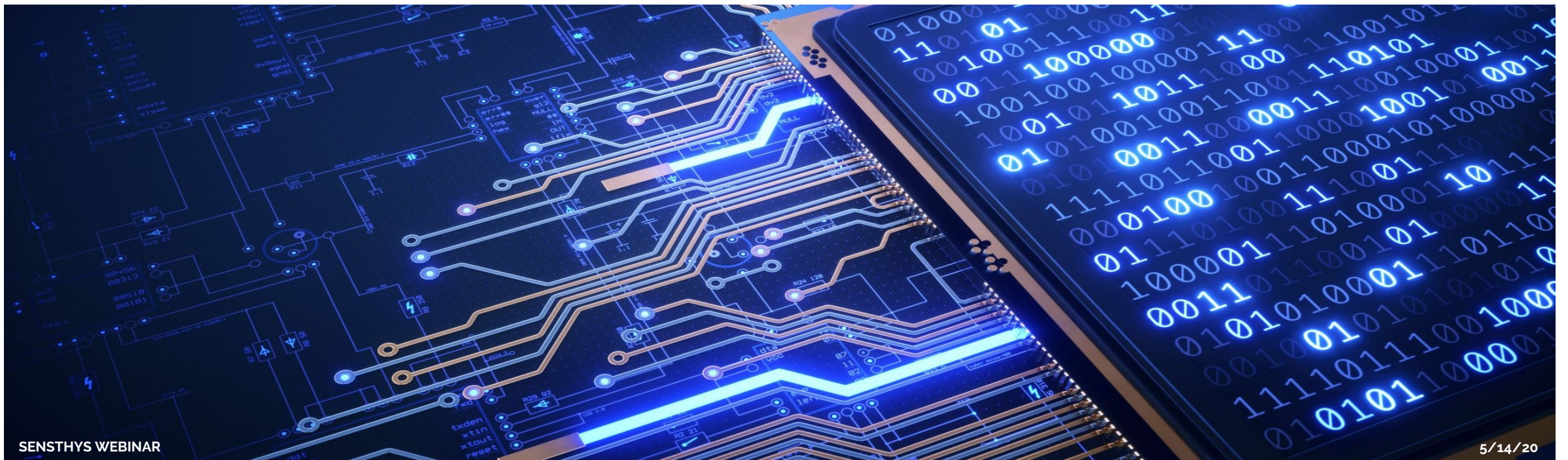



NOVEL USES OF RFID & SENSORS

FOR HEALTHCARE, HOSPITALS AND HOSPICES



AGENDA




 Healthcare Problems?

 Value

 Sensors

 Use Cases

 Announcements!!!

 Wrap-up

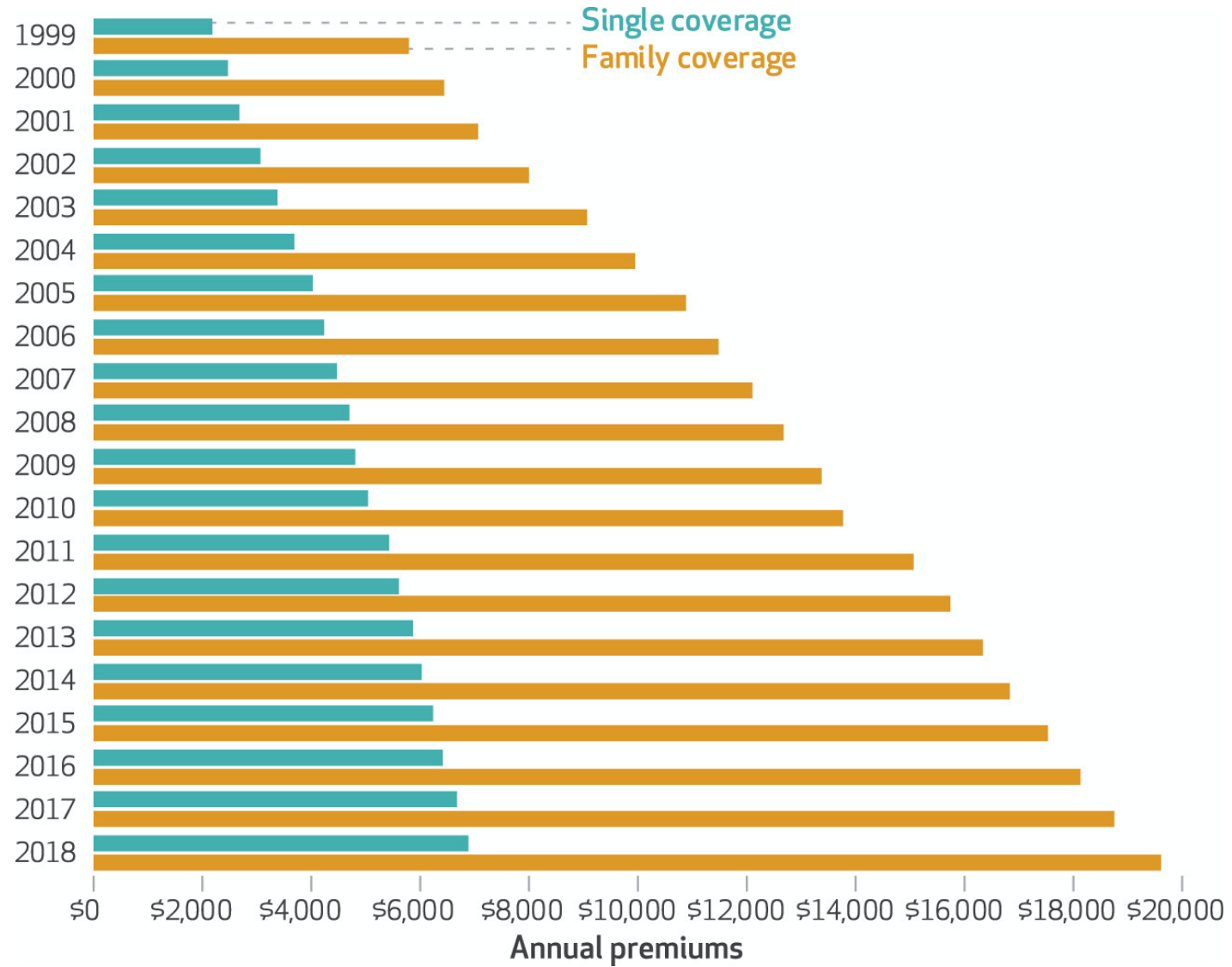
THE PROBLEM

- ❁ U.S. health care costs currently are >17% of GDP
 - Aging of populations
 - Complexity
 - Economic incentives
- ❁ Other countries also facing rising costs
- ❁ Covid-19 & future pandemics

<https://hbr.org/2011/09/how-to-solve-the-cost-crisis-in-health-care>

<https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical>

COST



<https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2018.1001>

GOALS OF HEALTHCARE SYSTEMS

Goals

- Best patient **outcomes**
- Optimal **efficiently**

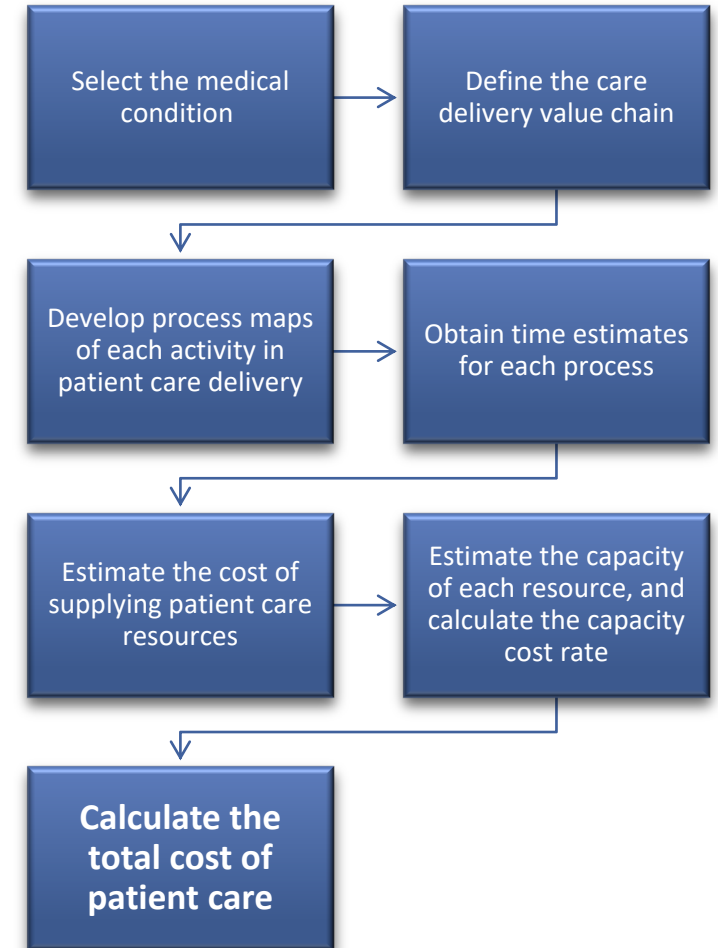
Require

- Measurement
- Accurate data
- Analyze data
- Improvement



Focus

- Logistics
- Data integrity



The Big Idea: How to Solve the Cost Crisis in Health Care, Harvard Business Review, Sept 2011

PATIENT OUTCOMES

What Contributes? Accurate, Quality Data...



Drugs

- ❖ Correct drugs?
- ❖ Drugs available?
- ❖ Expiry date valid?
- ❖ Correct dosage & instructions?
- ❖ Administered per instructions?



Equipment

- ❖ Inventory known?
- ❖ Location known?
- ❖ Maintenance?
- ❖ Available @location when needed?
- ❖ Return to inventory location?



OPTIMAL EFFICIENCY

What Contributes? Accurate, Quality Data...



Percentage or dollars

- ❖ Equipment cost (\$)
- ❖ Equipment utilization (%)
- ❖ Efficient drug dosing (\$)
- ❖ Staff utilization (%)

Utilization

- ❖ Where is it?
- ❖ Is it ready?
 - Maintenance
 - Repairs
- ❖ Where needed?
- ❖ **Improve?**

ARSENAL OF SENSORS

Why limit your system to only one of these?



Sensor	Use	Primary Question Answered	Secondary Question Answered?
RAIN RFID	Track & Trace	Do I have it?	Where is it?
Passive Sensors	Temp / Moisture	Is it too hot/wet now?	Where is it?
BLE Sensors	Temp / Moisture / others	Has it ever been too hot/wet?	Where is it?
GPS	Location	Where is it?	Is it moving, how fast?
Accelerometer	Shock/Vibration	Is it broken?	Is it moving?
PIR	Movement (single hot body)	Is someone moving?	
Radar	Movement (multiple objects)	Are things moving?	Direction of motion
Video	Counting, direction of travel.	How many items?	Direction, size, color

MEDICAL APPLICATIONS



PHARMACEUTICALS

No Longer Just Tracking



Conventional Approach

- ❄ Bar codes or pen/paper
- ❄ Manual input
- ❄ Data integrity suspect
- ❄ Conditions not monitored



Sensor Approach

- ❄ Pharma management
 - Automate stock refill
 - Drug distribution
 - Expiry dates alerts / prioritization
- ❄ Temperature/moisture logging
 - Real-time passive RFID sensor
 - BLE tags log history
- ❄ Track and Trace
 - Low-cost, high read-point
 - In building location (10ft accuracy)

ADULT DIAPERS / NAPPIES

Not previously possible



Conventional Approach

- ❖ Nurse checks patient every 2 hours
- ❖ Patient left wet for long periods
- ❖ Labor intensive and intrusive



Sensor Approach

- ❖ Place tags in diaper/nappy
- ❖ Reader antenna above each bed
 - Real time “wet” alert
 - Include patient ID and location

PATIENT ROOM

Room #	Patient Name	Status	Time Wet	Last Read
10	Neil	Green		5:01pm
11	Jo	Red	1 min	5:00pm
12	Will	Yellow		4:07pm
13	Brad	NOT IN ROOM		3:50pm
14	Rana	NOT IN ROOM		4:11pm

COMMON AREAS

TV Room	Ethel	Green		5:01pm
	Brad	Green		5:00pm
	Rana	Red	3 mins	5:01pm
Cafeteria	John	Green		5:01pm
	Margret	Green		4:59pm

AMBULANCE ASSET & DRUG MANAGEMENT

Automating In Vehicle Inventory Management



Conventional Approach

- ❖ Refilled at start of shift
- ❖ Barcode tracking via handhelds
- ❖ Manual input into a computer
 - Humans = mistakes

Sensor Approach

- ❖ Monitors entire vehicle
- ❖ Drug logs/stocking
- ❖ Updates to ER/A&E
- ❖ GPS → vehicle location/status
- ❖ Location + inventory → stocking



AREA OR BED COVERAGE

Not Previously Economic

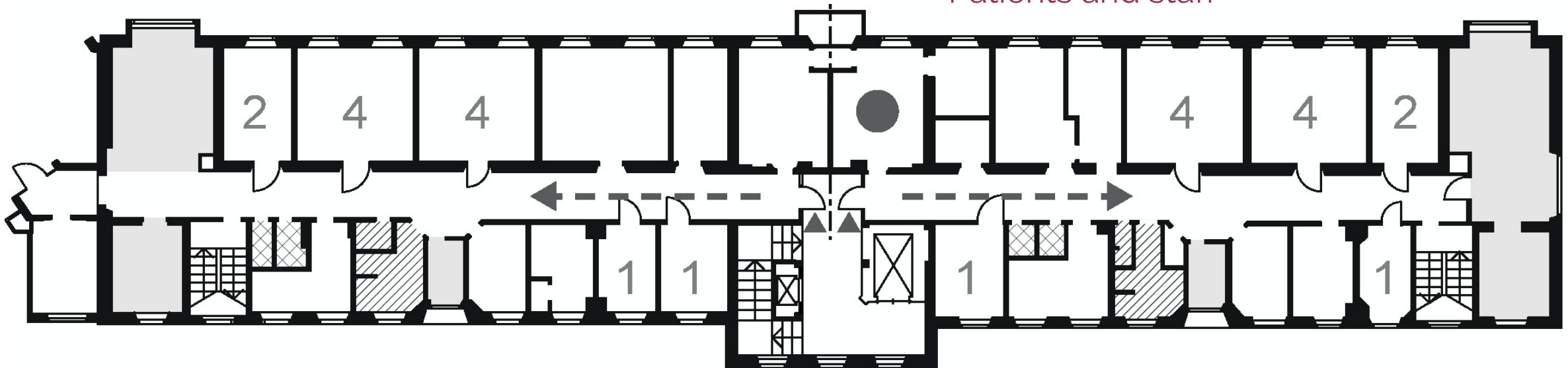


Conventional Approach

❖ None!

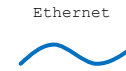
Sensor Approach

- ❖ Readers installed in:
 - Common areas
 - Patient / stock rooms
- ❖ Track:
 - Items and drugs
 - Patients and staff



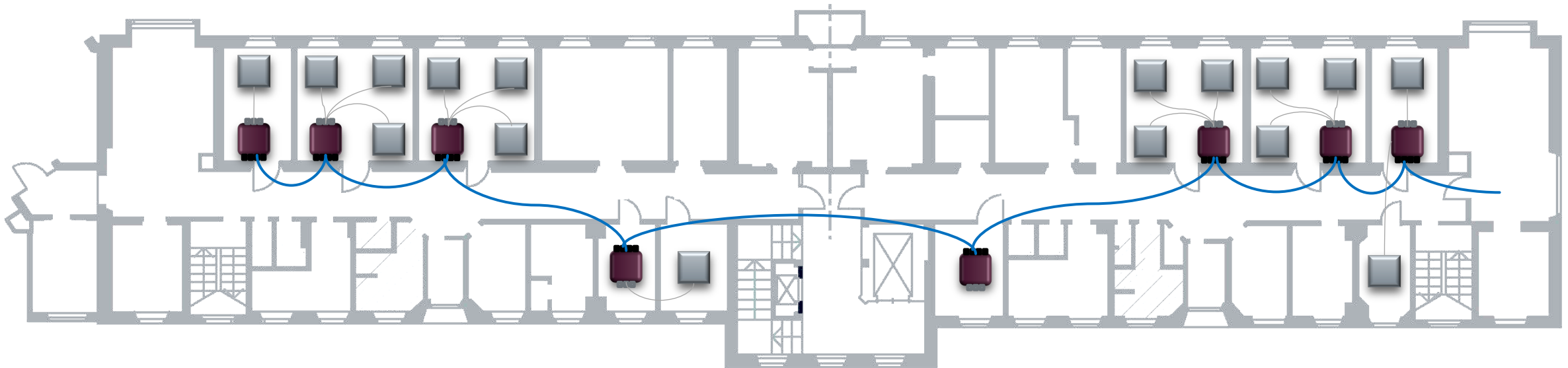
AREA OR BED COVERAGE

Sensor/SensArray Approach



- * Installation simplicity
- * No conduit or power cabling
- * One read point per bed

- * Read-point on or above ceiling
- * \$200 / read-point = \$2/Sq ft



TRACKING SCALPELS TO SHOES!

Automating Inventory Management



Conventional Approach

- ❖ Manual tracking – bar codes



Sensor Approach

- ❖ Fixed reader
- ❖ Automate
 - Operation room kit
 - Pre/post counts
 - Clean/Used
- ❖ Passive sensors
 - Quality validation

KEY SOLUTION CONSIDERATIONS



Identification

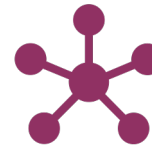
RFID



Condition & Status

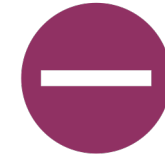
Passive Sensors

BLE



Connectivity

Data and power



Mounting

Ceiling & walls

No enclosures

Box = Fans = Noise



Installation

Time

Costs



Robustness

Longevity

Maintenance

Cleaning



Environmental Immunity

Flammability

Temperature

Humidity



In-vehicle Use

Battery

GPS

SensArray Enterprise



POWER



READER



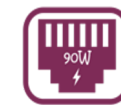
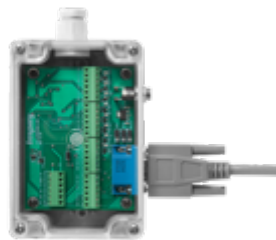
ANTENNA



SWITCH



GPIO



90W PoE Power

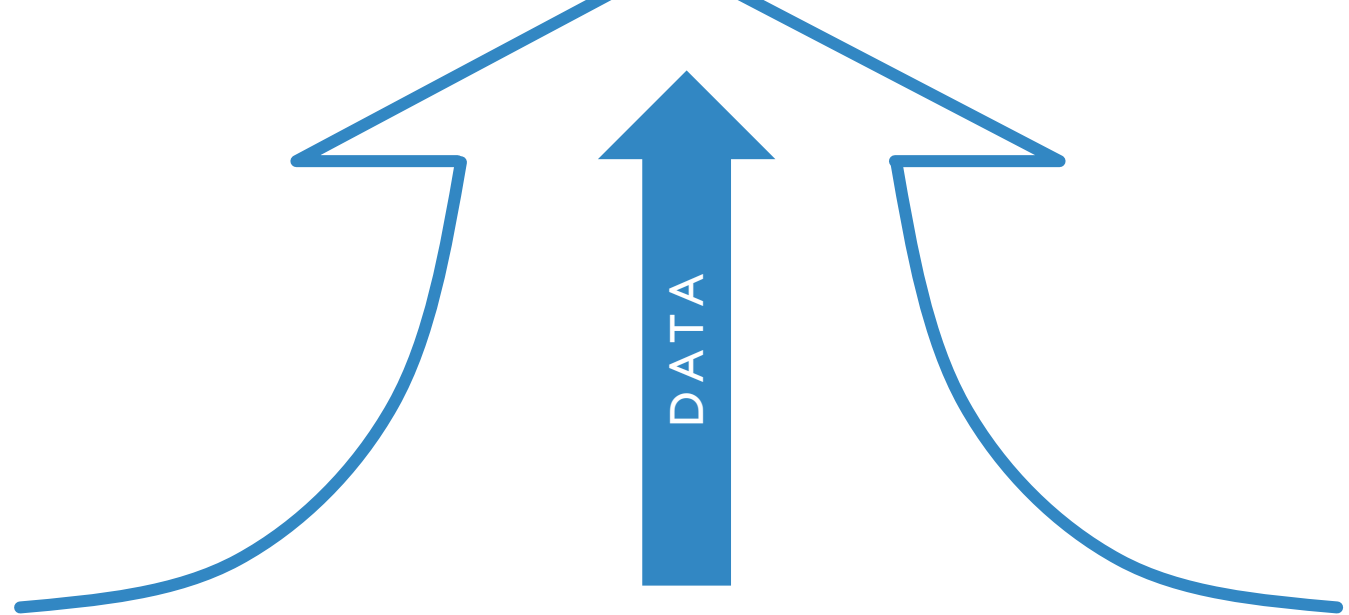


Security

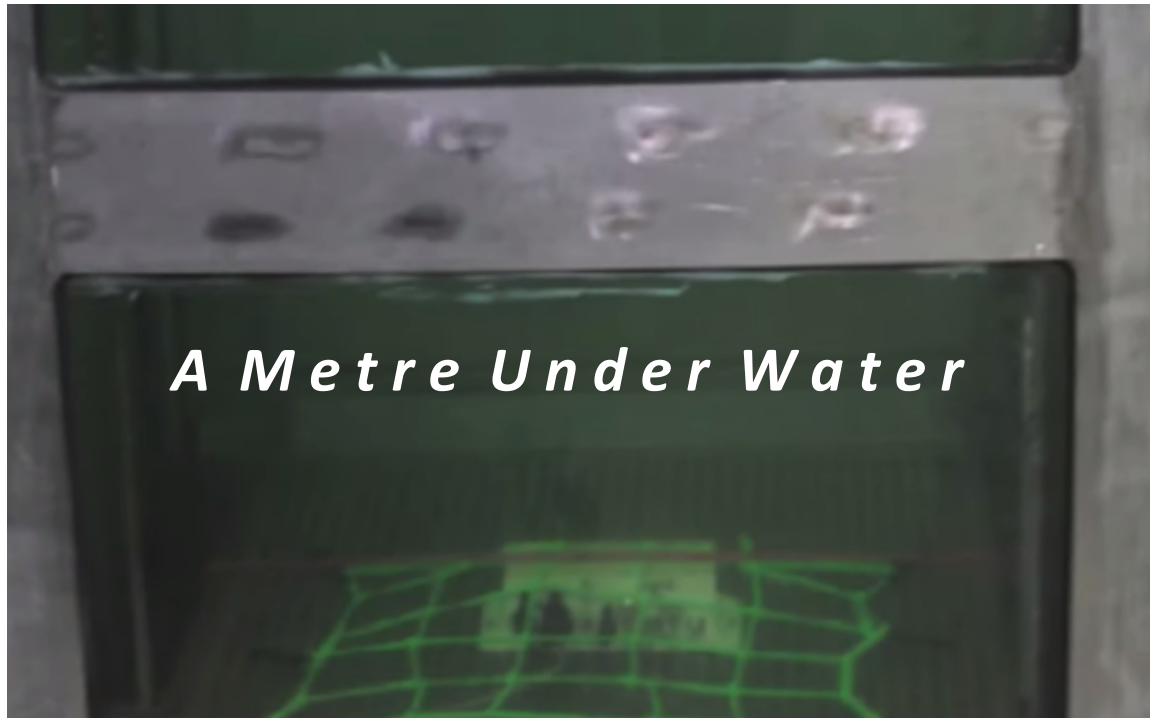


Networking

SensX EXTREME



EXTREME ROBUST



EXTREME ROBUST



ANNOUNCEMENTS

✦ Certifications

- SensArray Enterprise and One are now ETSI certified
- SensX Extreme Canada

✦ Software

- Extreme supports LLRP
- Antenna Morse code
- 99.999% up-time demonstrated

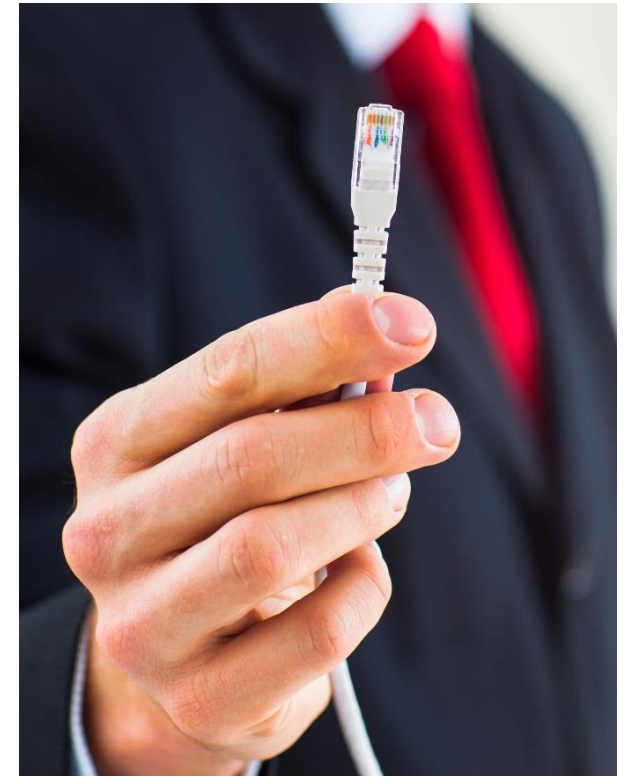
✦ Specialty Sensor

- Axzon Magnus S2 and S3
- Specialty Development Kit

AND...

SENSARRAY-ONE IS NOW SHIPPING...

One Cable for Reader AND Antenna



THANKS!

CONTACT: EMAIL NEIL.MITCHELL@SENSTHYS.COM OR INFO@SENSTHYS.COM
 CELL +1-408-656-9500

