ATMAE 2014 Annual Conference: Tomorrow's Gateway

St. Louis, Missouri, November 19-22, 2014

"Implementation of a Technology Management Skills & Knowledge Analysis "

Dr. Jason Davis
Associate Professor, Department of Engineering & Technology
Texas A&M University - Commerce

Dr. Brent Donham
Dean, College of Science & Engineering
Texas A&M University - Commerce

TMGT Skills & Knowledge Analysis

- 5th oldest state university in Texas
- More than 100 majors at the undergraduate, master's and doctoral levels

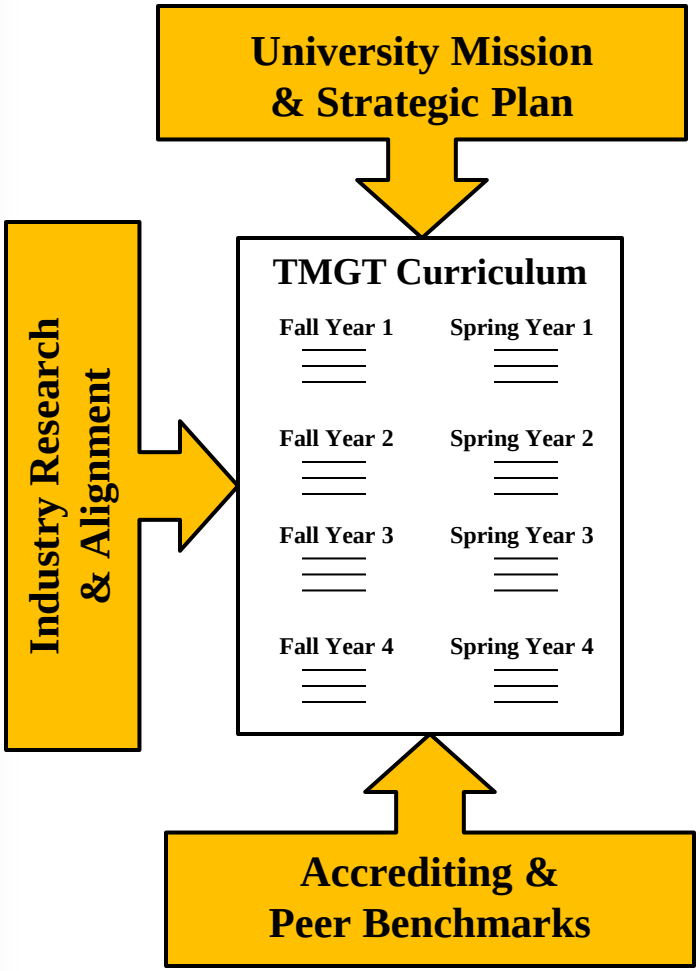
- Approximately 89% of the over 12,000 students in the student body comes from a 38-county area in East and Northeast Texas.
- 140,000 students in community/junior colleges within the university's service area.

BS Technology Management

Integration of:

- Technology
- Applied engineering
- Project management
- Cost engineering
- Quality
- Business management
- Leadership

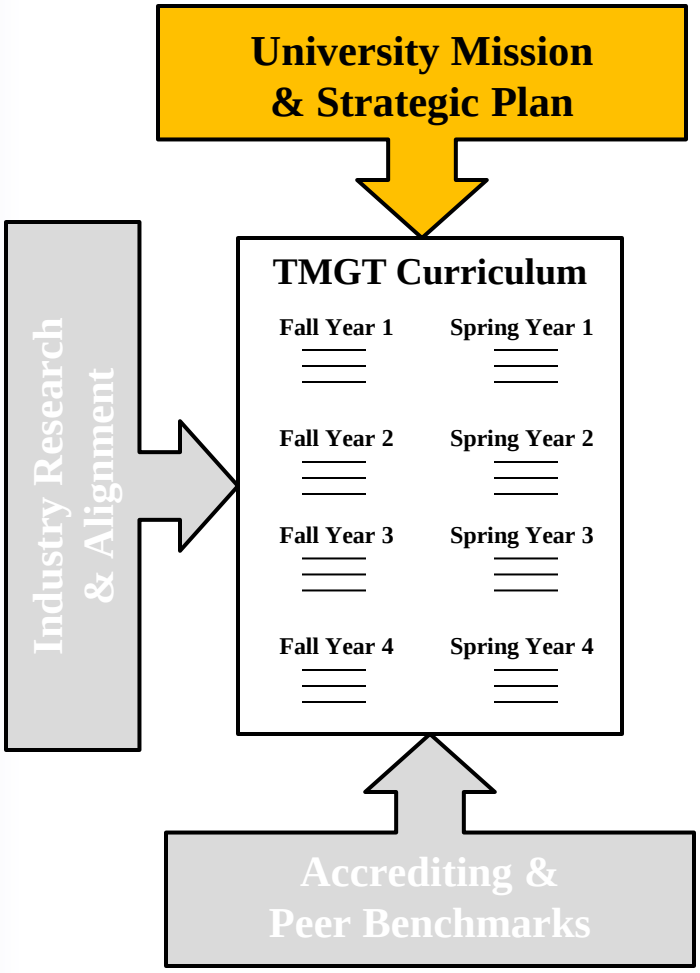
TMGT Skills & Knowledge Analysis



The academic program review process is intended to close the cycle of self-inquiry, review, and improvement.

Texas A&M University-Commerce
11.99.99.R0.04 Academic Program Review

TMGT Skills & Knowledge Analysis



Student Success

Strategy 1.3: *The number of undergraduate degrees awarded from critical shortage fields …will improve*

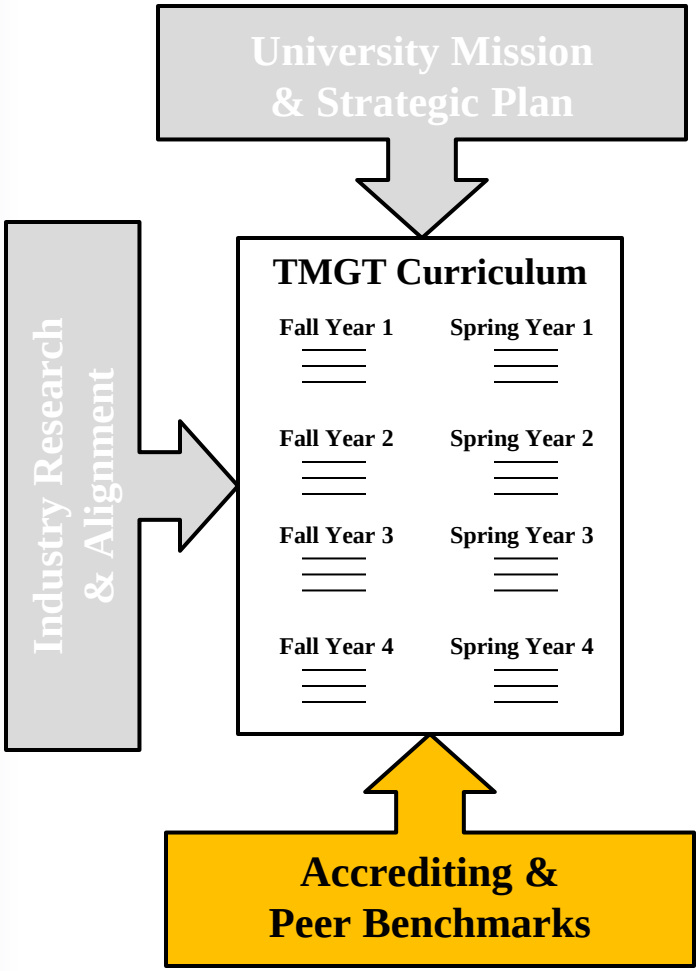
Strategy 1.4*: … focus on student-learning outcomes will result in an increase in placement rates…*

Communication

Strategy 1.1: *Build brand recognition in the Dallas/Fort Worth Metroplex that results in an increase in student enrollment from that region*

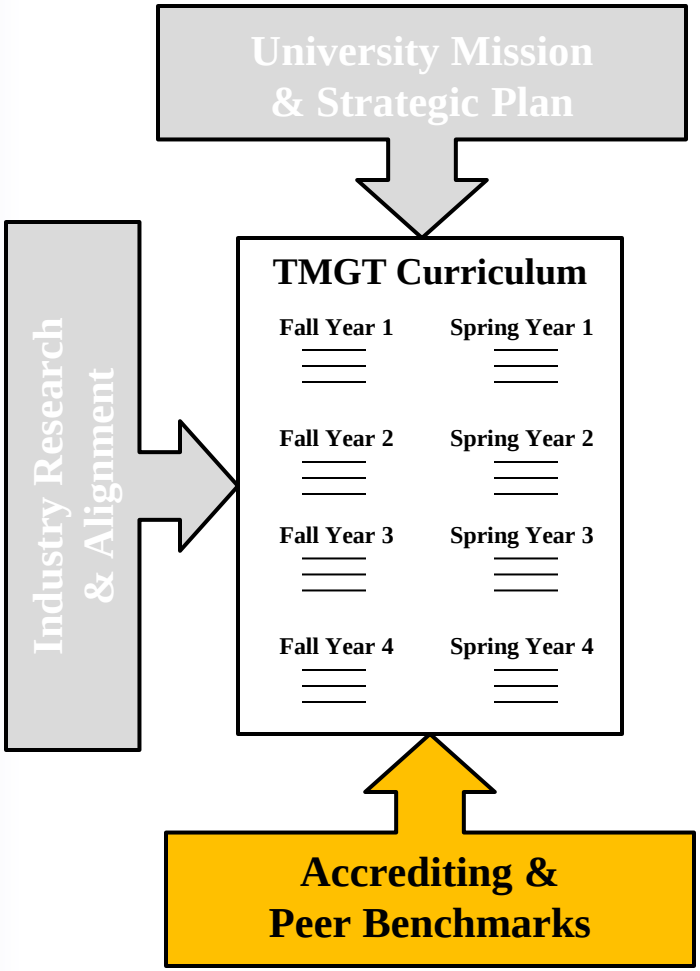
Texas A&M University-Commerce
Strategic Plan, 2011-2015

TMGT Skills & Knowledge Analysis



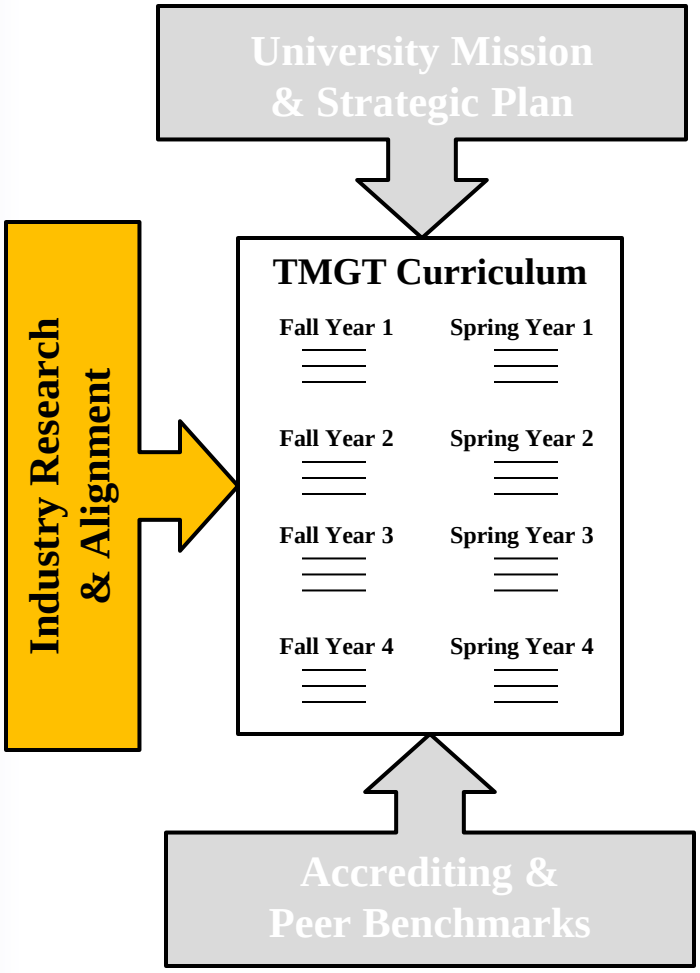
ATMAE			
ATMAE Foundation Requirements	Hours		TAMU-C Technology Management
General Education	18-36		University Studies (excluding Math and Physical Sciences) Industrial Communications (IT 303)
Mathematics	6-18		College Algebra (MATH 1314) Pre-Calculus (MATH 142)
Physical Sciences	6-18		College Physics I (PHYS 1401) College Physics II (PHYS 1402)
Management	12-24		
Quality Management			Quality Management & Improvement (IT 340)
Quality Control			Quality Management & Improvement (IT 340)
Production Planning & Control			Principles of Cost Engineering (TMGT 352) Project Planning & Scheduling (TMGT 455) Value Chain Control & Management (TMGT 456)
Supervision			Strategies for Decision Making (BAAS 444) Principles of Technology Management (TMGT 350) Human Resource Management (MGT 394) Managing Cultural Differences (TMGT 351)
Finance/Accounting			Principles of Accounting I (ACCT 221) Macro Economics (ECO 2301) OR Micro Economics (ECO 2302) Principles of Cost Engineering (TMGT 352)
Safety Management			Environmental & Safety Management (TMGT 311) Risk Management (TMGT 411)
Facilities Layout			
Materials Handling			Value Chain Control & Management (TMGT 456)
Legal Aspects/Law			Legal Environment of Business (BA 301) Strategies for Decision Making (BAAS 444) Contracts & Specifications (TMGT 454) Enterprise Analysis & Trends (TMGT 457)
Marketing			
Leadership			Organizational Leadership (BAAS 345) Principles of Technology Management (TMGT 350)
Project Management			Project Management (TMGT 458) Construction Cost Estimating (TMGT 336) Principles of Cost Engineering (TMGT 352) Human Resource Management (MGT 394) Contracts & Specifications (TMGT 454) Project Planning & Scheduling (TMGT 455) Construction Management (TMGT 439)
International Business			Sustainability in Contemporary Enterprises (BAAS 355) Managing Cultural Differences (TMGT 351) Enterprise Analysis & Trends (TMGT 457)
Teaming			*Integrated into curriculum*
Technical	24-36		
Computer Integrated Manufacturing			*Covered in IT 112 if taken as a technical elective**
Computer Aided Design			Computer Aided Design (IT 111)
Electronics			College Physics II (PHYS 1402)
Materials Science/Testing			Construction & LEED Systems (TMGT 335)
Computer Technology			Microcomputer Applications (CSCI 151) OR Business Computer Systems (MIS 128)
Packaging & Distribution			Sustainability in Contemporary Enterprises (BAAS 355)
Construction Manufacturing Processes			Construction & LEED Systems (TMGT 335) Construction Management (TMGT 439)
Electives	0-18		Technical Electives

TMGT Skills & Knowledge Analysis



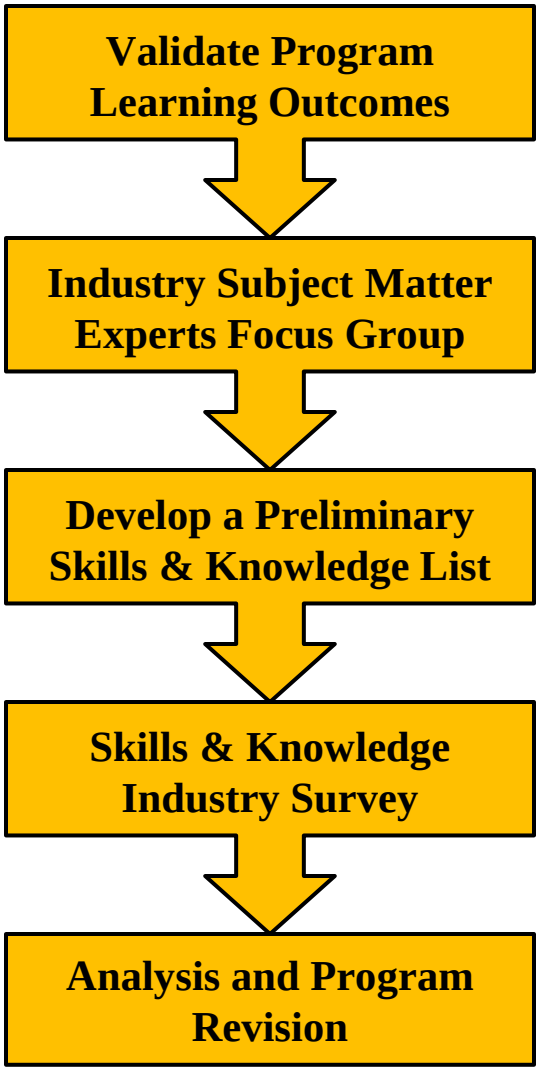
ATMAE Accredited Technology Management Programs	University #1	University #2	University #3	University #4	University #5	University #6	University #7			A&M-Commerce
University Studies (Academic Core)	X	X	X	X	X	X	X	100%		X
College Algebra		X	X	X			X	57%		X
Trigonometry	X		X	X				43%		X
Statistics	X					X	X	43%		
Chemistry	X	X				X	X	57%		
Physics I	X	X	X	X		X	X	86%		X
Technical Communications	X		X	X	X	X		71%		X
Business law		X	X	X			X	57%		X
Computer Aided Design		X	X	X	X	X	X	86%		X
Computer systems		X	X	X		X	X	71%		X
Construction Methods & Materials				X	X	X	X	57%		X
Construction Codes				X	X		X	43%		X
Industrial Organization		X	X			X		43%		X
Industrial Safety	X	X	X	X		X	X	86%		X
Manufacturing fundamentals		X	X			X		43%		
Production planning and control		X	X		X			43%		X
Quality Assurance/Management	X		X	X		X		57%		X
Risk assessment		X	X				X	43%		X
Supervision		X	X	X		X	X	71%		X
Internship	X		X				X	43%		

TMGT Skills & Knowledge Analysis



Identify specific knowledge, skills, and attributes that are aligned with industry needs, which graduates need to attain to be successful in the career field

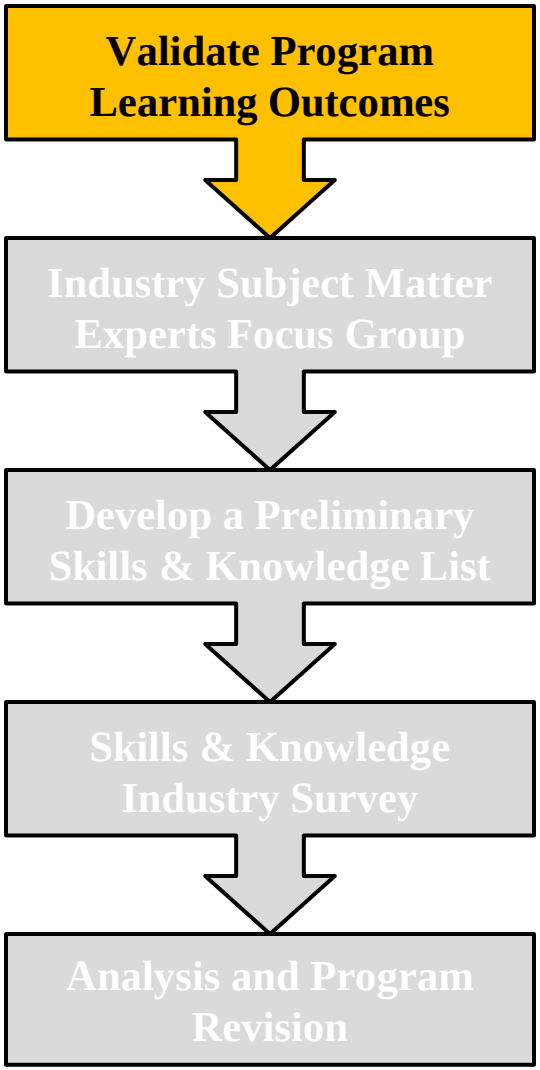
TMGT Skills & Knowledge Analysis



Utilize a modified Performance Criteria Analysis (PCAL)® developed at Richland College, Dallas, Texas

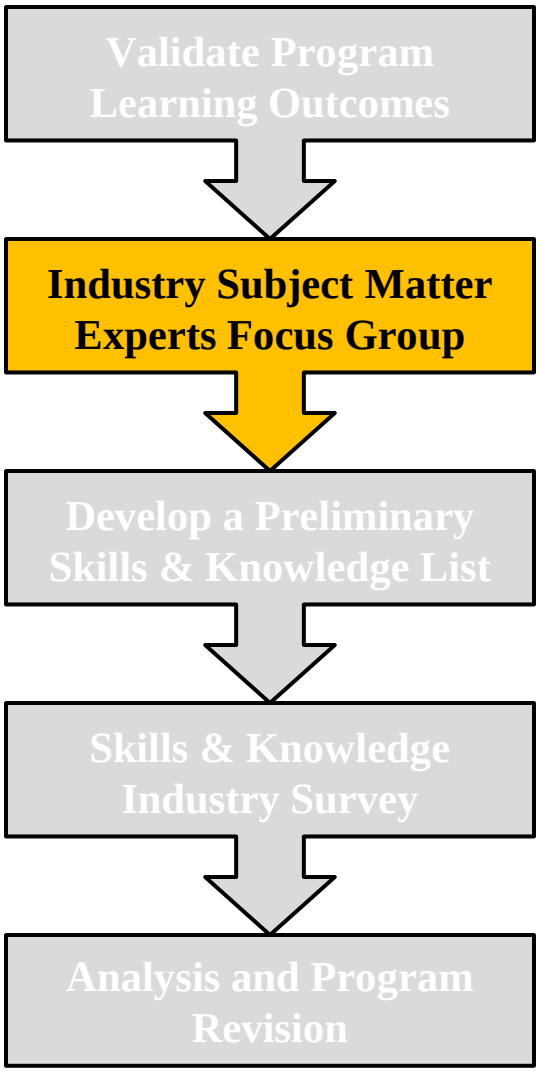
Richland College, Instructional Programs Office
Performance Criteria Analysis (PCAL) Manual, 2nd Edition

TMGT Skills & Knowledge Analysis



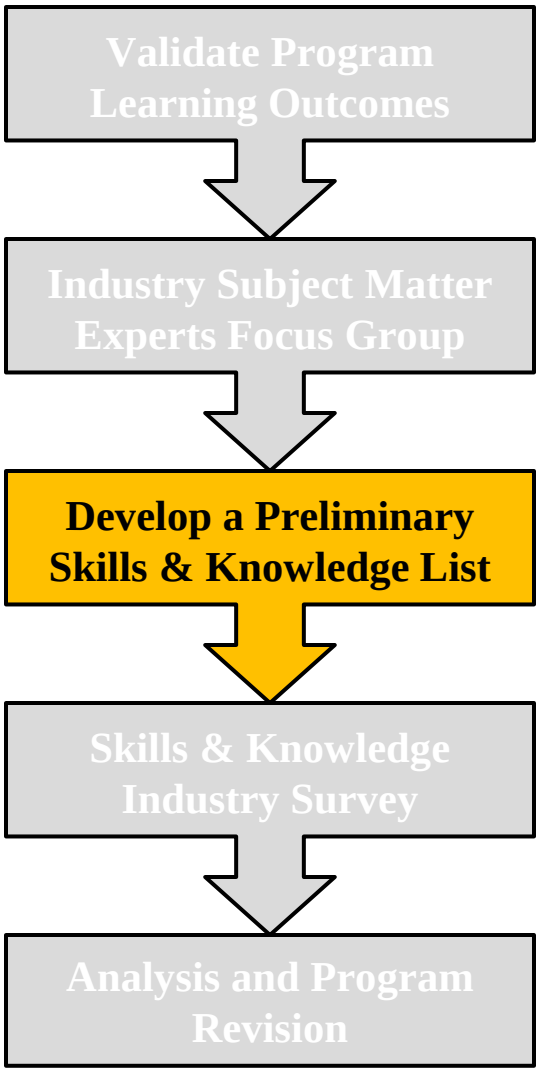
- Reviewed by industry representatives (hiring managers)
- Identified entry level positions that align with program outcomes
  - Facilities Planner
  - Technology Development Manager
  - Program Analyst
  - Project Controller
  - Product Manager
  - Operations Technology Specialist
  - Etc.

TMGT Skills & Knowledge Analysis



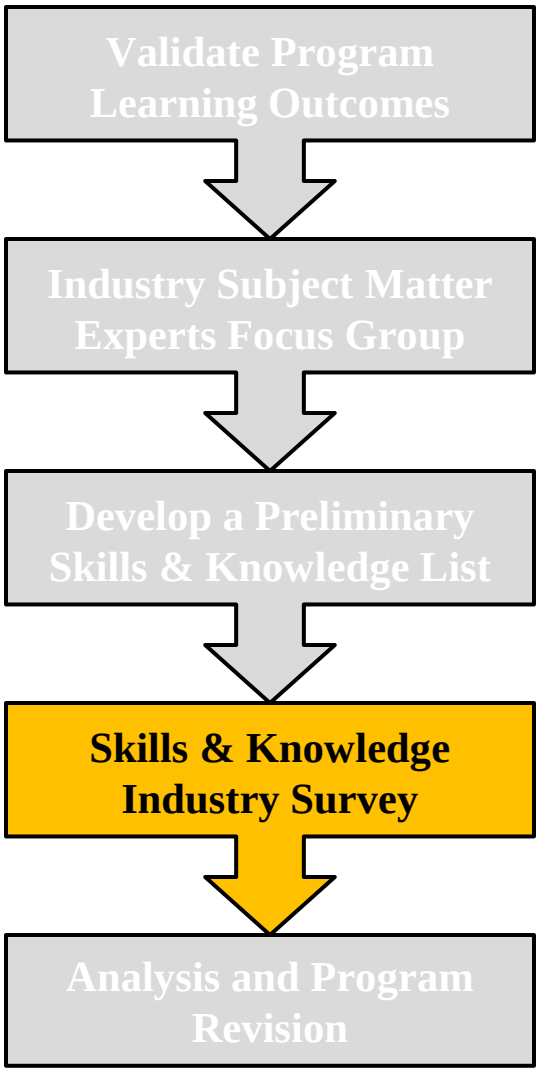
- Industry cross section (project management, energy, construction, manufacturing, etc.)
- Brainstormed **must have** entry level skills & knowledge
  - Bid development
  - Understanding of contracts
  - Design sequence process
  - Understanding of safety regulations
  - CAD, databases, word processing
  - Ability to gather and use data
  - Etc.

TMGT Skills & Knowledge Analysis



- Develop observable and measurable statements for industry's skills & knowledge
  - Assist in the development of bids
  - Interpret contract documents
  - Demonstrated working knowledge of a design sequence process
  - Interpret safety regulations
  - Demonstrated working knowledge of CAD and business software
  - Select, utilize, and interpret data
  - Etc.

TMGT Skills & Knowledge Analysis



- Survey a broader industry list in service area
- Attain ratings for 4 factors for each skill & knowledge criteria
  - Importance *(Importance to know or do the listed skill?)*
  - Proficiency *(Proficiency level expected for skill or knowledge?)*
  - Frequency *(How frequent does an entry-level employee need to know or do the skill?)*
  - Difficulty *(How difficult is it for an entry-level employee to know or do the skill?)*

Sample of BS TMGT Industry Survey

An ability *to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined technology management activities*

An ability *to select and apply a knowledge of mathematics, science, management, and technology to technology management problems that require the application of principles and applied procedures or methodologies*

An ability *to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes*

An ability *to design systems, components, or processes for broadly-defined technology management problems*

An ability *to function effectively as a member or leader on a technical team*

An ability *to identify, analyze, and solve broadly-defined technology management problems*

An ability *to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate literature*

An understanding *of the need for and an ability to engage in self-directed continuing professional development*

An understanding *of and a commitment to address professional and ethical responsibilities including a respect for diversity*

A knowledge *of the impact of technology management solutions in a societal and global context*

A commitment *to quality, timeliness, and continuous improvement*

Considering the previous abilities and identified entry-level positions, please assess the following skills and knowledge on 4 categories:

Importance: How important is it for an entry-level employee to know or do the listed skill? (4 = highest, 1 = lowest)

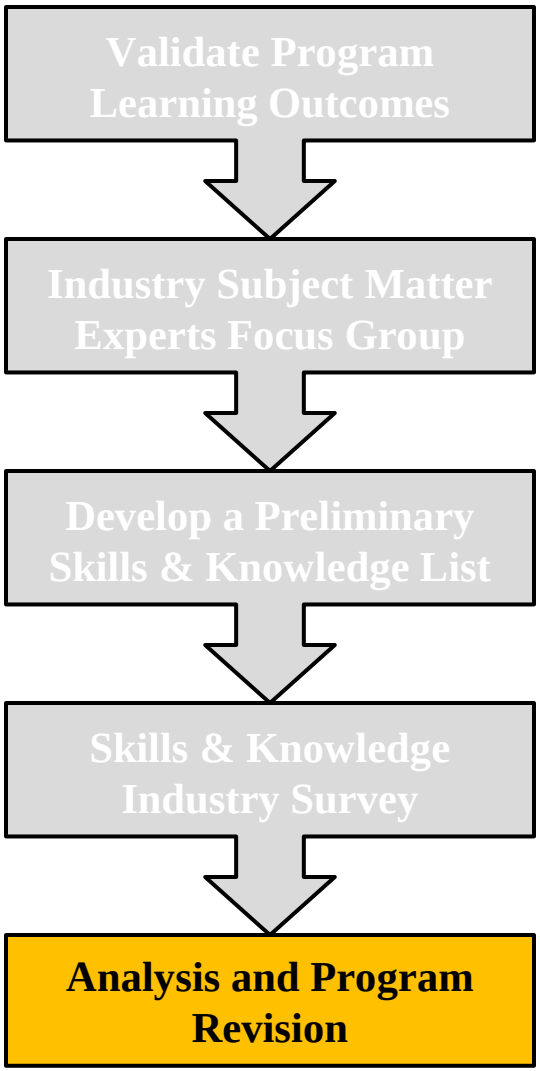
Proficiency: How good is good enough for an entry-level employee to know or do the listed skill? (4 = highest, 1 = lowest)

Frequency: How frequently is an entry-level employee expected to know or do the listed skill? (4 = highest, 1 = lowest)

Difficulty: How difficult is it for an entry-level employee to know or do the listed skill? (4 = highest, 1 = lowest)

	Importance	Proficiency	Frequency	Difficulty
Scheduling and Cost-Estimating				
1. Assist in the generation of a cost estimate for a given project	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2. Generate a budget estimate	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
3. Assist in the generation of a budget proposal	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
4. Assist in the development of bid tabs	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5. Generate a basic GANTT chart	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
6. Perform cycle time analysis	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
7. Material scheduling	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
8. Assist in project execution planning (e.g. Procurement plan, WBS, etc.)	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

TMGT Skills & Knowledge Analysis



- Generate an weighted *emphasis rating* to establish what skill & knowledge standards are to integrated into the curriculum
  - e.g. Skill #1 3.2/4.0
    Skill #2 1.3/4.0

    Skill standard #1 would be integrated into curriculum but #2 would not
- Average scores in the 4 categories determine the level of instructional coverage
- Curriculum crosswalks identifies course(s) where skill standard is taught

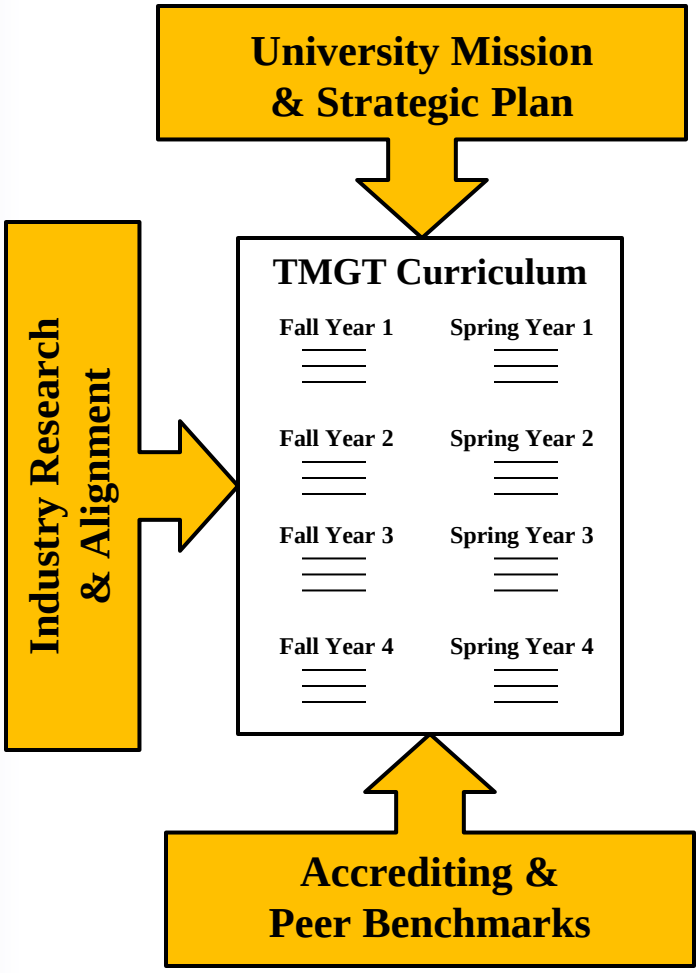
TMGT Skills & Knowledge Analysis

BS Technology Management Skill & Knowledge Standard Course Crosswalk	University Core	TMGT ####, Course 1	TMGT ####, Course 2	TMGT ####, Course 3	TMGT ####, Course 4	TMGT ####, Course 5	TMGT ####, Course 6	TMGT ####, Course 7	TMGT ####, Course 8	TMGT ####, Course 9
Skill & Knowledge Standard #1	√				√					
Skill & Knowledge Standard #2			√	√						√
Skill & Knowledge Standard #3								√	√	
Skill & Knowledge Standard #4	√	√					√			
Skill & Knowledge Standard #5			√			√				√

Process will result in the:

- Validation of the content in some existing courses
- Need to revise the content in some existing courses
- Requirement to develop a new course(s)

TMGT Skills & Knowledge Analysis



Questions?

Dr. Jason Davis
Jason.Davis@tamuc.edu

Dr. Brent Donham
Brent.Donham@tamuc.edu