Tradeshow Summary

HLTH 2019 – Creating health's future is all about about AI and asynchronous healthcare delivery

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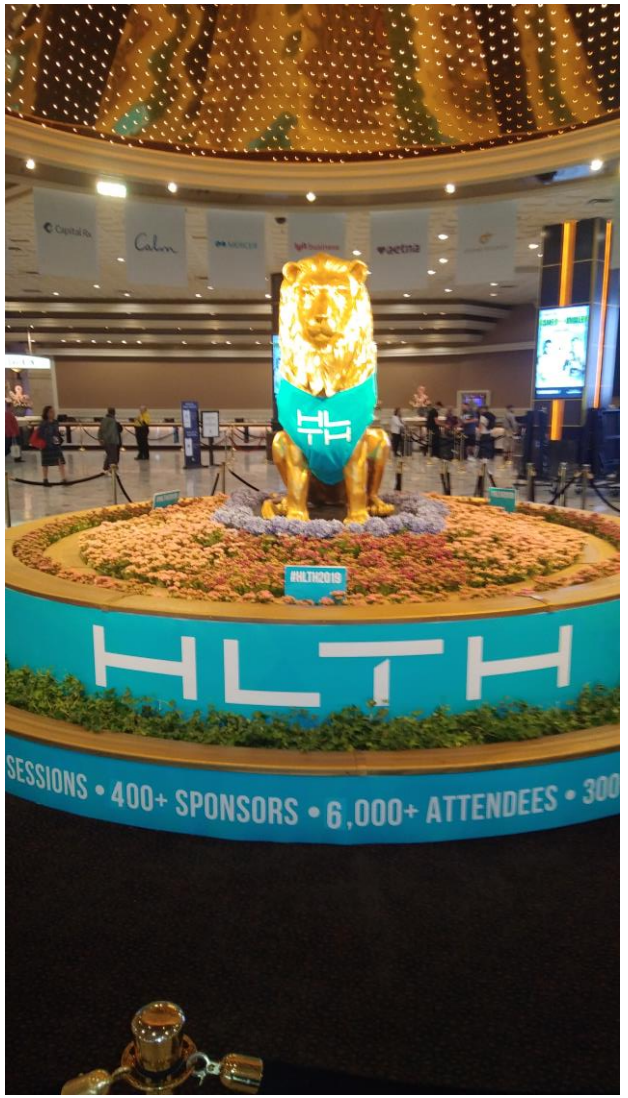
Introduction

- MGM Grand Las Vegas
- 6,000 attendees
- 400 exhibitors

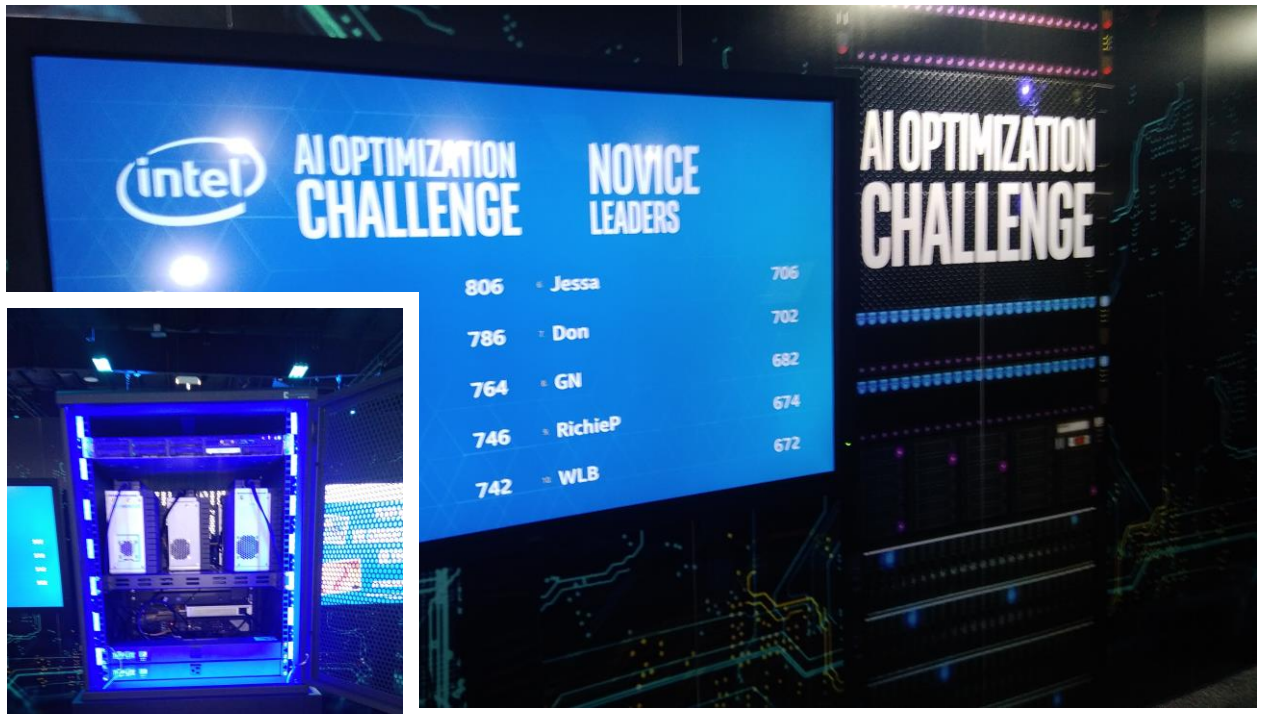
Following HLTH last year, we wrote about how the spotlight was trained on new buzzword mechanisms like blockchain and augmented intelligence, and how disruptive innovation and transformative technologies in healthcare were the subjects of much debate and discussion. All of which remained true at this year's HLTH conference, but with an even larger presence of attendees, speakers, and sponsors. Held for four days in late October in Las Vegas, HLTH presented an expansive forum for healthcare professionals, companies, and policymakers to discuss new advances and challenges confronting the healthcare ecosystem. Drawing representation from the healthcare continuum, including health payment and delivery, the event also offered insights into how the industry could leverage ongoing disruption toward providing next-generation healthcare. This tradeshow summary provides a brief overview from the IHS Markit analysts at the show.

Some of the more sweeping highlights for the week include:

- CMS Administrator Seema Verma calling for an end to the proposals for Medicare for All.
- Mark Cuban gets into pharma and is working on a new bipartisan healthcare plan.
- Google (Alphabet) makes a play for Fitbit (announced during but not at the show)



Intel and OpenVINO



Intel had a strong presence at the HLTH conference, not only with the OpenVINO platform and the AI optimization challenge at their booth, but with several talks covering topics such as:

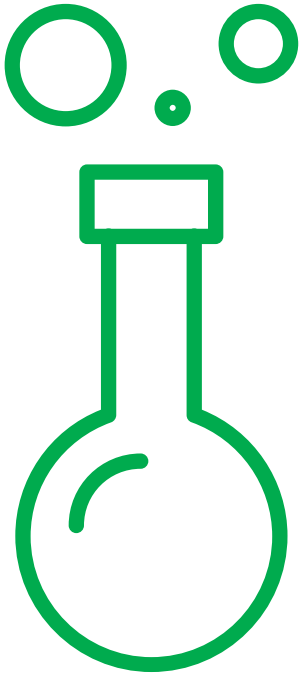
- The top challenges for ubiquitous precision medicine
- AI in clinical systems
- The digital transformation of pharma
- A bull vs. bear discussion on digital health between David Ryan (VP Intel Health and Life Sciences) and Ed Simcox (CTO HHS)

OpenVINO (Open Visual Inferencing and Neural Network Optimization) is a toolkit providing developers with improved neural network performance on Intel processors (CPU, Intel Processor Graphics).

Intel has been busy working with partners on developing AI solutions for healthcare, some of these collaborations include GE Healthcare, Siemens, Microsoft, AccuHealth, Broad Institute, Diaceutics, BlueScan Labs, Michael J Fox Foundation, Intermountain Healthcare, Mayo Clinic, Montefiore Health System, OptumLabs, Baidu, and Alibaba.

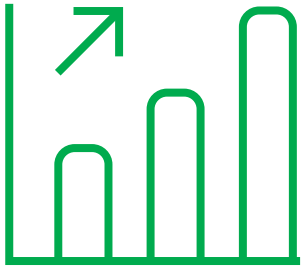
JLABS innovation platform - AI accelerating drug discovery

JLABS is the life science incubator platform from Johnson & Johnson, which is currently working with more than 600 startups. The HLTH panel, including Melinda Richter (Global Head, JLABS), Alex Zhavoronkov (CEO, Insilico Medicine), Dan Vahdat (CEO, Medopad), and Gavin Teo (GP, B Capital Group) discussed how artificial intelligence (AI) could accelerate drug discovery. The current statistics for drug makers are:



- 38 new drugs approved by the FDA each year
- 75% are from pharma, the rest from universities and biotech companies
- Average timeline of **12 years and $1.8 billion** to discover and develop a new drug
- Odds of success? 4% success rate post target ID (discovery); 12% success rate entering the clinic (development)

Ideally, AI will be able to speed the discovery process, but clinical trials will still delay time to market. **How long before the first drug is discovered by AI? Likely 7 years.**



Monetizing AI for drug discovery. Medopad has explored several business models including:

- SaaS – Payment based on regions and number of patients.
- Reimbursement code – There are two now from Centers for Medicare and Medicaid Services (CMS) but the company has yet to bill. While having codes are obviously beneficial, there is still a verification waiting period.
- **Revenue share with partners.** Milestones and royalties model common for biotech. The company said that this is working best.

Rare diseases, not actually rare

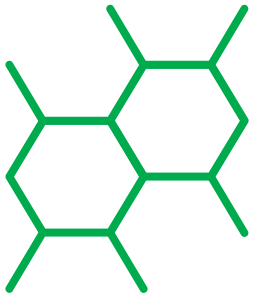
With as many as 7,000 rare diseases, the number of people living with a rare disease in the United States alone is estimated at between 25-30 million. So, rare diseases are not actually rare. Yet the diagnostic odyssey to identify a disease can take 8 years, during which time long-term problems may manifest. Aperiomics and FDNA propose two unique solutions.

Aperiomics is one of the most extensive disease testing companies, identifying every sequenced bacteria, DNA virus, parasite, and fungus. Using data stemming from Illumina sequencing devices, the company identifies every known microorganism through 'Deep Shotgun Metagenomic Sequencing', using their own database containing over 37,000 microbes.

Dr. Crystal Icenhour – UTI is a commonly missed diagnosis, often treated with pain killers/opioids that do not cure.

- Work solely with Illumina
- 1 test tube per sample
- 1 hour to run analysis
- $1000 per sample per patient, costs them $600 per sequence. IHS Markit finds it difficult to see how cost for consumer will drop toward $100 any time soon

FDNA is developing next-generation phenotyping (NGP) technologies that capture, structure and analyze complex human physiological data to produce actionable genomic insights. FDNA's database includes phenotypic and genotypic information associated with more than 10,000 diseases, crowdsourced from real-world patient cases through a broad network of users. This de-identified data is collected and stored in a private and secure cloud-based clinical warehouse, and integrated to laboratory information management systems (LIMS), electronic medical record (EMR) and variant interpretation systems through a set of open application programming interfaces (APIs).



One of the company's products is Face2Gene Clinic, which detects phenotypes and reveals relevant facial and non-facial features using facial photos.

- Automatic calculation of anthropometric growth charts
- Suggestion of likely phenotypic traits to assist in feature annotation

AI at the edge - An autonomous design for clinical monitoring

Care.ai
Care.ai is an AI company focused on patient monitoring, seeking to address the problem of healthcare staff working over-capacity. Care.ai is the first AI-powered autonomous monitoring platform for healthcare. Powered by the company's purpose-built, AI-accelerated edge sensors, the platform transforms ordinary rooms into 'Self-aware Rooms™'. Working with Google (utilizing Google's TPU) and NVIDIA, the company has developed an all-in-one device, with accelerated hardware and an array of smart sensors which is currently in four health systems and 250 facilities.

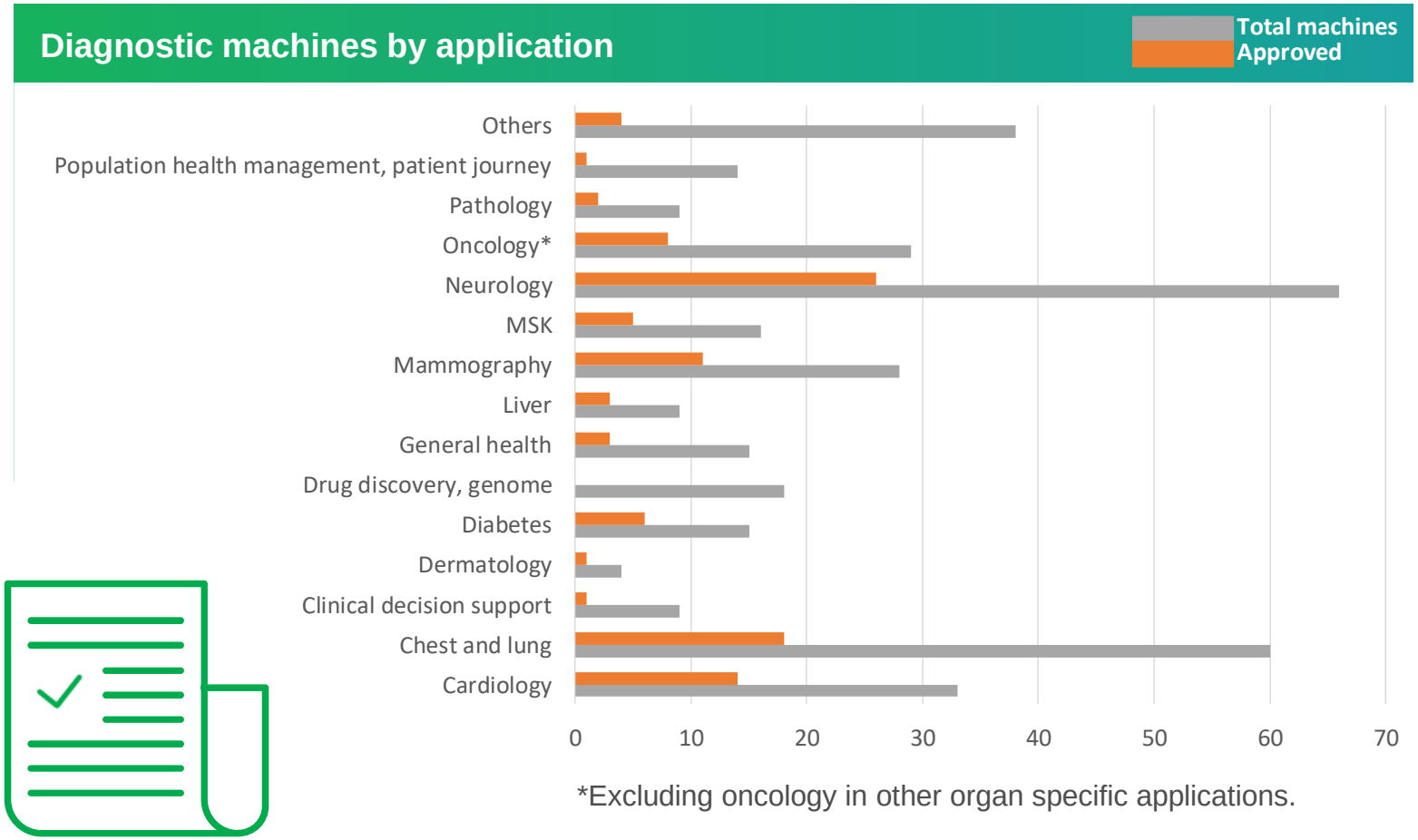
Care.ai has focused on three key problem areas in the hospital to prove return on investment (ROI):

- Fall prevention - Between 700,000 and 1,000,000 people fall in U.S. hospitals each year. 30% to 35% percent of those patients sustain an injury as a result of the fall.
- Pressure ulcers - 2.5 million patients are affected by pressure ulcers each year, and approximately 60,000 of those patients die as a direct result of pressure ulcers. The average cost of a pressure ulcer is $43,180.
- Hand sanitation - Hospital-acquired infections are the cause of 98,000 deaths annually. A 200-bed hospital facility can incur more than $1.7 million in annual MRSA infection-related expenses, attributed directly to hand hygiene noncompliance.

Machine reading – Microsoft and Jackson Lab

The **Jackson Lab** is working with **Microsoft** to use AI to improve cancer treatments. Researchers at the lab are utilizing AI to accelerate implementation of treatments that target patients' specific genomic profiles. The lab researchers are collaborating with computer scientists at Microsoft's Project Hanover, who are developing AI that enables algorithms to read complex medical research documents and highlight the critical data they contain. NLP (neuro-linguistic programming - machine reading) allows the lab to 'triage' the literature, identifying meaningful papers with which to allocate clinician time in order to verify clinical efficacy of controls described. The lab has developed a searchable database called the Clinical Knowledgebase (CKB). Subject matter experts store, sort, and interpret complex genomic data to improve patient results and exchange data about clinical trials and treatment options. The goal is to find the most relevant data from the thousands of biomedical research papers published every day.

The following figure is from the IHS Markit Healthcare Equipment Database, it illustrates the number of diagnostic machines that have regulatory approval by the FDA or CE marking. Some of these machines utilize NLP.

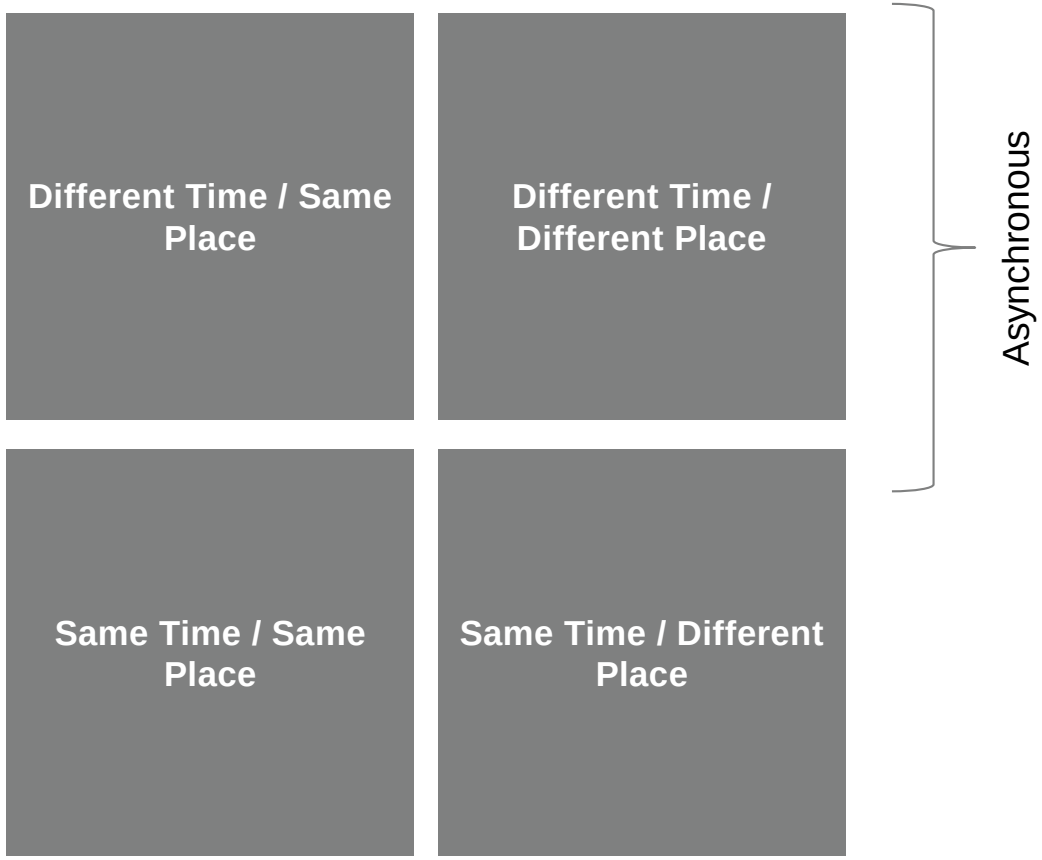


Asynchronous healthcare enabling scalable value-based healthcare

A big theme at HLTH 2019 was the concept of asynchronous healthcare. During Monday's sessions, the topic was mentioned in seven out of ten presentations, and although the concept of asynchronous healthcare is not new, its meaning today has a slightly different value proposition.

In its most basic sense, asynchronous implies an alternative alignment of time. In healthcare, this has traditionally been referred to as store-and-forward telemedicine, meaning a patient submits data, which is then reviewed at a different time by a healthcare provider. Store-and-forward telemedicine has mainly been used in rural care settings, with highly limited access to healthcare services.

The emphasis on asynchronous healthcare revolves around a movement away from traditional telehealth services that simply virtualization of certain workflows or services, and offer these through on-demand video consultations. Although such services are highly convenient to consumers or patients, the value is limited, as no cost efficiencies are achieved. The mode of virtualization with most potential for cost efficiency is when care is provided in different times, at different places, and such a model was the focus of many subject matter experts at HLTH. The advent of digital therapeutics, DTx, supports this model i.e. providing medical-grade software in combination with devices and/or pharmaceuticals to deliver asynchronous and evidence-based interventions.



An exciting future for medical devices in the care continuum

Qualcomm Life's previous Chief Medical Officer, Dr. James Mault, re-enters the health technology space as founder of BioIntellisens and presents a new exciting wearable device, expected to launch in 2020.

Effortless to use, medical-grade, easily integrated into existing workflows and inexpensive – these four acceptance criteria were presented by Dr. Mault and describes what health technology products of the future must feature to ensure good fit with value-based healthcare. BioIntellisens was founded in 2018, and has since developed a wearable sensor, currently under 510k review, for various applications, including remote patient monitoring. Based on a short video shared by BioIntellisens, the wearable device is placed near the heart via a sticker or adhesive, and likely features optical sensors and electrodes for multi parameter patient monitoring. In terms of connectivity, wireless connectivity will likely be featured in the device. IHS Markit will continuously track the development of BioIntellisens going into 2020.

Cellular connectivity is making its way into medical devices. Livongo shared that its devices, including the glucose meter, blood pressure monitor and weight scale, now feature or will soon feature cellular connectivity. This bypasses the need for gateway devices for data transmission. According to the company, Bluetooth connectivity has caused various compatibility issues. Historically, cellular connectivity has had limited use-case in medical devices, but this may change going forward. Technologies such as low-power wide-area network (LPWAN) will drive adoption due to its low-power and low-cost, which has already been witnessed in the sports and fitness technologies market.

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