Track 1 – Interoperability & Security

Internet of Things, –
The Good, The Bad, The Ugly of Being Connected
BOB, SLEEP MORE THAN 6.4 HOURS
BOB, RUN FASTER THAN A 9.2 MILE
BOB, DO SOMETHING ABOUT YOUR E.D.

STILL FEELING SMUG ABOUT BEING AN EARLY ADOPTER OF WEARABLES, BOB?
It's your doctor—he just got an alert that you're having a second helping of pie.
Gartner Hype Cycle for Emerging Technologies, 2017

- IoT Platform
- Connected Home
- Deep Learning
- Machine Learning
- Autonomous Vehicles
- Nanotube Electronics
- Cognitive Computing
- Blockchain
- Commercial UAVs (Drones)
- Cognitive Expert Advisors
- Enterprise Taxonomy and Ontology Management
- Augmented Reality
- Virtual Reality

Platesau will be reached in:
- Grey: less than 2 years
- Blue: 2 to 5 years
- Green: 5 to 10 years
- Orange: more than 10 years

As of July 2017
Healthcare IT Vendors Strategy for IoT

Resist Temptation
  Don’t redefine existing Tech as IoT
  Stick to your Value Proposition

Find a specific problem/solution

Leverage Edge Computing
Non-Technology Factors Will Keep Things Slow

Privacy – healthcare will lag industry
  Beyond securing transmission
  Permissions will be key

Money Flows
  Who will pay
  Federal Government restructuring uncertainty
Who We Are
Healthcare marked by compassion and sustainable excellence in a progressive environment, guided by physicians, delivered by exceptional professionals, and inspired by the communities we serve. Piedmont is a not-for-profit, community health system comprised of the following entities:

- Piedmont Athens Regional Medical Center
- Piedmont Atlanta Hospital
- Piedmont Fayette Hospital
- Piedmont Henry Hospital
- Piedmont Mountainside Hospital
- Piedmont Newnan Hospital
- Piedmont Newton Hospital
- Piedmont Heart Institute
- Piedmont Physicians
- Piedmont Clinic
- Piedmont Healthcare Foundation

Piedmont provides a wide variety of services including, but not limited to:

- Heart
- Cancer
- Transplant
- Primary Care
- Neurology
- Women’s Services
- Brain Tumor
- Urology
- Emergency
- Bariatrics
- Breast Health
- Diabetes
- Imaging
- Orthopaedic
- Rehabilitation
- Respiratory
- Robotic Surgery
- Sixty Plus Older Adult
- Sleep
- Spine
- Surgical
- Urgent Care
- Wound Care and Hyperbaric
About Piedmont

Atlanta 1905 (1957 location)
Fayette 1997
Mountainside 2004
Newnan 2006
Henry 2012
Newton 2015
Athens Regional 2016
Rockdale 2017
Columbus Regional early 2018
Healthcare CIO’s Reality of IoT

- Device Complexity
- Customer Support
- Cybersecurity
- Infrastructure
- Vendor Management

CIO View
Internet of Things (IOT)

The Good, The Bad, The Ugly of Being Connected

Christopher Kunney, CPHIMS, CPHIT, MSMOT
Managing Partner & HIT Strategist
Past President, GAHIMSS Chapter
Past Chairman, HIMSS Chapter Leaders Taskforce
Healthcare and IOT

- By embedding IoT-enabled devices in **medical equipment**, healthcare professionals will be able to monitor patients more effectively – and use the data gleaned from the devices to figure out who needs the most hands-on attention.

- **The internet of things** has a myriad of applications in healthcare that benefit patients, families, and physicians alike. Some hospitals are using the internet of things in healthcare to keep the **tiniest patients safe** and healthy, while others are using the **technology to keep track of inventory**.

- **IoT technology** holds the potential to revolutionize the healthcare industry, but not before overcoming barriers of **security and data ownership**.
Applications of IOT in healthcare

• When patients go in for surgery at Adventist Health System-Florida Division, they’re tagged with real-time location system (RTLS) badges that track their progress through from the pre-op room to the surgical suite to the recovery unit.

• When a high-risk patient is injured or falls in their home, IoT devices can help recognize and alert others that there might be problem with the patient.

• Medical devices with embedded IoT make direct communication with the implants possible. Pacemakers already have that capability, but ongoing advancements now allow for direct interaction with the neural network, opening up a whole world of possibilities.
Data Ownership and management

• The future success of connected healthcare devices will depend on more than Internet of Things devices and other hardware available in today’s marketplace.

• In healthcare settings, the advancement of IoT devices will depend greatly on what is done with the information these devices collect from patients and what actions can be taken based on the patterns deduced from the data.

• Today, the data collection model may not offer enough value for healthcare organizations to consider implementing healthcare IoT devices in their facilities. However as AI technologies improve, so will the value of IoT solutions.

• **IoT devices** must provide backend data processing that can convert the collected information into meaningful insights for healthcare organizations to consider using them.
IOT - Security Concerns

• **Bio-hacking** - Where will this leave us? Well for one the security debate will flame up. The television series *Homeland* highlighted a scenario where someone was assassinated by hacking his pacemaker.

• **IOT devices** can come into the healthcare setting through a different sources and most wouldn't have any common controls surrounding them. Passwords, encryption, and the latest versions of hardware and software on the device can have a myriad of authentication protocols.

• A **vendor, rogue IT staff member** or maybe even a hacker -- puts standalone devices onto an isolated network in our environment

• Many of the devices **lack evidence capture and forensic logging capabilities** so the likelihood of identify rouge activities becomes increasing a challenge
Blockchain – Is it information security holy grail?

• **So what is blockchain?** If we filter out all the hype and technological jargon, blockchain technology is, at its simplest, a distributed and immutable *(write once and read only)* record of digital events that is shared peer to peer between different parties.

• **The fundamental strengths of a blockchain system lie in its data integrity and networked immutability.**

• For the healthcare industry, the concept of blockchain technology and systems is undoubtedly disruptive, but it will not act as a *magic bullet* to solve emerging business problems in the fast-changing and highly interconnected digital health ecosystem.

• **It will be an evolutionary journey for blockchain-based healthcare systems or applications,** where trust and governance within a blockchain network or consortium will be the critical success factors for implementation.
IoT Security Recommendations

- "Basic security hygiene" is a must, such as authentication. If this step is properly followed, device access is limited, firmware being sent to the device is verified, and device-to-device communication undergoes scrutiny.

- Other basic security actions that providers and manufacturers can take include encryption and conducting a secure boot. A secure boot is making sure that when a device is turned on, none of its configurations have been modified.

- It is also important to not just take inventory of all devices and applications, but also create a "data dictionary".

- We recognized that having an application inventory doesn't solve the problem. However, you need to know and have in a dictionary where all data resides, where it originates, where it moves and what are its transmission capabilities.
mHealth: Data, Data Everywhere!

Mark Braunstein
Ga Tech Professor of the Practice
School of Interactive Computing

The Challenges
Challenges

Volume
Accuracy
Syntax/Semantics
Interoperability
Integration
Meaning
Volume/Accuracy

Observation Resource

Point in time

Context assumed

4 days

Context explicit

Open mHealth

```
{
  "resourceType": "Observation",
  "effectiveDateTime": "2015-02-05T07:25:00",
  "valueQuantity": {
    "value": 128,
    "unit": "mg/dL"
  }
}
```

```
{
  "blood_glucose": {
    "unit": "mg/dL",
    "value": 128
  },
  "effective_time_frame": {
    "time_interval": {
      "start_date_time": "2015-02-05T07:25:002",
      "end_date_time": "2015-06-05T07:25:002"
    }
  },
  "temporal_relationship_to_meal": "fasting",
  "temporal_relationship_to_sleep": "on waking",
  "descriptive_statistic": "average"
}
```
... Jeff Rossen went to the performance lab at New York's Hospital for Special Surgery. Still wearing the three fitness trackers on one wrist, he walked 500 steps. Afterward, one of the three devices came close to the exact step count, measuring **502 steps; the other two registered 520 and 559.**

The hospital's technology also measured how many **calories** Rossen had burned during those 500 steps. **None of the three devices was even close** to that count; one said he had burned nearly quadruple that number.
Blood pressure data is collected using a mobile app and sent to a backend service. This data can then be integrated with other health and medical APIs, such as health apps, medical records, devices, and lab results.
Personalized Physiology Analytics

“calculate or derive over 60 "features" that can contribute to characterizing human physiology”
Meaning: Insight

human physiology and systems biology

mHealth Data