Sept 2018

Welcome to the SDSU ASEE Best Practices in Engineering Education Series

Session #40 since starting in Spring 2011

Today's Topic:
ASEE TUEE Phase IV Report 2018 - Views of Faculty & Professional Societies

- Help yourself to pizza / drinks

ASEE: Views of Faculty & Professional Societies

TUEE = Transforming Undergraduate Education in Engineering

https://tuee.asee.org/

- Phase I, Synthesizing and Integrating Industry Perspectives, 2013
  - Generated KSAs – Knowledge, Skills, and Abilities
    - Discussed in Best Practices session in April 2014
  - A major framework for reviewing KSAs is “the T-shaped professional,” an individual who has both deep domain knowledge and broad professional skills.

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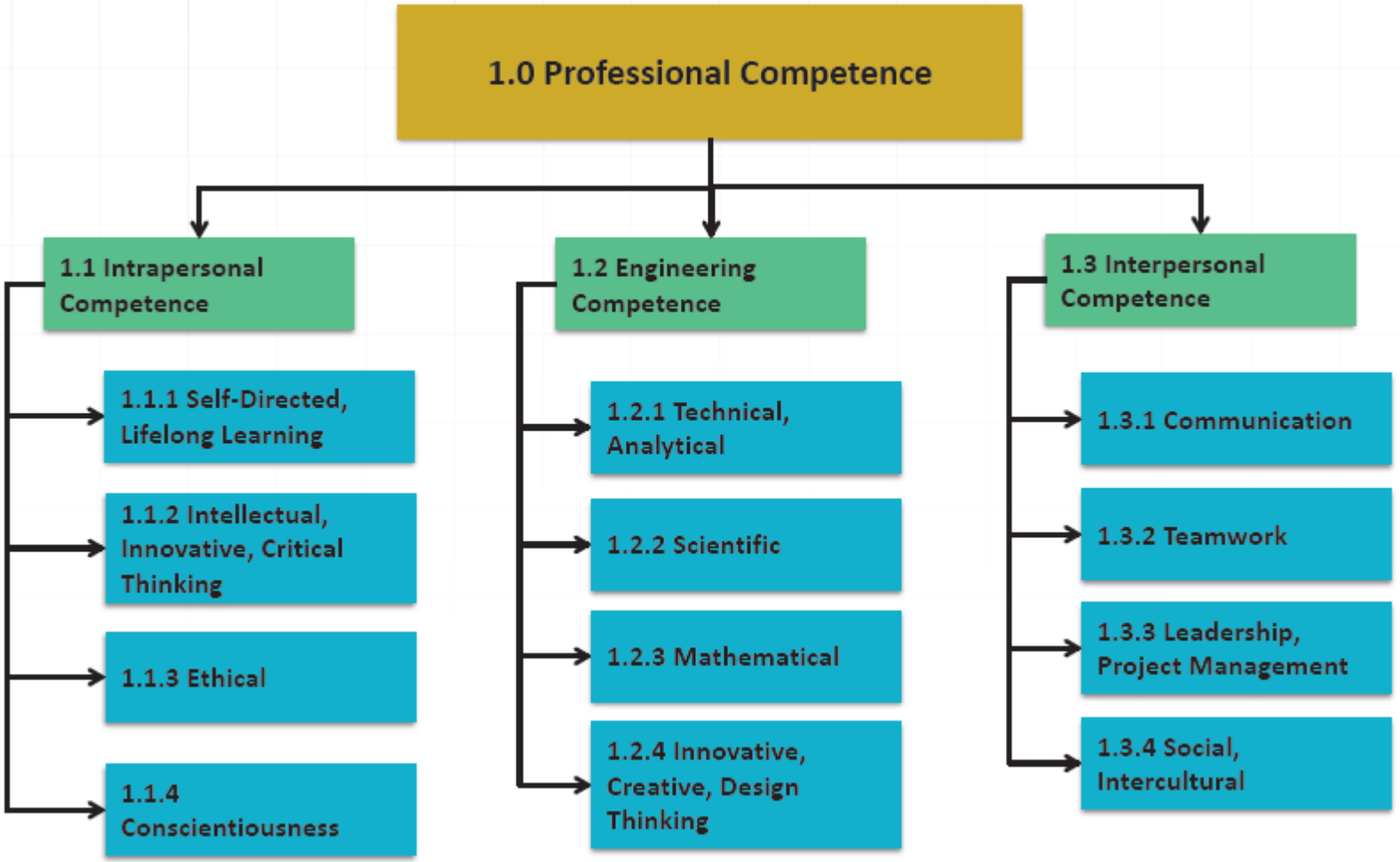

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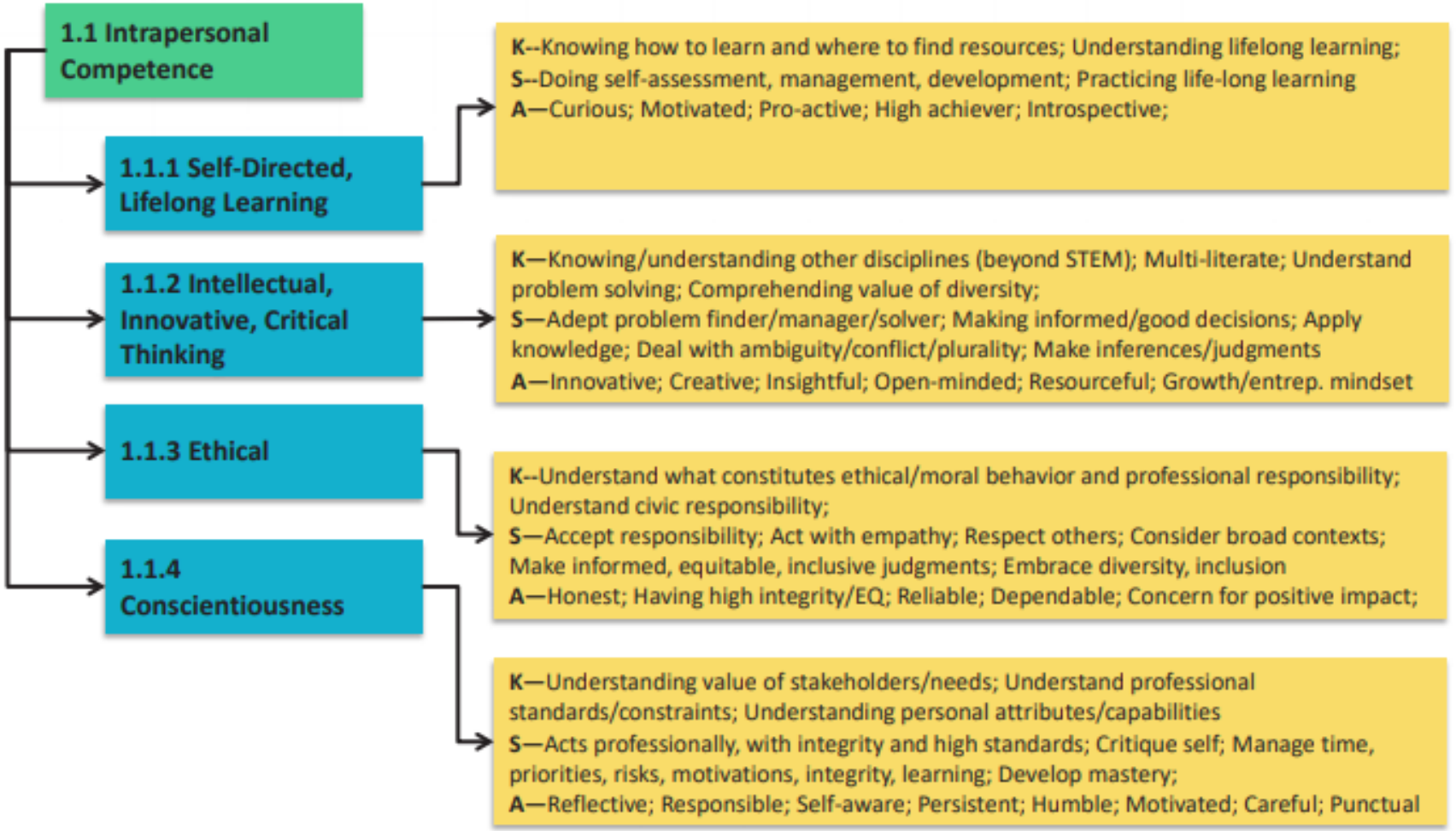

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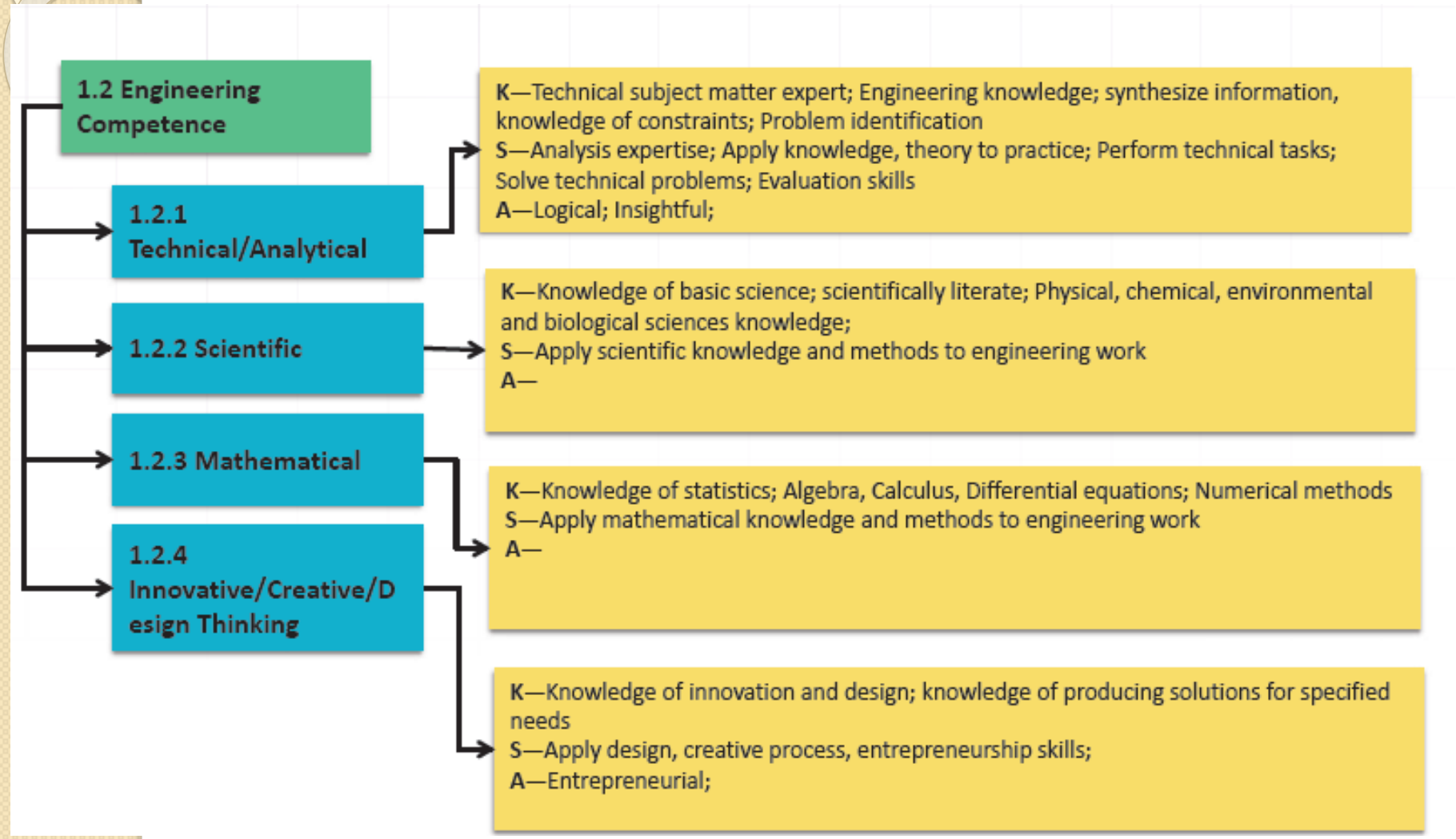

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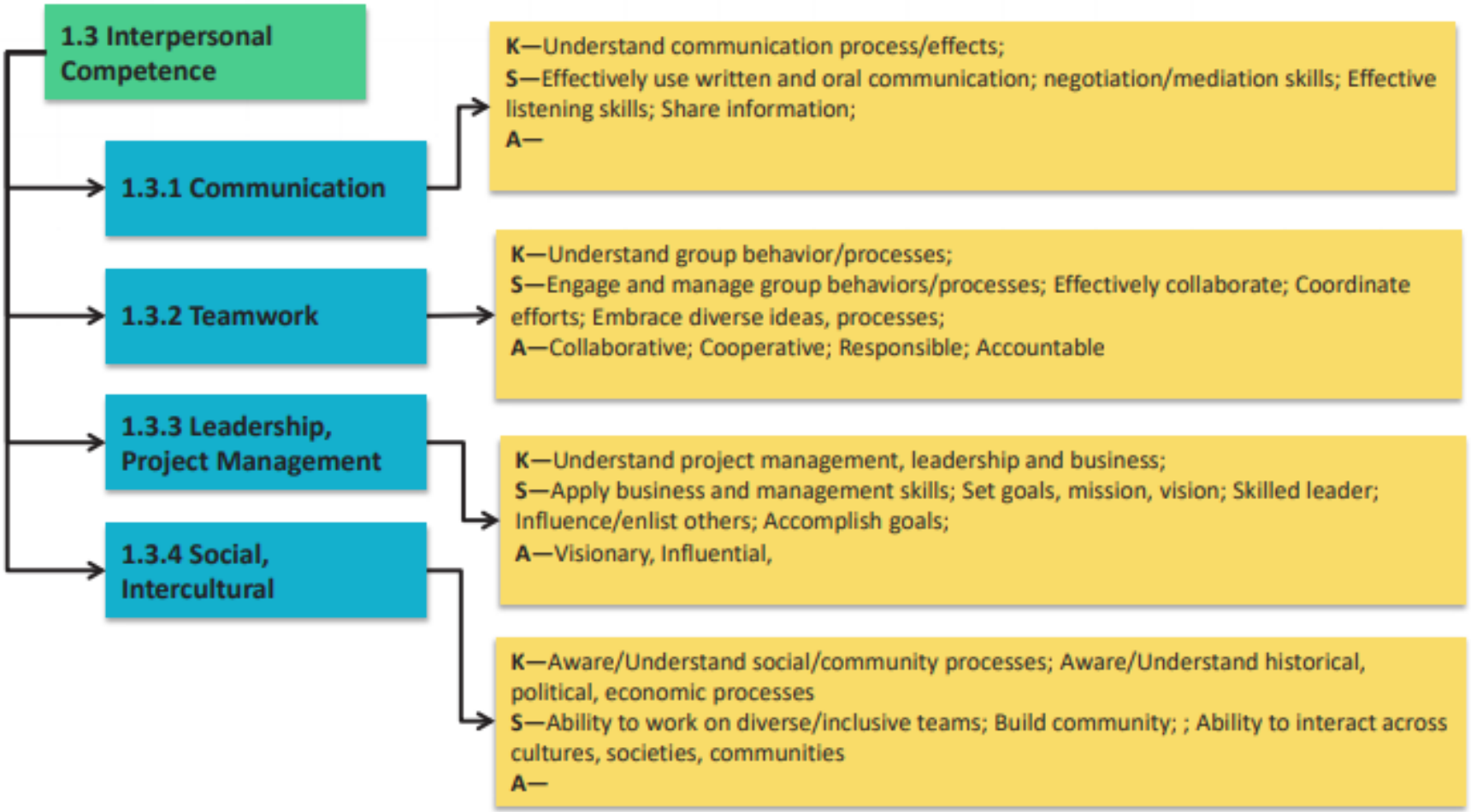

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- Phase II, Insights from Tomorrow's Engineers, 2013
  - Invited students to express their views on the strengths and weaknesses of the current chronological curricula structure and teaching methodologies.
  - Concluded that schools were paying insufficient attention to an array of KSAs needed to produce the desired T-shaped professional.
    - They did not fault the rigorous grounding in math, science, and engineering fundamentals that are a priority of engineering programs, but criticized how these and other courses were taught

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- Phase II, Insights from Tomorrow's Engineers, 2013
  - Recommendations
    - From the first year onward, calculus, physics, and chemistry courses should include examples of real-world engineering applications
    - Design-based projects, supplemented by extra-curricular activities, competitions, and makerspaces, should be part of the curriculum from the outset and incorporated throughout to stimulate learning and creativity
    - Exposure to industry, business training, ethics, and communication skills all require more attention.
    - Increase mentoring opportunities

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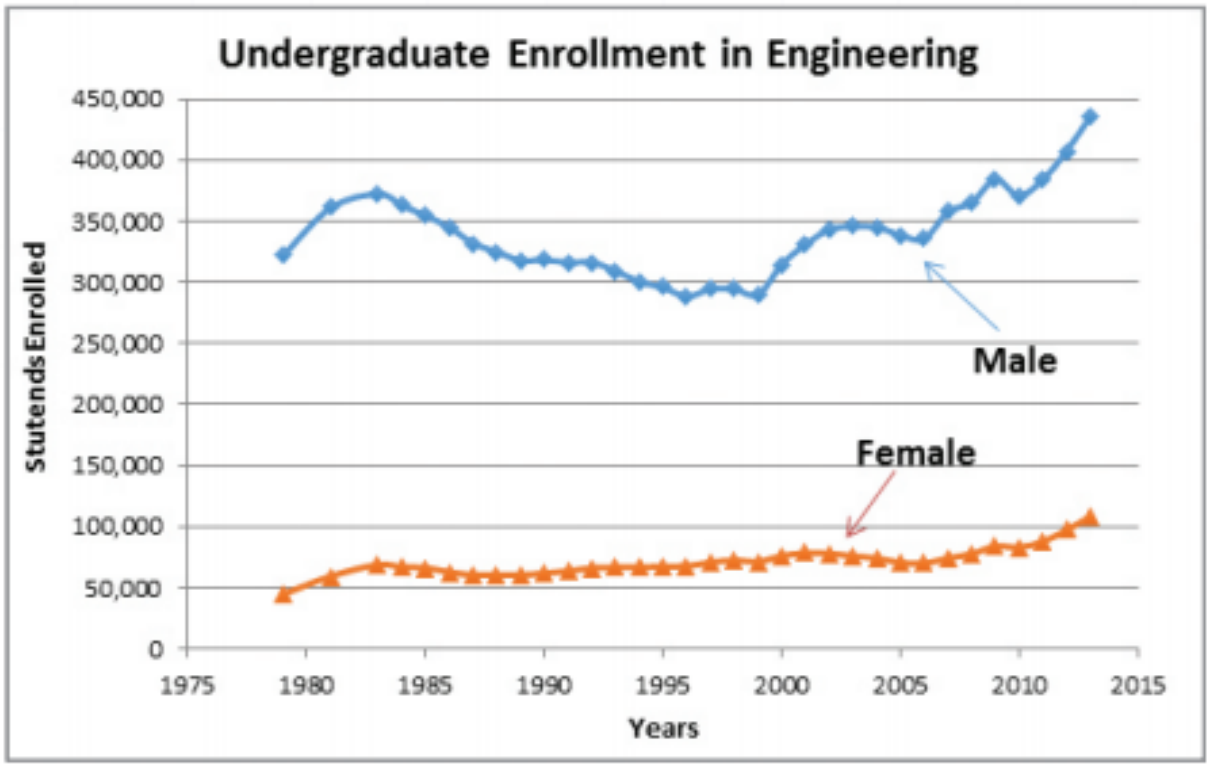
- Phase III, Voices of Women's Participation and Retention, 2015



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- Phase III, Voices of Women's Participation and Retention, 2015
  - Recommendations
    - Creating an online dashboard that shows the composition of engineering schools according to (minimally) gender, race, and ethnicity (ASEE).
    - Identifying gender diversity as an institutional value that must be implemented in a multiple ways across campuses (campus administrators).

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- Phase III, Voices of Women's Participation and Retention, 2015
  - Recommendations
    - Promoting equity by reflecting such values in grant policies, providing further incentive to comply (sponsoring agencies).
    - Bringing leaders together to focus on diversity and inclusion data management and training (professional societies).

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- Phase IV, Views of Faculty and Professional Societies, 2017
  - Working toward a Competency Map
    - "Can do" competencies comprise the knowledge and skills required to perform the work of an engineer.
    - "Will do" competencies are the traits of personality and attitude that motivate engineers to perform.

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- Phase IV, Views of Faculty and Professional Societies, 2017
  - Assessing Competencies
    - Compared with discipline-specific content, KSA competencies are more challenging to assess.
  - Participants provided a number of existing tools that could be applied to KSAs
    - For technical/analytic competence: Each discipline's Body of Knowledge; FE Exam; Concept Inventories (e.g., Thermal and Transport Concept Inventory, TTCI); Readiness Assurance activities
    - For ethics: Engineering Code of Ethics; Developmental Assets Framework (Search Institute); Leadership Style Inventory

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  - Participants provided a number of existing tools that could be applied to KSAs
    - For scientific/technical competence: Lean Certification; Certificate Manufacturing Engineering (offered by SME); ASCE BOK2; Problem Recognition and Solving and Rubric; undergraduate research publications presented at conferences
    - For mathematical competence: Force Concept Inventories; FE Exam; Physics Concepts Inventory; Concept Warehouse; Wiley PLUS; online assessment systems

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  - Participants provided a number of existing tools that could be applied to KSAs
    - For innovative, creative design and critical thinking competencies: Rose-Hulman Rubric for Curiosity, Connections, Creating Value; Critical Thinking Assessment Test (CAT); Design Competition SME; KEEN List of Skills for Entrepreneurial Design; Stanford D-School design-thinking rubric; SAE Collegiate Design Series (Baja; Formula)

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- Phase IV, Views of Faculty and Professional Societies, 2017
  - How can professional societies assist in affecting curricular and pedagogical changes?
    - Reforms could be encouraged by presenting awards (presumably from societies) for faculty, departments, programs, and even colleges that go “above and beyond” their normal duties to achieve change.
    - Societies could provide teaching workshops and forge inter- and multi-society collaborations

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- Phase IV, Views of Faculty and Professional Societies, 2017
  - How can professional societies assist in affecting curricular and pedagogical changes?
    - ASEE, for instance, could serve as a facilitator/catalyst for all societies to disseminate activities
    - Reevaluate program criteria, collaborating with ABET and professional societies to integrate new KSAs into program assessment
    - Provide assessment instruments and a train-the-trainer workshop module

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- Phase IV, Views of Faculty and Professional Societies, 2017
  - Summary- Examples of proposed improvements to curricula, mentoring, and experiential learning opportunities included
    - a “curriculum map” with a body of knowledge for each KSA;
    - enlisting societies as “brokers” among industry, faculty, and students;
    - creating dynamic repositories for curricular materials or, similarly, a faculty resource portal with guides to training, best practices, mentoring, case studies, and webinars; and
    - online learning modules on ethics, leadership, and communications.

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- Thank you for your attendance