



COVID-19 Summary

Vol. 13 July 2020

MIT ILP UPDATES // COVID-19 RELATED

This is a very brief collection of current resources and information from MIT's Industrial Liaison Program covering a range of issues related to COVID-19 and is offered to help us all navigate during this unprecedented and disruptive time.

NOTE: This brief, which has been a weekly publication since the end of March, will be issued this once in July, once in August, then twice monthly beginning in September.

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UPCOMING EVENTS

MIT ILP WEBINARS

<https://ilp.mit.edu/attend>

- 7 July – Scaling-up Low-carbon Energy, with MITeI
- 8 July – MIT Startup Exchange: Materials Innovations
- 9 July – Back to the New Workplace Post-COVID-19 (2 of 2)
- 14 July – Frontiers of AI/ML: MIT Quest for Intelligence Webinar
- 16 July – AI/ML Quest Webinar
- 21 July – MIT Startup Exchange STEX25 Accelerator Startups, Part 1
- 23 July – MIT Startup Exchange STEX25 Accelerator Startups, Part 2
- 28 July – Quantum Computing: Opportunities & Challenges

MONDAY, 7 JULY, 12:00 PM: BY LAND, AIR & SEA: INSIGHTS ON TRANSPORTATION DURING THE COVID-19 CRISIS

Moderator: [CEE Prof. Cathy Wu](#)

Guest speakers:

Nicole Adler, Professor of Operations Research, Hebrew University

Roni Floman, VP of Marketing, Optibus

Omer Primor, Head of Marketing, Windward

Amy Vogel, MIT Civil and Environmental Major Class of 2020 and MISTI MIT-Alumnae.

https://calendar.mit.edu/event/by_land_and_sea_insights_on_transportation_during_the_covid-19_crisis#.XvtfJFB7nCA

Organized by the MISTI MIT-Israel program, and co-sponsored by Ecomotion, the MIT Mobility Initiative, MIT Civil and Environmental Engineering and MIT Department of Urban Studies and Planning.

MONDAY, 13 JULY, 11:30 AM – 12:30 PM: OPEN OCEAN SEMINAR

[Prof. Thomas Peacock](#), Director of the Environmental Dynamics Laboratory ([ENDLab](#))

Prof. Peacock will his work on the societal and scientific aspects of deep-sea mining

Media Lab Open Ocean

<https://www.media.mit.edu/events/open-ocean-seminar-thomas-peacock/>

MONDAY - FRIDAY, 27 – 31 JULY: 2020 STAMP (SYSTEM-THEORETIC ACCIDENT MODEL AND PROCESSES) VIRTUAL WORKSHOP

Partnership for Systems Approaches to Safety and Security (PSASS)

<http://psas.scripts.mit.edu/home/2020-workshop-information/>

Agenda: <http://psas.scripts.mit.edu/home/2020-stamp-workshop-agenda/>

Register: <http://psas.scripts.mit.edu/home/2020-stamp-workshop-registration/>

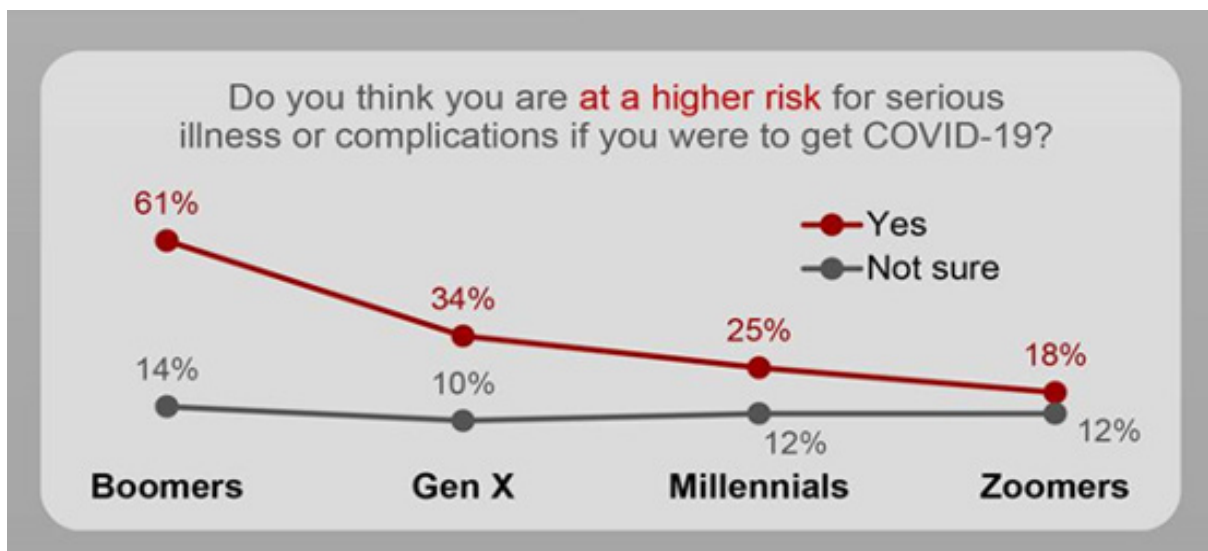
PROJECTS, INITIATIVES, RESEARCH

DEMOGRAPHICS / AGING / HEALTH: AGE LAB RESEARCH

For AgeLab, <https://agelab.mit.edu/covid-19>

AgeLab COVID-19 Research:

In addition to pursuing our longevity, aging, demographics, and technology research agenda, the AgeLab has begun to examine the impact of COVID-19 on the attitudes and behaviors of individuals and groups across generations through surveys and telephone interviews.



Source: MIT AgeLab Nationwide Survey on COVID-19, March 2020.

Staying Isolated in Order to Stay Safe: Exploring Experiences of the MIT AgeLab 85+ Lifestyle Leaders during the COVID-19 Pandemic

Julie B. Miller, Taylor R Patskanick, Lisa D'Ambrosio, Joseph F Coughlin (2020)

The Journal of Gerontological Social Work, Published online: 02 Jun 2020

<https://doi.org/10.1080/01634372.2020.1772437>

... Since 2015, the MIT AgeLab has convened a bimonthly research panel of adults ages 85 and older called the 85+ Lifestyle Leaders panel. Beginning in March 2020, we engaged the Lifestyle Leaders in mixed-methods research about their experiences during COVID-19. We fielded an online survey in mid-March and have continued to follow up with a longitudinal diary study. Data collection is still underway, with over twenty weekly phone interviews and activity tracking having been conducted so far.

One observation we have already is the resilience of the Lifestyle Leaders in managing the negative effects of physical distancing. In ordinary circumstances, physical distancing (and its byproducts, social isolation and loneliness) would be treated as a risk factor for older adults, not as a protective measure (Holt-Lunstad et al., 2015). However, with many Lifestyle Leaders accustomed to some forms of social and physical distance already, life for many of them during the pandemic, especially those with more limited mobility, is largely business-as-usual. Given this potential advantage in adapting to social

and physical distancing, the Lifestyle Leaders may be specially equipped to offer advice for staying healthy and connected during an undetermined period of isolation.

A second early insight is that many Lifestyle Leaders have described a loss of control that – while surely endemic across all age groups during the pandemic – surfaces in unique ways for the 85+ population. The unpredictable progression of government regulation restricting everyone’s daily activities is mirrored by the rapid implementation of regulations within age-restricted group living environments that many of the Lifestyle Leaders inhabit. Uncertainty and anxiety loom in the background for many Lifestyle Leaders due to other factors as well, such as food scarcity, not knowing where to turn for help should they need it, and a heightened sense of mortality and vulnerability due to the spread of an invisible killer....

DATA / POLICY: DATA TO INFORM THE PANDEMIC RESPONSE (COVID-19)

MIT GOV/LAB, <https://mitgovlab.org/>

Lily Tsai, [Faculty Director](#), MIT Governance Lab and Ford Professor of Political Science

Leah Rosenzweig, [Research Affiliate](#)

<https://mitgovlab.org/research/data-to-inform-the-pandemic-response-covid-19/>

The COVID-19 pandemic is impacting people around the world and exacerbating existing inequalities in both high and low-income countries. In developing country contexts, the virus is projected to send millions further into poverty. A combination of factors, including low hospital and health care system capacity, high urban density, poor access to water, and tenuous food security, means that response policies must be carefully designed to consider a wide range of economic and social impacts. The global crisis is also testing the capacity of our institutions and governance systems to respond quickly and effectively.

Building on our experience during the 2014-2015 Ebola epidemic in West Africa, we are developing rapid response surveys to inform government policies around the pandemic that can potentially lessen impacts on the most vulnerable populations. The studies cover a diversity of topics including virus awareness, community mobilization, trust in government, access to basic services (food and water), as well as the ability to withstand a lockdown.

Additional measures seek to understand what aid interventions and messages are more effective in motivating citizens to comply with critical public health measures (e.g., social distancing, hand-washing). Furthermore, fine-grained mobility data and spatial mapping will provide information to government decision-makers and humanitarian responders so they can provide people with the resources they need in order to participate or cooperate. Data will be collected at regular intervals to inform ongoing policies in a rapidly changing context.

We launched the first study, a nationally representative survey, in Sierra Leone, which was designed with input from multiple government agencies to ensure utility and maximize uptake of the results for decision-making. The study in Sierra Leone is a collaboration with the Institute for Governance Reform, in partnership with Sierra Leone’s Directorate of Science, Technology and Innovation (DSTI) and Ministry of Finance’s Research and Delivery Division (MoF-RDD). Projects in Nigeria and Uganda, focusing on COVID-19 response in large urban areas, are also underway.

See also: <https://polisci.mit.edu/news/2020/informin-covid-19-preparedness-sierra-leone>

Preliminary Results from Rapid Survey to Inform COVID-19 Response in Sierra Leone

Research brief with initial results from MIT GOV/LAB's collaboration with the Institute for Governance Reform and the Government of Sierra Leone to inform COVID-19 policy.

May 2020 / [Lily Tsai](#), [Leah Rosenzweig](#), [Alisa Zomer](#)

<https://mitgovlab.org/results/preliminary-results-from-rapid-survey-to-inform-covid-19-response-in-sierra-leone/>

Download brief: https://mk0mitgovlab6m5p3m06.kinstacdn.com/wp-content/uploads/2020/05/MITIGR_Survey-Results_15May2020-1.pdf

The MIT Governance Lab (MIT GOV/LAB) and the Institute for Governance Reform (IGR), in partnership with Sierra Leone's Directorate of Science, Technology and Innovation (DSTI) and Ministry of Finance's Research and Delivery Division (MoF-RDD), conducted a nationally representative survey of 2,395 respondents 11-18 April 2020 to gather critical information on citizens' COVID-19 awareness and preparedness across all 16 districts.

Note: Below are preliminary results (pending verification and subject to change).

Additional analyses forthcoming. Follow-up phone surveys are planned to inform a series of research briefs....

PAPERS, ARTICLES, PRESENTATIONS, TALKS

PATHOLOGY / DATA : THE NETWORK EFFECT: STUDYING COVID-19 PATHOLOGY WITH THE HUMAN CELL ATLAS

Teichmann Sarah, [Regev Aviv](#), Nat Rev Mol Cell Biol. 2020 Jun 30. doi: 10.1038/s41580-020-0267-3. Online ahead of print. <https://doi.org/10.1038/s41580-020-0267-3>

The SARS coronavirus 2 (SARS-CoV-2) pandemic is a global challenge, which the scientific community has tackled by mounting extensive global collaborations, combining expertise in diverse areas and applying cutting-edge techniques, to dissect mechanisms underlying coronavirus disease-19 (COVID-19) pathology. [The Human Cell Atlas consortium](#) is emerging as an important contributor to furthering this progress...

...Unlocking the identity of the specific cells involved in infection can clarify transmission patterns, pathogenesis and risk differences between individuals and will be key to developing effective therapeutic approaches. Single-cell approaches, including single-cell RNA-seq (scRNA-Seq) are uniquely poised to achieve this goal.

Excitingly, efforts along these lines have been underway across the world over the recent months, including those enabled by the Human Cell Atlas (HCA). The HCA — currently spanning >1,700 researchers across >70 countries — was launched in 2016 to create comprehensive reference maps of all human cells as a basis for both understanding human health and diagnosing, monitoring and treating disease....

INFECTIOUS DISEASE / IMMUNE RESPONSE: SINGLE-CELL PROFILING OF EBOLA VIRUS INFECTION IN VIVO REVEALS VIRAL AND HOST TRANSCRIPTIONAL DYNAMICS

Dylan Kotliar, Aaron E. Lin, James Logue, [Travis K. Hughes](#), Nadine M. Khoury, Siddharth S. Raju, [Marc H. Wadsworth II](#), Han Chen, Jonathan R. Kurtz, Bonnie Dighero-Kemp, Zach B. Bjornson, Nilanjan Mukherjee, Brian A. Sellers, [Nancy Tran](#), Matthew R. Bauer, Gordon C. Adams, Ricky Adams, John L. Rinn, Marta Melé, Garry P. Nolan, Kayla G. Barnes, Lisa E. Hensley, David R. McIlwain, [Alex K. Shalek](#), Pardis C. Sabeti, Richard S. Bennett, bioRxiv (2020). Preprint. Posted 14 June 2020.
<http://shaleklab.com/publications/>
<http://shaleklab.com/publication/single-cell-profiling-of-ebola-virus-infection-%e2%80%8bin-vivo%e2%80%8b-reveals-viral-and-host-transcriptional-dynamics/>
doi: <https://doi.org/10.1101/2020.06.12.148957>

Ebola virus (EBOV) causes epidemics with high case fatality rates, yet remains understudied due to the challenge of experimentation in high-containment and outbreak settings. To better understand EBOV infection in vivo, we used single-cell transcriptomics and CyTOF-based single-cell protein quantification to characterize peripheral immune cell activity during EBOV infection in rhesus monkeys. We obtained 100,000 transcriptomes and 15,000,000 protein profiles, providing insight into pathogenesis. We find that immature, proliferative monocyte-lineage cells with reduced antigen presentation capacity replace conventional circulating monocyte subsets within days of infection, while lymphocytes upregulate apoptosis genes and decline in abundance. By quantifying viral RNA abundance in individual cells, we identify molecular determinants of tropism and examine temporal dynamics in viral and host gene expression. Within infected cells, we observe that EBOV down-regulates STAT1 mRNA and interferon signaling, and up-regulates putative pro-viral genes (e.g., DYNLL1 and HSPA5), nominating cellular pathways the virus manipulates for its replication. Overall, this study sheds light on EBOV tropism, replication dynamics, and elicited immune response, and provides a framework for characterizing interactions between hosts and emerging viruses in a maximum containment setting.

CLIMATE / PANDEMIC: 4 LESSONS FROM COVID-19 TO HELP FIGHT CLIMATE CHANGE

By Kara Baskin, Sloan School 05/27/20

<https://mitsloan.mit.edu/ideas-made-to-matter/4-lessons-covid-19-to-help-fight-climate-change>

[John Sterman](#), Jay W. Forrester Professor of Management, Professor, System Dynamics and Engineering Systems, Director, MIT System Dynamics Group

<https://mitsloan.mit.edu/sustainability/profile/john-sterman>

It's hard to find positives amid the wreckage of COVID-19, but there is one silver lining. The lockdown has slowed climate change: cutting fossil fuel use, air pollution, and greenhouse gas emissions.

How can we retain this COVID-era benefit in a post-pandemic world? MIT Sloan Professor John Sterman, faculty director of the [MIT Sloan Sustainability Initiative](#), explored these issues in a recent webinar, "[COVID and Climate Change: Lessons and Opportunities](#)."

So what do COVID and climate change have in common? Sterman outlined four points:

Out of sight isn't out of danger: Just as we can't see a virus until it causes a fever, we can't see the effects of climate change until it causes extreme weather events. It's human nature to ignore both issues: Out of sight, out of mind. Gather at the beach without a mask; use fossil fuels. Where's the immediate harm?

"People can be asymptomatic and infectious, and they can be infectious even before they exhibit any symptoms, and of course there are many asymptomatic cases. And it's the same story with the climate," Sterman said.

COVID-19 is more immediately lethal than climate change, of course, but the necessary shift in mindset is similar.

"People have a tough time dealing with complex systems with long time delays," Sterman said, making behavioral change challenging.

Human behavior responds to emotion, not science: Just as we need a vaccine for COVID-19, climate change requires urgent solutions that can't wait a generation. But people are moved to modify behavior based on emotion, not on research...

To be moved to change, he said, the public needs to be able to visualize the science, which is why Sterman and his colleagues created the [EN-ROADS climate-solution simulation](#). The free online tool allows users to see how various behavioral adaptations affect climate change.

Such simulations help humans comprehend both the urgency of the problem and the concrete steps to solve it. "It's that emotional response that our studies showed drive people's actions in the real world to get politically engaged" — on climate as well as on COVID-19, Sterman said...

Stop thinking "growth versus green": Just as the debate over when to reopen the economy should not be presented as a choice between lives lost or jobs saved, climate action is not inherently in conflict with economic growth. With COVID-19 as with climate change, science is the solution, Sterman said...

Global action is essential: Put on a mask, and save someone's life. Change your environmental behavior now, and reap the benefits later.

"You can't solve the problem of flattening the curve and quenching the pandemic just by individual action," Sterman said. "When you choose to distance yourself socially, when you support school closures, business closures, sporting event closures, et cetera, you're not just protecting yourself, you're protecting other people."

The same holds true with climate change. Both are global, common threats that require a common, global solution....

SIMULATION / INFECTION: ESTIMATING THE GLOBAL SPREAD OF COVID-19

[Rahmandad, Hazhir](#), TY Lim, and [John Sterman](#), MIT Sloan Working Paper 6146-20. Cambridge, MA: MIT Sloan School of Management, June 2020, posted 1 July 2020, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3635047

Limited and inconsistent testing and differences in age distribution, health care resources, social distancing, and policies have caused large variations in the extent and dynamics of the COVID-19 pandemic across nations, complicating the estimation of prevalence, the infection fatality rate (IFR), and other factors important to care providers and policymakers. Using data for all 84 countries with reliable testing data (spanning 4.75 billion people) we develop a dynamic epidemiological model integrating data on cases, deaths, excess mortality and other factors to estimate how asymptomatic transmission, disease acuity, hospitalization, and behavioral and policy responses to risk condition prevalence and IFR across nations and over time. For these nations we estimate IFR averages 0.68% (0.64%-0.7%). Cases and deaths through June 18, 2020 are estimated to be 11.8 and 1.48 times official reports, respectively, at 88.5 (85-95.3) million and 600 (586-622) thousand. Prevalence and IFR vary substantially, e.g., Ecuador (18%; 0.61%), Chile (15.5%; 0.57%), Mexico (8.8%; 0.69%), Iran (7.9%; 0.44%), USA (5.3%; 0.99%), UK (5.2%; 1.59%), Iceland (1.65%, 0.56%), New Zealand (0.1%, 0.64%), but all nations remain well below the level needed for herd immunity. By alerting the public earlier and reducing contacts, extensive testing when the pandemic was declared could have averted 35.3 (32.7-42.7) million cases and 197 (171-232) thousand deaths. However, future outcomes are less dependent on testing and more contingent on the willingness of communities and governments to reduce transmission. Absent breakthroughs in treatment or vaccination and with mildly improved responses we project 249 (186-586) million cases and 1.75 (1.40-3.67) million deaths in the 84 countries by Spring 2021.

FOOD SUPPLY CHAINS / PRECISION AGRICULTURE: FEEDING CITIES OF THE FUTURE

[Michael S. Strano](#), [Carbon P. Dubbs Professor in Chemical Engineering](#)
16 May 2020, The Straits Times online, <https://www.straitstimes.com/singapore/feeding-cities-of-the-future>

Related: Technology can help tackle coronavirus-related food shortages, with agriculture needing to be more local, productive and flexible, says Michael Strano from the Singapore-MIT Alliance for Research and Technology (SMART).
<https://www.cnbc.com/video/2020/04/24/digitalization-of-agriculture-can-help-solve-food-crisis-researcher.html>

Singapore's journey in urban farming could become a good model for other cities

The Covid-19 pandemic is disrupting food supply chains across the world, but in Singapore, dinner plates are still full thanks to strategic moves by the Government to diversify food sources and build up local agricultural capabilities.

Here, where 90 per cent of food is imported, the target is that by 2030, we will produce 30 per cent of our nutritional needs locally - this is known as the "30 by 30" goal.

Visit any supermarket here and you will see an array of delicious, locally grown vegetables and herbs, fresh seafood, and eggs with different properties, such as those with less cholesterol or higher omega fatty acid content, all produced in one of the most densely populated cities in the world.

Advances in urban farming have allowed us to increasingly utilise our limited land area and cultivate far more yield per square metre than in traditional farmlands.

Our continued efforts to address this issue will turn a vulnerability into a strength.

Singapore's journey in urban farming could become a good model for cities around the world amid a growing population and an increasing demand for food, which will be more apparent in city centres due to urban migration.

Just like how the country has addressed its water needs and now provides leading water management and treatment technologies globally, it could do the same with next-generation technologies and expertise developed for urban farming.

Getting to 30 per cent self-sufficiency in less than a decade is a massive task, but it is not impossible.

The Government and stakeholders are working to create opportunities in the agricultural and agritech industry - making more spaces available for urban farming, fostering research and development, and offering new educational programmes.

I lead a team that has been making breakthroughs in the knowledge and technology we need to get there on time. The [Disruptive and Sustainable Technologies for Agricultural Precision \(Distap\) research group](#) that I manage is one of five interdisciplinary research groups at the Singapore-MIT Alliance for Research and Technology, the Massachusetts Institute of Technology's (MIT) research enterprise in Singapore....

SOCIETY / CHANGE: GET OVER IT! - WHY THERE IS NO GOING BACK TO NORMAL AFTER COVID-19

[Joseph Coughlin](#), Director, MIT AgeLab

29 May 2020, <https://www.linkedin.com/pulse/get-over-heres-why-going-back-normal-after-covid-19-coughlin/>

Everyone wants an answer to one question — and they want it now. When do we get back to normal? It has been three months. Politicians and pundits argue. Experts debate. Still no answer. Everyone wants an answer to one question — and they want it now. When do we get back to normal?

It has been three months. Politicians and pundits argue. Experts debate. Still no answer. Get over it. There is no getting back to normal. There is only a new normal — one that has been coming long before COVID-19.

Observers have described the pandemic as transformative to society. Not exactly. Instead, COVID-19 fanned the gale of creative destruction that was already underway and has served as a propellant accelerating economic and social change.

Nearly 80 years ago, Austrian economist Joseph Schumpeter described change, particularly economic change, as the result of a “gale of creative destruction.” Where technology, new processes, and entrepreneurs lead to the destruction of ‘normal’ and to the creation of a new economic and social equilibrium.

We’ve already possessed the paradigm-shifting technology for a long time. The Internet has grown into an all-encompassing force, capable of fulfilling nearly any emergent want or need with new technologies and services — if not always well, nor completely. But much of its vast potential had yet to be realized until the outbreak of COVID-19. The pandemic has created a virtual black hole of new demands, accelerating the introduction of technology and tech-enabled services into key areas of life — from education to work to satisfying basic needs — that were already on the trajectory toward change.

Here are four elements of life that the pandemic has helped to move faster into an inevitable future:

Education...

Work...

Health...

Home Shopping...

MIT-RELATED STARTUPS

MIT Startup Exchange: <https://startupexchange.mit.edu/>

E5 AEROSPACE

Belmont, MA, <http://e5aero.com/>

We provide services for the design of unmanned aerospace systems, image recognition, and medical devices. E5 Aerospace LLS also develops product prototypes for commercialization through joint ventures with manufacturing and distribution partners.

Covid Ventilator: [prototype has NOT been approved by the FDA for medical use]
<http://e5aero.com/covid-ventilator.html>

Together with vendors, manufacturing and distribution partners, E5 Aerospace LLC has developed ventilators that can be manufactured and deployed rapidly around the globe with Commercial Off The Shelf* (see link <http://e5aero.com/covid-ventilator.html>), locally sourced components. Our ventilators meet the safety and performance requirements characteristic of Class II medical devices and the range of ventilatory support needed. In the short term, we hope to address an emergency clogged by supply chain issues, in the long term we hope to transform the conversation around expensive medical devices. It is likely that we are being idealistic; but do come join our movement...

SPATIO METRICS

Cambridge, MA, <https://www.spatiometrics.com/>

We quantify the value of design to help support smarter facility planning decisions.

We've developed a suite of metrics and have kicked off projects to support companies with their back-to-work planning. We're here to help identify your office's COVID-19 spatial risks and give companies the insights needed to plan for health and safety.

TULIP

Somerville, MA, and London, UK <https://tulip.co/>

Tulip was started by a team of engineers out of the MIT Media Lab. Our platform is based on over ten years of research in digital manufacturing, lead by world-class experts on breakthroughs in technologies like the Internet of Things (IoT), machine vision, human-computer interaction, augmented reality and machine learning.

Tulip has long developed its product and service capabilities to enable manufacturers to remain adaptable and resilient in an ever-changing market.

Reopening After the COVID Shutdown:

In response to the recent COVID-19 pandemic, many of our customers were actively looking for ways to ensure the safety of their teams across their facilities as they worked to ramp up operations.

To help support their reopening, we created a Facility Safety app bundle that allows manufacturers to create an open line of communication with their team and conduct remote health and wellness screening before permitting employees to come on-site. As a top priority, our platform is designed to fit our customers' specific data, privacy, security, and access needs.