

Developing a Strategic Project Management Program Curriculum

*A Model-Driven Approach Based on Program Experience
at the University of Houston*

Creating a Project Management Program in Academia

A Model-Driven Approach Based on Program Experience at the University of Houston

By

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Introduction

The purpose of this paper is to outline the creation of an academic project management (PM) program, based on an eight-year review of the University of Houston's (UH) successful graduate Technology Project Management program experience. A second related goal is to describe some of the thought processes and history that occurred during this period. Third, the paper summarizes an after-the-fact conceptual vision illustrating how an academic curriculum can strategically evolve its role in project management to serve what needs to be recognized as a global gap in academia's view of this topic.

The author has a strong belief in the value of project management (PM), based on over forty years of involvement with this topic in industry, government, and academia. The most recent observations have been from the University of Houston (UH) in working to establish a technical PM academic program. Before we jump into further discussion on the UH program, let's make it clear that this description is not trying to say that the UH program is the best in the world; there are both positive and negative items described. Student and external acceptance of the program has been very successful. From all of these views, the approach outlined has the multiple perspectives of historical, philosophical, and lessons learned.

Some readers will not agree with everything presented here and this is to be understood. This subject is quite complex and other points of view are valid. One of the major themes in this paper is that academia is behind the knowledge curve in adopting more of a PM focus into the major program areas. Data are presented to build the case that this topic is broad and has value as a general human problem-solving skill. If one agrees with this logic, it is a small extension to agree that academic programs should expose their various majors to the PM model and its associated concepts. Second, academia has a societal role of not only training the next generation, but creating new knowledge in critical areas. PM is now recognized as an important element in the business world but it is in need of ongoing research because it is a relatively new (in knowledge time) and immature model. We should also recognize that there is demonstrated success with this model in the hands of a skilled manager.

A third aspect of this case is to highlight the issue of an industry knowledge gap regarding this subject. Academia should accept a role in dealing with what we are calling the non-traditional student—one who is not looking for a degree but rather someone who wants some segmented PM knowledge upgrade. As our program has discovered, this new class of arriving non-traditional student could well come from beyond U.S. borders; also, this type of student often has different learning styles and habits than the traditional student.

Formal Models of PM

Over the past twenty years or so, the evolution of project management theory has grown significantly as a result of international organizations such as Project Management Institute (PMI), the U.S. Department of Defense (DoD), and other industry groups. As a result of these various initiatives, there is now a relatively clear picture about how to execute a project. This does not mean that all entities have the same exact model perspective, but most have a common view regarding the key issues related to it. From an academic perspective, this dichotomy is an important aspect for academia to absorb. Even though we understand more about this aspect of human enterprise than ever before, all parties are not in agreement as to the appropriate underlying best process mechanics. These disagreements in process represent some of the lack of maturity regarding the topic, as well as its underlying complexity. There may in fact be multiple valid approaches based on different environmental situations, so the process is not a cookbook approach. Related to this point, ongoing research is a vital part of the academic role, given the current states of PM models.

An academic program structure must contain more than simple topic packaging of what is commonly used today. Students leaving academia need to be exposed to not only the current mechanical aspects but also be introduced to broader and more conceptual ideas, which will evolve throughout their future careers.

The UH TPM Story

Program-related material for this story was collected primarily during the time period of 2006 through 2011 and is based on the author's experience with the program. There is an early component to this history, which began in 2003 when the author left industry in 2003 and moved to the university with the goal of building an executive project management program. This initial three-year experiment failed from an economic standpoint, but served as a tutorial laboratory to help with the later program developments. The reader should take note that the first attempt to install a PM program failed because of a mismatch of organizational goals and lack of market understanding. One learns from failure as well as from success.

The data from 2006 through 2011 outline details regarding the Technology Project Management (TPM) graduate program housed in the UH College of Technology. Over this period, many program-related conversations were discussed with other academic and industry types. Some of that input is embedded here and represents a more philosophical view. Throughout this discussion, there is an effort to be honest without being overly critical. Yes, more could have been accomplished during this period, but personal observation is that most academic organizations are resource constrained to accomplish their recognized goals. The fact that not all of the UH TPM program's desired objectives were met is not a criticism of the system, it is simply the economic reality. On the positive side, there were many internal educators who worked hard during this period to make the UH program successful under very tough conditions. It will take a similar effort to accomplish this in any academic organization.

It must be recognized at the outset that adding a robust PM program to the traditional academic organization will be difficult, but hopefully the logic outlined here will be coherent and help other organizations wade through a complex program design process. By robust, I mean something other than laying a collection of pieces and parts onto existing programs.

Academic Organizational Environment

A driving question to explore in this paper is how to design an academic organization so that it leads to producing an improved level of theoretical understanding and skill across all academic elements. The typical academic organization is structured around select skill aggregations—focal skill groups doing what they know best (i.e., accounting, engineering, law, etc.). Attempting to lay the subject of PM onto such a functional organization structure leads to a mismatch of natural goals. PM, as a subject domain, is broader than most functional areas in academia or industry. This mismatch in content and organizational structure will be hard to resolve without creating redundant sub-structures in multiple segments to duplicate needs in each focal area. That may need to be the pragmatic solution, but at least one needs to understand what the least costly approach would be. The appropriate academic PM focus is to both teach and spread the knowledge, whereas the industry viewpoint is more focused on how to use that knowledge effectively. The design solution for an academic PM program should recognize its dual role.

PM content in academia is often disseminated by organizing students into small teams to produce some defined output. Oftentimes little prior theory is provided to go along with this assignment; in other words, there is an expectation to just get it together and produce the defined output. These efforts often produce poor results even though the project team size is small and the goal is not overly complex. Unless such groups are given some prior instruction regarding how projects operate and the essential process components, there is little hope for an improved output from this “teaching” strategy. Similarly, industry projects are often formed the same way and suffer similar results.

If one was to characterize the typical approach for PM topics in academia, we would see collections of similarly titled courses in management, operations management, quality, and finance, among others. Engineers might be exposed to similar topics under somewhat different titles. In both situations, PM as a model is fragmented into these discrete packages. We now understand that this topic has a strong

integration component in which all of the knowledge areas are interconnected, so a discrete teaching approach of a packaged course is not appropriate as the only pedagogy.

Emergence of Professional Certification

As PMI and other industry professional entities have matured, the awareness of an internationally recognized formal PM model has emerged, along with the initial concept of professional certification. The use of the term *profession* to describe PM is an emotional one. Many will argue that PM will never be recognized as a profession but it is surely a core competency with sufficient underlying unique knowledge and skill. Much of the current PM model knowledge has been created external to academia's influence and is now in reverse migration back to academia rather than the traditional academic creation outward to industry. One reason for this is that much of the complex PM environment is located in the external industrial world. In spite of this, academia should serve the roles of knowledge collector and analyst. We must also recognize that the level of maturity with this topic is such that the underlying definitions of best practice techniques will continue to evolve for the foreseeable future. As an example, the goal is no longer just to run a single project. We now recognize that most organizations have many of these ongoing projects at any given time, resulting in management formally dealing with a much larger tangle of organizational processes into which projects are attached.

A key conclusion from this view is that an academic project management curriculum is not just achieved by aggregating a series of existing courses and calling it a *major*. Traditional courses will be needed, but there are certainly more issues that need to be resolved before this theory can be translated into a coherent result. The hope is that this introduction will offer some insights into the process of creating a successful program.

Project Management in the Enterprise

The first order of this discussion is to briefly outline the scope of project management in the international community; there are many textbook definitions as to what this term means. I have always told my students that the role of PM is "putting mush in a bucket," but this is probably too loose of a definition for the sophisticated reader. Better said, it is a management framework that supports typical management processes related to translating an often ill-defined organizational change vision, or goal statement, into a resultant outcome and managing the related work processes from inception to closing.

Tom Peters, a leading management guru, commented that businesses should "Instill a 'project orientation' everywhere" (IPM).

There are two major growth drivers for the PM market. First, there is increased recognition that the PM role is different from the technical skill related to achieving the project objective and, second, there is a lack of skilled PMs as a result of annual retirement. Approximately 20% of the U.S. workforce is at retirement age, and this will generate the need for ongoing replacement of skilled employees. Beyond training individuals for the project management role, there is also a need to train other individuals who work in project activities that are supportive to the project but are not its management level. Examples of these are project team members, entities who support a project, the project management office, and other PM technical technicians that support the project team. One could even argue that understanding the project model and its operational characteristics would be of value to all organizational workers. Certainly, one of the industry selling factors for PM is to show how this apparent overhead justifies its additional cost.

Project Management Model Structure

A first question to answer here is, “what is meant by project management from an academic point of view?” There are several sources that could be used to define the basic content of this subject, but certainly the PMI model is undoubtedly the best known example used to describe what the basic model processes that PM entail and it is the most recognized example of this. Other project management processes and models described by well-known organizations, such as PRINCE2 and the International Project Management Association (IPMA) offer insights into the potential academic content of PM. For the sake of this discussion, we extract approximately fourteen content groups defined in these models, representing core material that would likely be packaged into the college curricula at various combinations and levels (Richardson):

1. Scope
2. Time
3. Cost
4. Quality management
5. Procurement (outsourcing and virtual organizations)
6. Communications
7. HR (individual and team development, team organization)
8. Risk management
9. Ethics and professional responsibility
10. Integration and interaction of the topics above
11. Project life cycle management activities (planning, execution, monitoring, closing)
12. Project portfolio planning and management
13. Organizational support processes (supporting the project)
14. Professional certification

The key point represented by the above list is to emphasize how broad the topic of PM is from at least the theory standpoint. This list does not reflect the operational aspects of these topics, nor does it necessarily suggest that an academic program involve all of these topics or even how an academic major might structure segments of the subject domain. The point is that this list of general knowledge areas is relevant to the project management problem domain and for that reason should be considered for inclusion by a robust academic program. Philosophically, an academic program should do more than just teach a couple of tactical PM concepts, such as scope and time. In the mature form, it must eventually embrace this full spectrum and at multiple levels of complexity. We also recognize that each major typically focuses more on certain subgroups and many of these topics could easily occupy a full semester course.

Academic Programs

An Anderson Economic Group (AEG) study found emerging interest in project management processes across broad industry segments to address various business requirements (PMI, 2). This recognized business trend is now being translated into various academic initiatives to support industry needs. AEG reports that 500 academic institutions offer undergraduate and graduate programs focusing on project management, with another 3,300 offering courses on the subject; however, this means that more than 4,600 schools do not offer any coursework on this topic. Recurring studies of this type clearly indicate an academic gap between industry interest in the topic and university program offerings.

Project Management as an Academic Topic

Based on personal observation, industry data similar to what have been described here, and a review of various university programs, it seems reasonable to conclude that academia (for the most part) does not

have the same broad view of PM that the contemporary model defines the topic to be. There certainly are arguable positions regarding which part of this model should be contained in various academic programs but, clearly, academia should be an aggressive distribution channel for this topic.

Contemporary project management has evolved over the last sixty years into its evolution; each decade of this evolution has exposed yet another complex aspect of the subject. As we understand it today, PM consists of a broad array of management and operational process theories that collectively stretch beyond the boundaries of traditional academic program structures. This model suggests that PM is not engineering, nor is it management per se; it is a broader aggregation of operational processes. Academic programs include subsets of this whole, but few programs embrace the full scope of the subject. Also, in my opinion, the traditional academic organization is not staffed with an appropriate array of skills needed to perform what is required to properly cover these topics. This statement is based on the idea of both teaching the material and expanding the theory.

Many commercial organizations struggle with this topic today, as exemplified by their associated project initiatives often not being well executed. One reason for these struggles is the lack of project participant training in even basic PM model concepts. This current skill deficiency is partially created by the lack of PM exposure gaps in earlier academic programs. This is a strong statement and is not meant to criticize any academic program; however, it is meant to say that there is a shortcoming in the academic view of this topic across broad major areas.

On a more global view, many forms of our life experiences fit the project model and all academic programs have project characteristics embedded in their existing majors. Industry is increasingly recognizing the role of PM for improved results. Defined limitations of the academic major view of this topic exacerbate future gaps. That is, technical majors learn the valuable skills required to design and build their widgets or other deliverables, but over time, these individuals move into directing teams of similar technicians in building bigger widgets. This new job function now has more of the characteristics of PM and fewer characteristics of their previous technical knowledge base. One of the academic program design dilemmas is how to handle this issue of making a technical lead morph into a project manager (job morphing). A specific technical skill is the original reason to be hired, but the future project management skill is what it takes to be promoted in the long term.

If one looks at the various aspects of work and life in general, there is a surprising frequency of events that begin as a goal then evolve into a subsequent planning and execution process used to achieve that goal. Given this, does it not seem logical to structure some of the broader academic world around that process model?

Undergraduate academic programs would need to address a set of PM material that would be called the *common body of knowledge*. Beyond this basic set, the student would have a more specific “major” area need. The “major” material is typically organized around traditional college skill specialties. In such a structure, the undergraduate would move around various university organizational colleges and programs over his or her degree major to complete his or her overall requirements. Conversely, graduate-level students tend to remain closer to a single home unit throughout their program, so for this audience a centralized approach for project management would be more difficult to sell.

When students are given a project assignment, the results are similar to what often happens in industry. The work process is haphazard, schedules are overrun, and the group’s morale is suspect. Why is this? Where is the student supposed to suddenly know how to take a vague assignment and build a viable plan and complete it on schedule? Would exposure to the project model suddenly make this problem scenario go away? No! With proper training, would the process move forward in a better fashion? Yes! So what is being said here? Simply that the level of PM knowledge needs to be improved, and academia needs to embrace the gap for both current students and industry.

If one believes in expanding exposure to the topic of project management has value, the next questions are where and how to deliver that material to the student. One delivery approach for PM is what one might call an *embedded strategy*. In other words, when the major area encounters the need to form a team to accomplish a goal (i.e., a project), they teach the necessary project processes that relate within that activity. Common project topics such as scope development, schedules, and team dynamics would arise from this activity. In some programs, specific discrete theory courses may be structured as an alternative. In these formats, the theoretical coverage is minimal, but there is some added advantage in embedding the process into a simulated work environment. The design question for this approach is how to balance theory and competency across a specific academic major. A test of the current program balance could be derived by asking a college senior to describe how he or she would go about executing some project-type goal; in other words, give the student a vision statement in his or her area of expertise and say, “develop a plan to accomplish this.” It is suspected that a haphazard technical management answer would result, because that individual has not been sufficiently exposed to the project model concept. This should then raise a curriculum design questions regarding deficiency in the program and whether exposure to project management concepts should be considered a common body of knowledge for all college graduates regardless of major.

In various academic programs reviewed, there were visible tidbits of project management theory and some applied processes embedded in IT, engineering, technology, and business programs. Few of these would be graded as robust in their breadth, and some segments of PM theory are generally missing altogether. Academic organizations will likely get defensive about this statement, but that is not the point here. Regardless of the past, it is time to recognize that this subject has arrived and matured. Academia needs to look at what it has to offer and see how best to deliver PM learning and competency to its constituency (internal and external to the university). Much of this paper deals with presenting PM to a technical audience, and the academic perspective focused on here is technology-based programs; however, realize that the principles described fit all other programs but these have not been studied to the same degree. So, with this as a philosophical start, let’s take a more tangible look at what a few of the PM academic leaders are doing with their programs.

Sample University Programs

A small sample of well-known university’s project management curricula indicates diversity regarding how programs are structured. The sample shown here is drawn from universities with PM programs that are visible outside of their geographical areas and quite varied in size, geography, and program approach. The analysis shown is generally based on external documentation and not an in-depth program review. Rather, the goal is to show how the program is structured and housed within the organization. Appendix A contains URL links to these programs.

Table 1 summarizes PM program attributes for the selected university group; this group would be considered as being more aggressive than average in pursuing the topic. Note from this sample the diversity of levels, types, and organizational owners.

Table 1. Sample Academic Project Management Profiles.

URL	UG	Grad	PhD	Certificate	Online	Owner
University of Maryland	X	X	X	X	X	Engineering
Florida Institute of Technology	X	X	X	X	X	Business
Purdue University		X	X	X	X	Engineering
Stanford University				X		Prof. Dev.
Villanova University				X	X	Prof. Dev.
Bellevue University	X	X		X	X	Business
University of Alaska		X			X	Engineering

Each of these institutions has a unique view of PM, but one would expect the “X’s” (breadth) to expand as a local program matures. The only thing that would limit this is the instructional goal of the organization (i.e., no PhD program, no market for certificate students, etc.). Based on the publicly available program documentation, a brief high-level descriptive comment about each program is offered here.

University of Maryland. This is a very mature academic program in terms of topic breadth and scope, as well as faculty maturity. PM as a topic has prospered from the nearby Washington, DC governmental project influence. This program is housed in the engineering organization.

Florida Institute of Technology. This program has prospered from long-term relationships with governmental contractors and more recently from a robust Internet-based distance educational structure. Their dual course focus is in information technology and the GAC-certified MBA program. Bisk Education handles the program’s registration and marketing.

Purdue University. This university is well known as an engineering-oriented institute, so it is no surprise that its project management offerings are heavily technology based. They also indicate an online presence.

Stanford University. This university has a stellar academic reputation and its project management program is organized external to a defined major academic organization. The offering focuses on industry professionals who are not seeking a degree. This graduate-level program is offered in both traditional and online formats.

Villanova University. This university has the most mature external Internet visibility, its advertising program is very well done, and the university appears to prosper from this approach. This sample Internet material is very well packaged and entertaining. Program registration and advertising are managed through Bisk Education, a commercial marketing firm that also manages the Florida Institute of Technology program.

Bellevue University. This is a private university in Nebraska that has had a good undergraduate PM growth profile and has followed the PMI model. This program illustrates that PM as a topic can have significant growth even in areas that are not thought of as heavy industrial centers.

University of Alaska. This university has very active PM initiatives and is certified through PMI’s GAC process. A primary program focus for this university is engineering and IT. To serve this market, the university has matured a distributed education model and PM seems well embedded in that model.

In each of the sample organizations, there is an affinity to house the program, based on the core mission of the institution and is not an unexpected initial structuring model. In these sample cases, the PM program offerings are linked to a single college within the university. Some of the linkages are departmental, whereas others appear broader in scope up through the college level. The most visible links are to engineering, IT, or business. None of the programs would be classified as being housed higher than a college level. So, one conclusion that can be drawn from this sample is that PM is sponsored at a traditional major college level and is not viewed as a stand-alone unique major or global university level program. The author’s personal experience supports this observation, but would add that there are often multiple lower level courses scattered across the academic landscape in which PM concepts are used. In these isolated cases, the level of PM model theory presented would be considered minimal.

Academic Course Packaging

One of the most difficult academic curriculum design issues to resolve is how to define and implement specific topic groupings for various degree levels across universities. In most universities, course content is heavily dictated by the individual colleges and their majors, although many universities do have a higher level curriculum monitoring committee. Nevertheless, at the present time, conflicts over

which organizational units can or should teach PM as a topic area do not seem to be a major concern, based on observations of existing program structures. Without some improved management process for high-level governance, fragmented PM topics and programs will spring up from the grassroots level and focus on low-level PM theory.

A second and more difficult packaging issue is the perception of PM value compared with a primary major. Most new college graduates are not expected to move directly into a project management role immediately after they get out of college, so the subject of PM is not a high priority. However, it is important to recognize that even a college bachelor-level graduate could be immediately involved in project activities as a team member or a technical support person. Also, within three years after graduation, it is not unreasonable to find an individual beginning to take on more formal project management roles. This migration of job responsibility will be more difficult without an adequate PM education.

Each of the considerations outlined above has an impact on the academic organization's subsequent curriculum goals and approach. The job role migration scenario is most likely in technical majors such as engineering, IT, business, and other technology-related majors. However, recognize that because project activity is also present in other organizational types, this migration phenomenon may be more prevalent than we recognize. Without more attention to this form of education within the academic major, these graduates are expected to somehow absorb the needed PM competency skill on the job. Experience suggests that this is not the best approach.

Moving Forward

The basic view of academia and project management is that there is a need to increase recognition of the topic beyond what is evident now. The basic challenge is to find appropriate ways to package this material for proper student exposure. The point made here is that basic PM content is relevant for all academic units.

History of the UH TPM Program

Early Period

This PM program history commences around 2003 when the author moved to the UH College of Business to start an executive project management certificate (non-degree) program. This early twelve-semester hour (equivalent) program featured guest speakers, PM theory, and followed PMI's *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* model. The audience reception and technical success of this initial structure were good, but the program cost was high compared with other PM training programs. Based on the newness of the program, lack of advertising, and poor economic climate, the enrollment remained low at approximately fifteen to twenty students per semester, which was below the cost breakeven point. The primary student enrollment goal for this program was to obtain the PMP® certification, which was clearly achieved. The local economic climate during this period was declining, and industry training budgets were constrained more so than usual.

The years 2004 and 2005 introduced major design changes to the course structure in an effort to cut cost. All frills, such as food and guest speakers were cut; the tuition cost was also cut in an attempt to get closer to market rates. By the third year, the enrollment had started to drift upward as internal UH graduate participants were allowed in; however, by the end of the second year (2005), it was decided that the executive market was not sufficient to continue the program and the decision was made to cancel the program, adding that PM for the internal academic student was not a focus or priority at that point. Even though this early phase was a good technical learning experience, it would be ruled as an economic program failure, given that it did not achieve the design vision as an executive PM experience.

Phase Two

It is always interesting to look back at isolated events in one's life and note how serendipity can change the direction of an occurrence and that is what happened in this case. A casual conversation with a College of Technology (COT) colleague in mid-2005 led me to be invited to move to a technology-based PM program in that college. This change started the phase-two history period. The existing COT Technology Project Management (TPM) program had an existing core set of courses related to general PM theory, team behavior, combined risk/quality, and a research capstone. The remainder of the program degree content was outside of project management focused content. The culture of this college was somewhat unique in that it had a wide variety of generally technical majors (approximately forty) and was much less structured in regard to departmental silos. In addition, there was a more mature understanding of PM as a desired component in many of the majors and that recognition actually grew over the next few years. This new environment supported the ability to tweak the course structure. Student enrollment reacted to the new structure and increases followed rapidly.

Enrollment Growth

Before diving deeper into the internal program course structure, let's examine some of the enrollment metrics observed over the period between 2006 and 2011. The TPM graduate program experienced significant growth over this period in the face of many program challenges. Initially, the Technology Project Management (TPM) enrollment data were comingled with supply chain and information security majors. At this point, all three major areas were housed in the Information and Logistics Department (ILT).

Figure 1 shows the overall COT enrollment trends and ILT/TPM growth rate. Other college majors shown in this graph are Construction Management (CMT), Engineering Technology (ET), and Human Development and Consumer Science (HDCS). The most notable metric in this listing is the performance of the PM segment compared with the other majors. The year-to-year growth rate for the ILT program is reflected by the red line on the graph. Note that this rate dropped to essentially zero after high growth rates in previous periods. It is important to point out that the TPM statistics do not really tell the whole story about what actually went on during this period. As a result of external major enrollment linkages, the PM course student growth rate is actually higher than indicated.

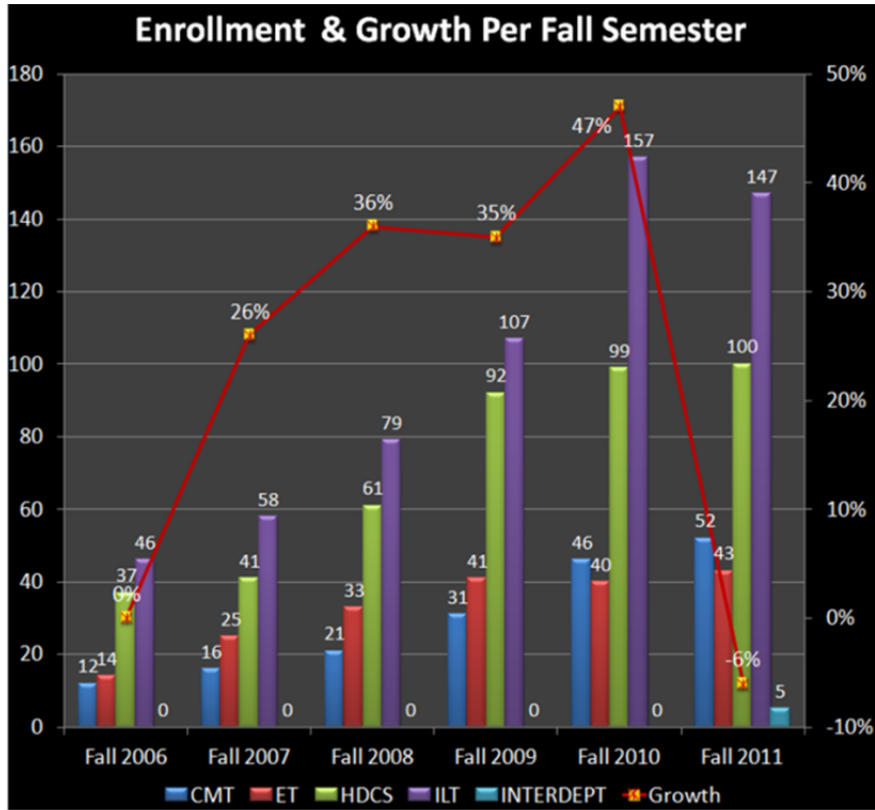


Figure 1. Technology Project Management Program Growth (2006–2011).

Table 2 decomposes the degree enrollment data within the three interlinked ILT majors for the same five-year period; note especially the TPM trends during this period.

Table 2. TPM Graduate Degree Program Headcount (Majors).

PROGRAM	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	5-Year Gain
Technology Project Management	-	3	20	38	67	>2000%
Supply Chain & Logistics Technology	13	18	25	28	33	153%
Information Security	33	36	33	41	57	73%
TOTALS	46	57	78	107	157	241%
Yearly % Increase		24%	37%	37%	47%	

The growth rate for TPM during this period was extremely high, but once again there is an additional student body count from outside the major, which is not reflected here. During this period, university-wide UH graduate students from beyond the three TPM embedded concentrations began registering for the core PM courses. This influx included major areas inside and outside the College of Technology, including MBAs from the College of Business. In addition to the internal UH student enrollment growth, there was an additional influx of non-degree seeking individuals into the Certificate program. Each of these two new populations added to the student body on top of the normal UH major registered count.

Figure 2 captures the actual student count growth for the three course sets: PM theory, PMP® Certification, and total PM core courses. This growth represented 50% of the total College of Technology growth during this period. This chart then represents the actual enrollment student count view, as contrasted to the earlier student major view. It also reveals the impact of the external student (non-major) and certificate enrollment as a supplement. One possible way to explain this external growth is the belief that a student desires some exposure to project management but does not want the full major or does not have an equivalent in his or her home major. This question can't be answered for certain, but it is a point to ponder.

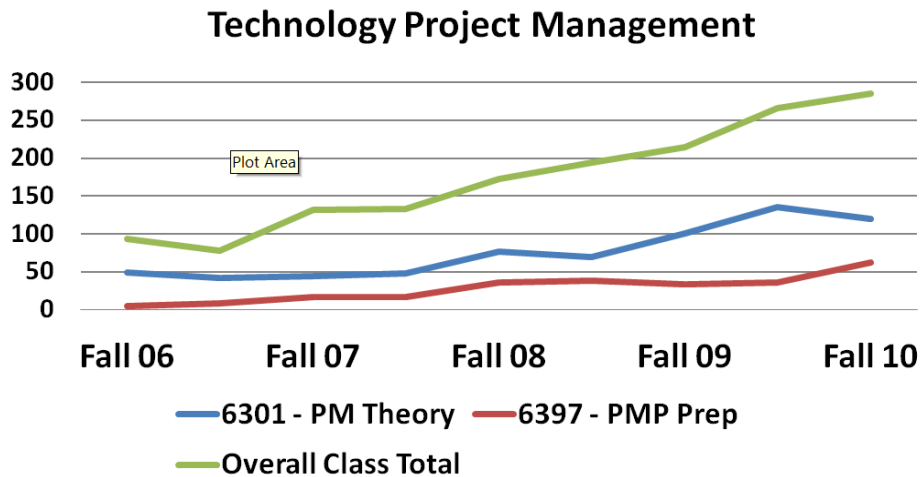


Figure 2. PM Core Course Student Count Enrollment (2006–2010).

Other Growth Sources

Beyond the formal student body count of statistical data presented, another source of hidden growth emerged from international external linkages from locations, such as China, India, Finland, South Africa, Russia, and South America. Similar interest emerged from location organizations seeking custom courses for their project-oriented employees. These requests came from a wide variety of organizational types, and the subsequent custom programs were produced by internal TPM faculty. In every case, these requests were for custom materials extracted from the TPM core courses.

Program Milestones

Between the period of 2006 and 2011, there were ten milestone events, which were the key drivers in creating changes in the character of the program and these are summarized below in essentially chronological order:

1. Program structure tweaking—2006
2. REP certification (three core courses)—2006
3. Established external industry advisory group—2007
4. GAC program accreditation certification—2007 to 2009
5. Academic partnerships—worked to establish intra-academic partnerships
6. External marketing—initially, only the university website, but moving to external late in the period to make the program more visible

7. Internet-based distance education program commenced—2008
8. International and custom program participant linkages—2008–2011
9. Multiple campuses staffed—2010
10. Endowed PMI professor—2011; funded by the local PMI chapter

Each of these events is briefly described below:

Program Structure Tweaking (2006). Two early changes were made to the program structure. The core quality course was enhanced to focus on Six Sigma Green Belt training, and plans were made to move risk management into a separate course. Second, a PMP® certification preparation course was added as an elective. Third, a certificate program was initiated for the theory and PMP® certification course. At this point, the TPM program structure was a thirty-six semester hour major, with essentially twelve hours focused on the specific content of project management theory.

R.E.P. Recognition (2006). Course additions and changes were made to start upgrading the program. First, the basic quality courses were upgraded to a Six Sigma focus with Green Belt certification for the student. Second, a PMP® certification preparatory course was added as an elective. Third, certificate courses were created for PM theory and PMP® exam preparation. Each of these changes was reviewed through PMI, resulting in Registered Education Provider (R.E.P.) status. This action made the program more visible to the outside community, and the external Certificate enrollment quickly grew along with the overall enrollment.

Advisory Board (2007). An external industry advisory board consisting of energy, consulting, legal, and medical professionals was formed in 2007. During this early period, the board supported the strategy of following the PMI model and supporting the PMP® Certification process, which was growing in popularity at that time. Houston has a very large contingent of PMI members, and some key members of the local chapter became major supporters of the UH program. Over the coming years, PMI chapter members served as adjunct instructors and four PMI chapter presidents served on the advisory board. This relationship has been very productive for the program.

GAC Accreditation (2007–2009). During this period, the program structure was evaluated using the PMI GAC learning outcomes standards and found to be a good match. As a result, the entire program was documented and in 2009 was granted GAC accreditation. At that time, UH was one of the largest state institutions to achieve this formal recognition. One never knows exactly what an accreditation logo can do for a program; however, there is no doubt that this recognition has increased visibility both nationally and internationally. Over the following period, multiple foreign groups came to the university for special PM programs, and it is believed that these groups found and selected UH as a result of the GAC accreditation visibility. Another internal value of the GAC process came in the forms of its defined learning objectives that the TPM program used in examining course content; these have been helpful in evaluating course content, and a text has been written for the theory class based on these learning objectives (Richardson).

Academic partnerships. One of the emerging design goals for the program was to link in a broader array of concentration areas. Similar attempts were made to invite other majors to take PM core courses à la carte as electives. As a result of this, MBAs were allowed to take the PM theory and PMP® Certification preparatory courses as parts of their elective area. Likewise, other majors came to these two courses with less formal support from their home departments. In an ideal world, much more of this would have been more formally approved. There is still resistance by many external departments for sending their majors to other colleges for courses. This issue has a significant impact on some aspects of the research segment of the PM program and will be

described later. This cross-fertilization issue has not been an easy issue to solve but one that is needed.

Marketing initiatives. Other than university web pages and PMI links, very little commercial marketing was used during the majority of this phase. Internally created brochures were prepared for handing out at various conferences and other venues, but most of the external marketing was web based and through word of mouth. In late 2011, the first commercial advertising was used. It is too early to see the impact of this type of advertising but it was productive in other programs and appears to be a viable strategy to stimulate external enrollment.

Distance education (2008). The university had a global initiative to expand to two newly established campuses and this expansion created a real drain on existing faculty resources, which had already been a recognized problem based on earlier growth at the main campus. As a result of this, some of the core courses were moved into a hybrid type of format, with live lectures being filmed and then streamed over the Internet to other sections. This process continues today, and the faculty is still learning how to best deliver this type of class. Also, the physical technology infrastructure for delivery is undergoing review. There is every indication that this mode of instruction will be a major driver for future program growth but there are associated quality issues to resolve.

International and local custom programs (2008–2011). The TPM program began to attract interest from both international and local sources around the year 2008. Over the past three years, international programs, in one form or another, are either in place or in process for participants in China, Russia, Korea, India, Finland, and South America. In addition, preliminary conversations are being held with other international sources. The key point here is that the international technical market for PM is very active but a difficult one to execute with a stretched faculty workload. One Chinese organization has now sent three different groups of engineers to the UH campus for approximately three months of customized training and PMP® Certification training. This group has achieved a 100% PMP® exam pass rate for 52 engineers taking the exam in English. This experience has been a great knowledge-building event for both sides but it has been difficult to schedule instructional faculty, given the ad hoc nature of such groups.

Multiple distributed campus programs (2010). As the multiple campus initiative went into operation, the faculty began to encounter issues in class scheduling. This initiative added both a new teaching load and the requirement for marketing activities related to the new location.

PMI Endowed Professorship (2011). Local PMI chapter members have served various roles in the initial content creation, teaching, and advisory activities related to the TPM program since 2003. Around 2009, the idea of funding an endowed PM Professor began to surface and, in late 2010 a financial grant was made to the college for that purpose. This position has not been staffed as of this writing, but it is our hope that it will further raise the overall visibility of PM in the academic organization and further legitimize PM in the academic and industry circles.

It is important to recognize that no historical statistics or milestone chronology fully describe what occurred in the TPM program during this evolution, but collectively, the data presented and the milestones summarized here clearly show the rate of dynamic change going on during this period. In each of these events, faculty members were involved in executing the change and all of this was accomplished external to normal teaching activity. The overriding internal operational problem throughout this phase became how to manage the rapid program growth with essentially no increase in permanent faculty. Another lesson learned is that it would have been better to have had a more robust program structure plan in place at the onset, but this conclusion is looking backward and was not a reasonable goal in this case.

Enrollment Growth Drivers

In order to better understand the TPM program structure, it is necessary to examine more details behind this program's growth drivers. The initial core growth driver courses were PM theory and PMP®/CAPM® Preparatory (Certification) courses. The associated growth rate of this segment was approximately 100% over a four-year period, while at the same time the overall TPM program growth represented approximately 50% of the total COT growth. The program's evolutionary milestones outlined earlier described several events that affected the direction of the program and, in some ways, each of these changes became somewhat of a growth driver in itself.

One growth-oriented factor not mentioned in the earlier list was a NASA linkage to the program. In early 2009, a major contractor at NASA approached the university asking us to support a technical graduate-level program for their engineers and they selected the TPM program as the target, with systems engineering as the concentration area. This industry/academia collaboration was very good, because all of the candidates were working engineers who were looking to improve their technical and management skills. UH saw this opportunity as having tremendous potential for adding other similar organizations to this program in the future. Twenty engineers started the program and soon after that, the drastic NASA budget cut was announced. As a result, this program essentially stalled out in 2010 and represents part of the enrollment decline reflected in 2011. There were other global factors at play at this point, which seemed to negatively affect the overall university and U.S. graduate enrollment (e.g., education budget cuts, student loan issues, and the overall economy). The total graduate enrollment in the United States dropped 5% in 2011, and the UH TPM program reflected near zero growth.

Various internal dynamics affecting how students are counted in the program makes showing simple growth statistics related to causal factors difficult. Nevertheless, no matter how the various views are analyzed, the TPM growth profile is impressive and substantiates the validity of PM in the academic area, as well as being a topic of interest to the outside professional market.

UH TPM Program Structure

Logical Structure

The TPM program is really much like a matrix major in that it operates much like a similar structure in project organization architecture, with PM residing at the core and various less visible "concentration" areas linked to that core. In its original design form, the horizontal concentrations were basically limited to information security and logistics (supply chain). As the program evolved, the concentration areas were opened up to accept almost any technical academic major, including business. Figure 3 shows a matrix-like view of the program. This structure reflects the notion that PM is applicable to essentially any discipline, and the only additional ingredient needed is a faculty member from the external discipline who is willing to guide the student in course selection, as well as the capstone research course. One common problem with this is that external faculty members do not see it as an advantage for them to deal with an individual student not getting his or her degree from that external college (or department). Essentially, this is viewed as extra work that doesn't show up in a formally documented teaching load. This new type of faculty student interaction requirement is a major operational constraint for fulfilling the matrix-design view, because a student cannot achieve this without faculty support.

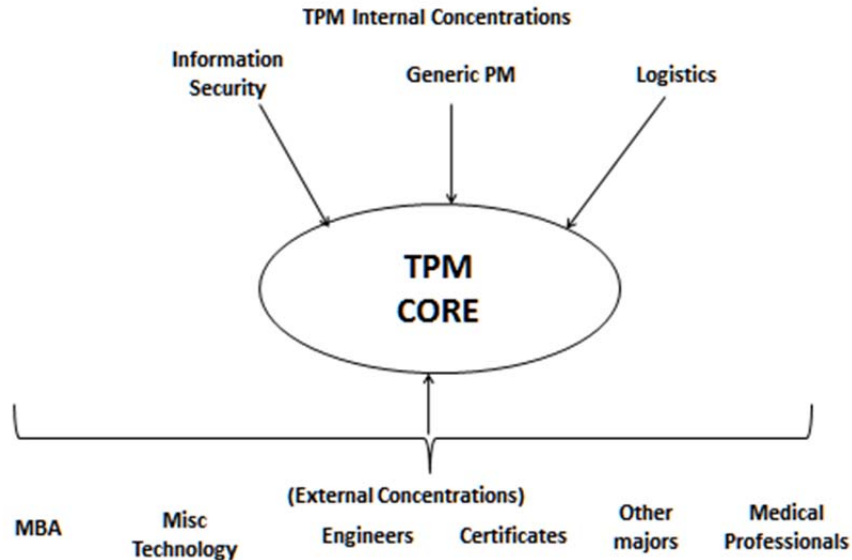


Figure 3. UH Program Structure.

Program Course Structure

This section will describe the basic program course structure and illustrate how the PM core content is meshed with other external academic concentrations. Even though the title of the major is Technology Project Management (TPM), this is somewhat of a misnomer with regard to the total program hours. Originally, the embedded content material was either information security or logistics, but the program options have now evolved to allow the student to have more flexibility in selecting a concentration area. First, the student can choose to stay within the ILT TPM departmental structure and select supply chain (logistics), information security, or generic project management. This option would offer a more captive faculty support in course selection and research initiatives. The alternative is to select an outside technical major area and try to find a support faculty in that area for concentration course selection and a research topic.

Regardless of the concentration area chosen, there is encouragement for the student to pursue PM certification as an elective course (leading to eligibility to sit for PMI Certificates, the CAPM® or PMP®). Over the past six years, the pass rate for students from this class has been approximately 99% (three known failures out of approximately 300 candidates). Also, the core PM quality course produces Six Sigma Green Belt certification. The Information Security option also encourages its students to be certified in that area and the National Security Agency (NSA) has sanctioned that degree.

The TPM program structure is designed to produce a student with a viable job entry skill, PM background, master's degree, and two professional certifications that have international market visibility. There is clear evidence that organizations favor the idea of formal certifications for both academic and individual programs. REP recognition and GAC accreditation have achieved this goal for the TPM program, and the certifications do the same for students. This is accomplished through the matrix approach, which links the job entry concentration material with PM and the various industry certifications. There are certainly those who would say that certifications are worthless logos or pieces of paper, but much of industry does not agree with this and we strive to ensure these labels have integrity, based on the program content.

TPM faculty members are sensitive to the issue that certifications alone are not the main program goal; rather, it is a student's competency in the area of managing projects and understanding the

underlying concepts of the PM model. It is also understood that the individual's future work competence will eventually define the reputation of the student, along with the program he or she comes from.

Program Degree Plan

This section will describe specifics of the internal program structure and augment the conceptual structure previously outlined schematically above. The program degree course structure is divided into four content groups, as follows:

- I. Project Management Core (12 semester hours)
 - TEPM 6301—Framework in Project Management
 - TEPM 6302—Team Leadership
 - TEPM 6303—Risk Management
 - TEPM 6304—Quality Management (Six Sigma)
- II. Concentration Area (12 semester hours)
 - An approved technical support area
- III. Electives (6 semester hours)
 - Student selected support courses—PMP®/CAPM® is an elective course
- IV. Capstone Research Sequence (6 hours)
 - A two-semester research practicum

The defined major topic concentration area and two additional flexible course electives are wrapped around the core PM material. One of the basic functions of the technical concentration area is to provide an initial graduation job entry skill. Technology, engineering, IT, computer science, medical research, and business academic units are popular concentration choices, but the majority of the historic concentration options are chosen from the various College of Technology major areas, based on volunteer faculty support.

Core PM courses. All PM core courses are now offered in both face-to-face and batch Internet formats (filmed from the live class). In addition, as of 2011, these courses are being offered at the two new distance locations in suburban Houston, Texas, USA. Enrollment currently continues to grow primarily in the PM theory, Six Sigma, and PMP®/CAPM® preparatory courses. Somewhat less growth has been seen in the team leadership and risk classes. A significant growth segment is now found coming from the non-traditional (non-degree seeking) student who wishes to upgrade his or her skills in those areas. One notable profile of the certificate participants interested in the theory course is that they seem to be somewhat remedial, whereas Six Sigma and PMP® certification students are more often senior technicians seeking certification and career enhancement.

Capstone course sequence. The course sequence (Item IV) from the degree plan shown above is designed to be the program capstone course and serves as a competency exercise for the student. This six-hour two-semester cohort module has evolved in design over time and is still evolving with regard to course approach and management. The underlying goal of the course remains to provide the student with a real-world PM learning exercise embedded in his or her concentration topic area. In this course, the student must identify and execute a technical project using the theoretical PM principles taught in the PM core. The first semester of this sequence focuses on what is equivalent to the project initiation and planning cycle, whereas the second semester is similar to the execution, control, and closing phases. Greater emphasis is now being placed on timely stage gate deliverables in order to get the students through the process on schedule, which had been a major issue earlier.

This course sequence is the most difficult program hurdle for the students because it breaks the traditional course paradigm of syllabus, textbook, lecture, exam, and grade. Here the student has to supply

the project goal and execute it under a fixed schedule. In the first semester, four fixed-time and fixed-delivery milestones are defined. The first two gates are project charter (formal initiation) and project management plan. Common templates are used for the documentation of these two steps and a fixed-delivery schedule is defined for all four gates. Specific content for the latter two gates is defined by the student and committee chair, based on the nature of the project. First-semester content is oriented to what would be considered the business case, logical design, and secondary research documentation-type activities. Second-semester gate deliverables are defined by the student's committee chair based on his or her project goal and focus on the final deliverable. Grade rubrics are defined for each gate's documentation in terms of both delivery time and technical content quality. In theory, this approach is designed to be a time-boxed project and to aid the student in completing the course on schedule. The previous structure was less defined in regard to time and, as a result, students were not finishing their research projects on schedule, which often delayed graduation.

The design objective of the capstone course is to create within the student's concentration area some new knowledge in the form of a business process, software utility, physical item, or mathematical model. One of the more popular emerging targets is to produce content suitable for publication in a technical journal and that format would then define the various project delivery gates for the second semester. Other project options would have different life cycles based on the nature of the project. Embedded in the overall documentation process of this sequence is the requirement for the student to attend the university's writing laboratory, where he or she can get help with writing style and peer reviews.

The existing program structure remains in a state of evolution as we pursue defined gaps in content and process. Individual faculty members remain critical of the current state but all seem intent on continuing to move the program forward with a research focus. Regardless of the future academic design format, increased attention must be given to producing experiential competency in the student.

Custom courses. One of the additional events that occur once a program or course gains an external (non-academic) reputation is interest from organizations seeking help in obtaining some formal exposure to a select PM topic. The typical topics requested are: PM theory, Six Sigma, team development, and PMP® Certification. Formats for these courses have ranged from a two-day overview to two months of intensive in-residence classes. Seldom is the requested content package the same as a formal internal course. Most of the special requests have some unique twist that requires extra preparation to fulfill. Some of the previous external courses have been sponsored by the university through the central distance education office, but this market input option has not been particularly successful. The primary contact source has come from isolated calls to the PM program coordinator asking for a specific topic. These custom courses were structured to deliver staff training and were taught by various program faculty members.

A second new format for course delivery arose from the non-face-to-face segment. Enrollment rose in this segment once the core and certification courses were made available through the Internet. One new participant profile came from individuals who either didn't want to come to campus or traveled frequently for work and could not meet a regular class schedule. Following that, individuals stationed in the Middle East and other foreign assignments requested special access. In the latter case, the program had always required the student to come to campus for two examinations and that requirement was waived for some of the more remote participants who typically did not require a formal grade. Yet a third new group emerged from external groups in India and South America that sought to license select video materials from the theory and behavioral courses for use in their local programs.

Based on this profile, one might view the Internet delivery model as a University Competency Center that helps other institutions bootstrap their programs with less resource costs. The question now arises as to whether this delivery model might be marketable to other universities. To date, nothing has matured on that front despite multiple marketing efforts. All in all, the Internet model has proven to be a viable teaching medium, but much more work is needed to mature this approach. At the present time, the

distributed courses are created by filming the live class and storing the results on a web server for access on command by the student. In order to be successful in this model, the key lies in having a reliable delivery infrastructure and this is a current target for program improvement. The Internet delivery model has proven to be more technically and pedagogically difficult than first envisioned; however, we believe this is one of the most important strategic targets for the program (see Kelderman).

Program Challenges

There are currently six critical program challenges that are recognized and for which there are no visible easy solutions and they are:

1. Approval to add faculty head count to match the growth rate
2. Finding competent faculty members who fit the experience and academic credential requirements
3. Faculty salary—PM is not viewed as a premium academic skill
4. Finding a way to allocate the required faculty research time in competition with a heavy program growth and teaching work requirements
5. Obtaining university support to construct the desired distance delivery infrastructure
6. Dealing with various support limitations related to faculty, facilities, and other instructional needs

Lessons Learned

The one conclusion that should be obvious from the material here is that this type of academic program is not a static view and also not simple to evolve. In looking at similar PM industry trends, we get an industry wave trigger that seems to have been a lagged linkage factor to the UH program. The first visible wave was recognition by external organizations (corporations/governmental agencies) of PM certification that showed explosive growth, starting around the year 1998; for example, PMP® certification holders numbered approximately 10,000 in 1998 and the number is now at 450,000. Second, a recent newsletter published the results of a Google query documenting the trend in earned value search references by year. This curve exhibited the same exponential growth found in the PMP® trend; the same was true for other PM-related subjects, such as Six Sigma and the Project Management Office (PMO). It seems logical to conclude that the program growth experience at UH has followed this earlier explosion in the industrial environment. We have also shown data to indicate that there is an emerging interest in technology education, with project management in international locations as well.

Despite these broad trends, when the non-traditional student groups arrive on campus for training, it is clear that most are not knowledgeable of even the rudimentary theoretical elements of this subject. So, even though there is marked interest in the topic internationally, we believe that there remains a major knowledge gap in industry, and a viable academic PM program structure can provide a valuable training service to both industry and the current traditional student. There is a similar knowledge gap in academia as measured by the visible program design outlined there. The academic version of PM is still focused at low levels of theory and often fragmented implementation views. Also, a global university governance model tends to be more focused on holding the material inside of a college rather than designing methods to share it across the full academic landscape. That process needs to have just the opposite goal.

Program Model Structure

Tiered Academic Model Roles

One approach to viewing an overall theoretical academic model structure is shown in Figure 4 as a set of expanding rings, which is meant to imply that the academic PM program can embrace any collection of these roles, starting at the core. A brief note on the roles for each tier is described below:

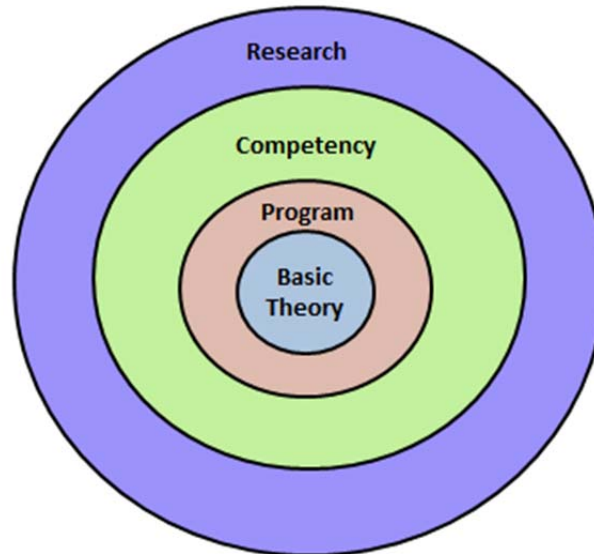


Figure 4. Program Tier Model.

Basic theory. Courses at the core level should be designed primarily to cover minimal PM model literacy. Sample material for this tier would be an overview of project management theory, executing PM software, or constructing a project plan from a standard template.

Program. The second tier of academic programs would be designed to focus more on the full spectrum of the PM topic, which would include all of the knowledge areas and possibly additional emerging topics such as portfolio management and Critical Chain theory.

Competency. The third tier level is the most difficult of the overall structure to design in that its goal is to demonstrate the student's ability to execute the full theory in his or her area of expertise (i.e., engineering, IT, business, etc.). Some portions of this material will likely need to be embedded into the specific major area programs in some fashion so that the student is capable of managing a project oriented problem in his or her domain using PM techniques.

Research. The outer tier should be designed to focus on the future development of PM theory and advanced concepts. This is the program content layer that academia has considered the least up to this point, but it should be. The mission of this layer is to serve as the global knowledge center for advanced research. The key point is that PM is an evolving art/science, so a research focus is needed in the program structure if it intends to be anything other than a secondary content information distribution source (i.e., a teaching organization).

Based on this four-tiered structural view, the university global view of PM should carefully decide at a central level how it intends to embrace each tier. The concept of program structure is best envisioned as a diverse set of intertwined items (courses, research grants, student projects, etc.). In looking at a way to describe how one goes about designing a course and program structure to fit this content description, we

are reminded of the old adage describing the blind man's view of the elephant. The perceptive view of the target that one has depends upon which part of the elephant you encounter and touch (Figure 5).

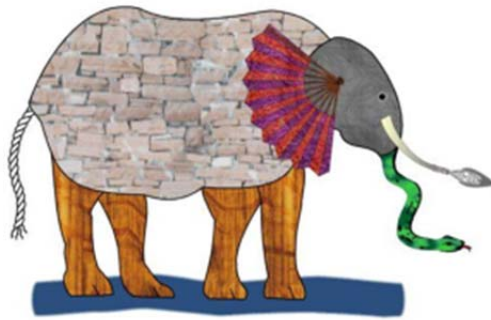


Figure 5. Viewing the PM Content.

Each of the blind men perceives a different input regarding what an elephant looks like. For one man it's a leg, to others it's a tusk, a tail, a trunk, and so on. And so it is with project management. The key to defining the elephant as a whole then becomes one of dealing with each part and deciding how all the parts fit together. That same point is valid for designing the global PM program. PM is analogous to all of the elephant parts described here and the net result still needs to look like a full PM offering when it is finished and not have several tiny elephants scattered around (if you can follow that metaphor). This design should include both the topic content set and the organizational unit to deliver that topic.

A second perspective of the design goal is to decide, tactically and strategically, how an individual work unit (course) fits into the various goal layers: basic theory, content scope, strategy for building student competency, and future research infrastructure. Ideally, the only split from a single organizational focus would be embedding specific content into a single major area. We must also understand that the term "competency" is not an absolute term in this case. Some level of competency can be achieved in a theory class and the goal for this should be defined as part of the course design. In the case of an undergraduate student, competency goals are best focused on the level needed at the three-year post-graduation point, unless the particular course is focused on non-traditional returning students who might need higher levels.

The goal of developing both a tactical and strategic program model structure will aid in not only packaging the current courses, but also in effectively evolving that structure through time. Simply defining a few marketable project management courses and starting a core-oriented academic program housed within a local college unit is not the recommended approach, albeit may represent reality.

The thesis here is that there is a strong similarity between creating an academic program structure and planning any multi-phase project. In both cases, the subsequent phases should not require significant redesign. One logical first step in course package design process is to create "design principles" to guide the actual content and packaging efforts to follow. These design and implementation principles are intended to provide logical guidance without pre-defining the physical or specific content. In the PM vernacular, we would call this process decomposition by defining vision and scope into work packages (course units).

Logical (non-physical) design principles are useful in guiding the physical packaging and implementation process. The principles shown here are actually similar to the packaging process for a project into actual work units, or courses in this case. The following are offered as sample guides:

1. A project (PM program) content should align with high-level institutional goals and not just lower organizational level (college or departmental) ones.

2. Initial implementation scope is an important decision—the smaller the scope, the quicker a working component can be implemented; choosing a broader implementation scope will make the design phase more difficult and complex.
3. The “work unit” (course) packaging must fit the available resource delivery skills (instructors) who will execute the project (program), or alternatively, define some external sourcing (adjunct/partnering) strategy. This intellectual property capacity management issue seems to remain a challenge in most organizations.
4. Other resource limitations may constrain the initial design options (scope). This is analogous to project resource leveling and will often affect implementation timing considerations.
5. Program content for customer needs should be prioritized, and the phased implementation strategy should be developed around that defined value structure.
6. Delivery strategy for the target audience (user) is as important as the specific package design.
7. Requirements definition process should involve broad segments of the overall organization in order to assess the potential scope (breadth) of the program. The design thesis suggests that this material has value to more than local academic segments.
8. Once a strategic architecture for the program is defined, the results should be communicated to appropriate management levels to obtain buy-in. Receipt of a formal charter from this group is an important strategic driver. Lower level program designs will result in an equally lower breadth of student focus.
9. A design assumption is that both budgets and skill resources are heavily constrained, so this effort must follow a disciplined Value Engineering philosophy (e.g., maximum value for minimum resource). These criteria may make the implementation plan more fragmented than desired.

Given these design principles, it should be recognized that the program solution may well be different for each university, given the local aggregation of market, institution, political, and economic factors. ***For this reason, the academic program design should not just copy another institution.*** A well-executed, front-end planning process may well be the key to future long-term success.

Strategic Environment

It is important to consider the strategic aspect of a program’s design and not just implement something that fits the current view of course needs. There are several dynamic aspects of the academic environment that further complicate the program design goal and it will be difficult to deal with the global set of these issues for program startup. Nevertheless, the initial PM course implementation should try to avoid migration complications as the program evolves. In many ways, the implementation plan should be viewed as a “prove and grow” type of strategy. In some cases, the program may have to pay for itself before it can fund or validate the next phase. Each incremental phase evolves into the next most profitable or value-added target with regard to content scope, customer segment, or delivery technology. Any subsequent packaging decision will have an impact on the organization, which will need to be resolved before moving forward.

This phased approach view is based on the belief that a one-phase “big bang” implementation would be very difficult given the level of organizational change involved. A typical example of program scope migration would be expanding the initial slate of PM courses inside a single university department. This is not a difficult migration; however, a more radical migration would occur in moving a program out of engineering or business into one designed to serve a larger segment of the university. This latter scenario is important to understand, because the initial installation target should be reasonably aligned to the strategic model solution.

Obviously, managing the evolving the PM program would be easier if each functional organizational group simply installed that part of the PM model that fit its needs. However, it is hard to imagine that this type of redundancy is the optimum approach to solving this problem. Commercial organizations have long recognized the inefficiency of isolated duplicate departmental processes. Profiting from these historical lessons learned, the academic program design goal should try to avoid that type of structure, based on the added resource cost.

Strategic Organizational Model

A second aspect of the design process is to define organizational roles and governance processes related to a university PM program. This step should be one of the documentation goals that precede a tactical program implementation. Some of the key organizational decisions related to the program packaging decision would be:

1. Define target courses for initiation. Given high-level management support this could be an entire program, whereas in other cases, it might be a subset of the defined courses.
2. Identify academic units that will be charged with executing various components of the project management program (e.g., housing, staffing, etc.).
3. Establish a PM governance management process. Ideally, this would be housed above the dean level, or at least governed by a collection of deans who would act as the steering group. Failure to achieve this will impact the future university-wide globalization process.
4. Identify cross-organizational partnering opportunities for both instruction and course sharing. For example, one academic unit would be charged with delivery of the basic university theory course, whereas another unit might be the research focus.

Embedding the Program into Existing Curricula

If we assume that at least some portion of the implementation goal is to embed PM into existing program structures, there are obvious issues to deal with and a few of these are:

1. The primary course content packaging solution should be used to serve the largest student population feasible for a single topic and attempt to provide that common knowledge package for as many other groups as possible. This would mean that a course related to general theory, risk, quality, certifications, and others would be housed in a single academic unit if that material was to be made available to all university majors (elective or requirement). Local course packaging of this material might be allocated to lower level departments if a common package cannot be agreed upon, but every effort should be made for a single delivery of core package units.
2. Assuming that a common course package such as PM theory can be defined, and that several units within the university agree to use it, preferably, as a required course. The question then becomes how to slot that course into each academic major program. Moving new material into local degree plans is a very territorial issue in academia, so this will be an implementation challenge.
3. Academic institutions today are under great constraints in terms of additional funding for a major program development such as PM, and for this reason a global implementation will most assuredly involve more than just defining the desired structure and adding the new courses. For this reason, high-level support becomes a critical success factor. The concept of an overall organization cost-effective delivery structure needs to be well understood and managed at a high level within the university. One approach to accomplishing this would be to create a single organizational Center of Competency dedicated to this subject area.

Instructors in this center could be partially drawn from their home organizations to teach the common core courses. This is exactly the way a matrix project structure works and it has merit in this model design process. As logical as this approach might sound, there will surely be internal negative behavioral reactions to such a centralized approach with the sharing of functional resources.

4. Individual academic groupings within an institution typically do not focus much of their resources on the theoretical elements of project management. If a PM program is to be strategically successful it needs to be broader than just teaching embedded material across fragmented major areas. Overcoming a departmentalized “stovepipe” culture for program design will be one of the major challenges if the organization wishes to do more than just be a follower in this topic area.
5. Curriculum course packaging should seek partnering solutions for the following three groupings:
 - a. The traditional undergraduate and graduate academic students represent the core group for curriculum design. These students are spread across multiple disciplines and college units. PM program centralization should be the goal for this group.
 - b. A second design grouping is the external outreach segment; in other words, the student market segment that is remote to the main campus. This segment will be heavily populated by non-traditional commercial targets and increasingly the traditional student. Centralization of delivery should be the goal.
 - c. A third educational segment is the research “institute” view, which represents the academic goal of PM knowledge development beyond the current norms. This segment represents the advanced program perspective that will focus on creating more technical expertise, basic research, and future evolution of the topic. Graduate programs would exist in this space, but centralization should be pursued.

There is a large external population of technical professionals who now recognize the PM industry competency gap and are seeking focused training and professional certification in this area. An academic program needs to recognize and focus resources on the non-degree seeking population, even though some academics consider this to be “trade school” education. The PM non-traditional market is synergistic to both academic economics and industry market needs. This gap issue will continue if academia does not deal with the current gap situation. Failure to accommodate this segment will leave external organizations to seek out other training avenues and both sides will lose if this occurs. Also, given the current immaturity of PM theory and practice, this external market segment will be a prime student source for the foreseeable future. We now know that moving education outward from the traditional brick-and-mortar format is a requirement for all academic disciplines, and PM programs are even more in need of achieving this than others.

Regardless of how one goes about defining the role of PM in the academic organization, it is important to recognize that this design and implementation activity is itself a project and has the same characteristics inherent in the PM theoretical model. Not only are the design factors the same, so too are the critical success factors. Current knowledge of project success criteria indicates that there are five fundamental requirements that need to be met to achieve PM program success and these are:

1. High level management support
2. Active involvement from stakeholders (students, external organizations, and faculty)
3. Clear definitions of requirements (aligned with university goals)
4. Defined governance process to guide the implementation (steering board)
5. Matching content to user needs

In the academic case, it would be ideal if an organization level above the college major functional unit (e.g., engineering, business, technology, etc.) could be established to house the centralized segments of the PM program, even though some may think this is the wrong approach. Having a college-level program will tend to lock the structure at that level and make future change more difficult. Pragmatically, a low level implementation may be the required starting place for a new program, but one must recognize the downside of this approach. At the very least, establishment of cross-organizational partnerships will improve this approach and should be pursued in any case. Conversely, failure to obtain support from at least the dean level makes the program a departmental grassroots initiative, with limited participant scope and poor strategic match. Also, recognize that a non-supportive dean can cancel a technically sound low-level program if it is judged to not be in concert with the higher level college goal structure.

The final academic design key is to attempt matching course packaging to both the graduate's tactical and strategic job needs in the marketplace. The most difficult part of this is dealing with the fact that not all outgoing students will immediately require high-level PM skills but may initially still need some tactical exposure and much more later. In order to help define this trend, some degree of alumni job profiling is needed.

Even if the organization can agree that the best approach is to define a global program, there still remains the issue of how to embed an appropriate amount of content specialization into the local academic curricula. For example, how much does an engineering undergraduate major need to know about planning, team development, procurement, risk management, budgeting, and so forth? The same question goes for the business major or any other academic major. This debate will center on how to centralize versus decentralize the material.

In many cases, the local academic major program designer's view is that all of their course commitments should be allocated to the major core topic, leaving essentially zero allocation to PM. This thesis can actually be tested by reviewing how much of the PM topic is currently structured within the individual majors. The predicted result is that teaching of the theoretical PM concepts will generally be found embedded in other technical content material and scattered throughout the various major academic areas. An additional personal observation is that local PM offerings are minimal, inadequate, and often taught as a secondary expertise area by the local instructor and based on the full definition of PM as described here.

The one mandatory data tidbit that is necessary to help with this process is the job profile timeline of former graduates, which is used to define normal career progression into management roles. This process would help define how much and what kind of non-major type subject material to place into the various major programs (could be PM and other topics). Specifically, to what degree have graduates moved into PM types of roles and in what capacity (i.e., skills needed, type roles, etc.). These results would reveal significant movement away from basic technical skills into increasingly more management-oriented activity. If the profile validates the migration thesis it would then be a mandate for those related programs to embrace the ideas outlined here. One can create a program design based simply on a collective philosophical basis, but given the different philosophies, it is harder to obtain consensus. Having the profile data would help establish a more firm target regarding the value of this material.

If we buy into the model that a successful technical professional tends to move into increasingly non-technical work, then all technical majors should assess their programs for that type of trend. In the case of PM, there is considerable evidence to suggest that this evolution results in requiring skills related to planning, budgeting, team management, communications, and other such "non-technical" project-oriented activities. Academic training can certainly soften this skill migration if the major program has recognized the need and has reacted accordingly. Some individuals are capable of making this transition without a formal academic background, but project success history suggests that many don't do it well. Certainly, when one looks at the management maturity of most projects, there is considerable room for improvement. Another more subtle aspect of this is that a "project culture" in the external organization

may also have value. This view suggests that all employees should have an understanding of project concepts, whether they are managing or just involved in a team or support role.

Involvement with a project model brings great insights into many human activities; that is, both life itself and work are filled with project-type activities. If one does not understand how this activity is best pursued, the result in these cases becomes a wandering path, where each fork is reduced to guessing what comes next. The current PM models can help one understand the fundamental components of this class of activity and, for this reason, a conceptual understanding of this event type would seem to be as important to all college majors as any other academically focused topic. If this view is congruent with the reader's conceptual view regarding what academia's goals should be, then there is a common stimulus to look at a more PM-centric academic approach. Conversely, if one believes that this topic is a minor subordinate activity to another major "professional" area, then PM would be embedded into that area with a minimal allocation of content.

The more important recognition is that PM is a valid subject that is worthy of being included in all academic curricula to an increased degree. This recognition would lead to a more global program structure, rather than having redundant courses teaching the same content in multiple organizational units across the university. This distributed approach is hard to justify for a cost-conscious university. Centralization needs to be the design goal for at least the common body of knowledge material.

The author has long noticed a general human attitude toward centralization; that is, moving control decisions downward is deemed good as long as it is moved to that individual's level of control, but not so good if moved to a higher level above him or her. A PM centralization strategy seems to run directly into this phenomenon. Academics will likely agree with all of the theory described here as long as the resulting decision to place control of it is at their level. But moving it to some higher level would not be "correct." Those attitudes would exist primarily at the departmental or college level. As with so many technical problems, when we get to the bottom of the core organizational issues, human bias is what we find and these issues are very hard to change.

Content Packaging

PMI's GAC accreditation program currently offers some of the best academically oriented documents for program content and learning objectives (PMI 5). The list below contains eighteen defined topic areas inherent in PM activity and generally reflected in the GAC and PMI literature.

1. Change control
2. Cost management
3. Configuration management (document and product)
4. Communication management
5. Procurement management
6. Project context/environment
7. Quality management
8. Reporting/performance metrics
9. Resource management
10. Risk management
11. Time management/scheduling/planning
12. Stakeholder/relationship management
13. Team building/development/teamwork

14. Work content and scope management
15. Professional responsibility/ethics
16. Portfolio management
17. Project management office
18. Organizational support processes

This list essentially covers the GAC and *PMBOK*[®] *Guide* Knowledge Areas, plus other key processes required for project operational management. Each of these topics could be a full semester course or, alternatively, part of one session in a broader overview package. The point here is that the topic listing provides at least a general summary guideline for material areas to consider in the program design. The working project manager must be knowledgeable of all these topics and competent in several; however, no attempt is made to translate this list into a recommended model set of courses. The result should be based on the design processes and concepts outlined throughout this paper.

Operational Considerations

Packaging a robust university PM program is a difficult undertaking, but it is also important to realize that the complexity is not over until it is staffed and being properly delivered to the target audience. Three elements are important to move the program into an operational phase and these are:

1. Startup checklist
2. Faculty considerations
3. Ongoing quality control

Startup Checklist

Defining a set of courses ends with their internal definitions for course syllabus, textbook, instructor skill requirements, and the forms necessary to get the course formally approved for the university catalog structure. Part of the earlier definition should have also uncovered a course time slot and delivery format that best satisfy the target student group.

In some cases, a new program or course has to be approved at the university board of regents level or at least the university academic administrative level. This process generally takes time, so patience is required (sometimes a year or more). Nothing is more valuable at this point than a senior faculty person who understands this process and can help guide it through the bureaucratic maze. Issues with other colleges over course redundancy may emerge at this point, even the titles on the course may be challenged (i.e., management can only be taught in business and software can only be taught in computer science, etc.). The academic politics of new course implementation can be a real challenge.

It is beyond the scope of this paper to attempt to lay out all of the preliminary steps that one must go through to get a course/program approved. The key reminder is to develop a checklist of items to cover, assignment of responsibilities for each, and then be sure that all of the steps are done according to the formal policies.

Faculty Considerations

Finding a single individual who is competent in all segments of PM is a near impossible task. The core background requirement for a faculty member should be his or her possession of basic project model knowledge and how his or her subject fits into the design model (i.e., learning objectives). For example, if the program design strategy is to follow the *PMBOK*[®] *Guide* model, that would require general knowledge in at least ten topics—nine Knowledge Areas and professional responsibility. In some cases,

niche concepts such as the estimating, risk management, agile life cycle, or some specialized project tool might also be the major course focus. One additional required faculty trait is to have actually lived in the real-project world and to exhibit ability to do research in the area. Finally, graduate programs must meet accreditation requirements, which raises the recruitment bar even further to essentially require doctorate level backgrounds for faculty members.

The simple fact from this broad set of requirements is that the academic PM faculty will almost assuredly have to be staffed with more narrow skill specializations linked to the specific course structure. Expertise in narrow theoretical topics such as behavioral, quality, operations management, or risk can fulfill some of the teaching needs, but adjuncts and other faculty members with broader professional experience are needed to add the reality flavor to the program. One possible staffing relief would exist if the national accreditation organizations would judge the PMP® with a master's degree as equivalent to doctorate-level expertise, or to find a way to use non-PhDs under some other teaching structure (i.e., serve under an instructor of record).

As an example of required faculty skills, the UH TPM program requires the following skills to staff the regular recurring course sequence:

1. Basic PM theory overview
2. Team leadership (behavioral)
3. Risk management
4. Quality management (must be Six Sigma certified)
5. Two capstone courses (research methodology)
6. PMP®/CAPM® Certification (must be PMP® certified)
7. Project management tools (PM mechanics)
8. Project management office (PMO and portfolio management)

At present, most of the above courses are taught by specialists in each content area. One newly identified faculty recruiting source worth mentioning is a PhD-level senior technical project manager who is retiring and wants to stay active. There is a clear academic role for individuals with this type of expertise.

One major academic dilemma for PM is that the research laboratory for this topic is in the real world and not easy to clone in the academic environment, which means that the academic research needs to have access to industry sources in order to be effective.

One likely additional teaching role for a PM faculty member is the requirement to produce and deliver Internet video courses. Also, an important role is being active with the external industrial project constituency. Traditional roles of serving on internal extra assignment activities, such as student research committees, college committees, and doing research in a topic area collectively constitute a full professional life.

In subtle ways, the problem of finding suitable faculty members to fill these roles is linked to the very problem being described here. Academia is currently not internally creating sufficient resources to support the academic PM program growth, and most industry PM practitioners are not interested in a low-paying adjunct night job to add to an already filled 60-hour/week day job.

Some university programs will show affinity toward what might be called niche segments of PM; example areas are global project management aspects of project selection or the PM financial side. Each of these options will require yet another faculty skill mix. Sample niche financial areas include topics such as estimating, cost management, budgeting, and project value analysis. The global niche segment examples would include PMO, PPM, maturity analysis, and so forth.

Beyond the traditional PM knowledge areas, there is another related topic evolving into a full spectrum program and that is the focus on enterprise business processes that support the project. Focus on this aspect of the PM spectrum requires still another set of skills more linked to business process design. Each of these defined special focus additions would have to seek out instructors from other academic areas, such as management, finance, accounting, industrial engineering, and so forth. As the initial program grows and matures, finding instructors with these more global views, and that focus on the project environment will continue to be a challenge.

The breadth of this topic area creates a skill challenge for any academic organization and one that can't be supported properly by staffing it completely with the existing traditional departmental faculty, regardless of the academic home (e.g., engineering, technology, business, etc.). Niche course project material topics can be properly covered by some existing instructors if one can look throughout the entire university to allocate staff for those courses (taught centrally).

Ongoing Quality Control

The basic concept of quality control is measurement against a baseline. In this case, the baseline represents the defined learning objectives for the program and its courses. Assignments and examinations are the typical formats used to quantify student performance level; however, qualitative measures such as class presentations and group work are also parts of the overall measurement suite. Formal course rubrics were mentioned earlier for the capstone course research sequence, but they are equally important in all courses. One way to envision this is to look at a PM program as a manufacturing work sequence with "subassembly" learning goals at each step. Learning objectives should be published, measured, and tracked if the program is going to produce a defined output.

Quality in education is a two-way street and should be measured from both the student and instructor delivery perspectives. Philosophically, education should be presented in such a way that it is not like medicine to the receiver. A good instructor can make a life-altering impact on a student. Interested instructors who are trying to improve a course need feedback from their students, so end-of-course student input is a part of the course's QC process. There is always the question of how to use these data. For example, how do you rate the instructor who has a "1" in quality of class handouts and a "5" in class content delivery? Average numerical scores for various course items can be very misleading. In the world of video-captured lectures, the ability of others to actually see how the class is conducted is a new academic evaluation paradigm.

Finally, a well thought-out set of grade rubrics should be published in the syllabus so the student can track his or her performance and be clear about timing for deliverables. In most cases, this should be something more than the grades on a couple of examinations.

Nontraditional Students

The nontraditional student market may well be the key stimulus that drives the overall future academic PM program, along with its associated external cash infusion. The UH program faculty uses these revenues as its primary source of discretionary spending. Each program will have to decide how it wishes to deal with this market segment and the answers will likely vary considerably. Heavily industrialized locations obviously will have more interest in this than less populated areas. The academic mechanisms used to meeting the needs of this segment are unprecedented and one could argue this may well be the largest reverse flow of students coming back to academia and not wanting to necessarily enter an existing program (i.e., the WWII model). These students require a real-world focus on the material and are somewhat resistant to semester-long courses. To date, the UH experience has had a significant growth presence in non-degree seeking students in certificate courses, external custom courses, Internet, and international course format offerings. It is not uncommon to have received calls from organizations

asking if the UH program can provide them with some specific PM topic. Likewise, some of the regular PM courses are now 50% populated by this segment looking for training in that area. This is a new type of student, with different characteristics, and the future programs will need to deal with their diverse needs in a value-added way. The one very clear message is that those classes will either have to be available on evenings, weekends, or on the Internet to accommodate job schedules; none of these options is a faculty favorite.

As a final comment, at some stage of program maturity, the inbound flow of the non-traditional student will become very visible. This opportunity may have to await the academic program gaining sufficient reputation to attract this group, but the market is there.

International Market Sources

International sources have long been interested in U.S. education, and many traditional university programs are currently well populated with eager international men and women seeking our intellectual property. Project management is a defined growth area for this population segment, primarily because of the popularity of certification. If we look at the PM skill maturity pyramid, this interest is primarily at the theory entry level, even if the student is looking for PMP® certification. It should be anticipated that a second wave push would come seeking subjects such as Six Sigma, team leadership, risk management, software tools, PMO, portfolio management, and other more specialized focus areas. Actually, this same trend should follow within the U.S. segment, assuming academia can get ahead of the curve and prepare to deliver useful material in these areas.

The nontraditional student wants to learn relevant material to improve his or her job skills. It is important to recognize that exposure to basic PM theory or certification may start this process and give one a better understanding of the topic but won't necessarily make that person a better project team member or manager. The future academic program is going to have to better understand the "competency" aspect of this topic for all participants. In other words, the concept of "how to" becomes the acid test and more important than one might find in other disciplines. This is especially true for the nontraditional returning student. Personal experience suggests that traditional course packaging may not be the best answer for the nontraditional student. In many situations, this type of student already knows much of the technical knowledge area but is having trouble with some segmented management aspect related to it or how to apply the theory. Also, the appropriate delivery approach is likely different than in a lecture class. In any case, the delivery approach for this group is often better received in the form of a more applications-oriented delivery by an experienced industry faculty source.

Professional Certification

Many academic organizations have shunned professional certification ventures with an often heard statement that "these are trade school topics." Conversely, community colleges have long recognized that one of their roles is to train and certify the workforce in various job skills, such as the building trades, medical technology, IT, and so forth. They are more than willing to take on the PM certification role, but that academic segment is not going to be capable of dealing with project management as a teaching goal, based on their internal faculty's skill levels. Also, the professional engineer with a master's degree would not consider going back to a community college as a career enhancer. The senior university environment must recognize that industry needs these skills and accept the certification role for both their new graduates and the nontraditional segment. Most will agree that passing a certification exam is not all that is required for PM competency, but it is not the worst development to occur in this industry and may well lead to an even better goal in the long term.

Let's leave this topic with a couple of final points. The academic interaction with a working professional needs to be different from that with a typical student. Students are not patient with class material that does not link to their real-world work environment. In the case of project management, they

want to see how it applies to a real project in some way, which means the course instructor is going to have to be able to show both the new material and the real-world side of it. One way of saying this is that they want “how” more than “what.” The class material may be saying that a project team may be more productive when properly motivated, but you can’t stop with that statement. And “Oh, by the way professor, I have to be in Russia for the next two weeks for work.” These are not the typical traditional student problems and the next class or examination may well not be the most important item in his or her life.

Delivery Model

Evolving technology is providing exciting opportunities for the delivery of educational content. This trend is leading the future delivery model out of the traditional classroom and into a more virtual class environment. To use a popular term, it is moving into the *cloud*, which means that the focus is toward getting the material to where the student is and not vice versa. In the future, more PM students will have full-time jobs, families, and specific educational needs regarding times, content, and place. Future course packaging will need to be more segmented in both time commitment per topic and content approach. Scheduling this individual away from his or her job for more than two or three days at a time will be difficult, so the material and delivery packaging will need to fit that profile. Also, the after-work hours or Internet delivery model will work better than a daytime schedule stretched out over a semester timeframe. The delivery technology should also offer the ability to interact with the class and most current Internet delivery systems are one-way outbound. The typical instructor disdains the impersonal distance format because of decreased interaction with the student. On the other hand, the typical student and the modern professional are both becoming more “wired” and familiar with the new technology forms of communication (and the capability of these are evolving rapidly). For example, the working professional is often dealing with global project teams at work and this form of interaction is embedded in his or her work life. Regardless of the specific technology employed, a remote form of course delivery via the Internet is almost assuredly part of the required packaging for PM programs. The specific technology to execute this and the related course packaging formats are still unfolding, but faculty members cannot stay remote from this aspect of the delivery issue.

Initial thoughts regarding the distance delivery model first indicated that it could handle hundreds of students with no incremental work (i.e., thus the “silver bullet” answer to the faculty shortage problem). Like so many technology silver bullets, it did not take long to find out that marginal class handout material that was in a face-to-face format did not work at all for the remote delivery model. Student communications were also more time consuming or non-existent. Also, many group-oriented class techniques that could be done quickly and effectively in a live class did not work well at all in the static outward-only delivery mode of the Internet method. The net conclusion here is that these classes are not easier to deliver in terms of preparation, materials, communication, and technical overhead. Hardware failure and network outages can ruin a class night. For many institutions, this is a new delivery approach that requires new expertise and research before going live. Some support organizations within the university must be charged with the role of “student connectivity technology,” which includes the network, hardware, software, and faculty support of the distance education process. Notable universities such as Colorado State University, Villanova University, and the Florida Institute of Technology have recognized this technical support aspect and are profiting from significant program enrollment increases as a result. Many others have dealt with this by using minimal internal technology investment with the belief that simply packaging a lecture and sending it out with a postage stamp-size video is sufficient. That model may be an economic reality, but realize that a usable technical delivery decision is certainly a key design piece of this puzzle that needs to be resolved. Regardless of the technology used, one key program design recommendation is to focus resources on the design and delivery of the distance education segment, with the nontraditional student specifically in mind. This comment also holds true as a requirement for all academic programs but seems to be more noticeable for project management programs because of the nontraditional audience.

Internet Delivery Implications

Course Quality

Internet-oriented courses have been growing since the 1990s—from a small niche offering to becoming a major program staple. For example, Western Governors University started this practice in 1999 and now enrolls 25,000 students across the country. Many other educational institutions are moving to this program delivery strategy and note significant growth rates. At this stage, the maturity of the program accreditation process has fallen behind the regulations. As a result of this, the U.S. Department of Education is now in the process of publishing regulations designed to keep a tighter rein over online courses. In some circles, online courses have a bad reputation, particularly among the not-for-profit institutions (Kelderman). Much of this concern comes from the business practices related to these courses but there is also a content delivery quality issue as well.

One of the new regulatory guidelines is that faculty members who teach in this medium be trained and that sufficient student support services be established (Kelderman). Although overall college enrollment has increased 2% over the past three years, online enrollment has grown 21%. Many universities appear to have taken on this new medium with the belief that a faculty member can be expanded without corresponding increases in support. Some institutions are now finding that distance enrollment is declining and student dropout rates are increasing. One possible reason for this is the marginal content quality of the course offering and delivery approach.

Technology Infrastructure

There is debate among academics regarding the quality of Internet-based technology for distance education and there are in fact economic and user tradeoffs between these delivery choices. On one hand, it would be most engaging for the remote student to be able to interact with the class in real time. If that model is chosen, the complexity of the hardware, software, telecommunications, and support component would be higher. At the low end, a personal computer with a camera and Internet connection could be used for one-way lesson distribution. An in-depth discourse related to delivery technology is beyond the scope of this article but is a major factor in the quality of the resulting remote course. A robust technology offering may require network bandwidth that is too high for the typical home DSL Internet connection; so, full motion video examples used in the class would not show well. Regardless of the technology chosen, the delivery infrastructure needs to be managed separately from the course instruction and this will add overhead to the delivery cost.

Another component of the distance class is the need for student/instructor interaction in some format external to the class that simulates the student office visit. By definition, this will need to be accomplished via a network and is often described as the “electronic office.” This scenario refers to a time when the student can converse with the instructor either in a group or one-to-one format. This is the more ad hoc student interface companion piece of the course delivery technology decision.

And, the last point: if the delivery model is to have a live class filmed for a remote audience, the technology needs to accommodate both groups.

Instructor Skills

From personal experience, sitting in front of a camera for a three-hour course is not an easy way to spend an evening; in many ways, it is a truly humbling experience and a skill that most instructors have not been trained for. Professional TV personalities perform this type of process by using fixed scripts, technical support, graphic artists, and makeup professionals. Somehow, the result is different when one tries to do it alone; no longer is it easy to walk to the white board and sketch an impromptu note. Some of

my “soft skill” colleagues like to have team sessions in class and other interactive student activities and their main complaint is that this type of interactive exercise is hard to duplicate for the remote student.

Future Delivery Model Architecture

Realize that this topic represents the new delivery paradigm and books can be written on the technical aspects of designing a distance delivery architecture. For this reason, we will simply highlight the topic with a short driver statement by saying that the distance student population is the fastest growing element in the equation, and most academic organizations have been slow to deal with these related factors. Also, review examples of video transmission from the new generation of mobile devices, such as the iPad, and imagine what that capability is going to look like in ten years; imagine what technology of this type can do to change the delivery methods in the future. Also understand that history suggests that we have not been very good at such forecasts. All that seems safe to say is that the educational process will change significantly over the coming decades and will be more technology and remote driven. Try to have this perspective in your strategic design model.

Program Strategic Vision

Figure 6 represents a high level method of structuring the future program. The goal at this point is not so much in course design, but achieving appropriate levels of competency for program topics and moving the program to broader audiences. In other words, higher views of what we initially called model knowledge areas (i.e., time, cost, etc.).

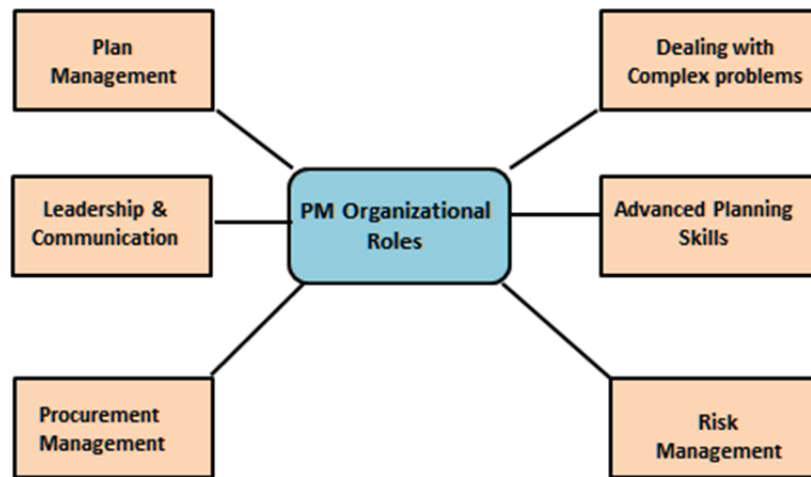


Figure 6. Future PM Roles.

Another dimension of the future academic program structure could also be envisioned with layered goals beneath these higher level competency boxes, as follows:

- a. Understand current theory
- b. Competency in principles within a professional domain (e.g., mechanical engineering)
- c. Small project model competency
- d. Large project model competency
- e. Program manager—multiple projects
- f. Segmented high skill areas—risk, estimating, requirements definition, budgeting, team leadership, contract management, conflict resolution, and so forth.

The sample competency roles defined by the boxes in Figure 6 can be envisioned as macro area learning objectives. Each of the layered competency goals would be used to drive lower level course learning objectives beneath that area view.

Simulation Modeling

The teaching tool that would change PM instruction more than anything else would be a robust project simulation model. This is a viable method to produce real-world type dynamics in a distributed academic structure. These models should follow the video game paradigm in which distributed players can interact and possibly compete as the project dynamics unfold.

Strategic Delivery Model

Program delivery strategies will increasingly move toward the distance model, which suggests that this hardware, software, and related pedagogy technology should be moving to higher levels of sophistication at the same rate. Regardless, a distributed content delivery model offers opportunities to reach a broader student audience more efficiently on the student's part but more complex on the instructor's side. PowerPoint slides and a video talking head are not the best delivery models of the future. Major course retooling is required to re-engineer this type of delivery.

Faculty Intellectual Property Issues

The distributed technology offers the potential for sharing content across universities to partner in program delivery. As a somewhat hidden faculty agenda, there has long been the threat that this type of video stored material would allow content to be delivered by that one great instructor in the sky. That will likely not be the actual outcome, but there is a threat of intellectual property control loss for the local professor as his or her material can be delivered without his or her knowledge or presence. If an excellent class can be delivered at University X to a student from University Y, and the cost of the class was low compared with local production, why would this not be a viable and selected option? Even replaying a previous lecture for the next semester is now doable. Likewise, playing the same video to multiple hybrid class sections has the potential to significantly multiply student to professor ratios. By default, the organization owns the video material for a distance program and this can be reused without instructor permission. We won't be able to solve this issue here, but it awaits a resolution somewhere over the next horizon.

Concluding Remarks

The most important idea underlying the strategic vision of PM in academia is that PM as a knowledge topic is only about sixty years old and essentially one of the youngest professional program academic topics. Despite this position, the subject now touches broad segments of the organizational and academic communities. Major knowledge gaps in both groups have been described in this paper. Unfortunately, the option to wait on the subject to fully mature does not seem to be the correct response for academia. We now understand that the project model is heavily embedded in organizational work, yet many of those organizations have yet to embrace the principles required to implement the successful execution of these initiatives. Strategically, academia needs to actively strive to design a global university program, with the vision of "gap closing" and "knowledge building." Both of these goals fit into the conceptual charter of an academic institution. Some academic organizations will decide to embrace the full scope of PM as outlined here, whereas others will pursue a lesser scope. Likewise, some universities will have a heavy influx of nontraditional students and others less so; regardless of the mix and level, the core design issues remain.

This paper has attempted to share insights into lessons learned in evolving the UH TPM program experience over an eight-year period. The philosophies offered come from this university experience base and from forty years of dealing with the project environment in all forms of industry. My personal belief is that this form of business process has been neglected by both academia and industry as being intuitive and requiring minimal skill; there is now significant evidence to refute this. Commercial organizations seem to be waking up to the need for more understanding of managing projects, but academia is still looking at only the uppermost part of the knowledge domain and market need. This paper has pointed out that project management is both a broad and complex topic, with applicability across many life and organizational processes. Academia has a key role in the proliferation of this knowledge to both its traditional student and industry counterparts. If this message was received and believed, then the goal has been accomplished. Certainly there are multiple ways of looking at this same topic and deriving other solutions than the one described. Local situations may dictate that, but the common outcome should be that projects are a major activity to be studied and better understood by all university students.

It was also pointed out that the current project models are immature, yet they produce successful outcomes in the hands of a competent project manager. Academia must recognize that this model needs to evolve through research. The academic challenge is to define how these various goals can be best accomplished and then develop the appropriate delivery mechanisms. Clearly, this fits the conceptual mission of academia and needs to become a major player in this process.

Hopefully, the reader will view these thoughts as something more than theory but based on observations made over a long period of time.

Appendix A. Sample University Project Management Links

UNIVERSITIES	LINKS/REFERENCES
University of Maryland	http://www.greatdegree.com/degrees/University-of-Maryland-University-College/Project-Management-6415.html
Florida Institute of Technology	https://www.fit.edu/programs/grad/ms_project_management
Purdue University	http://www.cln.iupui.edu/content/CS/CLN_ProjectManagement.pdf http://www.tech.purdue.edu/Prostar/MS-ITPM/index.cfm
Bellevue University	http://www.bellevue.edu/degrees/undergraduate/project-management-bs/
Stanford University	www.apm.stanford.edu
Villanova University	www.villanovau.com
University of Alaska	www.alaska.edu

Appendix B. Information and Logistics Department

Details related to the Technology Project Management degree and certificate offerings can be explored through the URLs described below.

- The University of Houston College of Technology overall program structure is found at the URL below. Note specifically the Departments and Programs & Degrees tabs.
<http://www.tech.uh.edu/programs>
- Technology Project Management is housed under the Information and Logistics Department. The course information can be retrieved from the following URL:
<http://www.tech.uh.edu/programs/graduate/technology-project-management/>
A sample degree plan can be extracted from the ILT section, along with core course catalog descriptions.
- Information related to the University of Houston can be found at:
www.uh.edu



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College of Technology

Department of Information and Logistics Technology

Special Admission Requirements

In addition to the College of Technology [admission requirements](#), applicants for the Master of Science in Information Systems, Supply Chain and Logistics Technology, and Technology Project Management degrees must submit transcripts of all college-level course credit. Students must also submit scores from the Graduate Record Examination (GRE). Also, students may be required to complete prerequisite courses.

Degree Requirements

The degree program requires all students to complete core courses in project management, a directed area of study, and electives. Students may concentrate their studies in information security or supply chain and logistics technology. Program guides specifying other requirements are updated regularly and are available from the department office.

Program Description

Requirements	Hours
Core Courses	18
Directed Area of Study	12
Approved Electives	6
Total	36

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