



Engineering with Engineers: Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity



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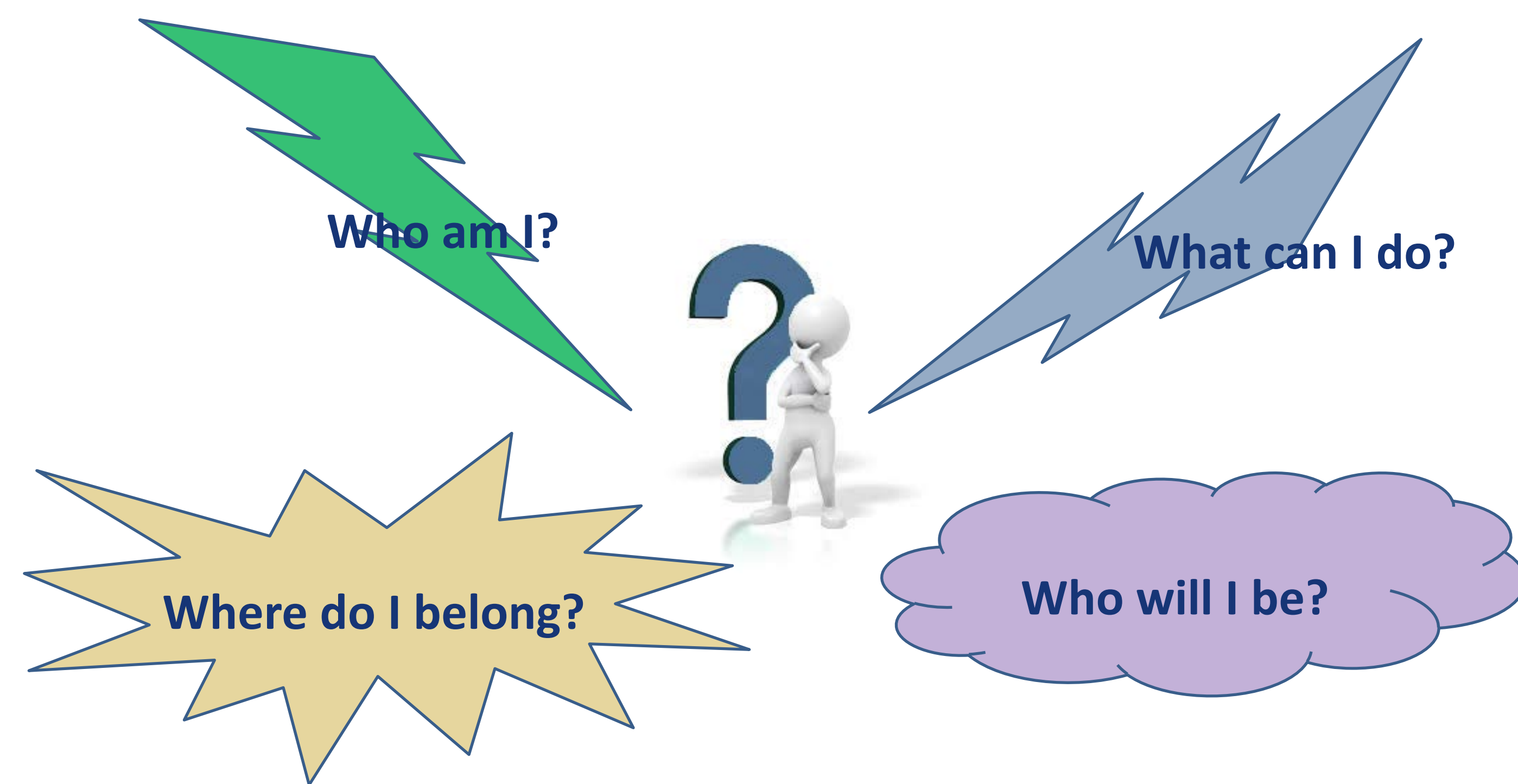
Objectives

This project develops a mechanical engineering program where students are immersed in a culture of doing engineering with engineers that in turn fosters an identity of being an engineer. This culture is created through changes in four areas that the research indicates are essential: *a shared department vision, faculty priorities, curriculum, and supportive policies.* The cross-cutting theme unifying these four areas of changes is a significant connection to industry.

Theoretical Framework

Identity is a determining factor in one pursuing, persisting, and persevering in a field. Identity development is a social process realized through a program's culture -- through the interactions of students, faculty, and industry, through participation in engineering-related activities, and through reinforcement of shared similarities.

The project will study the effects of cultural changes within the program on the identity of students and faculty, and how these identity changes affect students' engagement in and commitment to engineering. Results of the study will lead to a clearer understanding of the changes that promote engineering identities.



Scholarly Significance

- This research program will lead to
- Understanding how identities affect students' engagement, performance, and persistence.
- Changing incentives and training for faculty to promote industry engagement.
- Building strong industry-education interactions throughout the program.
- Better understanding of how best to create an inclusive educational environment.

Program Description

Department's Shared Vision

Doing Engineering with Engineers, Fostering Engineering Identities

- The department will be a hub of engineering with engineers.
- Faculty, students, and industry will share experiences and ideas.
- An Industry Advisor will nurture ties and facilitate communication and connection with industry.

Faculty Priorities

Maintaining Strong Connections with Industry and Incorporating Industry Practice into the Program

- Faculty will see their role, or identity, as guides moving students towards becoming practicing engineers.
- Faculty will use pedagogic methods that enable student engagement in activities that reflect what a practicing engineer might do.
- Faculty will acquire relevant industrial and teacher training.
- Faculty will participate in Industry Immersion Experiences.

Curriculum

Interacting with Industry and Cultivating Engineering Identities

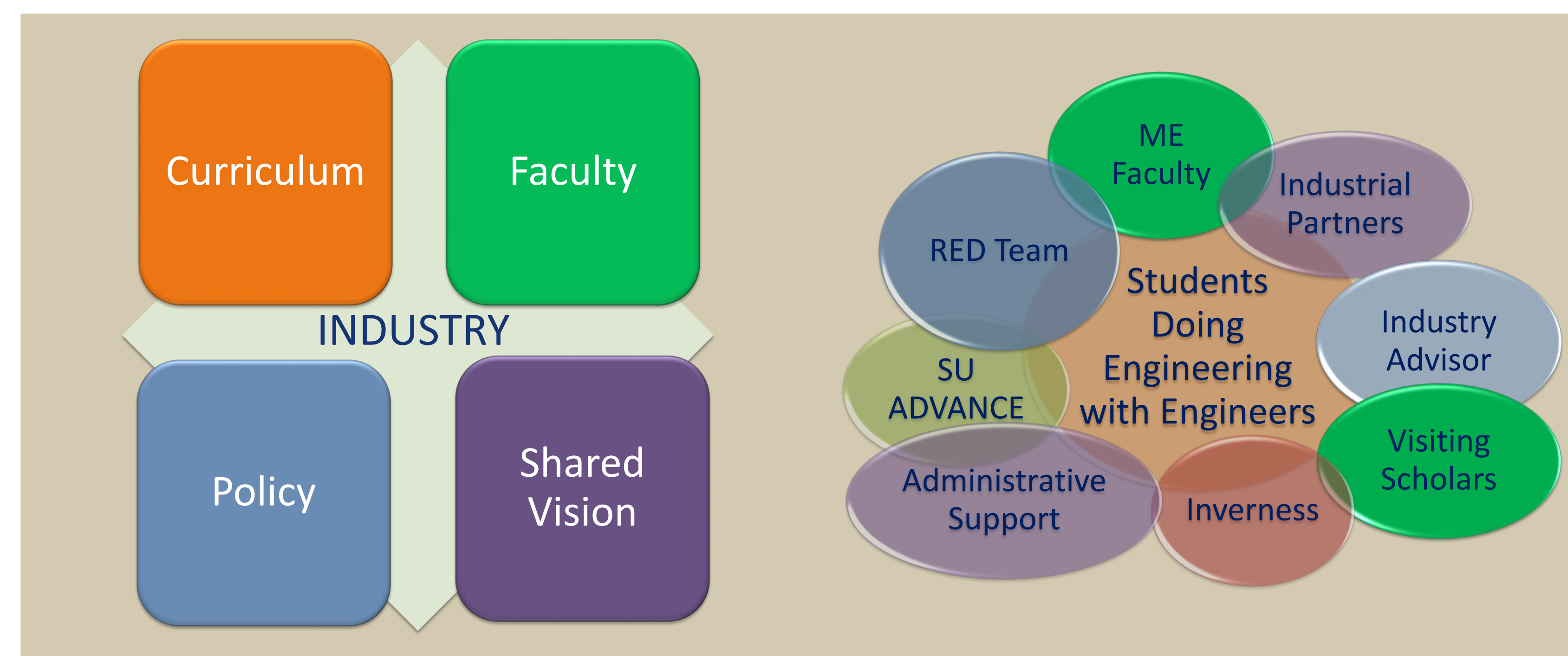
- Courses will include activities that reflect engineering practice.
- Vertically integrated design projects will connect to industry.
- Students will reflect on their education, identities, and career paths.

Supportive Policies

Change Expectations in Departmental Reviews

- Faculty Performance Reviews will recognize and commend faculty's engagement with industry and curricular revision.
- Department's assessment guidelines and procedures will be revised to reflect a broader view of assessment.

Synergy



Project Timeline

	1	2	3	4	5
Shared Vision					
Obtaining consensus on the shared vision	x				
Revise department mission	x				
Reflected Faculty & Industry					
Faculty industry immersion experiences		x	x	x	x
Faculty training and department vision day	x	x	x	x	x
Hire Industry Consultant	x	x	x	x	x
Curriculum					
Course development and revisions	x	x	x	x	x
Offer revised curriculum			x	x	x
Makeathons, industry seminars, and socials	x	x	x	x	x
Update and use makerspace	x	x	x	x	x
Policies					
Revise annual performance review evaluations		x	x		
Revise assessment guidelines and procedures		x	x		
Evaluation and Research					
Student & faculty surveys, IATs, and interviews	x	x	x	x	x
Required student portfolios and reflections		x	x	x	x
Campus visits by external evaluator	x	x	x	x	x
Dissemination					
Conferences	x	x	x	x	x
Workshops			x	x	x
Visiting scholars				x	x

Data Sources and Questions

During this project, changes to identities will be evaluated through interviews, surveys, portfolios, reflections, and audio & video documentaries. These evaluations will focus on three questions:

1. How have the identities of the students and faculty changed? Explicit and implicit measures will track identity changes.
2. How has the departmental culture changed? Interviews with faculty and students will provide a view of culture change in the program.
3. What happened in response to the changes that occurred? The path to change will be audio/video documented so that it can be shared with others in the future.

Current Status

- During this first year of the project, efforts have focused on building a shared vision, faculty and industrial connections, and revising the program's curriculum.
- Baseline survey, portfolio, and interview data have been collected.
- Documentation of ongoing changes in department culture specifically among faculty is continually being collected.
- Results will be disseminated in conferences, workshops, and papers.