Creative Changemaking within Complex Institutional Contexts

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Introduction and Literature Review

As one of the core institutions of society, higher education has contributed to the public good, supported local and regional communities, broadened democratic participation, and supported student learning. However, as both critics and supporters point out, this traditional role of higher education is under attack [1]-[5]. As market-oriented values like productivity, efficiency, and competition gain traction across many areas of social life, these pressures–combined with the evolving political environment [6], [7] and financial challenges tied to the expansion of higher education and the emergence of demographic and enrollment cliffs [8]–also reshape the identity and organization of higher education institutions (HEIs).

These "neoliberal" trends have an impact on the goals and priorities of HEIs, as well as the makeup and incentive structures of the very actors who constitute these institutions. Scholars point to a renewed sensitivity to changes that might have a short-term negative impact on student experiences [5], as students become increasingly redefined as "customers." Others point to how emphasis on cost-efficiency and flexibility—akin to the corporate world—lead to an increasing reliance on adjunct faculty, grad students, and non-tenure track faculty for the functioning of HEIs [3], [4]. As HEIs experience this industrial turn [1], tenured and tenure-track faculty in research-intensive institutions too often succumb to increased pressures for productivity [5], disincentivized from close interactions with students [3]. Furthermore, the emphasis on "marketable" skills undermines HEIs' role in the development of social and civic responsibilities [3].

While these neoliberal trends create new pressures on HEIs, they do not remain unchallenged. Actors within HEIs strive to maintain an institutional commitment to social and educational missions [1], even as they navigate market-oriented values and increasing scrutiny over efficiency and productivity. At the same time, the industrial logic of higher education is felt unevenly across disciplines, institutional cultures, and contexts. As higher education increasingly prioritizes its role in producing a globally competitive and productive workforce, investments have shifted toward applied and physical sciences, engineering, and computing, often at the expense of liberal education, humanities, and social sciences [3].

STEM fields, and particularly engineering and computer science, are viewed as critical to economic competitiveness. As such, they are specifically sensitive to industry demands and the socio-technical challenges of an expanding knowledge economy. While resources are shifting toward STEM fields at many HEIs, they often remain inadequate to support increasing enrollment and heightening demands for research productivity. Positioned as both beneficiaries of this prioritization and key sites where market-driven values are reinforced, STEM disciplines feel the intense pressures of the industrial logic while also resisting it. Within STEM fields, change-making efforts exist across institutions, seeking to improve curriculum, pedagogy,

culture, and student experiences, and aiming to broaden democratic participation and challenge the narrowing effects of market-oriented values.

The fact that these higher education trends are rooted in large, systemic societal changes complicates expectations about what changemakers can achieve and shape how they may navigate institutional change in their different contexts in creative ways. There exists a growing body of literature regarding change-making processes and outcomes in HEIs. For example, prior research has described an array of change strategies [9], [10], different change theories leveraged in change-making efforts [11], and the role of social relationships [12] and leadership [13] in determining change-making success. Since individual academic units, no matter how large, are only a small part of the overall HE system, further investigation is needed regarding how institutional context and cultures impact change efforts [14], [15].

In this paper, we examine how departmental and disciplinary culture, and the broader institution of higher education, influence change efforts in HEIs. In this study, we make comparisons across academic change teams who receive the same National Science Foundation (NSF) grant, and thus share overarching goals and requirements, allowing us to focus on the role of institutional and cultural contexts in shaping change-making processes and outcomes.

Data and Methods

Our study is situated in the context of conducting participatory action research (REDPAR) with the NSF Revolutionizing Engineering Departments (RED) grant recipient teams. RED teams are based within different HEIs and they implement unique strategies to catalyze and sustain revolutionary changes in their home departments or colleges. The desired outcomes vary across institutions and include curricular change, pedagogical transformation, programmatic innovations, implementation of new policies and structures, shifts in relationships among members of the unit, connections with industry partners, and more. As described on the NSF RED website, many projects have a "focus on organizational and cultural change within the departments, involving students, faculty, staff, and industry in rethinking what it means to provide an engineering program."

In this IRB-exempt research project, we examine the change-making processes and outcomes of seven teams from the first three RED cohorts, who were embedded in varying institutional and cultural contexts. They represent several different engineering disciplines, including mechanical engineering, computer engineering, and more. See Table 1 for an overview of participant and institutional characteristics.

Table 1. Participant and institutional characteristics.

Institution	Public or private	Research status (Carnegie 2025)	Size and setting	# of interviewees	Roles of participants
1	Private	RCU	Medium, primarily residential	3	PI, eng ed, soc sci
2	Public	R1	Large, primarily residential	4	Eng ed, soc sci (3)
3	Public	R1	Large, primarily residential	2	Eng ed, soc sci
4	Public	R1	Large, primarily residential	1	Soc sci
5	Public	R2	Large, primarily non-residential	2	PI, soc sci
6	Public	R1	Large, primarily residential	2	Eng ed, soc sci
7	Public	R1	Large, primarily non-residential	2	Soc sci, eval / soc sci

Primary data collection and analysis were completed by three researchers on the REDPAR team, including one graduate researcher and two research staff. For our analysis, we utilized two key data sources (protocols available upon request): 1) baseline focus groups conducted with each of the seven focal RED teams during the first year of their grant period (2015-2017), and 2) retrospective individual interviews with changemakers from each team after their grant period concluded (conducted by the three researchers in May to September 2024). For baseline focus groups, all active members of the RED team were invited to participate. RED teams are composed of members holding different roles and expertises; for our changemaker interviews, we prioritized recruitment of team members likely to have deep knowledge of the change process, including PIs, engineering education experts, external evaluators, and social scientists.

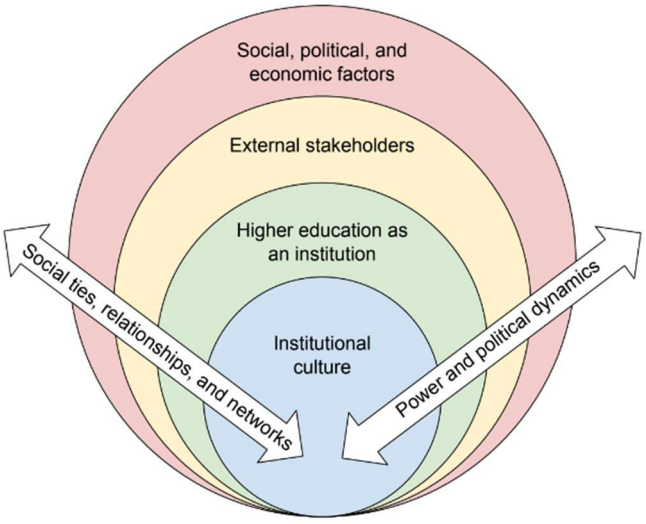
While the baseline focus groups provided helpful background regarding team members' perceptions of their change-making context and initial change strategies, the retrospective interviews allowed us to learn how contextual factors facilitated or constrained teams' change-making success. Engaging with these two data sources enabled us to gain a more comprehensive understanding of each team's processes and outcomes through their reflections at multiple points in their change-making experiences.

To analyze this data set, the focus groups (N=6) and interviews (N=16, with a range of 1-4 interviews per institution) were transcribed using Rev, then coded by two of the primary researchers using Dedoose qualitative data analysis software [16]. Researchers generated analytic memos to capture insights throughout the coding process. To ensure analytic validity, we used regular research team meetings to discuss emergent questions and examine data excerpts together, thus clarifying the definitions, boundaries, and nuances of our coding structure.

To ground our analyses, we leveraged the characterization of context outlined in Kezar's change macro framework [17]. This holistic conceptual framework highlights layered dimensions of context that facilitate or inhibit change-making processes in higher education, and is thus well-aligned with our focus in this research project. To build on Kezar's framing, we also attended to the presence of social relations, power, and political dynamics across the layers of the change-making context. See Figure 1 for a visual representation of our conceptual framework.

To generate theoretical insights regarding creative change-making strategies within complex institutional contexts, we used an abductive approach to data analysis [18]. Abduction allows us to approach the findings with an informed theoretical agnosticism, balancing deductive and inductive orientations to the data. Specifically, our initial codes were grounded in Kezar's framework and our conceptual interventions, and we used analytic memoing to clarify or expand upon these initially defined categories. In leveraging this approach, we were able to generate nuanced interpretations of how institutional culture shapes change-making endeavors. At the same time, we identified observations of teams' creative change-making strategies (in italics throughout the text) that reframe the relationship between HEIs and change-making, deepening our understanding of how changemakers exercise agency to disrupt and revolutionize the structures of HEIs.

Figure 1. Conceptual framework based on Kezar's change macro framework [17].



Our analyses relied on participants' own accounts of the change-making process and outcomes, which may diverge from more formalized institutional change outcomes. However, by conducting multiple interviews related to each change project and analyzing focus groups where various team members are present, we were able to make broader inferences from these data sources. Furthermore, our interview protocol asked participants to represent their RED team's key project outcomes and the relationships between outcomes and organizational context factors using the Miro online whiteboarding platform [19]. The visual representations generated by participants on Miro served as an additional data source to triangulate findings related to the conceptual framework through our abductive approach.

As a participatory action research project, our approach to research involves close collaboration between researchers and participant-experts in the RED community to generate theoretically and empirically-grounded insights [20]. In the case of this paper, our full research team consists of higher education scholars and practitioners (overlapping categories) with a variety of higher education journeys, disciplinary backgrounds, methodological expertises, institutional positions, and tenure and tenure-track statuses. Three of our authors have been members of RED teams and have brought the lenses of their experiences within RED and beyond to shape the framings utilized and analytic interpretations generated within this project.

In this paper, we focus specifically on the two innermost layers of the change macro framework: institutional culture and higher education as an institution. Institutional culture refers to disciplinary or departmental identity and value systems. For example, we attend to whether disciplinary identity is dynamic and unsettled, or whether the discipline/department has a settled and historically entrenched identity. Regarding value systems, we attend to how teaching, research, and/or service are valued within the department. These dimensions of institutional culture are often closely related to the broader structures and systems of higher education as an institution.

By higher education as an institution, we mean "the rules of the game" in academia that shape faculty power and shared governance. This encompasses the expectations placed on faculty and staff, the curricular requirements, the presence of different centers and units on campus, the degree of departmental autonomy, siloing, and the overall ecology in which change efforts are embedded. Although some systems and structures are difficult to transform, we argue that changemakers rely on creative strategies to find pockets where they can innovate within these constraints.

Below, we describe three key themes that emerged regarding how organizational contexts shape change-making processes and outcomes, as well as the creative approaches that changemakers implement to navigate these constraints and opportunities.

Theme 1: Engineering and Disciplinary Identities

Engineers' epistemological frameworks can contribute to complex orientations toward change-making processes. For example, participants identified different aspects of engineering culture that influence the process and outcomes of change-making, such as "think[ing] about change in a really pragmatic way," "see[ing] things in ways that isn't messy," or understanding change as "a technical problem with a technical solution" rather than a social or organizational process.

In addition, beliefs that change should be emergent rather than managed affected some transformation efforts. One participant reflected:

> I would say that the assumption of self-directed or emergent change remains the underlying assumption of the right way, the natural way, the appropriate way to approach things. I don't think we have a whole lot of individuals who would be willing to sign totally on to the idea that there should be change management. I think emergent change, self-directed change is an idiom that goes way back in [discipline]. Even if it's never taught overtly, I think [professionals in the discipline] get that, and I think they come to value it and probably bristle at efforts to be a little stronger about managing change. I think that's something we didn't really account for.

Since their training predisposes them to recognize technological over cultural change, engineers' perspectives can constrain and define change processes. In other words, engineering faculty are highly aware of ongoing technology-induced change, which happens organically due to advancing boundaries of engineering. From this perspective, organization-focused change may seem to be top-down, overbearing, and unnecessary, causing powerful engineering faculty members to push back against change management processes. Put more simply, faculty who observe change happening organically through technology may see institutionally-driven change initiatives as misguided or a waste of time. Faculty members who are suspicious or critical of change can thus create barriers to deliberate change management while still believing change is constant and ongoing.

In other cases, disciplinary identities can contribute to building motivation, vision, and momentum for change. For example, a department's aspirational values of being "cutting edge" can be mutually reinforcing with a commitment to pedagogy:

> Well, I think this came out of people, faculty members who were very committed to the pedagogical aims and really interested in pedagogy, and a department head who wanted it to be a cutting edge program and who wanted to update and improve what the undergraduate program was all about, in part because these departments are complicated, or fundamentally it's just interdisciplinary, and the curriculum wasn't really, I think, well aligned with who they were trying to become and what students needed. And so, I think there were both reasons at the, "this is a really important, fascinating pedagogical

> exercise" from people who are really teaching focused, as well as from a head perspective, "we're an atypical department." It's very interdisciplinary, and our curriculum doesn't align with our faculty. And if we're really going to try and strategize who are our faculty and who are our students and where are we trying to go and what is the future of [engineering discipline], we need to rethink this.

As noted in this excerpt, disciplines and individual departments within engineering exhibit differing degrees of openness to transformation, shaped by their particular histories and identities. Whereas some disciplines and departments are more well-defined and static, others are more contested and adaptive. Some academic units are highly "convergent" in the sense of focusing on transdisciplinary integration to understand and address complex problems [21] (as opposed to other meanings of "convergent" as a process of narrowing to a solution in engineering design processes [22] or as a characterization of disciplines and departments with high epistemological cohesion [23]). Convergent approaches may be more common in newer units that are more dynamic, have more immediate application to real-world issues, and have colleagues with connections to multiple disciplines, departments, and organizations. For example, bioengineering is a newer discipline that has emerged in recent decades, and bioengineering units are often composed of faculty members with diverse disciplinary backgrounds and expertises. Such units may be more open to deliberation and adaptation and more willing to experiment with different models.

In the context of programs that span a range of disciplinary perspectives, a creative strategy for change-making is *leveraging ideas, influence, and social connections within and across departmental and disciplinary affiliations*. One participant elaborated on how this unfolded in their change-making process:

> You actually get a lot of ideas and a lot of possibilities that you wouldn't have had if everyone has the same training. And with that, the richness of connections to other departments is extraordinary in this group and rare. You don't normally get that many faculty that participate in 87 other things as you see in a department like this.

When members of the academic unit hold highly variable experiences and disciplinary identities, they can introduce new possibilities inspired by approaches that have been tried elsewhere. In contrast, academic units with longer histories may be more entrenched in traditional approaches, fixed notions of expertise, and a stabilized curriculum, and therefore be more resistant to change.

The interview data indicates that larger and more well-established disciplines and departments, particularly those at R1 institutions, may be more heavily siloed, prone to taking on an "institutional mantle" that prioritizes preservation, and have strongly embedded scholar-academic belief systems [24]. For example, one participant mentioned characteristics such as "authoritative textbook[s]," the "old guard" that consists of "long-standing, really successful and influential people" and "legendary figures," and a sense of "history and heritage." Another

participant reflected that their colleagues who were invested in traditional approaches "genuinely were opposed to these changes more philosophically." One changemaker described how such qualities can influence day-to-day functioning and the possibility of change: "And so you basically had this really fixed way of doing things that really shaped things, and also set the framework for how faculty interacted with each other and how they identified themselves."

In one such institutional context, changemakers enacted a creative strategy of *focusing on relational and cultural change rather than curricular change*. As a member of this RED team shared:

> People have, I think, very deeply held beliefs about the curriculum in ways that are either emotionally driven, or whatever they are, they're not exactly evidence driven. And in the curricular world, they will argue to the death about whether some particular concept should be included in a course or not included, or it should be in a different course or whatever. But on these relational things, I don't think people had as deeply held beliefs about what the right answer is. And they felt... I think at the beginning I said that people were always willing to listen to us and to the extent that they could prioritize the time, they would come join us at a meeting or if we had one of those coffee events or something, they would come, and they recognize the value of our efforts to try and build community. So I don't remember anybody like vetoing things the way I'm talking about on the curricular side.

When disciplinary identities present barriers to transformation, addressing interpersonal dimensions can be an entry point to organizational change that circumvents resistance. In addition to an emphasis on tradition, a closely related aspect of disciplinary identity is conceptions of rigor, technical knowledge, and what a "valid" education entails in a particular discipline. Several participants described how members of their departments expressed concerns about "watering down the content" or that increasing the openness and transdisciplinarity of a program would lead to a loss of identity. For example:

> There's probably several faculty who [have] been teaching the course the same way for a long time, didn't want to make changes to the way that they were teaching, didn't feel like there was any issue with it, didn't want to water down the curriculum or the applications. They wanted to [feel] like… [...] "It's supposed to be a super tough major, and I love that my classes are weed out." The faculty that are like "one of three of you is not going to make it" and they're proud of that. And then they don't want everyone to succeed.

One potential change-making strategy in these contexts is *framing change as a response to the demands of a changing field*. Given the rapid pace of change in technology, disciplinary knowledges and practices, and broader society, some faculty members worry that "we teach them stuff and then it's outdated by the time they leave." To prepare students for careers in their

disciplines, programs need to strengthen students' ability to navigate a dynamic field. One participant elaborated:

> So just that rapid pace in the world changing so quickly. One of the things we could do is kind of say, well, by adapting your teaching a little bit and giving students more opportunities to learn how to be flexible, to [teach] them to teach themselves a bit, maybe they can adapt better to that fast-paced [disciplinary] world. Because for a lot of them, they come through this very rote, this is how you do [discipline], this is the way it works. And then we teach it to the next generation and so forth.

Relatedly, disruptions to the status quo in the broader field (e.g. recognizing systemic inequities in educational access and experiences, reckoning with losses in enrollment, etc.) can call into question traditional forms of departmental or disciplinary identity and increase awareness of the need for change.

Disciplinary and departmental identities reflect the interplay of institutional cultures and how departments are created, developed, and maintained within the institution of higher education. These identities often play a substantial role in defining possibilities for transformation within a given academic unit. In the next section, we examine how institutional structures themselves can also facilitate or impede change-making processes.

Theme 2: Structure and Governance

The second theme focuses on structure and associated governance models. Structure in this case refers to the interconnected elements (people, organizations, units, etc.) and relationships that make up a system [25], [26]. Structure is defined as persistent relational patterns that determine what behaviors are possible; significant behavioral change thus requires changing existing relationships or structure. In this context, governance consists of processes that take place within the structure that seek to provide decision-making frameworks, provide operational guidance to define roles and responsibilities, perform functions of risk management, and balance sometimes competing needs [27]-[29].

The interviews of participants in the NSF RED program show that structural variations across institutions shape the dynamics of change processes in engineering education. In other words, like much engineering work, change in engineering degree programs is highly contextualized [30]. One big structural factor emerging from the interviews that influences change processes is scale, particularly department size and institution size and type. US engineering schools have a wide distribution of sizes as measured by enrollment, nearly four orders of magnitude [31]. These differences can shape change-making processes. For example, at smaller scales, departments may have more flexibility, which may foster a fertile environment for transformation as smaller units are less encumbered by competing interests and complex governance structures.

Within departments, internal factors that contribute to a sense of independence and make change more likely include: political power due to department size relative to other units, leadership, history of change, and not feeling a need to satisfy diverse constituent groups. Larger departments may experience a greater degree of autonomy to make decisions and changes. For example, one interview participant shared that because their department is among the largest on campus:

> [...] it operates in its own way. It just operates. So the connection to the broader institution is not so imperative. And we have to follow all the university policies and stuff, promotion and tenure and all that. But I wouldn't say that there's any significant driver. [Institution], a department that big has a lot of autonomy to run its business how it wants to.

Interview data indicates that changemakers enact a creative strategy of *identifying where the locus of power and possibility is within their institution's governing structure* and its particular relationships between departments, colleges, and the broader institution. In some cases, this locus lies within departments themselves. One changemaker shared:

> We operate in a very distributed fashion. So, in some universities, colleges have a lot of weight, and departments do what colleges say. [Institution] is a place where departments do what they want and colleges hope they can follow. So, there's a lot of power in the provost and there's a lot of power in the departments, and colleges tend to be weak at [institution]. That's been the tradition. [...] And so, this is a highly distributed place, which means it's actually a lot easier to make change. And so, that's really powerful.

Similarly, when departments are situated within a college with diverse disciplinary constituencies, this can also lead to greater autonomy within the department that enables change. An interview participant from another institution reflected:

> There'd be some institutions like where the department was part of a series of engineering programs …there would be some "being" up here that was preventing things from happening. As I say, because we're our own contained unit… and in a college of science and engineering, so math is in there, and chemistry. You can't have that much top-down control. They're too differing. They don't even have the same accrediting boards. We just didn't have that.

Organizational units with more diverse disciplinary constituencies could encounter resistance to change due to competing priorities within the unit and a lack of shared understanding of why reform is needed. However, departments within multidisciplinary colleges may also experience greater flexibility within a governance structure that is necessarily more loose given the differing nature of the disciplines represented.

In other institutions, the ability to create change seems to be related to the independence granted to colleges in an institution, and so change might best be situated at the college level where movement is possible.

> And the nature of our university is a lot of independence between the college structure. So we have about [number of] colleges, and those, the colleges themselves are somewhat very independent. And so we were already trying to change the whole, that particular college.

Whereas some changemakers operated primarily within their departments, this team found autonomy and a locus of power and possibility at the college level. These examples from different institutional contexts demonstrate changemakers' creative leveraging of their institution's characteristics and structures to generate momentum for transformation.

In addition to department and college structure, the nature of the institution itself may shape change-making processes and outcomes as well. Note that because larger departments are often situated within larger, research-intensive institutions, it is difficult to separate size and priorities at different levels. One factor that data indicates may account for the differences across scales is that larger universities often have more top-down policies, so that local bottom-up change efforts need to creatively adapt to or integrate with existing policies that are not necessarily aligned with the desired vector of change. One participant described:

> We were hoping to address issues of how to get things done in a highly siloed and highly hierarchical institution. [Institution] is a massive school and there's a lot of moving parts. And so making change in that space can be difficult. It is an institution that typically works from top down. As far as making change, that comes from the top, and then everybody has to change based on the policies of the institution. And I believe this was an attempt to do a little bit more grassroots, so bottom up. So seeing what kinds of changes we could inspire that wouldn't necessarily be policy changes, but perhaps small tweaks in the way things are done on the department level that could be done without policy.

In this context as well, the interview data demonstrates how changemakers are *adapting their approach in response to the constraints and opportunities of their institution's structure and governance*. While a highly hierarchical environment may not be conducive to sweeping, systemic transformation, the team was able to implement changes by focusing their efforts on smaller-scale, localized initiatives.

These examples of changemaking across different scales highlights an important paradox: while departments or colleges within institutions can accelerate localized change within their realms of power and autonomy, their independence and tight-knit nature often impedes broader diffusion. As one participant reflected, while the siloing of an institutional unit can be an advantage in

facilitating change, a downside is that “if you have things that work well and things that are successful,” “they tend not to perpetuate out because they remain. People assume that they're idiosyncratic to the silo [...].”

In addition, localized, non-systemic changemaking can make long-term sustainability contingent on individual champions who may eventually disengage or leave.

> I have memories of talking to people at REDCON [RED teams’ annual meeting]…and they were talking about how they were basically doing an approach to a piece of the program or to some people who were involved in the program and I thought, “Well that's going to be really hard to sustain because then it becomes very dependent on those individuals maintaining that position.” It's not something that becomes endemic or inherent in the program.

As reflected in these interview excerpts, changemaking within higher education contexts is shaped by the complexities and idiosyncrasies of institutional structure and governance and by changemakers’ responses to these constraints. The competitive, individualistic nature of academic culture may exacerbate these issues, with faculty members prioritizing their own success over collective or curricular goals, further complicating the landscape of collaborative change.

Theme 3: Ideologies of Success

The tension across scales, differing departmental, institutional, and disciplinary cultures, and lack of incentives for faculty to change, inform ideologies of success, defined as beliefs, ideals, and values related to what is required to succeed as a faculty member. The means of attaining success, as well as measures of success, differ for each academic unit and are dependent on the makeup of constituents within the unit as well as the broader institutional context. This section offers several suggestions on how to overcome prevailing obstacles.

Competing demands and expectations (instantiated in performance review and promotion and tenure criteria) put pressure on faculty members’ time and energy and shape their priorities. Given these realities, faculty members’ resistance to change has been documented. For example, Dana and colleagues explain why faculty resist change and list strategies for encouraging faculty to change, which are [32]:

> 1) Frequently engage faculty in the process of change. Dedicate the time required to adequately discuss the reasons and benefits of reform. 2) Clearly define what it means to reform and come to a consensus. Discuss what it means to reach these benchmarks and how success will be gauged. Appoint an appropriate entity to gather data and report back to faculty. 3) Recognize faculty for outstanding contributions to student-centered teaching, and value these contributions equally with research and service when evaluating

> academic promotion. 4) Secure sufficient resources to support faculty as they reform, including academic promotion incentives and faculty development costs.

RED projects were awarded to departments that proposed unexpected and revolutionizing changes situated within the particular histories, cultures, and structures of their contexts. Hence, ideologies of success need to be understood as one key dimension of change-making context.

In R1 institutions, as one participant explained, "if [faculty] don't meet those expectations, if they don't bring in the big grant money, if they don't publish, then they're not going to last." In tuition-driven institutions and institutions affected by the demographic cliff [8], emphasis is placed on prioritizing student enrollment. Popular STEM majors, including engineering and computer science, are seeing large course enrollments. Overhead and coordination related to working with larger numbers of undergraduate students and the difficulty in building relationships with students affect faculty in most HEIs. Faculty members are increasingly asked to participate in recruiting students to respond to challenges during the pandemic or the demographic cliff. A RED team member shared:

> The projections are that students are going to start dropping off at all kinds of institutions everywhere. Even though [institution] turns away 50% of its students, it's still also a concern. We're not going to have as many students applying…They're trying to actively recruit.

However, these increasing teaching and service demands are in opposition to the prevailing measures of faculty success. As one faculty member from an R1 institution said:

> Faculty get promoted and get tenure based on their research grants and their publications. Research, teaching, service. Service is the least important for faculty to do, absolutely lowest priority on their list. Curriculum-based service is even lower. If faculty are going to put their time towards service work, typically they're going to want to try to do that on a professional organization level. They're going to try and do that on the college level or maybe even the university level. But sitting in faculty meetings trying to figure out small changes offers very little return for faculty. So our entire project was basically based on a misalignment of priorities.

This comment provides insight into a potential strategy: faculty and administrators can enable meaningful changes by *adopting different performance and promotion criteria*. A department can adopt changes in annual performance reviews that incentivize and support faculty who engage in change-making. Organizational teams with authority over specific domains, such as curriculum committees, teaching evaluations, and performance review criteria, can be leveraged to instigate desired change.

In the greater ecosphere of HEIs, this strategy may be effective and useful for some departments. However, entrenched cultures in many departments emphasize individualism, which can generate a culture of competitiveness. As one participant reflected, “It's not that people don't want to collaborate, because they do, but … it's a low trust environment in a lot of ways… A team doesn't get into the National Academy, an individual gets into the National Academy.”

The current ideologies of scarcity of resources, recognition, and individual prestige are not conducive to the collaboration needed to create meaningful changes in the quality of teaching and mentoring, effective pedagogy, up-to-date curriculum, and culture. Even if faculty are interested in change, they may not have the bandwidth or feel invested in and committed to making it happen. A participant reflected:

> Faculty are necessarily focused on effectively short-term successes to show that they've got a publication record, a funding record, a presentation record. They followed whatever was successful for them, and if it was successful, it fit their short term, “got to get tenure and promotion” interest. Any other ideas were just distraction.

The observation that faculty struggle to prioritize change-making was mentioned often in the interview data. One changemaker shared, “We didn't have trouble with people buying in whether or not this was important. We had people trouble buying in whose job it was, or where on their priorities of importance that it fell.” Faculty are under the pressure of “strict hierarchy and [a] consistent sense of being overwhelmed with the amount of work to do. And so [they are] highly protective of time. So overwhelmed and busy with strict time priorities.”

As a result of the competitive nature of faculty culture and the positioning of time as a scarce resource, faculty have little incentive to change their own practices or contribute to change-making efforts within the current system. The individualism of organizational units and faculty–supported and enhanced by the system in which they operate–supports almost anti-curricular approaches. In other words, incentive structures discourage individuals from contributing their time to collective initiatives because existing structures are designed to free up time for faculty members’ individual efforts. One participant described how “unless something makes them shift, there's really no incentive to do that. They have to bring their own incentive. New faculty already have that as a value.” This quote offers insight into another possible strategy for success: *leveraging the interests and value systems of new faculty members, who can help establish a new path for the department and plant seeds for change over time.*

Interview participants highlighted a multitude of ways they sought to navigate these pervasive cultural and ideological challenges in their change-making initiatives. One creative strategy is *using intentional language to connect with concerns that resonate for members of the department community*. Change-making teams benefitted from identifying what connects faculty and what is the common thread for faculty. Frequently, changemakers leveraged faculty members’ shared care for the students’ wellbeing and learning (e.g., “we stopped talking about

the project as the project, and started talking about the concerns we thought faculty had about their students. Like you want to have a better classroom experience, here's what research says will make that happen.") and their performance as instructors (e.g., "what are the problems that you face in teaching? And let's see how these things might come together. And that made all the difference.") Faculty may be motivated to change if they realize that innovative pedagogies and curriculums may bolster enrollments in their classes and improve their teaching practices and evaluations.

Faculty may also be motivated by *identifying shared overarching values and goals,* such as those that can be placed into a mission statement, and then the collective can leverage these as a touchstone to instigate change. One changemaker reflected how:

> Really surprisingly easily, we all agreed on a new mission and direction for the department. I think the process of developing that and then all agreeing to it was in a way like a contract….it continued to remind people that yes, this was what they wanted and whatever we were asking to do or whatever we were changing was in service of that.

In addition to identifying collective priorities, changemakers can build motivation for implementing changes by *engaging with data that are relevant to faculty and that highlight the dissonance between their values and actual student experiences*. In one instance, RED team members collected data on student experiences of inclusion and belonging and shared them with the rest of the faculty:

> They were quite surprised to hear that no, our women and underrepresented minorities do not feel included. They do not feel like they're engineers….And they did recognize that because that …. dissonance, if you will, with their value and belief that they're providing everyone this great experience and they're great teachers. So that became the big lever that we were able to push to capitalize on prior beliefs, to shift them to thinking what they need to... how they need to be, and how they need to think about their roles.

While shifting individual faculty members' beliefs and motivations can be powerful, these strategies need to be complemented by the creation of a system and environment that is conducive to these change-making commitments. For example, a department can catalyze change by *providing encouragement and substantive support to faculty who are willing to make curricular and/or pedagogical changes*. Departments may free a faculty member's time by reducing their workload elsewhere; for example, one RED participant said that they have:

> …lots of support in terms of graduate students for grading, so they have time to work on curriculum improvement. We have strong positive enforcement, rewarding them in terms of the behaviors we want to see. The grant has resources within the concept we proposed, so we'll pay for course buyouts.

Finally, another strategy that changemakers used to address faculty resistance was *leveraging other departmental constituents, such as teaching faculty, staff, graduate students, and postdocs, to contribute to the changes.* One participant shared, "If you want to get a new program working, you go to the staff." Staff members are able to develop innovative initiatives and programs within their scope of responsibility that address change-making priorities. Similarly, another changemaker reflected on the important role of postdocs and graduate students:

> I think the assessments were good because having the postdocs and the grad students that were funded on the project allowed us to work alongside faculty. And so that allowed us to make real change in terms of assessments. I think otherwise, if it was all on the faculty to do, it wouldn't have happened. So those are still ongoing, we still have this really unique assessment platform, even though the grant ended two years ago [...].

Given the competing demands on tenure-track faculty members' time, it can be a powerful strategy to lean on other members of the department ecosystem whose roles and responsibilities are more closely aligned with changemaking efforts. However, existing hierarchies, relationships, and power dynamics between and among faculty, staff, and students (e.g., "that non-tenure track versus tenure track divide was very real") can shape what voices and perspectives are heard. These dynamics will be explored in greater depth in a future paper.

Discussion and Conclusion

The three themes discussed in this paper–disciplinary identities, structure and governance, and ideologies of success–are intertwined factors that cannot be understood in isolation. All of these contribute to culture, which is central to understanding how and why change occurs in engineering departments. Institutional structures—shaped by financial models, reward systems, and policies—interact with individual faculty agency to reinforce disciplinary norms and values. RED projects underscore that such individual values, deeply embedded in academic culture, often manifest as resistance to collaborative efforts or curricular reform, reflecting the anthropological principle of schismogenesis [33]. As scholars of change point out, power structures can vary greatly from organizational charts [17].

Our research data indicates, however, that when cultural shifts acknowledge existing organic change and technological innovations, they can catalyze broader transformations. Strategies employed by RED programs–such as carving out experimental spaces within existing structures, recognizing and adapting to negative impacts of technology on student learning, or recognizing conflicts between entrenched values and practice–suggest that change is more effective when it operates at the nexus of structural reform and cultural adaptation.

As mentioned previously, a recurring theme across RED projects is the critical role that time and resource allocation play in enabling change. Faculty time, a perpetually scarce resource, underscores the need for accessible, high-impact processes that align individual motivations with

programmatic goals. Institutions with a more localized, bottom-up approach to change often bypass rigid, top-down policies, creating pockets of innovation. However, sustaining these efforts requires integrating change into institutional habits and structures, making it less dependent on individual champions who must invest time in sustaining change.

Broadening faculty perspectives beyond their disciplines also emerges as a key factor in fostering openness to change, suggesting that interdisciplinary collaboration and a focus on societal applications can counteract the provincialism often associated with entrenched academic silos. Ultimately, engineering departments must balance their historical identities with a willingness to evolve, leveraging both structural innovations and cultural shifts to address the challenges of sustainability and relevance in higher education.

It is worth noting that RED projects, and change-making efforts more generally, may work toward change goals that are in alignment with or in opposition to broader societal forces such as the neoliberal trends described at the beginning of this paper. For example, strengthening connections with industry partners may enable an academic unit to reimagine the disciplinary canon and increase the relevance of its programmatic offerings. At the same time, these industry connections may also fall into neoliberal logics of producing "marketable" students. Though analyzing the content of change goals is beyond the scope of this paper, articulating the sociopolitical implications of different change-making projects could be an important focus for future inquiry.

In terms of the organizational context model (Figure 1), almost all the interviews in this data set focused on local institutional cultures, with influences (usually constraining) from the structures of higher education as the second most frequently mentioned category. In other words, the success of change efforts seems closely tied to the extent to which they build on an understanding of and ability to address local and immediate concerns. From this perspective, while external stakeholders and social and political factors clearly influence decisions and strategies, institutional and disciplinary cultures (the focus of this paper) often mediate the realities of and resistance to broader neoliberal trends, as evidenced by the change-making strategies laid out in our analysis. We will dive deeper into the nuances of these other codes in our framework and their interconnections in a future manuscript.

In this paper, we aimed to contribute to existing literature on change-making in HEIs by providing detailed descriptions of several contextual dynamics that exist within academic units and institutions. While the intricacies of the themes may play out differently across fields and disciplines (particularly Theme 1 regarding engineering and disciplinary identities), these findings are broadly relevant across engineering and non-engineering departments. Importantly, we also prioritized highlighting the creative strategies that changemakers use to exercise agency within the unique constraints and challenges of their organizational contexts. These creative strategies are as follows:

To navigate engineering and disciplinary identities:

- leveraging ideas, influence, and social connections within and across departmental and disciplinary affiliations
- focusing on relational and cultural change rather than curricular change
- framing change as a response to the demands of a changing field

To navigate structure and governance:

- identifying where the locus of power and possibility is within their institution's governing structure
- adapting their approach in response to the constraints and opportunities of their institution's structure and governance

To navigate ideologies of success:

- adopting different performance and promotion criteria
- leveraging the interests and value systems of new faculty members, who can help establish a new path for the department and plant seeds for change over time
- using intentional language to connect with concerns that resonate for members of the department community
- identifying shared overarching values and goals
- engaging with data that are relevant to faculty and that highlight the dissonance between their values and actual student experiences
- providing encouragement and substantive support to faculty who are willing to make curricular and/or pedagogical changes
- leveraging other departmental constituents, such as teaching faculty, staff, graduate students, and postdocs, to contribute to the changes

The strategies presented here are ideas that were shared in the interviews of the RED grant participants and are by no means the only strategies. It is important to emphasize that each academic unit must formulate its own creative strategy and measures of success, as each unit has a distinct culture and community and is part of a unique larger ecosystem. However, we hope that this focus on adaptability and possibility will be useful, relevant, and inspiring to changemakers in other contexts who are seeking to transform higher education systems.

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