference, please visit the official website:

http://tha2014.org/

CALL FOR PAPERS



Triple Helix

A Journal of University-Industry-Government Innovation and Entrepreneurship
Editor-in-Chief: Henry Etzkowitz
ISSN: 2197-1927 (electronic version)
Journal no.40604

The Triple Helix of university-industry-government relations is an internationally recognized model for understanding entrepreneurship, the changing dynamics of universities, innovation and socio-economic development. The aim of the journal is to publish research for an international audience covering analysis, theory, measurements and empirical enquiry in all aspects of university-industry-government interactions. The objective is to unite key research on the transformations of universities, capitalization of knowledge, translational research, spin-off activities, intellectual property, knowledge and technology transfer, as well as the international bases and dimensions of Triple Helix relations, their impacts, social, economic, political, cultural, health and environmental implications as they arise from and shape Triple Helix interactions. Related subjects: Entrepreneurship -R&D / Technology Policy - Social Sciences.

INAUGURAL ISSUE : INNOVATION'S FUTURE

The 'triple helix' concept was implicit in a movement to address the 1930's depression (Etzkowitz 2012). The great depression of the 1930's created underutilized physical resources in contrast to the contemporary underutilization of intellectual resources. Innovation appears to be stalled in the wake of the 2008 economic downturn. A spectre of obsolescence haunts the innovation system of societies irrespective of national differences, developmental stage or previous success. Hastened by globalization challenges and increased competition, an industrial mode of production has run out of steam in many countries and brought the processes of transition to a knowledge-based society to the forefront of attention, in different guises.

'Open innovation' pervades the US although only a very small proportion of R&D is conducted collaboratively despite the elimination of Anti-Trust restrictions. 'Smart specialization' takes hold in Europe, requiring concentration of resources and focused choices among R&D fields in regional development projects. 'Indigenous innovation' supersedes reliance on foreign technology transfer as China

- What is the way forward in an era of financial stringency?
- What is the future line of development of the National Innovation System concept and its offshoots, the Triple Helix and its variants?
- Is there a changed relationship between human needs and technological opportunities in a knowledge-based society?

You are invited to address these questions or pose your own. An ideal article combines theoretical, empirical and policy elements, although the balance may differ. Contributions to: https://www.editorialmanager.com/trhe/. More information at: journal@triplehelixassociation.org.

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SPECIAL ISSUE : THE SPATIAL DIMENSION OF INNOVATION: TRIPLE HELIX AND THE CITY

Horizon 2020, the next European Framework programme will target technology, regional and urban innovation, and reopen the discussion on the old nexus of innovation and space when addressing the smart city as an integrative concept for interdisciplinary knowledge creation and capacity building.

The world is experimenting with innovation models. China is changing development zones to clusters in order to upgrade the economy, Germany reopens a new discussion on governance in innovation and Africa might benefit from these new approaches to innovation and contribute to the debate in a new way. A pattern connecting these innovation models will have to link technological and social innovation as well as different types of spatial transformations (e.g. urban and regional). Innovation policy faces organizational challenges when embracing the idea of space.

New forms of interaction and governance between innovative industries, intergovernmental policies and universities and other knowledge producing institutions have an impact on the social and physical transformation of cities and metropolitan areas. Synthesizing insights from megacity research, sustainability science, and innovation and cluster policy, the spatial dimension of technological and social innovation will be the focus of this special issue.

The special issue will integrate the current discussion on social and/or technological innovation into the Triple Helix debate, and we welcome papers on 'Triple Helix and the City' focussing on:

- Innovative approaches for managing urban and regional transformation such as smart growth strategies; 'syntegration'; cross-sectoral, transdisciplinary urban transition management.
- Interdisciplinary case studies and best practices in social urban innovation, new innovation models ('post-Baconian'?), and their institutional implications.
- The specific role of global and local finance (for infrastructures, urban and rural transformation, systemic risks…).

Eds: **Dr. Christiane Gebhardt**, Christiane.Gebhardt@t-online.de
Prof Dr Harald A Mieg, harald.mieg@hu-berlin.de

PRESIDENT'S CORNER

THE GOVERNANCE OF SCIENCE, TECHNOLOGY AND INNOVATION POLICY FORECASTING FROM HISTORY[1]

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To find the basis for evidence-based science, technology and innovation policy (Rosenbloom, 2013), I suggest that the best evidence might not necessarily be found at the macro level of bibliometrics and econometrics, nor at the micro level of case studies of the intimate processes in the anthropological studies of laboratories but rather at the meso-level: the organizational and institutional level of interactions especially between university, industry, and government as key players. My thesis about science policy is that if you find the right case even if it is only a single case, but if it has potential for generalizability, looking into the past can give you a window on the future.

And so it was in the President's Papers at MIT that I read letters and communications from President Compton to the leaders of an organization that had been established in the 1920s by the governors of the six New England States that called together the leadership of the region. Instead of being the usual public-private partnership of business leaders and government leaders, this was New England where universities are such an important part of the institutional landscape that they could not help but also invite the academic leadership. And so it was in this unique situation, the only place in the country that had this high concentration of academic leadership, that they called together these three parties, and so instead of coming up with the usual policies and programs, they were open to innovation through adding this third element of academia. They first considered the conventional ideas of trying to attract branch plants, centre delegation to Detroit to invite an automobile company to open up in New England. Of course, they were laughed at; New England was too far from lines from distribution raw materials.

Then, the next idea with which we are still familiar with today, raise the level of the local small and medium-sized firms, but in this case, the analysis showed that these firms were too far behind making things out of a whalebone in the plastics era. So in this situation, they were open to new ideas from a respected person from the region, the President of MIT, who had just come back from Washington where he had been the chair of President Roosevelt's Scientific Advisory Commission. In this commission, he had proposed that the way out of the depression was to establish a new form of science-based economic development, based on the experience that was already present at MIT and Harvard from the early twentieth century, founding new firms based on scientific research, first in scientific instruments in the turn of the century; then in the radio industry in the 1920s (Etzkowitz, 2002).

Similar developments were going on in Japan during this same era here at the University of Tokyo, such as the importation of Scottish engineers to develop the capabilities, to develop new products within the university, that were then transferred to industry with government support. These ideas that I am going to talk about are deep in Japanese academic history as well, but many have been lost or put aside because these links were often broken for political reasons because it was also these links that were involved in preparing the military for the Second World War. These strong links were broken after the war and things receded to a more modest level of relationship between professors and their former students in industry.

President Compton's ideas were rejected at the national level. At that time in the 1930s, it was thought too much science and technology was the problem, too many labor-saving devices, and so the report was never issued; it's still somewhere deep in the National Academy of Science Archives. When they finish renovating the building, I'll be able to see directly, but indirectly I saw the book that he never finished in the MIT archives describing his experiences.

When he came back to New England, he participated as the President of MIT in the deliberations of the New England Council, and there he proposed the idea of science-based economic development, and he made an analysis of the strengths and weaknesses of the region. Today, we would call it a SWOT analysis. They had the academic resources in the universities. They

[1] Excerpt from Keynote Address to SciREX International Symposium, University of Tokyo, 2 October, 2013 *stig.jp/**scirex**2013/english.html*

have risk capital that could help start new enterprises. They did not have a source of advice to help start those firms. Only a very few professors would have the ability to do it on their own.

From this analysis of the strengths and the weaknesses of the region, they invented a new type of organization to fill the gap. Notice that it was on the basis of this analysis among the three parties and then the organization they formed immediately after the Second World War, the American Research and Development (ARD) Corporation as a public corporation, a *pro bono* organization for regional development. Graduates of MIT would go around and scout the laboratories for potential technology that could be commercialized. Graduates of the Harvard Business School would provide the business advice to these new firms, and a long-term organization to follow through. It took more than a decade before they found the first technology with large-scale potential.

This was the minicomputer that was actually a derivative of a World War II research project to build aircraft simulator. What was realized was that they had in fact invented a form of computer, and it was this computer that was commercialized through the formation of the Digital Equipment Corporation in the 1950s, that became the basis of the minicomputer industry in Massachusetts now disappeared. What was left behind was an organizational infrastructure, a venture capital industry and a panoply of state government programs that has to support the development of new businesses, an infrastructure that then was available to start the next science-based industry when the developments in biotechnology were available, and that is what is now the mainstay of Boston.

If we want to know the reality of what is happening in university-industry-government relations, we must do it through case studies. For example, we studied the Shakespeare Festival in Ashland, Oregon, started by a drama teacher in the 1930s, who wanted to put on plays but the university didn't have the resources, and he got support from the town, business, and government leadership. At various times in the more than seventy-year history, there was support from the state level, even from the federal level, which had totally changed the economy of this town from resource extraction to being a cultural leader. Europe can learn from this that it needs to have a broader base for culture than simply what can be supplied by the national government to support the regional Italian opera houses, for example.

This model shows when you have this broad-based support from the municipality, from the state government, from the ticket purchases and others, you create a cultural complex, a theater complex, which then led to broader arts and other initiatives transforming the economy of what I call a local innovation system, because it's not so broad as even to cover the region because the next town has a different economy, and so it's a local innovation system that was transformed (Etzkowitz, 2013).

But what happened in Ashland, Oregon, provides a model that can be learnt from, especially if you compare to less successful cases. It so happens that at Stanford in 1935, a professor in the English department also started a Shakespeare festival but two years later, the dean of humanities said, "This is not appropriate for a university to be providing public entertainment," he closed it down. She wasn't embedded in the town to find other sources of support the way the drama teacher was a member of this local business and professional persons organizations and could acquire the support and then build upon; and she later joined that festival and became active in it providing academic leadership to it. And so we can see from the analysis of cases, what are the elements that can be put together in a more organized way to create Triple Helix collaborations from a policy standpoint as well as to analyze what happens bottom up.

Again, we can see this not as a linear process, you don't necessarily have to go from a teaching university to research university and then to being an entrepreneurial university. The Ashland case showed a small teaching college starting this entrepreneurial activity in the culture area and later on, much later on, develops some elements of research.

Stanford, the most successful entrepreneurial university, can be examined as an instance of under-performance. I did a participant observation study in '04, '05 of the Office of Technology Licensing (OTL) at Stanford. When I finished the study, I was asked by the director to give a talk about my findings. And I told them from my research, the case studies I did. "You guys are doing great. You make more money each year. You are the world's leading technology transfer office, but," I said, "You are operating at only a very small percentage of your potential". My analysis of the cases that I was asked to study, interdisciplinary cases, was that they only happened for very idiosyncratic reasons. Stanford was relying for its success on a very small group of faculty members who were serial entrepreneurs who had the experience, the links to venture capital firms to form firms again and again. But most of the faculty members were people who didn't have this experience. They often had good ideas but the OTL would say to them, "Ah, you're in Silicon Valley. We'll introduce you to a venture capitalist, you take it from there." Well, that wasn't enough. These people didn't know what to do with the introduction. What they needed was an organization like the original ARD that provided the business advice from the Harvard students and did the scouting to help them realize the commercial potential of their invention. That was lacking at Stanford.

I brought this to the attention of the leadership of the university, the Dean of Research who said, "We don't pay attention to OTL; it's so successful. Why would we bother with them?" Basically, he said, "If it's not broken, don't fix it." I say if it's working well, make it better, but I couldn't prove this and so I didn't publish the paper at that time. The paper will only come out at the end of this year in a special issue of Social Science Information on 'Silicon Valley: Global Model or Unique Anomaly' (Etzkowitz, 2013a). I couldn't prove the hypothesis until students at Stanford, who had difficulty in forming their firms, investigated the issue through a student government project and organized an accelerator project, StartX. StartX then started bringing out a dozen firms each academic quarter that were already going on in the research groups, but now they were given the final push to take them out of the university. There's still a gap in the StartX project. Stanford has no "wet lab" incubator that now the University of California, San Francisco does and so the biotech firms are coming out. They still come out at

Stanford, but they have great difficulties because the university provides no assistance, so I helped the students prepare for a meeting with the president of the university, and he argued the same as OTL was telling their earlier generations. "You are in Silicon Valley. The resources are there. Go out and find them." After some minutes of discussion, he finally accepted that there were difficulties that the university could help with and he promised to look into it.

Well, we don't yet have an answer as to whether Stanford will start a "wet lab" incubator but just the other day, it was announced that Stanford will offer investments in the firms started by the StartX project. Stanford will put money into those firms and of course take equity. The university recognizes the nature of the process but what is happening is that a larger percentage of students, it's now 7% of the students apply to the StartX project and basically take leave or absence from their studies, and some come back but others don't come back.

In the near future, if Stanford does not incorporate what's happening in the StartX incubator into its educational process, it will start seeing a drop in its graduation rate of PhDs because some years ago, you could tell the PhD that, oh, they get a job after graduation, but now its well known that your chances of getting an academic job is 15% at best. So the PhD students know that if they have a good technology and they can transform it into a firm, that's their best chance for a future job, whether or not they complete the PhD.

In the meeting with the students, some would say to me, "The University of California at Berkeley, they will offer a three-year leave of absence. Stanford only gives us a two-year leave of absence." I say to them, "There should be no leave of absence." The process of forming your firm should be included in the PhD degree, and an entrepreneurial university PhD should consist of not the current international model of three published papers, but two published papers and the third element, a line of work carried forward to the implementation process. This should be the third element of an entrepreneurial university PhD.

My thesis is to do case studies, find out what are the interesting developments going on at present and in your history that have potential for generalizability. One case study can provide the answer to what you are looking for that you may not find either at the level of broad statistics or microanalysis (Etzkowitz, 2013b).

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SPECIAL REPORT : TRIPLE HELIX 11 CONFERENCE, LONDON : 8/10 JULY 2013

UNIVERSITY, BUSINESS, AND GOVERNMENT MUST BECOME CO-PLAYERS, CO-CREATORS AND CO-CATALYSTS IN BOOSTING INNOVATION AND GROWTH IN THE GLOBAL ECONOMY

BIRGITTE ANDERSEN AND WILL HUTTON

Professor Birgitte Andersen
Director, The Big Innovation Centre
Professor in Business Innovation, Lancaster University

Will Hutton
Chair, The Big Innovation Centre
Principal of Hertford College, University of Oxford

1. BRINGING BUSINESSES, UNIVERSITIES AND GOVERNMENTS TOGETHER TO CO-INNOVATE AND SOLVE ECONOMIC, SOCIAL AND TECHNOLOGICAL CHALLENGES

The Triple Helix conceives the three way relationship between universities, government, and business as fundamental to the growth and innovation process. This is now a well-established proposition. The open questions are how: in particular what defines an entrepreneurial university, and what are the processes in which the best linkages with business and government can be made? The Triple Helix conference in London 2013 sought to take the debate forward, while strongly adhering to the basic proposition, in a number of ways. We wanted to:

- Focus on the people and stakeholders within 'university-business-government institutions', and what are the worldwide lessons for the best way of fashioning inter-relationships which necessarily require a deep commitment to partnership and co-creation;
- Research the mechanisms which underpin the dynamics between the people acting as co-players, co-creators, and co-catalysts;
- In consequence, try to identify the Triple Helix's best contribution to solving the global economic crises.

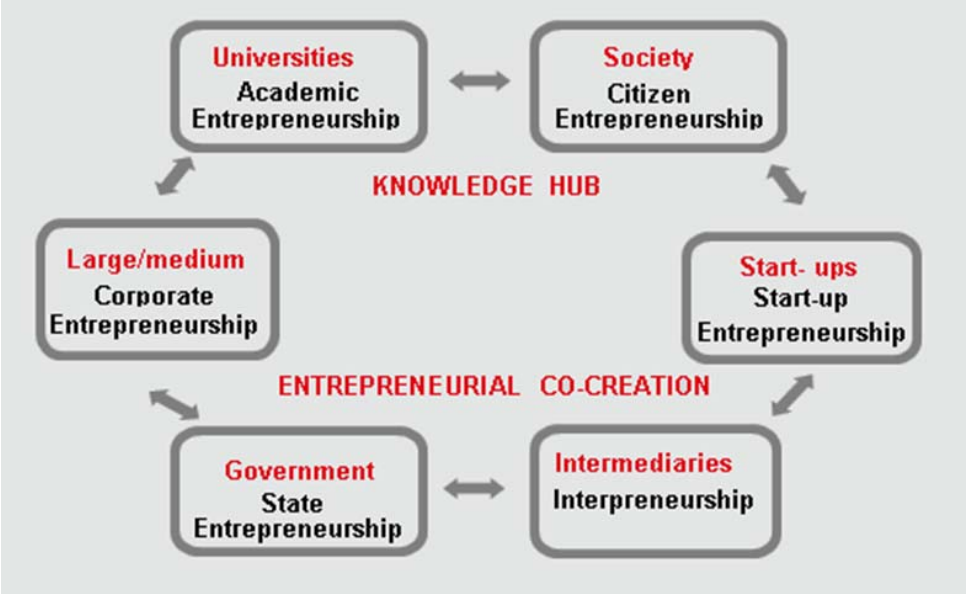
http://tha2013.org/index.php/tha/2013
Never has the Triple Helix mission been more timely. Globally the economy faces significant challenges - unemployment, low or no growth, spiralling healthcare needs, rapidly emerging digital business models, unsustainable changes to the environment. The need for universities and businesses to work together and take action alongside governments is critical. The 2013 Triple Helix conference will integrate highly topical contributions on challenges in each of the three spheres of the triple helix - universities, industry, and government - to address the key question:

How can the Triple Helix approach build the enterprising state in which universities, businesses, and governments, co-innovate to solve the global economic challenges?

This was the question asked to all the 350 delegates from thirty-five nations at the 2013 Triple Helix international conference in London, UK. Our response had to be smart, radical, and above all innovative, imposing a new urgency on universities, businesses, and government, to work together in a clear-eyed and decisive way.

Thus, while the Triple Helix concept was celebrated, the London conference also debated and challenged. We broadened the perspective from the *'entrepreneurial university'* to *'open innovation entrepreneurial ecosystems'* (see Figure 1) of universities, businesses, local and national government, SMEs, intellectual property service providers, financial institutions, and the citizens.

Figure 1: From the 'entrepreneurial university' to 'open innovation entrepreneurial ecosystems'



Muthu de Silva (2014), Concept note for the Big Innovation Centre Knowledge Hub on Entrepreneurial Co-creation

A central contribution from the conference was to link the triple helix concept to economic growth. Here we addressed the need for close collaboration and co-creation by all stakeholders around a 'challenge-led' growth approach. For this, university governance, businesses, and policies, have to be more effective in bringing innovations to market to solve the present economic, technological, and societal challenges such as green energy, health or crime. Stakeholders clearly include the Triple Helix actors, but they also include citizens and other intermediate organisations, which are all engaging with each other through multiple channels and pooling their internal resources through open innovation; including knowledge, finance, people, markets, and data.

This approach to open innovation is more than simply sharing risk and reward; it encapsulates the integration of the entire innovation ecosystem, and is about co-innovating new markets and more effective business models, integrating supply chains which would not exist otherwise. This ecosystem version of the open innovation concept is broader than that coined by Henry Chesbrough, arguing that firms can and should use external ideas as well as internal ideas - and internal and external paths to market - to advance their technology.


Solomon Darwin, Deputy Director of the Centre for Open Innovation at Berkeley, University of California

This led to a healthy discussion between Will Hutton and Birgitte Andersen (Chair and Director respectively of the Big Innovation Centre), who advocate the challenge-led ecosystem approach to open innovation; Solomon Darwin (Deputy Director of the Centre for Open Innovation at Berkeley, University of California, where the Chesbrough approach to open innovation was coined); and Henry Etzkowitz, who founded the Triple Helix approach.

2. HIGHLIGHTS

As mentioned in the Andersen and Hutton (2013)[1] provocation for the 2013 conference, the urgency of dealing with the global crises is clear. How do we create sustainable growth given the vast overhang of public and private debt in most countries of the world, and how do we do this given the transformational impact of disruptive technologies on traditional models for business and public sector organisations, and universities? Europe, Asia, America, and Africa, all face similar challenges.

But what does good look like? We must develop intelligence and monitoring systems which capture how well our organisations, institutions, and regions, attune to the entrepreneurial ecosystem needs, and translate their findings into performance metrics or diagnostic tools of key performance indicators.

The economy in times of crisis must build and grow innovative markets, places, and networks. There are challenges to competiveness, to industrial organisation, to demand, to business

[1]Andersen and Hutton (2013). Raising the potential of the Triple Helix. Co-innovation to drive the World Forward. Hélice, vol 2, Issue 3, 4-6.

models, and to social entrepreneurship. The workshop *'Super-charging the Triple Helix: Smart Specialisation as game changer'* organised by the European Commission, argued how our competition policy frameworks should allow for stimulating the development and growth (or scaling-up) of prospective, infant industries, something common to Asia and especially Korea. The European workshops argued that now that the EC has embraced smart specialisation as a policy concept, it should implement a tangible and real 'smart specialisation' strategy framework in order to operationalise and to capture pan-European, cross-border specialisation and collaboration opportunities.

The plenary on *'The Triple Helix, Universities and Health'* debated how we must stimulate and support user-driven innovation by translating and connecting major societal challenges into market opportunities using a shared value innovation model, in which user-citizens are empowered as co-players. This means embracing open innovation approaches through a Quadruple Helix - citizens being the fourth strand.

The workshop *'Empowering the users of university generated knowledge'*, organised by the Big Innovation Centre in collaboration with the UK Intellectual Property Office, on the role of universities as co-creators and as interactive partners in innovation systems challenged businesses' and universities' co-creation capabilities. The enhancement of the skills for open innovation across the industry-science spectrum was emphasized. This involves challenges to the management, leadership and incentives.

In particular, we need to empower and link people, facilitate skill development, and reward them for their engagements. For instance, it is very important that universities empower academics (beyond university bureaucracies and rigid career structures with narrow key performance indicators), so that they can interact closely with businesses and are rewarded for their engagements. The digital revolution has enabled people to link and work closely together. The focus could be on creating incentives for scientists and early career academics to engage in co-creation processes with the users of the knowledge they generate. Schemes for universities could focus on incentives for incubation and spin-offs, as well as incentives to build appropriate infrastructures that ensure co-creation between research institutions and their users. This includes the development of physical infrastructures (eg. joint research labs, technological platforms that link people, big data platforms, open innovation hubs and accelerators) and other institutional infrastructures, such as university-industry placements.

Several parallel sessions (such as *'Inducing innovation through IP management'* and *'Inter-organizational knowledge flow'*) illustrated the need for an international high quality, informed, flexible, and influential IP and Big Data policy which open up the users of knowledge, ideas and data (public as well as business data). Such a sharing revolution could make nations more attractive places for creators and users of IP, including boosting entrepreneurship for new growth. Although the innovation policy in the 1990s-2000s mainly aimed to boost the role of 'hard' IP (incentivising the acquisition of as many patents as possible), it is now clear that many interactions do not involve any IP rights, or those that do, tend to use bundles of formal and informal IP. How IP (patents, corporate brands, design rights, trademarks, copyright, secrecy, open source, publications, restricted access, division of duties, loyalty, fast innovation cycles, complex product systems, etc) can best be managed to drive innovation, competitiveness, financial reward, and market positioning is critical. This includes how it is best managed in an entrepreneurial ecosystem. Development of the open innovation skills to understand how to strategically use bundles of formal and informal IP is very important.

As noted in the parallel session on *'Finance and Triple Helix model: catalysing Triple Helix interactions through public finance'*, the value of intangible assets needs to be recognised. Intangible assets and intellectual property are vital for business innovation and growth. IP rich companies are more likely to succeed, but they fail to access the necessary growth funding. The financial systems neglect the role of intangible assets and intellectual property in high growth firms. Also, our financial ecosystem does not leverage the role of networks in finance ecosystems. Often SMEs are forced to sell off too much equity too soon in their career, or face corporate failure - a point made forcefully by our co-hosts University College London (UCL) and Birkbeck: a statement made at the conference opening *'The Triple Helix and the state of play'* by David Latchman, Master of Birkbeck, and by Steven Caddick, UCL Vice-Provost Enterprise, in the plenary on industry and green growth, see below. Early stage equity finance is leading to short-termism and a strategy towards early exit from the market as opposed to investing in growth. We urgently need to de-risk entrepreneurial finance for innovative companies and create entrepreneurial finance hubs supporting regions and markets.

One solution is to find ways to value and present intangible assets to support investment cases (ie. finance that backs IP), and we need to boost the flow of long-term finance in our innovation ecosystem. The plenary on *'The Triple Helix, Industry and Green Growth'* debated how regions must build more innovation-friendly and networked financial instruments and institutions to support entrepreneurship. In particular, regions must create a smart funding ecosystem in which challenge-led open innovation can thrive around solving real life problems, including their own. This includes the development of entrepreneurial finance hubs (of start-ups, SMEs, large firms, universities, venture capitalists and business angels, banks, crowd-sourcing and alternative finance) that foster collaborative investments for both short-term and long-term finance and the funding gaps in between.

3. The Triple Helix in a context of Global Change: Continuing, Mutating or Unravelling?

The Triple Helix approach must be more daring and more effective in bringing innovations into the markets to solve the present economic and societal challenges. The London Conference sought to trigger this discussion - and to do so openly.

The conference focused on the role played by the actors or stakeholders to understand the interplay between their organisations, emphasising an open innovation mindset as the key for actors in the university-business-government collaboration to be unleashing growth. How organisations - or people within them to be precise - absorb each other's ideas, needs, and propositions,

and then co-shape actions is key to the co-creation process. It is evident that this engenders a paradigm shift in policy from innovation institutions to innovation as a process (see Figure 2). The university-business-government Triple Helix proposition remains the conceptual anchor - but it must keep up and transmute as business models change. Or at the very least debate why it might not want to change!

The international evidence is unambiguous. Successful clusters of firms grow in self-consciously designed ecosystems in which there are 'thick' relationship networks between economic anchor institutions - from banks to universities - with both high absorptive capacity to the external and the new, and who actively seek to promote creative external relationships. This is the mechanism through which opportunities can be seized and the many risks associated with investment and innovation at the knowledge frontier mitigated.

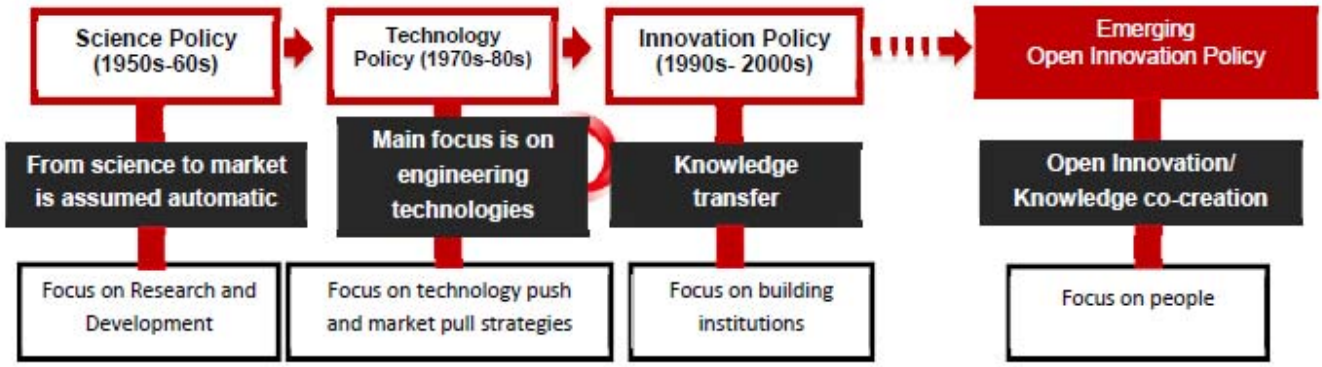
In the plenary on *'The Triple Helix, government, and innovation policy'* with UK Science Minister, Rt Hon David Willetts; Artyom Shadrin, Director, Department of Innovative Development Ministry of Economic Development of the Russian Federation; and Dr Dimitri Corpakis, Head of Regional Dimension of Innovation, European Commission, we picked up on the discussion of how government policy has evolved from the linear model of science policy in the 1950s-1960s (ie. a research-driven approach), which primarily focused on supporting the basic research base, to technology policy in the 1970s and 1980s with clear utilitarian - often engineering - perspectives (ie. technology push and market pull approaches).

More recently, innovation policy in the 1990s-2000s incorporated a knowledge transfer mission through building institutions, eg. technology transfer offices in universities and tighter intellectual property (IP) enforcement. It looks as though a new open innovation ecosystem landscape is emerging, with a major focus on people within the organisations co-creating solutions to their own as well as socio-economic challenges within an open innovation infrastructure.

Rt Hon David Willetts, UK Science Minister

(left) Artyom Shadrin, Director, Department of Innovative Development Ministry of Economic Development

Figure 2: Paradigm shifts in science, technology and innovation policy



- Even though the major focus and activities in each historical epoch of science, technology and innovation policy were different in each era, it should be noted that these are not contrasting shifts from one policy to another, but rather building upon the achievements of one to the other.
- Source: Andersen, B, De Silva, M and Levy C. (2013) Collaborate to innovate: How business can work with universities to generate knowledge and drive innovation, Big Innovation Centre report. Commissioned by the UK Intellectual Property Office.


Plenary Session

All the Triple Helix stakeholders - businesses, universities, public research organisations, financial institutions, citizens, and governments - need to be more open, more networked, more collaborative, and more absorptive of external ideas, while of course accepting the key role of public investment and public agency in driving frontier innovation. This is the challenge for today's Triple Helix in a context of global change. In our view, the concept should be continually in a process of renewal. It should not be left behind as a past paradigm.

Yet despite all this it was disappointing to read in Hélice vol 2, issue 3 (September 2013), that the Triple Helix Association President, Henry Etzkowitz, and guest author, Emanuela Todeva, introduced their 'President's Corner' piece with a statement that "an intellectual opportunity was mostly missed" at the London conference. It is surely in the spirit of innovation that there will, and should be, a plurality of opinion, and that ideas should continually be tested. The TH President and the TH committee, journal editors, and Hélice guest authors, have no option but to sponsor such open, networked and collaborative innovation-led growth on which, in different ways, their own intellectual vitality will increasingly depend.

The organisers of the 2013 Triple Helix conference were:

- ***Professor Birgitte Andersen***
  Director, Big Innovation Centre - The Work Foundation and Lancaster University
- ***Tim Barnes***
  CEO, UCL Advances, University College London
- ***Professor Helen Lawton Smith***
  Director, Centre for Innovation Management Research, Birkbeck, University of London

On behalf of all the organisers, we would like to take this opportunity to thank the Triple Helix network for your active participation which created such a dynamic event, and wish TUSUR University all the best for the 2014 conference in Tomsk, Russia.

All photographs: © Birkbeck Media Services Centre 2013, Photographer: Dominic Mifsud, Birkbeck MSC

2013 Best Student Paper Award

On Tuesday 9 July 2013, at the London Conference Dinner in the splendid Lincoln's Inn, **Rhiannon Pugh**, a PhD candidate from the School of Planning and Geography, Cardiff University, Wales, was presented with the Triple Helix Association Best Student Paper Award by Professor Jose Manoel Carvalho de Mello, Chair of the THA Awards Committee. Rhiannon's winning paper was entitled - *The Good, the Bad, and the Ugly: Triple Helix Policies and Programmes in Wales*, the abstract for which is given below:

This paper examines regional innovation policy from the perspective of the Triple Helix theory of innovation. It utilises this theoretical approach to analyse and evaluate innovation policies and programmes implemented in Wales, a weaker region of the UK. As well as utilising the Triple Helix theory to inform research into the Welsh innovation system, the findings from the Welsh case study are used to interrogate the theory itself and provide some insights as to its applicability in the context of a weaker region. It finds that Triple Helix approaches have featured prominently in Welsh innovation policy and programmes since devolution, with mixed success. Stakeholder evaluations revealed that Triple Helix approaches are generally popular with actors from the university spheres but do not feature highly on the agenda of the Welsh business sphere. We use these empirical findings to question the appropriateness of Triple Helix approaches in weaker region, finding that although they can provide a useful addition to the innovation policy mix it could be unwise for government to focus too heavily on universities as drivers of innovation and economic development at the expense of the business sphere.

The Triple Helix Association offers the Best Student Paper Award to recognize excellence among student participants in the annual conference, and provide them with an opportunity to obtain visibility in the international scientific community and win recognition for their achievements.

A Glimpe of London's History, Geography and Future

Helen Lawrence

London Triple Helix Conference Manager
Big Innovation Centre

As this was the first time the Triple Helix Conference had been held in London, we took the opportunity to give delegates a glimpse of London's history, geography, and future direction. We aimed for a social programme that would provide a taste of London's unique character to first-time visitors, interesting new insights to those who had visited before, and above all, plenty of opportunity to mix with other delegates and build new networks and friendships.

River Thames Boat Trip and Dinner

The birth and rapid growth of London over the centuries is completely interlinked with its location alongside the River Thames. On the opening evening of the conference, delegates were invited to view London through the ages - from the river itself. Starting at the heart of the original City of London, alongside the Tower of London, we embarked for a four-hour cruise along a stretch of the Thames which reflects well how key the river has been to the City's development.

The Dixie Queen, a luxurious replica of a nineteenth century Mississippi Paddleboat, was chartered exclusively for Triple Helix conference delegates. Our cruise departed from the Tower Millennium Pier on the north bank of the Thames and headed east, allowing delegates the dramatic experience of passing under the Tower Bridge as it was opening - the Dixie Queen being one of the few river boats which is too large to pass under the closed bridge. We benefited from a perhaps untypically sunny evening, so as our boat travelled down the River Thames towards the Thames Barrier, delegates walked around the open decks to take in the transition from the historic docklands area, to the towers of the Canary Wharf business district, and on to the O2 Arena, originally built as the Millennium Dome.

This opening to our social programme was designed to let delegates include their friends and family, who brought a note of holiday to the event. With live music from a London jazz band, and an informal buffet dinner, the atmosphere was relaxed, and our very youngest guest was so relaxed he slept through the trip.

Lincoln's Inn Event

London's historic legal quarter was a short walk from the conference venues in the Bloomsbury district, so for the second evening of the conference we arranged for our guest speaker to address delegates against the spectacular backdrop of the Great Hall of Lincoln's Inn. The Honourable Society of Lincoln's Inn is an active society of barristers, judges, and law students, whose members have dined on this site since 1490.

We took advantage of its setting in spacious and beautiful private gardens, and yet another evening of unexpected sunshine, to begin the evening with drinks on the terrace. Inside, waiters circulated to serve dinner in the fashionable 'bowl food' style, allowing delegates to move around, make new contacts, and look around the Hall. Opened by Queen Victoria in 1845, the Great Hall is the largest Hall of any of the Inns and is considered to be one of the most distinguished buildings designed by Philip Hardwick working in the Tudor Revival style. On the North Wall is a huge and magnificent fresco executed by G F Watts, the Pre-Raphaelite painter, showing the world's law givers from Moses to King Edward I.

Within this magnificent setting, Bill Janeway, author of 'Doing Capitalism in the Innovation Economy', gave his personal reflections from a career spanning forty years in venture capital. His talk covered the development of an original theory of the role of asset bubbles in financing technological innovation, and of the critical role of the state in playing an enabling role in the innovation process.

Bill Janeway, Author (Invited Speaker)

A 'Hub in a Day' in London's TechCity

We brought the conference to a close with a glimpse into the dynamic future direction London is taking. TechCity is a technology cluster located in Central and East London with a focus around the Shoreditch area. Google, Cisco, Facebook, Intel, McKinsey and Company, and Vodafone, are among the companies which have invested in the area, but it is mainly known as a vibrant cluster of start-ups and high tech growth. The cluster is often compared to Silicon Valley in the United States, and has become a catalyst for entrepreneurship, innovation, and investment in London, and in the UK as a whole.

We designed an event at Google's 'Campus London' facility to showcase this vibrant spot and, for a brief and intensive period, to bring together the key players in the innovation ecosystem - a 'Hub in a Day'. Members of the start-ups, entrepreneurs, investors, and representatives of incubator and accelerator communities were there, alongside key academics and 'intrapreneurs' based within large businesses.

The first hour of the visit was structured around three-minute presentations from inspirational organisations, showcasing their approach to entrepreneurial success and how to overcome the challenges:

- Welcome from Eze Vidra, Head, Google Campus London
- Tina Phillips, Operations Manager, Tech Hub
- Daniel Hulme, CEO, Satalia
- Denis Anscomb, Commercial Director, Kwickscreen
- Graeme Evans, Professor of Urban Culture and Design, Brunel University
- Lucy Montgomery, Research Director, Knowledge Unlatched
- Luke Ruskino, Founder, iBehave.

The aim was to provide a flexible 'marketplace' for ideas and collaboration, some determined in advance, others decided on the day. So immediately after these 'pitches' the speakers spread around the room to initiate multiple conversations with Triple Helix delegates.

The second hour focused on the support ecosystem that a cluster such as TechCity depends on, again structured around three-minute presentations followed by networking.

- Welcome from Ben Reid, Senior Researcher, Big Innovation Centre
- Andy Sirs-Davies, London Creative and Digital Fusion
- Benjamin Southworth, Deputy Chief Executive, Tech City Investment Organisation
- Dr Maurizio Pilu, Partnerships Director, Connected Digital Economy Catapult
- Caroline Norbury, Chief Executive, Creative England
- Ellie Gilbert, Public Relations Manager, Silicon Valley Bank

The networking aspect to this event attracted others from the one hundred companies based within Campus London to drop by, and so by the end of the Triple Helix Conference 2013, the concept of the Triple Helix approach had spread a little further.

TRIPLE HELIX II / LONDON: SUMMARY EVALUATION REPORT

INTRODUCTION

Following a decision made by the Future Meetings Committee, it was agreed that Triple Helix Annual International Conference delegates would be requested to complete an Evaluation Form to allow feedback to be obtained to improve future Triple Helix meetings.

The aim of the exercise was to receive feedback on:

- The conference program
- The general administration of the conference
- The quality of the conference components
- The value of the sessions available
- The planning of the conference
- The scheduling of future conferences
- General comments.

During the Triple Helix 11th conference held in London, UK, on 8-10 July 2013, evaluation forms were distributed to the attendees. Of the 300 delegates from 35 countries attending the event, 31 submitted a response, 14 of which were anonymous. The majority of respondents had heard about TH-XI from the THA website or by email communication.

This report is a summary of the feedback to each question. Options for scoring were: excellent, good, fair or poor.

CONFERENCE PROGRAM

Q. BASED ON THE SUBJECT MATTER, HOW DO YOU RATE THE OVERALL CONFERENCE PROGRAM?

a.	Quality of the technical content	Good
b.	Effectiveness of the presentations	Good
c.	Peer-to-peer networking opportunities?	Excellent

Although the subject matter scored well, the main criticism was that presentations were far too short, with five papers in eighty minute sessions. This was felt to be demotivating for the speakers and the audience. There were also very few attendees from industry or government, with the conference attendance being largely academic.

GENERAL ADMINISTRATION

Q. HOW DO YOU RATE THE GENERAL ADMINISTRATION OF THIS CONFERENCE?

a.	Marketing and promotion of the event	Excellent
b.	Pre/on-site registration process	Excellent
c.	Conference website	Good
d.	Hotel reservation system	Excellent
e.	On-site logistical support	Excellent
f.	Quality of the social events and meals	Excellent

Although the responses were positive, the comments provided were more of a negative nature.

On-site logistical support received much comment - the three venue meeting room locations, some being very hot. Comments were also made on the lack of adequate refreshments, and poor back up for audio-visual equipment users. The lunch menus were monotonous and disappointing, and buffet style presentations were uncomfortable..

It was almost unanimously stated that the Gala Dinner had been poor value for money. Apart from the fact there was no actual dinner; only canapés and drinks were served. The seating arrangements, the guest speaker, and directions to the location were all quoted as disappointing.

QUALITY OF CONFERENCE COMPONENTS

Q. PLEASE RANK THE QUALITY OF THE FOLLOWING CONFERENCE COMPONENTS:

a.	Pre-Conference Meetings on 7 July 2013:	
	- Masterclass on Triple Helix	Excellent
	- THA/UIIN Joint Society Workshop	Good
b.	Keynote presentations	Good
c.	Technical paper sessions	Good
d.	Registration processing	Excellent
e.	Final Program	Excellent
f.	Proceedings	Good
g.	Location (city)	Excellent
h.	Conference Meeting facilities	Excellent

VALUE OF THE SESSIONS

Q. FROM THE CONFERENCE SCHEDULE RATE THE VALUE YOU FOUND IN THE SESSIONS THAT YOU ATTENDED.

No all respondents completed this question, but of those who did, the following five sessions were deemed to provide the best value:

Rated excellent:

* Determinants of the entrepreneurial and academic ability of individual researchers
* Dynamic capabilities and interactions
* New methods as enables of strategic value creation
* University spin-off companies: ability to generate commercial benefit from university generated knowledge

Rated Good:

* Networks as determinants of open innovation outcome

Planning of the Conference

Q. If you were involved in planning TH Conferences, what changes would you recommended?

		Please rate on the scale: Essential/important/somewhat Important/not important
a.	Make content less theoretical	Not important
b.	Expand on industry topics	Essential
c.	Focus on non-peer reviewed oral presentations	Not important
d.	Focus on case studies with solution	Important
e.	Emphasis on cross disciplinary subject matter	Important

Future Conferences

Q. Do you plan to attend TH-XII 2014, in Tomsk, Russia?

Of the responses received:

7 plan to attend TH-XIII 2014 in Tomsk, Russia,
7 do not plan to attend, and
17 were unsure at the time of responding.

Q. How often would you like the Triple Helix International Conference to be held?

First choice	Bi-annually
Second choice	Annually
Third choice	Every three years or every 6 months

GENERAL COMMENTS

There was a general consensus that the conference had been good, and the programme informative and thought provoking.

Sheila M Forbes
Future Meetings Committee

Conference Delegates outside Lincoln's Inn, London

TRIPLE HELIX SCIENTIFIC NEWS

THE CONTRIBUTION OF VENTURE CAPITAL TO INNOVATION

MATTEO ROSSI

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Innovation isn't a new phenomenon, but over the last few years new concepts and models of innovation have arisen to complement and challenge existing past knowledge and notions.

Innovation can be defined: "as the commercial or industrial application of something new, such as a new product or process, or a new type of organization, a new source of supply in the product market" (Schumpeter, 1934: 66). Schumpeter is considered as a pioneer on innovation studies. He started studying how the capitalist system was affected by market innovations and he describes a process where "the opening up of new markets, foreign or domestic, and the organizational development [...] illustrate the same process of industrial mutation, that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one". This was called a "creative destruction" process. Schumpeter recognized in larger corporations - with some degree of monopolistic power - an advantage in developing innovations, due to their better resources and greater market power. But, the Schumpeter model of innovation is a closed innovation system: in the closed innovation model "research projects are launched from the science and technology base within the firm. They progress through the process, and some of the projects are stopped, while others are selected for further work. A subset of these is chosen to go through to the market" (Chesbrough, 2006: 3). This model was called the producers' model. In fact, in the past, entrepreneurs, economists, policymakers, and managers have assumed that the most important designs for innovations would originate from producers and be supplied to consumers.

More recently the old closed model has been superceded by a new model: the Open Innovation model (OI). This new paradigm is based on a concept that assumes that both the source of knowledge and the process of technology transfer (TTP) become external to the firm. More specifically: "open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology" (Chesbrough, 2006: 1). The Open Innovation System can be considered as opposite to the traditional producers' model. In fact, OI is: "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough, 2006: 1). In other words, Open Innovation posits that internal ideas and knowledge can also be taken to the market to generate new value. In this vision, knowledge, research and development, and innovation, become an open system. In fact, source of knowledge and the process of technology transfer "may well be in the same competitive context (competitors, suppliers, and clients) or in other actors whose main mission is the creation of knowledge" (Martini and Rossi, 2010: 453). In this system a lot of actors have an influence on the innovation process: first of all governmental institutions, but also collective associations and formal and informal investors. In this perspective the definition of innovation is broader: innovation is a continuous cumulative process involving not only radical and incremental innovation, but also the diffusion, absorption and use of innovation. "Innovation is seen as reflecting, besides science and R&D, interactive learning, taking place in connection with ongoing activities in procurement, production and sales" (Johnson et al, 2003: 4).

The Open Innovation System is characterized by a plurality of actors and new interactions between these actors. In this perspective innovation is considered a complex process, involving a research system, a productive system, and governmental/ institutional system. Alongside these actors there are other organizations that do not fit the three above mentioned players and/or act as an interface between two or more of the same areas, and/or represent a composite of these areas. In the innovation process, and in the TTP to business, an important role is recognized for investors, exercised both formally and informally (banks, venture capitalists, and business angels). This new system is characterized by new interactions between these actors. Mallone et al, (2005) use the expression of "extended enterprise" where it's particularly difficult to explain the source flows and transfer of knowledge and technology, internal or external. Moreover this system is characterized by a decreasing significance of the distinction between methodical private actors and public officials. The reasons for this relate to:

- an increase of public-private structures,
- a growth of public funding in private centers budget, and, above all,
- the increasing take-over of final and intermediate research results.

"In the new OI perspective, the problem of technology transfer acquires new dimensions: from a linear process (between donor and recipient), it becomes a bidirectional process, whose effectiveness depends, not only on the involved subjects, but also on the contexts and their languages" (Martini and Rossi, 2010: 451).

In this new system, the importance of financial structures in the process of production and transfer of innovation is underlined. In fact, finance and innovation are inextricably linked. The innovation process requires a multiplicity of resources - human, technical, organizational, and market - but financial innovation is one of the most important. These resources, in fact, permit the acquisition of other resources. Financial resources and their accessibility are crucial to support such business experimentation. The source of finance for innovative enterprises includes a multiplicity of equity provision, as well as a wide spectrum of public and private investors.

In recent years an important role in studies and policy reports on the supply of risk capital was recognized as Venture Capital (VC). VC can be defined as "independent, professionally managed, dedicated pools of capital that focus on equity or equity-linked investments in privately held, high growth companies" (Gompers and Lerner, 1999: 146).

Based on these statements it is possible to define the role of the VC in innovation. In fact Venture Capitalists are important figures in translating research and development (R&D) activities into commercial outcomes and are therefore credited with a catalytic role in innovation. In other words, venture capitalists invest in technology firms where growth and returns are expected to be significantly higher than other industries (Rossi et al, 2011; Rossi et al, 2013).

Venture Capital investments in new ventures can be classified according to the different stages of funding. These stages determine the finance lifecycle of the venture and may have different shareholders. It is possible to realize an analysis of the financing sequence of innovative firms and the role of Venture Capital in growth process. From the early stage to IPO and M&A stage, VC plays an important role in financing new technology-based start-ups. Gompers and Lerner (1999) explain the VC cycle that involves investors, VC funds, and new technology-based firms. It is possible to identify three different stages in this cycle:

- VC firms get their funding from limited partnership with private and institutional investors for a medium-long period (ten years), after which funding has to be renewed or returned to the investors,
- after the first step, VC becomes ready to invest in high growth companies; generally venture capitalists prefer a diversified investment portfolio of companies over which they have constant control and monitoring,
- VCs have very high expectations on the return of their investment. The most expected measure of success is liquidity, even where the portfolio company exists by means of going public or by being acquired by another company.

For these reasons, Caprio and Spisni (1994) define venture capital as a "patient capital", expected to follow the project lifecycle: thus, since high-tech investments are risky and have a long maturity, equity capital should be used more intensively by innovative firms than by traditional firms in order to finance the grow-up phase. But it's necessary to define what VCs do for innovation. Gorman and Sahlman show that the most frequent assistance to portfolio firms is to raise additional funds. Other important roles are given to strategic analysis and management recruiting. Reid (1999) found that the supply of financial capital and financial expertise are the most important contributions from VCFs. These considerations are important for innovative firms, but in these cases, in addition to funding, venture capitalists can provide specialized knowledge and access to a network of contacts. The venture capitalist brings terms, controls, expertise, and financial strength that help form a well-managed and well-financed company that is more likely to succeed. The role of the VCs in innovative SMEs is important because there are true difficulties in financing innovation. Gompers and Lerner identify four such problems:

a. high uncertainty,
b. information asymmetry,
c. intangible soft assets, and
d. sensitivity to volatile market conditions.

These make it difficult for many firms to raise funds through traditional debt financing. Venture Capital fills this void by providing high levels of funding to opportunities with high uncertainty and large information asymmetries - in other words, ventures that may not otherwise have been funded. Particularly Venture Capitalists tend to reduce high uncertainty that no amount of study or due diligence can entirely eliminate. Furthermore VCs reduce information asymmetry, and this is particularly important because of their particular specialized expertise. Innovators have a superior understanding of their innovation, while investors have a superior understanding of financing. Venture Capital is important for intangible soft assets - patents and trademarks, knowledge, human capital, and future opportunities - because the real value of these assets is difficult to measure. Moreover, the value and liquidity of innovative firms is highly sensitive to volatile market conditions. In essence, Venture Capital provides high levels of funding to business with high uncertainty and huge information. VCs can have two effects on innovation:

(a) a direct effect on the number of innovative projects that are undertaken, and
(b) an indirect effect on the average quality of funded projects.

The former is analogous to the effect of monitoring by venture capitalists, in the sense that it relaxes firms" financing constraint, albeit for a quite different reason. The latter effect regards the quality of funded projects that can be measured by the probability of innovation. The reason for this positive impact on an innovative firm is that VC - after funding an entrepreneur with an innovative idea - may be able to extract a surplus from potential entrants at a subsequent stage, exploiting the informational advantage gained through close interaction with the first entrepreneur. In other words, a number of models in the literature show that venture capitalists (VCs) are:

1. well-informed financial intermediaries,
2. able to face problems related to risky investments in high technology projects,
3. capable of engaging in active monitoring, and
4. skilled to add value to the entrepreneurial team.

VCs place valuable managerial competencies at the disposal of growing small firms; their stakes in the equity capital have a relevant image effect, which arouses intangible benefits in objective markets. A network of relationships with other enterprises can be exploited by VCs addressing different problems which might be experienced by innovative firms in the first stages of their life, thus stimulating the firm's growth.

In this sense, Florida and Kenney (1988) assign a new role to VCs: they build important linkages among a variety of organizations which are essential to the innovation process and act as "technological gatekeepers" accelerating the process of technological change. Venture capitalists are situated at the centre of extended networks, and actively forge connections which reach into large corporations, universities, financial institutions, and a variety of other organizations which play an important role in the innovation process. Florida and Kennedy (1988) consider VCs as the centre of the innovation process.

It is possible to subdivide this process in four overlapping networks. The first network is used for fundraising and to organize capital. It consists of investors in the venture capital fund and other venture capital firms that take part in innovation investment. A second network is used to locate and review potential investments, and turns to previously successful entrepreneurs, other venture capitalists, lawyers, and accountants, as well as contacts in large corporations and universities. The role of other entrepreneurs is important because they can have supplemental contacts that extend to the most promising potential start-ups. A third network cultivates professional service firms (i.e. law, accounting firms, market researchers, and consulting firms) which serve as sources for industry-relevant information. A final network includes sources of labour, which are used to recruit management and other personnel for start-ups. This network includes also sources for input into the production process and possible outlets for finished goods (Florida and Kennedy, 1988).

In this perspective, VCs have a fundamental role in the innovation process: venture capitalists are a crucial part of the context within which such breakthroughs occur. Due to the intensive flows of information at their disposal, venture capitalists are well positioned to spot the opportunities that arise as critical barriers are breached. It is at these junctures that they perform a "gatekeeping" function, intervening to help create new companies and actualize important breakthroughs, while capturing the "economic rents" that come from being first across such boundaries" (Florida and Kennedy, 1998: 128).

On a catalectic note, VCs appears to be a factor of growth and success. Though cause and effect has no clear boundary in this relationship, all evidence indicates that the mix of VC and innovation firms sums up to more than its constituent parts. Most probably, it's the very differences in their nature that leads to success: on the one hand companies with scientific competences and innovation drive, and on the other VCs, with financial and managerial proficiencies and business drive (Rossi et al., 2013).

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TECHNOLOGY-ENABLED INNOVATION STRATEGY - A PRACTITIONER'S APPROACH

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INTRODUCTION

The Triple Helix is a visual metaphor for an innovation ecosystem. It gives a representation of the potential interactions between government, academia, and industry, and implies an organic process that leads to innovation.

While it is true that these interactions are vital for a sustainable innovation ecosystem, in various ways, the reality is that the three strands are distinct, and the visual metaphor of a Triple Helix shows no clear interaction. As a metaphor, it does not describe how an innovation ecosystem operates, nor what is needed to make it sustainable.

This short paper presents a practitioner's perspective drawn from the experience within an innovative incubation centre in North Wales, and the innovation cluster based around Cambridge, UK.

WHY INNOVATE?

The obvious starting point is to ask why should one innovate? Innovation is a mantra that is taken to be the answer to many problems; making it happen - successfully - invariably requires informed and experienced action.

For each strand of the Triple Helix (university, business and government), the aims of innovation are different but they are all interconnected. Making innovation happen is not a serendipitous activity. Innovation is an active process that has to be driven forward while recognising the inter-dependencies that can enable it.

Such interdependencies are at the heart of innovation, and Jackson (2011) described these interactions in terms of an eco-system. Some years ago, regional innovation strategies invariably referred to Michael Porter's cluster theory. An Innovation Ecosystem is a more accurate description for Michael Porter's "cluster" as it implies an interaction between component members of the ecosystem, whereas a cluster is a term based on observation. The choice of language is significant; Triple Helix, cluster and innovation ecosystem all describe the same structure, but each term conveys something quite different.

Jackson's paper discusses the resources needed for a technology innovation eco-system. She recognises the different needs of the research (university) and commercialisation (business) partners, and where government is involved. In this paper, we elaborate on this and outline how the elements for innovation need to be managed.

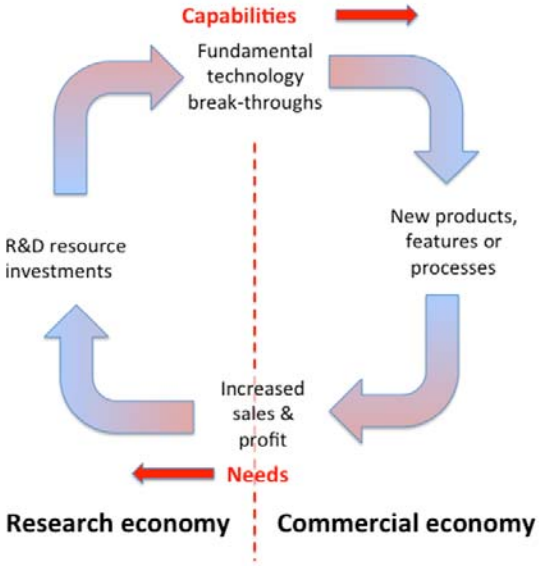

Figure 1: Some interactions in an innovation eco-system showing the dependency between commercial and research communities

Let us look at the three strands within the Triple Helix, and to the issues that innovation has for each, with a particular emphasis on the business area.

INNOVATION FOR GOVERNMENT

Without going into great detail, there are many potential benefits to government for supporting innovation, including;

- Increased tax revenue coming from businesses that reap commercial gain from innovation.
- Reduced unemployment if the innovation can create new jobs.
- Encourage inward investment into the country, bringing new talent and financial investment.
- Strengthen national innovation culture and resources.

These benefits, and others, justify Government support for innovation, and often lead to wider economic benefits.

Innovation for University

In addition to their prime functions of teaching and research, universities are now expected to engage with industry (in various ways) to exploit their knowledge and research. In the UK, this has become known as "the Third Mission" and is actively encouraged, if not demanded, by government.

It is seen, by government, as a way to initiate innovation. However, forcing universities into technology transfer activities which were aimed directly at wealth creation was a difficult task for many. The Triple Helix model illustrates this: there are three distinct strands (government, business, and university), yet the university strand was being distorted to overlap with business. Klein (2002) analysed some of the weaknesses in the third mission model.

While the third mission rhetoric has been toned down, there is still a drive to encourage universities to consider the 'impact' of their research. However, universities (as they currently operate) sometimes find it difficult to achieve success in this area.

Innovation for Business – The need

Within a manufacturing business, innovation is a practice that is necessary to survive (and potentially grow), and this has provided a rich seam of research for many authors over the years. Chadha and Chadha (2007) approached their analysis using a systems

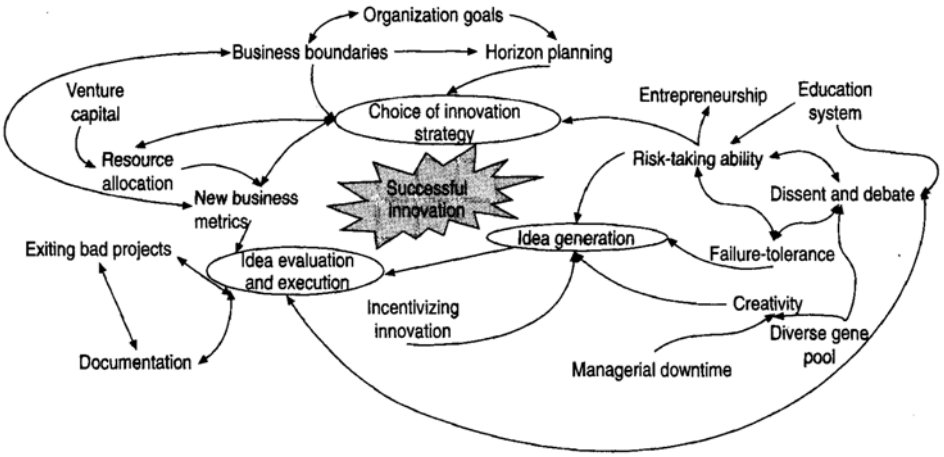

Figure 2: An Innovation System map for a business (Chadha and Chadha, 2007)

model for innovation within a manufacturing company.

This system map is useful in illustrating the interdependence of many parts within a business when innovation is involved. This is a snap-shot of one strand of the Triple Helix model and does not include the involvement of Government and Universities. However, this system model does not indicate the purpose of innovation - one definition of which is: "the successful commercial exploitation of new ideas." Building on this Innovation System map, it is possible to show some of these interdependencies.

This expanded version aims to show an output (from the business perspective) of a new, wealth-generating, product pipeline - which is the purpose of innovation, in this case. This activity draws on knowledge from many different areas within, and without, the company. Some of the interactions with the education system (wider than universities) and government are shown. Clearly, this is a complex model (only some elements are shown) and difficult to manage from within a business.

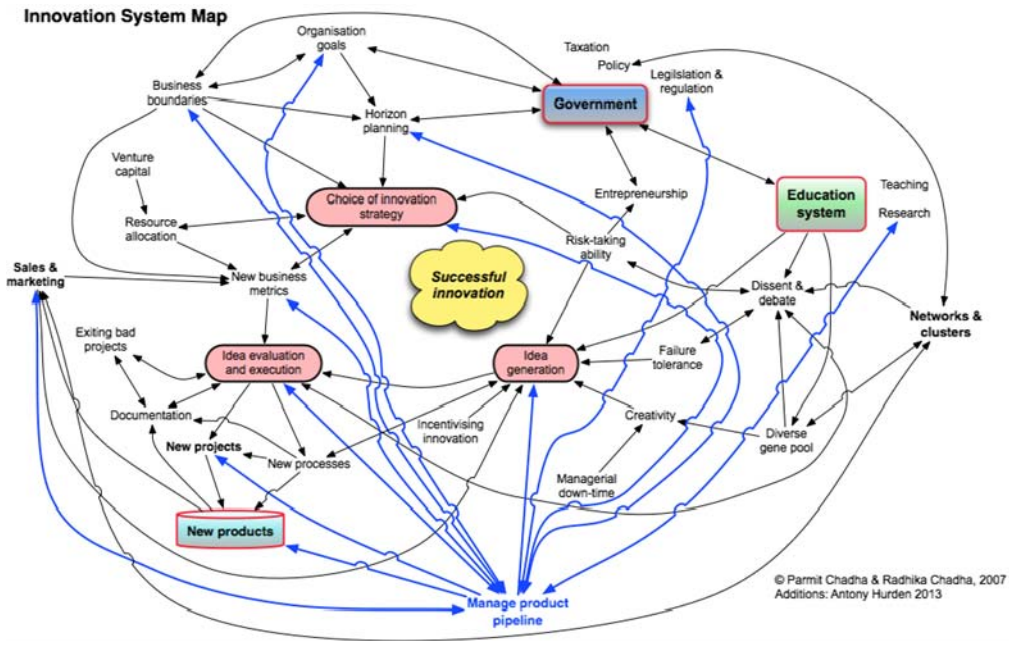

Figure 3: An expanded Innovation System map

Innovation for Business – The reality: the 'Valley of Death' and Soft Companies

Innovating and bringing in new technology, however, brings risk and cost. The failure of many innovative ideas occurs during a phase that has come to be known as the "Valley of Death".

Jackson takes a view that there are ways to tackle the valley by reducing the scale of the challenge. In her analysis, the best way to describe how to approach this is to start by viewing the "valley" in a metaphorical sense, and as a cauldron of opportunity: the "challenge basin". She

considers the question: what is required to bring the 'walls' of the 'valley' closer together, to make it easier to cross?

By asking what is needed to make such a change, one begins to define some elements of an innovation ecosystem where the object is to move the research side of the valley wall further to the right and/or to move the commercial side of the valley wall further to the left. If this can be achieved, it will improve the odds of an innovative venture successfully spanning the Valley of Death.

Jackson's view is that training a cadre of champions to shepherd ventures toward commercial success represents a technology push that effectively moves the valley wall to the right, and brings with it ways to mitigate risk, hence drawing the commercial valley wall to the left.

Such a cadre of champions can be found in many places. Connell and Probert (2010) discuss how 'soft' companies (primarily around Cambridge, UK), provide this facilitation and skill-set. They analyse this cluster and identify many of the characteristics that Jackson proposes for the cadre of champions. These 'soft' companies (the business and technology consultancies) excel at innovating for 'hard' companies which then benefit by being able to develop new product pipelines through a managed innovation process.

Cooper (2012) identifies five 'Innovation Vectors" that are key to "bold innovation" within his Stage Gate model:

- Vector I: Developing a Strategic Focus
- Vector II: Fostering a Fertile Climate and Culture
- Vector III: Generating, Capturing and Handling Ideas
- Vector IV: Designing a Next-Generation, Idea-To-Launch Process
- Vector V: Deciding the Right Investments, Picking The Winners

In North Wales, the lessons from Jackson, Cooper, and the Cambridge cluster were at the heart of an innovation eco-system that established OpTIC, the Optoelectronics Technology and Innovation Centre, in St Asaph, North Wales. Drawing on research from various organisations in the UK, it was clear that many of the UK's past models for innovation had not been as successful as desired.

The OpTIC was established using elements from the 'soft company' model where an innovation eco-system requires collaboration and management. Within OpTIC, there were several key elements:

- The Incubation Centre provides accommodation for up to twenty-four new start-up optoelectronics businesses which have access to facilities within OpTIC.
- The Technology Centre performs product development, contract research, and "joint programmes" with academic partners. Further, it provides support to start-ups and acts as a catalyst to help generate new ones through exploitation of IP, etc.
- The Business Centre manages the facility as well as providing appropriate support and advice to incubating companies and to fostering collaboration between companies and local industry

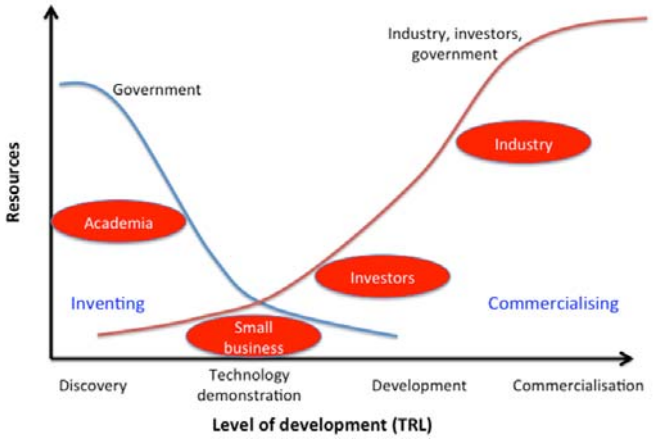

Figure 4: Representation of the 'Valley of Death'

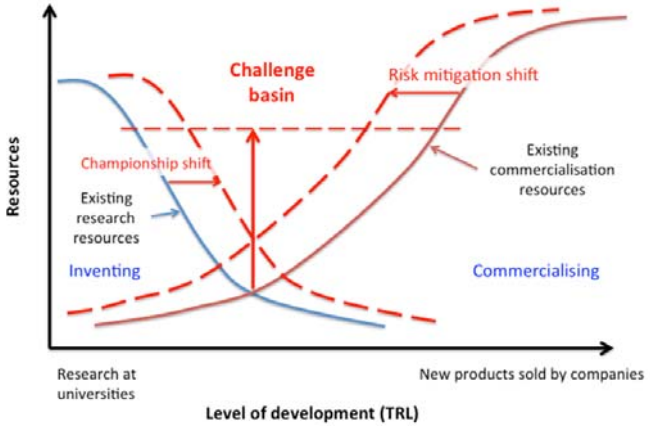

Figure 5: The transformation of the Valley of Death into a Challenge Basin

All three centres were created to operate together in a synergistic and unique manner to manage the complexities of innovation, and to support companies in the process of converting an optoelectronic idea into something that creates a successful business. The management team, during the first few years, had a wealth of experience in managing technology development, handling funding issues, interacting with Universities and Government - but primarily focused on how to make the innovation ecosystem within OpTIC operate as a sustainable and profitable business.

Government funding from the Welsh Assembly Government, and the European Commission, provided the capital to build the premises necessary to accomplish this task.

OpTIC opened in 2004, and by 2008 gained European recognition as a winner of a RegioStars award for "Support clusters and business networks". The jury commented, "This was seen as an innovative project which had the clear objective of rejuvenating a less developed region. It is a particularly good example of a successful industry-led cluster which was built on a pre-existing industrial strength in the region, i.e. Opto-electronics. That background provided the basis on which to attract and start additional companies in and around this sector by offering

networking, advice and top-class research facilities to help them become more innovative."

Conclusion

As a metaphor, the Triple Helix does not provide useful guidance for effective innovation. By keeping the three strands separate, it does not show that the intersection between business, government and university is a place of great activity and opportunity. When we sought for a way to illustrate how OpTIC worked, we used an optical metaphor - the mixing of three primary colour lights. The same visual metaphor could be used for the 'Triple Helix'.

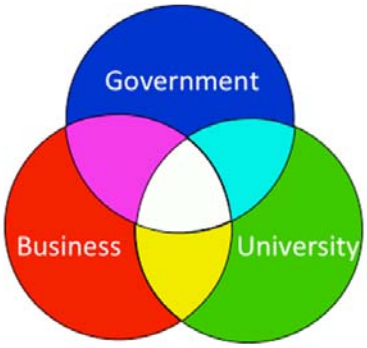

Figure 6: Visual metaphor for the innovation interactions between Government, Business and University

This image shows that the interaction between any two of the partners leads to something new, and the white space in the centre is only possible with the active involvement of each partner. Achieving this interaction, however, requires special expertise.

Jackson recommends: "training a cadre of champions to shepherd ventures toward commercial success" bringing experience and knowledge of technology transfer. Such expertise has been successfully operating in the consultancies around Cambridge, and was instrumental in establishing OpTIC.

By drawing on a practitioner's lessons learned from establishing the OpTIC in North Wales, one could generalise the requirements for a regional innovation strategy (in this case, choosing Wales for illustrative purposes):

- A **business-oriented** delivery team appointed to lead an innovation programme for Wales.
- It should be **independent** of any existing organisation, and thus **impartial** and **even-handed**.
- It should be **innovation-driven, technologically informed**, responsible for Cooper's five innovation vectors, and have extensive **knowledge** about capabilities and opportunities in the sectors of value within Wales, and be able to exploit these specific capabilities in Wales.
- It should **identify opportunities** that draw on capabilities in Wales, and **enhance** those capabilities as well as **contribute** to the economic development of Wales.

While all these elements are within the Triple Helix metaphor, the detail of implementation is missing. This proposed capability is new, brings new insights and new mechanisms to innovation, and is increasingly recognised as a pragmatic solution to delivering consistent innovation at a regional level.

Authors

Antony Hurden has spent half his career in manufacturing companies, developing new technology-based products to bring to market (hard companies). The second half of his career has taken this experience and combining it with the skills of consultancy working in Cambridge and, more recently, at Grounded Innovation Limited. (soft companies).

Dave Rimmer's background is primarily in high technology product development and manufacturing. He has management experience at board level, and was instrumental in the creation of the OpTIC innovation centre in North Wales which he successfully led for several years as CEO. He subsequently established DREM Ventures to continue his work in technology management.

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Assessing the Impact of University-Industry Collaborations: A Multi-dimensional Approach


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Introduction

The growing importance of university-industry knowledge transfer has prompted government bodies at all levels to devise ways to support and encourage collaborations between universities and industry (UICs). These collaborations have been shown to be effective knowledge transfer channels and are particularly likely to generate long-term benefits for firms and various stakeholders. Funds are made available to support collaborative research projects, for example by the European Commission Framework Programmes, the Advanced Technology Programme in the United States, the Research Councils in the United Kingdom, government programmes in Germany and the Netherlands, and many others.

Despite these increases in funding, the literature shows that the assessment of the impact of interventions in support of UICs is usually based on a narrow range of metrics, mainly focused on capturing the income accrued from the collaboration and a few other quantitative output indicators. There is, therefore, a need for more in-depth investigations into the impact that UICs have on a broad range of stakeholders, over time, in order to support a transition towards more accurate and comprehensive approaches to impact assessment.

In our study, we propose a theoretical framework to identify the multiple dimensions of such impact. By focusing on the case of the United Kingdom, and in particular on one type of government-supported university-industry collaboration scheme, Knowledge Transfer Partnerships (KTPs), we discuss the application of this framework to our empirical investigation of fourteen case studies of recent KTPs, and we explore ways to standardize the measurement of at least some of these impact dimensions, in order to contribute to the debate on how to build better indicators of UIC performance.

Collaboration Impact as a Multidimensional Concept

UIC literature has illustrated that knowledge transfer is a complicated and complex process. Some of this complexity arises because, among other things, (a) all the parties involved learn from the interaction, (b) active participation of the receiver is crucial for knowledge transfer to transpire, (c) the respective parties' prior knowledge bases and absorptive capacities strongly influence the outcome of the interaction, and (d) strong spillovers can emerge that benefit agents beyond those involved in the initial transfer. The impact of UIC is therefore likely to be multidimensional, and should be calibrated with respect to the pool of potential beneficiaries, the degree of involvement of all parties, and the length of the time span in which the benefits from knowledge transfer are accrued. In line with these objectives, we articulate a general framework in order to assess the impact of UICs.

We propose three key dimensions to assess the impact of UICs. These are the "reach" of the collaboration (that is, the number and variety of stakeholders that benefit from that activity), the "value" created by the collaboration (the nature and variety of the benefits accrued), and the "time span" in which the collaboration manifests its effects. The impact of university-industry collaborations results from the combination of all of these dimensions, as summarized in Figure 1..

In this framework, "reach" refers to the range of beneficiaries (number and type of stakeholders involved) from the collaboration. The collaboration may have a broader impact if it has more beneficiaries and if these are more diverse, since it would impact on different areas of the economy and society. However, the identification of the relevant stakeholders of UICs is not a straightforward task. Because of spillover effects, the "unlocking" of knowledge promoted by knowledge transfer activities is likely to impact on a variety of stakeholders that sometimes go beyond the

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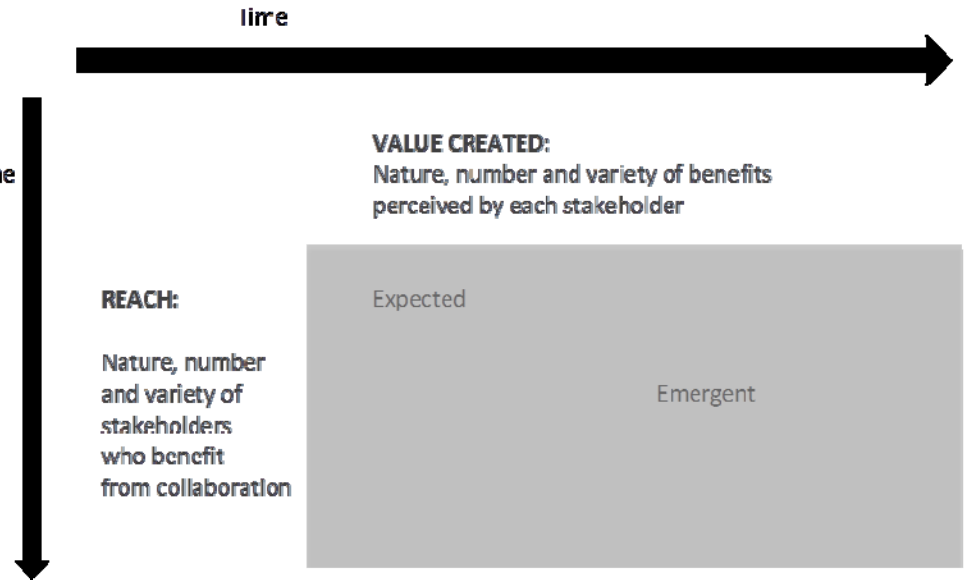

Figure 1: The key dimensions of university-industry collaborations' impact

intended beneficiaries. Therefore, the specific identification of the relevant stakeholders should be made on a case-by-case basis.

The benefits that each stakeholder, including the university itself, receive from UIC - that is, the way in which the collaboration enables them to achieve their goals - constitute the "value" generated by the collaboration. These benefits are to be assessed while taking into account the costs that the agents had to incur in order to obtain them. Benefits are strongly subjective and different stakeholders may have different views as to what benefits matter to them, and of the extent to which they are accrued through knowledge transfer. This is because each of them has different knowledge, goals, backgrounds, which affect how the benefits are evaluated and appropriated. As such, value generation depends on "how", "when" and "where" the benefit is extracted. Benefits are not necessarily economic in nature, or they can bring economic advantages only indirectly. Moreover, they are not necessarily quantifiable in monetary or even, more generally, quantitative terms.

Finally, time matters for both reach and value created. Over time, more beneficiaries may emerge, or expected beneficiaries may not materialize, broadening or narrowing the reach of the collaboration's impact. For each beneficiary, different benefits may take more or less time to manifest themselves. Typically, as time progresses the range of stakeholders that derive benefit from the collaboration expands, and so does the variety of the benefits generated. This is why we have distinguished between "expected" benefits and beneficiaries of the collaboration, which are typically identified in the early stages of the collaborative activity, and "emergent" benefits and beneficiaries, whose importance becomes apparent later, if at all. It is, however, possible for "emergent" beneficiaries and benefits to appear early in the course of the collaboration, and for "expected" beneficiaries and benefits to materialize later, or not to materialize at all. For this reason, the impact of university-industry collaboration should be evaluated at different points in time, and not just immediately after the end of the project as it is customary in current practice.

The collaboration therefore may generate a broader or narrower range of benefits, and generate value in the short term and long term.

Case Study: Assessing the Impact of Knowledge Transfer Partnerships

The Knowledge Transfer Partnership (KTP) scheme, launched in 2003, is a UK government scheme that enables firms to take advantage of the wide range of expertise within universities. The scheme is currently funded by fifteen government organisations led by the Technology Strategy Board. As of March 2013, there were 627 ongoing partnerships, and 10,101 partnerships have been established since 2003. Through the KTP, partnerships are formed between a university (or a College of Further Education, public sector research establishment, or private sector not-for-profit research and technology organisation), and a business partner (this could be a private company as well as a not-for-profit or public sector organisation) who will jointly supervise an associate (a recent graduate) who is recruited into the partnership. This tri-partnership in knowledge transfer, which lasts between twelve and thirty-six months, involves the associate working for the business partner to deliver a project of strategic value, under the direction of the academic adviser, and a business adviser who acts as the associate's line manager. The partnership is supported by a KTP adviser, who is involved in the process of proposal submission, and monitors the project on behalf of the funding organisation(s).

Through in-depth interviews with twenty-seven stakeholders including associates, academic advisers, business advisers, KTP advisers and university knowledge transfer managers, and also thanks to additional data from public reports and other forms of written information available about the partnerships, we investigated fourteen different KTP case studies. The objective was to implement the impact framework established previously by identifying, for each one of our KTP cases, the relevant reach and value dimensions, and the time span along which impact manifested itself.

The reach dimension captures the nature and variety of the stakeholders involved. As shown in Table 1, the fourteen cases identified at least ten broad categories of stakeholders, some of which were mentioned in most KTPs; these include, not unexpectedly, the associate, the business partner, and the academic partner (both the institution and the academic advisor). Interestingly, most of the KTPs had positive impacts on students, academics, company staff and / or other businesses and an on society in general.

The reach of the impact differed with regard to the number of stakeholders that benefited from each KTP, from a maximum of eight different broad types of stakeholders identified, to a minimum of one.

The value dimension varied in terms of the nature, number, and variety of benefits perceived by each stakeholder. The analysis, as shown in Table 2, yielded four generic categorisation of benefits (economic/innovation, intellectual, social, strategic). Economic and innovation benefits consist of direct economic gains, innovation, and access to material resources. Intellectual benefits encompass two areas, gaining competence and experience, and improving knowledge and understanding. The process of learning may only be realised when there is a continuous dialogue between partners which builds across the years through cooperative relationships. Face to face interactions bring numerous benefits in terms of building personal relations and trust. Social benefits are related to networking and gaining recognition; they are concerned with how stakeholders benefit from the distributive aspect of the knowledge. Strategic benefits relate to the expansion of opportunities that arise through the collaboration, which could eventually have far-reaching effects. Many of the KTPs explicitly indicated that the impact of the KTP was still being felt at the time the interview took place.

Table 1: The reach of KTPs: relevant stakeholders identified by the case study participants

Relevant categories of stakeholders	Number of KTPs that identified these stakeholders
Associate	14
Business partner: company	12
Business partner: staff	4
Academic partner: advisor	10
Academic partner: other academics	5
Academic partner: university institution	12
Academic partner: students	9
Other businesses (clients, competitors)	4
Other universities	1
Society	5

Conclusion: A Schema for Impact Assessment

We posit that, from a policy perspective, guidelines to understand the characteristics and quality of the *interaction processes* through which knowledge transfer takes place (for example their duration, the number of partner organizations and people involved, the partners' satisfaction with the interactions, their perception of what they learned from the interactions and the short and long term benefits they received) are much needed. Our case studies of KTPs highlighted a variety of benefits (which we articulated into four main categories - economic/innovation, intellectual, social, strategic), which eventually had far-reaching ripple effects on the stakeholders. Hence, understanding "how", "when" and "where" the impact of the KTP is felt, should enable policy makers to really encapsulate the value created by these knowledge transfer activities.

Table 2: The value of KTPs: relevant benefits identified by the case study participants

General type of benefit	Specific benefit	Examples from case studies:
Economic / innovation	Direct economic gain	Salary, Permanent employment, Employment growth, Increased efficiency, Competitive advantage, Market expansion, Research income, Profit, revenue, turnover growth, More work commissioned, Supporting local businesses / local community, Increased employability, More KTPs and other collaborations with firms
	Innovation	New products, New patents, New solutions to problems
	Access to material resources	Access to equipment, Access to facilities, Access to journals
Intellectual	Competences and experience	Developing new skills, expertise, specializing, Updating skills and knowledge, Developing personal confidence, developing soft skills, Applying knowledge into practice, Gaining expertise in business sector, Opportunity to teach others, Experience in running a project
	Knowledge and understanding	Obtaining new knowledge, Opportunity to obtain certificates, qualifications, Access to data, Opportunity to develop research, Enhanced research output, Enhancing teaching experience
Social	Networking	Building relationships with companies, Building relationships with universities, Building relationships with academics, Building relationships with students, Building relationships with funding bodies, Building relationships with the community / society, Gaining access to qualified human resources
	Influence / recognition	Influencing policy, Influencing industry practices, Influencing company strategy, Recognition from industry, Recognition from university, Recognition from society, Marketing tool, Brand development, Reputation, Platform for dissemination
Strategic	Expanding opportunities	Improve career prospects, Change of strategy, Change of culture, New insight, Increased job satisfaction, New directions to explore, Improving quality of life, Making people's life better

In the light of this, we suggest a schema of quantitative and qualitative indicators for assessing the impact of KTPs, shown in Table 3. Those with an asterisk are indicators that are already present among the current KTP metrics; the others are new proposed indicators.

With recent trends towards supporting UICs having taken place in higher education policies across the globe (such as in the United Kingdom, Australia, Canada and Finland to name a few), many have favoured a shift to performance-based evaluation approaches that rely on quantitative metrics. By broadening the full range of benefits captured by the collaboration in relation to each stakeholder, we suggest that the level of coverage of impact indicators would increase; the proposed approach aims to allow for flexibility both in terms of the possibility to include additional benefits and additional stakeholders (without limiting in advance

Table 3: Proposed quantitative and qualitative indicators for each type of benefit and their applicability to each stakeholder

	Applicability to stakeholders				
Indicator	Associate	Business partner: company	Academic partner: university institution	Academic partner: advisor	Other stakeholders (other academics, students, other universities, company staff, other businesses, society)
Direct economic gain: descriptive examples	x	x	x	x	x
Salary increase	x				
Increased turnover*		x			x
Increased profit*		x			
Increased exports*		x			
Increased R&D investment*		x			
Increased investment in plant and machinery*		x			
Cost savings		x	x		x
New jobs created*	x				
Public funds accrued		x	x	x	x
New projects undertaken*	x	x	x	x	x
Increased enrollments			x		x
Innovation: descriptive examples	x	x	x	x	x
New products		x			x
New processes		x			x
New patent applications / grants *	x	x		x	x
Other IPRs (copyright, trademarks, design rights)	x	x		x	x
Open source licenses	x	x		x	x
New spinoff companies	x	x	x	x	x
New courses*			x		x
New curricula			x		x
New teaching materials*		x	x	x	
Access to material resources: descriptive examples	x	x	x	x	x
Competence and experience: descriptive examples	x	x	x	x	x
Knowledge and understanding: descriptive examples	x	x	x	x	x
Number of qualifications gained	x			x	x
Number of people trained*	x	x	x		x
Publications*	x			x	x
Conference papers	x			x	x
REF contributions *			x	x	x
Networking: descriptive examples	x	x	x	x	x
Memberships of professional / industry bodies	x	x			x
Influence/recognition: descriptive examples	x	x	x	x	x
Expanding opportunities: descriptive examples	x	x	x	x	x
Other benefits: descriptive examples	x	x	x	x	

the span of the reach and value impact dimensions investigated), and in terms of the time frame in which impact is assessed (without limiting assessment to the period immediately following the end of the project, but capturing ripple effects two-three years later, in order to identify any further spillovers from the project). This investigation represents a first attempt to systematically organize information about the impact of UICs starting from in-depth qualitative evidence about a specific type of collaborative projects, KTPs. More effort is needed to explore the impact dimensions of UICs, investigating other collaboration schemes and the appropriate monitoring and data collection approaches to capture their real impacts and help them capitalize on their success.

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Unzip the Triple Helix Application of Regional Triple Helix in Japan

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A system of University-Industry-Government (UIG) collaboration, termed the as 'Triple Helix', which is a coalition of three functionally different entities, is an indispensable element in national and regional development in the knowledge economy era (Etzkowitz and Leydesdorff 1997, Etzkowitz 2008). The Triple Helix concept is popular among policy makers; not only national, but also regional governments have strongly promoted collaboration between industries and universities. Under the circumstance, UIG collaboration in a region can take the form of a Regional Triple Helix (RTH) model (Etzkowitz 2008: 76).

Regional Innovation Initiative in Japan and Profile of Three Selected Regions

In Japan, as in other countries, the central government has deployed several university-industry joint research and development (R&D) promotion programmes since the 1990s. In concert with programmes initiated by the central government, local authorities have also promoted joint R&D between local universities and companies. Policy makers especially have considered academia–industry collaboration as the key element in regional innovation. Thus, to foster regional innovation, local authorities supported by the central government, make an effort to transfer advanced technology of local universities to local companies. Most local authorities have aggressively promoted matches between academia and industries, which leads to granting funds to local university-industry collaborative R&D, facilitating R&D, purchasing research equipment and so forth. In addition, many prefectures have been promoting a regional innovation policy that includes an industry cluster policy. Despite facing a financial deficit, local governments have maintained local technology centres (LTCs), designed primarily to help small and medium-sized enterprises (SMEs).

In order to clarify the characteristics and issues of RTH, a study was conducted by comparative analysis of three regions - Yamagata, Gunma and Nagano. If regional conditions are varied, it is

impossible to compare them, and it is necessary to satisfy certain regional conditions. The three chosen regions have similar conditions in terms of local resources, industrial agglomerations based on assembly manufacturing, and are prefectures located in a peripheral area.

Yamagata Prefecture is located approximately 350 km north of Tokyo, in a peripheral area. Local industries include electronics and machinery manufacturing. For example, NEC-Lenovo's large personal computer assembly plant is in Yamagata. But industrial agglomeration is relatively thin compared with the other two regions. Gunma Prefecture is located approximately 100 km north of Tokyo, in relative proximity to Tokyo. The main Subaru (owned by Fuji Heavy Industries) automobile factory is located here. Machinery and electronics industries are concentrated in Gunma, where the manufacturing industry is thriving. Nagano Prefecture is located approximately 200 km west of Tokyo, in a mountain region. In this prefecture, industrial agglomerations are scattered. Precision machinery industries (eg watch manufacturing) have long thrived here. In recent years, automobile parts manufacturing and electronic component and device manufacturing have blossomed. For academic resources, in all of three prefectures, there is a national non-traditional general university, a national college of technologies, and a couple of local industrial technology centres established by prefectural authorities.

Methodology

Although the study focuses on the relationship among university, industry, and government, we can say that the main innovator is a company that serves as a node, extending relational links to the other organisations. Since the company seemed to be located at the nexus, the author analysed how companies have built relationships with universities and/or LTCs that represent governments. Therefore, the postal survey conducted for this study targeted company activities. Furthermore, data was required to investigate the characteristics of relationships with local companies and the RTH structure. Therefore, the survey focused on collaboration between manufacturing firms and universities and/or LTCs. The questionnaire comprised several parts, with items concerning the following: company profile, relationships with universities and NCTs, relationships with prefectural industrial technology centres, development experience with new products/technology, and informal partnerships to solve technical problems.

Destination companies for the survey were selected by random sample. The questionnaire was sent to 1900 manufacturers (500 in Yamagata, 700 in Gunma and 700 in Nagano, depending on the magnitude of industrial agglomeration). A total of 699 responses were received, equivalent to a response rate of 36.8% (NISTEP 2013a, 2013b, 2013c).

To classify the characteristics and structure of RTH, the study was conducted in three steps. The first step was dividing the respondent companies into six categories. The general features extracted from each category were as follows: 1) university and LTC utilisation for developing a new product or technology, 2) sole university utilisation for developing a new product or technology, 3) sole LTC utilisation for developing a new product or technology, 4) utilisation of another private company for development or sole development, 5) interaction with a university and/or LTC to improve an existing technology or product, but not to develop new products or technology, and 6) no utilization of a university or LTC but not to develop new products or technology, which are status quo companies such as subcontractors. In the second step, the RTH structural features from the six company types' composition ratios were extracted and their intentions for UIG collaboration discovered. The third step showed more clearly the issues and features of RTH through comparative analysis of the three prefectures.

Structures of Regional Triple Helix in Japan

Characteristics of the Regional Triple Helix

From the composition ratios of the six categories (see Table 1), and the result of the postal survey and interviews, we can assess the structure of RTH.

	①Developmen: with University and Governmen:	②Developmen: with University	③Developmen: with Governmen:	④Developmen: with Firms or by itself	⑤No Developmen: but Collaboracion with University and/or Governmen:	⑥No Developmen: and No Collaboracion
Yamagata	22.7%	4.7%	16.6%	10.9%	24.2%	16.6%
Gunma	27.4%	3.2%	9.5%	9.5%	13.2%	36.3%
Nagano	41.3%	4.7%	10.4%	8.0%	13.4%	18.1%

Table 1: Percentage of Companies Categorized in University-Industry-Government Collaboration

1. Yamagata

Technical consultation in R&D, rather than joint R&D with a university, characterized RTH in Yamagata. Relatively large companies with more than 100 employees had generally collaborated with academia. Local SMEs were relatively inactive in terms of academic-industry collaboration. A reason for low activity in terms of UIG collaboration was weakness of management capacity due to the scale of the companies, and their role as subcontractors to larger companies. In many cases, companies in conjunction with LTCs were not innovation oriented, but improvement oriented. Even medium- and relatively large-scale companies were reluctant to cooperate with academia for development because many were branch plants of capital-intensive apparatus industries. These companies seldom intended to cooperate with academia.

2. Gunma

To solve technical problems, Gunma local companies tended to contract with companies in the same industry rather than with academia and/or LTCs. One reason for this might be the availability of many highly skilled companies within a relatively dense industry agglomeration. Several SMEs belong to Keiretsu, subcontractors of large manufacturing companies, and in such cases, LTCs contributed

less than they did in other prefectures. In Gunma, inactive companies were most common, but many companies leveraged both universities and LTCs for R&D. Clearly, two types existed, making it reasonable to conclude that RTH was polarized into active R&D, with academia and/or the government, and inactive R&D, without academia or the government. In Gunma, the most flourishing industry was automobile manufacturing: many relatively large-scale, tier-one subcontractors collaborated with universities and/or the government. Meanwhile, many relatively small-scale, tier-two or -three subcontractors did not collaborate with academia or LTCs, and did not practice product development.

3. Nagano

Nagano was the most positive among the three prefectures in terms of UIG collaboration. SMEs tended to contract with LTCs to solve technical problems, and medium and large sized companies tended to contract with both academia and LTCs. The companies that connected with academia tended to form relationships with other public bodies such as LTCs and regional development agencies. Moreover, they also contracted with same- or other-industry firms to solve technical issues. Relatively few companies had not contracted with academia, but had experienced R&D and wanted to collaborate with academia. Thus, in terms of RTH, Nagano was the most developed and evolved among the three prefectures.

In addition, we can clearly observe differences between the three RTHs. RTH in Yamagata was a typical case of a peripheral innovation system indicating local firms' weak absorptive capacity due to a branch plant economy and assembly manufacturing without R&D sections. In fact, Yamagata RTH can be deemed inadequate from the functional point of view. In Gunma, two types of firms were revealed by the study: one expertly utilized academia and/or government; the other depended less on the local Triple Helix and connected positively with the private sector rather than with public entities. Therefore, Gunma's RTH tended to be polarized. Compared with the other prefectures, many independent firms in Nagano were not subordinate to large companies and thus aggressively conducted UIG collaboration. In short, Nagano's RTH may be considered as mature.

Future Intentions to Collaborate with Academia

For future intentions of collaboration with academia by geographical areas, about fifty per cent of companies wanted to collaborate with a university in the same prefecture. Most companies wanted to collaborate with nearby academia. In Yamagata, the percentage of companies that collaborated with academia in an adjacent prefecture, or in other prefectures, were smaller than the percentages of companies in Gunma and Nagano that wanted to collaborate with academia. Moreover, in Nagano, firms tended to conduct research with relatively distant academia (see Table 2).

Common Features of the Regional Triple Helix in Japan

The survey results indicated that each prefecture's RTH infrastructures were already instituted by academia, industries, and governments. We distinguished three common features among RTHs in three regions. First, universities have developed relationships and strengthened existing companies, thus helping maintain industrial agglomeration. Due to thin entrepreneurship, the number of new companies is relatively low. Therefore, universities develop relationships with existing SMEs rather than venture companies.

Second, the processing and assembly industry is the main industrial partner in Japan's UIG activities. This differs from the USA and the UK, where many examples are reported in the biotechnology industry (Zucker et al 1998, Feldman 2000, Owen-Smith and Powell 2004, Lawton Smith and Bagchi-Sen 2006). University knowledge, such as patenting, is crucial for the biotechnology industry, and academia–industry collaboration is indispensable for developing the biotechnology industry. However, for many processing and assembly companies, university collaboration is not critical; rather, they tend to collaborate with companies in the same industry, even for R&D purposes.

Third, LTCs have played an important role in each prefecture. They have developed broad relationships with local SMEs for technical consultation, lending research equipment, and so on. LTCs and universities in the same region do not compete but complement one another. LTCs often assist local companies absorbing advanced university knowledge. The existence of LTCs is one distinctive characteristic of RTH in Japan (Fukugawa 2008).

Differences in the Structure of the Regional Triple Helix

Even though the three regions investigated displayed similar local infrastructures, their UIG collaborations differed as a result of regional industries' structures, and the technological capacity of universities or local government entities. These variations are caused by local conditions: (1) local resources, (2) local institutions, (3) industry characteristics, and (4) company characteristics.

With regard to local resources, it seems that the number of companies influence UIG collaboration. A comparison of the three

Table 2: Future Intentions to Collaborate with Academia

	Want to collaborate with academia				Do not want to collaborate with academia
	In the same prefecture	In adjacent prefectures	Other prefectures in Japan	Overseas	
Yamagata	42.7%	8.5%	7.1%	1.9%	41.7%
Gunma	47.4%	13.7%	12.1%	3.2%	41.1%
Nagano	55.7%	13.1%	18.8%	4.0%	25.8%

*Multiple responses

regions indicates that most companies are located in Nagano, so the most active UIG collaboration is evident in the region. In terms of local institutions, Nagano exhibited a positive environment for UIG collaboration. Indeed, local collaboration has been locked in because the local government and universities aggressively encourage matchmaking. Concerning industry characteristics, even though processing and assembly industries were thriving in the three regions, the characteristics of industry agglomeration differed. In Gunma, many automobile and machinery manufacturers constitute Keiretzu. A number of SMEs hold technical capacity, and local SMEs rely on these companies rather than on LTCs. Consequently, a lower percentage of companies in Gunma use LTCs than in other regions. In Nagano, independent component industry companies are pressed to develop new products or technologies. In contrast, Yamagata's agglomeration mainly comprised SMEs or branch factories, so its industry-academia collaboration was weak as a result of limited R&D function.

As for company characteristics, certain conditions affected motivation for UIG collaboration. First, the scale of capital or employees is a primary factor determining corporate behaviour. A company's capacity is a factor in collaborating with academia. Second, the type of factory or office influences attitudes towards UIG collaboration, and in turn, attitude depends on whether the company is independent or a subcontractor, and the factory headquarters or a branch. In the case of Nagano, many companies belong to the components industry, and many factory headquarters have their own development divisions.

Concluding Remarks

Issues of the Regional Triple Helix

Primarily, the Triple Helix as a concept was not distinguished with regard to scale of space (Etzkowitz and Leydesdorff 2000). However, several issues could emerge as a result of adapting the Triple Helix at the regional level. The first is a possible mismatch between universities and companies. Although the Triple Helix is discussed theoretically, it should be regarded as a specific relationship development between a particular company and university. Mismatches become especially obvious when attempting to adjust the Triple Helix at the regional level. We can assume that mismatch factors result from technical levels, behaviour, and needs of enterprises, as well as the fields or academic levels of the university.

The second issue is the number of companies in a region. For RTH, if a limited number of local companies are able to collaborate with a university, the local economy may reach its growth limit, as in Yamagata. In the three regions overall, one-half to two-thirds of companies are R&D oriented. In addition, 33%-50% cooperated with universities in the three regions, and it is extremely difficult to increase this percentage. Few new companies are being established in Japan; thus, the number of potential cooperation partners is not increasing.

The third issue is the territoriality of RTHs (Moulaert and Sekia 2003). Local companies tend to first collaborate with a proximate university (Maskell and Marmberg 1999) in terms of coordination by the local government. However, given improved exploitive ability, local companies were not necessarily interested in relationships with local universities. Universities within the region may have difficulty providing the precise knowledge that expert companies want because, compared to large, traditional research universities, they are relatively new and have limited resources. Therefore, companies tend to expand corporate activities outside the region when seeking expertise, as in the case of Nagano. RTH is not intended to be restricted to a locality; therefore, its structure may become increasingly vulnerable as it evolves.

Contextualising the Regional Triple Helix

The three selected regions have similar resources, universities, firms, and local governments, and the central and local governments have deployed similar policy options in these prefectures. However, clear differences are evident in UIG relations. The differences in RTHs are caused by the shift from space as an abstract term to place as a concrete one. The Triple Helix as a concept is in an abstract space, because the concept was established by compressed manifestation doing away with detailed conditions. However, RTH as a policy tool is in a concrete place. One reason for differences among RTHs is that RTH organisations require concrete relationships in a particular place. So policy makers have to unzip the Triple Helix in order to apply the concept to their own case.

Resources and institutions, which are crucial elements in the regional context, influence developing relations among local actors. Regional contexts - such as the research level of companies and universities, agglomeration density, sector field, spatial division of labour, and the maturities of local industries, for example - lead to regional differences in RTH.

The Triple Helix is a popular concept for regional innovation among policy makers, and its application has ostensibly diffused through most countries. Not all locations thrive as a result of regional innovation through UIG collaborations, mainly as a result of the limited capacities of local companies. To foster innovation in a region, regional policy must not adapt a single-model policy throughout. Given the necessary contextualisation, regions may not form the same type of Triple Helix. Even though the three regions surveyed here have similar conditions and have established a Triple Helix, the characteristics of each RTH differ. To clearly understand the significance of RTH, we must investigate regional conditions in more detail. Thus, RTH as a regional policy must be contextualised.

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EXPLORING THE REGIONAL TRIPLE HELIX THROUGH DESIGN KNOWLEDGE EXCHANGE

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INTRODUCTION

In the United Kingdom, there have been many national and regional initiatives to develop the application of design in small and medium-sized enterprises (SMEs). Design-led manufacturing is seen as a primary means by which SMEs in traditional industries can combat the threat of low cost overseas labour and compete successfully in the global marketplace. Furthermore, substantial public funding has been available for initiatives that encourage building clusters and networks, as well as facilitating knowledge transfer between various support organisations, including higher education, and SMEs to increase their awareness and use of design.

The following outlines four such projects delivered by teams at Birmingham Institute of Art and Design, Birmingham City University. It compares their methods, results, and outcomes, and presents some of the major findings from experiences gathered over fourteen years. The projects have involved over 500 companies and attracted over £5million in funding, primarily from the European Regional Development Fund (ERDF) and a regional development agency, Advantage West Midlands (AWM). All have focussed on the Interiors and Lifestyles cluster in the West Midlands region of the UK. 'Interiors' includes furniture and furnishings, textiles, ceramics, glass and lighting. 'Lifestyle' covers industries such as jewellery and silverware, clothing, fashion and accessories, leather goods, homewares, giftware, and artworks.

THE PROJECTS

Public funding from the national and European government invariably carries a number of constraints:

- Projects are normally tasked to achieve a number of business assists or interventions. These involve the provision of a free advisory service to a company for a few days. The business should then implement the recommendations and make changes which result in measurable benefits such as sales and jobs, which are directly attributable to the service provided by the project and realised within the project's lifetime.
- Assisted companies should be SMEs, ie those that employ fewer than 250 people, be in a prescribed geographical location, and within certain industry sectors.

However, within the boundaries of the funding requirements, projects can deliver their own programme of services to achieve their agreed targets. In this work, each project took a different approach to improve the innovative and design capabilities of companies as below:

- the Centre for Product Design Information (CPDI) [1999-2001, total value £960,000], a web-based resource of product design and related information assisting 150 companies, (Burns et al, 2001, Burns et al 2003);
- Design Knowledge Network (DKN) [2002-2008, total value £2.6m], provision of product development and design related consultancy services and business reports, assisted over 70 companies through 180 business assists, generating £2.5m of sales and nearly 70 jobs (Burns and Ingram, 2004, Burns and Ingram, 2008);
- Furniture West Midlands (FWM) [2003-2007], a networking and action group for furniture designers and manufacturers (Burns 2007); and
- Interiors and Lifestyle Futures (ILF) [2009 to date, total funding over £3m, assisted 300 companies, created 21 new businesses, network of over 400 companies], delivering workshops and building collaborative groups to enable SMEs to exploit high value markets and/or develop high value-added products.

With government funding and links into policy, delivery by a university and engaging with SMEs, all are examples of the Triple Helix in action.

Project Comparison

Table 1 presents a comparison of the four projects:

Major Findings

Certain assumptions are implicit in the funding principles:

- The notion that companies can be improved quickly and easily by the provision of the right services. Successful funding applicants need only to establish a sector's needs, devise appropriate assistance and services to address those needs.
- There is a body of willing companies ready to take advantage and implement the assistance to effect lasting and positive change.
- Beneficiary companies are capable and have the capacity to make changes.
- The link between the service provided by the project to a measurable benefit, such as new sales or jobs, is easy to evaluate and articulate.

However, both experience and analysis of the delivery of the projects challenges these assumptions:

- Similar assistance can be supplied to two companies, one effects positive changes, the other sits on the information and makes no changes.
- There are few recognised measurements of impact, other than new and safeguarded jobs and new and safeguarded sales, making it difficult to assess the effectiveness of different knowledge transfer methods and tools.
- Publicly funded projects are often set up by people with a specialist interest but with little experience of other areas, eg, knowledge transfer and exchange. This is likely to slow down, even impede, the ultimate success of projects and reduce the impact and value of the funding.

Project	Relationship	Number clients	Design impact	Strengths	Weaknesses
FWM	Many-to-many; network of companies to provide mutual support facilitated by the public sector	~200	Low	Forged new links and raised profile of industry as a whole and design in particular	Not sustainable in the longer term – once public funding and resources were removed, the group floundered and is currently inactive
CPDI	One-to-many; provision of web-based information	>1000	Medium	Analysis of sector information needs and the development of a usable website	Lack of follow-up of target users to check on assumptions made during development and an understanding of how information could be used by companies to improve or change performance
ILF	Combination of one to few (workshops), one-to-many (website and social media) and one-to one (knowledge base collaborations)	~400	Medium to high	Raised the regional capability in high-value, design-led and quality manufactured products through national and international showcasing Creation of new businesses Well-funded allowing the delivery of a range of activities to suit various needs	Companies relying on secretariat function and unwilling to put own resources and money into sustaining benefits Difficulties in reconciling three autonomous organisations with their own methodologies and priorities
DKN	One-to-one; range of bespoke consultancy services	<100	High	Intensive assistance tailored to individual needs, follow-up of company change some time after assistance provided	Once assistance complete, no further support provided to help implement advice No contact between companies

Table 1: Comparison of Case Study Projects

- National and regional policy tends to specify what it wants to be achieved, not how to achieve it. While this provides freedom for project activities, it also makes it difficult to capture lessons learnt in a constructive manner. Thus, projects continue to repeat ineffective activities and make the same errors so that public money is potentially squandered.

Differences Between Companies

During the DKN project three linked observations were made (Burns and Ingram, 2008):

- Some companies did not implement advice, despite having given positive feedback directly after the assistance.
- Where companies experienced significant benefits from the advice, there was sometimes reluctance to attribute this success to outside influences or help.
- Given the same recommendations and advice, companies behaved in different ways, ie, some would make changes and generate results, others would do nothing.

Explanations considered:

- The real needs of a company were not correctly identified. However, the project applied a rigorous process where companies had to agree their requirements at an early stage and had an opportunity to indicate that the work was not useful soon after the end of the assistance.
- The project team comprised mainly people in their late 20s/ early 30s based in a university. Some companies may then have been resistant to advice they perceived was from business-inexperienced consultants. However, this was rarely noted in the initial feedback stage.
- There was no time allocated in the five days of assistance to mentor the business and help it to put the findings into operation. The business manager or owner was responsible to implement recommendations, subject to time and resource constraints.
- The work may have been undervalued as it was free of charge at the point of delivery.

Similar observations were made with the other projects. For FWM, the initial launch event attracted only 29 companies, from a database of over 2,000, and this reduced further to a group of only nine companies that were willing to devote time and effort into building the network. In the case of CPDI, West Midlands companies were willing to be part of the directory, over 150 responding positively, but only a handful registered to use the material on the website. During delivery of ILF, companies were keen to take part in specific activities, for example, a spot on a fully -funded trade stand, but were not prepared to put in their own time, money, and resources, to repeat the activity for the same benefits.

In investigating the extant literature, the concept of absorptive capacity appeared to provide a possible explanation of companies' varying responses to the assistance provided.

Cohen and Levinthal (1990) define absorptive capacity as the capability "of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends". "Organizations with higher levels of absorptive capacity will tend to be more proactive, exploiting opportunities present in the environment, independent of current performance" (Cohen and Levinthal, 1990).

Zahra and George (2002) reviewed the notion of absorptive capacity in the context of research into the dynamic capabilities of companies. This produced a refined definition of absorptive capacity as "a set of organizational routines and strategic processes by which firms acquire, assimilate, transform, and exploit knowledge for the purpose of value creation" (Zahra and George, 2002).

From the experience of the projects, it is a useful approach to consider a company's capabilities in order to determine its information and knowledge needs. How this may be applied in a design environment is discussed below.

Measuring the Use of Design

To make a comparison of different projects in order to assess their relative efficacy in effecting changes in design awareness, usage and management, there need to be clear and agreed benchmarks and measures of design.

Design benchmarks might include:

- the existence or size of the in-house design department;
- the number of new products introduced on an annual basis;
- usage of university and other knowledge transfer channels;
- the presence of a codified company design process;
- evidence pertaining to the design being integral to business plan and management structure; and
- the number of collaborative relationships.

The ensuing measures would then be increases in the benchmarked values of the above. Measures of design impact are discussed further by Burns and Annable (2011). In the context of this work, the need to establish consistent measures across design-related projects is paramount in order to make valid comparisons.

Specialist Knowledge

There are many industry facing projects developed by universities anchored in the transfer of specialist knowledge from academia to industry. These are based on a conviction that, if properly applied, this knowledge will prove advantageous to one or more companies. However, a major difficulty of implementing a business support project, found through experience, is the range of areas of expertise and skills needed in order to deliver a successful programme. These include: administrative, planning, communication and organisational skills and foresight; budget management; good interpersonal skills; a basic understanding of economics and the fundamentals of regional development; knowledge and experience appropriate to particular businesses, ie, an aptitude for moving seamlessly from the academic environment to a business one, conversant with the milieu of each; an understanding of company development and learning; research and analysis skills; and an

appreciation of the type of knowledge to be delivered, and the methods most appropriate for its transfer.

Some of this can be bought in through specialist expertise. However, there are often budget restrictions as well as the additional complexities of managing a larger delivery team. A good project manager needs a wide range of skills in addition to the specialist knowledge deemed to be of value to industry. It is not within the scope of this paper to explore this further, but it would seem that investigating the link between the success of projects and the capabilities of their managers would be a useful topic.

Understanding of Knowledge Exchange to Complement Project Organisation

When bidding for regional funds to administer and deliver a project, applicants must evidence project management credentials as well as providing SMART (specific, measureable, achievable, realistic and timely) objectives. Indeed, projects are encouraged to be over-ambitious in their delivery promise in order to demonstrate 'value for money'.

There has been a move in various funding streams, both structural and research, to request project logic models/chains from applicants, for example, see AHRC (2007). These comprise a number of stages:

resources/inputs → activities → outputs → outcomes → impact

where:

- resources are what is needed to achieve the project's aims and objectives;
- activities are the things to be done to address the aims and objectives;
- outputs are the products that will be delivered by the activities;
- outcomes are the changes in knowledge, skills and behaviour that the activities will lead to; and
- impact is the fundamental changes in service, organisation or community that will result from the activities.

Developing such a model helps the consideration of how the project will work. However, little other guidance is supplied about the factors to consider when trying to help companies, despite a plethora of literature in the knowledge exchange, open innovation, communities of practice and diffusion of innovation arena.

Implications

In examining the lessons learned through this experience, as well as investigating the extant literature, the work has identified models that would aid the design of knowledge transfer projects. Added to the project logic model, these would provide a powerful set of techniques for the development and delivery of effective and efficient projects. However, these are not supplied in the funding guidance for applicants.

For example, in a review of the literature relating to the role of external expertise to business growth and development, Bessant el al (2005) combine the knowledge states derived from the absorptive capacity literature with six tipping points to develop a two dimensional framework to classify a company's growth states. They suggest that a company can be mapped onto this framework to identify priority areas for assistance.

Burns (2009) extends the Bessant et al (2005) model to suggest the growth stages for firms with respect to increasing their use of design. These are given in Table 2 below.

Tipping point	General considerations	Design specific considerations
People management	Delegation of tasks, managing people, establishing functional or geographical teams	Employing designer (s), working with external consultancies
Strategy	Definition of types of work to accept or markets to target, development of brand and market position	Marketing strategy, product/service development strategy, branding and communications strategy
Formal systems	Developing systems to ensure consistency and reduce risks of things going wrong	Design process, product development process, customer feedback database
New market entry (new customers, new areas, new products)	Adapting business model to the new market, scaling-up of business, understanding new customer needs	Customer needs research, market research, competitor research, trends analysis, assessment of different market opportunities, adaptation of product offering
Finance	Obtaining funds to grow and meeting funder requirements	Obtaining funds to grow and meeting funder requirements
Operational improvement	Understanding process capabilities and best practice	Understanding and defining product development; design and marketing processes

Table 2: Design Tipping Points

In exploring the Triple Helix, Farinha and Ferreira (2013) propose a Triple Helix Triangulation (THT) model built round the institutional spheres of university, industry and government. They suggest various nodes for the formation of ethics and cooperation networks as well as an overlapping centre where all three spheres combine to create the dynamics for competiveness and regional development. In considering future work, Farinha and Ferreira (2013), suggest "the empirical testing of the Triple Helix Triangulation conceptual model, as well as proposing new questions or hypotheses leading to the development of the model itself and a better alignment of the regional competitiveness perspective."

CONCLUSION

In the fourteen years of experience and research described in this paper, the lessons learned in regional schemes are difficult to promote beyond the project's boundaries. As a result, money is spent on repeating processes, not on refining experience to provide improved and genuinely innovative services. Best practice is not being collated due to a focus on new sales, new jobs, not on the processes involved. Further, while there are no clear measures of design improvements, it is not easy to compare project methodologies and approaches to define clearly lessons learned and spread best practice. As such, the Triple Helix is strong in the nodes between universities and industry, but the overlap with government is weak, making constructive feedback difficult.

Specifically there is no guidance on:

- What knowledge/information is needed to help potential beneficiaries to make positive changes to bring about growth?
- What are the best mechanisms to transfer and exchange knowledge? A sub question may be are the methods for transfer different for different types of knowledge, eg technical, say IT, and design?
- Are there any company characteristics, capabilities, and capacity issues needed to make successful transfer more effective?
- How can the most suitable companies be attracted to any scheme? How can the most appropriate companies be selected?

As a start, the author proposes a new model combining project logic models, tipping points, and knowledge transfer elements, as a powerful tool for developing projects to deliver regional innovation and competitiveness. How to link this back to policy development remains an area for exploration.

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Prior to joining the University, Kathryn spent fifteen years in industry, primarily in manufacturing companies ranging from SMEs to multinationals, and encompassing roles in software engineering; project management; product management and marketing. Kathryn has a BSc and MPhil in Chemical Engineering from the University of Leeds, and a Master in Business Administration from the University of Bradford.

REWEWING THE TRIPLE HELIX IN A CONTEXT OF SMART SPECIALISATION

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ABSTRACT

Europe has not been very fast in recovering from financial crises. This article elaborates on the following questions: Why is the Triple Helix one of the basic requirements in answering the grand societal challenges? What is the role of the respective parts of the Helix and, in particular, of the knowledge institutions? What new elements does the EU Smart Specialisation policy bring to renewing the Triple Helix concepts?

A strong message coming from the many opinions of the EU Committee of the Regions (CoR) is that there is a huge gap between the latest research knowledge and real-life practice. The article will review this gap in more detail and also respond to the question: What do we need to do to fill it?

The evidence supporting this article comprises three interwoven sub-areas that the present author has invested in for years: 1) the strategic EU level where Mr Markkula contributed as a CoR member and rapporteur in several of the statements revolving around the topic, b) the Helsinki Region level where Mr Markkula acts in several positions of trust, c) the integrative local level tying together the Triple Helix operating groups and where Mr Markkula has extensive experience from university tasks and city positions of trust.

The key focus areas and messages of this article can be summarised with the following. The first two describe the frame of recent developments, and the third focuses on the model itself in modernising the Triple Helix model.

Firstly, the CoR stresses that Smart Specialisation is a regional policy framework for innovation-driven growth. What distinguishes the EU Smart Specialisation policy from traditional industrial and innovation policies? The answer, in brief, is that the difference is the process highlighting the "entrepreneurial discovery": an interactive and innovative process in which market forces and the private sector together with universities discover and produce information about new activities, and the government assesses the outcomes and empowers those players most capable of realising the potential. Smart specialisation strategies are much more bottom-up than traditional industrial policies.

Secondly, globalisation has changed the economic landscape of growth and competitiveness. The number of traditional industrial jobs has been, and will be, decreasing rapidly in Europe. The cornerstone of economic transformation and societal renewal is a mindset change towards entrepreneurship and innovation. New jobs are created through structural changes and entrepreneurship, and by integrating digitalisation and key-enabling technologies into systems and processes in all industries in private and public sectors. Achieving the targets requires conscious learning to be integrated everywhere - emphasised by the full use of ICT.

Thirdly, Europe needs a dynamic understanding of regional innovation ecosystems where public, private, and third sectors learn to operate together. The Triple Helix concept needs to be taken into active use - but in a modern form. Europe needs pioneering regions to be forerunners in implementing the Europe 2020 Strategy and in speeding up the necessary transformation.

EUROPE 2020 STRATEGY

With the prolonged economic crisis, finding solutions to the grand societal challenges has become centerpiece in both political decision-making and university research. When the EU renewed its own research framework programme practices by identifying its goals and policies for 2014-2020, two new pillars, Industrial Leadership and Societal Challenges emerged next to Scientific Excellence. Political consensus exists also on that the objectives of Europe 2020 Strategy cannot be reached without strong regional activities on place-based research, development, and innovation policy. The key question is the way in which the required large-scale changes can be achieved. This cannot be reached by traditional measures and structures. The Committee of the Regions has called for pioneering regions to form European consortiums integrating different capabilities to create ground-breaking societal innovations for Europe-wide use[1]. The focus needs to be in regional innovation ecosystems implementing

[1] CoR Committee of the Regions (2012), Opinion on "the Role of Local and Regional Authorities in Achieving the Objectives of the Europe 2020 Strategy", CdR 72/2011 final, rapporteur Markku Markkula.

Research and Innovation Strategies based on Smart Specialisation RIS3 and the Digital Agenda for Europe DAE (see Figure 1).

In many member states and regions in Europe there is a long tradition in Triple Helix, the concept comprising three actor groups: universities and other research-oriented institutions, industry, and cities and other public -sector organisations. Initially, industry operates in the Triple Helix as the locus of product development and production, government as the source of contractual relations that guarantee stable interactions and exchange, and the university as a source of new knowledge and technology.

Figure 1: Orchestration to speed up and scale up the EU 2020 implementation and Focus on Regional Innovation Ecosystems

The roles and responsibilities of these institutional spheres are, however, changing. For decades, the innovation was closely linked with product development, thus being mainly the responsibility of the business sector. Now in the knowledge society, the universities are taking a more prominent role in innovation, especially in creating favourable conditions for open innovation mentality.

There is an accelerating movement toward collaborative relationships among the three major institutional spheres, in which innovation policy and innovation practices are increasingly the outcomes of interaction and co-creation rather than a prescription from the government.

In addition to fulfilling their traditional functions, each institutional sphere also "steps into the shoes of the others", with a deep understanding of the innovation processes and local ecosystems, as well as performing new roles needed for co-creation.

Institutions taking non-traditional roles are viewed as a major potential source of innovation. The increased importance of knowledge, and the role of universities as incubators and accelerators for startups and growth companies, have given them a more prominent position in the institutional firmament.

The transformation with respect to the Triple Helix model means above all[2]:

1. More systemic strategic thinking in defining and implementing regional innovation strategies based on smart specialisation:
   a. Increasing smart city and smart region initiatives;
   b. Prioritising the regional activities and strengthening the base for focused activities;
   c. Building critical mass based on European-wide strategic partnerships.

2. Focusing more on societal challenges and as a result, broadening the innovation base:
   a. Increasing a general motivation towards innovation;
   b. Stressing the importance of the real-life and real-case approach;
   c. Moving towards Open Innovation 2.0.

3. Recognising the crucial role of regional innovation ecosystems to be based on the co-creation culture and the network of innovation hubs:
   a. Creating living labs and innovation test-beds for knowledge co-creation;
   b. Encouraging bottom-up activities by creating new arenas as innovation hotspots;
   c. Moving towards experiments, demonstrations and rapid prototyping.

Some of these alignments deserve closer treatment to concretize the key questions posed in this article.

DIGITALISATION

The CoR has stressed that, as many phenomena of the digital society have already demonstrated, significant transformation takes place from the bottom up. And further on, the need of balancing technological, design and social innovation in both the public and private sectors, all of which are influenced by far-reaching digitisation. What is behind this? What does this mean for the regional development reviewed from the perspective of cities and regions? And with respect to modernising the Triple Helix model?

The trend in top global businesses has already for several years been a corporate focus on the core intangible and tangible niches of products, including companies' core processes, core technologies, core competencies, as well as their main customer groups. The importance of responsiveness and innovativeness has grown hugely over the past few years in all types of business activity and work - including policy-making. In the global and digital age, pioneers and potential trend-setters are more and more often those who

[2] *These alignment summaries are evidenced, on the one hand, by the EU-level examination based on my CoR and other experiences in 2010-2014 and, on the other hand, bottom-up scrutiny based on my experiences from Aalto university preparations in 2007-2009 and launching 2010-2014.*

succeed, because they open the way and set the ground rules for action. It is not necessary to be a leader in every sphere, what matters is the state of mind. It is usually enough to build with sufficient confidence on knowledge and practices developed elsewhere. Digitisation provides an enormous opportunity.

Digitisation drives change, and convergence towards digital services is speeding up. New business ecosystems and value creation arenas are often driven by new consumer behaviours - as a result of user-centric designs and openness. They challenge top-down construction approaches inherited from the old, analogue world.

One of the final obstacles to developing a future based on digital services has been removed by a technology carrying the brand name "the cloud". Cloud technologies provide access to the best service available, at any time and in any place. This way of developing and producing services challenges the traditional type of service thinking, where "being local" is described as a service attribute in the literature (eg asking for local servers, or hardware "in every corner"). All of this puts service design at the centre of every value proposition. Thus, when creating services for truly smart cities where consumers abandon old memes and old user interfaces, service providers need to accelerate the learning process working alongside their customers. The competition is fierce, and currently many players claim to have created the dominant concept. But the game is not over yet, on the contrary, it has just begun: everything that can be digitised will be digitised.

In Europe, evolution has made progress through too little steps through incremental innovations. As the prolonged crisis has shown, the working life would have needed radical innovations. The human mind, however, is too satisfied with what it is familiar with and what earlier functioned as least moderately. So far we have not been ready to implement opportunities opened up by digitalisation.

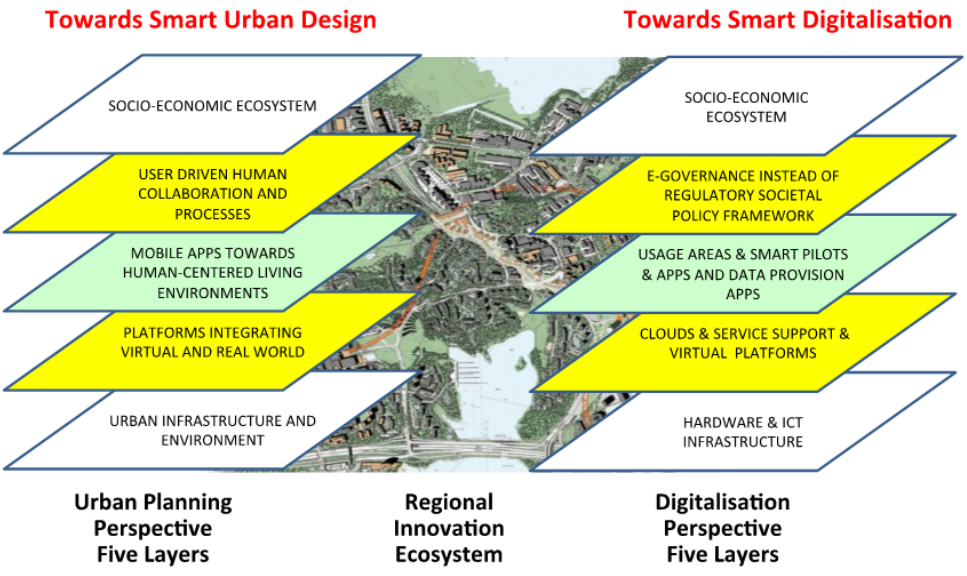
Digitalisation means new forms of collaborative work, and also new ecosystem creation, evolution, and business models. Francesca Bria[3] has proposed a synthetic model "Future Internet Ecosystem for Smart Cities and Regions" that can help to understand the evolution of the Internet ecosystem and to encourage a productive conversation on the possible models and strategies for Europe to exploit the technological and commercial opportunities in the digital economy, while fostering societal innovation. The model is based on the frame of five layers (see Figure 2, the layers on the right) describing a holistic approach with not only the technological requirements and developments, but also regulatory, social, and business issues: constituencies, governance, applications, cloud platform, and ICT infrastructures.

Europe needs the first and second layers of constituencies and regulations to be structurally coupled with the technology and business infrastructure layer and the application layer. Due to the impact of services enabled by the Future Internet on the life of citizens, cities, and regions, should therefore be fully involved in the process of governance related to the deployment of digital infrastructures and Internet-enabled services. They represent a critical mass, able to scale up and reuse the new applications and services developed.

In order to foster entrepreneurial innovation on smart services and the Internet of Things IoT, Europe needs to have a technological infrastructure with common open specifications and reference implementations around technical standards, trust, privacy and security and business regulatory frameworks. This will, in turn, foster social entrepreneurship and civic innovation, enabling the creation of smart, interoperable services and applications by many potentially unforeseen European actors.

Within "the Energizing Urban Ecosystems" research programme (focusing on Espoo Innovation Garden, 20 m€, 2012-2015, industry driven), the focus is on regional innovation concepts. The regional information modelling will, through the research in 2014-2015, be complemented with the multi-dimensional urban development approach, which combines the physical and digital infrastructures on shared innovation platforms.

The regional and city decision-makers must address the urban development challenge as a mutually complementing, integrated system of 1) socio-economic objectives set by the active user-



Markku Markkula, Research Plan, Energizing Urban Ecosystems, 2014

Figure 2: Integrating Urban Design and Smart Digitalization Platforms

[3] *Bria, F. (2012) New governance models towards an open internet ecosystem for smart connected European cities and regions, Open Innovation Yearbook 2012, European Commission.*

driven society, 2) e-governance practices encouraging renewal capacity building, 3) active use of emerging and enabling technologies, 4) facilitating services and mechanisms operating through open innovation platforms, and 5) urban infrastructures and attractive living environments.

'Smart Urban Design' can be portrayed as a layered structure of built and natural environments, integrating physical and virtual platforms, human-centric applications, and user-driven collaborative processes, which constitute the emerging socio-economic system. This 'Design' should and could be improved with digital means and with enabling digital technologies. Accordingly in future cities, the hardware and ICT infrastructures become an integral part of urban infrastructures, ICT platforms merge with industry platforms, smart living labs and mobile apps complement the human-centric living environments, e-governance processes match with user-driven needs and systems, thus extending the reach, depth, and relevance of the re-engineered socio-economic realities.

With respect to modernising the Triple Helix, this development has a strong influence on innovation ecosystem development, urban planning, and construction industries, as described with the five layers on the left in Figure 2. The special emphasis is on the experiments and processes needed in the desired transformation.

SMART SPECIALISATION

The adoption of the new multi-annual financial framework 2014-2020 states that at least EUR 100 billion of European Structural and Investment Funds (ESIF) is available to Member States to finance investment in innovation, in line with industrial policy priorities. Investments in innovation by ESIF will be guided by the concept of Smart Specialisation, to allow Member States and regions to concentrate investment on their comparative advantages and to encourage the creation of cross-European value chains. Building on the work of the task forces, the Commission proposes that Member States combine regional and industrial policy tools to create Smart Specialisation Platforms to help regions roll out smart specialisation programmes by facilitating contacts between firms and clusters, enabling access to innovative technologies and market opportunities[4].

Not only the Structural and Investment Funds but also Horizon 2020 should provide funding for the development of the Triple Helix activities related to innovation and valorisation of knowledge. Modernising the Triple Helix is of crucial importance in challenging and supporting regions towards Smart Specialisation and in creating a stairway to European excellence through increased collaboration and bench-learning. For this, Horizon 2020 needs to include funding for pioneering universities and regions to closing the research and innovation divide in Europe, by teaming excellent research institutes and less-developed regions up, by recognising excellence in less-developed regions, and by facilitating innovation policy learning at the regional level.

In the context of Europe 2020, smart specialisation emerges as a key element for place-based innovation policies. Regional RIS3 strategies (Research and Innovation Strategy based on Smart Specialisation) can be defined[5] as follows:

- They focus policy support and investments on key national/ regional priorities, challenges and needs for knowledge-based development, including ICT-related measures;
- They build on each country's/region's strengths, competitive advantages and potential for excellence;
- They support technological as well as practice-based innovation and aim to stimulate private-sector investment;
- They get stakeholders fully involved and encourage innovation and experimentation;
- They are evidence-based and include sound monitoring and evaluation systems.

RIS3 is not just an important document. For each region more important is that:

- RIS3 is an economic transformation agenda. RIS3 is a dynamic and evolutionary process (not a structure) deeply grounded in an entrepreneurial discovery process (not a one-off action) where governments are rather facilitators than in a position to command and control. RIS3 is for innovation leaders and for those lagging behind.
- The smart specialisation approach is not just about a more focused and limited approach to cluster funding. RIS3 is a structural reform to upgrade the entire business environment and innovation ecosystem in the region.
- Smart specialisation is opening up important opportunities for joining forces, matching roadmaps and building more world-class clusters.

What do these mean in practice? RIS3 should be the main instrument guiding the implementation of the regional policy programmes. In the Helsinki Region, RIS3 integrates EU-level activities to the more traditional local and national policy.

This is not so much a question of how to allocate structural and regional EU development funds to different administrative sectors and action lines and further to different endeavours, but rather how to direct the funding most effectively to achieve the selected change targets and how to incentivise the top expertise for successful collaboration with the funding. The target is to double the impact, productivity, and other benefits during the new programme period 2014-2020 compared to the previous one. This means a demanding change process in the administration and decision making - shared ownership and strong stakeholder commitment being the key principles in reaching the targeted results.

Achieving the high-level results defined in the Helsinki Region programme necessitates most recent innovation expertise to support the regular development efforts of municipalities and other actors.

[4] *EU Commission (2014) European Industrial Renaissance, Communication from the European Commission (COM(2014)14*

[5] *JRC S3 Platform (2012) Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3)*

In RIS3 implementation, the RDI expertise of especially universities, universities of applied sciences and research institutes plays a significant role, as do endeavours where the major local RDI organizations strengthen the capability, and whose participation provides an absolute prerequisite for the active application of the knowledge created through Horizon 2020.

Table 1: RIS3 steps in the process for the Helsinki Region [6]

Smart Specialisation Strategies should be iterative, tailor-made policy processes
Step 1: Regional Policy Programme: Scenarios and SWOT and Audit à Spearheads
Step 2: Stakeholder commitment and culture of collaboration à Shared ownership
Step 3: Use the best global knowledge à Strategic alliances
Step 4: Strong links with Europe 2020 à European Partnerships
Step 5: Define a coherent policy mix and action plan à Experimenting and Rapid prototyping
Step 6: Integrate monitoring and evaluation mechanisms à On-going process of renewal

The Helsinki Region's RIS3 has the following points of action (some already fulfilled, some on the process):

1. A collaborative scenario process was carried out 2012-2013 within the Greater Helsinki Region.
2. The main targets up to 2040 were defined by the Helsinki Regional Council in cooperation with the municipalities.
3. The process for the Helsinki Region policy programme was organised in 2013 with stakeholder hearings and open consultation. The outcomes including the vision and strategy 2040, as well as the strategic priorities for 2014-2017 were approved by the Regional Council in December 2013.
4. The implementation plan with the spearhead mega-endeavours is approved.
5. The changes are going on in re-organising the operational base of the Steering Board for using structural funds and running the RIS3 process.
6. The ongoing process phase aims to define in more detail the ecosystems and roadmaps for each spearhead mega-endeavour. All stakeholders are engaged. Universities and other innovation key actors are playing the major role in this.
7. The most challenging activity is integrating points 5 and 6 targeted to new RIS3 governance concepts, which are based on orchestration and synergic implementation processes.

The Triple Helix model is no longer enough in the context of Smart Specialisation. The quadruple Helix allows for a variety of innovations other than the ones strongly based on technology or science, in the spirit of the wide concept of innovation at the basis of RIS3, but it requires significant flexibility, adaptation of processes, acquisition of new skills, and potential re-distribution of power among organisations[7].

In the Helsinki Region, the RIS3 process, as well as other activities closely linked to that, is carried out by taking this into account. As Finland has a long tradition in effectively implementing the Triple Helix model and as the citizens are actively engaged in public-sector processes, the Quadruple Helix thinking and operations are natural means to speed up innovations. In the RIS3 processes, we even go one step further - modernising the Triple Helix means focusing on the regional innovation ecosystems.

LOCAL DIGITAL AGENDAS

The ongoing global change will have an enormous impact on everything. The European Parliament resolution of 5 May 2010 on a new Digital Agenda for Europe stated: "this digital revolution can no longer be thought of as an evolution from the industrial past, but rather as a process of radical transformation[8]". And the opinion of the Committee of the Regions approved on 6 October 2010 conveyed the same message: "the Information Society has been a tremendous accelerator of economic and social progress. The required transition from an Information Society to a Green Knowledge Society can even be seen as a type of paradigm shift[9]."

Smart Specialisation and Local Digital Agendas should be integrated as effective instruments for change. To present one example from the Digital Agenda flagship, there is list of initiatives where regional and local authorities can clearly deliver results: e-government to improve supplying of public services in education, health, social inclusion, and territorial planning; to increase the interoperability between central, regional, and local administrations; to enhance literacy in ICT; to raise awareness on stimulating the infrastructure upgrade; to support the development of public-private partnerships involving local and regional authorities; and to support ICT development for SMEs in the area of public ICT services, to name but a few.

This development will, however, not take place on its own. Strong commitment to change together with prioritisation of measures is needed. It is much easier to write well-meaning programs that look good on paper, than actually focus resources to enable the development and implementation of necessary innovative solutions. A Local Digital Agenda is needed for this purpose. Conceptualisation and orchestration are the right words to describe what is needed. These include a definition process to enable decision-makers to recognise grand societal challenges and commit themselves to the radical renewal that is required.

The Finnish National Digital Agenda (based on Digital Agenda for Europe) was a result of an extensive process engaging decision-makers and stakeholders. What can the rest of Europe learn from this exercise? Focusing on leadership issues and change management, the critical success factors (based on the lessons

[6] *Developed for the use of Helsinki Region by Markku Markkula, based on Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3), JRC S3 Platform, 2012*

[7] *JRC S3 Platform (2012), Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3)*

[8] *European Parliament (2010), Resolution on a new Digital Agenda for Europe.*

[9] *CoR Committee of the Regions (2010), Opinion on "the Digital Agenda for Europe", CdR 104/2010 final, rapporteur Markku Markkula.*

learned through this national process) include the following:

1. Strengthening the central decision makers' and actors' understanding of digital economy in order to enable the renewal.
2. Promoting radical customer-centeredness and new practices in leadership, both on strategic and operational levels.
3. Interconnecting small-scale project and pilot activities to a whole supporting the same goal.
4. Renewing the working culture, since silos in management prevent efficient service development. The member-state level, local level, third sector and businesses must be open-minded and cross-organisational boundaries in seeking working practices for developing customer-centred production and optimising costs.
5. Increasing the continuity of knowledge society policy and implementation as well as accelerating the reaction speed in answering the grand societal challenges and changing needs.

This requires flexible planning and prioritising, commitment to a common determination, and allocating resources according to the changing needs. The ability to lead the big picture is crucial, together with the ability to motivate the actors for multidisciplinary, multi-sector and multi-level collaboration.

Towards Smart Cities

The 'smart city' concept is one of the EU focus areas in driving sustainable growth and improving quality of life. The enablers include investments in modern ICT infrastructure and e-services, as well as in human and social capital. The drivers of change used to be technological innovations, but now the drivers are above all regional renewal capital and the multidimensional effectiveness of innovation ecosystems. This requires modernising the Triple Helix collaboration culture and increasing regional responsiveness through citizen participation.

The key conclusions from digitalisation with respect to modernising the Triple Helix model and integrating this to the smart city development constitute, above all, for the next years for the EU policy:

1. Digitally-driven transformation is unstoppable - speed up the economic recovery by removing the barriers of the European Digital Single Market …
2. Digital Agenda for Europe needs to focus strongly on human aspects of encouraging the effective use of ICT and engaging all actors - need for European / national / local digital agendas and action plans …
3. European priorities need to be on investments to build competence capacity - synergy between R&D&I, renaissance of the industrial base, network culture, apps/clouds and open data, e-skills …
4. The focus of the European flagships implementing the Europe 2020 Strategy need to be clearly transferred on regional and local levels - bottom-up experimenting, rapid prototyping …
5. The best experiences in implementing and further developing the Triple Helix need to be adopted throughout Europe - widening participation, focusing more on joint co-creation cultures and regional innovation ecosystems …

Increasing bottom-up collaboration is a must in order to reach the Europe 2020 targets. The experiences from the Aalto University and the Espoo Innovation Garden initiatives provide evidence that the strong commitment, active participation, and shared ownership, are the key starting points for a new mentality.

In making smart cities a reality in today's policy requires piloting and experimenting with the help of testing and implementing demonstration projects related to sustainable and inclusive development: studying, piloting, demonstrating and verifying new models. This leads to the mentality of entrepreneurial discovery in collaboration with the significant businesses, universities, and research institutes of the region. This also requires ambitious targets in taking a pioneering role in the full use of digitalisation in creating partnerships to a new working culture, innovative concepts, and methods to support them.

To tackle the societal challenges, the decision-making processes need to be reviewed and new forms experimented with by using the best international knowledge and collaboration expertise, developing the required competencies of the decision-makers, as well as methods to support them.

In the City of Espoo, we have created a new governance concept with five policy programmes, each having a steering group of five top decision-makers from the City Council and top civil servants. The themes of these policy programmes are: 1) Innovation and Entrepreneurship, 2) Sustainable development, 3) Youth Inclusiveness, 4) Active Healthy Ageing, and 5) Citizen Collaboration and Active Partnering. The ambitious targets for each programme are set by the City Council. The planning phase is over, and the implementation has started. These programmes are based on multi-sectorial, multi-discipline, and multi-stakeholder collaboration both inside the city organisation and outside with public-private partners.

In practice, the real challenge is in creating synergy by integrating and orchestrating the huge number of bottom-up activities of the City itself, as well as many others. This means a new culture of what can be called mega-endeavours or project portfolios, and we use this in an important role in modernising the Triple Helix culture.

Orchestrating the Regional Innovation Ecosystem

The EU Committee of the Regions CoR[10] has stressed that regions need new arenas as hotspots for innovation co-creation. These could be described as "innovation gardens" and "challenge platforms", which together form prototype workspaces for inventing the future. These are needed to address challenges - from small local challenges to major societal challenges at global level. RDI activity is therefore required that will pilot and create prototypes of 1) spatial configurations with physical, intellectual and virtual dimensions, and 2) orchestration and knowledge management toolkits needed to address challenges.

To become smart, cities need to create innovation hubs and these need to have hub actors to take over the coordination task of hub planning and management functions and concentrate their efforts

on building up the necessary partnerships for systemic, reciprocal success. The trend in forming these hubs is to encourage bottom-up initiatives in flexible operations through new innovation institutes focusing on the new mindset and environment required for user-centric design, co-creation, and rapid piloting.

These new institutes, most of which have only been set up in the past few years, are flexible entities with a collaborative approach. Examples include: Incubators and Accelerators, Living Labs, Entrepreneurial Hubs, Development Labs, Social Innovation Labs, Fab Labs, Societal Innovation Learning Camps, and Future Centres. They usually operate as associated entities of universities, municipalities and businesses. They combine new, open operating practices, use of social media, new intellectual property rights and funding practices, a broad stakeholder network and entrepreneurship[11].

The main pre-conditions for a positive start include (see Stage 1 in Figure 3); 1) real potential for an innovation activity within the existing regional system, and 2) a willingness to utilize this potential. It is important to start ecosystem planning with a comprehensive assessment of the regional potential. This includes auditing the existing infrastructures, the key research strengths, the regional risk-taking capacity, and the usability of regional intellectual asset stock for private companies.[12]

It is equally important to audit the cities and other regional key actors and their role in the future development. This includes assessments of the cluster management capacity of the public support services, willingness to create platforms and provide funding for innovation activities, and ability to commit the required resources to international collaboration. Academia must be assessed for its overall research and education abilities, as well as its capability to play a crucial role in creating commercially successful innovation and other intellectual properties.

Stage 2 on the development path refers to the joint activities to initiate steps towards the regional innovation ecosystem. The obligatory basic elements in structuring the innovation landscape and in supporting the innovation actors in their joint activities are**:**

1. Draft the master plan for the entire ecosystem with concrete links to urban planning;
2. Analyse, build up and complement local networks for quality service provision, both public and private;
3. Provide hands-on support for intra-ecosystem networking, information exchange and cross-domain communication.

However, the key success factor is how well the orchestration of joint initiatives is carried out by serving the synergy throughout all existing projects. This orchestration has several focus areas, as described by stage 3 in Figure 3. The orchestrator(s) plays a crucial role in channelling resources to and within the regional ecosystem and the local innovation actors, as well as in building a positive brand image for the region.

Europe needs pioneering large-scale research programmes such as Finland's Energizing Urban Ecosystems (EUE) programme (EUR 20 million, 2012-2015, industry driven research), focusing on creating an evidence-based and well-documented concept for globally leading, regional innovation ecosystems. The main research will be conducted in the Espoo Innovation Garden area (previously called T3), one of Europe's pioneering innovation ecosystem test-beds. It will demonstrate how to effectively implement the key enabling success factors of the Europe 2020 strategy, and how to modernize the Triple Helix model by enhancing collaboration between the city, universities, research institutes and diverse enterprises through the Knowledge Triangle approach.[13]

The key EUE programme-level research questions have been defined as follows:[14]

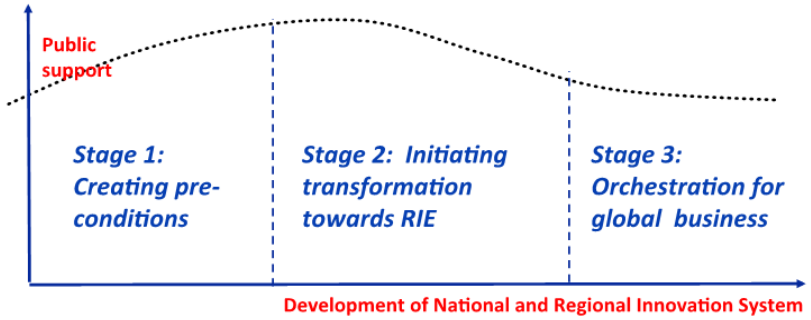
1. What kinds of elements and processes are critical in creating dynamic, sustainable, energetic and evolving urban ecosystems, which are capable of responding to the complexities of urban actors and their ever-changing needs and behavioural patterns?
2. What are the mechanisms required to increase the renewal capital and to maximise the potential value of available and emerging enablers (e.g. advanced technological solutions, gradually converging PPP intelligence, and accumulating design competencies) for modern urban development?

The focus and the platform of this research, as well as many other RDI activities, is the Espoo Innovation Garden - a five km2 area with the Aalto University Campus at its core - is a living community with 110 nationalities, 5 000 research scientists, over 800 companies, 16 000 students, and 43 000 residents. A great deal more is on the way, with plans and commitments to invest 5 billion euros in infrastructure and buildings for businesses, housing, education, and research, in this area over the next ten years. The driver of change for success is its entrepreneurial mindset. The main activities with respect to the innovation ecosystem and societal impact are defined in Table 2 (compare stages 1 – 3 in Figure 3). The focus of Table 2 is on Aalto University activities, keeping in mind that there are also many other actors influencing the development of the Espoo Innovation Garden.

Concluding Remarks

The once-lauded Triple Helix approach is not dynamic enough to meet new challenges: a Quadruple Helix at least is required, where

[10] *CoR (2013), Committee of the Regions, Opinion "Closing the Innovation Divide" CdR 241/2012 final, rapporteur Markku Markkula.*
[11] *id*
[12] *Viitanen, J, Markkula, M and Ripoll, C. (2013) The Changing Realities in the Systemic Development of Regional Innovation Ecosystems "From Triple Helix to RIE", Published in Lappalainen, P and Markkula, M. (Eds): The Knowledge Triangle - Re-Inventing the Future. European Society for Engineering Education, Aalto University, Universidad Politecnica de Valencia.*
[13] *Markkula, M and Kune, H. (2012) Pioneering regions and societal innovations as enablers for the Europe 2020 strategy, Open Innovation Yearbook 2012, European Commission.*
[14] *Energizing Urban Ecosystems Programme, Research plan 2012.*



Stage 1:
1. Potential of existing innovation systems (=audits)
2. Willingness to utilise this potential (=active participation)

Stage 2:
1. Joint R&D
2. Joint innovation capacity
3. Joint commercialization
4. Joint platforms

Stage 3:
1. Mindset change
2. Knowledge Triangle
3. Integrating innovation activities with research programs

Source: Jukka Viitanen & Markku Markkula & Carlos Ripoll, article in the Knowledge Triangle book, 2013

Figure 3:
The Development Path of the Regional Innovation Ecosystem (RIE)

community is the fourth strand. The approach needs to be modernised, and intensive engagement with the activities of regional innovation ecosystems is needed in order to bring this operational concept and culture up to date[15].

Universities together with companies are, still, the drivers of co-creation and renewal. However, the best laboratories for breakthrough innovations today are no longer traditional university facilities, as such, but regional innovation ecosystems operating as test-beds for rapid prototyping of many types of user-driven innovations, based on transformative and scalable systems. Innovation communities operate as ecosystems through systemic value networking in a world without borders. Innovation processes are strongly based on demand and user orientation and customers as crucial players in innovations. Innovation strategies focus on catalysing open innovation and encouraging individuals and communities towards an entrepreneurial mindset and effective use and creation of new digitalised services.

To be able to tackle the Grand Societal Challenges, we need to create synergy with the RIS3, Living Labs and hundreds of projects, as well as to mobilise the best knowledge and resources. Innovation is often based on experimenting and implementing demonstration projects by partnerships, applying the best international knowledge and creating new innovative concepts.

To take an example, the Helsinki-Uusimaa Regional Programme defines that the strengths of innovation activity in the region stem from a user-driven and open operational model that is based on real-life development environments, which can, for their part, actively support both local and international R&D projects. The model brings together collaboration between universities, universities of applied sciences, municipalities, and SMEs[16].

The objective of the Helsinki-Uusimaa Region is set to become an international centre of innovations and a pioneer in the deployment of innovative products and services. To achieve this, the measures focus especially on 1) support business and innovation through urban planning. 2) Support actions to remodel and network the Helsinki-Uusimaa Region's innovation structure, and 3) Promote the development of new service solutions by utilising open data and societal and social innovations[17].

The other set of spearhead measures is targeted on the positioning of the Helsinki-Uusimaa Region as a hub for innovative business activity. To achieve this, the measures focus especially on 1) strengthens the region's status as an international hub for start-ups. Promote measures that create incentives and small-scale financing instruments for early-phase start-ups. Support the networking and internationalisation efforts of start-ups. 2) Increase interest in entrepreneurship among young people and students at all levels of education. Supporting an entrepreneurial culture and student entrepreneurship strengthens entrepreneurial foundations and enables the successful succession of businesses[18].

These measures materialize the theoretical and political alignments described in the Smart Specialisation section of the present article. Also the Digitalisation section depicts measures essential for goal achievement, analysing how the most recent developments in digitalization can be integrated into changing of practices in urban planning. The steps in Table 1 help us implement the theories illustrated in Figures 2 and 3. Table 2 shows that the targeted change requires extensive and in-depth collaboration and commitment.

For the regional level, this means learning a new culture of targeted orchestration of open innovation activities and major transformation operations, as well as creating a regional innovation ecosystem architecture. Innovation is accelerated through partnerships experimenting with and carrying out rapid prototyping. The Triple Helix model is still valid but in a modernised form.

[15] CoR (2013) Committee of the Regions, Opinion "Closing the Innovation Divide" CdR 2414/2012 final, rapporteur Markku Markkula.
[16] Helsinki-Uusimaa Regional Programme (2014)
[17] id
[18] id

Table 2: Applying the development path of the Regional Innovation Ecosystem

Stage 1 (2008-2013) focusing on 3 groups of enablers

1. **Aalto University** started in 2010 as a result of a merger three prestige universities
   a. Multi-disciplinary = Science and Technology & Economics and Business & Art and Design.
   b. Extensive Research Assessment Evaluation in 2009 and Education Assessment Evaluation in 2011.
   c. Strategy 2020: a strong focus on top research to create a strong base for innovation and entrepreneurship.
2. **Encouraging bottom-up activities**
   a. Establishing Aalto Factories (Aalto Design Factory…)
   b. Societal Impact (Executive Education and Professional Development, Aalto Global Impact, Aalto Camp for Societal Innovation ACSI…)
   c. Platforms (Aalto Entrepreneurship Society & Startup Sauna, Learning Hubs, Urban Mill…)
3. **City Planning and Energizing Urban Ecosystems**
   a. Defining the urban vision for the T3 area (Espoo Innovation Garden).
   b. Plans for the university campus development
   c. New research (creating synergy through Energizing Urban Ecosystems programme)

Stage 2 (2012-2015) focusing on 3 groups of enablers

1. **Digital City and Sustainable City & Inclusive City**
   a. Aalto University campus development (Green campus, Lively campus, Well-connected campus…)
   b. Scientific excellence on the Regional Information Modelling and Integrating Real and Virtual Worlds
2. **Open innovation Platforms**
   a. Further development of Aalto Platforms
   b. Integrating open innovation and digitalisation
3. **Espoo Innovation Garden as a Living Lab**
   a. Energizing Urban Ecosystems and other research
   b. Espoo Innovation Garden as an open collaborative process
   c. Integrating university campus with an attractive business environment and a modern residence area

Stage 3 (2014-2016) focusing on 3 groups of enablers

1. **Orchestration**
   a. Integrating Aalto Platforms with regional and global activities
   b. From separate projects to orchestration of mega-endeavours
   c. Implementing prof. Nonaka's Ba and Flow
2. **Implementing Knowledge Triangle**
   a. Conceptualising Knowledge Triangle activities
   b. Integrating mental and physical development
3. **From Triple Helix to RIE** (regional innovation ecosystem):
   a. Open Innovation 2.0
   b. Aalto Entrepreneurship Ecosystem
   c. Aalto Factory Concept 2.0

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Innovation Ambidexterity: Addressing Gaps in Theoretical and Empirical Interpretations

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Innovation Ambidexterity

Given the fast-paced pervasive change induced by modern digital technologies managers of any technology-based firm (TBF) face the same crucial question: *How to tap the value of today's capabilities and prepare for tomorrow's cutting edge innovations?* Innovation ambidexterity, conceptualised as the organisation's capability to exploit old certainties while simultaneously exploring new opportunities, has often been argued to be the best way for firms to organise to ensure continuous technological innovation, organizational learning and, ultimately, long-term performance and growth (Benner and Tushman 2002, 2003, March 1991, Tushman and O'Reilly 1996). More descriptive empirical research advocates the presence of exploration and exploitation, and the optimal balance between them as crucial elements of a corporate strategy for firm longevity (Birkinshaw and Gibson 2004, Burgelman and Grove 2007, O'Reilly III et al 2009, O'Reilly III and Tushman 2004, O'Reilly III and Tushman 2011). However, the popularity of the terms exploration, exploitation and ambidexterity in managerial literature and practice may be outpacing their conceptual development. Theoretical scrutiny of the concept of innovation ambidexterity seems to provide more questions than answers on the nature of the proposed balance between exploration and exploitation activities as it struggles to disentangle the two in a variety of application contexts.

Existing Issues of Innovation Ambidexterity

Whereas exploration and exploitation are seen as inherently conflicting at a single organisational level, and extensive research is dedicated to exploration-exploitation trade-offs (Leonard-Barton 1992, Levinthal and March 1993, March 1991), there is considerably less understanding of potential complementarities and spill-over effects between exploration and exploitation over longer periods of time in either a single context or across units (Katila and Ahuja 2002). Reconceptualising ambidexterity as a behavioural rather than structural capability (Gibson and Birkinshaw 2004, McCarthy and Gordon 2011) or raising the level of analysis to differentiated organisational structures (Birkinshaw and Gibson 2004, Kauppila 2010) or, to the broader industrial landscape (Chesbrough 2003, Lavie and Rosenkopf 2006, Lavie et al. 2010, Powell et al. 1996), allows theorisation of exploitation and exploration as orthogonal and non-competing (Gupta et al. 2006), but leaves us with the challenge of distinguishing between the two, which in turn complicates the analysis of the interactive ambidexterity effect. Switching or combining levels of analysis necessary for a holistic and dynamic study of the firm blurs the notions: an individual employee might consider their work inventive and explorative, but it may be advancing the firm along the existing trajectory, therefore, amount to exploitation. On the other hand, various exploitative efforts of individuals might accumulate into qualitatively new recombinations, i.e. result in exploration at the level of the firm.

Academic debate on the value of the ambidexterity concept is polarised between those who claim its analytical weakness, point at inconsistent empirical evidence and therefore view it at best as a convenient metaphor (DRUID Society Conference Debates 2012), and those who strive to ground its principles (Jansen et al 2006, Lin et al 2012), reconcile definition and conceptual tensions (Gupta et al 2006, Raisch et al 2009, Smith and Tushman 2005), generalise across multiple contexts of application (Luo and Rui 2009, Siggelkow and Rivkin 2006), and systematise various literature streams (Lavie et al 2010, Nosella et al 2012, Raisch and Birkinshaw 2008) to increase the theory's theoretical robustness and empirical relevance. Importantly, both parties unanimously emphasise, that if we are to use theory of innovation ambidexterity as an analytical tool rather than a rhetoric device and make constructive contributions to managerial practice, we need to advance operationalisation of the theory's conceptual apparatus, test its premises, scrutinise its assumptions, and define scope of its application.

Research Goals and Methodology

The paper presents initial findings of the PhD research in progress that aims to assess innovation ambidexterity theory by adopting a dynamic multi-dimensional perspective on innovation processes and

examine mechanisms, processes, and routines that are directly involved in balancing ambidexterity tensions across multiple levels of a technology and management intensive firm. The goal of this paper is to identify points of contradiction between normative and positive interpretations of innovation ambidexterity.

The study represents a case study research of a major technology intensive company in the microprocessor IP manufacturing and licensing industry. For anonymity, the remainder of the text will refer to the company as 'Genesis'. The case draws on qualitative data consisting of semi-structured interviews with top executives, senior and middle managers, as well as industry presentations and the firm's documents. The objective of data analysis was to identify organisational routines and managerial decisions associated with exploitation and exploration, organisational structures that support these, and determine the content of definitions attributed to innovation activities within the firm.

The study addresses the following questions: (1) *what are the organisational processes, structures, and managerial decisions associated with exploration, exploitation, and innovation ambidexterity in the chosen empirical setting?* (2) *what are the contexts in which these phenomena operate?* (3) *how do exploration-exploitation mechanisms and definitions vary across these contexts?* and (4) *how does the obtained empirical evidence relate to the extant conceptualisation of exploitation, exploration and innovation ambidexterity?*

Findings and Discussion

Genesis is a world-leading semiconductor intellectual property designer and licensor supplying low-power high-performance microprocessor designs to a network of over 2500 microprocessor and original equipment manufacturers. It supports and collaborates with its connected community of over 1000 partner firms. Genesis employs a licensing and royalties business model: it is a fabless semiconductor company focused entirely on the production of intellectual property (IP), which is sold via a number of flexible licensing models to its customers.

In its online value and culture statement, Genesis explicitly declares innovation to be one of its main values. Interviews with top executives and senior managers showed that the terms 'ambidexterity', 'ambidextrous organisation', 'exploration' and 'exploitation' have become part of the managerial speak in application to the way of thinking about innovation in the company. The organisational capability associated with ambidexterity incorporates three "layers" (dimensions): temporal, technological and a business model layer. Because these dimensions embrace a number of organisational functions and levels, ambidexterity is understood and enacted more as an organisational rather than individual capability.

The company is subdivided into two distinct structures: Genesis A and Genesis B. The former is Genesis' core microprocessor business charged with evolving current products and delivering financial results, whereas the latter is a considerably smaller body vested with experimenting *"completely outside the current business model" "in maybe completely different cultures, systems, processes, etc."* [having] "*the freedom to develop into a completely different framework"* (Interviewee, senior executive). An important strategic function of Genesis B is to scan the industrial horizon with the aim of setting foot in radically new businesses via mergers, acquisitions, and investment activities. To date, no tangible product output has been reported as a result of Genesis B work.

As proposed in the theoretical part of the research, structures and processes of organisational ambidexterity can receive various interpretations depending on the level of analysis and the standpoint from which the level is viewed. This is demonstrated in the context of Genesis. On the macro organisational level, throughout its history, Genesis has been exploiting an IP licensing business model and strongly relying on the existing knowledge of system-on-a-chip and microprocessor hardware, which predominantly took Genesis along the evolutionary development trajectory. Given the current widely reported focus on the efficiency of Genesis A business (Genesis Annual Report 2012), Genesis can be considered an evolutionary exploitative business both in terms of the underlying technology - making the microprocessor smaller, faster, more energy efficient, cheaper and in terms of the business model of "designing once and licensing many times" (Genesis Company Profile 2013). However, given the value of innovation, it is not surprising that Genesis' top managers emphasise exploring new business and technological opportunities for the future alongside efficiency, and actively establish organisational processes and structure that support both. In this sense, they act ambidextrously and ambidexterity in Genesis as revealed both at the managerial as well as organisational level. However, it is not clear at this stage, whether, and how, individual ambidexterity of managers translates into a more dynamic organisational capability to exploit and explore apart from the structural arrangements, Genesis A and Genesis B, discussed above.

At the level of organisational divisions, given the presence of Genesis A and Genesis B structures, the company's organisational design resembles structural ambidexterity (see Figure 1). The duality of functions and structures is in accordance with Genesis' interpretation of ambidexterity and self-identification as an ambidextrous organisation. Furthermore, viewed from the inside, the core Genesis A structure itself can be seen to include both exploration and exploitation. Genesis' five main product divisions are responsible for following the current roadmaps (exploitation), while Corporate R&D and Advanced Product Development (APD) divisions are responsible for advancing technological IP along the existing technological trajectories, but in the longer time scale, as well as expected to generated insights in potentially new fields of application or new technical capabilities (exploration). In sum, explorative activities are inherent in both Genesis A (APD and corporate R&D) and the dedicated explorative Genesis B. According to an interviewee, this is where "the boundaries tend to become fuzzy: [product divisions] would actually be working on designing an implementation of a microprocessor, whereas [APD] might be working on exploring new ways of creating part of the instruction set of a microprocessor which is not a product in its own right but it is maybe a technology ingredient. Separate from there you've got your corporate R&D which is where you potentially start branching out into areas that are less closely coupled. […] It is vital to create future ingredient technologies

that will feed through into your products, and I always wanna say blue sky, but it's not blue sky research" (Interviewee, senior executive).

Furthermore, from the partners' perspective, Genesis is seen as a repository of IP, as their external R&D department, the complementary explorative part to their businesses. Partners exploit system-on-a-chip designs developed by Genesis to manufacture a wide range of electronic products.

Lastly, given the complementarity of Genesis and the Connected Community partners, Genesis can be said to enact ambidextrous organisation at the level of a wider ecosystem, using the manufacturing, sales and marketing, service and support resources of the partners to jointly bring Genesis chip powered products to live. An ecosystem approach has been repeatedly emphasised by Genesis and is credited for providing exceptional possibilities for recombining the diverse capabilities of the ecosystem participants.

The described levels and perspectives combined make it difficult to arrive at straightforward conclusions about Genesis' organisational ambidexterity design. Importantly, Genesis' underlying technology base is vastly impacting the innovation strategy and ecosystem organisation. The advancement of digital technologies in the post PC era characterised by mobility, on-line presence, blurring of the boundaries between product lines and connection into "the cloud" of devices and information presents Genesis with novel opportunities for capability development and recombination. While some innovative devices require cutting-edge systems-on-a-chip, other innovations thrive on microprocessor technology developed a decade ago. This has implication to the balance of Genesis' exploitative and explorative innovation processes in individual product families. Because of Genesis' unique competence in designing the microprocessor core, which lies at heart of every electronic device regardless of its level of sophistication, the company can innovate equally successfully by advancing the technology proper, by experimenting with the existing technology in the new areas of application, or by developing new systems-on-a-chip for new applications. This characteristic blurs the border between exploitation and exploration within Genesis, which calls on conceptualisation of exploitation and exploration in relation to the technology base in addition to the theorisation across organisational levels.

Conclusions and Practical Implications

This paper focused on the discrepancy between the normative and the positive view on innovation ambidexterity, and discussed the problem of divergent understanding of exploration, exploitation and innovation ambidexterity in academic literature and actual managerial practice, which is detrimental for the theoretical robustness of the framework as well as problematic for business practitioners who often cannot rely on the vast but inconsistent body of research on innovation ambidexterity. For ambidexterity theory to be a useful tool in managerial practice, further research needs to be done that clarifies the conceptual apparatus of the theory and validates its mechanisms. The greatest potential for extending the presented research is in the analysis of the Genesis' ecosystem, which illustrates the blurring contexts of exploitation and exploration activities, technological as well as business model innovations, and multiple-level mechanism and perspective on the optimal balance between them.

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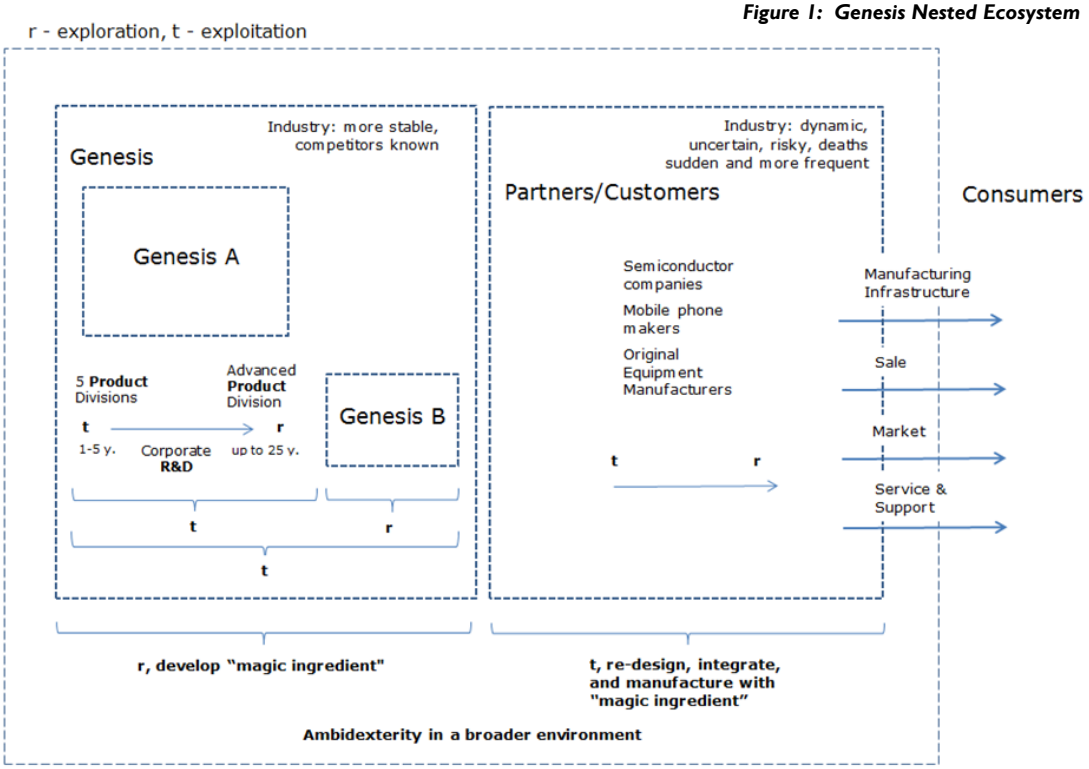
Figure 1: Genesis Nested Ecosystem



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EXAMINING THE USE OF PEER REVIEW IN THE DEVELOPMENT OF REGIONAL RESEARCH AND INNOVATION STRATEGIES FOR SMART SPECIALISATION

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INTRODUCTION

In 2011, the European Commission (EC) launched its Smart Specialisation Platform. This facility is there to help European regions and Member States to develop, implement, and review research and innovation strategies based on the principle of *smart specialisation* (S3). European regions are encouraged to identify their own R&I assets and strengths so that they can focus efforts on a limited number of justified priorities. Regional and national authorities across the Union are required to prepare *research and innovation strategies for smart specialisation* (RIS3), so that Structural Funds are used more efficiently with the aim of increasing synergies between different EU, national, and regional policies, as well as public and private investments. If some regions are quickly advancing with the development of original RIS3 strategies, others are finding it more challenging to focus on clear priorities.

To address this divide, the S3 Platform team has developed and implemented a *peer review methodology* to assess the smart specialisation strategies drafted by regions (Midtkandal and Rakhmatullin 2014). RIS3 peer-review workshops bring together regions with a common goal of facilitating mutual learning around specific policy-related issues, and exploring the ways in which RIS3 strategies can be further improved. These events organised by the S3 Platform have two principles. The first is to allow regions to meet their peers from other regions and countries, the EC staff, and academic and industry experts, to discuss common issues related to the smart specialisation approach. The second component is to allow European regions to review each other's work on RIS3 in an open and trusted learning environment. The first RIS3 workshop was organised in January 2012. Four more workshops were organised in 2012, with a further seven events taking place in 2013. Nearly fifty regions and Member States have been peer-reviewed from 2012 to 2013. During each RIS3 workshop, three to five regions present their RIS3 strategies for examination by their international counterparts.

Effectively, organisations such as the European Commission believe that participation in such workshops allows regions to examine their RIS3 strategy from the perspectives of other regions with an ultimate goal to improve their policymaking, employ best practice, and follow tested standards in the R&I policy area. In addition, these peer review events provide a good opportunity for regional policymakers to network with their international counterparts, where such networks could be tapped for solving any common regional policymaking issues. The peer review approach seems to be an important instrument allowing European policymakers to assist regions across the Union in the development of their RIS3 strategies, and thus their design and methodology should be continuously shaped around the changing needs of EU regions. Peer review as a tool has been used at a country level in various policy areas for some time now, yet its effectiveness has not to date been examined by the academic community. This research examines the main reasons why regional policymakers choose to engage in peer review exercises, how these evolve over time, and the extent to which the peer review is able to meet these expectations.

This research employs data collected through a series of surveys. Questionnaires were sent out to a group of policymakers who represented the first twelve regions whose RIS3 strategies have been reviewed during the first three peer review workshops. Emails with a questionnaire were sent out to twenty-nine policymakers who represented these regions. Both surveys (survey T1 and T2) employed an email-based questionnaire of closed-ended questions, which primarily used quantitative ordinal scales. The first questionnaires (survey T1) were sent out within three months after each workshop. The second batch of questionnaires (survey T2) was sent out six to nine months after these workshops. Survey T1 included a number of questions about the respondents' initial objectives (expectations) for taking part in a peer review exercise, as well as questions about the actual outcomes (based on the list of objectives) achieved as a result of taking part in such an exercise. Survey T1 further included questions on participants' prior experience of cooperation with other regions, and about factors facilitating mutual learning and sharing during the actual workshops. While survey T2 did include a similar set of questions, it further offered respondents the opportunity to reflect on their progress in the six -nine months after the initial workshop. Respondents were asked to indicate the extent to which they achieved specific outcomes as a result of their participation in peer review exercises. They were further asked to indicate the reasons why they would choose to take part in future peer-review workshops.

AN OVERVIEW OF OBJECTIVES

Capacity Building

Traditionally, many national or regional policies and strategies have been developed through intensive in-house analysis and decision-making. However, the increasing complexity of the policymaking context means some European regions do not possess an appropriate capacity to develop complex policies and are unable to internalise all necessary resources. The very *concept of smart specialisation* can be perceived by many as complex as it deals with a number of somewhat 'contradictory' policy requirements: identifying priorities in a vertical logic (specialisation) while keeping market forces working to identify niches where priorities should be selected (smart) (Foray and Goenaga 2013). Given this complexity, some policymakers might require further clarification of relevant theoretical and practical issues associated with the concept. There seems to be a change in the innovative process from in-house policy development to networked development efforts involving several peers who possess the required policymaking know-how and other critical resources. Peer reviews can be used by authorities and stakeholders to learn about complex policy instruments, to evaluate alternative policy options and possible impacts of such solutions (Iurcovich, Komninos, Reid, Heydebreck, and Pierrakis 2006). Where new methodologies are unfamiliar to policymakers, such as benchmarking or the use of quantitative indicators before a review event, the exercise would offer a good learning opportunity (Pagani 2002).

Even the more experienced policymakers can benefit from attracting new ideas and external support without upsetting their internal setup and operations (Murray 2002). Collaborative mutual learning activities involving external parties complement internal institutional efforts, while their own internal expertise would allow these institutions to contribute to other participants' learning, to assess and learn from any developments carried out by other parties externally (Powell, Koput, and Smith-Doerr 1996). The results of our surveys suggest that regional policymakers tend to view peer reviews primarily as a venue *to learn about the policy concept, to learn about it as an ex ante conditionality,* and *practical implications for their regions/countries*. Furthermore, regional policymakers take part in review exercises in order to gain *new insights and ideas in relation to their own region's S3 strategies*.

While policymakers from some EU regions can have new innovative strategic ideas, their counterparts in other parts of Europe might have already experimented with similar concepts. Having the opportunity to learn from such regions could mean *less failed experiments* and *improved domestic policymaking*. Interestingly, our results suggest that *improving domestic policymaking* was not initially one of the most important reasons for taking part in peer reviews. However, the importance attached by regional policymakers to the six capacity-building objectives discussed above changes significantly over time as regions progress with the development of RIS3 strategies (see *Figure 1*).

Collaborative learning through policy dialogue is important due to a lack of accumulated evidence associated with some policy areas. In the presence of such uncertainty, peers are most likely to aggregate their differences and similarities of knowledge and thinking through collaborative arrangements (Stephan 1996). Closer transnational collaboration between governmental institutions and agencies would be particularly important when working on newer and riskier policy topics as it would allow external peers and the policymaker to share risks. However, in the less innovative and less risky processes (working on more incremental ideas), the innovating policymakers might be less central to the process of realising the idea. Peers involved in review activities can both exchange knowledge and information related to specific policy areas and identify alternative policy solutions. During the peer review workshops organised by the S3 Platform, counterparts from different regions are engaged in an informal *policy dialogue* by exchanging information such as regional/national and/or EU policy decisions, and their application with a specific aim of learning from the experiences of other regions and countries on a range of policy decisions, as well as to share their regions' own experiences with other peers. Such an open discussion of problems is likely to facilitate further co-operation through actions such as the adoption of new policy guidelines or even strategies. The majority of such collaborations come with important policy implications. Our survey results suggest that if policy dialogue related objectives were not initially among the most important objectives behind the initial decision to be peer reviewed, their importance seems to improve slightly with time (see *Figure 2*).

Access to Peers and Networking

Among other resources, peers involved in collaborative arrangements generally access expert knowledge, methodology,

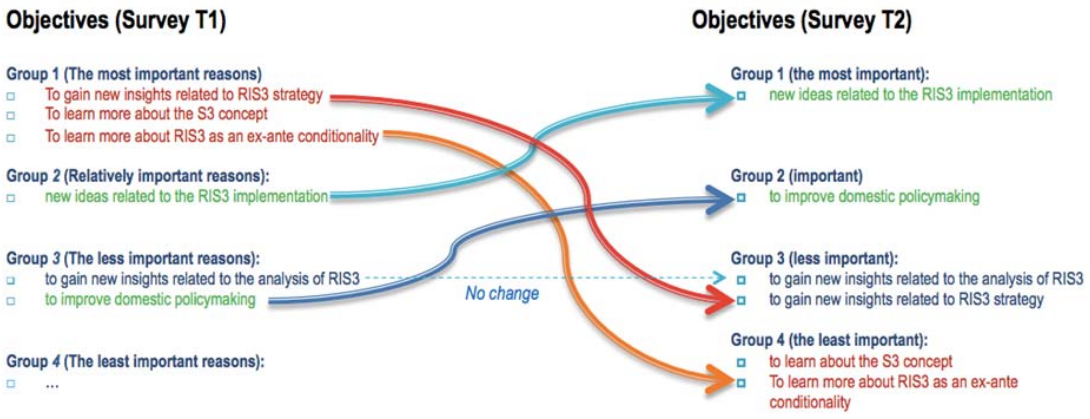

Figure 1: ***A change in capacity-building objectives over time***

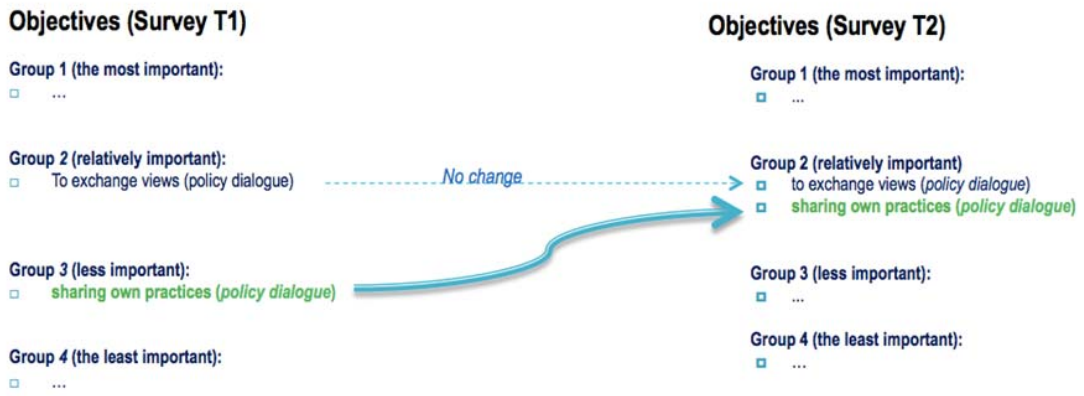

Figure 2:
A change in capacity-building objectives over time

facilities, as well as access to experts. Policymakers working in narrow fields of expertise are rarely self-sufficient. Collaboration with peers could allow them to source some critical policy knowledge. Many participants can utilise their own participation in peer networks as a shortcut to the required knowledge allowing them to learn in the most efficient and timely manner (Calvert and Patel 2002). In practice, such behaviour can allow individual policymakers to benefit from the joint use of specific training facilities such as the S3 Platform. Communities of practice built around regular peer reviews can provide their participants with a possibility to meet peers from other regions working on the same issues. Active involvement in activities of such communities of practice would allow participants to build their own networks for possible cooperation in the future. According to our survey results, regional policymakers are particularly interested in *meeting their counterparts from other EU regions and countries working on the same policy issues*, yet they do not always aim to add peers to their own professional network. Interestingly, the importance attached to these two objectives does not change over time.

Compliance, Advocacy and Transparency

An important role of peer reviews is to carry out specific functions such as the assessment of the effectiveness of different working methods, further improving the accountability of public authorities to their civil society actors, detecting new niches for capacity building, and the definition of common policy objectives and positions (Sabel and Zeitlin 2010). It is the exchange of knowledge and information through horizontal networks that generally allows many countries across the globe to ensure their compliance with international policies (Chalmers and Lodge 2003). Peer review and benchmarking exercises can be ideal for assessing and encouraging the region's work towards compliance, even among the relatively under-performing regions or countries (European Commission, 2012a). Current financial crisis adds pressure on the EU regions to put in place additional frameworks and mechanisms monitoring their compliance with the requirements set at the national and EU level. Peer review can improve the region's compliance by comparing and trying to understand the differences in the existing policy positions taken by peer regions involved in the process.

Unlike a more traditional legal enforcement mechanism, peer reviews contribute to the creation of a 'softer' enforcement system, which generally provides policy- and decision-makers with outputs such as feedback reports and recommendations (European Commission 2012a). In such reviews, peers are generally able to examine both policies and performance of a region under review within its own specific context. The initial results of our study further confirm that regional policymakers view review events as a possibility for benchmarking/comparison with other regions. Furthermore, their interest in such benchmarking/comparison increases over time, as they progress with their RIS3 strategies (see *Figure 3*).

Existing literature provides examples of when networks were organised expressly to represent particular communities with aims such as to influence decision-making and public policy, as well as to provide dedicated forums for critical analyses and evaluation of new and existing practices and experiences (van Zee and Engel 2004). In theory, such collaborative efforts are expected to ensure both a more democratic and inclusive set of processes when compared with regular processes of planning, management and

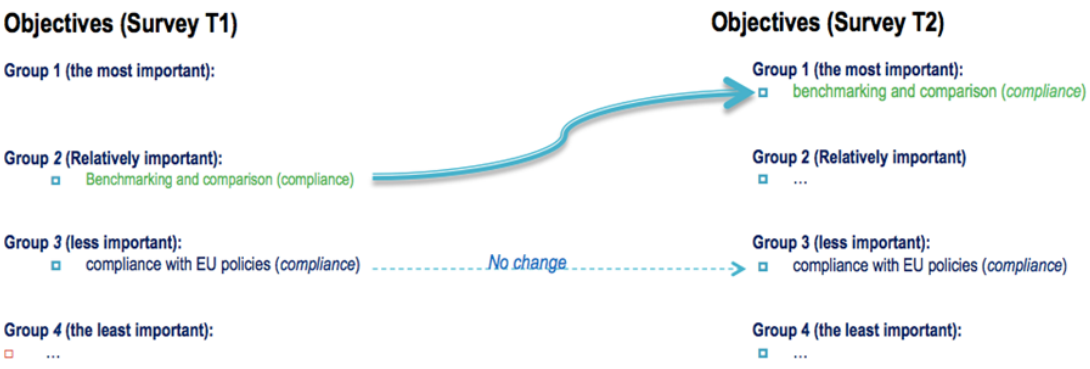

Figure 3:
A change in compliance related objectives over time

government (Vernon, Essex, Pinder, and Curry 2005). Regular involvement in review activities organised by the S3 Platform can provide peers with various possibilities to advocate new policy ideas. Such advocacy can include activities that can improve the position of network participants in influencing public and development policy discussion. Relationships developed within such networks can then help solve other problems such as difficulties with regulation, as well as problems with opportunism and legitimisation (Coleman, 1988). Over the last few years, many policymakers from across the Union became involved in S3-related activities organised by the EC. The newly emerged community of practice allows regional policymakers to influence their agenda by proposing and discussing new policy ideas. This S3 peer review methodology relies on informal interactions between policymakers at different levels thus allowing all parties to promote new policy ideas and solutions across all of these levels, both top-down as well as bottom-up. In this policymaking context, regional actors can significantly shorten the strategy preparation cycle by promoting/explaining their policy decisions, which in turn can effectively reduce the periods between new policy development, approval and implementation.

A peer review exercise can offer a region under review a chance to present and clarify its regulations, practices, and procedures, as well as it can explain its rationale (Pagani, 2002). This is critical in the context of the EU Cohesion Funds where the disclosure of policy decisions and related information enables public engagement in an important discussion about how taxpayers' money is spent. The European Transparency Initiative, originally launched in 2005, plays an important role in the communications efforts behind EU cohesion policy. One of its main objectives is to increase the level of information made available to the public on beneficiaries of EU funds (European Commission 2009). Active merging of levels of transparency (eg. towards other regions/countries and public stakeholders) can further contribute to the overall effectiveness of the peer review and the related peer pressure, as well as to improving the overall image of a region and informing its peers about its competitive position in the world (Pagani 2002). The results of this study suggest that neither advocacy (*promoting new ideas*), nor transparency (*presenting their region's RIS*) motives, have not been among the most important objectives behind the decision to take part in peer review exercises (see *Figure 4*). Interestingly, the importance of the latter for possible future reviews seems to decrease over time.

From Motives to Outcomes

As regions advance through different stages in the development of their strategies, policymakers attach less importance to information -related objectives such as acquiring further information about policy concepts. They also seem to be less interested in collecting insights into their own RIS3 strategy, as they start focusing on issues such as collecting new ideas related to the policy implementation stage, and effectively on improving domestic policymaking. Some motives determining inter-organisational collaboration confirm the significance of external environmental constraints and institutions. It is important to note that while policymakers formally represent their regions in review events organised by the Commission, in reality, these individuals may also seek to maximise their personal objectives. In addition, certain motives can influence policymakers' collaborative behaviour, yet these may not be the actual outcomes of collaborative activities such as peer review. A list of sixteen objectives has been further converted into a list of possible outcomes. Respondents have been asked to indicate the extent to which they have achieved each outcome as a result of their region's peer review. These questions have been asked twice: within three months after a review of their region's RIS3, and once again, six to nine months after the review. When asked after the workshop, respondents felt that the following six outcomes have been achieved to the extent originally anticipated: (1) learning about the S3 concept, (2) meeting peers from other countries working on the same issues, (3) presenting their regions' practices and explaining their RIS3 rationale; (4) examining the extent to which their region complies with the EU policies; (5) exchanging views on regional/national, and/or EU policy decisions and their application; and (6) gaining new insights/ ideas related to the analysis of region's activities.

However, respondents felt that the following outcomes have been achieved but not to the extent they hoped: (1) to learn more about RIS3 as an ex-ante conditionality and the practical implications; (2) to compare and benchmark their region's activities (RIS3) against other EU regions; (3) to gain new insights/ideas related to the implementation of their region's RIS3 strategy; (4) to improve domestic policymaking; (5) to receive an endorsement by the European Commission of their current work on RIS3; and (6) to promote new ideas and their regional initiatives at a higher level. When the same questions have been asked once again six to nine months after the original workshop, respondents have somewhat re-assessed the extent to which they had achieved each of these outcomes. Not all results can be apparent within the first few

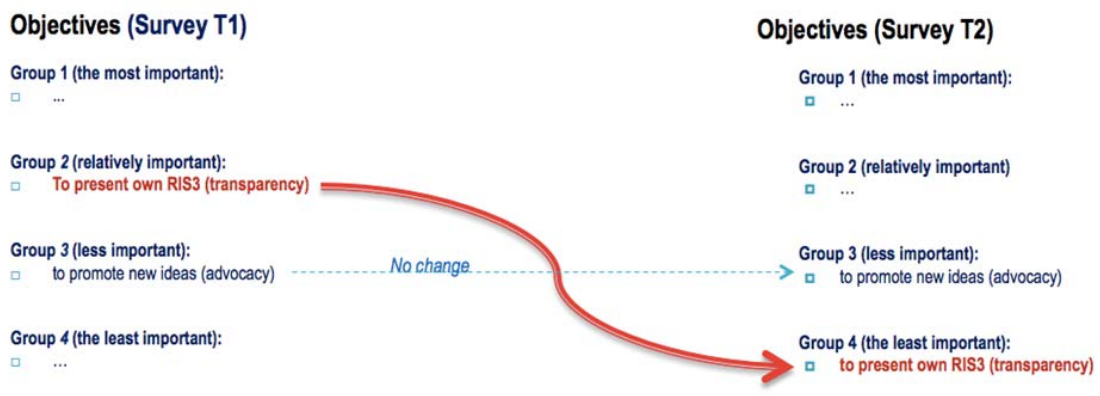

Figure 4:
A change in advocacy and transparency related objectives over time

months following the workshop. Having initially felt that they had achieved (as anticipated) seven outcomes out of sixteen, within the first 6-9 months, respondents have reported achieving (as originally anticipated) thirteen outcomes out of sixteen, with an exception of three outcomes which have been now downgraded: (1) to exchange views on regional/ nationa,l and/or EU policy decisions and their application; (2) to find out the extent to which their region complies with the EU policies, standards and principles; and (3) to receive an endorsement by the national authorities of their current work on RIS3. Respondents have been later (T2) asked to indicate the reasons why they would choose to be reviewed again. It is important to note that their priorities have shifted from capacity building towards transparency, compliance, and advocacy.

CONCLUSION

Exercises such as peer review and benchmarking at the regional level are still a relatively new mechanism, and are most frequently applied trans-nationally only by the OECD and the European Commission. Peer review and benchmarking exercises at the national level are, however, regularly organised by a number of international institutions including the European Commission and the OECD. Both institutions tend to use peer review and benchmarking exercises for similar reasons. According to one study, both the European Commission and the OECD tend to apply it primarily with a specific objective of horizontal policy learning, while the European Commission is additionally applying the same instruments to achieve two further objectives: surveillance/observation and vertical steering for EU wide objectives (Groenendijk 2009). The reasons why the Commission promotes the use of peer review might differ from those motivating regional policymakers to take part in peer review exercises organised by the European Commission. Mutual learning through trans-regional peer review can be seen as a new generation of public policymaking for innovative regions and countries. Peer-review workshops organised by the S3 Platform throughout 2012 and 2013 proved to be popular with most events fully booked. This strong interest confirms that regional policymakers start recognising the potential of peer-review tools as they allow these actors (a) to monitor regional socio-economic developments in other countries and regions, (b) to facilitate the exchange and collection of knowledge and information about the best regional practices and policies; and (c) to promote the reputation and attractiveness of regional economies (Huggins 2009).

The concept of smart specialisation pays particular attention to the importance of the so-called 'outward-looking dimension' which implies a need for a continuous analysis of where the region stands in relation to other regions (European Commission 2012b). Being able to position one's own region among other regions/countries, is increasingly seen as a pre-condition to being able to choose reasonable areas for competitive and sustainable growth. Furthermore, being able to know and measure how peer regions are performing seems to be 'a prerequisite for membership among competitively advantaged regions' (Malecki 2007 p.645). At the same time, even if regional and national policymakers increasingly accept the importance of understanding practices and policies related to these softer factors behind regional competitiveness, the availability of tools and measurable indicators (to support benchmarking and peer review exercises) remains critically limited (Huggins, 2009).

The S3 Platform can, therefore, be seen by the European regions and Member States as a very timely venue for learning about the latest policy developments in other regions across the European Union, as well as a suitable framework to seek (formally or informally) advice and feedback from their peers on specific policy issues. This paper examined a range of possible motives behind the policymakers' decision to be peer-reviewed by their international counterparts. The results suggest regional policymakers choose peer review for reasons falling into several categories: *knowledge and information sharing*, *learning together*, *policy dialogue*, as well as *advocacy*, *compliance* and *transparency*. One particularly encouraging finding, is that most of the reviewed outcomes are not just expected as review outcomes but also seem to be realistically attainable. However, the overall learning process resulting from any such peer review activities can unfold over time, and so many anticipated outcomes might not always be achievable shortly after peer review exercises, and could take longer to be fully realised and understood. The authors of this study believe that new peer review activities could benefit from further elements and could improve future peer review outcomes by focusing on (1) how to link different policy areas (in a policy mix) at the regional/ national level; (2) how to define and review RIS3 roadmaps and action plans; and (3) how to plan, structure and implement coordination mechanisms.

The theoretical framework behind the S3 concept remains to be somewhat limited and is not always able to provide an adequate evidence base to guide policymakers through the challenges associated with its implementation (Foray, David, and Hall 2011). This research suggests that peer review approaches should be frequently revisited, in order to ensure the instrument continues to assist regions and Member States to advance in their policymaking. Regions' objectives and priorities seems to evolve over time, and thus these new priorities need to be taken into account before introducing any additional changes to the existing peer review methodology developed by the S3 Platform staff.

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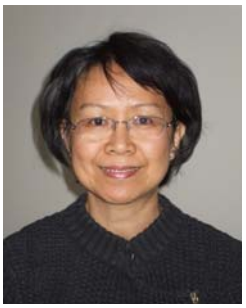
Understanding University-Industry-Government Interaction from the Perspective of Academic Researchers in the Buffalo Niagara Medical Campus (BNMC)



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Introduction and Background

A major area of research across disciplines is technology and economic development. Every city, every state, and every country have experimented with or strive to capitalize from science– and technology-led economic development. Various theories have been offered over the years across the disciplines to explain the role of technology in development, that is, the role of science and technology in the evolution of economy and society (Bagchi-Sen and Lawton Smith 2012). More recently, the focus has been on innovation given the importance of life sciences in addressing one key area of development, that is, health and human development.

Understanding the role of life sciences brought attention to the role of universities in economic development. One critical aspect in understanding the role of universities in economic development is their location; universities are fixed in their location, which often dictates the development paths. Universities face major risks depending on their location (eg. government support, scientific labor supply, innovation absorptive capacities) including the effect of the broader external environment such as demographics, which can affect their revenue streams (eg. declining population leading to declining revenue, declining government support) (Lawton Smith and Bagchi-Sen 2012). One major revenue stream for basic and translational research is the support from the national government (see Woolf 2008).

The expectation is that major research universities will contribute to fostering local high tech clusters; weak connections with local/ regional industrial clusters or weak performance in terms of technology transfer locally, or otherwise raise doubts among certain groups of government officials and taxpayers about the role of the university in economic development. Lawton Smith and Bagchi-Sen (2012) argued that the regional impact of universities depends on: (1) the internal characteristics of the university; (2) university-level response to exogenous shocks (Feldman and Francis 2006); (3) public funding decisions for higher education institutions; and (4) the characteristics of the regional economy (eg. skilled labor supply, local clusters of innovative firms). Similarly, Casper (2013) argues that a university's success in research, translational research, and entrepreneurial activities depends on various internal and external factors. With the rising importance of the multidisciplinary approach to problem solving, collaboration, both in-house and with external partners, is a key to success in the life sciences (Bagchi-Sen 2004, 2007). Furthermore, individual researcher characteristics, organizational capabilities, and local/ regional factors go hand in hand in directly and indirectly influencing outcomes of collaborative research (Bagchi-Sen et al 2001, Lawton Smith and Bagchi-Sen 2006, Bagchi-Sen and Lawton Smith 2012). The goal of this paper is to show patterns of academic and industry collaboration among researchers in a medical campus, which is located in a mid-size city with a rich knowledge base but shrinking population.

STUDY CONTEXT

This study is based on a survey of researchers and clinicians at the Buffalo Niagara Medical Campus (BNMC, http://www.bnmc.org/) located in downtown Buffalo. BNMC is a unique consortium that incorporates and promotes biomedical research, higher education and training, and clinical services in a multidisciplinary institutional environment. The three research institutions involved are: University at Buffalo-State University of New York, Roswell Park Cancer Institute, and Hauptman-Woodward Medical Research Institute. Buffalo, NY is located in Western New York near the US -Canada border. The city of Buffalo is known as a declining manufacturing town. Currently, Buffalo is home to a broad range of organizations (http://buffaloniagara.org/Doing_Business/ TopBusinesses), who are major employers such as the University at Buffalo. The recent decision to move the medical school to downtown has been facilitated by NYSUNY 2020 legislation (http://www.buffalo.edu/ub2020/about/NYSUNY2020/NYSUNY2020_updates.html).

The University at Buffalo (UB) serves as the lead academic organization of the New York State Center of Excellence in Bioinformatics and Life Sciences (CoE). The CoE is located on the Buffalo Niagara Medical Campus as part of more than $200 million in investment from state, federal, industry, and philanthropic sources to create a hub of life sciences expertise and innovation in Upstate New York. Roswell Park Cancer Institute (RPCI) is not only a research institute and clinical hospital, but also a teaching institution with a long tradition as a Graduate Division of the University at Buffalo. About two-hundred doctoral and masters students are enrolled in the programs. The Hauptman-Woodward Medical Research Institute (HWI), named after the Nobel Laureate Dr Herbert Hauptman, is an independent, not-for-profit, biomedical research facility located in the BNMC. Since the collaborative agreement with UB, HWI's scientists serve as faculty members of the UB Structural and Computational Biology Department housed at HWI. Many of the institute's researchers have joint appointments at RPCI.

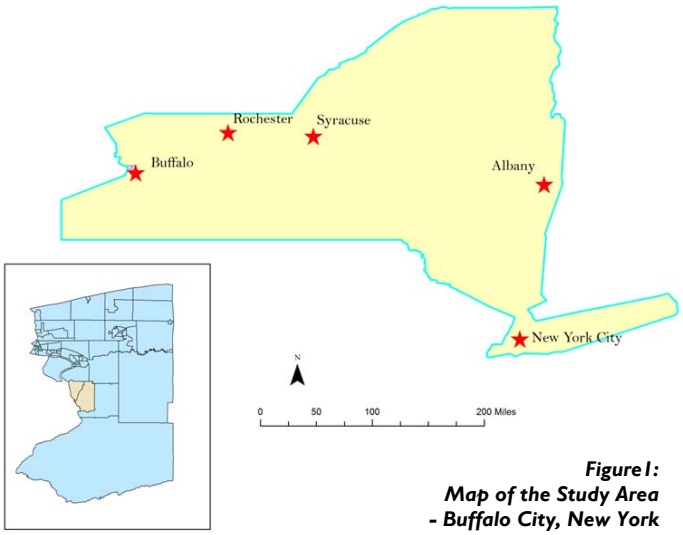

Figure1:
Map of the Study Area
- Buffalo City, New York

The survey focused on individual life science/biomedical researchers and clinicians who have served in the role of lead or co-principal investigator in major federal grants. The survey yielded a sample of 48 individuals, out of which 38, or 70%, are male. Moreover, 52% of researchers are engaged in basic science research, while 48% of the respondents are clinical or applied science researchers. Respondents have twenty years of extensive research experience on average ranging from 3 to 53 years since their final degree conferral. Some evidence of their research performance includes an average of 84 Web of Knowledge publication counts, 61 PubMed publication counts, and *h*-index of 19.05. They also possess an average of three patents; 70% of the respondents indicate that they hold a leadership position such as department chair, research group leader, research center director, or administrative unit head. The response of all indicates that 46 out of 48 have collaborated with at least one researcher at one of the three local institutions. Below, the results are organized to understand patterns of collaboration, facilitators of collaboration, and outcomes of collaboration. A specific goal is to understand the pattern, facilitators/barriers, and outcomes of university-industry collaboration.

Collaboration Trends

Collaboration is prevalent among research scientists and considered an important aspect of scientific career development (Cummings and Kiesler, 2005; Heller and Michelassi 2012). Bercovitz and Feldman (2006) indicate that research teams are generally more successful than solo inventors in generating commercial outcomes including patents, licenses, and royalties. From the study on academic research teams in two prominent universities with medical schools, Bercovitz and Feldman (2011) found that the experience of the teams is positively associated with performance in support of internal cohesion arguments of network closure. In the case of diverse external networks, they found that teams composed of members from multiple institutions are more successful in generating patents, licenses, and royalties. In addition, prior social ties that support links with external team members positively affect commercial outcomes. Over the years, scholars have confirmed that productive scientists tend to collaborate at a higher rate than their less productive counterparts (Lee and Bozeman, 2005; Price and Beaver, 1966; Zuckerman, 1967).

In the BNMC study, a comparison of collaborators shows that on average researchers have 3.5 collaborators nationwide compared to 2.4 in New York State (outside of BNMC). Local collaboration among BNMC scientists is still the dominant type. Furthermore, internal and external collaborators are more or less equally divided between basic and applied/clinical research. Researchers were asked to rank collaborative outcomes into two categories: idea or tacit knowledge exchange/generation, and specific output (e.g., codified knowledge).

- The idea generation category included interaction about publication; experimentation (data); knowhow-methods-skills discussion; and discussions about research plan, funding, and conferences. The top three outcomes (ranked in order of importance) for local and non-local collaborations, are learning about experimentation, knowhow-methods-skills, and research paths.
- In terms of outputs, the categories are co-publishing, grant application, patent application, licensing, spinoffs, and translational research (clinical trial/innovative patient care and drug/device/diagnostics/treatment development). Co-publishing and grant application topped the list followed by translational research. Academic entrepreneurship (licensing, patenting, and spinoffs) received ranking as the bottom three outcomes with licensing being the least important of all benefits.
- About 30 percent of the researchers noted pursuing clinical trials, innovative patient care development and drug/device/ diagnostics/treatment development with both internal and external partners. While 15 percent noted engaging in patenting activities with internal partners, the share was much smaller (ranging between 8 and 12 percent) for the other two types of entrepreneurial activities: licensing and spin off formation.

Selection of Collaborators

Selecting research partners is influenced by various factors. Literature shows that the most important categories are level of knowledge and experience, prestige, positive outcomes of past collaboration, sharing of common vision/approach, personal relations and geographic proximity (Bozeman and Corley, 2004; Link and Bauer, 1987; Meline, 2000; Newman, 2001). The BNMC study shows that the three critical factors are: (i) the level of knowledge and experience, (ii) past collaboration, and (iii) shared vision. Although geographic proximity on its own did not rank high on the list, we know that the majority of the collaborators are in-house and, therefore, geography or physical proximity does play a significant role in the collaborator selection process.

Translational Research

In life sciences, translational research is now being considered as an important aspect of a researchers' portfolio - translational research is often multidisciplinary.

Woolf (2008) refers to translational research as the "effective translation of the new knowledge, mechanisms, and techniques, generated by advances in basic science research into new approaches for prevention, diagnosis, and treatment of disease" (p211). In addition, the National Institutes of Health (2007) offers the following definition (Institutional Clinical and Translational Science Award (U54):

> *Translational research includes two areas of translation. One is the process of applying discoveries generated during research in the laboratory, and in preclinical studies, to the development of trials and studies in humans. The second area of translation concerns research aimed at enhancing the adoption of best practices in the community. Cost-effectiveness of prevention and treatment strategies is also an important part of translational science.*

In this context, the basic concept of translational research is about harnessing knowledge from basic sciences to clinical trial, or actual patient care by developing new drugs, medical device, diagnosis, or treatment.

Factors that influence this type of research are both related to the individual researchers' internal (institutional) and external (eg. broader region) environments: federal funding, state funding, industrial funding, focused educational programs, access to dedicated conferences and workshops, institutional support and coordination, and researchers' individual interest, and networks (Blumenthal, 1994; Mowery and Nelson, 2004; Stiglitz and Wallsten, 1999; Zerhouni, 2003). The BNMC researchers responding to our survey ranked the following as their top three facilitators (in order of importance): (i) researchers' interest, (ii) federal funding, and (iii) institutional support and coordination. The most important factor for academic entrepreneurship is noted as patenting or intellectual property protection. Researchers noted that patenting is recognized as a significant scientific contribution in promotion and tenure cases at the University at Buffalo-SUNY.

University-Industry Collaboration

When asked, researchers highlighted the importance of industry funding for translational research and commercialization. Arza and Vazquez (2010) grouped channels of interaction into four categories. The traditional channel includes common academic functions such as publications, training graduates for industry employment, and conference participation. The commercial channel involves forms of interaction to commercialize existing knowledge outputs through patents, licenses, spin-off firms, and incubators. The service channel provides problem-solving opportunities or professional advice through consultancy, staff training, testing, and monitoring, usually in a short-term period. The bidirectional channel is a long-term and personal form of interaction in which knowledge flows in both directions (from universities to firms and vice versa) through joint R&D projects.

According to Arza (2010), benefits of university-industry collaboration for academic scientists refer to obtaining, sharing, or securing equipment, knowledge input in research, and financial support. Intellectual benefits from the interaction include ideas for new research projects, academic publications, scientific discoveries, new perspectives to solve industrial problems, and shaping of the knowledge exchange pathways through the collaboration. Firms' benefits for production are short-term matters including resource utilization from academic facilities for tests and quality control, project completion, new human resources, and the development of new products and processes (Bishop et al 2011, Cohen et al 2002, Lee, 2000). Innovation benefits are products of long-term engagement, such as access to high quality academic research teams; shaping knowledge produced within academia; identification, selection, or direction of firms' new R&D projects; technology licensing and patents; and access to university research and discoveries (Bishop et al 2011, Cohen et al 2002, Lee, 2000, Zucker et al 2002).

BNMC industry collaborators are mostly pharmaceutical firms. A small number (4-6 out of those with industry collaboration) collaborate with biotech or medical device firms. Three groups of industry collaborations can be identified based on the literature on forms of collaboration for BNMC: (i) contract research and joint research, (ii) sponsorship of academic events by firms, consultancy, Scientific Advisory Board (SAB) involvement, and corporate board membership by a scientist, and (iii) firms using research laboratories at one of the BNMC institutions, training of company employees by BNMC scientists and clinicians, and the use of firms' facilities by BNMC scientists. These categories do not exactly match Arza (2010) but show the range from traditional, commercial, service to bidirectional.

Studies show that university-industry collaboration outcomes include one or more of the following: publication, grant application, patent application, licensing, spin off formation, clinical trial, drug/ device/treatment development (Bercovitz and Feldman 2006; Etzkowitz 1983; Mowery et al 2004; Nelson 2001; Perkmann et al 2013; Siegel 2006; Thursby et al 2001). BNMC response shows three categories of outcomes from university-industry collaboration: (i) over 60 percent note publications and grant development, (ii) between 30-40 percent note patenting and translational research (clinical trial, patient care development, and drug/device/diagnostic/treatment development), and (iii) 20-30 percent note licensing and spin- off formation. Among respondents, about 30 percent have current industry funding and about half of the respondents have industry collaboration. Of those with industry collaboration, the academic entrepreneurship trends are as follows: 38% applied for patents as a result of collaboration with industry; 28% engaged in licensing as a result of collaboration with industry, and 25% have formed a new company as a result of collaboration with industry. Among all with industry collaboration, close to three-fourth of respondents has current federal funding. Federal funding attracts collaboration from industry counterparts.

Barriers to Collaboration with Industry

Barriers to collaboration can be categorized as follows: (i) finding partners - about 64% state that they are not aware of firms interested in university-industry collaboration, (ii) scope and financing - 50-60% note that the orientation of industry research (eg. testing, problem solving) is not likely to foster collaboration, and the lack of government funding for joint university-industry research is a further deterrent, and (iii) university-industry mismatch and institutional barriers - 40-50 percent state that there is a lack of industry participation in the BNMC network and a lack of industrial interest in BNMC research; moreover, established procedures for entering into a collaboration with industry and the absence of a proactive industry liaison office create institutional barriers in bringing together BNMC scientists and industry partners.

Conclusions

In the absence of panel data on facilitators, barriers and outcomes of academic collaboration, most studies depend on single case analysis, which allows for controlling the context of the study. Research universities in the United States have complex evolutionary characteristics and geographic context. BNMC includes a major public research university and a major cancer research institute. The location is a declining manufacturing city in Western New York. The sample of scientists surveyed shows that collaboration is actively pursued at BNMC - the average number of internal collaborators exceeds the average number of external collaborators. Specifically, internal collaboration activities are mainly concentrated within a major cancer research institute and the major public research university or between the two institutions. External research partners outside BNMC are mainly located across the United States rather than in other parts of New York state and/or foreign countries. An interesting finding is that, on average, BNMC scientists collaborate more with international partners, than with researchers in other institutions in New York. Further investigation is needed to learn about various forms of non -local collaborations - comparisons of facilitators and specific benefits of different forms of collaboration can guide institutional policy of BNMC partners.

The literature suggests that basic research is more efficient for collaboration at a distance, and applied or clinical research collaboration needs more face-to-face interaction in a local setting

(Florax 1992; Gabbay and Zuckerman 1998; Mansfield 1991; Mansfield 1995). However, BNMC scientists collaborate with research partners in basic or applied fields regardless of distance, even showing more collaboration activities in the clinical or applied field with external partners located outside of the BNMC campus. The focus is the achievement of academic research excellence given that the two major reasons for collaboration are ranked as publications and grant applications. One other reason could be the dearth of partners outside BNMC in the local region. However, when asked about interaction within local and non-local networks of collaborators, idea or tacit knowledge sharing ranks high on the list - this type of tacit knowledge sharing includes research ideas, know-hows, methods or special skills. Usually, such tacit knowledge exchange requires proximity. But BNMC researchers are overcoming the barrier that distance may impose to seek out external partners. Translational research outcome is notable as an important reason for collaboration, resulting in clinical practices, patient care and treatment development. One major facilitator of collaboration is federal funding and the outcomes are traditional research outputs. However, a small number of collaborators have industrial partnering with outcomes ranging from traditional research output to translational research.

The results of this study provide implications for geographies of innovation within a Triple-Helix framework. Collaboration trends of BNMC scientists show that they are crossing geographic and institutional boundaries to seek research excellence, both traditional and translational. In other words, multi-scalar Triple Helix facilitates collaboration. Policymakers may note that federal funding is one of the most important factors needed to facilitate multidisciplinary and translational research. An increase of federal funding, for example, the expansion of the Clinical and Translational Science Award (CTSA) program, and National Science Foundation's innovation Corps (I-Corps) program, transforms the local, regional, and national research environment for increasing the efficiency and effectiveness of innovation-driven research in the life sciences. State and local institutional policies need to create a research environment that will facilitate competitive federal fund seeking by scientists. Specific legislations for various tax incentives, which may include financial assistance such as R&D tax credits, job creation tax credits, and subsidies for manufacturing, can foster life science based entrepreneurship in the region, but conditions (upstream activities such as research, design and development) of such downstream activities have to be nurtured. State and local government agencies can actively collaborate with universities and industry as well as other organizations (see San Diego's CONNECT, www.connect.org) to expand the scope of securing federally funded research programs, continually improve educational and training for translational research, and career development programs.

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TRIPLE HELIX AND THE CITY

WORKSHOP CHAIRS

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The workshop addressed the relationship between Triple Helix relationships and the impact of these interactions on urban agglomerations. Empirical analysis of knowledge clusters (Leydesdorf and Ahrweiler 2013, Leydesdorf and Deakin 2014) shows that innovative regions and large metropolitan cities have a self-organized capacity to attract further investments and highly skilled competences to generate prolific variety and modularity for science-based developments and highly skilled employment.

In many local networking models, universities, industries, governments, and citizens are seen as key actors to contribute to the formation of new collaborative environments and identities increasing the innovation capabilities and facilitating continuous improvement (Etzkowitz and Leydesdorff 2000, Etzkowitz et al 2000, Kaufmann and Toedtling 2001). This might also lead to shifting paradigms in the development of local innovation systems, to new policies addressing structural disparities between rural and urban areas, and to innovative and accelerated interaction models, for instance based on sustainable urban development (Mieg 2012, Mieg and Töpfer 2013). Researchers will be challenged by these dynamics of cities which are triggered by globalization and digitization as well as a range of emergent political practices that necessarily have to involve citizens and social groups (Sassen 2003).

As Horizon 2020, the next European Framework programme, targets technology, regional and urban innovation systems, it reopens the discussion on the old nexus of innovation and space. The so called *Smart City* which is still a fuzzy and technological concept will in fact develop as an integrative approach comprising high technology intake, interdisciplinary knowledge creation, social innovation, capacity building, and political concepts. Synthesizing insights from megacity research, sustainability science, and innovation and cluster policy, the spatial dimension of technological and social innovation of the Triple Helix was in the focus of the workshop @ TH Conference London.

We had three invited guest speakers:

Jean-François Balducchi, IASP (International Association of Science Parks and Areas of Innovation) introduced the changing criteria of science and technology investments for the assignment of incubators and technology parks close to cities. The worldwide network of science and technology parks and other areas of innovation have members in sixty-nine countries and host about 128,000 companies in the parks.

Konstantin Fokin, CEO Centre for Innovation Development of the City of Moscow, Russia, illustrated how the Skoltech initiative and the City of Moscow correspond, and which inputs the new University and High Tech Agglomeration outside Moscow might have on the City in terms of entrepreneurship and technological upgrading.

Fangzhu Zhang from Bartlett School of Planning, University College London Shanghai, outlined the critical role of the municipal government in the creation of the biotechnology sector in Shanghai. She explained how the establishment of ZJHP Development Co. Ltd as a key player, and land-driven development models, not only have created a skilled workforce and attracting overseas talent returnees, but also led to emerging CROs and global R&D centres and twelve parks.

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THA Special Events

Triple Helix for Newbies and How Institutions Can Enhance Effectiveness of TH Relationships

REGISTER NOW

THURSDAY, MAY 29, 2014 : 9:30 – 11.00 am ET

In this webinar, the Director of the Research Centre on Business Clusters, Networks and Economic Development (BCNED), **Dr Emanuela Todeva** will moderate a panel discussion examining the fundamental concepts of **Triple Helix, or Government-Industry-University interactions, the essence of innovation and knowledge and technology transfer, the entrepreneurial behaviour that emerges within the Triple Helix model, and the critical role of institutions.**

The key panellists are renowned academics in this field:

Prof. Henry Etzkowitz : President of the Triple Helix Association (THA), Editor-in-Chief of the Triple Helix Journal, Senior Fellow at Stanford University, the Clayman Institute for Gender Research, the H-STAR Institute and the Center for Design Research, and Director of the International Triple Helix Institute.

Prof. Mark Casson : Professor of Economics at Reading University, UK, Director of the Centre for Institutional Performance (CIP), Member of John H Dunning Centre for International Business, Centre for Economic History, Centre for Entrepreneurship and Centre for International Business History.

By participating in this webinar attendees will be able to:

- Learn about the origin and the most recent developments of the **Triple Helix (TH) model.**
- Understand the TH model, and how it can be applied for managing **Academia-Business-Government (ABG) interactions.**
- Learn about **institutional practices** associated with innovation systems and how to engage with institutions to ignite innovation process.
- Explore the role of **institutions as intermediaries and moderating agents** for Triple Helix interactions.
- Understand the role and expectations of different innovation **stakeholders** in the public and the private sector.
- Reflect upon current government **innovation policies** and the strategic response by industry and universities.
- Learn from successful cases which **critical actions** across the Industry-University-Government interface can boost innovation at micro and macro scale.

The webinar is designed both for *academics* and *practitioners* who would like to become familiar with the Triple Helix model in a theoretical and practical context, and share experiences and insights into the most effective use of institutions as a gateway to effective multi-lateral relationships. Attendees and Triple Helix practitioners will be able to discuss the scale of **orchestration of relationships** in Triple Helix interactions.

REGISTRATION:

- The £40 registration fee will include access to the webinar, and a free annual THA individual membership.
- THA members can join the webinar free of charge.
- Please register at: Mlaura.fornaci@triplehelixassociation.org

WORKSHOP

ENTREPRENEURIAL UNIVERSITY, ENGAGED INDUSTRY and ACTIVE GOVERNMENT: *TRIPLE HELIX OPPORTUNITIES*

University of Surrey, Guildford, UK
29-30 May, 2014

HOSTED BY

Business Clusters, Networks and Economic Development Research Centre, Surrey Business School,

Chairperson:

Dr Emanuela Todeva
Director of Business Clusters, Networks and Economic Development Research Centre, University of Surrey, UK

Organising Committee:

Prof. Henry Etzkowitz, President of the Triple Helix Association, Stanford University, USA
Prof. Alan W. Brown, Professor of Innovation and Entrepreneurship, University of Surrey, UK
John Edmondson, Chief Editor for Industry and Higher Education Journal

BACKGROUND

We welcome you to participate in a Workshop on ENTREPRENEURIAL UNIVERSITY, ENGAGED INDUSTRY and ACTIVE GOVERNMENT: TRIPLE HELIX OPPORTUNITIES to be held in Guildford, UK, in May 22-23, 2013. The organisers of the workshop received an award from the Institute of Advanced Studies, and from Surrey Business School, to develop the first joint event between the Triple Helix Association and The University of Surrey.

The aim of the workshop is to provide in-depth discussion of cutting-edge issues related to Government-University-Industry interactions, in a forum that permits intense discussions, the attention to detail and definitions, as well as open panel interactions. The organisers aim to create an open debate that will enable alternative view-points to surface and to be acknowledged as legitimate concerns which require further theoretical development of the Triple Helix model, or will highlight practical examples of Triple Helix solutions as innovative platform solutions to complex scenarios.

There will be two specialised panels on *Triple Helix Intermediation*, focusing the discussion on theoretical and practical aspects of engagement, facilitation, orchestration, and third party brokerage of triple helix relationships, and practical cases of how intermediation assist government, university and industry.

The expected maximum number of participants is forty, which will constitute keynote speakers, invited panel discussants, and other contributors and participants.

WORKSHOP THEME

This two-day event aims to solicit contributions that address *the challenges of governance, interaction, co-alignment, facilitation and intermediation in the Triple Helix model of entangled government-industry-university*. We would like to focus on *the role of institutions* in the governance and intermediation process and key institutional actors that shape the UK industry-university landscape and facilitate interactions. In particular, we aim to review the challenges faced by the entrepreneurial universities and entrepreneurial governments throughout *the process of innovation, knowledge transfer, and knowledge commercialisation.*

The workshop is designed to bring together scholars and practitioners from the Triple Helix community as well as the wider field of experts that have researched:

◊ *intermediation, governance and orchestration of relationships in the context of:*
- innovation systems,
- knowledge transfer practices,
- public-private partnerships,
- stakeholder platforms,
- institutional intermediation,
- multi-level and network governance,
- technology mediated relationships, or
- other modalities of government-university and industry interactions

◊ *brokerage, bridging and third party activities in the context of:*
- university-industry engagement,
- government-industry lobbying, information exchange and policy implementation,
- self-regulation and normative activities by industry,
- stakeholder activism, representation and mediated dialogue,
- research funding,
- R&D collaboration, or
- skills and capabilities development

◊ *cases of governance and intermediation of complex networks in the public domain:*
- health care networks
- utility networks
- social care networks

The Triple Helix as a concept is recognised to have a transformative effect on industry performance, generating accelerated knowledge and technology transfer between the public and the private sector and systemic change. In the recent years,

we have observed a radical shift in the approach of governments - as *active orchestrators of Triple Helix relationships*, pursuing economic development through innovation, institutional changes through community and participative practices, and industry transformations through collaborative public-private funding and university- industry interactions.

The European regional development policies towards smart specialisation encourage regional public authorities to lead in a Triple Helix mode developing regional research and innovation strategies that focus on key enabling technologies through active engagement with universities and industry. Governments are to engage with leaders in technology and innovation, encouraging industry to pursue *collaborative advantage* and *strategic co-alignment* with regional and national socio-economic goals, and encouraging universities to act as *innovation entrepreneurs*.

Building active and transparent Triple Helix relationships is a critical element of the implementation of innovation policies at regional and national level. This is supported by a variety of institutional arrangements, technology platforms, or communication practices and instruments that aim to bridge across Triple Helix domains and to oil trust in the mutual engagement. We expect presenters to bring in cases of intermediation in the Triple Helix, and to engage in the open debates that will contribute to our understanding of processes and agents that constitute the Triple Helix dynamics.

We have invited speakers from the business community, government departments, and the university sector to share experiences and report on *the challenges faced in the design and implementation of Triple Helix interactions* and the critical role of *intermediary institutions and agents*. While looking at *intermediary practices*, we have invited speakers to discuss the *theoretical implications of intermediation in tripartite and multilateral relationships*, and the value added from intermediation and facilitation in the innovation process.

Call for Contributions

We welcome contributions discussing different aspects of the Triple Helix, Quadruple Helix, or the intermediation, governance and orchestration of bi-lateral and multilateral relationships within the public space of innovation, the creative commons and the commercial realities of R&D funding by the public and the private sector. Potential speakers are invited to contribute to two thematic debates that will take place in open panel discussions.

Open Panel on Triple Helix Intermediation

Participants are invited to address the intermediation theory and practice from a particular disciplinary perspective and/or a specific case of facilitation, intervention intermediation or orchestration of university-university-government interactions.

We invite contributions and interventions that focus especially, but not exclusively, on the following questions:

- Does the innovation process require intermediation and what intermediaries are ready to step-in
- Who governs in Triple Helix interactions
- Who are the actors mediating in regional development projects and how these actors mediate between infrastructures, nature, urban spaces, regulators, providers and consumers
- How intermediaries govern in sociotechnical networks
- What intermediations take place in urban development
- How stakeholders engage in decisions and sustainable solutions
- What is the role of institutional intermediation in stakeholder engagement
- What are the trade-offs in Intermediation
- Can transparency be achieved in Intermediation, orchestration and brokerage
- Paradigms and Techniques of Governing University-Industry-Government interactions
- From diplomacy to orchestration and influence in Triple Helix
- Assessment of the 'positive and negative externalities' from collaboration and intervention in the innovation process
- How intermediaries deal with 'conflict of interests', and deliver 'good value-for-money'.

Open Panel on The Practice of Engagement and Governance of Innovation in Multi-lateral and Participative Networks

Participants are invited to address the issues of governance, control, facilitation and optimisation in multi-lateral collaborations and to look at the transferability of knowledge and technology across the industry-university-government interface.

- Governance, leadership and accountability
- Collaborative governance
- Collaborative capacity and business models for cooperation, coopetition and collaboration
- Relational governance
- Network governance
- Platform governance
- Governing the activities of brokers and third parties
- Routines and transformations in governance and intermediation
- Creative commons and governing citizens science
- Collaboration, Competitiveness, and Universal Values
- Knowledge sharing and the boundaries of good will
- Alliance management in triple helix formations
- Antecedents and consequences from Triple Helix interactions
- Triple Helix and facilitating inter-organisational relations.

We invite contributors to prepare a two-page statement that captures the essence of their work, their knowledge, and expertise, related to the theme of the workshop and to one of the open panels:

Selected contributions and papers will be included for publication in one of the two special issues commissioned for the workshop:

- Industry and Higher Education Journal (IP Publishing)
- Triple Helix: A Journal of University-Industry-Government Innovation and Entrepreneurship (Springer).

A live webinar will be broadcasted to a wider audience.

To participate in the workshop and make a contribution to the open platform debates, authors should submit an **abstract/ summary statement (2 pages)** with a description of their case and point of argumentation: **Monday 21 April 2014**. Proposals for contributions should be submitted via the webpage, or emailed to: fbelevents@surrey.ac.uk or e.todeva@surrey.ac.uk.

REGISTRATION FEE

The registration fee includes participation in the workshop, lunches, workshop dinner, morning and afternoon refreshments.

To Register, please, LOG-IN and follow the instructions at: http://www.ias.surrey.ac.uk/workshops/triplehelix/cfp.php

For invited contributors to the panels	**No Fee**
For other participants	**£80**

For academic queries, please contact:

Dr Emanuela Todeva (e.todeva@surrey.ac.uk)

For administrative queries, please contact:

Events Team (fbelevents@surrey.ac.uk)

Important Dates:

21st April 2014	Last date for submission of two-page statements of experience
12th May 2014	Registration deadline for presenters and participants
29-30th May 2014	Workshop Dates

WORKSHOP OF THE MICRO FOUNDATION OF THE TRIPLE HELIX AND SPECIAL ISSUE OF TECHNOVATION

Grenoble Ecole de Management, Switzerland

26-27th May 2014

Chairperson:
Vincent Mangematin
Associate Dean for Research, Grenoble Ecole de Management

Coordination:
Henry Etzkowitz (henryetz@stanford.edu)
Conor O'Kane (conor.okane@otago.ac.nz)
James Cunningham (james.cunningham@nuigalway.ie)
Vincent Mangematin (Vincent.mangematin@grenoble-em.com)

BACKGROUND

The Triple Helix is a key concept to describe how industry, university, and public authorities articulate their activities, and how these combine to promote innovation (Etzkowitz, 2008). While the Triple Helix has been used at the macro level to describe the workings of national systems of education and innovation, and at the regional levels to analyze "innovations in innovation" such as the invention of the venture capital firm, the aim of this event is to explore the basic elements of the Triple Helix, focusing on how the Triple Helix actually operates.

The Triple Helix has been operationalized in different ways in different contexts. In academia as well as firms, research has been organized by programs launched by funding agencies that are more related to societal and economic concerns. Governance has supplemented government as coordination occurs laterally as well as vertically. Research projects are designed to better understand these developments. Some projects are long term, such as common labs between firms and universities and dedicated teams or buildings, or short term like research projects led by co-principal investigators or mechanisms to move people around the Triple Helix, nationally and internationally. In every country and region, more or less similar organizational formats for cooperation and collaboration have been adopted. However, the results are different in terms of academic outputs and of articulation between academia, government, and industry, varying by previous organizational structure, culture, interface mechanisms, and other variables.

The workshop aim is to explore practices around the Triple Helix, how organizations and scientists are transforming their methods of performing science and translating it into practice to match Triple Helix objectives.

To feed the workshop agenda, a call for contributions has been launched and selected draft papers will be discussed at the workshop. The deadline for revised papers after the workshop or full paper is 1 November 2014. Full papers must be submitted to the Elsevier submission system for publication in the special issue of Technovation (Elsevier). They will be double-blind reviewed.

For further information and to download the workshop agenda, visit: http://www.triplehelixassociation.org/special-events/workshop-micro-foundations-triple-helix-special-issue-technovation.
For registration enquiries, contact: Vincent.mangematin@grenoble-em.com or ryan.rumble@grenoble-em.com.

PUBLICATIONS

CALL FOR PAPERS

Call for Articles – Journal of Research in Peace, Gender and Development (JRPGD)

ISSN: 2251-0036

The Journal of Research in Peace, Gender and Development (JRPGD) **is a multidisciplinary peer reviewed journal that publishes significant advances and discoveries in all aspects of Peace, Gender and Development** (http://interesjournals.com/jrpgd).

JRPGD aims to promote communication among Peace, Gender and Development researchers worldwide. The journal strives for a global focus on conflict, peacemaking and gender equality. JRPGD will publish original works within the area of Peace, Gender and Development and related disciplines that has not been published elsewhere or submitted simultaneously to other journals.

Authors are invited to submit complete unpublished Research Papers, Survey Papers, Informative Articles, Case Studies, Review Papers, Comparative Studies, Dissertation Chapters, Research Proposals or Synopsis, which are not under review in any other conference or journal. All tracks are open to both research and industry contributions. All authors must agree on the content of the manuscript and its submission for publication in this journal before it is submitted to us.

JRPGD will cover all areas of the subject. The journal welcomes the submission of manuscripts that meets the general criteria of significance and scientific excellence.

Authors are invited to submit their manuscript(s) to jrpgd.publications@gmail.com for publication in the Journal of Research in Peace, Gender and Development or through the online submission at: http://interesjournals.com/jrpgd/submit-manuscript.

JRPGD objective is to inform authors of the decision on their manuscript(s) within four weeks of submission. Following acceptance, a paper will normally be published in the next issue. Guide to authors and other details: http://interesjournals.com/jrpgd/guide-to-authors.

SPECIAL ISSUE:

SILICON VALLEY - global model or unique anolamy?

Vol 52, no 4, December 2013

Guest Editor: Henry Etzkowitz

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Silicon Valley *at risk*? Sustainability of a global innovation icon: An introduction to the Special Issue
Henry Etzkowitz

The dynamics of Silicon Valley: Creative destruction and the evolution of the innovation habitat
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From white gold to silicon chips: Hydraulic technology, electric power and Silicon Valley
James C Williams

The formation and growth of Google: A firm-level triple helix perspective
Annika Steiber and Sverker Alänge

StartX and the 'Paradox of Success': Filling the gap in Stanford's entrepreneurial culture
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New-technology clusters and public policy: Three perspectives
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Entrepreneurial regions: Evidence from Oxfordshire and Cambridgeshire
Helen Lawton-Smith, John Glasson, Saverio Romeo, Rupert Waters and Andrew Chadwick

(http://ssi.sagepub.com)

Gebhardt, C and Pohlmann M C (2013)

Managing the organisation 2.0: Entrepreneurial spirit and general management competences as early indicators for cluster success and sustainable regional development. Findings from the German Entrepreneurial Regions Programme.

Journal of High Technology Management Research 24:153–160.

SPECIAL ISSUE: Scientometrics
vol 99, issue 1, April 2014, ISSN: 0138-9130
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***including an interview with Professor L Leydesdorff, THA Vice-President**

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Han Woo Park

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Han Woo Park

TRIPLE HELIX ASSOCIATION NEWS

SECOND ROUNDTABLE DISCUSSION ON TRIPLE HELIX INTERACTIONS AND SMART SPECIALIZATION ORGANIZED BY THE THA CHAPTER OF GREECE THESSALONIKI, GREECE *24 FEBRUARY 2014*

The Second Roundtable discussion on Triple Helix Interactions and Smart Specialization of the THA Chapter of Greece, which took place on Monday 24 February 2014 in Thessaloniki, continued the success of the previous roundtable, bringing together key representatives from the Triple Helix stakeholders.

The session was coordinated by Professor Ketikidis (President of the THA Chapter of Greece) and Mr Stavros Mantzanakis, Director of Emetris Consulting (Sponsor of the event). The panelists of the discussion included: Dr Christos Vasilakos, General Secretary for Research and Technology (GSRT), Mrs Tzelina Makrantonaki, Vice-Regional Governor of the region of Central Macedonia for Technology and Innovation, Professor Ioannis Chatzidimitriou, Rector of University of Macedonia (UoM), Professor Pericles Mitkas from Aristotle University of Thessaloniki (AUTH), Professor Athanasios Konstantopoulos, Chairman of The Centre for Research and Technology (CERTH), Mr Nikos Zaharis, Director of the South-East European Research Centre (SEERC), Mr Dimitrios Lakasas, Chairman of the Alexander Innovation Zone (AIZ) and of the Greek International Business Association (SEVE), and Dr Christos Georgiou, Director of the Research and Documentation Department of the Federation of Industries of Northern Greece (FING). Participation in the event exceeded 150 people.

The central pillar of the discussion was the extent to which Triple Helix interactions can enable the implementation of the smart specialization strategy towards economic growth. Actions that need to be taken, and the tools to be deployed towards achieving regional development and the exit from the crisis were also discussed. The perspective opportunities are significant as it was clearly shown during the roundtable discussion, and despite partial disagreements, there was a strategic convergence both among the stakeholders and at the national agency for innovation (GSRT). A further significant point was the intention and high motivation of all the stakeholders to collaborate in order to properly deliver their services, knowledge, and know-how, towards market demands so that both the industry and society (the 4th Helix) can benefit.

The key domains of the region of Central Macedonia, which have the capacity to offer their competitive advantage to the region and on which the smart specialization strategy should be implemented, are: the agri-food sector, energy, tourism, building materials, transportation and logistics, information and communication technology, textile industry, sea related industries, green development and, last but not least, the key enabling technologies (KET) such as biology and nanotechnology. To this end, the focus and common interest of the Triple Helix stakeholders from this region should be tailored around these sectors towards a proper implementation of the smart specialization strategy with economic growth.

In order to have positive results, there is a need to increase the competitiveness and internationalization through innovation, and this is where the convergence of the Triple Helix stakeholders will contribute significantly. Enterprises need support in order to turn to the universities and research centres for solutions for developing their products and making them suitable for the market. In parallel, government needs to provide a stable political and taxation framework, offering at the same time opportunities to support the entrepreneurs at the strategic planning of their actions and investments. It should be understood that the three stakeholders share common interests, and that their collaboration will create multiple benefits and win-win situations for the creation of internationally commercialised goods and services.

Actions which could contribute towards the above mentioned direction consist of: procedural simplification, provision of incentives/motivation, creation and support of research clusters

with representatives from all Triple Helix stakeholders, support for innovation in relation to SMEs, programs for business start-ups, programs for youth innovation clusters as well as programs for the valorisation of research outcomes, so that added value is created from the money invested in the market. Furthermore, fund absorption from and for innovation is critical for the strategic planning of the region's smart specialisation strategy.

The THA pinpoints that the Greek economy is at a critical point, and thus suggests that no more time should be wasted in defining policies and actions which will promote the growth. Moreover, a common belief is that the Triple Helix is the DNA of smart specialisation and will help the enterprises in Greece to become more international, competitive, and robust.

The next steps for the THA Chapter of Greece are associated with researching both the drivers and barriers for boosting the promoters and mitigating the blockers of regional economic growth, so that this growth can be achieved through proper entrepreneurship and innovation. For this reason, further roundtable discussions will take place as well as networking activities which will involve interested triple helix stakeholders from the whole region of South-East Europe.

Highly Commended Paper Award

We are pleased to congratulate THA member, **Professor Matteo Rossi** of the University of Sannio (IT), Italy, on the citation received from the Editorial Team of the International Journal of Organizational Analysis (Emerald) for his paper "Mergers and acquisitions in the hightech industry: a literature review", which has been awarded as the Highly Commended Paper winner. "It is one of the most impressive pieces of work the team has seen throughout 2013", commented the Journal's Editorial Team.

Reference: Matteo Rossi, Shlomo Yedidia Tarba, Amos Raviv, (2013) "Mergers and acquisitions in the hightech industry: a literature review", International Journal of Organizational Analysis, vol 21 Iss: 1, 66-82, published in the International Journal of Organizational Analysis (Emerald), volume 21, issue 1,

http://www.triplehelixassociation.org/thpost/others/award-highly-commended-paper

University of Strathclyde secures Times Higher Education 2013 Entrepreneurial University of the Year Award

THE UK Entrepreneurial University of the Year 2013/14 UK University of the Year 2012/13

The host of the 2009 Triple Helix VII Conference, the University of Strathclyde in Glasgow, UK, has enjoyed success at the prestigious Times Higher Education (THE) Awards for the third consecutive year, being named THE 2013 'Entrepreneurial University of the Year'. The award follows the 2012 'UK University of the Year' award, and the 2011 'Research Project of the Year' award.

The Award was presented in recognition of the outstanding culture of entrepreneurship fostered at the University through education, research, mentoring and partnership programmes.

University of Strathclyde Principal Professor Sir Jim McDonald said: "This is a magnificent achievement for the University. Winning one award is a great success in itself but awards in three consecutive years are a testament to the quality and quantity of work by everyone at Strathclyde. An entrepreneurial spirit permeates our activity, and our distinctiveness as an entrepreneurial university is rooted in our vision and strategy. By cultivating this spirit in our students, we are laying the foundations for future prosperity, and nurturing future generations of leaders and successful businessmen and women. Entrepreneurship is one of the key parts of our mission as a leading international technological institution."

Strathclyde has created more than fifty spin-out companies, with annual sales of £80 million and employing more than 700 people. It has created eighty-four student or alumni companies, employing 200 people.

The Times Higher Education Entrepreneurial University of the Year Award is made to universities which have "developed an environment and culture that fosters enterprising attitudes among all members of its community and delivers significant entrepreneurial impact at regional, national, and international levels." It is based on criteria of: vision and strategy; culture and mind-set; entrepreneurial impact, and policy and practice.

University of Strathclyde Principal, Professor Sir Jim McDonald (third from left) receiving the Award

LETTER PUBLISHED IN FINANCIAL TIMES FEBRUARY 4, 2014

FROM: PROF HENRY ETZKOWITZ

US PUBLIC VENTURE CAPITAL

US Innovation has a Rich History of State Support

Sir,

From the investment in developing interchangeable parts that sparked the American system of manufacture in the early 19th century, to the contracts that fuelled Silicon Valley's data mining industry, government has played a key role in the development of US technology industries ("Free innovators from the state's deadening hands", Edmund Phelps, January 31). Behind the private investment in the development of a biotechnology industry lies decades of public support for biomedical research at universities. Nevertheless, the "public" base of the glacier is all too often overlooked in favour of the "private" tip of the iceberg.

Despite its growth, venture capital is still highly concentrated in particular US geographies, and focuses on just a few "hot" technologies at a time. Although there are occasional exceptions in the very hottest and best publicised areas, private venture capital is seldom available at the early stages of company formation. This is where government has creatively stepped in to fill the gap.

For example, an SBIR (Small Business Innovation Research) award can serve as a stamp of approval to venture capitalists or other prospective investors that a company has qualified its technology through a rigorous vetting process. Although the path from public to private funding can take many courses, a typical approach is to leverage the credibility gained through a public award into private funding. According to SBIR policy, applicants need not leave their jobs, even temporarily, until after receipt and acceptance of a grant. Indeed, as is now typical, government laboratories have entrepreneurial leave programmes that allow time to be taken off work with the option of returning. Scientists are thus incentivised toward entrepreneurial risk-taking, while the necessity of eventual private investment helps ensure against government over-reach.

The US has developed an industrial policy based upon university-industry-government relations. It is a knowledge-based policy with a specific role for the federal government in creating and developing technologies, industries and jobs, beyond general measures to encourage economic health such as regulating the supply of money. More localised than macroeconomic policy, industrial policy is nonetheless broader than measures cloaked in general principles aiding particular companies or interest groups.

While the very idea of government providing "seed capital" to catalyse company formation is anathema to some, a successful "public venture capital" strategy can be discerned in postwar US science and technology policy. Professor Phelps' commentary obscures the rich history of government support for innovation. Lest we forget, artistic creation too is supported by all levels of American government, though you will not find any paintbrushes, chisels or cameras in the "state's deadening hand".

Henry Etzkowitz
International Triple Helix Institute
Palo Alto, CA, US

"LEARNING FROM ANALOGIES" (LEAN) PROJECT

Fondazione ISTUD, a THA organizational member, together with a consortium composed of universities, business schools, and private companies from Poland, Romania, and Cyprus, has been awarded an EU grant under the Life Long Learning Programme for implementing the "LEarning from Analogies" (LEAN) project.

LEAN answers to the increasing need for soft skills development among managers and entrepreneurs, through the transfer and implementation of an innovative training methodology for problem solving and decision making, based on the use of "analogies" and cross-cultural cues. Multicultural training is intended to be an effective instrument to help SME's, entrepreneurs, and managers, to acquire a global vision based on a cross-functional set of information, histories, and best practices, which are often very far from their way-of-thinking but are crucial in a globalized and rapidly changing business environment.

Beside developing new teaching material and analogical cases, the project contributes to the capacity building of trainers and the wider awareness on the use of "analogies" for management education and its added value.

http://www.triplehelixassociation.org/thpost/others/learning-analogies-lean-project

New Members

The Triple Helix Association is glad to welcome new members, and to introduce them to our Community!

Organizational Member

FONDAZIONEISTUD

Research Center, Private not-for-profit Foundation
Training Center and Headquarters: Strada Nazionale del Sempione Oltrefiume, 25 - 28831 Baveno
Office: Piazza IV Novembre 7, Milan, Lombardy, Italy
www.istud.it, +39 323 933801

ISTUD Foundation is an independent business school that operates in Europe in the field of executive education, advanced lifelong learning and in the field of management research since 1970. From 2005, ISTUD has become a private no profit foundation that acts as a 'bridge' between theory and practice, between academy and the world of professions. Its mission is to consolidate and spread a management culture based on corporate social responsibility, multiculturalism, professional upright and value production.

In the last years ISTUD has developed research and training initiatives linked to:

- working life cycle (youths and labour market; aging; elder workers)
- social role of companies and stakeholders engagement
- business integrity; management and legality, anti-corruption policies
- green management, business innovation, entrepreneurship
- health management and wellbeing
- innovative learning methodologies

ISTUD is member of EFMD, ABIS, and subscribes the Principles for Responsible Management Education (PRME) UN Global Compac. It has managed international projects funded by the EU and other relevant international donors (World Bank, IFC, ETF)

Representative
Cristina Godio
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Individual Members

Stavros Mantzanakis

CEO
EMETRIS **EO**SA
Greece (affiliated to TH Chapter Greece)
sm@emetris.gr

Biography
Stavros Mantzanakis with over twenty years of managerial experience in companies and institutions, is the CEO, founding Partner and head of Innovation department of Emetris SA, a business consulting company specializing in futures studies, strategic, business and financial planning, innovation and green technologies. He has been General Director of Thermi S.A, an innovation Incubator for 2,5 years, an incubator based in Thessaloniki, supports innovation startups and is one of the largest incubators in South East Europe. Since 2010 he's been working on his PhD research.

Education
PhD research "Participative Regional Strategic Foresight"
MBA in International Finance
Executive Masters on "Digital Cities"
Bachelor degree in Business Administration

Areas of interests in TH research
Future studies, innovation, participatory strategic foresight, regional development, start ups, strategy, finance

Areas of competence and expertise in TH Research
Innovation, regional development, start ups, spin outs, spin offs

Mr Nikos Zaharis

Director, South East European Research Center
South East European Research Centre (SEERC)
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Education
Pennsylvania State University, USA, 1988-1990: Master of Science in Chemical Engineering
Aristotle University of Thessaloniki, Greece, 1982-1988: Diploma in Chemical Engineering

Areas of interests in TH Research
Innovation policy, innovation management, start-up creation and support

Areas of competence and expertise in TH Research
Innovation policy, innovation management, start-up creation and support

Dr Diana Twigden

Biomedical Academic and Industry Executive (strategy and policy)
Switzerland
diana.adastra@xtra.co.nz

Education
MSc
PhD Molecular Biology (oncology)
Master Public Policy
MIoD (UK) [Member, Institute Board of Directors (UK)]
MIoD (France) [Member, Institute Board of Directors (France)]

Mrs Karen Viviana Barrañón Navarro
Professor and Director of Innovation and Entrepreneurship Center at the Park of Innovation and Development of Veracruz State in Mexico
Monterrey Institute of Technology and Higher Education
Mexico
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Education
Master in Business, Technology and Entrepreneurship (University of Waterloo, Canada)
Master in Marketing (Monterrey Institute of Technology and Higher Education)
BA Accounting (Monterrey Institute of Technology and Higher Education)

Areas of interests in TH research
Open innovation and social and university entrepreneurship

Dr Elena Rogova
Professor
National Research University Higher School of Economics
Russia
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Education
Specialist diploma in Economics, Leningrad Financial and Economic Institute, 1991
Candidate of Science, 1995, Economics, St. Petersburg State University of Economics and Finance
Doctor of Science, 2006, Economics, St. Petersburg State University of Economics and Finance

Areas of interests in TH Research
Business incubators, venture capital, technology transfer

Areas of competence and expertise in TH Research
Financial models of technology and R&D cooperation, venture capital

If you would like to know more about THA members, visit our Members Gallery at http://www.triplehelixassociation.org/members-gallery.

Through the Gallery, the THA offers visibility to members within and outside of the Association, thus facilitating networking and cooperation.

We invite THA members not yet included in the Gallery to send a short bio, areas of research and competence in TH research, and a passport photo, to: info@triplehelixassociation.org.

ANNOUNCEMENTS

JOINT MEETING OF SOCIEDAD LATINOAMERICANA DE ESTUDIOS SOCIALES DE LA CIENCIA Y LA TECNOLOGÍA (ESOCITE) AND SOCIETY FOR SOCIAL STUDIES OF SCIENCE (4S)

AUGUST 20 – 23, 2014
INTERCONTINENTAL HOTEL, BUENOS AIRES, ARGENTINA

The **2014 ESOCITE/4S** joint conference will be held in Buenos Aires, Argentina on 20-23 August 2014. The general theme of the conference is "Science in Context(s): Souths and Norths", which refers to the opportunity for STS scholars to meet colleagues (and research traditions) from other parts of the world, giving rise to new dialogues and exchanges.

IMPORTANT DATES

April 1 – May 1, 2014	Early registration.
May 12, 2014	Preliminary program posted.
July 1, 2014	All presenters must register to be included in the final program. For papers with more than one author, one presenter must register to be included in the final program.
July 21, 2014	Final program posted.

Contacts: Program Chairs, Pablo Kreimer, and Leandro Rodriguez Medina - jointmeeting2014@yahoo.com
For technical assistance with the submission or registration process: webmaster@4sonline.org

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7TH ANNUAL EUROMED ACADEMY OF BUSINESS CONFERENCE

"THE FUTURE OF ENTREPRENEURSHIP"
SEPTEMBER 18-19, 2014
KRISTIANSAND, NORWAY

In recent years, economies worldwide are witnessing the emergence of new business models within entrepreneurial realms, new funding mechanisms and platforms, new international scopes of activities, new ways of organizing ventures, as well as greater varieties of venture types spanning both commercial and socially driven initiatives. Some of these initiatives emerge from urgent questions involving academia, government, and industry in a period of economic slowdown and uncertainty in developed and emerging economies. Such urgency and interest is evident in wider governmental initiatives such as the European Community's Entrepreneurship 2020 Action Plan, as well as various individual governmental programs across the world. The **EuroMed Research Business Institute,** organizing the Conference, welcomes papers and contributions in the following tracks:

Competitiveness, Development and Sustainability
Conflict, Diversity and Cohesion
Corporate Governance
Cross – Cultural Management
Education and Training
Entrepreneurship and Innovation
Finance and Accounting
International Business and Management
Marketing
Organizational Behaviour and Human Resources Management
Strategic Management
Tourism
Virtual Tracks
General Tracks

Further details on sub-themes are available at: http://www.euromed2014.com/#!call-for-papers/c5yp

IMPORTANT DATES

By April 28, 2014	Notification to authors (for early submissions by March 17, 2014)
By May 16, 2014	Notification to authors (for submissions after March 17, 2014)
Until July 18, 2014	Early-bird registration
After July 18, 2014	Late registration
August 31, 2014	Deadline for inclusion in Book of Proceedings

The Triple Helix Magazine, Hélice, is published quarterly - March, June, September and December. Contributions, articles, news or announcements, should be sent to:

Devrim Göktepe-Hultén
Editor in Chief
devrimgoktepe@gmail.com
or

Sheila Forbes
Managing Editor
sheila.forbes@.strath.ac.uk

Deadline for inclusion in June 2014 issue: 22 May 2014

THA members and partners can now advertise current and upcoming projects, activities, events, call for papers, contributions, and job search, through our new "TH post" service - http://www.triplehelixassociation.org/th-post.

Items published in TH post will be widespread either through the THA Hélice Magazine or the THA Newsletter.

Members and partners can submit posts directly on the THA website at: http://www.triplehelixassociation.org/th-post-add, or send them by email. For more information, or to send a TH post: info@triplehelixassociation.org