“...Star Wars technology in a Flintstones health care system.”
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29 2019 World Medical Innovation Forum
The 2018 Forum focused on the advancements and opportunities of Artificial Intelligence.

The event brought together industry-leading CEOs, digital experts, investors and deal makers to share perspectives on how cognitive computation, machine learning, and big data are having a transformative impact on patient care. International experts were joined by attendees from the senior ranks of the information technology, life science, pharmaceutical, government and health care investment communities, as well as top Harvard faculty and staff.

In addition to examining the cutting-edge issues in the field, the Forum featured presentations from emerging leaders called First Look, the Discovery Café featuring senior academic and industry experts, and the “Disruptive Dozen”—12 AI emerging technologies with the potential to revolutionize the breadth of health care.

“The meeting was spectacular, truly. It’s the best conference I’ve ever attended. Our team will have follow-up aplenty before next year’s conference.”

Kevin Little
CSO, Advisor, Alliances, Toronto, Ontario, Canada
93% of 2018 attendees recommend the 2019 event.

89% of 2018 attendees rated the moderators and panelists either excellent or very good.

1,700 registrants representing 646 organizations.

173 international registrants from 30 countries.

169 speakers

1,440 minutes of discussion

by the numbers
The fourth annual World Medical Innovation Forum kicked off Monday morning with a record attendance representing the top health care, biotech and venture capital firms from across the globe.

Much of the discussion on Day One focused on the promise, complexities and limitations of AI in health care. Speakers were optimistic about the potential for AI to drive big improvements in predicting disease, treating patients and managing outcomes, but also cautioned that the technology is still in its early stages and there will likely be some growing pains along the way.

In her opening remarks, Anne Klibanski, MD, Chief Academic Officer of the Partners HealthCare, noted that Partners has been investing in the large-scale aggregation, collection and curation of clinical data that can be used to power AI technologies, and is well positioned to serve as an AI hub with collaborators worldwide.

Massachusetts Governor Charlie Baker was impressed by the speakers and participants at the Forum. “This is what I call rock star city,” Baker said in his opening remarks. “I’ve never seen such a terrific collection of intellectual capital.”
First Look: Next Wave of AI Breakthroughs

Monday’s First Look Session provided attendees with a look at 19 new innovations in AI-powered medical applications from Partners early career Harvard faculty.

Applications were in psychiatry, surgery, genetic profiling, in vitro fertilization, predicting C. difficile infection rates and blood group typing, just to name a few. Audience members were energized by the presentations with 100% positive comments.

Ziad Obermeyer, MD, an emergency medicine clinician at Brigham Health, presented a concept for using machine learning algorithm to improve the decision making process for costly medical tests.

“We’re seeing errors on both sides,” Dr. Obermeyer explained. “Predictably low risk patients are getting tested and predictability high risk patients are not getting tested.”

“One thing clear to me is that anything would be better than what we are doing today.”

“It won’t come as a surprise to anyone that doctors make mistakes, but we can use these algorithms to find out where and with whom those doctors make mistakes. Building on this understanding, you can come to a whole range of possibilities.”

Dan Hashimoto, MD, a surgical resident at Massachusetts General Hospital (MGH), presented on a system called “Surgical Fingerprints” that is designed to reduce the risk of adverse intra-operative events by collecting data from previous surgeries and using that information to guide real-time decision making in the operating room.

“It’s like Waze for surgery, but instead of avoiding traffic, it will allow you to avoid surgical complications,” Hashimoto explained.
Discovery Café Workshops

At lunch, the crowd broke out into smaller groups for a series of Discovery Café Sessions taking a closer look at the potential for AI in pathology, anesthesiology, neurosciences, data security and the workforce.

In the neurosciences session, Maurizio Fava, MD, director of the Division of Clinical Research at MGH and the vice chair of the MGH Department of Psychiatry, noted that 20 percent of clinical trial participants never actually take the drug that is being tested. Fava said he was hopeful that AI technology could help to identify and screen out those participants to improve the accuracy of results.

Panel Sessions

Monday afternoon’s panel sessions began with a big picture view of AI in clinical care before digging deeper into specific areas of interest, such as the role of AI in drug development, the interaction of AI with electronic health records and the role of AI in improving clinical trials.

Tom Lynch, MD, Executive Vice President and Chief Scientific Officer of Bristol Myers Squibb, was optimistic that AI could help to streamline the movement of new molecules from discovery to development. The current process “takes way too long and costs way too much,” he said.
Notable Tweets

**Charlie Baker** | @MassGovernor
Massachusetts is a leader in innovation, technology, and healthcare, and I’m excited to welcome so many leaders who are experts in these fields to the Commonwealth for the World Medical Innovation Forum here in Boston. #WMIF18

**Nikhil Bhojwani** | @bnikhil
"AI will not replace radiologists. Radiologists who embrace Ai will replace radiologists who don’t." Bill Thorwarth, CEO American College of Radiology #WMIF18 @PHSIInnovation #ArtificialIntelligence #radiology

**Deepti Bathina** | @deepthibathina
Expecting the impossible from clinicians ..to interpret 100s or 1000s of lab test results for patient diagnosis #AI and #MachineLearning can help #WMIF18 @NuanceHealth

**Nick Mathisen** | @njmathisen
I’ve only been at #wmif18 for 2 hours and brain is already melting from 19 amazing presentations on AI breakthroughs. Thanks @PHSIInnovation

"AI is dumb without cultivated data, supervised learning and teaching to understand."
Day 2 of the Forum was packed with in-depth discussions on the opportunities and challenges of integrating AI into the health care system, with an up-close look at the role it could play in delivering affordable health care, supporting clinical decision making, processing large amounts of data and speeding up drug development.

The discussion also highlighted some key challenges in AI integration, such as convincing clinicians, patients and payors of the value of AI technology, standardizing data across platforms, and protecting patient privacy in a digitized world.
The Importance of Data

Data collection was a key topic in many sessions throughout the day. “The theme you will hear over and over is very high quality, well-curated data,” said Mark Murcko, PhD, Chief Science Officer of Relay Therapeutics, during a session on drug development. “One of the big challenges we have is to better represent the interactions that molecules are having. Just to tease out that little bit of insight that helps the drug discovery team move a little faster.”

A panel discussion on Data Engineering in Health Care emphasized the importance of engaging patients in discovery process regarding the benefits of sharing their health information with clinicians and researchers outweigh the risks of a potential data breach.

James Mault, MD, Senior Vice President and Chief Medical Officer for Qualcomm Life, noted that 15 years ago many people were hesitant about using their credit cards to make purchases online, but today nearly everyone has their information stored on website such as Amazon because of the convenience it provides. “The risk is still there, but we’re willing to accept that risk because we’re getting these tremendous benefits,” he said. “In health care we’re seeing a lot of risk, but we’re not yet seeing a lot of benefit.”

Fireside Chats

Day 2 also featured a series of one-on-one fireside chats. Atul Gawande, MD, a surgeon at Brigham Health and bestselling author of Being Mortal and The Checklist Manifesto (among others), told Brigham Health President Betsy Nabel, MD, that the key to successfully integrating AI technology into clinical care is to identify clear benefits for both the patient and the clinician-and to ensure that the health care providers are ready and willing to use it.

“If you give people a great process solution, the perfect innovation tool, and plug it into a ready environment, you make a major impact.”
Afternoon Panel Sessions

In a panel session on AI and Genetic Sequencing, moderator Heidi Rehm, PhD, said that while researchers are now able to collect much more genetic data from patients, their ability to process and take action on that data is still lagging behind.

“The team in my laboratory still reads articles in the literature to try to figure out what these variants mean,” Rehm said. “We will never be able to disseminate these technologies for broad medical use if we can’t advance what we are doing today in terms of understanding the genetic and genomic variation.”

Despite the concerns raised and the work that still needs to be done, the tone of the day’s sessions were overwhelming positive, with nearly all participants saying they believed that AI technology could make significant improvements in the delivery of health care.

In a CEO roundtable discussion hosted by MGH President Peter Slavin, MD, Terri Bresenham, Chief Innovation Officer for GE Healthcare, shared her optimistic outlook.

“We’re very bullish,” Bresenham said. “I think there’s no doubt that this will be by far the most transformational technology change that is going to occur, in concert with some other very important changes in genomics and genetics and biotherapies as well as diagnostics and imaging technology.”
“Software writing software: better and faster, we will become the teachers of AI.”

Notable Tweets

Samuel Myllykangas | @SamuMyllykangas
CEO panel: #AI will transform healthcare by expanding access to care, improving quality, reducing cost, streamlining information flow and integration, accelerating drug discovery, supporting decision making and supplementing research. #WMIF18

Behrooz Hashemian | @behxyz
Amazing roundtable with CIO and CEO’s from @Philips, @SiemensHealth, @Vertex, and @GEHealthcare, talking about the AI opportunities in healthcare and how it is transforming the industry. #WMIF18 @MassGeneralNews

Cassie Lee | @cassan_druh
Understanding that you in the #innovation world have two customers: you have the patient whose lives you have to make better, and you have the clinicians who you need to make easy tools for that scale – @Atul_Gawande at #WMIF18 @BrighamWomens

Dan Hashimoto | @Laparoscopes
I want @Nvidia to be an intelligent autonomous machine. I want @NvidiaAI to be an #AI. #AI needs to do 3 things: perception of the environment, reason about what it’s perceiving, develop a plan to take action. – CEO Jensen Huang #WMIF18
The third day of the World Medical Innovation Forum featured a series of panel discussions and fireside chats that focused on ways that AI can be used to improve the performance and data-gathering capabilities of medical devices, reduce health care costs, improve operational efficiencies across the health care system and mine new insights from clinical and research data.

“If you think about the magnitude of the information we have available to us in this space, you think about where technology is today and the compute horsepower that is available to all of us, it just makes sense to continue to evaluate technologies like artificial intelligence to be able to streamline not just operational and administrative efficiency, but be able to make more informed and timely decisions,” said Eric Murphy, CEO of OptumInsight and Enterprise Growth Officer at Optum, during a discussion on how AI technologies could factor into health care reimbursement systems.
Another engaging discussion focused on the concerns that AI technologies may eventually replace human pathologists and radiologists in diagnosing patients. The message from the speakers on this panel was that AI tools should be viewed as a friend, not a foe.

Constance Lehman, MD, PhD, Chief of Breast Imaging at Massachusetts General Hospital (MGH), said AI technologies have helped make imaging services at MGH more precise, targeted and personalized while reducing repetitive tasks that lead to burnout.

“Without a doubt this is on the friend side and a really powerful technology,” said Andrew Beck, MD, PhD, CEO, of PathAI. “The types of problems we are interested in solving are really hard and big and we’re very far from being able to effectively solve them, even with the AI of today. We’re very lucky that we have the access to these new technologies that will assist the profession.”

Fireside Chats

Wednesday’s Fireside Chat sessions provided valuable insights from health care leaders in the government, technology and pharmaceutical sectors.

“I’ve been in this industry for nearly four decades now. I honestly believe that I have never seen a technology that’s as transformative as this one,” said John Kelly, PhD, Senior Vice President for Cognitive Solutions and Research at IBM.

“The opportunity is enormous to transform this industry for better outcomes, lower costs for the benefit of all,” Kelly said. “But it’s now into the hard work portion of this. It is not easy to build a very intelligent, at scale, precise artificial intelligence system to be injected in the workflow of a clinical physician or a drug researcher. That is a big job. And by the way, you better have heck of a lot of good data to train that system.”
The Disruptive Dozen: 12 AI Technologies That Will Reinvent Care

The forum concluded on Wednesday afternoon with the presentation of the Disruptive Dozen, 12 technologies that faculty members in the Partners HealthCare System (PHS) believe have the potential to significantly advance health care in the next decade.

1. AI at the Bedside
2. A Picture is Worth a Thousand Words
3. Can Personal Devices Improve Your Health?
4. Risky Business: Using EHRs to Predict Disease Risk
5. Reading the Tea Leaves of Cancer Immunotherapy
6. Bringing “Smart” Machines to Medicine
7. Harnessing the Power of Digital Pathology
8. Minimizing the Threats of Antimicrobial Resistance and Infections Associated with Antibiotic Use
9. Getting Back to Face Time: AI Tools that Help Reduce Physicians’ Computer Use
10. Disseminating Medical Expertise to Areas that Need it Most
11. Next-Gen Radiology
12. Melding Mind and Machine

First Look Winners

Congratulations to First Look presenters MGH’s Sabine Wilhelm, PhD and Brigham Health’s Ziad Obermeyer, MD for winning the Peter K. Ranney Innovation Award!

The award was presented at the Innovator’s Dinner on Wednesday, April 25 to honor the BWH and MGH First Look presenters who embodied the innovative, entrepreneurial and visionary spirit the World Medical Innovation Forum was established to recognize.
“In 5 years, there will not be a decision made in healthcare without AI being somehow a part of it.”

Notable Tweets

**Timothy Howe | @HamiltonHowe**

Vasant Narasimhan CEO of @Novartis, “We need to win the race of turtles…” commenting on how slow the industry is moving with regard to #AI and data collection. #WMIF18

**BCBSNC | @BCBSNC**

“We need to remove any remaining friction between insurers and healthcare providers when it comes to sharing #data. We need a free flow of information.” – @PatrickConwayMD #WMIF18

**Laura Lovett | @lauralovett7**

Will robots be creating our meds in the future? Experts say probably not. But there is use for AI in pharma. I got to hang out at the World Medical Innovation Forum yesterday and hear all about it #WMIF18

**Slalom Boston | @SlalomBoston**

It’s the final day of #WMIF18 and we’ve had a blast learning about #AI in #healthcare. Thanks to @PartnersNews for the outstanding event!
Please join us in congratulating the twelve 2018 Innovation Discovery Grant Award recipients. Also, many thanks to the more than 100 faculty members who applied for these $50,000 AI focused grants. We are also grateful to the large number of industry reviewers who guided the selection as well as our own IDG grant management team.
A Web-Based Neural Network Calculator for Ovarian Cancer Screening using Serum miRNA
Kevin Elias, MD
BWH | Obstetrics and Gynecology

Artificial Intelligence Based Seizure Detection and Classification
Brandon Westover, MD, PhD
MGH | Neurology

Augmented Digital Microscopy for Diagnosis of Endometrial Neoplasia
George Mutter, MD
BWH | Pathology

Breast Cancer Scanning Initiative (BCSI): Predicting Unnecessary Surgeries in High-Risk Breast Lesions
Jochen Lennerz, MD, PhD
MGH | Pathology

Deep-Learning Facilitated Lesion Detection in Medical Images
Jinsong Ouyang, PhD
MGH | Radiology

DeepROP - A Point-of-Care System for Diagnosis of Plus Disease in Retinopathy of Prematurity
Jayashree Kalpathy-Cramer, PhD
MGH | Radiology

Development of a Machine Learning Algorithm-Guided Approach to Treatment Selection for Depressed Patients
Christian Webb, PhD
McLean | Psychiatry

Machine Learning Optimized Intraoperative Multiplexed Quantitative Optical Image Guidance for Brain Tumor Surgery
Alexandra Golby, MD
BWH | Neurosurgery

Poly-Exposure Risk Scores for Psychiatric Disorders
Martin Teicher, MD, PhD
McLean | Psychiatry

The Identification of Intracranial Hemorrhage using Machine-Learning Analysis of Sparse Transcranial Ultrasound Signals
Phillip Jason White, PhD
BWH | Radiology

Ultrasound-based Sensors for Physiological Monitoring, and How They can make MRI and PET/CT Scanners Work Better
Bruno Madore, PhD
BWH | Radiology

Using Deep Learning to Predict Next-Day Patient Discharges to Optimize Hospital Capacity Management
Peter Dunn, MD
MGH | Anesthesia
The Future of AI in Pathology and Laboratory Medicine

Diagnostic medicine is accepted as one of the first domains in medicine that should benefit from AI and machine learning. This session addressed how AI will impact pathology and laboratory medicine in the near and long term.

Technology and AI in Anesthesiology

Anesthesiology is a major element of the in-patient environment and AI implementation in it has the potential of far reaching effects. This session addressed how AI will impact anesthesiology in the near and long term.

The Future of AI in Neurosciences

The neurosciences in its broadest definition touches the most patients in medicine. This session addressed how AI will impact neurology, psychiatry and psychology.

Intelligence in Sight: How Machine Learning Will Impact Ophthalmology

There has been an explosion in the research and development of artificial intelligence for assessment of retinal and optic nerve diseases using ophthalmic imaging. Deep learning algorithms have been shown to screen for common conditions such as diabetic retinopathy with high precision. The advantages and challenges of integrating machine learning in ophthalmic care was discussed by a panel that includes industry leaders and clinicians who are the forefront of artificial intelligence discovery and development in the ophthalmic space.
Data Security

The security of data is a fundamental requirement throughout health care. The growing ubiquity of data driven machines throughout medicine introduces new risks and potentially increased scale of breaches. A panel of top provider and industry data security experts discussed security implications in detail.

Innovation Fellows: A New Tool

The Innovation Fellows program is a hands-on model of collaborative innovation that enables industry to gain access to early career Harvard faculty through personnel exchanges between Partners hospitals and participating biopharmaceutical, device, venture capital, digital health, payor and consulting firms. It provides experiential, career-development opportunities for future leaders in health care. Panelists highlighted program characteristics, how participants can maximize value and broader implications for industry-academic collaboration including how it might be used to address AI requirements.

Workforce: Humans, Machines and the Future Delivery of Care

The growth of AI and machine learning in health care is inexorably tied to workforce issues – it will both drive the evolution of the workforce and its rate of adoption will be subject to workforce characteristics. This session will address the human dimension in the growth of AI in healthcare including workforce composition and strategic issues associated with the inevitable changing roles of humans and machines. Issues of how to identify, characterize and respond to future requirements were discussed in detail.
The 2018 World Medical Innovation Forum was made possible through the generosity of the following sponsors.

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- Boston Scientific
- Mintz Levin
- Northern Light Venture Capital
- Philips
- Pure Storage
- Vertex
innovator’s dinner

The 2nd Annual Innovator’s Dinner was held Wednesday evening, April 25th as the concluding event of the World Medical Innovation Forum. This invitation-only dinner honored the 660 MGH, BWH, McLean and Spaulding principal investigators who submitted an invention disclosure during the calendar year 2017. Each investigator was recognized with a framed certificate and inclusion in the Innovator’s Dinner program guide.

A popular event, over 350 investigators and attendees registered to hear insights and perspectives from Sue Siegel, GE’s Chief Innovation Officer and CEO of Business Innovations, and Anne Klibanski, MD, Chief Academic Officer, Partners HealthCare.

Following the keynote and fireside chat the Peter K. Ranney Innovation Award was given to Sabine Wilhelm, PhD, Chief of Psychology; Director, OCD and Related Disorders Program, MGH; Professor, HMS, and Ziad Obermeyer, MD, Assistant Professor, Emergency Medicine, BWH; Assistant Professor, HMS. These two First Look presenters embodied the innovative, entrepreneurial and visionary spirit the World Medical Innovation Forum was established to recognize. The award comes with a framed certificate and a $10,000 cash reward.
panel videos

Watch the 2018 panels and subscribe to our channel

[DC] The Future of AI in Pathology and Laboratory Medicine

[DC] Technology and AI in Anesthesiology

[DC] The Future of AI in Neurosciences

[DC] Intelligence in Sight: How Machine Learning Will Impact Ophthalmology

[DC] Data Security

[DC] Innovation Fellows: A New Tool

[DC] Workforce: Humans, Machines and the Future Delivery of Care

*[DC] Discovery Café
Can AI Based Drug Development Feed A Hungry Pipeline?

Smart EHRs: AI for All

AI and the Cost of Trials: The Impact of Real World and Real Time Evidence

Reflecting on the Impact of AI at the Bed and the Bench: Chairs Roundtable

Will AI Bend the Cost and Access Curve

Drug Therapy Redefined Through Machine Learning

1:1 Fireside Chat: Atul Gawande, MD

Data Engineering in Healthcare: Liberating Value

1:1 Fireside Chat: Jensen Huang, CEO, NVIDIA

1:1 Fireside Chat: Paul Ricci, Former Chairman and CEO, Nuance Communications

AI and Gene Sequencing

Tangible Returns on the AI Value Proposition
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