

## ITHI Working Paper Series

### #4. A Close Observation on Silicon Valley and Stanford University

by Henry Etzkowitz

Two clusters of high-tech firms, Silicon Valley and Santa Rita, built from and interacting with a knowledge resource, albeit in two different time frames, have a rough comparability. Their similarities reside in a dynamic high-tech spin-off formation from other spin-offs. Key differences reside in the level of knowledge resources (an emerging research university at the time - Stanford University, and a secondary technical school for Santa Rita), and especially in the scale of government R&D resources committed to northern California, primarily in the postwar, at the instance of Stanford University and at government's own initiative. The Brazilian high-tech conurbation may be estimated to be at the level of development of early post-war "Silicon Valley," before the label was affixed in the early 1970s. However, why is Silicon Valley so successful as an innovation/entrepreneurship global hub in postwar?

The origins of Santa Rita do Sapucaí, Brazil's "Electronics Valley" illustrates the significance of trained people as a source of knowledge-based economic development. A relatively isolated town of 30,000 in Minas Gerais, two hours drive from Sao Paulo, is home to 160 electronics firms focusing on telecommunications but now diversifying to biomedical and other electronics application fields. The cluster's first firm was founded in 1978, but the cluster's origin is recognized as residing in the founding in 1959 of a secondary technical school, focusing on electronics. The School was the brainchild of Sinha Moreira, a woman who had grown up in the region, but had travelled widely as an Ambassador's wife, including to post-war Japan where she saw the role that technical schools were playing in the economic renewal of Japan. She believed that the same phenomenon could take place in her hometown and took the lead in founding the school.

Now home to two universities, with PhD programs and emerging research capabilities, the region's electronics industry was sourced in a secondary school, passing on existing textbook, device and tacit knowledge in the field, much as Homestead High School, in its electronics course-module, was doing for Steve Jobs in Cupertino during the same period. Similarly, De Anza College and the Foothills Community College district, San Jose State University, Santa Clara University and other less well-known schools played a role in training thousands of entry level software engineers, but still are an under-recognized Silicon Valley asset.

US Government procurement programs induced a learning curve in the nascent semiconductor, aeronautics and space industries, stimulated growth in start-ups and attracted national firms to locate R&D and then production facilities in the region. The visible presence of government has declined in Silicon Valley in recent years but sponsored research, largely from federal funds represent 30% of Stanford's 3.8 billion dollar 2010-2011 operating budget. During the Q& A at the St. Petersburg University seminar, a Russian professor commented that he had visited the Office of Technology Licensing (OTL) at Stanford where he had initially been impressed by the \$20 million per annum licensing revenues until he learned about the enormous scale of the university's research budget and found the proportionate return wanting. The implication is that more active measures than the current official approach of making introductions to venture capitalists could produce greater results.

Firms' incubation in academic labs in the early post-war at Stanford and MIT was superseded by policies to separate academia from business activities as soon as possible. As a tech transfer administrator put it, contemporary "MIT does not have the physical or intellectual infrastructure to support firm-formation inside academic labs." A Stanford administrator said, "We wouldn't do that here." In a reprise of MIT and Stanford's early experience, the Brazilian Innovation law of 2004 allows universities to sponsor conjoint academic lab/firms, realizing the utility of inducing permeability in university boundaries to stimulate entrepreneurship. The Pontifical Catholic University of Rio Grande do Sul, an aspiring research and entrepreneurial university in Porto Alegre, has taken advantage of this provision to attract leading scholars, from the neighbouring federal university, who wish to start-up inside their research group.

Nurturing the early phase of a start-up in an academic research group occurs naturally as group meetings generate ideas to realize the theoretical and practical implications of their findings, exemplified by some of the projects showcased at the StartX's Demo Day. StartX is a student initiated incubator project, hosted in AOL's basement in the Stanford Research Park, that spun-off from SSE Labs (<http://sse.stanford.edu/category/division/sse-ventures>), a Stanford University Student Enterprises project (the recent Stanford graduate founders of StartX were respectively CEO and CTO of Business Association of Stanford Entrepreneurial Students (BASES) where they began their collaboration). Faculty members and research associates as well as students, whether undergraduate and graduate, are members of some of the start-up teams supported by basic research funding in academic labs, especially in the medical school (author interviews with firm-founders at "Demo Day", 8 September 2011. One team was applying for commercialization funding from SBIR; another already had their product on the market in Apple stores in the US and Europe as an iPad app, while still others have achieved seed funding or agreements to distribute their products through major firms. At a Triple Helix Workshop this Fall at Birkbeck, University of London, a colleague quoted AUTM statistics showing that seven start-ups emanated from Stanford during the past year.

However, these statistics only counted the firms that came through the official route, with licensed IP from OTL. Nevertheless, many internally generated start-ups happen below the radar. For example, a Stanford medical researcher, wound up her lab, took early retirement and used her final pay as start-up capital for a medical software simulation firm, encouraged by OTL to go-ahead in the absence of significant patentable government supported research. As the director of OTL, Kathy Ku says, "We are not the intellectual property police. On the other hand, if a significant patent is at stake, Stanford will act, having recently spent 10 million dollars on a lawsuit. Even though the university lost in court, it set down a marker to firms that it was willing to commit considerable resources to protect its interests".