Envisioning the Future of Design at MIT
April 2021

Steven Eppinger, Sloan

John Gabrieli, BCS

D. Fox Harrell, CMS/CSAIL

Colette Heald, CEE/EAPS

Eric Klopfer, CMS

Miho Mazereeuw, Arch

Stefanie Mueller, EECS/SCoC

Elsa Olivetti, DMSE

Mitchel Resnick, Media Lab

Ellen Roche, MechE/IMES

Gilad Rosenzweig, MITdesignX

Michael Short, NSE

Amy Smith, D-Lab

Scott Stern, Sloan

Skylar Tibbits, Arch

Kate Trimble, OEL

Sarah Williams, DUSP

Danielle Wood, Media Lab/Aero

Co-Chairs: John Ochsendorf (Arch/CEE) and Maria Yang (MechE)

The charge

In September 2020, Deans Hashim Sarkis (SA+P) and Anantha Chandrakasan (SoE) invited Professors John Ochsendorf and Maria Yang to assemble a committee of design-focused faculty and staff from across all five schools and the MIT Stephen A. Schwarzman College of Computing to envision ways to more fully offer design leadership in service to MIT and the world. Through eight committee meetings, spanning Fall 2020 and Spring 2021, the committee has assessed the state of design at MIT today, has heard from a range of faculty and students, and is pleased to offer recommendations to strengthen design across the Institute. In March and April 2021, an earlier version of this document was presented to School Councils of Engineering and Architecture and Planning and their feedback was incorporated.

What is design?

Design is many things to many people. By exploring a premise or question from multiple perspectives to stimulate effective and even beautiful resolutions, design combines creativity, innovation, and synthesis to reveal new pathways forward. Focused on the process itself, design is as concerned with problem framing as it is with problem solving.

Design at MIT

Design is a process and mode of inquiry that underpins research and pedagogy across the Institute. We have a rich history of advancing design theory, research, teaching, and practice, with considerable impact at MIT and around the world. Whether creating lab experiments, musical scores, medical devices, consumer products, computer codes, business models, or architectural plans, we believe every MIT student could be considered a designer. Moreover, MIT has deep experience and leadership in design that cuts across all five schools and the college, as represented in this committee's membership and summarized in Appendices I and II.

Design with purpose and for a better world

Since the founding of MIT, one of the driving forces that has attracted talented students, faculty, researchers, staff, and collaborators to the Institute has been our commitment to real-world impact. A co-equal driving force has been our community's dedication to our values of integrity, diversity and inclusion, and to making a better, more just world. Through countless acts and deeds over generations, MIT has been a leader in promoting and striving to promote these vitally important matters, although our track record is certainly not pristine. Our committee believes design at MIT already creates compelling, cross-disciplinary opportunities to move the needle on some of society's greatest challenges, with the public good in mind. As detailed here, our committee's vision and goals for the future of design aims to ensure that any effort to deepen design expertise and efforts at MIT must stay true to our mission and values.

Design Plus

The signature of design unique to MIT brings together design plus disciplinary expertise and applies this potent mixture to tackle pressing global challenges. Examples of this abound across the Institute and are embedded in existing hybrid programs, which could be considered "design plus programs" (e.g. design+engineering, design+management, design+biology, design+urban studies, design+arts, design+health, design+democracy, design+computing, design+making). This is a differentiating factor for MIT when compared to peer institutions or to traditional design schools where design is often limited to discrete programs (e.g. fashion design, industrial design).

The need

The design field is of growing interest to industry and academia alike, and our peers are investing in this area. While we all "do design" by definition in our research and teaching, only very recently has the need to study and improve the design process been better framed and articulated. There is increasing demand among our students for design tools and strategies to address urgent and challenging societal issues. Some of the Institute's most popular and visible classes center around design, and the recently established design minor has quickly become the second most popular minor for MIT undergraduates. Societal impact is foundational to so much of our research and pedagogical mission, and design principles empower and facilitate the process of MIT students, researchers, and faculty to co-design novel ideas and solutions with collaborators elsewhere, who often bring their expertise or local knowledge to bear. Hybrid programs, like the college's Common Ground for Computing Education program, allow students to pursue such majors while also gaining the ability to think synthetically and with an open mind, and seeking ways to address societal issues.

The vision

An initiative to build design at MIT should not aim to own the term or discipline of design, but rather to build connectivity across disciplines and departments through hybridized design plus programs. MIT is currently one of the premier universities for design in the world, but one may not recognize this from the outside. We do not have the visibility or coherence that we should. In recent years, MIT has drawn upon the '*mens et manus*' motto to underscore our commitment to entrepreneurship, innovation, and computing. We believe the same case can equally be made for design, which is equally essential to these disciplines, and is already subtly interwoven into the fabric of areas in which we already excel. By building on our current strengths, the Institute can usher in a new era of design innovation and excellence. Our long-term aspiration is for MIT leadership, faculty, students, and, in turn, the world, to embrace design as a critical aspect of our mission and for MIT to be known as the best school in the world for: (1) learning, studying, and applying design research to solve critical challenges in science, technology, engineering, and society; and (2) continuously iterating upon design pedagogy and research to graduate new types of designers with expertise in other disciplines (e.g. science, engineering, urban planning, management) and who are uniquely capable of bringing innovation to the world.

"We have had a discussion about design every decade since I have been at MIT, but we have not succeeded in getting it to the MIT-level," says Dava Newman. "In the meantime, we all continue to do our own good design work in our schools. Perhaps now may be the time to do so." Kate Trimble put it another way, we should aim to "throw a sheet over the ghost," asserting that MIT ought to more fully celebrate, strengthen, and make visible its strengths in design. The committee shares their perspectives that the time is now to strategically begin connecting design efforts – currently distributed across MIT – into a more cohesive whole, so we can become greater than the sum of our parts.

Recommendations for design at MIT

As Professor Warren Seering said to the committee, "any design initiative ought to be student-focused. If our efforts are in the best interests of our students, then we cannot go wrong." With this in mind, our recommendations are focused on education and pedagogy, at all levels of the student population, to more fully integrate design principles and strategies into MIT's academic, research, and extracurricular activities. Our framework is to focus efforts through the lenses of 1) design education, 2) community/visibility, and 3) social and societal impact. We offer both immediate and aspirational recommendations in each area.

1. Design education. Grow the footprint of design education through courses, awareness, and access.

- **Strengthen design minor and major.** Anticipating growing interest among our students, these degree programs require sufficient support to meet the varied interests of our diverse student population, and they should become more visible and more integrated with other departments across the Institute.

- **Strengthen graduate and lifelong learning design programs.** Graduate programs, professional certifications, and online courses centered around design could benefit from deeper cross-campus connectivity, integration, and collaboration.

- **Design intensive denotation in course catalog.** Just as is being considered now for computing-intensive subjects, this would help students to navigate toward courses with a strong design component, and would foster educational experiments in areas not traditionally conceived as being design-centric.

- **Funded, design-centric undergraduate opportunities including internships, UROPs, SuperUROPs, and service projects.** Coordinated by the Office of Experiential Learning and offering greater design opportunities for students outside of the classroom.

- **Aspirational: graduate and postdoctoral design fellowships.** Dedicated design fellowships would enable MIT to attract diverse interdisciplinary talent, regardless of financial means, and promote cross-pollination of ideas between academic units.

2. Community/visibility. Enhance the profile of design excellence, across campus and around the world.

- **Digital convening space.** We recommend a dedicated, centrally-managed web presence to highlight and map the resources, events, courses, and DLCs advancing design efforts, which would serve the MIT community and the wider world.

- **Physical convening space.** The Met Warehouse, including Project Manus, could provide a hub of design and community maker space for the wider MIT community and the public. The International Design Center (IDC) space in building N52 has become a valuable resource for teaching and research in design, though the Singapore University of Technology and Design (SUTD) collaboration formally ends in June 2021. Spaces for teaching interdisciplinary design classes with a maker component will likely continue to grow in demand in the future.

- **Establish a first-year learning community in summer 2021.** For students having difficulty exploring design at MIT, a new first-year learning community will enable students with shared interests in design to meet each other, share ideas, and learn about opportunities across the Institute. Working with Elizabeth Young in the Office of the First Year, a small cohort of 30 students in the class of 2025 will form the inaugural class of a new first year learning community in design this fall.

3. Social and societal impact. Improve the world through MIT designs and designers.

- **Establish and celebrate MIT's design values.** Everyone should know how members of the MIT community apply values in our design process. Drawing from MIT's core values, we can show that it is natural and necessary to emphasize these social goals in our design.

- **Renew emphasis on diversity, inequality, sustainability, and ethics.** Human-centered and environmentally-centered design approaches, coupled with invention and entrepreneurship, can focus our efforts on addressing the complex issues of ongoing societal challenges. These values can be incorporated into the models for design education and emphasized when providing funding for research, such as via grand challenges, as noted below.

- **Grand design challenges.** Focus on big global problems, where classes, labs, and students are supported to tackle them through design and research. Themes would evolve over time and could cut across MIT with regularly changing areas of focus. The choice of design challenges would build on the values and can be coordinated with design education opportunities. Moreover, there is a powerful opportunity to coordinate design activities with Institute-wide priorities identified by MIT leadership. For example, there could be a mechanism within new endeavors, like the MIT Climate Grand Challenges, to ask, what role can design play in surfacing innovative, impactful ideas?

- **Design and social entrepreneurship for societal impact.** Skills in design can provide students the tools needed to create change in the world, through social entrepreneurship and social practice with local organizations, building on the design values noted above. This would help to reverse the trend that students are more socially engaged when they arrive at MIT than when they graduate from MIT.

- **Aspirational: design awards, designer-in-residency program, design fellows, etc.** Celebrating and welcoming leading designers to MIT, similar to the Eugene McDermott Award in the Arts, Lemelson–MIT Prize, and MIT MLK Visiting Scholars & Professors Program, or the Loeb Fellowship at the Harvard Graduate School of Design.

Establish a design center at MIT
In order to better achieve the objectives above, a design center's dedicated financial and organizational resources would provide a platform, incubator, and hub to begin to achieve the above-mentioned goals and to build community, visibility, and collaboration. It could strengthen bridges and connections internally and externally. There is the potential here to re-envision and rename the mission of the IDC, as the collaboration with SUTD is now ending. Based on knowledge of our committee, global philanthropists have made generous gifts to establish such centers at peer institutions. There could be a standing advisory board on design to support the formation of such a center and to seek new donors.

The Future
Excellence in design is already core to the fabric of MIT. There is great potential in the possibility of further fusing our design-oriented mindset with expertise across a range of fields. Design – imbued with MIT's "mind and hand" motto, dedication to making the world a better place, enabling collaboration across disciplines, and expertise in science and technology – differentiates us from conventional approaches at peer institutions. By recognizing, celebrating, and building upon these unique MIT capacities, we could meaningfully strengthen our educational mission in the years to come. MIT could also bring about exciting new advances in design methodologies that could help shape a more sustainable and just society, from the nanoscale to the city-scale, from objects to systems, from art to science, and from invention to innovation.

Appendix I: Design Initiative Committee Members and web sites

Name	School	Webpage
Steven Eppinger	Sloan	https://mitsloan.mit.edu/faculty/directory/steven-eppinger
John Gabrieli	BCS	https://mcgovern.mit.edu/profile/john-gabrieli/
D. Fox Harrell	CMS/CSAIL	https://www.csail.mit.edu/person/d-fox-harrell
Colette Heald	CEE/EAPS	https://cee.mit.edu/people_individual/colette-l-heald/
Eric Klopfer	CMS	https://cmsw.mit.edu/profile/eric-klopfer/
Miho Mazereeuw	Arch	https://architecture.mit.edu/faculty/miho-mazereeuw
Stefanie Mueller	EECS/SCoC	https://www.csail.mit.edu/person/stefanie-mueller
Elsa Olivetti	DMSE	https://dmse.mit.edu/people/elsa-a-olivetti
Mitch Resnick	Media Lab	https://www.media.mit.edu/people/mres/overview/
Ellen Roche	MechE/IMES	https://imes.mit.edu/people/faculty/ellen-roche/
Gilad Rosenzweig	MITdesignX	https://www.linkedin.com/in/giladrosenzweig/
Michael Short	NSE	https://web.mit.edu/nse/people/faculty/short.html
Amy Smith	D-Lab	https://d-lab.mit.edu/about/people/amy-smith
Scott Stern	Sloan	https://mitsloan.mit.edu/faculty/directory/scott-stern
Skylar Tibbits	Arch	https://architecture.mit.edu/faculty/skylar-tibbits
Kate Trimble	OEL	https://officesdirectory.mit.edu/oel
Sarah Williams	DUSP	https://dusp.mit.edu/faculty/sarah-williams
Danielle Wood	Media Lab/Aero	https://www.media.mit.edu/people/drwood/overview/
Faculty co-leads		
John Ochsendorf	Arch/CEE	https://architecture.mit.edu/faculty/john-ochsendorf
Maria Yang	MechE	https://meche.mit.edu/people/faculty/MCYANG@MIT.EDU
Support staff		
Nick Marmor	SA+P	https://sap.mit.edu/staff/nicholas-marmor

In committee meetings held during the 2020-21 academic year, this committee met on eight occasions and included presentations by the following individuals:

- MIT students and alumni: Lizbeth Barrios De La Torre SM '20 (MAS) Orisa Coombs SB '21 (MechE) Jierui Fang SB '20 (Architecture) Miki Hansen SB '21 (MechE) Yunyi Zhu SB '20 (EECS), SM '21 (EECS)
- Martin Culpepper, MIT Maker Czar
- Nicholas de Monchaux, Head, Department of Architecture
- Dava Newman, Apollo Program Professor of Astronautics; Incoming Director, MIT Media Lab
- Warren Seering, Professor, Mechanical Engineering

Appendix II: Partial list of design research labs, programs, courses, and outreach programs identified by the design committee
*This list does not include departments that have an emphasis in design.

Partial List of Research Labs with a Design Focus
CADlab
Center for Bits and Atoms
Civic Data Design Lab
Digital Structures
Global Engineering and Research Lab
Human-Computer Interaction
Ideation Lab
Integrated Design and Management
Laboratory for Manufacturing and Productivity
Leventhal Center for Advanced Urbanism
Martin Trust Center for MIT Entrepreneurship
MIT Civic Design Initiative
Self Assembly Lab
Space Enabled
Sustainable Design Lab
Urban Risk Lab

Programs and collaborative research organizations
D-Lab
IMES
International Design Center
MITdesignX
MIT Sloan Design Club

Programs and student-focused organizations
Art & Design major
Design minor
MIT Nucleus makerspace
NEET
Project Manus
ProjX
The Hobby Shop
MIT Design for America

Outreach beyond MIT
App Inventor
Education Arcade
MIT Game Lab
Learning Creative Learning