

*The Use of the Triple Helix Concept in Accelerating the Pace of Commercialization of
Micro and Nano Technology based products*

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One question often asked of the authors is: How can we accelerate the pace of commercialization of Micro and Nano technologies? Indeed this question formed the basis for the series of articles in the commercialization corner over the past few months. We have, over that time, provided models and concepts that investigate emergent industry infrastructure, firm based strategies and user acceptance issues that firms encounter when commercializing these potentially disruptive technologies. Here we investigate the utility of the “Triple Helix” concept as an aid in accelerating the pace of Micro and Nano technology commercialization.

What is the “Triple Helix” concept and How is it Operationalized?

At its essence it is a partnership between the Industrial, Academia and Governmental communities which recognizes the differing goals and stakeholder communities of the three groups but stress the common interest of those groups to provide value to the societies in which they resided. It is often operationalized as co-sponsored programs and we will examine programs that utilize the triple Helix concept to accelerate the process of commercialization of Micro and Nano technologies.

These programs have assisted both small and large firms to transfer technologies from government and academic research laboratories and have enabled societies to more greatly benefit from the technological research that those same societies fund. A “Triple Helix” based commercialization program however must recognize the strengths and limitations inherent in their respective communities and require the differing communities to change long-standing behaviors. For example, the costs associated with accessing the significant infrastructure and technology at a government or academic laboratory can be a barrier for some small and emerging entrepreneurial firms. In addition, government and academic institutions have a tendency to focus on establishing partnerships with larger firms, because they are viewed as more likely sources of significant revenue. Large, established firms often have the resources and contacts necessary to effectively establish significant partnerships with institutions like the National Laboratories or universities. Establishing such relationships can be a challenge for smaller firms. Yet history has demonstrated that disruptive technologies are often first embraced and aggressively marketed by small, not large firms. Thus, we have the situation where Universities and National Laboratories around the world have demonstrated the capacity to be significant providers of disruptive technology, but are not always well poised to partner with the segment of the industry best suited to exploit those developments. The most successful “Triple Helix” Micro and nano technology commercialization partnerships directly address this issue.

Practical Views of the Triple Helix Concept

Many view the triple Helix concept as the most effective method that a society has in deriving value from government sponsored research initially focused of national safety, or other government imperatives. The United States over the last 10 to 15 years has moved to a “Dual Use” model in order to obtain maximum social benefit from government sponsored research. US programs such as the SBIR utilized by US government agencies such as DARPA, NIST and the DOE have directly leveraged research towards the commercialization of Micro and Nano technologies. NSF research centers in Micro and Nano technologies provide similar support. The Micro Machine Center and MITI in Japan, ITRI in Taiwan, the Microsystems program in Korea, and the Micro and Nano technology initiative in India are all examples of similar “Triple Helix” like efforts in Asia. EU sponsored activities, other efforts by European governments, NEXUS, IVAM are all examples of Government, Academia and Industry working together in order to maximize the commercial potential of Micro and Nano technologies in Europe. This is only a short list of these industry, government and academia based collaborations focused on the commercialization of micro and nano technologies around the world. The most successful understand the differing roles of small and large firms and provide programs that differentiate between disruptive and sustaining technology commercialization.

Outcomes

Outcomes in a “triple helix” program is designed to meet the needs of all three stakeholder groups. All of these programs in one way or another decrease the risk of firms investigating micro or Nano technologies or allow firms with limited resources to utilize existing infrastructure. They also provide the societies a pathway to obtain maximum benefit from their funded research. Further they increase the likelihood that government sponsors will utilize a technology that is now much more robust.

Small and large firms have benefited from these Micro and Nano technology programs and we highlight some of these here. TMP, for example, an Entrepreneurial effort led by Job Elders is a result of such a triple helix activity born of Netherlands government, University of Twente and EU based interactions, (Elders and Walsh 2000). TMP, through these beginnings became the first venture capital funded MST “Foundry” before becoming part of Kymata last year and has just been acquired with the rest of Kymata by Alcatel. Analog Devices has been an active partner with DARPA and National laboratories in their search for competitive advantage in the Microsystems marketplace ultimately becoming a dominant accelerometer manufacturer and supplier to the optical Microsystems. MCNC participated with DARPA and other academic and industrial institution before becoming Cronos, which was eventually acquired by JDS Uniphase. Sandia National laboratories partners with academia and industries through their SAMPLES program to provide an avenue for commercialization of national laboratory based technologies (Walsh and Kirchoff 2000) that have provided the technological foundation for commercial ventures for large and small firms in Microsystems. The Albeta Micromachine Center, Nortel effort all provide evidence that this works in all of North America.

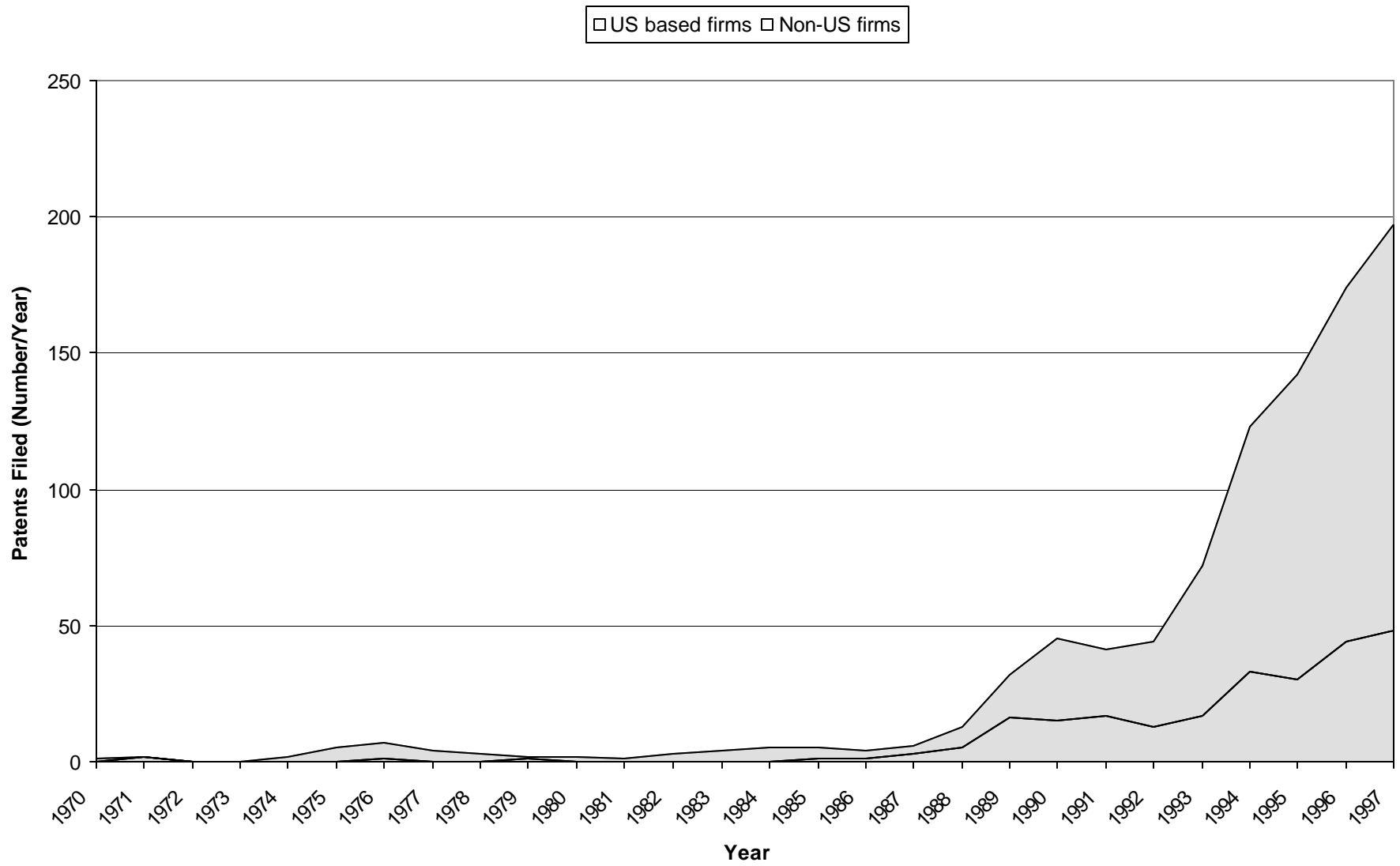
Further you can link the pace of Commercialization in Microsystems directly to the pace of R&D in Microsystems. This provides anecdotal evidence of the need for triple Helix activity. Figure One provides a graph of the market projections involved in Microsystems. These projections range from \$8 Billion to \$40 billion by the year 2003. The values are very different but the rate of increase or compound annual growth rate are very similar between the 8 studies ranging between 25 and 40%. Figure two provides the rate of increase in patents a R&D proxy and it has grown at a compound rate of near 38%. This provides some empirical evidence between the emerging commercial value of MEMS and University, Corporate and government research. The Triple Helix is a working concept for our field.

Footnotes

Elders, J. and Walsh, S., (1999) "TMP" Total Micro Products B.V.": Micro-Electro-Mechanical-Systems Company in Commercializing Knowledge: examples of entrepreneurship at the University of Twente pp. 51-54

Walsh, S. and Kirchhoff, B. (2001) "Technology Transfer and Entrepreneurial Firms" submitted to Journal of Small Business Management

Figure 2: Rate of Filing of MEMS Related Patents in USA, Europe, and Asia (Nagel et al., 1998)



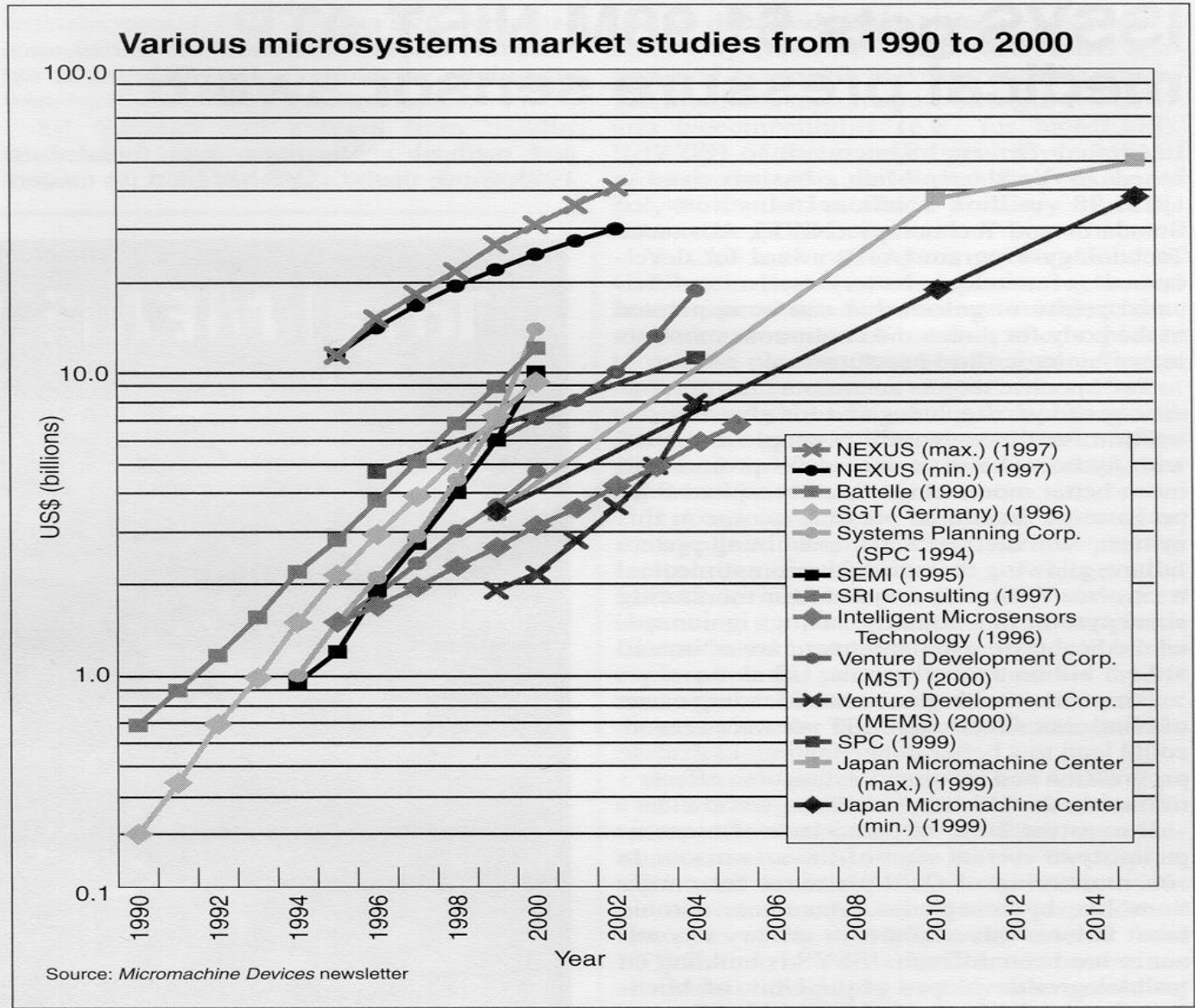


Fig. 1. Studies show the potential growth of the microsystems market through 2015.

For perspective, *MMD* shows its updated chart (Fig. 1, above) of 13 market studies on the growing MEMS/MST market dating to 1990.