

Educational Committee  
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**Statement of Work:**

The education committee has been asked to develop a proposal that includes the following issues:

- 1) Certification of MOT MBA programs, Engineering Management Programs and Stand-alone programs. This program is not meant to compete with but rather provide information to the management school accreditation bodies such as AACSB. Similarly it will provide the same value to engineering certification bodies like ABET
- 2) Improving the image of engineering management and Management of technology professionals and graduates.
- 3) Understand that the certification standards must meet the realities of differing programs.
- 4) Speed up these first two efforts by utilizing and recognizing the efforts to date of IAMOT professionals involved in the education field, and the realities of differing programs.

**Introduction:**

The committee has devised a plan to support and facilitate the above goals.

The following people have provided inputs or shown interest in the education efforts in one or more of the three parts of the process:

Eduardo Vasconcellos, Fred Betz, Jonathan Linton, Rias Van Wyk, Sul Kassicieh, Andres Fortino, Hans Gatzen, Ben Yuan, Antonie de Klerk, Chihiro Watanabe, John Age, Sven Hivid Nielson, Dan Berg.

**Group Plan:**

**A. Realities that bound the process:**

- 1) MOT education is found in Engineering Management programs, in management schools and in stand alone programs
- 2) Any certification of MOT programs that would assist in ABET or AACSB accreditation must reflect their criteria
- 3) Accreditation takes into account three aspects of a program: Teaching or course work, research and service embodied in clinical activities.
- 4) Many programs have only a Masters level degree

## **B. Toward a strategic Process**

We have devised a tiered process of categorizing and assisting the differing types of programs. First we look at the accreditation requirements of Business and Engineering schools. Next we discuss program realities.

1. Differing Accreditation realities create differing certification opportunities and constraints. A certification process must take into account the needs of a school's overall certification process. In a management school the process is designated by AACSB, for an Engineering School ABET and in stand-alone schools a combination of these certification processes would be the only certification they would receive. We discuss the needs of dovetailing our activities to meet the needs of overall school accreditation requirements
  - a) Management Schools – in order to be of assistance for a Business School seeking AACSB approval any certification program must certify the existing programs at each degree holding level. A different certification standard and progressively higher is required of Bachelors, Masters, MBA or Ph.D. Programs.
    1. The standard approvals would require standards in Teaching or education, Service to the community and research output.
    2. For example, academic research output is a key element of a Ph.D. granting management school program and is important at the Masters level.
  - b) Engineering schools – There is a different accreditation procedure for engineering schools. ABET approves the entire engineering program based on the review of the bachelors, masters or Ph.D. programs. This means we must make three-sepreperate certificates must be approved at differing levels of scrutiny for a school offering bachelors, masters or a Ph.D. Engineering school seeking ABET certification which only requires a school to chouse which program gets reviewed and at that point is reviewed for all programs through the review at that level.
  - c) Finally there are requirement to receive something like certification for non-degree programs and / or stand alone MOT schools not directly affiliated with and engineering or management school. Here we need to develop our own certification process much like those in the project management national certifications.

### **2) The realities of Existing MOT programs:**

MOT and engineering management programs have a variety of distinct client basis. These include:

For management schools

	Full time	Part time
Bachelors	x	x
Masters Program	x	x
MBA	x	x
Ph.D.	x	
Certificate programs		x

For engineering schools

	Full time	Part time
Bachelors	x	x
Masters Program	x	x
Ph.D.	x	
Certificate programs		x

Stand alone programs and Centers

Masters Program	x	x
PH.D.		
Certificate programs		x

The certifications are based on accomplishments in teaching, research and service. For example, part time student programs for example have clinical program advantages over those in full time programs. Moreover, full time student programs are in more need of a clinical aspect.

### 3) Taking advantage of Member activities

We have members who have already invested in methods review the three segments of educational process that need to be reviewed in any certification process. Specifically the following members have worked in the following segments: Research (Linton, Walsh), Education (Van Wyk, Walsh, Vasconcellos, Aje, Betz, and Berg), and Service (clinical aspects Nielson, Walsh, Kirchhoff and Vasconcellos).

#### a. Research:

Jonathan Linton chair of our research committee has developed a peer-reviewed methodology to review journals, review active individuals and review research-intensive programs. He has produced three journal articles based on this method.

1. IAMOT has used the individual paper to provide these years awards for most active researchers in the field. We believe without contradiction this was a great success.
2. The awards committee and the certification committee propose to make the same awards to the schools at next years banquet.
  - a. This creates good will and perhaps more buy –in our certification process.
    - i. In this process we will quickly notify the top tier research schools and ask for their participation at next years IAMOT and present awards to the schools, which attend.
3. Linton, Walsh, Eduardo, Khalil, Betz, Berg, and other members of the education committee are co-authoring a paper that will develop a “how to improve your programs research ranking.” This paper seeks not only for research recognition in itself but also utility for Engineering management and MOT programs worldwide. We expect this to be a part of the first parcels in our certification efforts.
4. We would like to suggest to others that they should also co-author papers or be involved with papers being developed.

### **B. Teaching and coursework:**

Here we look to take advantage of works by Van Wyk, Berg, Eduardo, Walsh, Kassicieh and others. Here we would look to capitalize on efforts such as Van Wyck new book, Berg’s effort in service sector and mot, Betz, book publications, Walsh efforts in technology entrepreneurship. Here we would review:

- 1) # of MOT concentrations
- 2) # of MOT courses in core programs
- 3) # of MOT courses
- 4) # of MOT students
- 5) Course contents
- 6) Course sequences

### **C. Service and Clinical Activities**

Here we have a dichotomous activity most part time students have jobs, which emphasize MOT in some manner and therefore do not require as much of a clinical experience. However it is as important for the faculty to be involved in community effort with their students. Here we have Walsh’s clinical certification book for specific MOT tasks to borrow from as well as best practices from Vasconcellos and others.

- 1) Get a match between research and education
- 2) Expand clinical activities
- 3) Use some of the agreements from Kirchoff and Neilson

**4 Model: Certification Matrix**

We will be using a tiered model based on our cliental. We will certify activities according to their needs. Here is the matrix along with our certification needs matrix. We utilize a typology of certification efforts in order to meet the needs of a specific program

The Matrix requirements for research, teaching and courses and service or clinical is as follows:

0 for no requirement  
 X for minimal  
 XX for medium Requirement  
 XXX

For management schools

	Full time	Part time
<b>Bachelors</b>		
Research	x	0
Courses and Teaching	xx	xx
Service	x	0
<b>Masters Program</b>		
Research	xx	x
Courses and Teaching	xx	xx
Service	xx	0
<b>MBA</b>		
Research	xx	x
Courses and Teaching	xx	xx
Service	xx	0
<b>Ph.D.</b>		
Research	xxx	xx
Courses and Teaching	xx	xx
Service	xx	0
<b>Certificate programs</b>		
Research	0	0
Courses and Teaching	xx	xx
Service	0	0

For engineering schools

	Full time	Part time
Bachelors		
Research	x	0
Courses and Teaching	xx	xx
Service	x	0
Masters		
Research	xx	x
Courses and Teaching	xx	xx
Service	xx	0
Ph.D.		
Research	xxx	xx
Courses and Teaching	xx	xx
Service	xx	0
Certificate programs		
Research	0	0
Courses and Teaching	xx	xx
Service	0	0
Stand alone programs and Centers		
Masters Program	x	x
Ph.D.		
Research	xxx	xx
Courses and Teaching	xx	xx
Service	xx	0
Certificate programs		
Research	0	0
Courses and Teaching	xx	xx
Service	0	0

## **5. Content materials**

There are many that have provided content materials to the education committee. van Wyck and Khalil have been especially supportive on the education content side. Neilson and Walsh have provided excellent material and ideas on the service arena. Linto and Walsh have provided materials on the research and service areas respectively.

### **Course and teaching Material:**

Dr. Van Wyck has sent many an excellent contribution on the courses and teaching content and I like many have purchased his book. Dan Berg has provided some insight on technology and the service sector. I list here a number of further educational efforts provided by a number of our group.

Betz, Fred, 2003, *Managing Technological Innovation: Competitive Advantage from Change*, Interscience (June 2003) ISBN 0471225630

Betz, Fred, 2001, *Executive Strategy: Strategic Management & Information Technology*, ISBN 047138402X John Wiley & Sons (July 2001)

Betz, Fred, (1997), *Managing Technological Innovation : Competitive Advantage from Change*, John Wiley & Sons Inc

Kassicieh, S. and Radoesevich, R., 1995 *From Lab to Market: Commercialization of Public Sector Technology*, ISBN 0306447177, Kluwer Academic Pub

Khalil, Tarek, 1993. "Management of Technology Education for the Twenty First century", *Productivity & Quality Management Frontiers IV*, Institute of Industrial Engineers, Norcross, Georgia, February.

Khalil, T. and Garcia-Arreola J. 1997. "A Framework for Educational Programs in Management of Technology", *Proceeding of the 6th International Conference on MOT*, Gothenburg, Sweden.

Khalil, Tarek M., Garcia-Arreola, J., "Curricula for MOT Education - Intellectual Base," *Proceedings of the Portland International Conference on Management of Engineering and Technology (PICMET'97)*, 1997.

Miller, William L. 1998. "New broadened disciplines for MOT", *Position papers of the 1998 Workshop on the Management of Technology*.

National Research Council 1987. "Management of Technology: The Hidden Competitive Advantage", National Academy Press.

Scott, G.M. 1988. "DELPHI Questionnaire study of Strategic planning for technology products: a Research Report", *Center of International Business Education and Research, University of Connecticut, Report # 98-09*

Khalil, Tarek, 2000. *The Drivers of Technological Changes in the 21st Century*, NSF/UM report, University of Miami, Coral Gables, Florida, January 2000.

Van Wyk, 2002. "A Credo For MOT", IAMOT web site [www.iamot.org](http://www.iamot.org).

## **Research Material**

Linton has provided the best research material to date. He has used the tracking journals in our field to delineate the top journals in our field, the top researchers in our field in the last five years and rankings for the top 50 schools in MOT research. These have all been published or accepted to be published.

- 1) Schools and journal rankings accepted to be published in JPIM
- 2) IAMOT recognized the top 50 researchers

Proposed IAMOT activities

- 1) Send out a recognition of research excellent to top 50 schools – a joint effort by the education and awards committee chairs.

## **Service Material**

This is one area where two schools seem to have developed some expertise. Walsh and Kassiech at UNM has developed a certification manual for teachers, students and mentors and a similar program has been developed by Neilson. We provide a short listing of some of the activities below.

Business plan writing

The process of Technological Forecasting

The Process of Technological Description

The Process of Technological Road mapping

The process of Technological Commercialization

The process of Disruptive Technology and Discontinuous Innovation Management

Expeditionary Marketing Studies

The Process of Technological Assessment

### **1) Business Plan writing**

Business Plan writing is an exceptional task. It is first a selling document that takes a variety of forms dependant on the audience. For the most part we write an operational business plan. We generate a living document that tries to embody the reality and vision of the firm we work with. Our business plans have won national awards and helped firms acquire equity funding of hundreds of millions of dollars.

### **2) Technological Forecasting**

Technological forecasting provides a prediction to a corporation of the technical trajectory of their own or competing technological pathways. This is especially important when technological substitutes exist or might impinge on the products of the company. This process usually requires the development of a technological trajectory of the firm's current technology versus a proposed technological substitute.

### **3) Technological Description**

Technological Description is a process that enables a small firm to briefly and articulately describe the value inherent in their technology to potential users. Executives in many small businesses find it difficult to express the value inherent in their technology to potential clients, investors or other stakeholders. The process of technological description involves making this complicated process commonplace. Utilizing a series of questions and sentence structures we provide the client with exception explanatory power.

### **4) Technological Road mapping**

Technological Road mapping provides a customer with milestones and direction in their internal technology development process. Small businesses cannot afford to waste resources and therefore must focus technology development to meet new product needs. This process provides investment schedules and knowledge milestones for future product and corporate success.

### **5) Technological Commercialization**

Technological Commercialization for high tech companies is a process that enables them to profit from their intellectual and managerial infrastructures. Technology based entrepreneurship is by its nature iterative and this process reflects that nature. It is a process used to reevaluate a firm's value proposition based on technological competence and managerial capabilities resident in the firm.

### **6) Disruptive Technology Management**

The Disruptive Technology Management process allows small businesses that often are the harbingers of change to profit from it. The process of disruptive technology management and discontinuous innovation management is radically different from that experienced by firms who are commercializing high tech but more incremental technologies. We provide a typology of customers, the sources of technology, and the market strategies that will enable a firm based on disruptive technologies to increase its chance of success. The resultant report is a living document that small businesses use for their process of competitive advantage.

### **7) Expeditionary Marketing Studies**

Expeditionary Marketing Studies provide the customer the ability to market based on competency rather than on market focused or customer compelled activities. Small firms must often prove that they have a competency to offer a potential client. Many times this takes the form of demonstrating the ability to provide a value that a customer finds appealing and then using customer input to redefine their competencies in a more valuable to their customer form. It is the process of teaching the small business owner to find problems in a customer cohort that her small business can uniquely satisfy based on its technological competencies.

### **8) Technological Assessment**

The process of Technological Assessment provides an internal audit and benchmarking of a client's companies technological competencies and managerial capabilities. It

provides a snapshot in time of a customer's ability to provide value to a user community. The process takes one step further assessing a firm's competency to provide valuable solutions in an industrial setting. Finally it provides a pathway for a firm to meet the technological standards to provide value in an industrial setting.

## **5. Call to action**

We now have a process that all can embrace. We need to make joint actions that make sense and allow us to develop a comprehensive program. Here are some tasks that are required

1. Please review the process and see if it makes sense to you
2. We have a joint project with the awards committee
3. We have at least one perhaps more papers to publish.
4. We need your efforts on content.