



Financial services (fintech) and banking, along with many industries, are going through a time of challenge and disruption. To remain competitive fintech and banking will need to address the impact and transformative power of technologies such as artificial intelligence and machine learning, big data, blockchain, cybersecurity, digital currency, mobile banking and mobile payments, the regulatory environment, and taxes. Innovations in these areas offer opportunities to improve mobile and digital options available to customers, while big data and machine learning provide intelligence for increased customer focus and engagement based on sophisticated analytics.

What makes MIT unique in its ability to generate advances in the aforementioned fields?

- MIT is a world class research university: The 2017 QS World University Rankings identified MIT as the #1 university in the world in engineering and technology as well as the natural sciences.
- MIT is solutions-focused, entrepreneurial, and impact driven: as of 2014 MIT faculty and alumni had founded more than 30,000 companies and continues to spin-out 80-100 new companies each year.
- MIT is at the center of the Boston innovation ecosystem: its ability to engage and leverage this ecosystem is unmatched.
- MIT is a convener of global thought leadership: through this network MIT helps address strategic and technical solutions to the major challenges facing society.
- MIT's interdisciplinary culture: allowing thought leaders from multiple disciplines and fields to collaborate freely and reach for the previously unimaginable.

MIT Corporate Relations provides access to MIT through two integrated programs, the MIT Industrial Liaison Program (ILP) <http://ilp.mit.edu/> and MIT Startup Exchange <http://startupexchange.mit.edu/startupexchange/html/index.html>

In the following pages, a selection of MIT centers, departments, groups, and labs are presented. These entities are actively involved with research and education related to topics of relevance to the financial and banking industries bulleted below.

- AI, Machine Learning
- Banks, Economy, Policy, Regulations
- Big Data, Computation, Analysis
- Blockchain, Cryptocurrency
- Cybersecurity, Cryptography, Data Security
- Digital
- Economics and Management
- Entrepreneurship, Venture Capital
- Finance, Financial Engineering
- Global Development, Local Innovation Systems
- Real Estate
- Social Networks, Collaborative Intelligence

AI, MACHINE LEARNING

The **ALFA group: Anyscale Learning For All** studies scalable machine learning technology, evolutionary algorithms, and data science frameworks for large-scale knowledge mining, prediction, analytics and optimization with projects in clinical medicine knowledge discovery, cybersecurity and MOOC technology.

The **Probabilistic Computing Project** is building a new generation of computing systems that integrate probability and randomness into the basic building blocks of software and hardware. The group has discovered that this approach leads to surprising new AI capabilities and are exploring them via a combination of academic research and entrepreneurship. The researchers also carry out basic research on the mathematical foundations of probabilistic computation. The group's work is made as freely available as possible via open-source software, public workshops, and online educational materials, and they collaborate with industry and non-profit partners on applications in the public interest.

The goal of **SystemsThatLearn@CSAIL** is to promote in-depth interactions between industry and academia. Member companies will have the opportunity to be exposed to multiple research projects that span the full spectrum of machine learning/artificial intelligence and analytics. The initiative will collaborate closely with industry to provide real-world applications and drive impact. The group's team of world-class researchers covers the full spectrum of research in systems and machine learning.

BANKS, ECONOMY, POLICY, REGULATIONS

The **Billion Prices Project** at the MIT Sloan School is an academic initiative that uses prices collected from hundreds of online retailers around the world on a daily basis to conduct research in macro and international economics. It was founded in 2008 by Alberto Cavallo and Roberto Rigobon.

The **MIT Golub Center for Finance and Policy (GCFP)** serves as a catalyst for innovative, cross-disciplinary and non-partisan research and educational initiatives that address the unique challenges facing governments in their role as financial institutions and as regulators of the financial system. The GCFP is an Institute-wide initiative that is managed by MIT Sloan's finance group. Research initiatives supported by the GCFP are organized into three main tracks: Evaluation and Management of Government Financial Institutions; Regulation of Financial Markets and Institutions; Measurement and Control of Risk.

The **Institute for Work and Employment Research (IWER)** is a highly collaborative hub for research and educational activities on the broad range of work, employment, and labor market issues and policies. IWER's broad research areas address: Inequality and Fairness in the Workplace; Work and Employment Relations; Work and Family; Global Employment Standards; and the Good Companies, Good Jobs Initiative.

The **Political Economy and Technology Policy program** applies theories and methods from the discipline of political economy to examine issues in science and technology policy. The program studies: Emergent technologies; uncertainty and environmental decision-making; regulation and the management of business risk; and north-south financial and technology transfers. Political economists from the social sciences work closely with MIT technologists and humanists, government, nongovernmental organizations, and private firms, and with academic partners at Cambridge University, the Stockholm School of Economics and Chalmers University, the Swiss Federal Institutes of Technology (ETH) and the University of Tokyo.

The **World Economy Laboratory (WEL)** is organized around the Central Banks-MIT research network, and aims to develop relationships between MIT and central banks. WEL hosts occasional meetings in Cambridge and visits by central bank researchers to the MIT Economics Department. The working group environment of the meetings is aimed at discussing policy issues at a relatively technical level. The meetings are attended by the heads of research of many central banks, as well as faculty and students working on international finance and macroeconomics policy issues.

BIG DATA, COMPUTATION, ANALYSIS

BigData @ CSAIL researchers are investigating how to transform big data into big insights. The initiative's approach brings together world leaders in parallel architecture, massive-scale data processing, algorithms, machine learning, visualization, and interfaces to explore all the challenges and opportunities presented by big data, from cloud computing, data management, massive scale data analysis, algorithms, data mining, machine learning, security, privacy and visualization to all of big data's applications in fields such as finance, medicine, biology, artificial intelligence and social networking.



The **Database Group (DBg) at MIT** conducts research on all areas of database systems and information management. Projects range from the design of new user interfaces and query languages to low-level query execution issues, ranging from design of new systems for database analytics and main memory databases to query processing in next generation pervasive and ubiquitous environments, such as sensor networks, wide area information systems, personal databases, and the web.

The **Mathematics Department at MIT** is one of the top-ranked mathematics departments in the US— a world center in Pure and Applied Mathematics. In pure mathematics, the department explores exciting current research directions in most of the major fields. The pure math group studies many aspects of algebra, analysis, geometry, mathematical logic and foundations, number theory, probability and statistics, and representation theory. The applied math group focuses on combinatorics, computational biology, computational science & numerical analysis, physical applied mathematics, theoretical computer science, theoretical physics.

The **MIT Institute for Data, Systems, and Society (IDSS)** is committed to addressing complex societal challenges by advancing education and research at the intersection of statistics, data science, information and decision systems, and social sciences. IDSS applies state-of-the-art, analytical methods in information and decision systems, statistics and data science, and the social sciences to address complex societal challenges in a diverse set of areas such as finance, energy systems, urbanization, social networks, and health.

The **MIT Statistics and Data Science Center** is an MIT-wide focal point for advancing research and education programs related to statistics and data science. The Center was created in 2015 with the goal of formalizing and consolidating efforts in statistics at MIT. Project areas include: nonparametric Bayesian statistics, causal inference and applications to learning gene regulatory networks, combinatorial learning with set functions, online learning, and statistical and computational tradeoffs.

BLOCKCHAIN, CRYPTOCURRENCY

Blockchain.mit.edu is focused on the marketplaces enabled by crypto tokens and blockchain technology. In 2014, a major field experiment was conducted at MIT where 4,494 participants were randomized into multiple conditions in conjunction with the distribution of \$500K in Bitcoin on campus. The study presented unique security, regulatory and technical challenges, but also allowed causal evidence to be generated on key questions about the use of new technology and digital privacy choices that cannot be answered with observational data.

The **Digital Currency Initiative** is a group at MIT focusing on cryptocurrency and its underlying technologies. The group seeks to push the envelope on the development of cryptocurrency with fundamental research, while shedding light on the associated benefits, risks, and ethical quandaries. Beyond research centered at MIT, the group also helps support open-source cryptocurrency communities and diversity, and hopes to foster a broader academic community.

The **MIT Geospatial Data Center (GDC)** brings together applied computation research in data science, cybersecurity, simulation, augmented reality, the Internet of Things (IOT), blockchain, and educational technology (EdTech). The GDC is researching security, financial, social networks, storage, and general purpose application of blockchains.

CYBERSECURITY, CRYPTOGRAPHY, DATA SECURITY

The **Computer Systems Security Group** researches and builds secure, practical, and flexible systems. The group's work spans operating systems, computer architecture, distributed systems, programming languages, and web browsers.

The **CyberSecurity@CSAIL** approaches security from all sides (programming languages, software verification, computer architecture, crypto, systems, policy) with the goal of creating security “by default” and removing program error as a source of vulnerability. The researchers are designing new theoretical and practical foundations of secure computing that integrate security in the design process. By bringing together world-renowned leaders in the security specialties of cryptography, hardware, and software, they will leverage the existing research portfolio and work collaboratively with industry partners to address the most pressing cybersecurity challenges.

The **Cryptography and Information Security Group (CIS Group)** develops techniques for securing tomorrow's global information infrastructure by exploring theoretical foundations, near-term practical applications, and long-range speculative research. The group

aims to understand the theoretical power of cryptography and the practical engineering of secure information systems, from appropriate definitions and proofs of security, through cryptographic algorithm and protocol design, to implementations of real applications with easy-to-use security features.

The **Trust::Data Consortium** addresses the growing tension between societal data proliferation and data security by developing specifications, software, tools and documentation that help organizations adopt a holistic approach to cyber protection. Trust::Data is building new models for digital identity, data provenance, universal access, and secure privacy-preserving transactions to harness the future potential of global data sharing. The consortium brings together MIT researchers and business vanguards to collaborate on the development of open-source software that enables better data security and privacy, while also allowing for easier data sharing, and more robust digital identity.

DIGITAL

The **Center for Information Systems Research (CISR)** helps executives meet the challenge of leading dynamic, global, and information-intensive organizations. CISR provides the CIO and other digital leaders with insights on topics such as business complexity, data monetization, and the digital workplace. Through research, teaching, and events, the center stimulates interaction among scholars, students and practitioners. More than ninety firms sponsor the center's work and participate in the consortium.

The **Initiative on the Digital Economy (IDE)** is a team of visionary, internationally recognized thought leaders and researchers examining how people and businesses work, interact, and will ultimately prosper in a time of rapid digital transformation. Drawing on MIT Sloan School of Management's faculty and strengths in technology and innovation, the IDE is analyzing the broad sociological changes brought about by the advance and spread of digital technology. Research is focused on: Productivity, employment, and inequality; big data and information privacy; new digital business models; and social analytics and digital experimentation.

ECONOMICS AND MANAGEMENT

The **MIT Sloan Fellows Program** is a 12-month, full-time executive MBA program designed to prepare an elite group of global mid-career managers with the management skills necessary to magnify their impact as leaders and innovators. The program is a tactical integration of core courses, electives, team projects, and candid sit-downs with global leaders. MIT Sloan Fellows spend one year dedicated to the goals and challenges of their organizations, spending long hours working closely with peers—from 30+ countries and as many industries—to develop a set of competitive strategies and pragmatic solutions. All while building the necessary skills for executing those strategies, skills grounded in the three pillars of the program's rigorous executive development curriculum: innovation, leadership, and global perspective.

The **MIT Sloan Neuroeconomics Lab** is a multidisciplinary research center studying problems at the intersection of economics, management, and cognitive neuroscience. The lab's projects are stimulated by economic theory and decision analysis, which provide an ideal standard, as beautiful conceptually as it is flawed empirically. The group studies behavior that appears anomalous in light of the rational model, focusing especially on financial, medical and consumption choices. Methods include functional MRI, lab experiments, game theory, Bayesian modeling and machine learning.

The **Department of Economics** faculty is equally committed to graduate and undergraduate education and is at the forefront of both theoretical and applied economics. Its faculty has made pioneering contributions from theory to macroeconomics, to finance, to industrial organization, to international trade. The department's scholars have received numerous awards, including four Nobel Prizes (Peter Diamond, the late Paul Samuelson, Robert Solow, and the late Franco Modigliani), many are Fellows of the National Academy of Sciences, the American Academy of Arts and Sciences, and the Econometric Society, and any faculty members have served in elected offices of the American Economic Association and the Econometric Society. Student dissertation topics span a wide range of issues in microeconomics and macroeconomics, and include economic theory, data analysis, and econometric methodology.

The **Sloan School of Management** is one of the world's leading business schools—conducting cutting-edge research and providing management education to top students from more than 60 countries. The mission of the Sloan School is to develop principled, innovative leaders who improve the world and to generate ideas that advance management practice. MIT Sloan offers undergraduate, master's, PhD, executive education and non-degree programs together with special seminars, conferences, and programs for alumni. MIT Sloan includes 200 professors and lecturers; approximately 1,300 students; and 10 degree and non-degree programs



for undergraduates through experienced executives. MIT Sloan has 120,000 alumni in 90 countries; more than 650 companies have been founded by MIT Sloan alumni.

ENTREPRENEURSHIP, VENTURE CAPITAL

The **Martin Trust Center for MIT Entrepreneurship** provides the expertise, support, and connections MIT students need to become effective entrepreneurs. The Center serves all MIT students, across all schools, across all disciplines. MIT students and alumni use their entrepreneurship skills to found hundreds of companies each year, many using cutting-edge technologies developed in MIT labs or elsewhere. The Center team educates and develops leaders of successful ventures by offering best-in-class educational courses and executive programs powered by MIT's leading-edge technology and business research.

The **MIT Enterprise Forum** is a global organization of dedicated professionals with local chapters, affiliated with MIT through MIT Technology Review, and is open to all participants of the entrepreneurial ecosystem. The Forum informs, connects, and coaches technology entrepreneurs—enabling them to rapidly transform ideas into world-changing companies. MITEF has chapters in major markets in the U.S. and a growing number outside of the U.S., including many in emerging markets.

The **MIT Startup Exchange** is a web community for the MIT innovation ecosystem, particularly MIT ILP's members, MIT-connected startups and all MIT employees or alumni who have active startup engagements. The Exchange lists 1500+ MIT-connected startups in various stages of development and since 2009, has arranged 200+ one-to-one meetings between MIT ILP member companies and MIT-connected startups.

Student Group: **The MIT \$100K Entrepreneurship Competition** has been bringing together students and researchers from across MIT and Greater Boston to launch their talent, ideas, and technology into leading companies for 25 years. The competition is run as a series of distinct, increasingly intensive contests from October to May: Pitch, Accelerate, and Launch. Each contest focuses on developing specific founding skills, and for each semi-finalist contender the MIT \$100K brings together a network of resources, including mentorship from venture capitalists, serial entrepreneurs, corporate executives, and attorneys; media exposure; prototyping funds; business plan feedback; and discounted services.

Student Group: **The MIT Venture Capital & Private Equity Club (VCPE)** provides its members with opportunities to learn about the venture capital and private equity industries, to interact with leading professional investors and business executives, and to develop relationships with members of the MIT community who share similar interests. The VCPE Club hosts and co-sponsors a broad portfolio of activities which span private equity, venture capital, entrepreneurship through acquisition. The club has established deep partnerships throughout MIT and with the local businesses and investing community, and has a proven track record of developing new projects, engaging with prominent private equity investors, identifying and matching talent, and helping drive MIT-generated technology towards successful commercialization.

FINANCE, FINANCIAL ENGINEERING

The **Finance Research Practicum** is a key element of MIT Sloan's Master of Finance Program, and is open to other graduate-level students who have completed the prerequisites. In this graduate-level finance course, students work in teams on substantive projects proposed by external sponsors. The goal is to provide students with a meaningful opportunity to work with leading industry practitioners on important topical finance problems, while helping them to bridge the gap between theory and practice, and introducing them to the broader financial community. The course is full-time during the month of January, and includes some preparation and follow-up before and after the full-time experience.

The **Laboratory for Financial Engineering (LFE)** is a partnership between academia and industry designed to support and promote quantitative research in financial engineering and computational finance. The principal focus of the LFE is the quantitative analysis of financial markets using mathematical, statistical, and computational models. LFE research projects are grouped into five areas:

INDUSTRY BRIEF

MIT AND FINANCIAL SERVICES | BANKING INDUSTRIES

foundations of financial behavior and adaptive markets, risk management and systemic risk, healthcare finance, big data and financial technology, and capital markets and asset-market dynamics.

The **Operations Research Center (ORC)** education and research draws upon ideas from engineering, management, mathematics, and psychology to apply scientific methods to decision-making. ORC faculty contribute to a wide range of application domains such as energy, engineering, finance, health care, marketing, service industry, and transportation.

GLOBAL DEVELOPMENT, LOCAL INNOVATION SYSTEMS

The **Abdul Latif Jameel Poverty Action Lab (J-PAL)** serves as a focal point for development and poverty research based on randomized trials. The objective is to improve the effectiveness of poverty programs by providing policy makers with clear scientific results that help shape successful policies to combat poverty. J-PAL works with NGOs, international organizations, and others to evaluate programs and disseminate the results of high quality research. The researchers work on issues as diverse as boosting girls' attendance at school, improving the output of farmers in sub-Saharan Africa, racial bias in employment in the US, and the role of women political leaders in India.

The **Abdul Latif Jameel Poverty Action Lab North America (J-PAL North America)** was launched at MIT in 2013 to improve social programs in the region by ensuring that policy is based on scientific evidence. Academic affiliates collaborate with governments at the city, state, and national levels as well as a variety of social organizations to conduct randomized evaluations. J-PAL North America disseminates results from these studies and works to build organizational research capacities. The network of affiliates is conducting randomized evaluations, sharing policy lessons, and building evaluation capacity. The work spans a wide range of sectors including health care, housing, criminal justice, education, and economic mobility.

The **Global Entrepreneurship Lab (G-Lab)** is an interdisciplinary project-based learning course at the Sloan School. G-Lab focuses on developing markets in up to 15 countries with emerging economies throughout the world. The course focuses on measuring and understanding what kinds of entrepreneurship thrive in different countries, and it develops analytical diagnostic frameworks that can be used to better understand any situation. This includes applying macroeconomic, financial, and microeconomic tools—as well as thinking about the role of politics, culture, and other noneconomic variables.

The **Industrial Performance Center (IPC)** is a multidisciplinary research center focused on firms, industries and technological change in the global economy and how their emergence and transformation impact society at large. With a particular interest in Innovation, Productivity and Competitiveness, the IPC brings together teams of researchers in engineering, science, management and the social sciences at MIT and beyond to carry out innovative, applied research often from the “bottom up.” Core research includes: Innovation Ecosystems, Advanced Manufacturing, Energy, Globalization.

The **Legatum Center for Development and Entrepreneurship at MIT** is a community hub for students, alumni and faculty who seek to accelerate social and economic progress through innovation-driven entrepreneurship. The Center was founded in order to demonstrate the power of entrepreneurship to catalyze transformation in society and to improve global wellbeing. The Center runs a competitive fellowship program for MIT students with a commitment to building and scaling their ventures through principled entrepreneurial leadership. It provides seed grants and travel support for students to explore and experience global innovation-driven entrepreneurship opportunities, and offers research grants and assistantships for faculty and students looking to understand and shape the conditions for system change.

The **School Effectiveness and Inequality Initiative (SEII)** is a research program based in the MIT Department of Economics. SEII focuses on the economics of education and the connections between human capital and the American income distribution. SEII's diverse projects explore topics ranging from the effectiveness of charter and pilot schools to the impact of rising Chinese import competition on America's regional labor markets.

REAL ESTATE

The **Center for Real Estate (CRE)** research investigates the real estate transaction from initial concept to market reality, providing breakthrough knowledge to help organizations capitalize on today's dynamic markets and technologies. Uniting industry leaders with MIT's distinguished researchers and students, CRE's selective industry partnership program advances the art and science of international real estate, and bridges the gap between theory and practice. CRE is



home to the first-ever one-year Master of Science in Real Estate Development (MSRED) degree, as well as an integrated suite of professional development courses.

The **Samuel Tak Lee MIT Real Estate Entrepreneurship Lab (STL Lab)** supports and mentors young individuals to fulfill their potential to become entrepreneurs and thought leaders in the field of socially responsible development and real estate studies. To achieve this, the lab funds graduate fellowships, advanced faculty research, and academic and professional exchange programs to attract U.S. and international students, scholars, and practitioners to participate in cross-disciplinary research and educational activities. The aim of the STL Lab is to harness the transformative power of socially responsible real estate development to enrich the lives of future generations of entrepreneurs and to shape the built environment in China.

SOCIAL NETWORKS, COLLECTIVE INTELLIGENCE, MOBILITY

The **MIT Center for Collective Intelligence (CCI)** research effort draws on the strengths of many diverse organizations across the Institute including the MIT Media Lab, the Computer Science and Artificial Intelligence Laboratory, the Department of Brain and Cognitive Sciences, and the MIT Sloan School of Management. Broad research area examples include measuring collective intelligence; collaborative innovation networks; Climate CoLab.

The **MIT Design Lab** is organized as a collection of multidisciplinary research and project teams unconstrained by the traditional boundaries between the design, planning, and engineering professions and disciplines. The lab is particularly interested in the emerging possibilities afforded by new technologies and is concerned not only with the design of individual products, systems, buildings, and urban areas, but also with the roles these elements play in larger urban, regional, and global systems and their long-term sustainability. Banking and financial services has been one area of focus.

The **Human Dynamics Group** uses Reality Mining to ask how this data can be better used to organize companies, public health, and governance, by better understanding how social networks influence people when they make decisions, transmit information, adopt new technologies, or change behaviors. The group's projects have already demonstrated the potential to dramatically improve the competitiveness of companies, and hint at the ability to revolutionize social environments.

The mission of the Massachusetts Institute of Technology is to advance knowledge and educate students and others in science, technology, and additional areas of scholarship. MIT is committed to generating, disseminating and preserving knowledge and to working to bring this knowledge to bear on the world's great challenges. As part of its mission, MIT maintains relationships with industrial organizations that enable the exchange of ideas in the context of real-world problems and demonstrate how principles studied at MIT are applied to generate practical benefits for industry and society. MIT's Industrial Liaison Program helps develop these relationships by facilitating industry's access to MIT and its vast resources.