THE TRIPLE HELIX ASSOCIATION NEWSLETTER

www.triplehelixassociation.org

TRIPLEHELIX
UNIVERSITY INDUSTRY GOVERNMENT association

Hélice

VOLUME 1 ISSUE 3 JULY 2012

Triple Helix X, 2012, Bandung, Indonesia . . . www.th2012.org

EDITORIAL WELCOME

Summer Greetings!

Towards the final days of this academic year, we would like to welcome you to the third issue of the Triple Helix Association Newsletter - *Hélice*.

Hélice is distributed quarterly to over 1550 scholars, practitioners, and policy-makers, and is reaching organizations, universities, and public research establishments. Thank you all for your interest and input in making *Hélice* a cooperative and interactive environment.

At Hélice we welcome your feedback, comments, critiques, additions or alternative opinions, as well as reflections on any published articles. If you have working papers, short articles, or news about ongoing or prospective projects, we would be delighted to consider them for inclusion in future issues.

In this issue we are pleased to present articles from (a) Marty Beard and Tapan Munroe on "America's Extraordinary Economic Opportunity", the Mobility-Social Network Nexus, (b) Henry Etzkowitz, on "Beyond the "Male Model": an Alternative Female Model of Science, Technology and Innovation" and (c) Danilo Piaggesi reflects on the "The International Conference on Information Systems and Technology Management and the new initiative, ICT 4 DEV".

We also bring news of an exciting Triple Helix Workshop on "Building the Entrepreneurial University", organized by the Triple Helix Research Group at the H-STAR Institute, to be held at Stanford University on 12-16 November 2012, and we hope that those interested will take advantage of this opportunity.

It is with pleasure that we announce our newly appointed regional correspondents: Tapan Munroe, *Hélice* Silicon Valley Region; Danilo Piaggesi, *Hélice* Latin America Region; and Guilherme Ary Plonski, *Hélice* Brazilian Region. We are pleased to welcome them on board, and if you would like to represent your region, please feel free to contract Devrim Göktepe-Hultén or Sheila Forbes.

In addition to our usual section on Publications, and recognizing that it is difficult to publish, let alone receive feedback from academic journals in a timely manner - the THA is pleased to initiate the "THA Working Papers Series" - WPS, which will provide scholarly dissemination of academic papers and convey them to a wide and knowledgeable readership to provide further feedback and comments.

As Editors of *Hélice*, we appreciate your time and interest in receiving news from the Triple Helix Association. We encourage you to share your reflections to sustain and extend the innovative dialogue that *Hélice* is initiating, and invite you to contribute to this effort.

For further information, and for publication in *Helice,* please contact Devrim Göktepe-Hultén at devrimgoktepe@gmail.com, or Sheila Forbes at s.forbes@eee.strath.ac.uk.

We wish you a pleasant and enjoyable Summer, and look forward to seeing you at the Triple Helix Annual Conference in Bandung, Indonesia, on 08-10 August 2012.

Devrim Göktepe-Hultén and Sheila Forbes

We look forward to receiving applications for:

- Triple Helix Association Membership
- THA Ambassadors
- Setting up THA Chapters in your country
- THA Regional Correspondents

If interested, please visit:

www.triplehelixassociation.org

Hélice - THA Newsletter

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Volume 1, Issue 3, July 2012

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Deadline for inclusion in the October 2012 issue: 10 September 2012

TRIPLE HELIX SCIENTIFIC NEWS

AMERICA'S EXTRAORDINARY ECONOMIC OPPORTUNITY

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The meteoric rise of both high-speed mobile technologies and social networks has spawned the most innovative time in the history of technology. In particular, the combination of mobile broadband, as embodied in smart phones and tablet devices, and social networking tools, as embodied in services such as Facebook, Twitter, and LinkedIn, have created a frenzy of innovation as hundreds of new companies work to leverage this powerful combination of Mobile + Social.

Many of these innovations, and the companies that pioneered them, are American; and indeed, this is a time of great opportunity for America to renew and sustain its economic vitality via these cutting edge technologies. Experts agree that innovation is the most important agent of economic development and a cornerstone of sustainable prosperity, and America is innovating at a pace perhaps never seen it its history. Can we turn this innovative frenzy into sustained, broad economic growth as a whole? We've done it before: the growth of the railroad, of the telecommunications infrastructure, the birth and growth of the Internet, all contributed to material economic growth.

In this paper we will first examine the core attributes of the Mobile-Social ("Mo-So") trend. We then explore opportunities that this turning point in the history of technology offers, followed by a discussion of what the U.S. has to do to sustain its primacy in the Mo-So space in the 21st century.

Mobility

It is estimated that the number of smart phones will surpass the number of personal computers by mid-2012. Smart phone connections to the Internet are growing at three times the rate of personal computer connectivity. This is actually reshaping the global economy, and we suggest that this sea-change represents a turning point in history. For the first time in history, people around the world are able to reach the Internet inexpensively and with great convenience to access healthcare information, on-line education, disaster preparedness resources, job opportunities, and to conduct business. People are no longer tied to their homes or offices for connectivity. They can access the Web from wherever they happen to be and at any time of day.

The salient point here is that mobile broadband is the most pervasive electronic technology in the history of the world. Out of a world population of nearly seven billion people, nearly six billion mobile devices are expected to be in use by mid-2012. Nearly 85% of the world's population is within signal range of wireless Internet service - what is amazing is that this exceeds the penetration of the electrical grid.

Some specific examples of important applications of high-speed mobile broadband technology include:

1) Distance-learning for underserved populations.
2) Sharing digital images among physicians in distant geographical areas.
3) Video conferencing.
4) More efficient energy management via smarter electric grids that conserve energy and support environmentally-friendly public policy. (Darrell West, *Ten Facts about Mobile Broadband*, Brookings Institution December 8, 2011). There are, and will be, many others.

Of course, the U.S. is not the only major mobile broadband player in the world. Mobile trends are truly global. In fact, all developed economies of the world have almost 100% wireless penetration.

Here are the standouts in terms of wireless device usage (number of wireless devices per person):

Hong Kong	188% (almost 2 per person)
Saudi Arad	170%
Russia	155%
U.S.	A surprising low 104%

(McCann Worldgroup, 12/2011)

Not surprisingly, mobile phone usage has become a high priority item in emerging countries. It is important to note that many emerging nations have skipped over the usual sequence in information technology: from landline and desktop computers to cell phones and laptops then to tablets and smart phones. For example, the growth in mobile phone usage in Sub-Saharan Africa has been dramatic. Today, mobile phones outnumber landlines by ten to one. Nearly 60% of the population has a mobile phone. The positive impact on the economy of the region is going to be dramatic as mobile telephony greatly enhances agricultural and labor market efficiencies by reducing market research and communication costs, as well as by creating new (and often global) opportunities.

In recent years, the smart phone has become a major factor underlying significant economic development and job creation. It helps spawn new businesses and products. According to a recent Deloitte study, investment in 4G technologies is likely to help the U.S. GDP grow by nearly $73 billion between 2012 and 2016, and 372,000-771,000 new jobs are expected to be created during the same period.

Social Networking

The data on social networking is equally impressive. Globally, there are now well over one billion "Social Networkers." They exceed users on basic Internet "portal" sites like Yahoo, Microsoft Network (MSN), America on Line (AOL). In 2011, social networking enthusiasts spent a total of 80 billion minutes on social networking sites. An overwhelming 90 percent of the usage was on Facebook. Globally, per-person time involved in social networking activities stands at an average of ten hours per month. And this more than just a "consumer" phenomena; enterprises are scrambling to interact with and serve this exploding community.

Who are the highest users in the world? Not Americans - we are twelfth. The leader's rank as follows: Israel, Argentina, Turkey, and Chile, and so on. The top five economies of the world are not in the top-five list of social networking nations, but they are coming on fast.

Social networkers place huge value on being connected. They place high value on fast and convenient access to their networking communities, as evidenced by these facts:

- Two thirds of college age young people would choose Internet access over owning a car.
- Nearly 55% say that they literally could not live without Internet access.
- By contrast, only 4 % say that newspapers are an important tool for accessing information.
- One in three student in Brazil and Italy say that it has been two years since they have purchased a book.
- Nearly 90% of young adults check Facebook at least once a day.

And they are doing more than just "communicating". For example, social networkers have spent more than $12 billion on "virtual goods" such as digital game currency, virtual weapons, and intangible gifts. This is more than just sharing photos.

Global Picture

Today, usage of mobile technology and social networks is heavily international. More than seventy percent of Google, Facebook, Yahoo, Wikipedia, and Apple traffic is international. Nearly half of the top technology companies (ranked by market value) today are outside the U.S., and that translates into a very challenging issue: external to the U.S. there is a growing base of competitive innovation.

Most importantly, China is the major emerging force in the use of mobile communication and social networking. In the last three years, China has added more mobile users than the total number of users in the US. In addition, the emerging economies of the world are increasingly "going mobile" and getting connected. As a result, they are driving innovation related to mobile communication and social networking. For example, mobile banking and financial transactions originated in poor countries. Mobile money transfers are exploding all across the developed world. The smart phone is fast becoming the new face of money. Perhaps we are witnessing the most innovative time in the history of money, too.

America's Opportunity

There is wide agreement among experts that innovation is the most vital agent of economic development, and a cornerstone of sustainable prosperity. Rising mobile communication and social networking continue to spur innovation in many regions of the world by introducing more people and more businesses to mobile digital technology. Today, the world is literally innovating around the MO-SO (Mobile-Social) platform. This combination is a great innovation accelerator. Why? Because needs drive innovation. The more people use these technologies, the more innovation occurs via "open innovation" - user-suggested innovations. This has been a great source of success for Apple and similar companies. (Henry Chesbrough, UC Berkeley).

In the light of the long-term economic promises offered by these exploding industries, many countries have decided to declare broadband and wireless communication as a prime infrastructure and strategic need. The trillion dollar question is: can the U.S. keep up with the enormous global surge in mobile communication and social networking as well as related innovations beyond our shores, and maintain its primacy as the leading innovator in these critically important fields of technology?

One could find solace in the fact that America still has the icons of the MO-SO companies: Apple, Facebook, Twitter, LinkedIn, Salesforce.com, etc. but we need to address several questions

before we can sustain our leadership in these rapidly rising strategic fields.

They include-

1. Do we have the financial resources and leadership to maintain our innovation edge in these difficult economic times by expanding our investments in digital infrastructure?
2. Can we seamlessly cross time zones and cultures and operate globally?
3. In light of the enormous global surge in MO-SO, can we maintain our spark of creativity by investing in skill-building and talent development to sustain our national innovation ecosystem?

BEYOND THE "MALE MODEL": AN ALTERNATIVE FEMALE MODEL OF SCIENCE, TECHNOLOGY AND INNOVATION[1]

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I am often asked: why is a man studying women in science? The answer to that question is: my mother. She graduated with high honors in Geology from Hunter College, a public women's college in New York City during the 1930's depression. I had long thought that the reason why she didn't pursue a career in geology was because of the depression, that there were simply no jobs. However, on a research trip to the University of Texas at Austin, I visited the Engineering School which had a "wall of recognition" at the main entrance, including the names of many distinguished professors and practitioners, all of them men, who had graduated during the 1930's depression and pursued careers in Geology. Perhaps the reason why a woman did not pursue a career in geological science at the time, might be found in the gender dynamics of science and technology.

The broader question is how the best results may be attained from societal investment in human capital formation.

Firstly, we will consider the implications of findings from a study done in the 1990s, in the United States, sponsored by the National Science Foundation, of women's experience in academic science (Etzkowitz, Kemelgor and Uzzi, 2000) including over 400 in-depth qualitative interviews conducted in a dozen leading research universities in five disciplines: biology, physics, chemistry and computer science:

1. One of the lessons from this study is that in Europe and other countries, there is a move to introduce the American system of higher education, including tenure procedures, which put a very strong emphasis on early achievement which, as we shall see, has deleterious consequences for women. Higher education policy makers in Europe and other parts of the world may want to look more closely at its effects before introducing this system, which is now taken as the gold standard in higher education. The introduction of the tenure system is driven by international ranking procedures which drive movement from a system of relatively equal universities. Before abandoning values of equality, it should be seriously asked if introducing extreme inequalities will overall advance or inhibit quality academic research, teaching, and innovation.

2. Secondly, I discuss the Vanish Box model, derived from a four country study, sponsored by the European Union, DG

[1]Keynote Address to the FemTalent Conference, Barcelona, Spain 2011

Research, on Women and Technology Transfer (Ranga, et. al. 2008). During interviews with women in US academic science on Athena Unbound study, some of them would talk about colleagues who were no longer in the department, they were now in jobs elsewhere. I interviewed some of these women leaving academic science, and found that they were taking up careers in science-related professions such as science journalism, technology transfer, museology. etc. They were using their scientific training in translating science into use and spreading the results of science to a broader public. Rather than being "lost to science" as presumed by the "Leaky pipeline" thesis of science career loss; they were pursuing work -life balance in their new careers. This finding inspired the study sponsored by the European Union on Women and Technology Transfer.

3. Third, I outline a four phase model of women's experience in science, technology, and innovation, "the Vanish Box": after the magic trick of the "disappearance of re-appearance of a woman". "The vanish box" model shows the dynamics of the historical experience of women in science, and questions the taken for granted "male model" of science that does not work for women or men who seek work-life balance.

4. Finally, we address the question of whether the Gender Revolution in science and technology is stalled or moving forward.

Gender Inequalities in Academic Careers

The historical relationship between status and gender provides a clue to understanding the underlying dynamics of women and men's careers in science. Typically, there is strong participation of women in the early stages of development of a new discipline, but as the new area becomes prestigious and rewards increase, women disappear. As fields attain recognition and fruition, and the Nobel and other prizes are awarded, it is men who are there to receive them. There were a significant number of women working in "the fly room," the drosophila genetics lab headed by Thomas Hunt Morgan at Colombia University, but as the field became prestigious, women virtually disappeared from classical genetics (Kohler, 1994).

Does this historical relationship between gender and science still hold today or has it changed? The most important finding from all the specific instances that we came across was that the most important thing holding back women's advance in academic science was "inflexibility" of rules and procedures. It didn't matter what the specific procedure was. For example, in the US it's expected that that you should pursue your PhD at a different University than your undergraduate degree. This is the highest route to achievement. If a woman has a relationship, and the man moves will she leave the relationship to seek her competitive advantage? On the other hand, if the man in the relationship moves, and the woman goes along, she may then have to move to a school that is not as good as the one which she otherwise might have gotten into with a broader range of selection. Thus, this informal rule of exogamy, mandating leaving the previous school or worksite at each point of progression, from undergraduate degree to PhD to entry level position, works against women's advancement.

On the other hand, in Sweden the rule is the opposite. Instead of saying that you should move from one university to another, the rule is that you should stay at your own University; that if you are a highly successful junior scholar you will be kept within that University. A Swedish professor said, "why would I send my best graduate student away? He is going to replace me when I retire." So the rule in Sweden is endogamy that you stay within one university. Again, if a woman's partner moves, and she moves with him, it will hurt her career, because she has left her university of origin. So which ever way the rule is, it is an inflexible rule, it has more negative consequences for women than for men. The gender policy implication is to increase flexibility in the system.

A female model of science, balancing work and family life, has been invented but it is a subsidiary and undervalued format that needs to be brought to the forefront and institutionalized. However, this would necessitate re-thinking aspects of the academic system, especially the US model, that unintentionally yet systematically works against women's inclusion in the higher level of academic science. The US model of academic hierarchy, front loading in the academic career with a strong emphasis on youth and achievement in the early years, is partly based on a mistaken idea that youth are more productive in science than people who are of an older age. That finding was documented in a study done by Merton and Zuckerman of "Aging and Age Structure" (1973). They found that "productivity was as high or even higher at the later stages of a scientific career", and that makes sense. When you are more advanced in your career you have more access to resources, more graduate students, more research associates, more people working with you. Co-authorship arises from having members of your research group being highly productive. Nevertheless, there is a strong belief that youth makes disproportionate scientific advances, and this has been the basis of a system in which there is a strong emphasis on early achievement during the first years of your career. There is a race to accumulate publications and research grants in order to be given a permanent position in a high status American University.

In Europe, the tradition has been once you are hired there is a probationary period and then you continue to be promoted or not. But in the United States there is a very sharp dividing line: an "up or out" system. The implications for women's advancement in science, includes the contradiction between the "tenure clock", typically of seven years, and the "biological clock", the time when is possible to have children, and these coincide. Thus, women have to make the choice to postpone having children to after tenure, which then becomes their middle or late 30s. There were some women who didn't want to postpone, and some of them rethought their commitment to academic science and left for that reason.

Occasionally, in some universities there has been some reform of these procedures to try to accommodate women by extending the clock. i.e. you can apply for a year extension to reduce your time in the workplace and/or take a break in order to have more time for one's young children. Even this attempt to ameliorate the male model of science and make it more amenable to women's participation contains a contradiction: women are concerned that if

they apply for this privilege that it will be held against them in the final review. The academic system requires a demonstration of full commitment to racing the clock, otherwise you will be viewed as insufficiently competitive. Moderating the conditions will be held against you, or at least that is the fear. The attempted reform has its dangers since many women feel that they may be given points off for taking advantage of the attempt to change the rules. The contradiction between the tenure clock and the biological clock encourages some women in academic science to seek an alternative career path.

An American professor talked about a leading female student who stayed in the same city and took a job at a local teaching college. But an exception was made for her because she was such an outstanding scholar that she was then brought back to the leading University in the same city where she had received her PhD and allowed to pursue a career at that university. The rule was counterproductive to the best use of talent, but this case was an unusual exception. However, it is one that can be more regularly made if we are thinking of how to revise the system that works against women by following an implicit male model of science.

Another negative factor is the "two out of three" time bind. In interviews in the US and Mexico, it was found that if you are trying to do three things, most women usually find it was too much, they could do advanced research in a highly productive way, and manage their family relationship, but that didn't leave time for spending time in local politicking and talking with people, which is the way towards advancing within the academic system. So they could advance in their research career, but not in the career that would lead to becoming a chair person or administrator within academia. So this is the two out of three time bind.

Traditionally there has been a gendered division of labor where men worked with men and women with women, in gendered occupations. Some think that this occurred as a basis of naturally occurring gender divisions. But historically we can see that these gendered occupations change over time. I did my masters thesis on the male nurse, titled "the Precarious Identity of the Male Nurse" (Etzkowitz, 1971). The nursing profession in the nineteenth century was entirely male, and began to change over to a female profession by the end of the nineteenth century, and by the middle of the twentieth century it was virtually entirely female. Thus, gendered professions can change over time and are subject to revision.

From "Leaky Pipeline" to the "Vanish Box"

The pipeline model has been based upon the movement from schooling into higher education and into careers; the premise that there should be an unimpeded flow. Over a period of twenty years, at maximum, women should be at the highest level of any occupation. Recruitment has taken place: young women now make up equal numbers in bachelor's degrees, and the numbers are moving up in the PhDs. But they have not moved up at the same rate to the associate and full professor levels. The pipeline has not worked by filling it at one end, and expecting a changed result at the other. We need to make changes in the system to make the pipeline work. A gender neutral occupation would be one with flexibility in the role, and with balance between on-site and off-site work, and the possibility of equal participation of both genders in the occupation.

What happens to women who, for one reason or another, don't continue in an academic career in science? This was the question that we posed in: "*Women in Science and Technology"(WIST)* sponsored by the European Union. We identified that women who had left academic science, were reappearing in science related professions, using their scientific, networking and social skills in these new professions. In the UK, when opportunities opened up in the mid 1990s, female PhDs entered this career, following the States where women had risen to the top of their profession as heads of offices at major universities.

From this study of women disappearing and reappearing from academia to science related professions, we developed a concept that we called the "vanish box" model (Etzkowitz and Ranga, 2011), that takes place in four stages:

1. The first is the disappearance of women: the disappearance that we found in the Athena Unbound study, the exclusionary practices, or the taken for granted male model of science which did not take account of women's needs, of women's life chances and lifestyles. They weren't found at the highest levels of academic science to the extent that would be expected if the pipeline was working as it was supposed to, with women flowing in and being promoted up over a period of time. So disappearance.

2. The disappeared women are in the reserve army: at home or in part time positions unemployed or underemployed. The reserve army is called back when there is an emergency or a shortage. For example, during World War II women PhD's who had been unemployed or working as volunteers in their husband's laboratory were called into full-time positions in the Manhattan Project and other Labs. After the War, some began to get academic positions and rose to the highest level after having been in the reserve army for many years.

3. The third phase of the model is the creation of new opportunities; either by emergency situations, or by the creation of new professions that require people with scientific training. An example of this was the Technology Transfer profession that we studied: a new profession that required people with scientific training and background and business training, and typically people with a scientific background would learn the business skills, take courses or even a master's degrees in business. This provided opportunities, but there are still limitations: the new profession wasn't as prestigious as the old one, and it had both advantages and disadvantages: working in a technology transfer office gives more of an opportunity for a work life balance, but the prestige of the profession isn't that high and the opportunities for advancement are limited.

4. On the other hand, as the knowledge society advances, professions that translate knowledge into use become more prestigious and the profession also rises in status and prestige over time. That is what has been happening with technology

transfer. The question that arises is, will it follow the same model of classical genetics, or will it lead to a new model of a gender neutral profession, with men and women working at the highest levels in a situation that allows for work-life balance? There is some evidence that this may be happening in small biotech firms. A recent study found that women recruited into these firms were taken seriously in their work, they were being promoted, and so the start-up biotechnology firm has offered evidence that there may be a changing relationship between gender and career advancement and new possibilities available in this area.

Beyond the "Male Model": An Alternative Female Model

The American sociologist Cecilia Ridgeway has set forth the thesis of a stalled revolution, in the 1970's large numbers of women entered professions in law and medicine but more recently advancement of women has halted. Pay differentials continue to exist. Women have not risen to positions in board of directors of firms to the same extent that might be expected.

On the other hand, women now make up a majority of bachelor's degrees recipients - over fifty percent in some places and as high as sixty percent in others. Forty years ago the percentage of women at MIT could be counted on the fingers of one hand. Today half of the undergraduate students at MIT are female. Once you get to the level of twenty percent social relations within organizations start to change; but they really transform at the fifty percent level.

Typically in women's entrepreneurship the service occupations make up the majority; but in Catalonia, there is a major change going on as the majority of the women in a program to support entrepreneurship were in science and technology related occupations. The woman running this program said that the key issue is working with these entrepreneurs is how to grow their firms and still retain a work life balance. So the revolution is moving here. Academia is still resistant to change, but business has been moving faster, and Academia has to learn from industry. That is the next stage in making the gender revolution in science and technology.

To this end, the relationship between career structure and life cycle needs to be rethought (Etzkowitz and Stein, 1978). The current taken-for-granted career path is based on implicit male assumptions that do not take into account women's greater responsibilities for family maintenance and societal reproduction that persist, even given good faith efforts on the part of men to play a greater role in child care (Kayyem, 2012). In the male model, imposed on women as well, significant early achievement, typically involving a high time commitment, is the prerequisite for subsequent high-level positions. It is hypothesized that women's difficulties in conforming to this model explains at least part of the variance in the paucity of women in high-level positions even as their participation rates increase.

An alternative female model, with a higher time commitment after child-rearing years, may be discerned. A Rockefeller University Professor, who started on her PhD at a later than usual age, and US Secretary of State Hilary Clinton, exemplify this alternative model that needs to be legitimized as an alternative path to high achievement[2]. When an alternative "female model" is available for women and men, gender democracy in science, technology and innovation, as well as in the larger society, will be a reality.

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[2]The current offering of a relaxed early career path in law firms is stigmatized as a "mommy track" and reified into a permanent blockage to later high flying.

THE TRIPLE HELIX APPROACH BROADENS THE 9TH CONTECSI'S OBJECTIVES BY PRESENTING THE 'KNOWLEDGE ECONOMY' BEST PRACTICES, AND THE 'INFORMATION AND COMMUNICATION TECHNOLOGY FOR DEVELOPMENT' (ICT 4DEV) NEW TRACK

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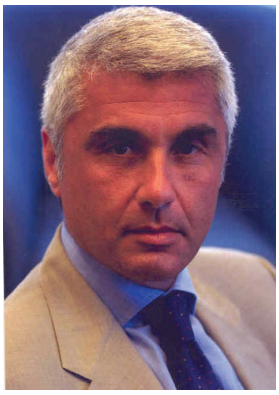

The International Conference on Information Systems and Technology Management - CONTECSI, is a groundbreaking event focusing on information systems, information technology and information science under a multidisciplinary view that aims at bringing together academicians and practitioners involved in management and research issues for a *state-of-the-art* discussion among international speakers, professors and researchers.

The purpose of the event is to discuss the effect of information technology, information systems and information science on organizations and society as a whole, putting together a community in constant search for answers to meet the never ending challenges represented by these fields. As a result of the close relationship developed with technology and information management researchers along the years, international researchers and professionals are expected to contribute to the integration of the academic and the professional communities, thus widening the interest in research, updated information sharing, and the practices currently in use.

The Ninth CONTECSI was held from 30 March 2012 till 1June 2012 at the School of Economics, Business and Accountancy - FEA, the University of São Paulo, USP Brazil. Organized by Professor Edson Riccio, Professor of Information Systems and International Management; President of the International Cooperation Office - CCInt/FEA; Editor, Journal of Information Systems and Technology Management (JISTEM); and Director, TECSI, Research Lab in Technology and Information Systems Management; the 2012 meeting was extremely successful, thanks to the presence of contributors from sixteen countries: Argentina, Belgium, Canada, Colombia, Iran, Italy, Korea, Morocco, Mexico, Portugal, Saudi Arabia, Spain, Switzerland, Taiwan, Turkey, United States, and twenty-two Brazilian states. As invited speakers, we also welcomed colleagues from ISRAEL and FINLAND.

After nine years, we have observed that the CONTECSI network has promoted the establishment of local and international partnerships linking professors, students, research groups, schools, universities and countries.

Many cross-country and university events, and "products" have been created as a result of this annual conference, for example, joint paper publications, books, master and doctoral juries, double thesis supervision and, most important, a lot of friendship.

Brazil is well known for being the sixth world economy and for its tradition of friendship and multi-ethnic culture. CONTECSI has the same characteristic - to promote high quality research whilst increasing the number of participants from different nationalities and broadening its discussion areas to include the social development and human rights dimension, in a "out of the box" approach.

Last year, at the Eighth CONTECSI, inspired by the presentation of Professor Dr Linamara Rizzo Battistella, Secretary of the State of Sao Paulo for the rights of people with disabilities, and her pioneering initiatives in bringing a new momentum to the effective implementation of public policies in favor of people with disability, we decided to add a new track social area : ICT4DEV and Disability.

One of the main outputs of this new track is a contribution to the establishment of a Center of Excellence in ICT for the social inclusion of people with disabilities (CETID), Sao Paulo, Brazil, within a Knowledge Economy approach. CETID is posed to become best practice in the area of knowledge economy for social inclusion. To download CETID's abstract, visit::
http://ksm.dicom.uninsubria.it/ict4devis/wp-content/uploads/2012/06/CETI-D-Abstract.pdf.

From the 354 research papers received, a total of 142 papers were selected for presentation in parallel sessions, ninety-four in the research forum, four in the doctoral consortium, three in the Master Colloquium, six in the poster session, and seven in the research communications forum. Papers were grouped into nineteen topics to be presented during the three days of the conference.

The Ninth CONTECSI featured as a keynote speaker, Professor Dr Dov Te´eni, the President of AIS (Association for Information Systems) USA, and Professor of Information Systems, Tel Aviv University, Israel. It has been a tradition for CONTECSI, since its first conference, to have the AIS President delivering the opening presentation. The conference this year hosted some very important events including the International launch of the ICT4 Development International School (ICT4DEVIS). To download a ICT4DEVIS brochure, visit:
http://ksm.dicom.uninsubria.it/ict4devis/wp-content/uploads/2012/05/ICT4DEVIS_DraftBrochure_v7.pdf.

ICT4DEVIS is an initiative was conceived an the Eighth CONTECSI in 2011, and became a reality through the agreement signed among TECSI/FEA/USP and Fondazione Rosselli Americas (whose Manager Director is Dr Danilo Piaggesi), and Universitá dell´Insubria (Professor Walter Castelnuovo). Other universities and institutions in countries such as Colombia, Korea, Mexico, Ghana, and the Sao Paulo State Secretary for the Rights of People with Disability have also joined this initiative.

The ICT4DEV international school (ICT4DEVIS) functions as a non-for-credit, hands-on, practice-oriented, cross-cultural course, intended for students and practitioners who want to pursue a professional career in deploying ICT as a means for international development. ICT4DEVIS is shaped by contributions from a hand-picked cluster of high-level academic institutions around the world, fueled by a will to excel in their respective academic contexts, and willing to engage in an innovative process that will use all the benefits of existing technology to develop what could be a new model for academic design and implementation.

The project's idea came during informal discussions with Professor Riccio from the Sao Paolo University in Brazil, and Professor Castelnovo from the Insubria University in Italy, as we considered there was renewed interest in academic institutions around the world to incorporate the subject of ICT in their academic programs. However, program concentration as well as later job-placement for students coming out of these schools varies widely, with strong representation of subjects related to the technology industry and technology trade. Yet, studies show the promise of ICT as an instrument to accelerate the pace and widen the reach of international development efforts, but the cradle of ICT4DEV practitioners is still limited. Furthermore, students coming out of current ICT university courses who want to devote themselves to international development find themselves faced with three major hurdles:

- **ICT is, by definition, a multiple-sector endeavor, but schools must concentrate in a focused range of knowledge in order to provide specialized training.** As a result, most ICT academic programs tend to emphasize one aspect over others: science and technology; economics; or social applications - education, public services; etc. Yet, when the time comes to apply ICT to a development objective, students find their education lacking in one or more areas needed to make an appropriate choice of technology and achieve a successful end-result;
- **The application of ICT as a development tool requires the involvement of the public and private sectors, whose purpose, institutional mind-frame and level of knowledge tend to be quite different.** The development practitioner seeking to devise an ICT-based solution to a given problem finds that he/she must have a good understanding of these two very different mind-sets, and the ability to propose a solution that would satisfy both;
- **Information access, as well as communication channels and protocols, vary greatly from one cultural setting to another.** Students are rarely trained to fine-tune their outputs to these strong cultural components, with the result that the ICT4DEV project inception and deployment face the risk of suffering setbacks or even fail to achieve its goals.

It seemed apparent formal academic education in this field would benefit from supplementary training aimed at rounding up a student's education with practical, job-related, additional capacity-building, for the purpose of improving their effectiveness in a development context.

Today I am glad to report that we have a kernel of strategic partners representing different continents of the world, interested in pursuing a way to improve the ability of academic institutions to prepare their students to be highly effective agents for the application of ICT4DEV. This core group will work to shape the contents of the ICT4DEVIS, so that it responds to the group's perceived needs, and reflects our institutions' respective capabilities.

The strategic partners that have agreed to join this initiative are (as of June 2012):

- The School of Economics, Business and Accountancy, FEA, University of Sao Paolo, USP, **Brazil**
- The School of Technology Change and Strategic Innovation, University of Rosario, Bogota', **Colombia**
- The Technological Institute of Monterrey, **Mexico**
- The Department of Informatics and Communication**,** University of Insubria, Como, **Italy**
- The Dongguk University, Seoul, **Korea**
- The College of Business Administration, Chonnam National University, Gwangju, **Korea**
- The **Ghana-India** Kofi Annan Centre of Excellence in ICT
- The Fondazione Rosselli Americas, Alexandria, **USA**

and the ICT4DEVIS Scientific Committee members include:

- Johanna Awotwi, Centre for E-Governance, Ghana
- Walter Castelnovo, Department of Theoretical and Applied Science, University of Insubria, Italy.
- Dianne Davis, President, United Nations ICCC, USA.

- Elena Ferrari, Department of Theoretical and Applied Science, University of Insubria, Italy
- Dorothy K. Gordon, Director, Ghana-India Kofi Annan Centre of Excellence in ICT, Ghana
- JaeJon Kim, Director, College of Business Administration, Chonnam National University, Korea
- Sang Yoo Kim, Director, International Relations, Dongguk University, Korea
- Danilo Piaggesi, Managing Director, Fondazione Rosselli America, USA
- Leonardo Pineda Serna, Director, Business School, Universidad del Rosario, Bogotá, Colombia
- Edson Luiz Riccio, Director, TECSI - Information Systems and Technology Management Laboratory, and Director of International Relations, School of Economics, Business and Accounting, University of Sao Paulo, Brazil.
- Carlos Scheel, Full-time Professor, Monterrey Institute of Technology and Higher Education, Mexico.
- Pablo Rodas, Economist specialized in Central America, formerly Chief Economist at Central American Bank for Economic Integration (CABEI).
- Kristian Sund, Principal Lecturer in Strategic Management, Programme Leader, MBA in Shipping and Logistics, Middlesex University Business School, UK.

The first session of ICT4DEVIS, will be held in Como, Italy, during the first week of September 2012. To download more information on ICT4DEVIS Como Edition, visit:; http://ksm.dicom.uninsubria.it/ict4devis/wp-content/uploads/2012/05/ICT4DEVIS_DraftBrochure_v7.pdf.

In order to address the organizational aspects of this common endeavor, Fondazione Rosselli is offering the use of its virtual platform "AKNOS". AKNOS is a web-based platform used to promote open and guided discussion on the general subject of the Knowledge Society. Your group can gain access to AKNOS - which is available upon invitation only, to conduct virtual meetings and discussions, maximizing the immediacy of communication while minimizing its costs. AKNOS will serve as our working tool.

I strongly believe that through ICT4DEVIS cross-cultural cooperation and cross-pollination, we will make a valid contribution to the international cooperation for development in the context of today's Knowledge Society.

TRIPLE HELIX ASSOCIATION NEWS

TRIPLE HELIX WORKSHOP: "BUILDING THE ENTREPRENEURIAL UNIVERSITY"

12-16 NOVEMBER 2012

http://triplehelix.stanford.edu/triplehelix

We have the pleasure to invite participation in the Workshop "Building the Entrepreneurial University" that the Triple Helix Research Group, Stanford University, is organizing on 12-16 November 2012.

After the successful Triple Helix 9 International Conference at Stanford in July 2011, this five-day intensive workshop comes to meet a growing demand for learning about the increasing role of the Entrepreneurial University in national/regional economic development and growth creation.

The event presents the experience of some of the most successful US entrepreneurial universities, including Stanford, MIT, Utah, Arizona State, Berkeley, CalTech, Boston, University of Southern California. We are also discussing various innovation initiatives at the university-industry-government interface, US federal and state policies and mechanisms to support them, the successful trajectory of high-tech companies emerging from university research, and the role of venture capital and business angel investments. Held at Stanford University, the heart of Silicon Valley – the world's leading innovation and high-tech hub - this is a premium event that will offer its participants a memorable experience.

The workshop is particularly suited for higher education and innovation leaders and policy-makers, university managers, faculty and technology transfer professional staff, academic evaluation and accreditation managers and practitioners, postgraduate students, innovation and higher education consultants, entrepreneurs, venture capitalists, business angels, etc.

The event has a rich and exciting intellectual content, and a stellar line-up of speakers from the top levels of Stanford and other US universities' leadership, business firms and US federal and California state innovation policy administration (OSTP, NSF, California Governors' Office for Economic Development, San Francisco City, etc). Confirmed speakers to date include (in the order of presentations):

- **Katharine Ku**, Director of the Office of Technology Licensing (OTL), Stanford University
- **Rebecca Edwards**, Manager of International Partnerships, Stanford Technology Ventures Program, Stanford University
- **Cameron Teitelman**, Founder and Senior Managing Director, StartX, Stanford University
- **Caleb Bell,** CEO and Founder of Bell Biosystems Inc.
- **Krisztina Holly,** Vice Provost for Innovation and Founding Executive Director, USC Stevens Institute for Innovation, University of Southern California
- **Andre Marquis,** Executive Director, Lester Center for Entrepreneurship and Innovation, Haas School of Business at UC Berkeley
- **Jack Brittain**, Professor of Management, David Eccles School of Business, Vice President Technology Venture Development, University of Utah
- **Ashley Stevens,** Past President of AUTM, Lecturer, School of Management, Boston University, CLP President, Focus IP Group, LLC
- **Fiona Murray,** David Sarnoff Professor of Management and Technology, Faculty Director, Trust Center for MIT Entrepreneurship, MIT Sloan School of Management
- **Sethuraman "Panch" Panchanathan,** Senior Vice President, Office of Knowledge Enterprise Development, Arizona State University
- **Curtis Carlson,** President & CEO, SRI International
- **Wayne Johnson,** Assistant Vice President for Institute Corporate Relations, Caltech
- **James Spohrer,** Innovation Champion and Director, IBM University Programs World-Wide (IBM UP)
- **Charles (Chuck) House,** Chancellor, Cogswell Polytechnical College, Sunnyvale, CA and former Executive Director of MediaX, Stanford University
- **Dennis Boyle,** IDEO Partner
- **Lawrence Udell,** Executive Director of the California Invention Center and Intellectual Property International, Limited, Co-founder and Managing Director of the Silicon Valley Chapter of Licensing Executives Society (LES).
- **Larry Hornak,** Industry/University Cooperative Research Centres Program Director, National Science Foundation
- **Edward Metz,** Program Manager of the Education Technology Research Program and the *Small Business Innovation Research Program (SBIR),* US Department of Education, National Center for Education Research
- **Doug Henton,** CEO, Collaborative Economics
- **Louis Stewart,** Deputy Director, California Governor's Office for Business and Economic Development, Sacramento
- **Jay Nath,** Chief Innovation Officer for the City of San Francisco
- **Kayvan Baroumand,** CEO and Founder of Global Tech Venture (GTV)**.**

As a workshop participant you will:

- **Fully engage** with the workshop activities, not as a passive listener, but as an active actor who will shape the workshop overall outcome. You will listen to keynote addresses and individual presentations by top academic, business and policy-making leaders, an overview of the most important US and California State Innovation policies and programs. You will participate in panel discussions with scientists and corporate managers involved in university-industry collaboration, Silicon Valley entrepreneurs and business angels. You will visit Stanford's interdisciplinary Clark Center and its Bio-X program, the Plug and Play Tech Center - one of Silicon Valley's most renowned start-up accelerators, as well as the Ecobator, the world's first platform bringing together innovation economy stakeholders under one roof to stimulate their interaction. You will explore the future of the Entrepreneurial University in a first-time ever foresight exercise using innovative techniques. You will present the experience of your own institution in a group discussion and receive feedback from the guest speakers and fellow participants.
- **Join a community of like-minded individuals** with similar goals and the belief that the Entrepreneurial University has a key role in the education, research and societal engagement of the future.
- **Expand networks, meet partners, open markets, and learn** from the entrepreneurial experience of world leaders sharing real-life examples of how they have succeeded in their endeavours, and from an active dialogue with and demonstrations of health and educational technologies innovators.
- **Enjoy a rich social programme** - a Welcome Reception, a Gala Dinner, a Cocktail Reception and an off-site trip for wine-tasting in Napa Valley or sight-seeing in San Francisco.
- **Explore the possibility to initiate a longer-term research collaboration** with the Triple Helix Research Group at the H-STAR Institute and with faculty and research groups across Stanford University, on the basis of a Visiting Partnership Agreement (see full text of the Agreement at: https://hstar.stanford.edu/partnerships).

The registration fee is **$6,500 per person,** with a **discount of 10% for groups of 5+ people from the same institution**. The cost is all-inclusive and covers six nights on-campus accommodation at Stanford Munger Apartments, meals, all the workshop materials, visits, Welcome Reception, Gala Dinner, Networking Reception and off-site trip. A Certificate of Completion of the Stanford H-STAR Triple Helix Workshop will be awarded to each participant.

If your institution wishes to enhance its international visibility, we also offer a broad range of sponsorship opportunities available on our website, recognizing your contribution in various ways.

We look forward to welcoming you at our event.

Henry Etzkowitz and Marina Ranga
Triple Helix Research Group - H-STAR Institute
Stanford University

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Tapan Munroe is an author, speaker, and advisor in economics. His expertise includes innovation economics, energy economics, and regional economics. His current research and writings focus on the economics of innovation and economies of innovation regions such as Silicon Valley and High Tech San Diego.

He holds a PhD in Economics from the University of Colorado. He has authored three books relating to Silicon Valley, including "*Dot-com to Dot-bomb - Understanding the Dot-Com Boom, Bust and Resurgence*." 2004, Moraga Press; *Silicon Valley: Ecology of* Innovation, 2008, Science Parks Association of Spain (APTE); and "*What Makes Silicon Valley Tick?"* 2009, Nova Vista Publications; his latest book with coauthors Mary Walshok and Henry Devries is entitled "*Closing America's Job Gap",* January 2011, WBusiness Books.

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Danilo Piaggesi is Managing Director of *Fondazione Rosselli Americas (FRA)* and a member of Fondazione Rosselli's Board. FRA focuses on Knowledge Society, ICT, and innovation for development. He founded and directs FRA's International Knowledge Economy Program (IKEP). He is founder of the "ICT for Development International School", ICT4DEVIS, a higher education summer program hosted simultaneously by the University of Insubria in Como, Italy, University of Sao Paulo in Brazil, and other prestigious international Institutions and Universities. ICT4DEVIS will hold its first session in summer 2012.

He is a Physicist, with specialization in geophysics, *cum laude*, Diploma from the University of Rome (1980), and an Executive International Business Certificate from Georgetown University/John Cabot University in Washington DC and in Rome (1996). Other training includes remote sensing (1981); digital image processing and analysis (1986); technical cooperation project formulation and appraisal (1989); telecommunications management (1995-1996); and ICT, innovation and Knowledge Society for development (2005).

His recent publication "*Global Strategy and Practice of E-Governance: Examples from Around the World"* was published by IGI Global in 2011. He was lead editor, in collaboration with Kristian Sund (Middlesex University, UK), and Walter Castelnovo (University of Insubria, Italy).

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Guilherme Ary Plonski has a Master and PhD in Production Engineering, Polytechnic School, University of São Paulo (USP). Postdoctoral Fellow (Fulbright Visiting Research Scholar), Center for Science and Technology Policy, Rensselaer Polytechnic Institute, USA. Full Professor, Business School and Associate Professor, Department of Production Engineering, Polytechnic School, both at UPS. Research Director, UPS Center for Technology Policy and Management,

He was Chief Executive Officer of the State of São Paulo Technological Research Institute, and President of the Brazilian Association of Science Parks and Business Incubators (ANPROTEC). Member of the Board of Governors, Technion-Israel Institute of technology.

We are pleased to announce the appointment of three regional correspondents located in major regions of the world to identify and provide recent physical activity-related publications and programs hasppening within their area. If you have an interest in serving as a regional correspondent, please contact Devrim Göktepe-Hultén at devrimgoktepe@gmail.com, or Sheila Forbes at s.forbes@eee.strath.ac.uk. If you have any questions or enquiries with regard to any of these regions, please contact the respective correspondent directly.

PUBLICATIONS

SOCIALIZZARE PER INNOVARE. IL MODELLO DELLA TRIPLA ELICA

Elvira Martini
University of Sannio
Benevento, Italy

ISBN 9788875645076
Loffredo University Press, 2011

PREFACE

Modern societies are pluriform or, in other words, differentiated in many respects. Both the institutions can be very different and institutions can have very different functions. The Triple Helix model of knowledge-based innovation systems first distinguishes between university, industry, and government. One can further distinguish between institutions and functions. Whereas previously a one-to-one correspondence could perhaps be assumed between universities and knowledge production, industry and wealth generation, and government and institutional control and legislation, nowadays these functions can, to a certain extent, be shared in networks. Universities, for example, may be active on knowledge-markets in terms of patents and licenses, industries can be constitutive to academic institutions, and governments at national or regional levels support and participate in networks: the networks carry knowledge-based developments.

The Triple Helix model can further be developed in terms of these institutional networks or also in terms of whether synergy is achieved between the functions of knowledge production, wealth generation, and normative control. In the latter case, one obtains a neo-evolutionary model, while inter-institutional arrangement can be studied using a neo-institutional model of how networks develop in terms of agents.

Thus, the Triple Helix as a model provides us with an opportunity to combine insights from evolutionary economics, technology studies, and agent-based modeling into a single framework (Leydesdorff, Zawdie, 2010). For example, one can study questions such as: is a system of innovation emerging, and if so, in which dimensions? How does the Catalan system of innovations, for example, differ from innovation systems in Italian industrial districts? Does a metropolitan area such as Boston or Munich provide another niche for Triple Helix relations than underdeveloped regions? The Triple Helix model stimulates the specification of differences and correspondences. The resulting insights can be used for policy making because the simple assumption of the existence of uniform "systemness" is replaced with a more informed insight into how nations and regions differ in terms of economic opportunities and knowledge infrastructures. For example, the study of the Piedmont innovation system (OECD, 2009) may lead us to the conclusion that the patent portfolio of Piedmont accords with the knowledge infrastructure in the university system of Lumbardy, or *vice versa*. If such were the case, then one would be ill advised to develop these two regions from the perspective of either Turin or Milano. However, regional authorities may be inclined to do so because of boundaries which were previously functional to developing political economies. Boundary-crossing and reshaping can be considered as hallmarks of a globalizing knowledge-based economy (Etzkowitz, Leydesdorff, 1998).

This study is moving in this direction: trying to demonstrate that socialization is a mechanism to promote effectively the relational dynamics among the actors of the knowledge and of its diffusion. Although I am not sufficiently able to read it in Italian, I know this result to be based on many years of fine research and it is an upgrade of the first PhD thesis on the subject of the Triple Helix to my knowledge. Therefore I wish the book to be a success on the market.

Loet Leydesdorff, Amsterdam, April 2011

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INDICE

European Planning Studies
Vol 20, Issue 1

Peter Svensson
Magnus Klofsten
Henry Etzkowitz

DOI: 10.1080/09654313.2012.665616
Pages 505-525, March 2012

An Entrepreneurial University Strategy for Renewing a Declining Industrial City: The Norrköping Way

Norrköping, a small urban area formerly dependent upon old labour-intensive industries, has developed a knowledge-based renewal strategy inspired by ideas emanating from its superseded local economy. Using a longitudinal case study, this paper explicates the dynamics of change among a triple helix of university, industry and government actors that involved building consensus within the city and with its neighbouring city of Linköping. The keys to success have been cross-institutional entrepreneurship, aggregating regional and national resources to realize a unique, locally generated strategy based around the establishment of a local entrepreneurial university. Rather than adopting the usual list of hot high-tech topics such as information technology, biotechnology or alternative energy, and striking a balance between intra-regional competition and collaboration in order to achieve common objectives and avoid any stasis arising from hyper-competitiveness. This paper utilizes a triple-helix "spaces" framework and makes comparisons with other relevant cases to develop a theoretical model of regional renewal through the hybridization of old and new industrial and knowledge elements.

New Initiative

The THA Working Paper Series

Members of the Triple Helix Association are invited to submit papers that are not yet ready for peer-review, but that are deemed interesting enough to generate debate and point to new directions to the **THA Working Paper Series (WPS).**

The idea of the WPS is to enable authors who want to provoke discussion on their research papers prior to sending them out for publication, to do so through the Triple Helix medium. The papers should be emailed James Dzisah [james.dzisah@usask.ca] for review, in either 'word document' format, or as a 'secure pdf' file. Papers reviewed will then be placed on the THA website, where a Forum will be creater to encourage discussion of the papers.

PRESIDENT'S CORNER

ACADEMIC ENTREPRENEURSHIP: BACK TO THE FUTURE

Henry Etzkowitz
President
Triple Helix Association

Sir Peter Hall, the University of London's distinguished regional innovation expert, organized a special track at the recent European Regional Science Association Conference in Delft, The Netherlands, on the question of whether policy interventions such as "Technopoles," can create high tech conurbations (RSA, 2012). The prospectus noted that the weight of academic discussion on science parks has been negative, but that this advice has been ignored as parks are founded at an increasing pace. Is the belief in a science park "cargo cult" so strong that it cannot be deterred, or do its proponents know something that researchers have missed? Discussion in the cafes, on the canal boat, and during the walking tour, was lively and a special journal issue, led by Sir Peter, will present the results of the debate.

A related issue, with even greater relevance for the Triple Helix thesis, is whether universities are effectual technology transfer actors and spin-off creators (Etzkowitz, 2012). Easily available statistics, such as the AUTM (Association of University Technology Managers) survey, may undercount (Leydesdorff, 2012), especially since the "marketing model of technology transfer," commonplace in the United States, leads some firm-founders to fly under the radar in order not to have information about their inventions or business models passed on to competitors. Thus, negative conclusions may be premature and may even serve to deter emerging entrepreneurial universities from trying, creating a self-fulfilling prophecy.

I have been following the progress of StartX, the student initiated Accelerator that provides coaching and mentoring to start-ups involving Stanford students (Etzkowitz, 2012). The government helix was represented by Stanford's student government in StartX's founding, playing a key role in bringing together academia and industry to initiate this not-for-profit accelerator. StartX hosts four classes of start-ups each year, with the summer quarter open to ventures from elsewhere. Founded in 2010, "more than 160 founders have started sixty companies with StartX, and eighty percent of them are funded and still growing" (Techcrunch, 2012), in comparison to the seven firms that the AUTM database shows arising through official channels during the last academic year. It may reasonably be expected that still other firms are emerging from Stanford, apart from the StartX and Office of Technology Licensing regimes.

Social Science Redux

StartX also hosts occasional events with presentations of interest to its members and friends. I recently attended a talk by Gustaf, a key member of the entrepreneurial team of Voxer, a San Francisco based start-up with a walkie talkie application for smartphones. Gustaf's presentation of Voxer's strategy implied that the quantitative and qualitative tools to analyze and encourage firm growth were very close to social science research techniques. Therefore, Voxer might look for people with social science, as well as computer science, backgrounds for future employees to work with these techniques.

The knowledge that firms like Voxer are using social science-like tools in their business could be a point of entry to encourage social science students to combine their training with computer science as an entry path to these jobs. Indeed, Copenhagen University has an interdisciplinary program uniting the two areas. Linking the computer and social science disciplines in the start-up process was highlighted by a recent visit to Copenhagen hosted by the student organization "Suitable for Business" (www.suitableforbusiness.dk). The premise is that since computer scientists are relatively scarce and social scientists more plentiful, the firm growth process could be speeded up by bringing in social scientists rather than encouraging computer scientists to learn social science, though the two way interchange is, of course, ideal.

Resolving the Academic Entrepreneurship Dilemma

While in Boston to speak to Calestous Juma's annual Workshop on International Development at Harvard's Kennedy School of Government (Harvard, 2012), I took the opportunity to meet with Bill Aulet, director of MIT's Martin Trust Entrepreneurship Center and catch up on recent developments (MIT, 2012).

Founded by Ed Roberts, an early researcher on entrepreneurship, the Center runs a highly successful business plan competition and has recently begun an entrepreneurship-coaching program for student firm founders. The summer program provides successful applicants with a stipend of $20,000 so that they can focus on their project. Although the program's purpose is to encourage start-ups, a group effort by its very nature, it is targeted at individuals in order to allay opposition to the project by some MIT faculty and administrators. Opponents were concerned that the Institute's playing an active role in encouraging firm-formation could jeopardize MIT's 501C3 status, the term for the legal clause that regulates its existence as a not-for-profit organization.

In the early post-war, Karl Compton, the President of MIT, encouraged faculty to incubate firms in the university's laboratories and served on the advisory board of the American Research and

Development (ARD), the first venture capital firm, founded in 1946. MIT played a key role in organizing ARD and indeed was one of the firms investors. Compton convinced colleagues at other US technological universities to invest in ARD. Its first success was the Digital Equipment Corporation (DEC), a firm emanating from a government funded research project at MIT, of Second World War origins, to develop an aircraft-training simulator. In the course of developing a simulator, Ken Olsen, and his colleagues invented the mini-computer. When funding from several military agencies finally ran out and the lab was about to close, MIT's Treasurer, Horace Ford, also an advisor to ARD, introduced the venture capital firm to the project. An investment offer from ARD led to the formation of DEC, and the subsequent efflorescence of the mini-computer industry on Route 128.

MIT, however, soon drew back from Compton's hands on approach to firm formation. Indeed, the Institute sold its shares of ARD stock as soon as Compton retired, well before the great financial and technical success of DEC! A so-called "Chinese Wall" has since been erected between university and industry in the form of conflict of interest regulations that discourage firm incubation in the lab, out of concern that the university's not for profit status will be placed at risk or the unfounded fear that basic research will be displaced.

Universities expect that the requirements of "inurement" limit to approximately ten percent the activities on their premises that have a profit-making connotation (Donovan, 2011). It is typically required that different people than those active in the lab will organize the firm in separate facilities. However, there is provision for a leave of absence for a faculty firm founder, with return expected in a couple of years, although an advisory role may be continued through the one-fifth rule, invented at MIT in the early twentieth century to regulate consulting activities (Etzkowitz, 2002). Nevertheless, an MIT professor who wished a continuing higher level of involvement with his firm, but still believed he had a significant contribution to make to the university, recently resigned his academic post with regrets.

The Brazilian Innovation Law of 2004 creatively solves the problems of dual roles, duplication of facilities and personnel, by allowing start-up firms and university labs to co-exist as a single entity. At the Pontifical Catholic University of Rio Grande del Sul (PUCRS), the 4G biotech firm and lab members divide their efforts among research projects and commercial activity, implicitly following the "Polyvalent knowledge" model (Etzkowitz and Viale, 2010). The Brazilian Innovation Law of 2004 is the most significant innovation in public policy to promote academic entrepreneurship since the US Bayh-Dole Act of 1980 (Maculan and Mello, 2009).

The Obama administration's current policy is to encourage start-ups from universities (IGERT, 2011). It is highly unlikely that the Justice Department will sue universities for increasing their involvement in firm formation, when that is now a key part of the country's economic renewal policy to end the Second Great Depression (Etzkowitz, In Press). The President sponsors a webinar series in which more experienced universities share their commercialization experience with less experienced schools. Having increased funds for academic research in the stimulus package during the early part of its administration, without providing support for commercialization, the Obama administration is limited to shifting funds within constrained budgets, for example, establishing a 500 million dollar translational research program in the National Institutes of Health (NIH), with existing funds (Etzkowitz, 2012).

Conflicting policies are currently hobbling academic entrepreneurship, creating cognitive dissonance by simultaneously encouraging and discouraging efforts. Just as New York State constitution was reinterpreted some years ago to allow ancillary commercial activities on campus such as bookstores and travel agencies, so may it be envisioned that a similar reinterpretation might take place at the national level. Alternatively, the law regulating not-for-profit organizations could be revised following the example of the Bayh-Dole Act, clarifying Patent Law regarding the disposition of intellectual property rights emanating from federally funded research. Indeed, by giving universities the mission to put knowledge to use, the legislation of 1980 nudged universities to take more explicit steps to capitalize knowledge.

Back to the Future

MIT should return to its roots as the original entrepreneurial university, founded in 1862, and, through projects like its own Entrepreneurship Center and Stanford's StartX, increase efforts to infuse its region with new technology and firms even as "ivory tower" universities, like Johns Hopkins, have recently taken up a leading role in realizing the university's third mission. Start-ups, like Voxer, should hire social as well as computer scientists to develop growth techniques and metrics and governments at all levels, student, local, regional, national and multi-national can spin-off projects, like StartX, to stimulate academic entrepreneurship and regional development.

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