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ISME

The Development of Competencies for Mechanical Engineering Education in Iran Within Global Context

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Introduction:

- The Current and Future Global Challenges in the World:
  - Energy
  - Environment
  - Economic
  - New Technologies
  - Global Competition:
    - ✓ Better Products
    - ✓ Higher Quality
    - ✓ Lower Costs
    - ✓ Process Functionally
  - etc.

2028 Vision For Mechanical Engineers:

- "Mechanical Engineering will develop engineering solutions that foster a cleaner, healthier, safer and sustainable world".

Two Major Challenges Raised By ASME:

- Developing Sustainably
- Engineering Solutions for all

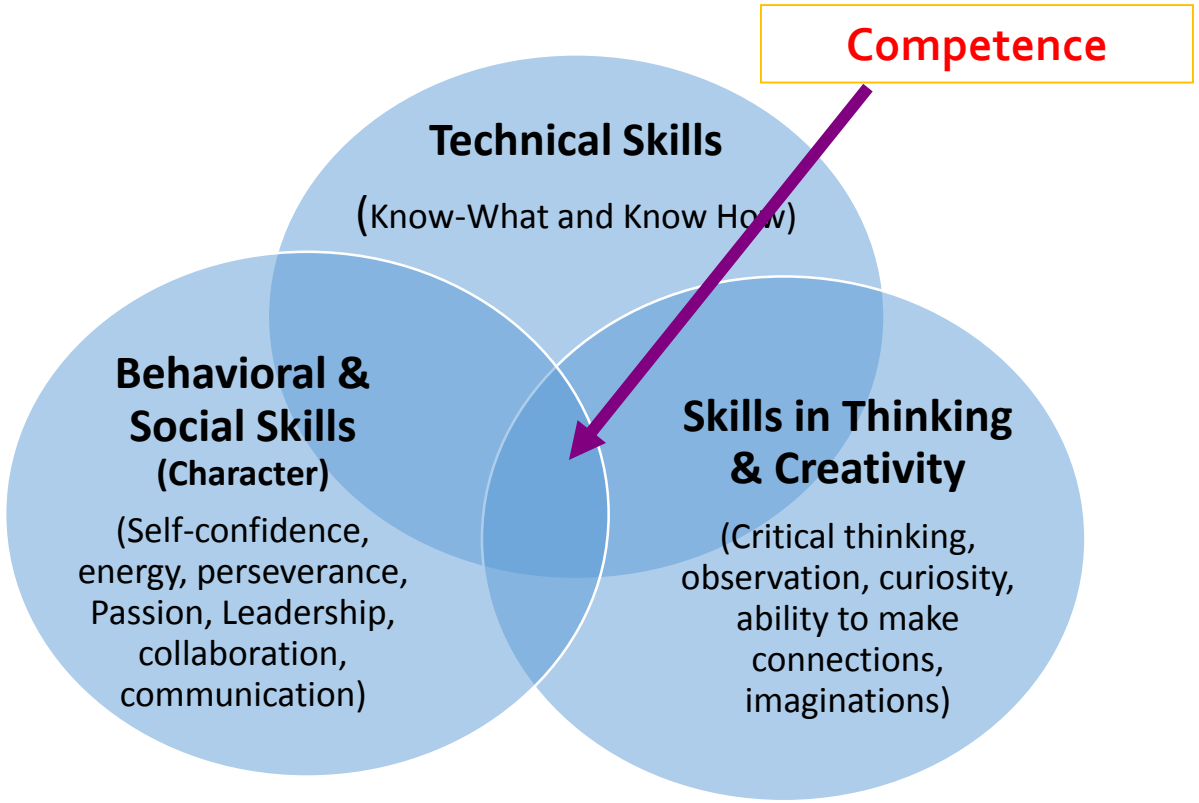
A Brief Assessment of Existing Challenges in Engineering Education :

- Existing differences of Competencies between developing knowledge and skills in universities and practice in industries.
- Engineers and Trans-Global Environment
- Serious challenges of engineering educators in the 21th century?
- Trans-global vs. intra-organizational operation
- Contextualize the learning to achieve more complex competencies
- To face with growing speed of changes in technology

Engineering Competencies:

- What is competencies?
- From what skills it consist of?

Competence is the ability of an individual to do job properly. A competency is a set of defined behaviors that provide a structured guide enabling the identification, evaluation and development of the behaviors in individual employees.



Engineering Competencies:

- Importance of Jobs are getting more technical, and going forward, skills that have a technical underpinning will be essential for anyone who wants to compete. Even those who do not choose a career in **Science, Technology, Engineering or Math** (STEM) would do well to be stem literate because these disciplines are going to be critical to the workforce of the future.(John S. Watson, CEO and Chairman of the Board at Chevron)

Engineering Competencies:

- What competencies are required to facilitate and enhance an engineer's personal, professional development, individual creativity and involvement within the context of multicultural and diverse global environments?

Competency Model for Engineering By AAES:

Core Competencies: Tiers 1 and 2

Tier 1

PERSONAL EFFECTIVENESS

- Lifelong Learning
- Adaptability & Flexibility
- Dependability & Reliability
- Interpersonal Skills
- Initiative
- Integrity
- Professionalism



Tier 2

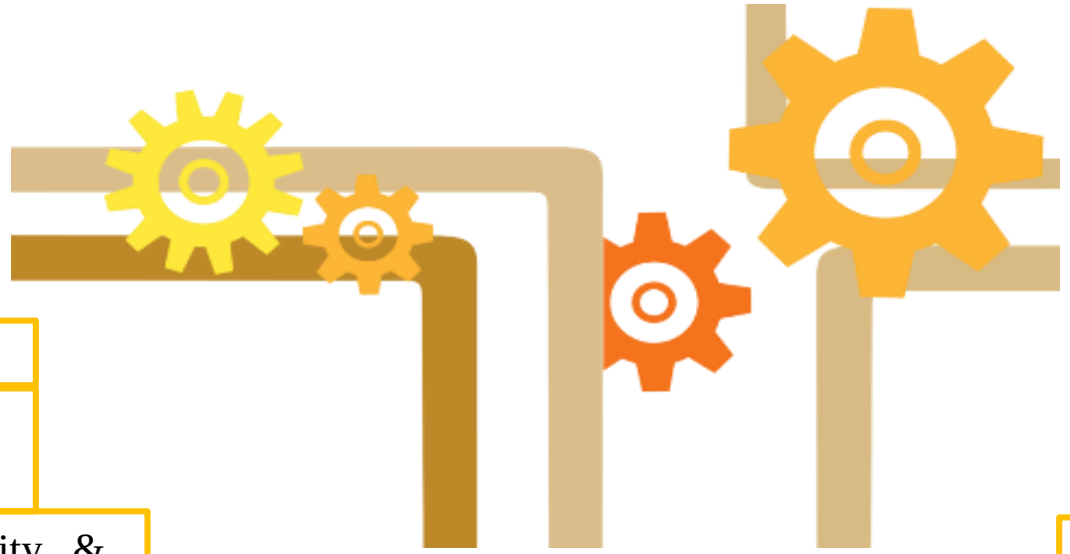
ACADEMIC EXCELLENCE

- Mathematics
- Computer Skills
- Critical & Analytical Thinking
- Writing
- Reading
- Communication
- Science & Technology



Industry-Wide Technical Competencies:

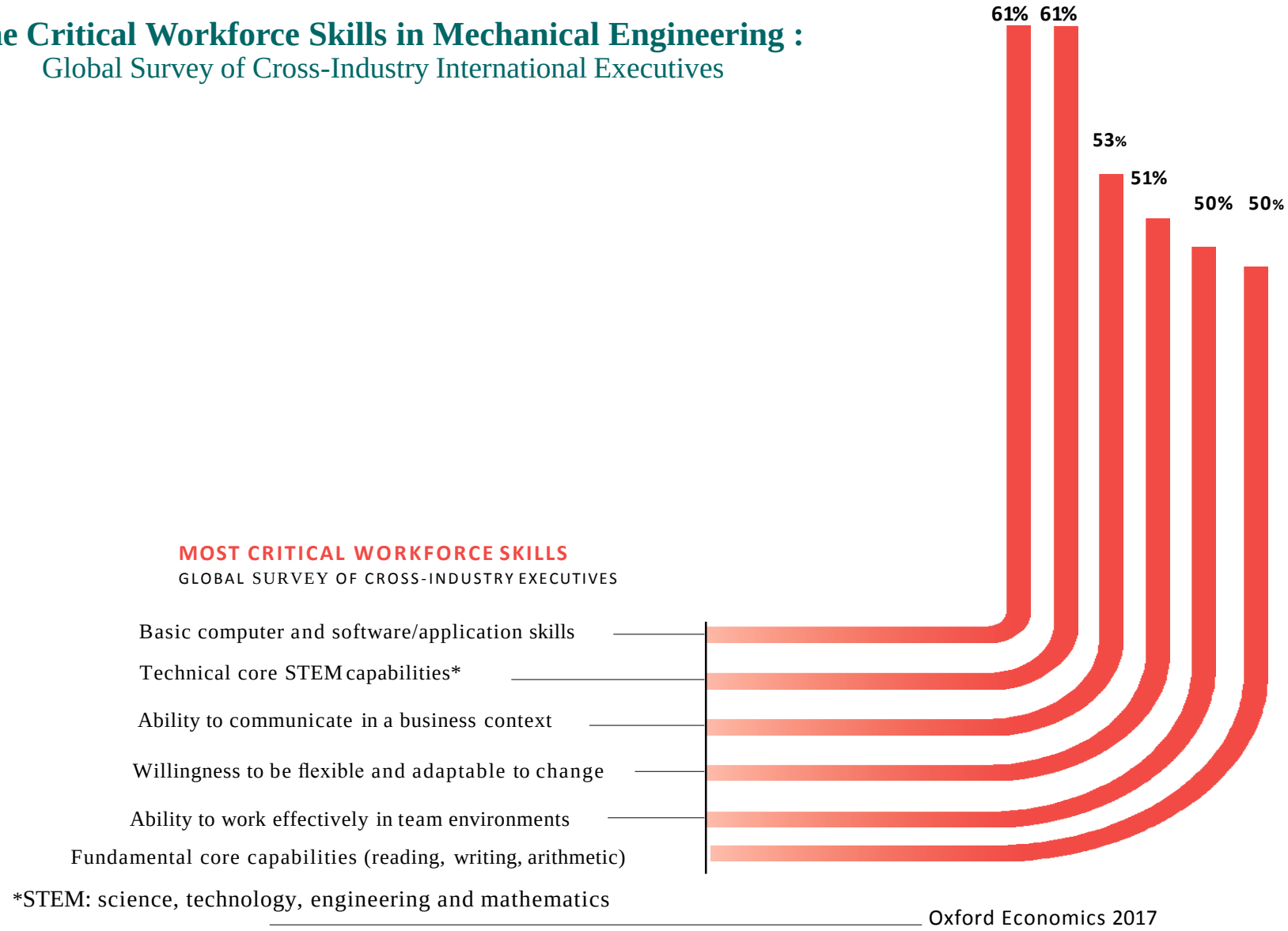
Tier 4



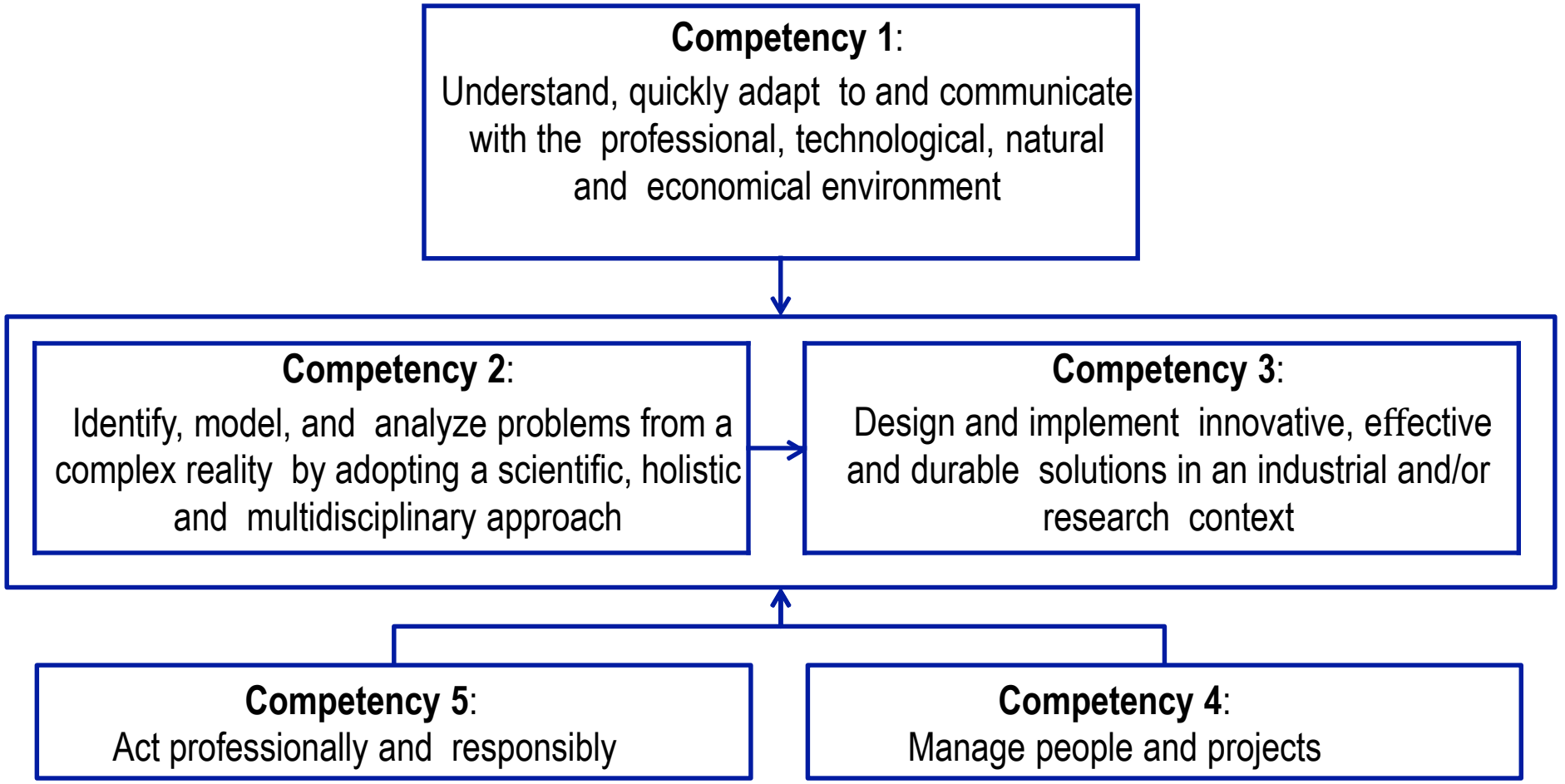
- Professional Ethics
- Quality Control & Quality Assurance
- Safety, Health, Security, & Environment
- Design
- Foundations of Engineering
- Manufacturing & Construction
- Engineering Economics
- Business, Legal, & Public Policy
- Operations & Maintenance
- Sustainability & Societal & Environmental Impact

The Critical Workforce Skills in Mechanical Engineering :

Global Survey of Cross-Industry International Executives



Mechanical Engineering- Competency Model :



Global Efforts on Education of Mechanical Engineering(Cont.)

Investment on Workforce Development by National Oil Companies(NOCs):

- ✓**PETRONAS**
- ✓**PDO**
- ✓**ARAMCO**
- ✓**ADNOC**
- ✓**SOCAR**
- ✓**etc.**

"International Live Training Centers in Malaysia"

Mechanical Engineering Education in Iran:

- Recent education development of mechanical engineering in Iran
- Absence of engineering accreditation organizations (e.g. ABET, JABEE and...) and PDE council in Iran.
- There are many weaknesses and gaps between Current Mechanical engineering Curricula and Industrial needs.
- Lack of Experience of “Academic Members”
- Succession Planning and lack of Mentoring and Coaching System in Industries.
- The unwillingness of industrial managers for investment in **“Human Resource” and “Training and Development”.**

The Global Competitiveness Index in Detail

	Rank/138	Value	Trend
5th pillar: Higher education and training	60	4.6	
5.01 Secondary education enrollment rate gross %	79	88.4	
5.02 Tertiary education enrollment rate gross %	33	66.0	
5.03 Quality of the education system	97	3.3	
5.04 Quality of math and science education	48	4.6	
5.05 Quality of management schools	90	3.9	
5.06 Internet access in schools	113	3.5	
5.07 Local availability of specialized training services	78	4.1	
5.08 Extent of staff training	121	3.4	

Solutions:

- Establishing of an organization of **Iranian Accreditation Board of Engineering and Technology (IABET)** is highly necessary for professional development in all field of engineering which enables curriculum change and encourages more flexibility.
- The ME program criteria could address a minimum faculty size/student ratio to ensure program quality in design and encouraged an increase in the proportion of "practice experienced" faculty within programs.
- The hiring of "Practical Professors" faculties with experience in product realization and innovation, project management and business processes.

Solutions:

- Businesses should link with school of mechanical engineering to provide work experience and ensure they get the employee's industry needs.

- ***ISME*** must be more active and responsible for ME education by establishing of "Education Strategic Council Committee"

- ***ISME*** should seek modifications to the general criteria and program criteria for mechanical engineering as noted above.

- ***ISME*** could facilitate faculty practitioner exchange programs, and practice based endowed faculty chairs.

Conclusions:

- ✓Engineers solve the world's fundamental and most complex challenges and so, it is very important to put more attention for education and training of future generation of mechanical engineers. Because the nations need more innovative and talented engineers to harness their capabilities to build and sustain a better world.

- ✓In order to reach the above goal, a holistic education and training plan along with development of new competencies must be prepared by collaboration of all involved beneficiaries from government, universities, industries, and NGOs.

- ✓Joint Venture investment to establish live training center for educating of international technical workforce (as well as considering industrial sabbatical for Iranian educators/professors along with employing of faculties with significant industry experience) is highly recommended.

Thank You For Your Kind Attention