Wi-Fi Enabled Healthcare

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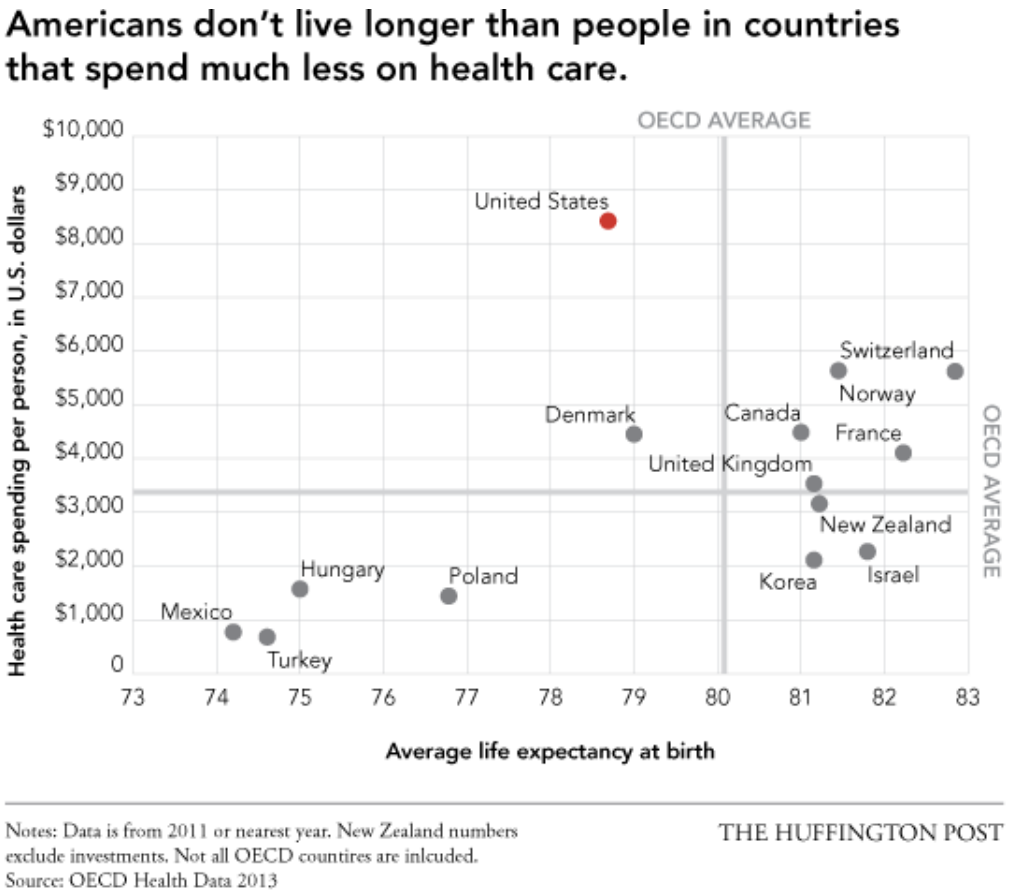
Introductions

- My Background
- About You
  - How many of you work or have worked in Healthcare?
  - How many work for institutions that have dedicated Wi-Fi engineers?

Session objectives

- Importance of Wi-Fi in healthcare
- What makes healthcare environment unique
- Overview of Henry Ford Health System
- RF design considerations, and best practices
- Wireless medical devices
- The future

Why mobility is so important in Healthcare



- Focus on mobility can help decrease re-admissions
- Continuous and remote vital signs monitoring
- More efficient communication with staff
- Increased time at the bedside
- Desired end result is less expensive care, and improved clinical outcomes

Typical Office

Typical Hospital

What makes Healthcare Unique

- Open to the public (patients and guests)
- Mission critical communications can correlate to Life/Death
- Dense pockets of fast moving mobile users
- Ubiquitous, Reliable, Easy to use, and High availability.
- Typically very old structures with complex construction
- Decentralized procurement budgets
- HIPAA and HITECH compliance and government mandates
- Application centric
- Vast variety of device types including medical devices

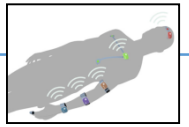
Henry Ford Health System Wi-Fi Network

- HFHS is a not-for-profit organization primarily located in Southeast Michigan.
- More than 23,000 total employees.
- 3.2 million outpatient visits and more than 88,800 surgical procedures (2013)
- 14 Wireless Controllers
- Over 4,800 wireless access points and sensors
- Overlay IPS/IDS
- Over 100 facilities and 8 million square feet of coverage.
- 7,000+ concurrent guests daily
- 14,000 concurrent Wi-Fi devices

Mobile landscape in Healthcare

- Indoor Voice handsets (900-928 MHz; DECT 6.0 1.93GHz)

- Medical Body area networks (2360-2400 MHz)



- Bluetooth (2.4 -2.485 GHz)

- Cellular Distributed Antenna Systems (3G, 4G)

- Zigbee (2.4 GHz)

- Telemetry WMTS (608-614 , 1395-1400 , and 1429-1432 MHz)

- WLAN/Wi-Fi (2.4 GHz, and 5 GHz)

Why focus on Wi-Fi? Interesting statistics

- There will be more than 7 billion new Wi-Fi enabled devices by 2017(Sys-Con)
- 2/3 of US consumers prefer Wi-Fi to cellular (Deloitte)
- 71 % of all mobile communication flows over Wi-Fi (Wi-Fi Alliance)
- By 2017 60% of carrier network traffic will be offloaded to Wi-Fi (Wireless Broadband Association)
- By 2020, the average mobile user could be downloading 1 terabyte of data annually—enough to access more than 1,000 feature films (IEEE Spectrum magazine)

Wi-Fi Devices In the hospital

Guest Access

Employee Devices

Medical Devices

VoWLAN Phones

BYOD

RTLS











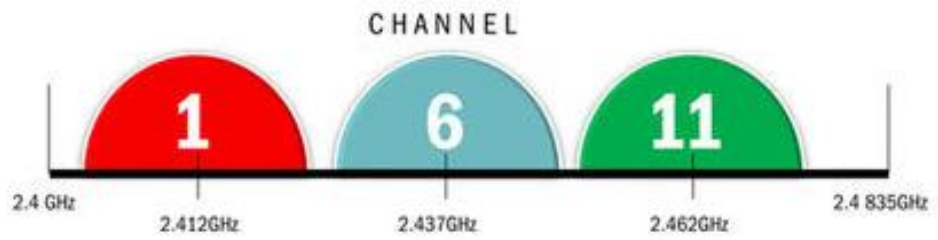


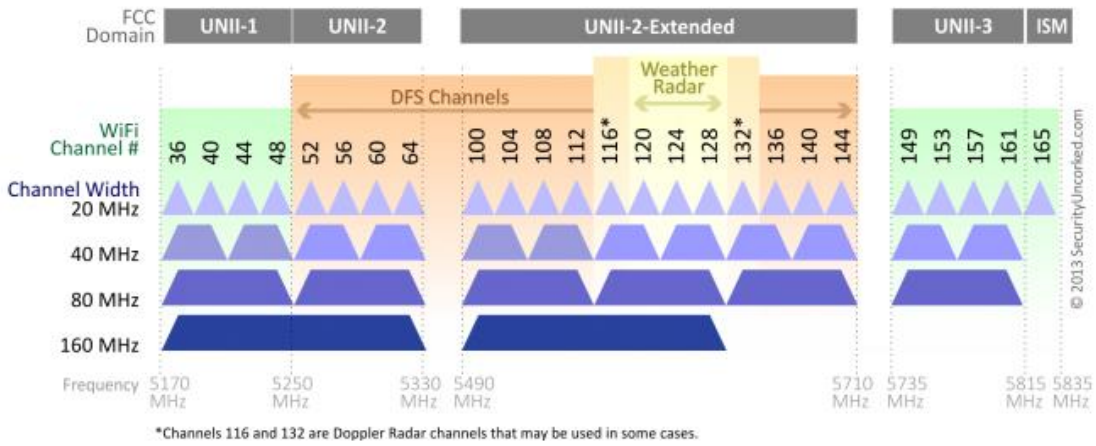





RF Design Best Practices

- Universal RF physics and limitations
- Design for actual devices and applications.
- Design for voice and video (-67dbm)
- High density and accounting for RTLS
- Traditional onsite site survey is recommended
- Scrutinize security requirements.
- Ongoing testing is crucial to success
- ITIL framework – capacity planning, continuous improvement and optimization.





Design Evolution

2014

Design For Dynamic Intelligence

-Dynamic traffic classification and prioritization

2010

Design For High Density

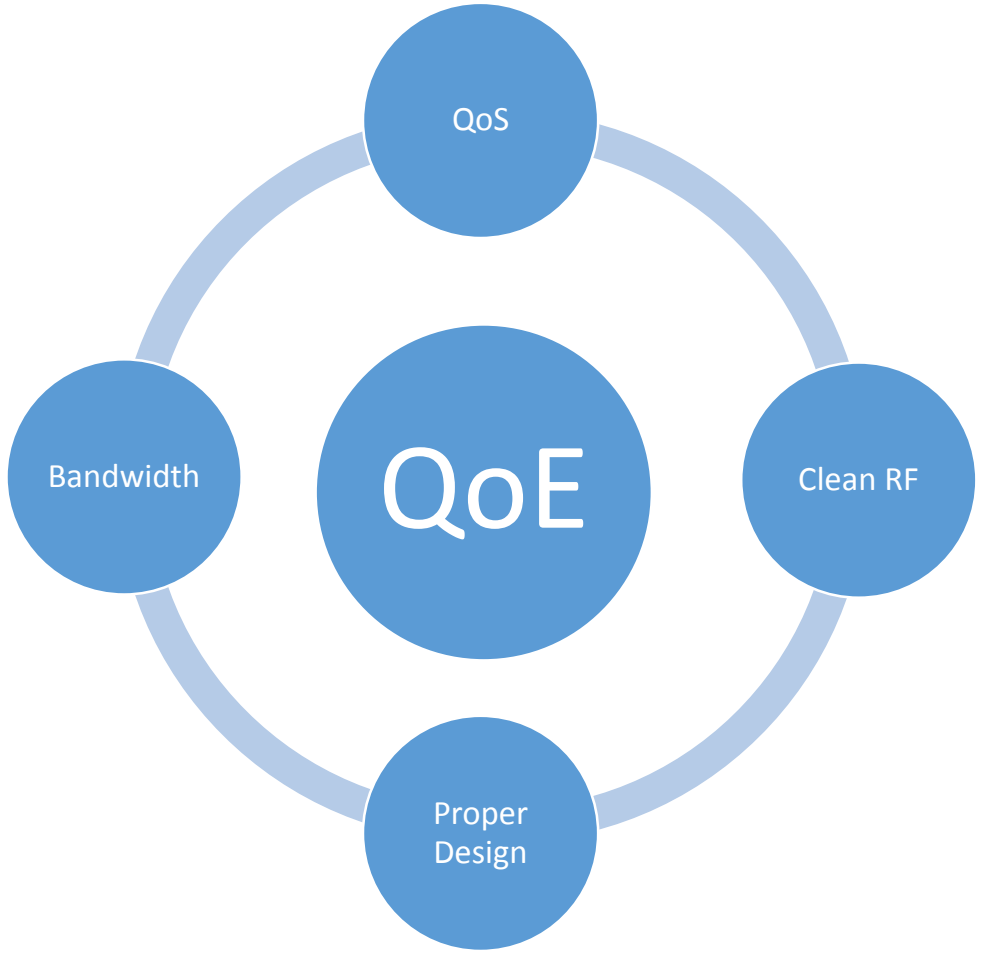
-Microcells , real time applications, and RTLS

2005

Basic RF Coverage

-Focus on Signal Strength and SNR

-Static Channel and Power plan

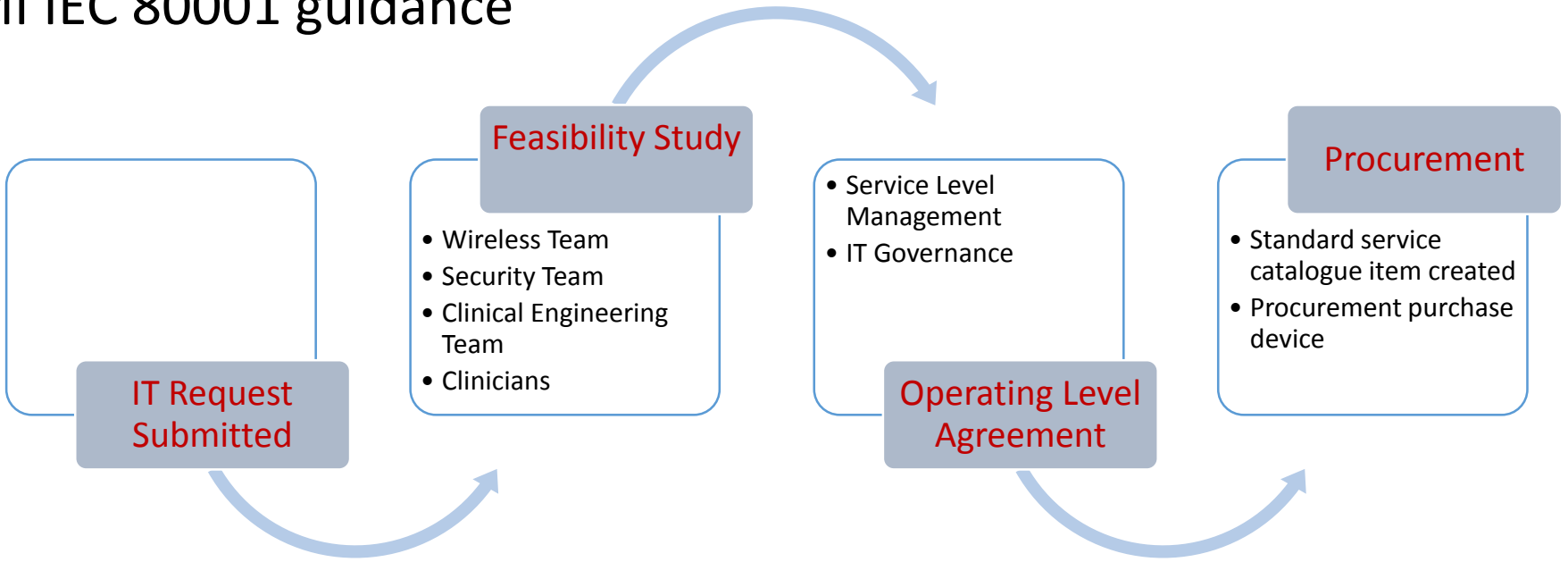


Focus On Clients

- Upwards of 80% of issues on our network are client related.
- Supported frequencies (2.4 GHz, 5GHz)
- Updated drivers (chipset & manufacturer)
- Roaming characteristics
- Security considerations
- Consumer grade devices

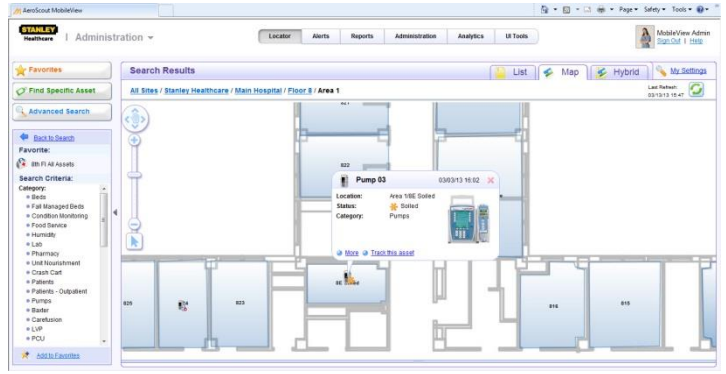
Wireless Medical device onboarding and certification process

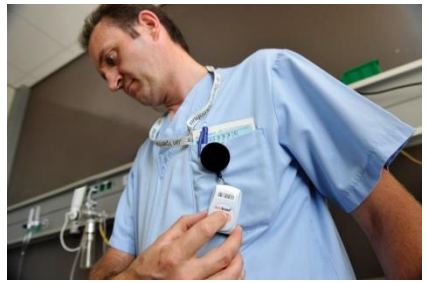
- Started with less than 100 medical devices in 2006, and now up to 3000 WMDs at HFHS
- Standard onboarding and certification process
- AAMI IEC 80001 guidance



Real Time Location Services

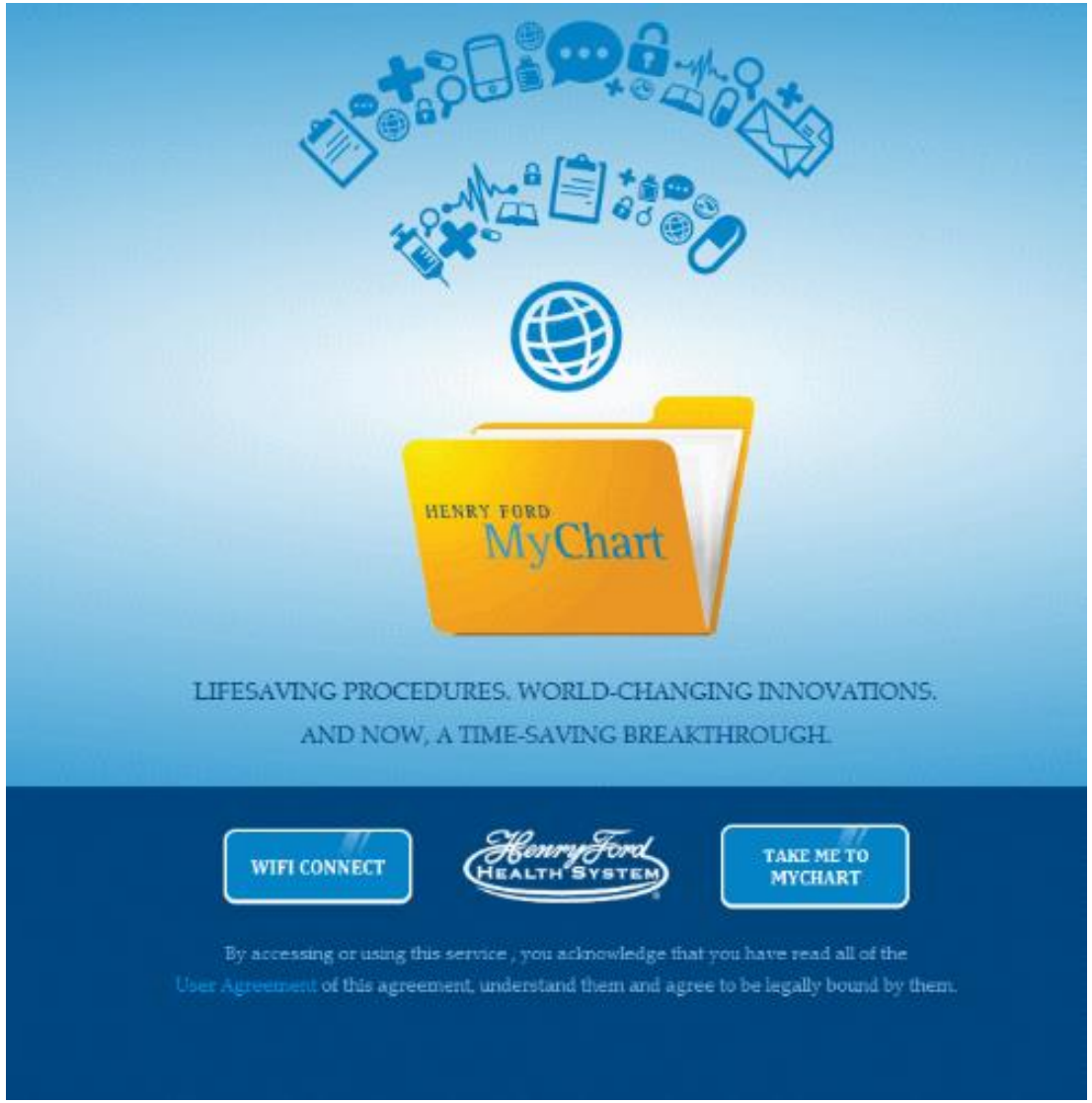
- Much more than asset tracking
  - Hand Hygiene
  - Staff duress badge
  - Temperature monitoring
  - Patient and guest tracking
- Zone, Room Level, Sub-room level accuracy
- Wi-Fi based system vs. dedicated Infrastructure for RTLS
- Largest ROI when system is used to trend workflow, and drive improvements.





Guest Access

- Make no mistake about it…It is supported.
- Ease of access and use
- Stance on streaming applications
- Marketing platform
- Pay vs. free model
- Authentication and encryption
- Heaviest user count. The numbers don’t lie (7K out of 14K users)
- HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems)



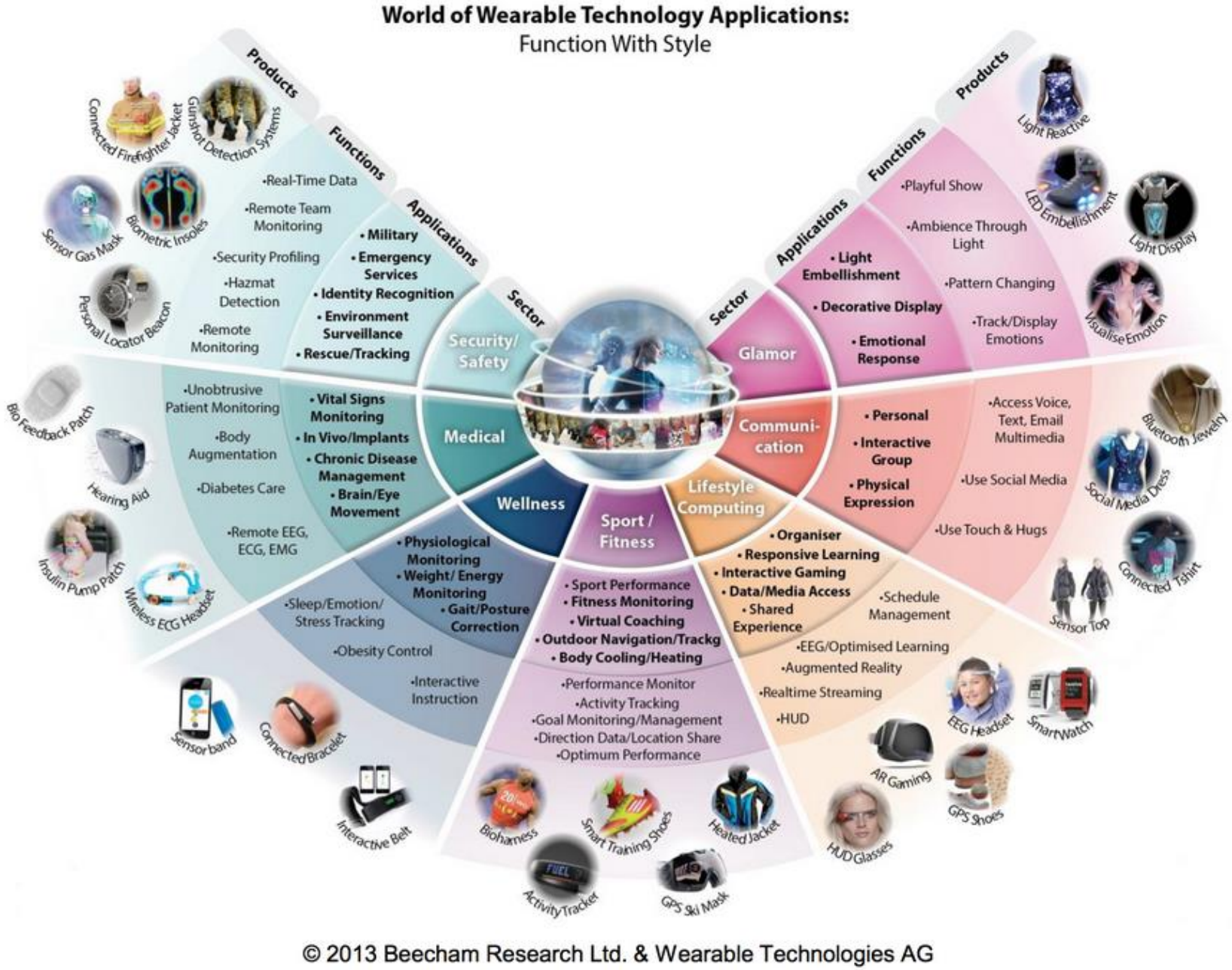
Wearables

- 90 Million Wearables projected to be shipped in 2014
  - - Largest area of growth in mHealth
  - - Consumer Devices
  - - Fitness and adult tracking
  - - Medical Devices

Wearable Computing Device Shipments by Category (Millions)

	2013	2014	2015
Wearable Cameras	6.64	13.61	15.81
Smart Glasses	0.01	2.13	10.57
Smart Watches	1.23	7.44	24.92
Healthcare	13.45	22.59	34.25
Sports/Activity Trackers	32.46	42.64	57.42
Wearable 3D Motion Trackers	N/A	0.87	2.00
Smart Clothing	0.03	0.72	1.24
Totals:	53.90	90.00	164.20

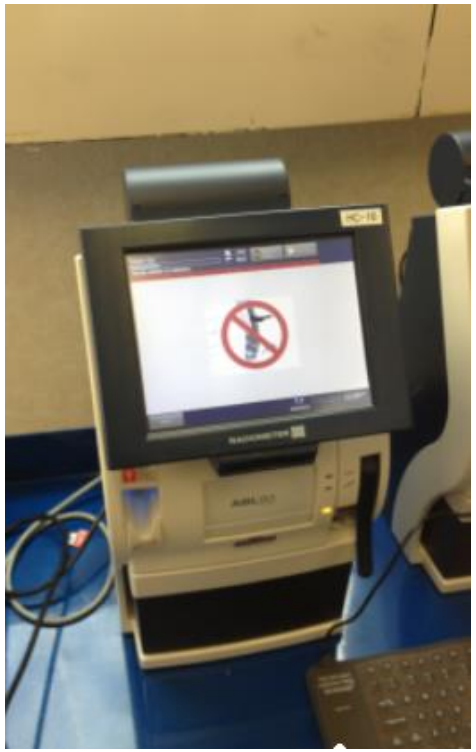
Source: Data from ABI Research World Market Forecast: 2013 to 2019



Beecham Research

Clinical Engineering & IT

- Clinical device vs. IT knowledge
- Majority of medical devices are now Wi-Fi capable.
- Network architecture driven in part by medical devices.
- Medical device design engineers are not Wi-Fi engineers
- AAMI Wireless Strategy Task Force



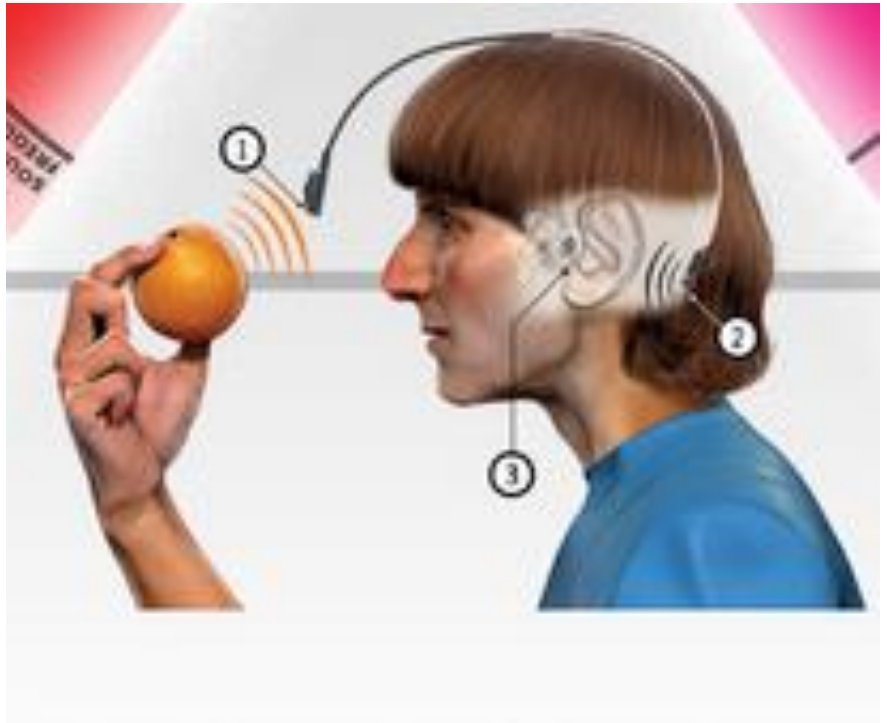
Getting it Right

- Having the right people with the correct skillset is increasingly crucial
- Dedicated trained Wi-Fi engineers is key to your success
- All of HFHS Wireless Engineers are certified by CWNP.
- Mandatory requirement to have at least CWNA credential

- The right wireless toolset is equally important
  - Take the guess work out of designing
  - 802.11ac tools are already available
  - Don’t forget to test performance

The Future of Wi-Fi in hospitals

- Upgrades to 802.11 ac (next 3 years)
- Real time location apps
- Increasing use of video
- Mhealth
  - 2 years – Making data actionable
  - 5 years – Smaller or no tether
  - 10 years – More Neil Harbissons (Cyborgs)



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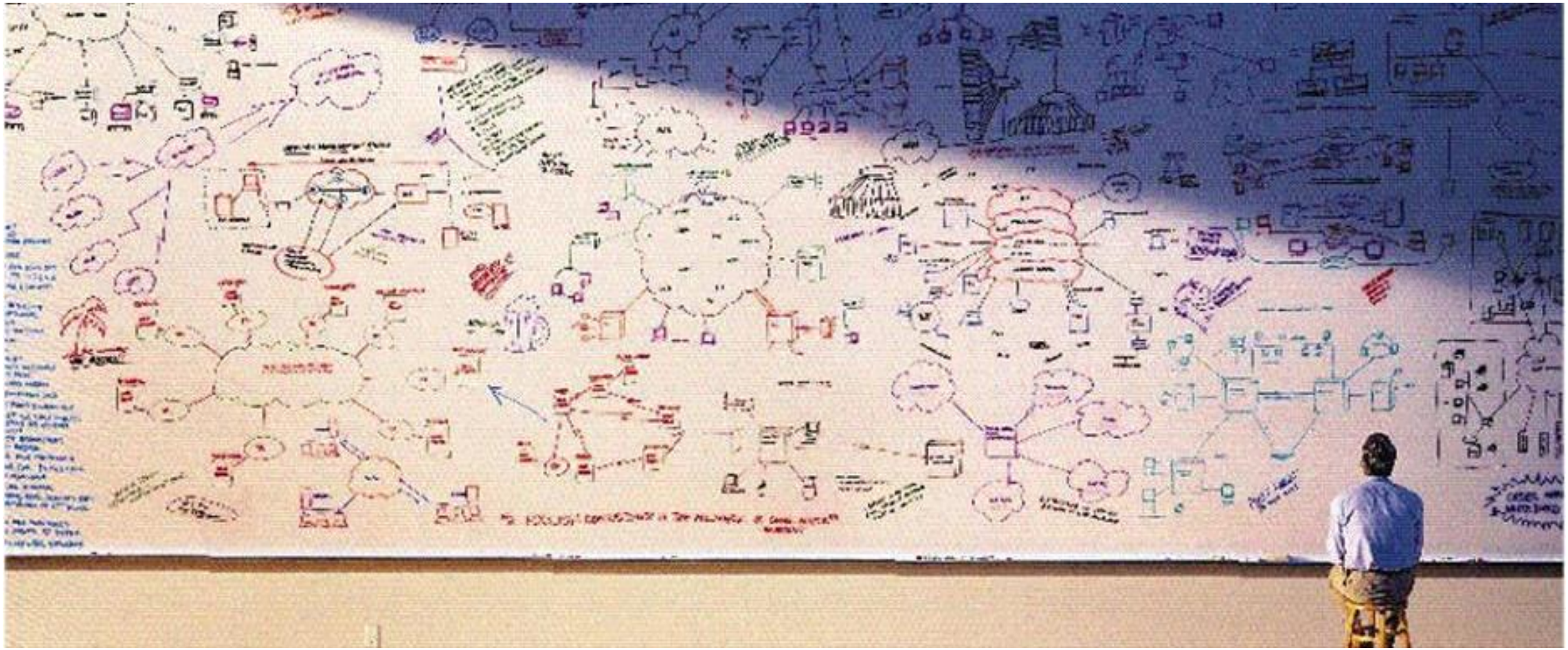
Q&A



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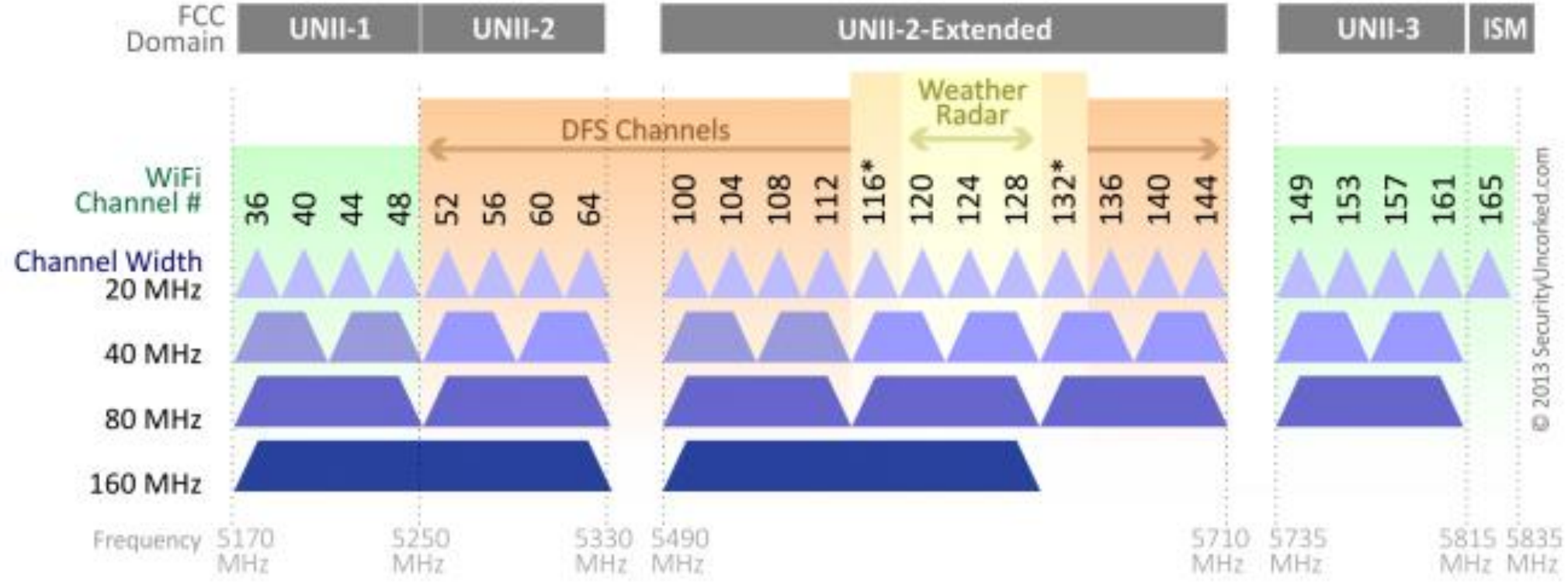

*Channels 116 and 132 are Doppler Radar channels that may be used in some cases.