Within this structure, we also see an opportunity for EECS to reorganize and refocus, especially to go beyond its previous binary structure. The most natural way to achieve this would be to build three semiautonomous groups within EECS:

- Electrical and Computer Engineering (ECE)
- Computer Science (CS)
- Artificial Intelligence and Decision Making (AI+D)

The spectrum of activities in EECS could be divided naturally into three overlapping areas: ECE, CS, and AI+D. ECE would represent the hardware side of computation, focusing on new technologies, devices and systems, quantum computing and engineering, and information science (including representation, storage, and communication of information). CS would represent much of traditional computer science, including systems, theory, and algorithms. AI+D would combine machine learning with our traditional strengths in information analysis and decision sciences to create a new area that purposely spans the EE and CS divide.

The major risk of this approach is not being able to strike the balance between the two constituent parts of the SCoC, Common Ground and EECS. Two potential scenarios represent undesirable outcomes. EECS could come to dominate the SCoC, thus yielding a school rather than the original vision of a college of computing. Alternatively, the legacy of excellence in electrical engineering and computer science could be lost in favor of service functions that provide excellent instruction to the rest of MIT but do not continue to advance the state of the art.

Our working group believes that these risks could be managed and overcome. We also believe that this potential structure represents the most favorable balance of pros and cons for the SCoC.

IMPLEMENTATION

Up to this point, we have discussed our models as though they could be successfully implemented by fiat. In reality, moving from the existing structures to a new configuration would be far from trivial. Here, we briefly discuss how these models might be implemented and highlight some of the

complexities and challenges, particularly as they relate to the disposition of the current EECS department.

The most immediate implementation challenge concerns those in the EECS department who identify as engineers. Not surprising, those who identify as electrical engineers wish to remain associated with the world's leading school of engineering and not be entirely subsumed by the SCoC.

This problem could be solved by allowing Course 6 to remain in the SoE, creating a new course number for those who wish to be in the SCoC, then allowing existing EECS faculty to self-select. Those who wish to be labeled as engineers would stay in SoE, those who wish to be labeled as computer scientists go to the SCoC. As discussed earlier in this report, however, this approach creates the same sorting problem mentioned above: the bulk of the EECS members having a strong incentive to identify as CS and leave the EE department below scale. This also would create the related problem of determining who gets to hang on to the "Course 6" label— which, though entirely symbolic, has the potential to produce a conflict worthy of a *Game of Thrones* sequel.

To avoid instantiating the existing EECS divide and consequent acrimony in the new structure, an interim approach would be to temporarily construe the entire department and all its courses as sitting both in SoE and SCoC. EECS faculty would then be free to continue their teaching and research without the need to declare their allegiance to one side or the other. Temporarily treating EECS as one large group with two homes would allow its members to engage with the new SCoC teaching structure while at least postponing any forced sorting.

Our hope is that the reorganization of EECS into ECE, AI+D, and CS would represent vibrant activities in increasingly active areas and fit well with the vision of the SCoC. We believe it also would lead to productive interactions across the EE/CS divide, particularly in the AI+D group, and begin to remove the current boundaries. Having developed a more productive set of intra-departmental interactions, any subsequent sorting or labeling would likely be more productive and less contentious.

The major cost of this approach is simply that managing a group of 130 faculty who report to two deans would be complicated. However, the current department already is managing most of that

complexity. Incurring the temporary costs of continuing with this administrative overhead appears to have more upsides than locking in a more efficient, but clearly suboptimal, structure.

SUMMARY: STRUCTURING KNOWLEDGE PRODUCTION

The challenges facing computing at MIT are largely the consequence of success. While the Institute has likely always adjusted its structure to match the changing landscape of research and teaching, the rapid expansion of computing has been a bit of an extreme-conditions test demonstrating that the pace of innovation now exceeds our existing adaptive processes.

While launching an entirely new entity like the SCoC feels like a unique moment, this is probably not the last time that MIT will face a mismatch of its own making. If this episode has implications beyond the study and teaching of computing, it is perhaps that we need to develop more dynamic structures for reorganizing ourselves as the state of knowledge and practice evolve.

MIT faculty have proven quite adept at working around structural impediments, often creating significant innovations in the process. It is not clear, however, that such work-arounds represent the optimal configuration for knowledge production and dissemination. Explicit attention to the ways in which MIT reorganizes itself might yield an even more productive, more impactful, and more collegial environment.

APPENDIX

PROPOSAL FOR THE SCHWARZMAN COLLEGE SOCIETY OF FELLOWS (SCSOF)

The report of the working group on the organizational structure of the SCoC includes the concept of "Faculty Fellows" as one of the ways for non-SCoC faculty to engage with the SCoC. This proposal elaborates on how Faculty Fellows would benefit MIT through the SCoC. We believe that a Society of Fellows is a valuable contribution to MIT and the SCoC—whatever its ultimate configuration with respect to permanent, rotating, single, or multi-community members. The Schwarzman College Society of Fellows (SCSoF) would be a permanent organization with rotating membership distinct from the proposed research clusters or departments. We offer a proposed structure for the SCSoF below.

This concept builds on similar units at other universities such as the Simons Institute for the Theory of Computing, Berkeley's Miller Institute, the Center for Advanced Study in Behavioral Science at Stanford. It also builds on the several Societies of Fellows at Harvard, Princeton, Columbia, and Michigan, which often host scholars in the humanities as well as social sciences. Each of these organizations combines its organizational features in different ways and often with different substantive foci and institutional emphases. MIT would invent its own particular flavor—and that flavor would ensure a cross-Institute computing-focused alliance of disciplines. The central benefit is a permanent organization, with possibly unique endowment and name, but with rotating members from outside as well as inside MIT. The Weatherhead Center for International Affairs at Harvard is another possible model that combines internal and external appointees.

We offer this proposal for a SCSoF to create a center through which:

- All departments, laboratories, and centers will have a stake in the SCoC.
- Barriers for general participation in computational research and curricula will be minimal.
- Cutting-edge research takes place in the SCoC for all disciplines, including computer sciences, engineering, sciences, humanities, and management.
- The SCoC would have a unique contribution to MIT's educational commons.

While the entire organizational structure of the SCoC may facilitate participation and investment from across the Institute, the SCSoF has particular advantages:

- Rapid adoption of computational fields as they develop.
- High external and internal visibility.
- Accelerated commencement of SCoC activities.
- Accelerated diffusion of innovations across MIT and externally**.**
- Naming opportunities for fundraising at several scales/amounts.
- Bringing to MIT expertise in fields that we do not offer but are essential to the digital world (e.g., law).

Structure

1. MIT faculty appointments to the SCSoF will be for a limited term (e.g., three to four years). The SCSoF Fellows will be selected competitively by an internal advisory committee with cross-MIT representation. These may be independently named or endowed (e.g., The XYZ Computing Fellow). The MIT-SCSoF Fellows would come from a range of disciplines and departments and would retain their positions in their respective departments. All promotion considerations would remain in those departments. Each Fellow would have resources to support their research and teaching efforts.

2. The center also would host visiting external scholars or experts. Visits would typically be one to two years. The Visiting-SCSoF Fellows would be selected competitively by the internal advisory committee in collaboration with a specifically appointed selection committee. The visiting Fellows would come from other academic institutions, research labs, or industry. They might be relatively senior researchers or promising, newly established early career researchers. Applications would be solicited annually (with a rotation established from the outset). The Visiting-SCSoF Fellows might be separately endowed with a distinct name, which would provide additional funding opportunities.

   In addition to their research and collaboration, the Visiting-SCSoF Fellows would be obligated to contribute to the MIT educational commons. They might, for example, create a computation module that would be jointly offered by a department and the SCoC. They might offer a short course, or they might contribute a few MITx lectures via the Office of Digital Learning (ODL).

3. The SCoC could also create a competitive fellowship for postdocs (SCoC Postdoc Fellows). Each postdoc would be assigned to one or more Faculty Fellows (i.e., two Fellows may co-advise two postdocs). Postdoc Fellows would be obligated to contribute to the educational as well as research contributions of the faculty partner. This obligation would not only contribute to the MIT curriculum but would provide materials visiting that Fellows might take back to their home institutions (if they are academically appointed).

Contributions to MIT

All Fellows (MIT, visiting, or postdoc) would be expected to participate in seminars designed for a wide audience (i.e., all members of the SCoC and MIT community). The seminars would be organized by a Postdoc Fellows committee. More specialized seminars would be expected to arise naturally. The SCSoF would have its own seminar with regular sessions scheduled to develop internal community.

In addition to their computing research, SCSoF Fellows would be expected to develop a module supporting computing for the Institute, teach a portion of a class, or develop a short series of MITx lectures. This would be a condition of appointment and continued affiliation. Fellows may create SP.xxx residential subjects for MIT credit or assist in instruction in a regularly offered MIT subject.

A Schwarzman College Society of Fellows has clear benefits:

- Departments would have a stake in the SCoC as appointments should cycle among departments.
- The role of the SCoC would be identifiably different than an MIT school—it would not be perceived as "business as usual."
- The SCoC would be regularly refreshed because MIT- and Visiting-SCSoF would come from cutting-edge,-research-active backgrounds or be thought leaders in the policy arena.
- Visiting-SCSoF will continually "enlarge the gene pool."
- Turnover would allow the SCoC to initiate growth rapidly without creating a "plug-flow" of initial faculty or static silos.
- The creation of educational content, whether MITx or residential, would have continuing benefits to the Institute and its prestige. All departments would naturally benefit from computational subjects in their disciplines.

- MIT departments and the SCoC would share in the visibility of new SCoC research (i.e., a department benefits from computational advances in their discipline).
- The research directions of the SCoC would change more rapidly with developing research trends.
- The external visibility may be enhanced by the competitiveness of the external Fellows and postdocs.
- The creation of such Fellows may create opportunities for fundraising. (i.e., named Fellows). Mid-range donors may feel that they can make a recognizable contribution.
- The SCoC could begin to function prior to the completion of the Vassar Street building.
- Collaborations between the departments and the SCoC would be facilitated. The bridges would be structural and populated.
- The relevance to the educational mission of the entire Institute would be very clear to the MIT community.
- Social implications and moral hazards of computing would be included by regularly inviting legal scholars or social scientists as Visiting Fellows. As such, regular seminars would occur and contributions to the educational commons would result.

Of course, a rotating population of visiting faculty and postdocs would generate specific costs. The most important cost would be housing. For the MIT faculty appointed to the SCSoF, some compensation to the department may be needed for a temporary loss of faculty while MIT faculty take up fellowships in the SCSoF (perhaps appointments of instructional staff could help with this).

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