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hybrid event

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Contemporary Systems Engineering for the UN-SDGs and NAE Grand Challenges

Meet the Authors

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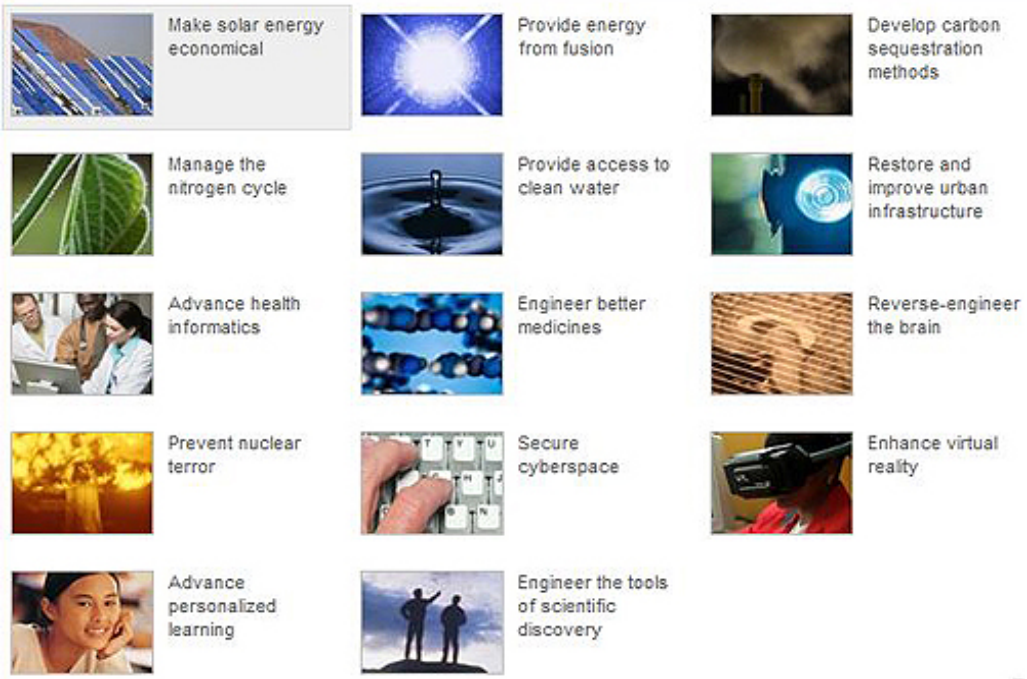
“A Better World Through a Systems Approach”

UN Sustainable Development Goals

National Academies Grand Challenges



“… rooted in systemic social, economic, cultural, and environmental challenges”

“A Better World Through a Systems Approach”

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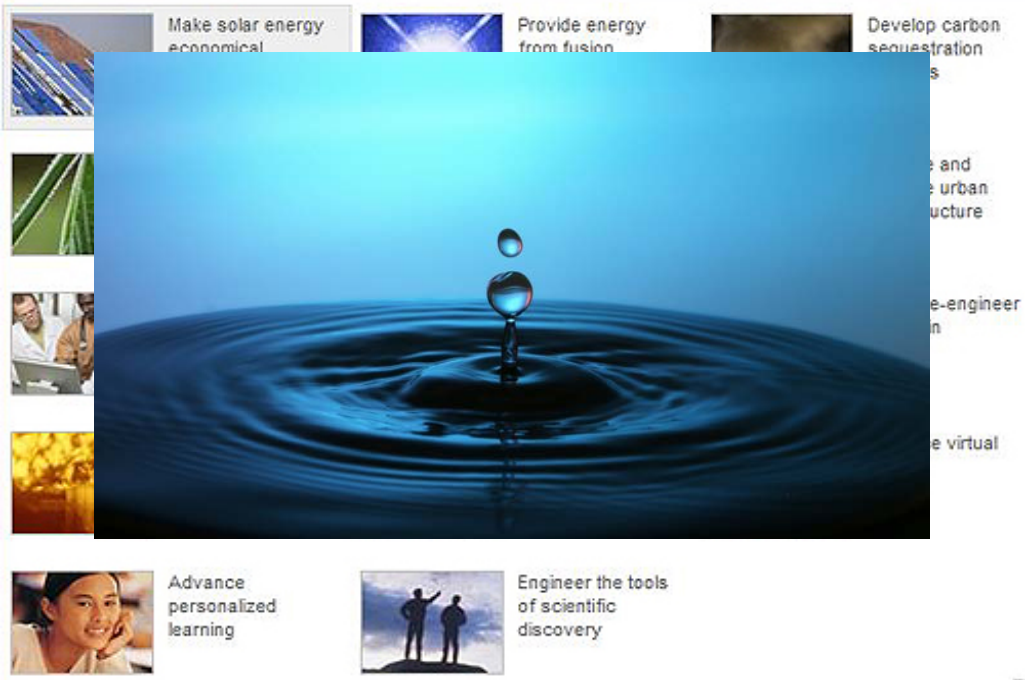


rooted in systemic overlapping and synergetic challenges

Perspectives on the societal role of engineers

View	Engineering's role in higher education	Engineering's role in society	Engineers' social role
Scientific	Oriented toward the development and transfer of knowledge as inherently good	To translate scientific knowledge into practical applications	The engineer is a specialist whose main role is as an advisor
Economic	Oriented toward professional training, with an emphasis on promoting economic growth	To create applied technological innovations that enable entrepreneurial and industrial development	The engineer is a professional innovator who creates commercial products
Service to humanity	Oriented toward personal development of the student's personality and character	To provide public service to society oriented toward social justice and sustainability	The engineer is an actor and active participant in social construction and change

Monteiro et al. (2019)

Reciprocal Relationship – Co-evolving through education

Systems approach

- Provides methods and tools for evaluating social phenomena and addressing social challenges

Social sciences

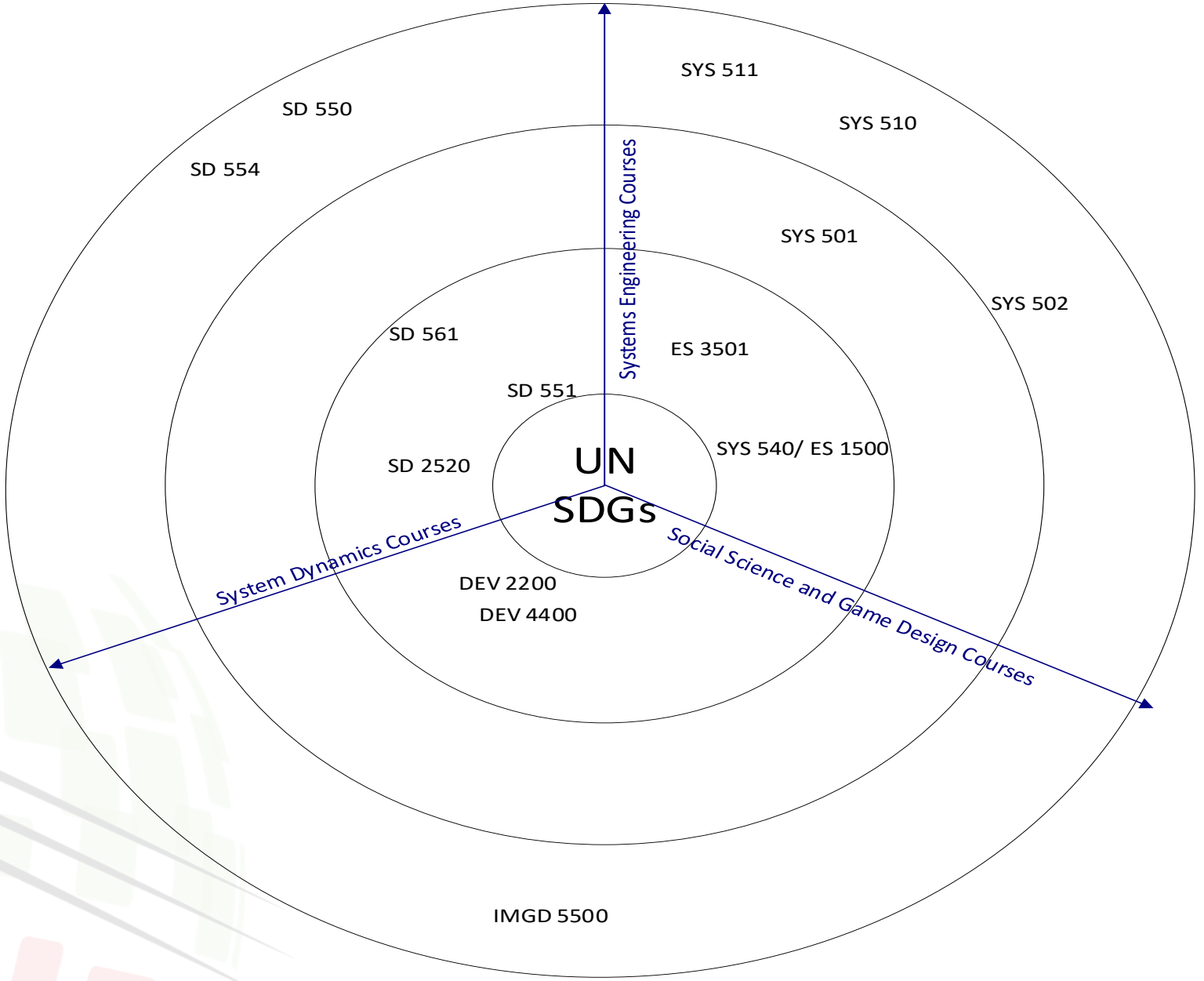
- Provide methods for evaluating the impact of the integration of social systems engineering

Case study of WPI curriculum using QNA

- WPI values theory and practice, and exposes all students to systems thinking and project-based systems engineering
- **The goal since 1977 is to create "technical humanists," who are engineers grounded in their discipline-specific fundamentals, but who also have advanced knowledge of social aspects on technology's impact, including its development, adoption, and disposal.**

- Qualitative network analysis (QNA) is particularly useful for policy cases
- Aim to identify relationships that currently exist through university policy focusing on sustainability and systems
- Survey of faculty involved in systems engineering, system dynamics, and game design
- The study generated discussion about how systems education can play an important role in training future engineers

Results: closer proximity to center indicates relevance to UN SDG



WPI relevant course listings

Dynamics	Engineering	Social Science and Game Design
SD 551 Modeling and Experimental Analysis of Complex Problems (All)	ES 3501 Project Based Introduction to Systems Engineering (9,11,12,17)	DEV 220 - Case Studies In International Development Policy And Engineering (All)
SD 561 Energy and Environmental Dynamics (6, 7, 13, 15)	SYS 540 Systems Thinking (6, 7, 8, 11, 12, 13)	DEV 4400 - Science Engineering and Design in International Development (All)
SD 2520 Modeling Economic and Social Systems (All)	ES1500 - Fundamentals of Systems Thinking (6, 7, 8, 11, 12, 13)	

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SD 2520 Modeling Economic and Social Systems (All)	ES1500 - Fundamentals of Systems Thinking	

There are limitations to this study. WPI was used as an example but is bounded by its characteristics. For example, a larger, public university will elicit different results. This study acts as a starting point for future work on evaluating how systems approaches across university disciplines can foster a transdisciplinary environment for working toward sustainability

Results -2

- Engineering and Public Policy GOV 210 is now part of WPI undergraduate program
- Publications
  - **Decolonizing stakeholder analysis for engineered systems** By Bhada and Stanlick at ASEE 2024
  - **Policy Modeling and Systems Engineering Literature Review** by Bhada , Polojärvi and Palmer INCOSE IS 2024 (Session: 10.6.4, Friday | Paper#474)

Some closing questions...

- What role do you see community voice having in the systems design process?
- What challenges/opportunities do you see in your classrooms to teaching community voice?
- What responsibility do you feel engineering educators have in teaching human impacts of system design?
- Is anyone interested in partnering, discussing, building, testing with us?

Questions ?