

# Foreword

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There is worldwide interest in translating the technology arising from university research into economic development through entrepreneurship. Representatives have visited the Technology Licensing Office at the Massachusetts Institute of Technology from Finland to Brazil, and from South Africa to Malaysia, asking how to do it.

The reasons for this interest are evident. As economies progress from agricultural foundations to technological ones, it becomes increasingly important for countries to reach and remain at the state of the technological art through their universities' research, but then also to translate their technological findings into industrial development. Yet, as multinationals and other large firms are driven more and more by stock markets that value primarily short-term earnings, investment by these firms in basic research and even in longer-term development is decreasing. Such bastions of research as Bell Labs, IBM's basic research facilities and Xerox Park have all been closed down or converted to near-term development laboratories. Even pharmaceutical companies now proclaim that they are not looking for basic research developments in their technology acquisition, but only for drugs in late-stage clinical testing, whose efficacy has been largely proven.

Thus, there remains a 'development gap' between university research findings and investment in developing these findings into new products and processing. Entrepreneurial ventures are beginning to fill this gap using high-risk venture capital and, in some cases, supplementing it with government support for small businesses, to invest in new technologies from universities. The universities' increasing sophistication in intellectual property and licensing enable the new ventures to protect themselves from later competition from larger firms through exclusive licenses to university patents. Then, when the entrepreneurial spinoffs have stepped up the technology to a point of evident commercial utility, they may either bring the product to market themselves, or form alliances with large firms to develop further and market the technology.

The process is a 'food chain'. It begins with government support of basic research in universities, then goes on to identification of inventions arising from the research to be protected with intellectual property. Then comes 'technology licensing', the process of licensing the inventions to a company to develop it. In the case of new ventures, this part itself involves many steps.

conceiving and developing the idea of a new company, commitment to its formation by the founders, identifying critical staff, finding funding, and negotiating the license agreement with the university. Putting together this agreement is complex: on one side it must give the new venture sufficient latitude to operate and provide incentive for investors, and on the other side provide the university with (a) assurance that sufficient investment will be made in developing the technology, (b) protection from liability and (c) financial return. Next in the ‘food chain’ is development of the technology (often including the critical step of identification of the best uses for platform technologies) and finally comes the marketing of the product, alone or through strategic alliances with large companies.

Finally, the ‘food chain’ may loop back on itself, with both positive and negative consequences. Positive consequences include more university partnerships with industry, increasing sophistication on both sides and education of both faculty and students in entrepreneurship. On the other side universities worry about distortion of the direction of research, conflicts of commitment by faculty and the prospect of both the appearance and the actuality of conflicts of interest. Caution about these negative consequences is well warranted.

MIT has been engaged in spinning out technology from its laboratories into entrepreneurial ventures for over half a century – since shortly after World War II. More recently, beginning in the late 1980s, the process has been formalized through technology licensing to new ventures. Since then, more than 250 new companies have spun out of the MIT Technology-Licensing Office. Their effect on the region has been notable: creating new jobs, increasing the value of local real estate, introducing new products to the market, and helping to feed the entrepreneurial spirit of the New England region.

Scott Shane spent many months in our office, combing through a complex database that was never designed to yield with ease the information he sought. He spent much more time coming to understand the non-quantitative aspects that lead to successful technology transfer, through intensive conversations with our staff and extensive interviews with company founders. His enquiring mind and hard work led to insights of value to all of us. This book describes what he learned, and couples it with analysis of the literature on university technology licensing and spinouts, resulting in a valuable roadmap for university administrators and governments interested in economic development through technology transfer from universities.

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