(Session Number—1454)

THE DEVELOPMENT AND IMPLEMENTATION OF AN INTER-DISCIPLINARY GRADUATE COURSE LINKING ENGINEERING, MEDICAL, AND BUSINESS STUDENTS WITH UNIVERSITY RESEARCH INVESTIGATORS TO DEVELOP STRATEGIES TO COMMERCIALIZE NEW TECHNOLOGIES

William G. Marshall, Jr., MD, MBA[1],
Michael W. Fountain, PhD, MBA[1],
Stephen R. Budd, MBA[1],
Paul E. Givens, PhD, MBA[1, 2]

Center for Entrepreneurship at the University of South Florida[1]/
College of Business Administration
Department of Industrial and Management Systems Engineering[2]/
College of Engineering/
University of South Florida
Tampa, Florida

Abstract

Faculty at the Center for Entrepreneurship at the University of South Florida (USF) have developed and implemented a novel integrated inter-disciplinary graduate course entitled *Strategic Market Assessments for New Technologies*. Graduate students who are candidates for Masters and/or Doctoral degrees from the disciplines of arts and sciences, business, engineering, and medicine, in addition to faculty investigators, learn in cross-disciplinary team project environments under the class direction of faculty from both USF Colleges of Business Administration and Engineering. Students and faculty investigators develop the critical skills necessary to evaluate the intellectual property portfolios of USF faculty investigators as well as the skills necessary to work effectively in interdisciplinary student team environments. Working in cross-disciplinary teams, graduate students develop: 1) evaluations of the strengths of the USF investigator's intellectual property portfolios, 2) competitive analyses of products and/or services currently in the marketplace and 3) strategic alternatives for commercializing the USF investigator's technologies.

As a result of the implementation of this new curriculum into graduate programs at USF over the past 5 years, 125 graduate students have engaged in 26 team evaluations of 25 different USF investigators' new innovations. As a direct result of the sets of strategic recommendations developed by the cross-disciplinary graduate student teams and their faculty instructors, 17 new ventures (out of 18 potential new ventures, with an additional 5 evaluations still on-going) have been launched to aid in the development and commercialization of new, USF faculty-based,

technologies.

The authors believe that the implementation of *Strategic Market Assessments for New Technologies* at USF has not only provided unique inter-disciplinary learning opportunities for graduate students and faculty investigators, but has enhanced both the awareness of technology commercialization in university faculty members and the university administration. Further, the rate of movement of USF faculty innovations from university laboratories into new venture businesses has been increased in numbers and in level of success.

Introduction

Universities are repositories of large amounts of research, information, and knowledge; but unless moved from the laboratory, translated into useful technologies and/or products, and ultimately commercialized, this information and knowledge sits unused, bereft of benefit.

The historical paradigm for technology commercialization has been for an idea or question to be investigated and answered in the laboratory by the scientist; translation of the laboratory results/output or process to a scalable, repetitive, reproducible level by the engineer; followed by the creation of an appropriate venture for the marketing and sales of the technology/product through the expertise of the business professional. To expand an old adage: "Science creates ideas, engineering creates products, and…*business sells the products*." This paradigm is, intrinsically and obviously, inter-disciplinary. This inter-disciplinary schema, when successful, results in wealth creation for all stakeholders and society.

The historical paradigm often has inherent difficulties when attempting to integrate highly specialized professionals into functional, efficient, and effective teams focused on technology commercialization and product development. Due to the training and specialization of the different professions (scientists, physicians, engineers, business individuals), there tends to be a "silo effect" where each professional has an immense amount of knowledge and expertise within his/her own area, but has difficulty crossing disciplines to understand and function successfully within a team format.

Entrepreneurship results in the creation of economic value by utilization of research and technical information and knowledge in inter-disciplinary projects and ventures. Entrepreneurs have been shown to be characterized by innovative behavior and to employ strategic management practices; the main goals being profit and growth.[1] However, Garravan and O'Cinneide[2] found: "…the portfolio of skills of many entrepreneurs is relatively narrow. It is unusual to find breadth and depth of knowledge at the same time— many tend to be specialists, not general managers... the real entrepreneur is a person who can organize others and tap into the knowledge and expertise required on all aspects of establishment and start-up…" "In a start-up situation, problems encountered tend not to be one-dimensional but highly integrated, incapable of being solved by a single expert. Many entrepreneurs are specialists within a particular field and tend to have a poor grasp of the intricacies of managing across the range of functions. It is in these situations that *true* (added by current authors for clarification and emphasis) entrepreneurial skills are demanded, to work across boundaries on complex, inter-related problems requiring the ability to take a holistic view and exercise skills of analysis and synthesis."

To address this "silo effect" and the concomitant inefficiencies and ineffectiveness, the faculty at the Center for Entrepreneurship at the University of South Florida developed an inter-disciplinary course for graduate business, engineering, and science students, and faculty investigators. This course and process focused on the assessment of intellectual property portfolios from both technical and market standpoints in order to develop effective strategies for the commercialization of university-developed technologies. This paper will describe the program and pedagogy and the results of the implementation from educational and commercial standpoints.

Methods and Materials

The Center for Entrepreneurship at USF was developed under the auspices of the University Provost to coordinate activities between the Colleges of Arts and Sciences, Business Administration, Engineering, and Health Sciences. The primary charge of the Center was to educate students in the various skills and techniques necessary for the creation and development of successful entrepreneurial activities. This has been accomplished through the development of a curriculum focused on technology and market assessment, product development, business plan development, new venture formation, and new venture financing. A second major charge was to assist the university administration in the identification of technologies and products developed within the university, for technology transfer and potential commercialization and, finally, the third charge was to educate, assist, and focus the faculty on the potential for technology and product development and commercialization.

Strategic Market Assessment for New Technologies (SMA) was developed to integrate many of these goals in one setting, utilizing a graduate level course and inter-disciplinary format. The course was designed to allow science/medical, engineering, and business graduate students to work in inter-disciplinary teams, in conjunction with university investigators. This would occur under the direction and supervision of business, engineering and science/medical faculty with significant professional experience as practitioners, academicians, and entrepreneurs in their respective fields.

SMA introduces the student and investigator faculty teams to intellectual property (IP) considerations—identification, protection, and defense—and identification of allied and competitive IP. This is followed by assessment of the technologies, including the regulatory considerations that might have to be navigated for commercialization, or that might work as a competitive advantage once the regulatory hurdles are successfully crossed. Following this, specific techniques and tools (including identification of experts, competitors, competitive technologies, grant funding, organizations with specialized facilities or expertise, etc.) are used to assess the technology for commercialization potential. After completion of the technology assessment, identification and assessment of appropriate markets for the respective technologies and potential products are undertaken. Specific, copyrighted tools (Appendices 1 & 2) are utilized in each segment of the course, along with direction and assistance in research and evaluation techniques, under the direction of the faculty. Finally, identification of potential partners/licensees, if any, and calculation of possible valuations, using comparable deals and terms, are defined to allow the team, faculty, and university to define the optimal plan for the technology /products and determine the best strategy to achieve this result.

Results

In the 1999-2000 academic year, *Strategic Market Assessments for New Technologies* was first offered at the University of South Florida through the College of Business Administration. Ten students evaluated four technologies in teams of two or three members. Of the ten students, six were female, four male, and three were also minority students. Four students had scientific/medical backgrounds and two had engineering backgrounds. The technologies were all potential medical technologies (one drug delivery system, one non-invasive monitoring system, and two potential human therapeutics), of which three were from the College of Health Sciences (COHS) and one from the College of Engineering (COE). All four projects resulted in the formation of new business ventures.

In 2000-2001, there were twenty-seven students (ten female and seventeen male), of which four were minority students. Eight students had medical backgrounds and five had engineering backgrounds. Five projects were undertaken in teams of five or six students—a drug delivery system (COHS), a human cellular-based therapeutic (COHS), an electronic chip technology (COE), and an electronic system and an optical system, both from the College of Marine Sciences. All projects resulted in the formation of new ventures.

In 2001-2002, there were thirty-one students (ten female and twenty-one male), with seven minority students. Four students had scientific/medical degrees and four had engineering degrees. Five projects were undertaken—a human cellular-based therapeutic (COHS), a clinical studies management company (COHS), a flow monitoring system (COE), a wireless relay system (Dept. of Physics, College of Arts and Sciences), and a medical monitoring system (COE). Four of the five projects resulted in new ventures.

In 2002-2003, thirty-two students participated—twenty-six males, and six females, with five minority students. Three students had engineering backgrounds and two had doctoral degrees in science or medicine. Six projects were undertaken in teams of five students—two virtual anatomy/dissection software projects (for the same investigator—COHS), a bioterrorism diagnostic technology (COHS), two human therapeutics (COHS), and a computer chip metrology technology (COE). All six projects resulted in the formation of new ventures.

In 2003-2004, twenty-five students participated—fourteen males and eleven females with ten minority students. Of the twenty-five students, thirteen had an undergraduate or graduate background in science (1), medicine (1), or engineering (11). Six projects were undertaken—two in carbon-based nanotechnology (COE-1, COAS-1), two human therapeutics (COHS-1, COAS-1), one medical imaging (COHS), and one in sol-gel chromatography (COAS). One new venture has been formed, and five are still under consideration for new venture formation or potential out-licensure.

In summary, 34% of the students were female and 23% were minority students. Of the 125 students, 20 (16%) had scientific backgrounds, 27 (22%) had engineering backgrounds, and 78 (62%) had business backgrounds. (Table 1) Prior to the implementation of this course, little of this type of material was taught, except in piecemeal fashion, in various courses in the College of Business Administration. This was a significant deficiency, from the standpoint of the students and faculty, which has been corrected primarily through the efforts and commitment of the senior administration in the Colleges of Business Administration, Engineering, and Health

Sciences, in conjunction with the Director of the Center for Entrepreneurship. This correlates with factors found in a study reported by Standish-Kuon, et.al.[3], i.e., a champion as director of the entrepreneurship program, and champions within each participating college. The number of engineering students appears to be increasing, primarily due to a renewed commitment to entrepreneurship on the part of the senior administration of the College of Engineering. There has been a significant recent negative effect on the number of science and medical students, interns, and residents in the course due to the necessity of increased research and clinical responsibilities. It is hoped and anticipated that this will improve in the near future, allowing more science and medical individuals to be involved.

Of the 26 projects, 14 (54%) originated in the COHS, 6 (23%) originated in the COE, 4 (15%) in the College of Arts and Sciences, and 2 (8%) in the College of Marine Sciences (Table 2). Over the five years, there were 18 potential new ventures (3 firms had two different potential projects evaluated), and 17 firms were formed (5 potential ventures are still under consideration). Of the 17 firms, all are either still in existence or were merged or acquired. This is in comparison to one venture every one to two years in the ten years prior to implementation of the *SMA* course, with many failing to survive.

Table 1.

Student Characteristics (N = 125)							
Year	Total Students	Males	Females	Minority Students	Science/ Medical	Engineering	Business
1999-2000	10	4	6	3	4	2	4
2000-2001	27	17	10	4	8	5	14
2001-2002	31	21	10	7	4	4	23
2002-2003	32	26	6	5	2	3	27
2003-2004	25	14	11	10	2	13	10
Total	125	82	43	29	20	27	78

Table 2

Projects Evaluated (N = 26)				
Year	College of Health Sciences	College of Engineering	College of Arts and Sciences	College of Marine Sciences
1999-2000	3	1		
2000-2001	2	1		2
2001-2002	2	2	1	
2002-2003	5	1		
2003-2004	2	1	3	
Total	14	6	4	2

Discussion

Entrepreneurship education, as a discipline, continues in a state of flux. Some of the reasons for this include the breadth of activities which are often included under entrepreneurship, and the lack of a clear definition of an entrepreneur. Sexton and Bowman[1], Hills[4], McMullan and Long[5], and Vesper[6], have reported that there are few accepted paradigms or theories of entrepreneurship education and training. However, it has been demonstrated that the entrepreneurial role can apparently be acquired either culturally or experientially[7], which supports the view that it might be able to be influenced by appropriate education and training.

According to Garravan and O'Cinneide[2], the following are among the most commonly cited objectives of entrepreneurship education and training programs:

- to acquire knowledge germane to entrepreneurship;
- to acquire skills in the use of techniques, in the analysis of business situations, and in the synthesis of action plans;
- to identify and stimulate entrepreneurial drive, talent and skills;
- to undo the risk-adverse bias of many analytical techniques.

Entrepreneurship education, in the sense of focusing on the creation of new economic entities centered on a novel product/service, has been, until recently, relatively rare. In a survey which was confirmatory of this, Solomon, et.al.[8], reported that the most common course offerings in Entrepreneurship education programs were: Small Business Management and Entrepreneurship, with New Venture Creation and Technology and Innovation being less common. The one notable exception to this might be modern technological entities where the creation of small new enterprise is based largely upon scientific know-how in areas such as electronics and biotechnology[1].

The *SMA* course at USF, as designed and implemented, meets the objectives cited by Garravan and O'Cinneide[2]; in addition to expanding the tools and pedagogy reported by Solomon, et.al.[8], (case studies, business plan writing, and lectures) by providing critical information and training in novel and innovative ways, and by utilizing inter-disciplinary, team-based methods. This allows different viewpoints and areas of expertise to be utilized for maximum team performance and outcome benefit; in addition to providing the best education and training for students and faculty, with maintenance of quality control and accountability through the mentor(s)/instructors.

The goals and objectives of this course have been to:

- teach and demonstrate the principles and techniques of inter-disciplinary teamwork,
- teach students and investigators the principles and techniques of intellectual property identification, assessment, and protection,
- teach students and investigators to assess strategic markets to be addressed by specific technologies,
- teach students and investigators to assess technologies for specific strategic markets,
- teach students and investigators to assess commercialization opportunities (including required financial resources and expectations) for technologies within specific markets,

- teach students and investigators to assess the potential for new venture formation built around a specific technology,
- assist the investigators and the university in the assessment of specific technologies and markets,
- assist the investigators and the university in technology transfer and commercialization—both in licensure opportunities and the development of new ventures,
- increase the awareness of all university stakeholders of the importance of intellectual property identification and protection and technology transfer and commercialization,
- increase the regional and national visibility and success of USF technologies and corporate spin-outs.

Two specific examples demonstrate the effectiveness of this approach:

> Two investigators with a unique stem cell technology and licensed intellectual property were unsure how to proceed. The intended focus of the technology was Alzheimer's disease. After completion of the *SMA* assessment by the student/investigator team, which included MBA students and graduate engineering students, it was recognized that the chronicity of Alzheimer's disease and the lack of specific, reproducible diagnostic and treatment criteria made this a very difficult market within which to operate. Evaluation of the technology, including assessment of other potential uses for stem cells under investigation in other programs and within the biotechnology industry, convinced the investigators to focus on stem cell transplantation for stroke, spinal cord injury, and traumatic brain injury. This allowed the investigators to continue within their fields of expertise, yet expand their focus in a very specific way into a defined area in which the technology had a much greater likelihood of success.
>
> An investigator in molecular immunology had developed technology focused on the prevention and treatment of the complications of bone marrow transplantation for hematologic diseases. During the *SMA* class evaluation, by a team with an engineer-MBA student, a physician-MBA student, and two traditional MBA students, it was recognized that the technology might also have significant opportunities as a therapeutic modality for organ and cellular (e.g., stem cell) transplantation since it potentially limited the risk of rejection and graft-versus-host disease. This potential product is currently undergoing evaluation with a stem cell company focused on cellular transplantation while the basic bone marrow transplantation research continues with plans for development of a therapeutic modality.

These are only two of more than 20 technologies that have been, or are currently being, evaluated; and each one has some variant of this story—expanded markets, more appropriately focused markets, more specifically focused technologies, and/or technology adaptation to additional markets—identified, assessed, and recommended (with "hard data" support) by inter-disciplinary student teams under appropriate direction of the instructors.

The USF Division of Patents and Licensing (P&L) has also begun to utilize the materials developed within the team projects to assist in the due diligence necessary for optimal licensure and commercialization opportunities. Within the past year, P&L has requested that a portfolio of

specific technologies be assessed within the framework of this class to help the university develop the appropriate licensure and commercialization strategies for the specific portfolio in question. This project is currently on-going.

Finally, as noted by the Association of University Technology Managers (AUTM) in 2002, USF was ranked in the top 10 nationally for the creation of start-up companies[9], an acknowledgement that unquestionably increases the recognition of USF and its spin-out firms—firms that almost without exception have been evaluated through the *SMA* class. Venture capital firms and forums have also focused on the technologies and companies that have been evaluated through the USF *SMA* course[10]. Multiple requests have been made to the USF Center for Entrepreneurship to meet and evaluate the companies that have commercialized the technologies assessed by the *SMA* course and teams. This increases the likelihood of successful venture funding for these firms.

Because USF is a Carnegie Research I University, we have focused a large portion of entrepreneurship education on technology development and commercialization. Entrepreneurship in technology ventures requires an inter-disciplinary approach to best utilize the skills of the highly educated and trained individuals involved. It is our strong belief that in a technology setting, entrepreneurship is a team-based activity, inclusive of scientists, engineers, and business professionals. Further, no licensure, commercialization, or new venture strategy, especially in an area of technology, will ultimately be successful unless the following criteria are met:

1) the technology must be understood by the entire entrepreneurial team,
2) the technology must be proven to be competitive in the environment and markets in which it will be utilized,
3) the technology must be able to be adequately protected within the marketplace,
4) the technology must meet, or exceed, any regulatory requirements, and
5) the market in which the technology will be sold must be of adequate size, with adequate expected growth.

We have striven to develop a pedagogy focused on inter-disciplinary cooperation between students, faculty, and colleges, with team-based projects and case-based discussions of specific and pertinent topics. The development and implementation of *SMA* is representative of our efforts.

Strong support for this approach can be found in recent studies by the Ewing Marion Kauffman Foundation, the London School of Economics and Babson College,[11, 12] indicating that providing individuals with quality entrepreneurship education on converting a market opportunity into a commercial reality is the single most important issue in developing and fostering an entrepreneurial environment. Further, a recent study from the University of Arizona[13] demonstrated that entrepreneurship education also promotes the transfer of technology from the university to the private sector and promotes technology-based firms and products. On average, entrepreneurship graduates are more likely to be with firms that use licensed technologies and to be with firms that license technologies to others. They also are more likely to be involved with a high-technology firm than are non-entrepreneurship graduates.

Finally, data from MIT[14] reveals that:

- MIT Academicians, Engineers, and Scientists have become aware that:
    - teamwork is essential
    - successful commercialization of an invention is the most effective way to diffuse an innovation.
    - 80-95% of "purely technical" spin-offs fail
    - 80-95% of MIT teams which combine marketing, business, and technical skills succeed.
- Talented managers need both training and real world experience which includes:
    - knowledge of markets, knowledge of people, and are known/respected
    - undergraduate science/engineering combined with practical experience in successful companies,
    - management training, including entrepreneurship,
    - sales and marketing successes in substantial companies.

The experience at USF would concur with all of the findings from the Kauffman Foundation, Babson College, the London School of Economics, the University of Arizona, and MIT. The authors believe that the implementation of *Strategic Market Assessments for New Technologies* at USF has not only provided unique inter-disciplinary learning opportunities for graduate students and faculty investigators, but has enhanced both the awareness of technology commercialization in university faculty members and the university administration. Further, the rate of movement of USF faculty innovations from university laboratories into new venture businesses has been increased in numbers and in level of success.

Summary

The development and implementation of *Strategic Marketing Assessment for New Technologies* at the University of South Florida has resulted in unique and improved inter-disciplinary learning opportunities for graduate students and faculty investigators. In addition, it has resulted in an increased rate of successful commercialization of USF faculty innovations and development of successful spin-out ventures.

Bibliography

1. Sexton DL and Bowman NB. "Entrepreneurship Education Suggestions for Increasing Effectiveness", Journal of Small Business Management, April 1984. 22 (2): 25-34
2. Garavan TN and O'Cinneide B. "Entrepreneurship Education and Training Programmes: A Review and Evaluation - Part 1", Journal of European Industrial Training, 1994. 18(8): 3-12.
3. Standish-Kuon T and Rice MP. "Introducing Engineering and Science Students to Entrepreneurship: Models and Influential Factors at Six American Universities", Journal of Engineering Education, Jan 2002: 33-39
4. Hills GE. "Variations in University Entrepreneurship Education: An Empirical Study of an Evolving Field", Journal of Business Venturing 1988. 3: 109-22.
5. McMullan WE and Long WA. "An Approach to Educating Entrepreneurs", The Canadian Journal of Business, 1983. 4 (1): 32-6.
6. Vesper, K.H., "Research on Education for Entrepreneurship" in Kent, C.A. et al. (Eds), Encyclopaedia of Entrepreneurship, Prentice Hall, Englewood Cliffs, NJ, 1982.
7. Bannock, G., The Economics of Small Firms: Return from the Wilderness, Basil Blackwell, Oxford, 1981.

8. Solomon GT, Duffy S, and Tarabishy A. "The State of Entrepreneurship Education in the United States", Int J Entrepreneurship Education, 2002. 1(1): 1-22.
9. 2002 AUTM Licensing Survey, Association of University Technology Managers, www.autm.net
10. "Companies Showcase Goods for Venture Capitalists at USF", The Tampa Bay Business Journal; February 14, 2003
11. Neck HM, Zacharakis AL, Bygrave WD, Reynolds PD. Global Entrepreneurship Monitor—National Entrepreneurship Assessment 2003 Executive Report, Ewing Marion Kauffman Foundation and Babson College, Kansas City, MO
12. Reynolds PD, Bygrave WD, Autio E, Cox LW, Hay M. Global Entrepreneurship Monitor—National Entrepreneurship Assessment 2002 Executive Report, Ewing Marion Kauffman Foundation, Babson College, London School of Economics, Kansas City, MO
13. Charney A and Libecap GD. The Impact of Entrepreneurship Education: An Evaluation of the Berger Entrepreneurship Program at the University of Arizona, 1985-1999, Report to the Ewing Marion Kauffman Foundation. Kansas City, MO, 2000
14. Morton MS and Ives A. Different Approaches to Entrepreneurship Teaching: The Management, Engineering and Science Schools at MIT, CMI—Innovative Learning Methods Workshop. Durham, UK, 2002

Biographies

WILLIAM G. MARSHALL, JR., MD, MBA
Dr. Marshall is a Visiting Assistant Professor at the Center for Entrepreneurship at the University of South Florida. Dr. Marshall has a joint appointment in the Center for Aging and Brain Repair in the USF College of Health Sciences with a focus on cellular technologies for cardiac repair and has worked with numerous USF biotechnology start-ups.

MICHAEL W. FOUNTAIN, PhD, MBA
Dr. Fountain currently serves as the Director of the Center for Entrepreneurship at the University of South Florida. In the College of Business Administration he serves as the John & Beverley Grant Endowed Chair in Entrepreneurship and is the Director of Graduate Entrepreneurial Studies. In the College of Engineering, he holds a faculty position in Industrial Engineering.

STEVEN R. BUDD, MBA
Mr. Budd is Assistant Director of the University of South Florida's Center for Entrepreneurship and serves on the adjunct faculty of the College of Business Administration's Entrepreneurship Program. He has significant experience in strategic planning, financial analysis, and identifying and assessing potential financing strategies and sources.

PAUL E. GIVENS, PhD, MBA
Dr. Givens is the Associate Dean, Outreach and Special Programs, College of Engineering at the University of South Florida. He is currently responsible for the integration of Entrepreneurship into the College of Engineering in working relationship with the Center for Entrepreneurship. A former winner of the Sarchet Engineering Management award, he teaches courses in the Engineering Management and Entrepreneurship programs.

Appendix 1. Technology Assessment Tool

Strategic Market Assessments for New Technologies

Investigators' Information Report Form

Please complete the following information regarding principal investigators' research activities. Additional support information should be attached as requested or required.

1. Principal Investigators (PI's):

Presenter and Key Contact:	Name:
Dept.:	Dept.:
Phone:	Phone:
E-mail:	E-mail:
Name:	Name:
Dept.:	Dept.:
Phone:	Phone:
E-mail:	E-mail:

2. Lay summary of PI's key research and technological inventions:

3. Recent relevant PI's published scientific papers (please attach reprints):

Titles of articles and authors

1)
2)
3)
4)
5)

4. PI's patent applications and issued patents (please attach copies):

Titles of patents, dates of issuance or application, patent numbers and inventors

1)
2)
3)
4)
5)

5. Names and locations of key leading investigators in your field of study:

Name:
Affiliation:
Phone:

Name:
Affiliation:
Phone:

Name:
Affiliation:
Phone:

Name:
Affiliation:
Phone:

6. View of research competition in your field (how do PI's rank themselves, in their own view). Additional comments may be attached.

7. Names and locations of collaborating investigators in your field of study working within university settings:

Name:
Dept.:
University:
Phone:

Name:
Dept.:
University:
Phone:

Name:
Dept.:
University:
Phone:

Name:
Dept.:
University:
Phone:

8. Names and locations of collaborating investigators in your field of study working within industrial settings:

Name: Company: Phone:	Name: Company: Phone:
Name: Company: Phone:	Name: Company: Phone:

9. Current status of PIs' research and developing technologies (status of PIs' commercialization activities and contracted studies):

10. List SBIRs and STTRs awarded to PI's. Please attach copies.

Titles, dates and granting agencies of PIs' awards

1)
2)
3)

11. Current status of commercial products developed using this or related research and technologies:

Overview:
Examples:

12. Current status of PI's research and clinical studies support (by whom, amount funded, how long, what areas of research)? Additional research support may be attached.

Current research grants and contracts

1)
2)
3)
4)
5)
6)
7)

13. How much research support do the PIs need for the next three years, for what purposes?

Appendix 2. Strategic Market Assessment Tool

Strategic Market Assessments for New Technologies

Business Opportunity Analysis Outline

1. Name of researcher(s), their department(s) and description of potential product(s) to be derived from the technology.

2. Overall Market
   - Describe the overall market for the past, present and the next five years.
   - On both national and international levels discuss sales, profits, trends driving the market and growth rates.

3. Specific Market Segment
   - Use the analysis above to describe the specific market for the product(s) both past, present and projected.
   - Provide a brief overview of the competitive factors affecting the market. Complete the following table with regard to competition.

Competitor Name	Product Name	Total Sales ($)	Product Sales ($)	Strengths	Weaknesses

4. Market Influences
   - Describe the factors that have a major impact on past and projected sales for the industry. Examples include:
     - Economy
     - Governmental
     - Seasonal
     - Technology
     - Social
     - Industry leaders
   - Describe key market indicators that may have a significant impact on sales.

5. Historical and projected sales
   - Complete the following table with regard to industry and product sales

Historical and Projected Sales

	Historical			Projected				
	Year T-3	Year T-2	Year T-1	Year 1	Year 2	Year 3	Year 4	Year 5
Overall Industry								
Specific Market								
% of Overall								
Product								
Best Case								
Worst Case								
Most Likely								
% of Overall								
% of Specific								

   - Describe your methodology and sources for developing the above analysis.
   - Provide major assumptions and remember to cite sources.