



The Future of Healthcare and HTM

Part Deux

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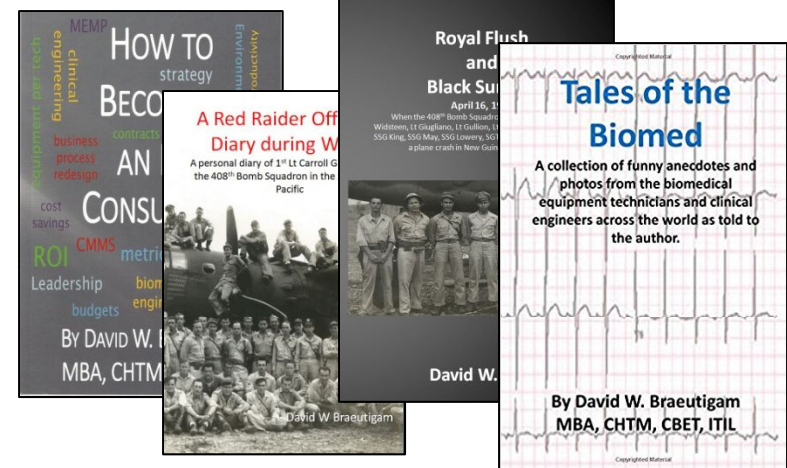
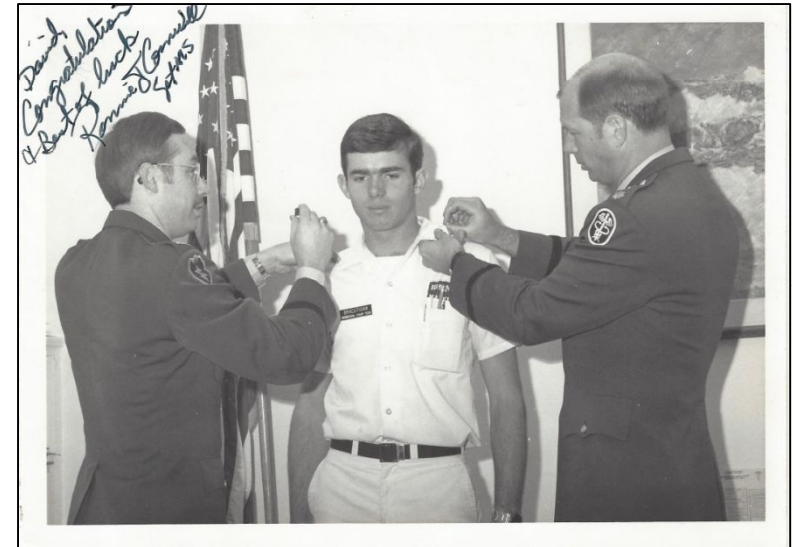
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About David Braeutigam

- 35+ years in Healthcare Technology Management
- Trained at Fitzsimons in the U.S. Army
- BMET at Walter Reed Army Medical Center, Ft. Bragg, El Paso, TX and in Dallas, TX
- Former System Director for 22+ hospitals and 400+ clinics in Texas
- Currently consulting in HTM and writing

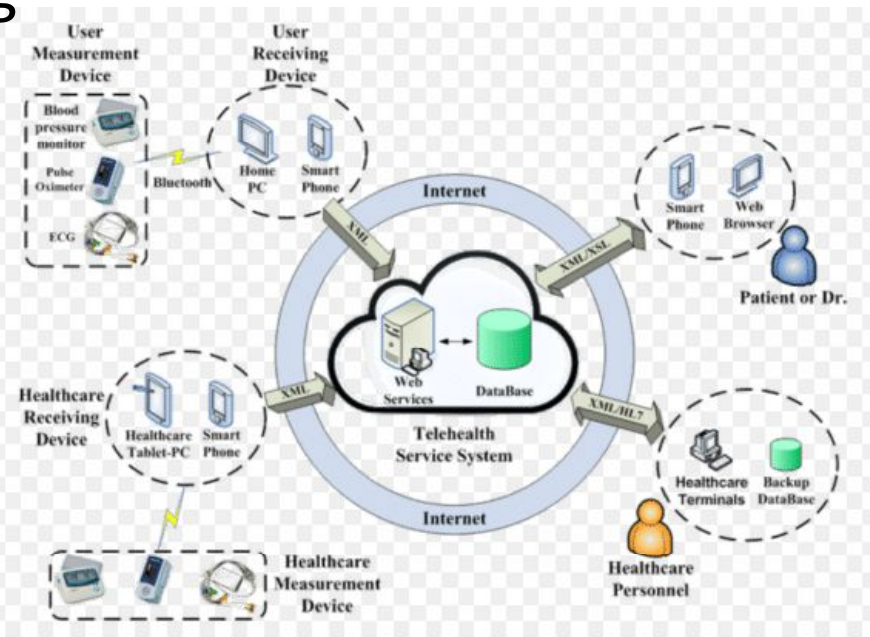


Agenda

- Today – what are the big things in HTM and Healthcare today?
- Tomorrow – what can we expect of HTM and Healthcare in the future?
- What should I do to prepare for the changes?

10 of the latest medical technology innovations to have impact on healthcare

1. Digital health records
2. Remote patient monitoring
3. Big data
4. Cloud computing
5. Acceptable and safe data storage
6. Telemedicine
7. Mobile apps
8. Patient portal technology
9. Wearable sensor technology
10. Electronic health records



<https://techengage.com/technology-and-healthcare/>

12 Trends That Will Dominate Healthcare IT in 2019

1. Using IT to help achieve patient engagement/experience
2. Digital health
3. AI
4. Population management
5. Payers to provide total care management
6. Interoperability
7. EHR optimization
8. Protecting health information and data security
9. Value based care
10. Virtual care
11. Cloud
12. Clinical decision support and real-world evidence

<https://www.healthdatamanagement.com/list/12-trends-that-will-dominate-healthcare-it-in-2019>

New Major Vendors in Health IT

BIG TECH IN HEALTHCARE				
<i>How the Big Four tech companies are transforming healthcare in the US</i>				
	Alphabet	amazon	Apple	Microsoft
Strengths	<ul style="list-style-type: none"> • Google Cloud Platform • AI • Cloud infrastructure • Verily Life Sciences 	<ul style="list-style-type: none"> • AWS • Alexa • Supply delivery 	<ul style="list-style-type: none"> • iPhone consumer base • Apple Watch • App Store frameworks 	<ul style="list-style-type: none"> • Azure • Healthcare NExT • Microsoft Genomics
Weaknesses	<ul style="list-style-type: none"> • Fragmentation • Limited clinical evidence of platform effectiveness 	<ul style="list-style-type: none"> • Limited clinical evidence of platform effectiveness • Health system relationships 	<ul style="list-style-type: none"> • Audience limited to iOS • Limited clinical evidence of device effectiveness 	<ul style="list-style-type: none"> • Muted customer awareness • Small developer community
Opportunities	<ul style="list-style-type: none"> • Population health • Precision medicine • Clinical decision support 	<ul style="list-style-type: none"> • Medical supply services • Personalized health benefits 	<ul style="list-style-type: none"> • Personalized health insurance • Remote patient monitoring • mHealth 	<ul style="list-style-type: none"> • Population health • Precision medicine • Clinical decision support
Threats	<ul style="list-style-type: none"> • AWS' and Microsoft's IaaS • Data security • Consumer trust 	<ul style="list-style-type: none"> • Google's and Microsoft's IaaS • Incumbent M&A activity • Consumer trust 	<ul style="list-style-type: none"> • Competing device manufacturers • Non-iOS ecosystem growth • Consumer trust 	<ul style="list-style-type: none"> • AWS' and Google's IaaS • Data security • Consumer trust

Google in Health IT

- Google and Apple have both secured additional patents for healthcare IT infrastructure technology.
- Google's patents include several focused on its artificial intelligence (AI) technology DeepMind and its healthcare disease and research entity Verily.
- Applications for Google Assistant (Mayo First Aid)



Google adds Cleveland Clinic CEO



Dr. Toby Cosgrove

Former Cleveland Clinic CEO Toby Cosgrove goes to Google

By Rachel Z. Arndt | July 23, 2018

Former Cleveland Clinic CEO Dr. Toby Cosgrove is heading to Google, where he'll be executive adviser to the Google Cloud healthcare and life sciences team.

In the role, he'll help the company pursue what Google and others are calling the "quadruple aim" of lowering costs, improving the patient experience and outcomes, as well as making the healthcare experience better for providers.

The addition of provider experience to the so-called "triple aim" reflects the

Apple in Health IT

- Apple has filed over 50 patents that will allow the iPhone to be used as a medical device to track patient health.
- Recently hired 50 medical doctors in wireless push*
- Working with J&J on atrial fib research

MarketWatch

Apple and Johnson & Johnson collaborating on heart research project

By Sarah Toy
Published: Jan 17, 2019 8:43 a.m. ET

Johnson & Johnson's [JNJ](#), +0.82% Janssen Pharmaceuticals Inc. is collaborating on a multi-year research study with Apple Inc. [AAPL](#), +0.59% to look at improving outcomes for patients with atrial fibrillation, the companies announced Thursday. The study will investigate whether a heart health app by Johnson & Johnson, combined with Apple Watch's irregular rhythm notifications and ECG app, can accelerate diagnosis and improve outcomes for people with atrial fibrillation. Atrial fibrillation is a condition that affects 33 million people worldwide and can lead to blood clots, stroke and heart failure. The study will be based in the U.S., the companies said, and subjects will be individuals 65 years or older. Shares of Apple were down 0.5% in premarket trade Thursday and have fallen 1.8% in the year to date through Wednesday. Shares of Johnson & Johnson have fallen 0.8%, while the S&P 500 [SPX](#), +0.76% has gained 4.4% and the Dow Jones Industrial Average [DJIA](#), +0.67% has gained 3.8%.

<http://fortune.com/2018/12/13/apple-hires-medical-doctors/>

Microsoft in Health IT

- Microsoft's patents include expanding on its AI technology to help monitor chronic disease.
- Cloud storage Azure.
- Major deal with Walgreen's in Jan 2019
 - Move Walgreens IT infrastructure to Azure
 - Microsoft 365 to Walgreen's employees
 - “to build health care solutions”
 - “digital health centers”
 - “sell select health care related hardware and devices



<https://www.thestreet.com/markets/microsoft-shares-up-after-major-health-care-deal-with-walgreens-14834582>

Amazon in Health IT

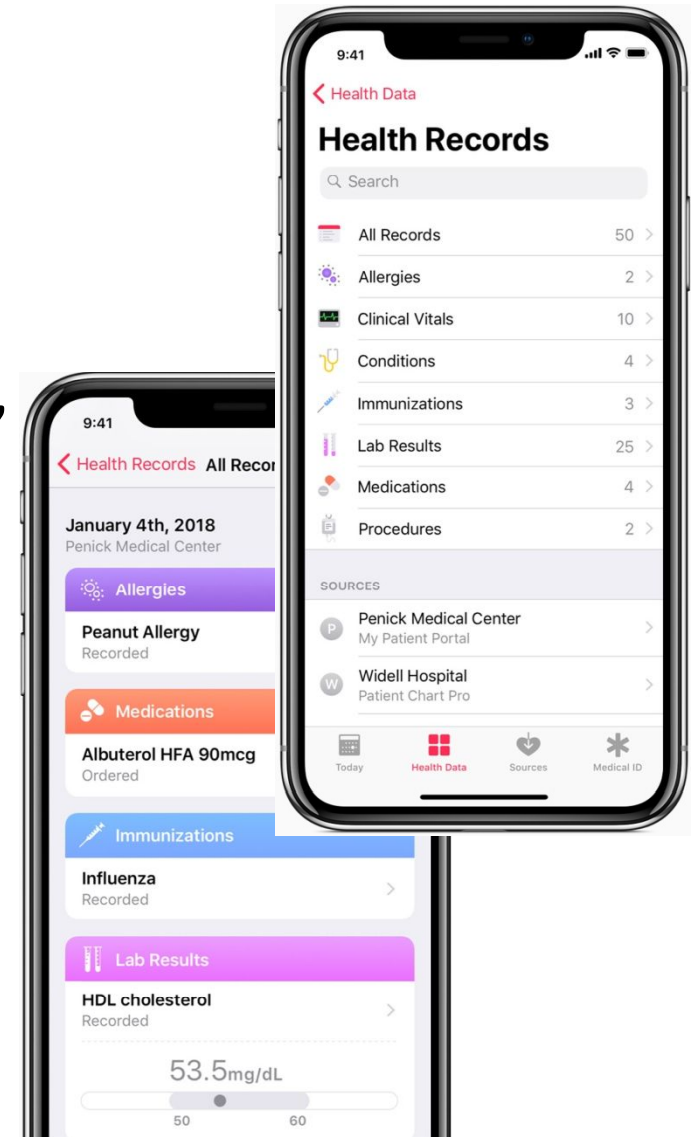
- [Amazon's health IT project](#) known as 1492 is focused on interoperability among disparate EHR systems to make it easier for healthcare organizations to migrate to new EHR systems, as well as helping entities share data with other healthcare systems. The project aims to make EHR data more available to clinicians as well as patients.
- Largest cloud storage in industry.

Smart Hospital for sale on Amazon

- A New York-based company called EIR Healthcare is now selling units of its hospital room, dubbed MedModular, for \$814 a square foot on Amazon.com, which the company claims is more affordable than traditional construction. The design is customizable but all the rooms come with a bathroom and a bed.
- These rooms don't come cheap at \$285,000 per unit, but they are targeted to business buyers that are increasingly flocking to Amazon

Apple Announces Health Records on iPhone

- Announced in early 2018
- Partners with Johns Hopkins, Cedars-Sinai, Penn Medicine, Geisinger Health System, UC San Diego Health, UNC Health Care and other participating hospitals and clinics



<https://www.apple.com/newsroom/2018/01/apple-announces-effortless-solution-bringing-health-records-to-iphone/>

FDA clears first EKG reader for Apple Watch

- FDA cleared the first medical device accessory for the Apple Watch in November 2017
- AliveCor's KardiaBand electrocardiogram reader
- Uses AI to analyze data from the watch's heart rate and activity sensors



\$199

AliveCor also has a less expensive model - KardiaMobile



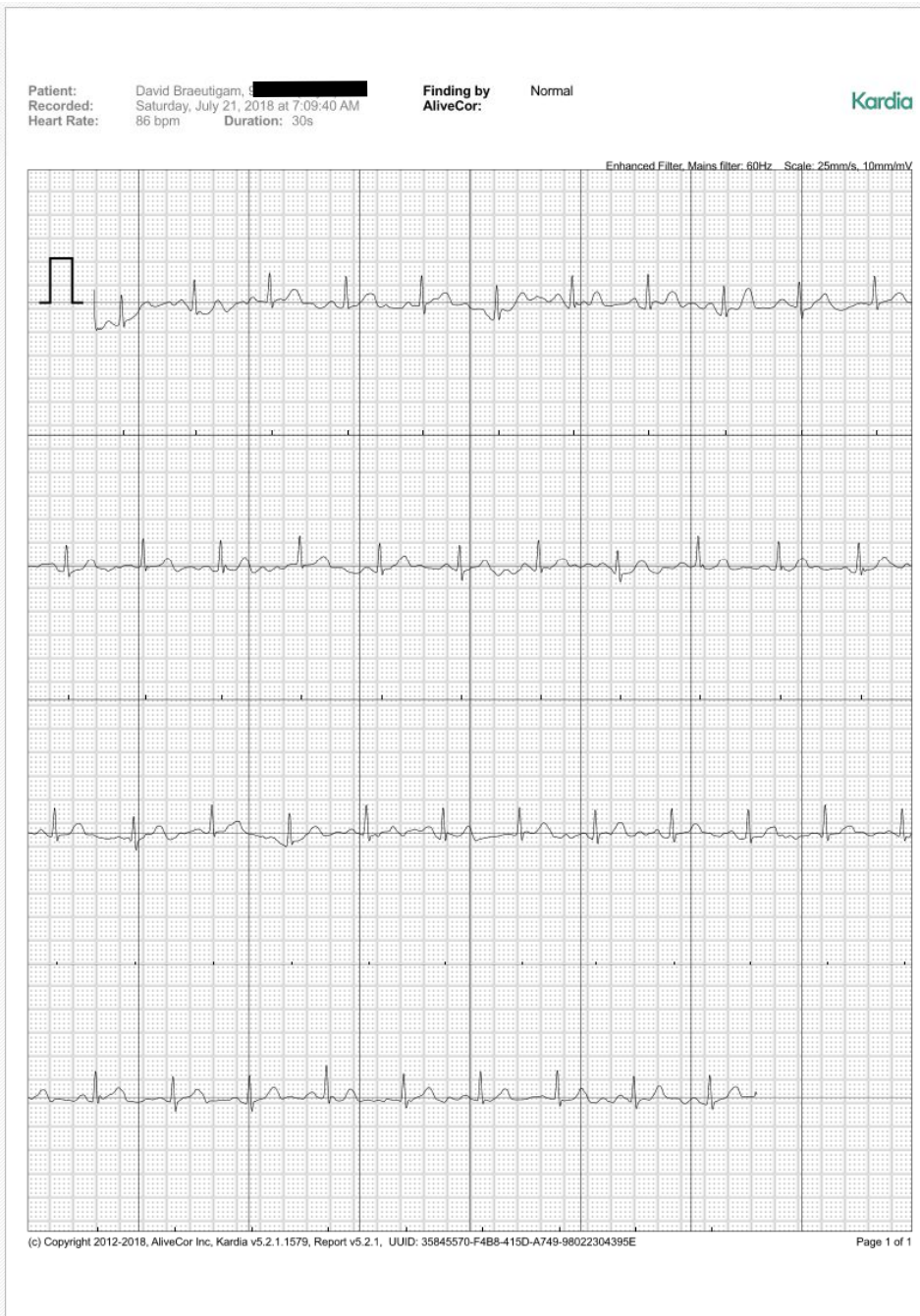
\$99

Here is the report you get back from AliveCor on your ECG

You can store it with AliveCor for \$10 a month

Or you can just send it to you email in an encrypted PDF format

What lead is being recorded
it I am using each finger to record?



Apple Watch Series 4

- Apple just received FDA approval for taking an ECG on an Apple Watch



Apple Watch Series 4

- Now includes fall detection
- Big seller for senior citizens



CES 2019 Announcement

Aura Bioimpedance monitor
Tracks body composition and hydration levels



CES 2019 Announcement

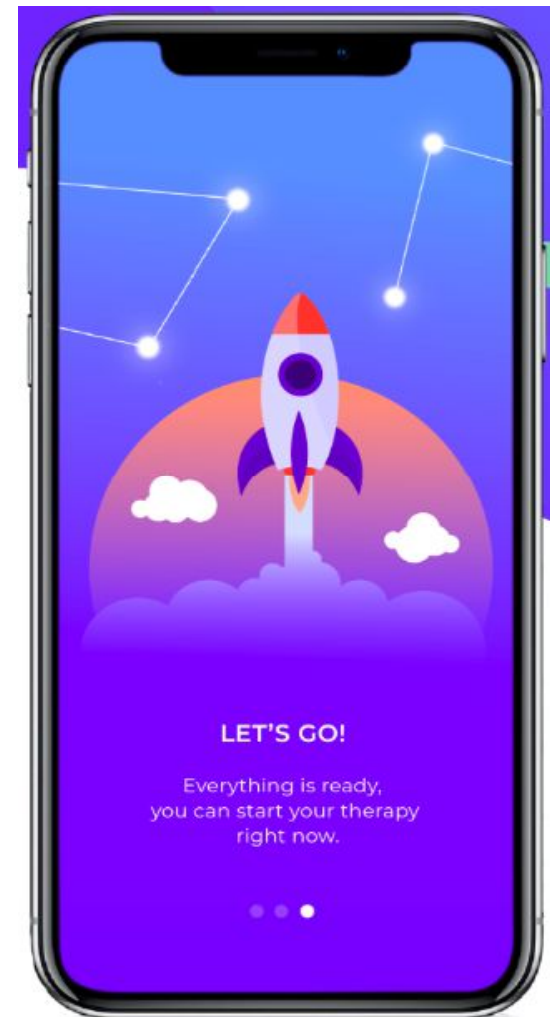
Samsung “Bots” and exoskeleton



CES 2019 Announcement

Diapason tinnitus mobile app

There's no magic cure for tinnitus. If you're one of the millions that suffer from this condition -- a strange ringing or buzzing in the ear -- coping can be a constant struggle. [Diapason](#), a French startup, has distilled some of the best treatments into a mobile app that people can use anywhere. It offers a series of three-to-five minute activities, served through daily collections, that are personalized to the particular frequency or pitch that your ears are struggling with. The activities are basically mini-games that can, the company claims, deliver tangible results in as little as two weeks.



CVS-Aetna Merger

- CVS acquires Aetna for \$69 billion
- Largest pharmacy and third-largest health insurer

<http://thehill.com/policy/healthcare/378145-shareholders-overwhelmingly-approve-cvs-aetna-merger>

Cigna to buy Express Scripts

- Cigna buys Express Scripts for \$67 billion
- Express Scripts is the largest independent drug middleman in the U.S.

<http://thehill.com/policy/healthcare/377354-cigna-to-buy-express-scripts-in-67-billion-deal>

Large Hospital Systems create nonprofit drug company*

- Hospital executives expressed frustration over scarcity of essential drugs
- “This is a shot across the bow of the bad guys”, said Dr. Marc Harrison, chief executive of Intermountain Healthcare
- The hospitals state they are tired of the increasing shortages and price escalation

*NY Times January 18, 2018

Amazon, Berkshire Hathaway and JP Morgan Chase

- January 2018 Amazon, Berkshire Hathaway and JP Morgan Chase announced they are working together to create a new health-care venture for their own staff aimed at “improving employee satisfaction and reducing costs”
- Will work first on technology as a way to provide simplified, affordable access to medical services

<https://www.nytimes.com/2018/01/30/technology/amazon-berkshire-hathaway-jpmorgan-health-care.html>

<https://www.nytimes.com/2018/01/30/business/amazon-health-care-plan-reaction.html?action=click&contentCollection=Technology&module=RelatedCoverage®ion=Marginalia&pgtype=article>

A.I. for the Simple Things

“Amazon could assume drug distribution. They could start to use voice platforms, like Alexa, to help discuss symptoms and get feedback, to coordinate hospital post-op care through voice-activated A.I., to do these and other rote things.”

— *Dr. Eric Topol, director, Scripps Translational Science Institute in San Diego*



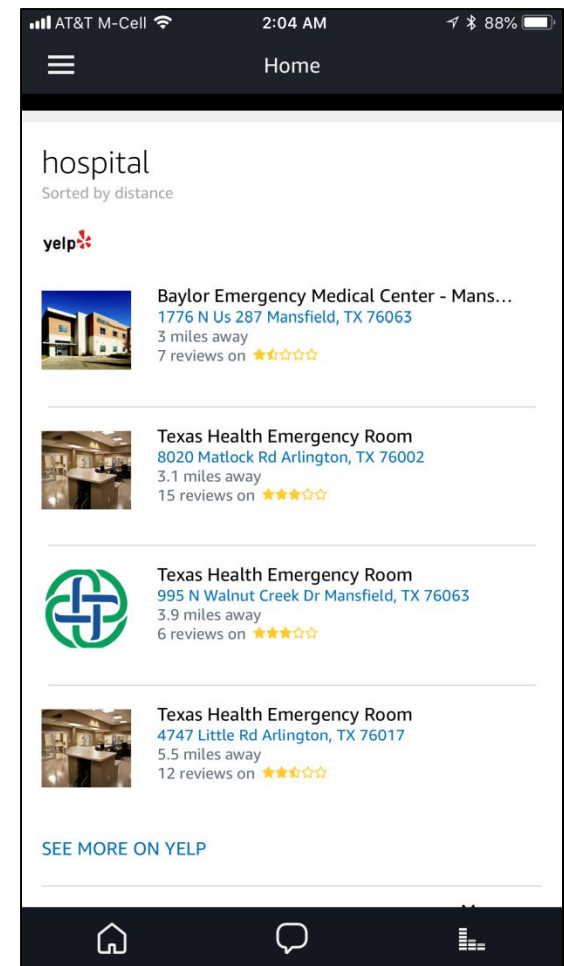
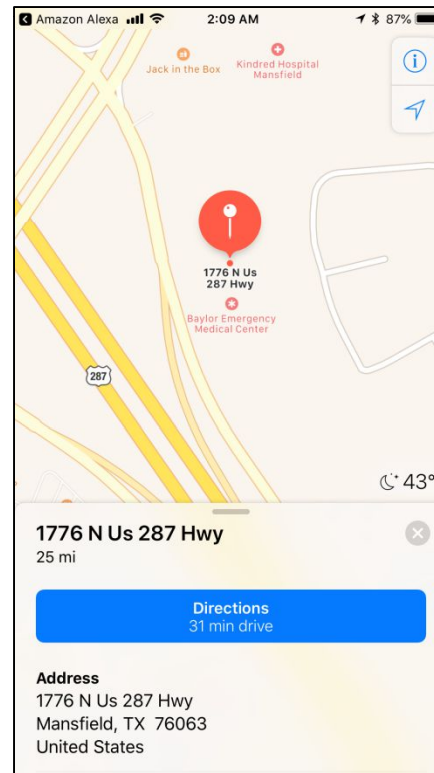
<https://www.nytimes.com/2018/01/30/business/amazon-health-care-plan-reaction.html?action=click&contentCollection=Technology&module=RelatedCoverage®ion=Marginalia&pgtype=article>

“Alexa I Have a Sore Throat and a Runny Nose”

- “This might answer your question ...”
- “Here is what I found on Wikipedia ...”
 - Pain medication such as nonsteroidal anti-inflammatory drugs ...
 - Mayo Clinics advises gargling with salty warm water and resting the voice
 - Without treatment the symptoms typically lasts two to seven days

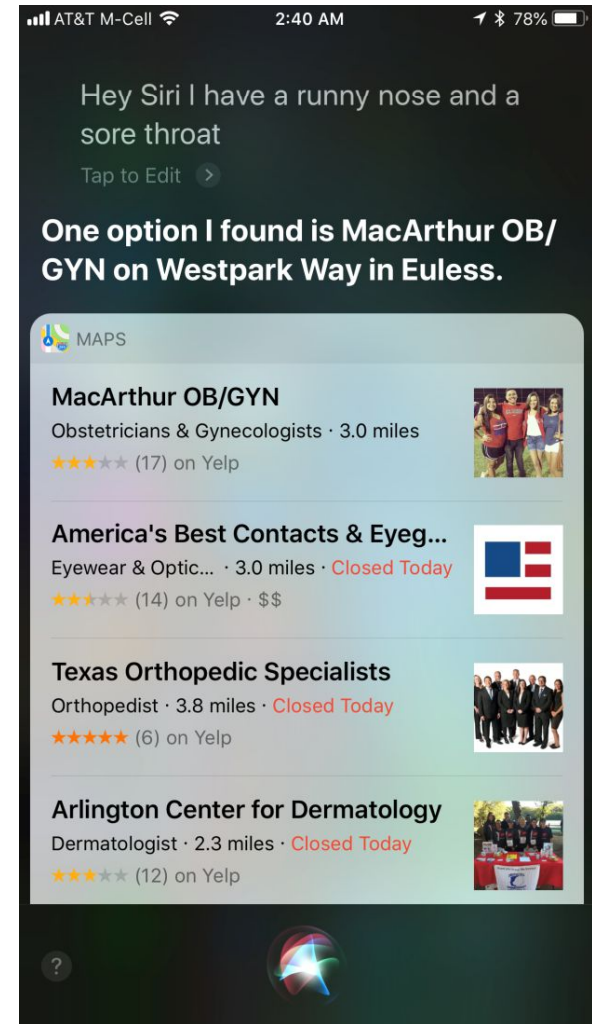
“Alexa What’s the Closest Hospital”

- “Based on your zip code settings here are a few examples ...”



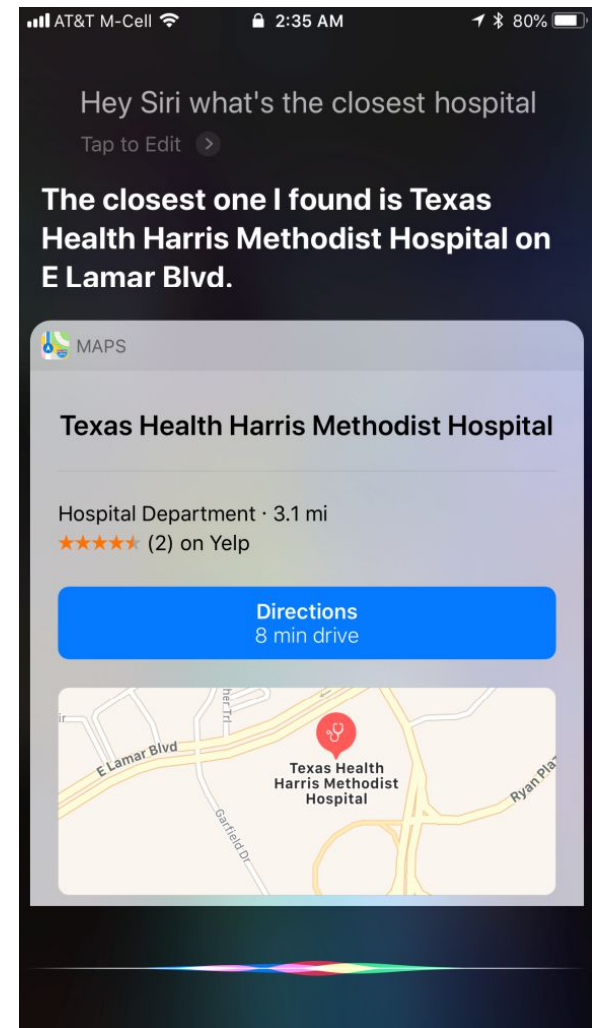
“Hey Siri I have a Runny Nose and a Sore Throat”

- Siri wasn't as good as Alexa in answering this question ...
- I don't think an OB/GYN clinic, an eye doctor, an Orthopedic Specialists or a Dermatology Center will help me out!



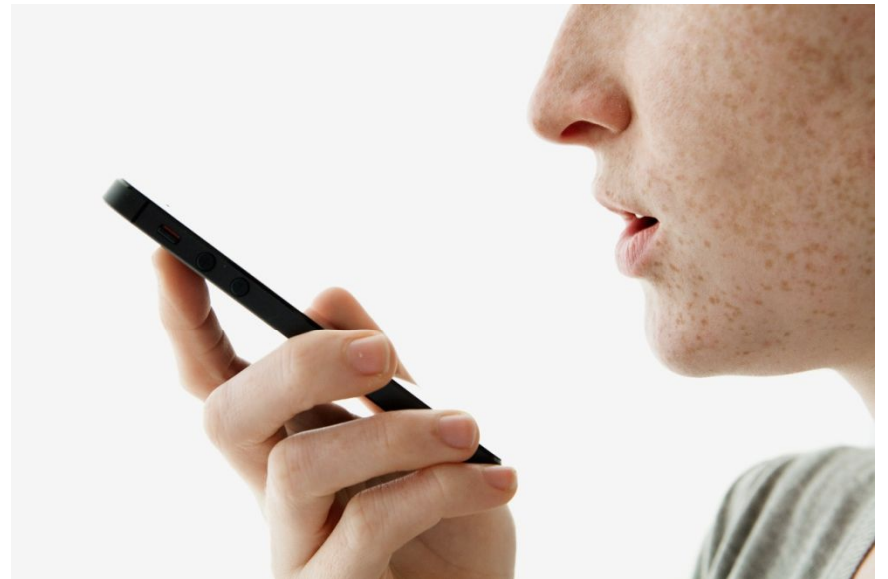
“Hey Siri What’s the Closest Hospital”

- Siri was much better at answering this question – even better than Alexa because of the location data (not perfect – this is their corporate headquarters!)
- This might be fixed in Alexa by adding your address in the App



Speak to Your CMMS

- At least one current CMMS allows you to speak to your phone to document a work order
- How's that for a time saver!



Using an Amazon Echo Show to Consult with your doctor



- Imagine being able to talk with a doctor over a device at your home?
- Lenovo and Google are designing similar devices for the home
- Telehealth surged 58% from 2016 – 2017*

* <https://www.modernhealthcare.com/care-delivery/telehealth-use-surged-2017>

Medical Devices on Your Phone

- Ultrasound
- EKG
- Pulse Oximetry
- NIBP



<https://www.linkedin.com/pulse/why-digital-app-based-ultrasound-soon-bring-next-medical-sharma/>

Medical Data and Knowledge

- Mine your data in your CMMS to make better informed decisions
- Good information is the key to better decisions. Make sure your data is clean and accurate.

AAMI Horizons Summer 2018



Holographic Imaging

- Holographic Imaging Market to witness remarkable growth by 2024
- Detect serious issues with sensitive organs such as the brain, the abnormalities of which are particularly difficult to interpret
- This technology finds applications in ophthalmology, urology, pathology, and orthopedics

AI and Machine Learning in Medical Imaging

- AI could improve health outcomes by 30-40%
- Mayo is using it for genetic markers in MRI
- Stanford has developed an AI algorithm that can diagnose up to 14 types of medical conditions
- Memorial Sloan Kettering using for prostate cancer

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AI and Machine Learning in Medical Imaging: From Potential to Reality

Powerful computing and storage capabilities required to move forward

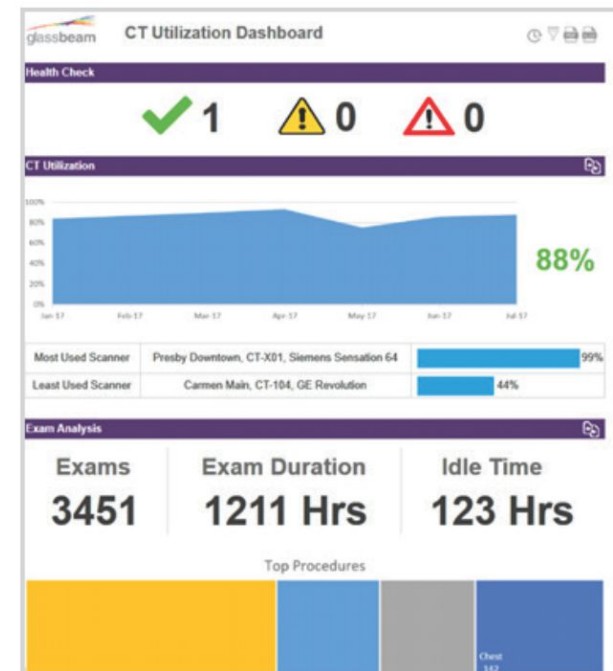
Introduction
The potential for artificial intelligence (AI) and machine learning in the healthcare industry is considerable. However, realizing this potential is not guaranteed. The challenge: While AI and machine learning offer a bevy of prospective benefits, software developers and researchers need to implement and then routinely rely upon a technology infrastructure that offers both the processing and storage capacity that will enable them to efficiently design machine learning solutions. By doing so, they can then bring never-before-imagined quality and efficiency improvements to the everyday delivery of care.

AI and Machine Learning: Vast Potential
AI and machine learning carry great promise for the healthcare industry, according to experts who testified before the Senate Science, Commerce and Transportation Committee's Subcommittee on Communications, Technology, Innovation and the Internet in December of 2017. For example, Victoria Capinet, president and CEO of ISAThe Software Alliance, pointed to a 2016 Frost & Sullivan report that predicts AI has the potential

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AI and Machine Learning in Medical Imaging

- Derive actionable insights from your machine log data
 - Know when a tube needs to be replaced
 - Increases uptime since you KNOW when to replace components
 - Know the usage of devices



AI for the Operating Room

- Using AI and computer vision during surgery*
- Uses AI to 'road map' surgeries as it happens
- Reduces risk
- Makes surgery safer

*OR Today October 2018 *Digital Surgery Deploys Surgical AI System for the Operating Room*

Virtual Training

- **Milwaukee, Wis – June 1, 2018** With 25 percent of the Healthcare Technology Management (HTM) population expected to retire over the next 10 years, hospitals and healthcare systems face an increasing challenge to train the next generation of professionals safely, affordably and efficiently. At [AAMI 2018](#), GE Healthcare is introducing interactive, customizable training options enabled by Virtual Reality (VR) technology for HTM professionals who service CT and MR equipment.



<https://www.genewsroom.com/press-releases/ge-healthcare-introduces-virtual-reality-training-healthcare-technology-management>

Virtual Reality in Medical Equipment Planning

- Initial design of hospitals was on paper
- Later mockups were done to give a better idea of flow and room
- Newer VR technology will give physicians, clinicians and planners a better idea of space and equipment location



<https://mcdmag.com/2017/09/enhancing-healthcare-planning-through-virtual-reality/>

Smart Stethoscopes

- Smart Stethoscopes are being designed by several companies that interface with a smart phone or smart watch

- <https://stethio.com/>
- <https://www.stethee.com/>



Robots

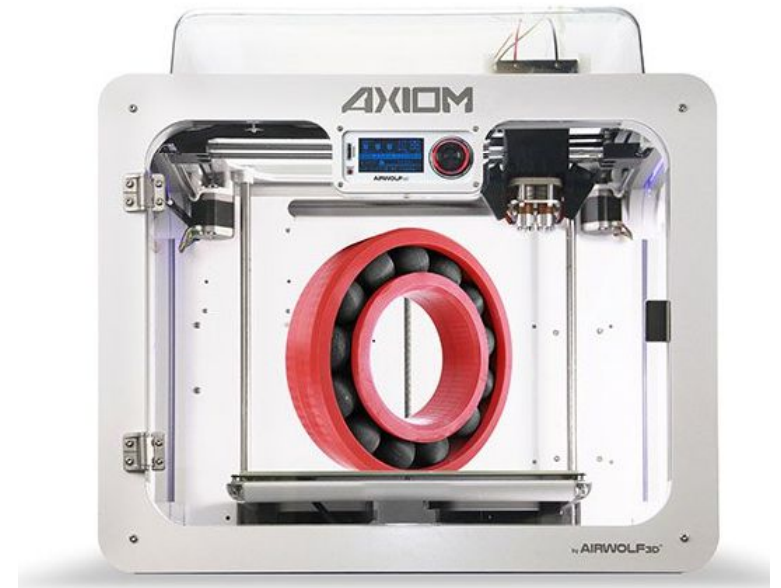
- Surgical robots
- UV cleaning robots
- Supply chain robots



<https://1technation.com/the-robots-are-coming-who-will-maintain-them/>

3D Printing

- Imagine being able to print parts for your equipment?
- The U.S. Military training for BMETs is already working on this at their school in San Antonio, Texas.



Cybersecurity is the new Electrical Safety Concern for HTM

- AAMIBlog December 2018
- Cybersecurity Is the New Electrical Safety Concern for HTM



The screenshot displays the AAMIBlog website interface. At the top, the logo 'AAMIBLOG' is prominently featured in blue. Below the logo is a navigation menu with links for 'HOME', 'ABOUT POSTING', 'GUIDELINES FOR USE', 'LIBRARY', 'CONTACT US', and 'WWW.AAMI.ORG'. The main content area shows a blog post by David Braeutigam, dated December 26, 2018, in the 'Healthcare IT' category. The post title is 'David Braeutigam: Cybersecurity Is the New Electrical Safety Concern for HTM'. The text of the post discusses the historical context of electrical safety in hospitals, mentioning a 1971 article by Ralph Nader and the industry's response through testing and improved equipment design. It also notes the relaxation of testing requirements by the Joint Commission (TJC) and CMS. The post concludes by highlighting the emergence of cybersecurity as a new safety concern for HTM, contrasting it with the traditional focus on electrical safety.

Search ...

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Enter your email address to follow this blog and receive notifications of new posts by email.

Enter your email address

Follow

SEARCH BY CATEGORY

- Healthcare IT (99)
- Healthcare Technology Management (155)
- Human Factors (13)
- Management (35)
- Medical Device Industry (47)

Cyber Security and HTM

- It continues to be a HUGE issue
- HTM and IT need to work TOGETHER to solve



- HTM needs staff that understands Cyber Security and how to work with their vendors and IT counterparts



- This past AAMI Conference there were more Cyber Security companies displaying their products



So We Now Have New Tools!



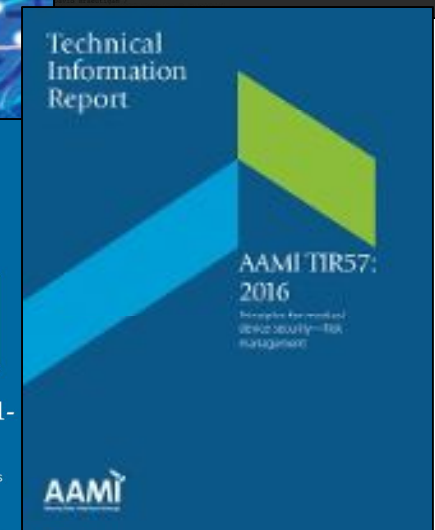
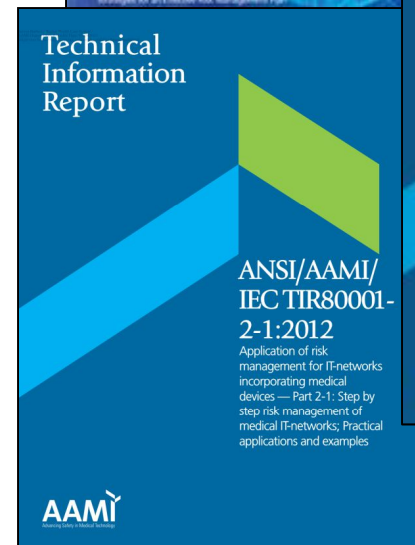
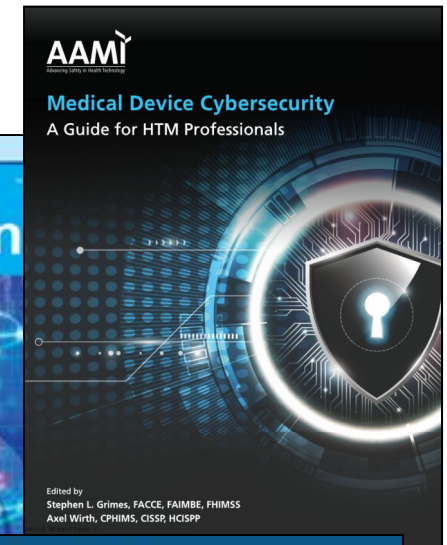
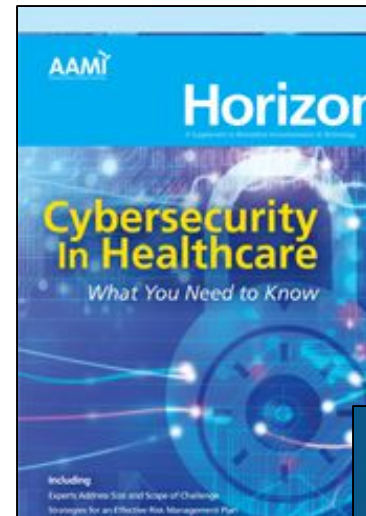
```
vivek@wks01:/tmp$ cp -avr /tmp/conf/ /tmp/backup
/tmp/conf/' -> /tmp/backup/conf'
/tmp/conf/resolv.conf' -> /tmp/backup/conf/resolv.conf'
/tmp/conf/passwd' -> /tmp/backup/conf/passwd'
/tmp/conf/security' -> /tmp/backup/conf/security'
/tmp/conf/security/namespace.conf' -> /tmp/backup/conf/security/namespace.conf'
/tmp/conf/security/limits.conf' -> /tmp/backup/conf/security/limits.conf'
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/tmp/conf/security/namespace.d' -> /tmp/backup/conf/security/namespace.d'
/tmp/conf/security/time.conf' -> /tmp/backup/conf/security/time.conf'
/tmp/conf/security/limits.d' -> /tmp/backup/conf/security/limits.d'
vivek@wks01:/tmp$
vivek@wks01:/tmp$ cd /tmp/backup/
vivek@wks01:/tmp/backup$ ls -l
total 4
drwxr-xr-x 3 vivek vivek 4096 Apr 10 22:08 conf
```

Identify Network Medical Devices

- Identify IP address, MAC address, OS version, patch version, virus protection vendor and version, etc.
- Identify the type of PHYSICAL security on devices – i.e. cable lock, locked door, etc.
- Work with vendors to obtain MDS2 and determine the OS version, patches, etc. that you should be running at for maximum protection

Resources Available

- AAMI Horizons 2014
- AAMI Medical Device Cybersecurity
- AAMI TIR57:2016 Principles for medical device security
- IEC 800001
- Search BI&T for Cybersecurity papers
- Subscribe to information on Cybersecurity
 - HealthITAnalytics.com
 - HITInfrastructure.com



Future of Medical Devices

- Gartner [in their healthcare report](#) estimates that “by 2020, the number of medical devices requiring security hardening by a healthcare provider will increase by 45%.”¹
- Verizon states that healthcare ranks number two in breaches, which is no surprise.²

¹ Gartner, Top Three Security and Privacy Impacts of Connected Medical Devices on Healthcare Providers, Saniye Burcu Alaybeyi, Marc-Antoine Meunier, Gregg Pessin, 27 September 2017

² “2017 Data Breach Investigations Report,” Verizon

Change is Constant

- As a security and risk professional in healthcare, there's one thing you can always count on – **change is constant**. Innovative ways of delivering quality care are dramatically transforming the digital landscape in this sector. One of the biggest game changers is the **push for new Internet of Things (IoT) devices and other connected technologies designed to enhance patient care and save lives**. While these innovations have enormous benefits for patients and caregivers, **they come with new security and compliance challenges**.

<https://www.forescout.com/company/blog/need-strategy-compliance-asset-management-healthcare-facility-start-visibility/>

Connected Medical Devices

- Do you know how many connected devices you have at your hospital?
- Probably 90-95% of your imaging devices are connected
- The balance of IV pumps, patient monitoring, EKG carts, Lab equipment, etc. is probably about 25%
- Roughly 25-30% of medical equipment is connected NOW!!
- Expect that to grow in the future.

So What Does All This Mean for HTM?

- Our field is evolving – *but it always has*
- More IT knowledge and IT work will be required
- More information about data and what to do with it will be required
- WE need to be prepared for these new changes
- **The CORE of what we do does not change though – providing patient safety!**

What Should You Do?

- Make sure your CMMS is clean and up to date
 - Good data is KING for the c-suite
- Make sure IT information is included in your CMMS including:
 - IP address, MAC address, patches, virus info, OS, etc.
- Have **all staff** trained on basic IT: A+ and Network+
- Create a position for Cybersecurity of Medical Devices in your department
- If you are a department head then get ITIL certification to understand how IT works
- Start working with IT and proactive Cybersecurity measures
 - Accruent, Assimily, CloudPost, CyberMDX, Nuvolo, ZingBox, etc.

Questions and Discussion