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STEM-in-Society Programs Deserve Institutional Support

Bluesky, the social media platform that has emerged as an alternative to Twitter, has been hailed as a radically different kind of social media. As the platform runs on an open-source protocol, its users can customize its algorithms and content moderation according to their own preferences and even, should they be so inclined, pack up all their followers and posts and take them to any other site running on the same protocol. Bluesky's infrastructure is an antidote to behemoth platforms that dictate what kind of content is prioritized in users' feeds, mine user data for advertising dollars, and generally pursue perpetual growth. Bluesky's CEO, Jay Graber, is a graduate of the University of Pennsylvania's Science, Technology, and Society program.

Now, perhaps not *all* of Bluesky's success and guiding ethos can be solely attributed to its leader's choice of undergraduate major. But the platform exists to subvert the power dynamics of conventional social media and to offer an alternative that's sensitive to the society-level harms its predecessors wrought—and these are precisely the kinds of things STEM-in-society programs train participants to do. Across the country, more than 200 such programs teach students not only how social values, historical and political context, and public policies shape science, technology, and medicine; they also help students imagine how our technology-driven world might be better designed and regulated to reflect public values.

With science and technology increasingly mediating nearly every aspect of people's lives and opportunities, technology companies and their leaders wielding exorbitant influence, and federal funding for science and technology on the chopping block, there is a great need for people who understand and can navigate the complex relationships among STEM—science, technology, engineering, and math—and ethics, society, politics, and public policy. STEM-in-society programs have proven their utility and never been more needed—but paradoxically, they are in jeopardy nationwide.

We are researchers at the University of Michigan's Science, Technology, and Public Policy program, and over the last two years we conducted a comprehensive landscape analysis of US STEM-in-society programs. We found that while interest in these programs is growing, most face significant challenges: lack of backing from funders and university administrators and an unsupportive academic culture in which technical programs are co-opting STEM-in-society curricula, siphoning resources and relevance away from humanities- and social science-based programs.

We believe the field is at a critical juncture in which programs and stakeholders have the opportunity to come together to innovate to surmount these barriers and set STEM-in-society education on a sustainable path toward continued growth, relevance, and impact. Informed by the conversations we had with nearly 80 faculty, administrators, students, and alumni of STEM-in-society programs, we've developed a roadmap for program leaders, university administrators, and funders to work collectively to ensure that students are well prepared to tackle the world's complex problems and bend science and technology toward the public interest.

STEM-in-society programs date back to the 1970s, when the social and ethical challenges of emerging science, technology, and medicine were becoming increasingly clear. Environmental, antiwar, and antinuclear movements triggered academic research and educational initiatives focused on the intersections of science, technology, and society (inspiring an academic discipline later known as science and technology studies, or STS). Humanists and social scientists offered analytic frameworks, data, and moral support to reflect critically on the implications of innovation. Meanwhile, news of the Tuskegee syphilis study and other cases of unethical research on human subjects led to the establishment of bioethics programs, often inside medical centers.

These fields grew as new advances, such as in vitro fertilization, genetic engineering, and stem cell research, stimulated public concern and revealed that everyone—not just STEM and medical professionals—needed to be able to understand and make informed decisions about rapid advances in science and technology. By the end of the twentieth century, new science and technology policy programs emerged to cultivate interdisciplinary solutions that brought together STEM, social, and policy understanding of the world's most complex problems, starting with energy and the environment. Today, STEM-in-society programs have expanded their offerings to help students manage the new challenges and opportunities afforded by AI and other digital technologies.

To understand how the landscape of these programs has developed nationally, in early 2025 we published a report, *Broadening Horizons: How STEM-in-Society Programs Train Socially Responsible Scientists, Engineers, and Policy Leaders*. We identified 247 STEM-in-society degree, minor, or certificate programs hosted by 90 higher education institutions across the nation. We analyzed program websites to identify educational goals and audiences served and then supplemented those data with a survey, which 82 programs responded to. Finally, we developed six in-depth case studies based on 79 interviews with program faculty, staff, students, and alumni.

Our results showed that STEM-in-society programs span a range of foci (including science and technology policy, bioethics, and science and technology studies) and target audiences (e.g., undergraduate, graduate, continuing education), but they are united in their commitment to help students use tools from the humanities and the social sciences to systematically analyze science, technology, medicine, and related public policies. Our interviews affirmed STEM-in-society's shared ethos and methodologies, as well as leaders' and students' enthusiasm for how transformative and valuable these programs are.

We heard over and over again that participation in STEM-in-society programs unlocks a wide range of career and leadership opportunities by teaching technical majors to interrogate the social and political implications and context of their research and introducing non-STEM majors to technical knowledge and skills. Graduates learn how to respect and work across disciplines while developing crucial writing, teamwork, and critical-thinking skills. Those with STEM-in-society training report advancing in their careers faster than their STEM-focused peers, which resonates with research showing the long-term value of the "soft skills" honed by liberal arts education.

We also heard the same frustrations echoed across programs. Due to their inherent interdisciplinarity, STEM-in-society programs often lack a departmental home and a clear advocate at higher levels of university administration, which limits and complicates funding pathways. Even those housed in a single department or college sometimes have uneasy relationships with unit leaders who may feel—because so many STEM-in-society students come from outside the program's home unit—that they are providing a service to other departments on campus without proper remuneration. One faculty member noted that, for these programs to succeed, they must be "multigenerational," but this "requires much more commitment of resources from the universities. Otherwise, you just have these charismatic people who are doing it for very little compensation."

Meanwhile, recent initiatives to encourage STEM departments to incorporate attention to social, ethical, and policy issues in their curricula have, perhaps paradoxically, further jeopardized STEM-in-society programs. Motivated by dedicated funding programs or incentives from university administrators, STEM departments often try to address these issues without knowing that some version of STEM-in-society education likely already exists on their own campus. If they do reach out to STEM-in-society faculty or staff, they treat this expertise as peripheral. Or they may find these perspectives "too critical" or not focused enough on solutions as STEM traditionally sees them. In such situations, STEM-in-society programs' comparatively small sizes, precarious financial positions, and nuanced approach to expertise make it difficult for them to assert themselves. By contrast, STEM departments occupy a privileged position—both in the university, because they bring in

external funding, and in the public eye, because they are credited with training students for higher-paying jobs.

As a result, the more visible and funded STEM fields have simply begun to claim STEM-in-society knowledge. They often do this without realizing that the roots and future utility of such expertise depend on the health of the humanities and social sciences and that STEM-in-society programs have been doing this work all along. This trend creates a vicious cycle, making it even more difficult for STEM-in-society programs to justify their existence, expand important activities, and engage in succession planning.

Now add to this equation the massive federal funding cuts that are rocking science and academia. Humanities and social science departments generally, and STEM-in-society programs specifically, are likely to be collateral damage as institutions are forced to make tough decisions in the face of enormous budget shortfalls. They will undoubtedly prioritize investment in STEM departments that seem to promise job security for graduates and produce research likely to generate industry funding.

To survive, and even thrive, against these headwinds, we call for STEM-in-society programs to establish a network that will foster mutual support. Regular connections among program leaders across schools will enable them to share strategies for managing the common problems they face, including how to maintain equitable relationships with STEM counterparts and effectively promote their work to university administrators. It might open up new avenues for collaboration—student exchange programs, for example, or centralized career guidance—and provide resources for those who want to establish new programs. And it could help programs mobilize for greater recognition, including asking accreditation organizations to require students receive STEM-in-society training as part of their engineering and technology education.

Meanwhile, university administrators who increasingly appreciate that interdisciplinary education is crucial to managing today's and tomorrow's challenges must recognize that STEM-in-society programs can serve as a bridge between STEM and the humanities and social sciences. But they require active cultivation and support. Administrators should encourage their STEM departments to take advantage of existing STEM-in-society programs on campus, rather than building pale imitations in-house, and provide resources to facilitate effective, balanced communication between the two. They can make it easier for students to take courses outside their home departments and can reward the humanities and social science departments and schools that offer STEM-in-society training for the services they provide to the university. They must also ensure sustained funding for STEM-in-society programs, which constantly innovate curricula to meet the newest science and technology challenges; after all, these curricula are likely to yield better and more cost-effective training that prepares graduates to meet the wicked problems of the day. University administrators could also help STEM-in-society programs develop curricula for the growing number of mid-career professionals seeking continuing education; our research discovered that this market is largely untapped.

Finally, philanthropic and government funders can signal their support for STEM-in-society training by recognizing the importance of long-standing programs through their grantmaking priorities, requirements, and individual grant decisions. The research community responded, for example, to the National Science Foundation's requirement that their projects have "broader impacts" by expanding their public engagement, developing equitable mechanisms for marginalized communities to participate, and training a wider range of learners. Ultimately, this requirement has generated university infrastructures to help researchers achieve and demonstrate the broader impacts of their work. Funders could have similar impact by directly supporting STEM-in-society programs with robust intellectual infrastructure rooted in humanistic and social scientific expertise. They could also support equitable partnerships between STEM and STEM-in-society researchers who have shared intellectual goals. Finally, funders are in a unique position to establish and provide logistical support for the STEM-in-society network described above, as well as to offer guidance on how such programs can remain strong over the long term.

STEM-in-society programs are more important than ever. The public increasingly reports feeling abandoned by scientists and universities, who produce research that does not reflect their communities' experiences or concerns. By teaching students and professionals how to engage these concerns and better serve society, STEM-in-society programs can help repair social distrust in elite institutions. They can also support citizens to participate more actively in public and policy discourse about emerging science and technology. And by coming together to share resources and best practices, STEM-in-society programs across the nation can support the development of leaders who, like Bluesky's Jay Graber, will go on to challenge socio-technological norms.

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