24/7

IoT Enabling Intelligent Hospital Facilities

Improving healthcare operational efficiency,
patient satisfaction, and safety for all

EcoStruxure for Healthcare: Solutions in action

Do you want to learn how to move your healthcare facility from the present status quo to the future of modern healthcare?
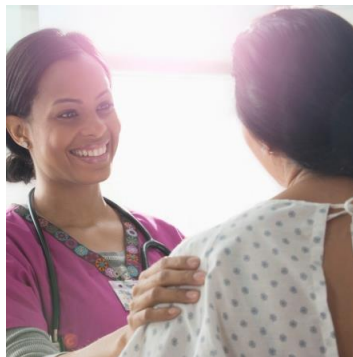
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Agenda

1. Challenges and trends

2. IoT for Hospital Facilities

3. Solutions for a digital hospital

4. Case studies

5. Conclusion

6. Questions & Answers
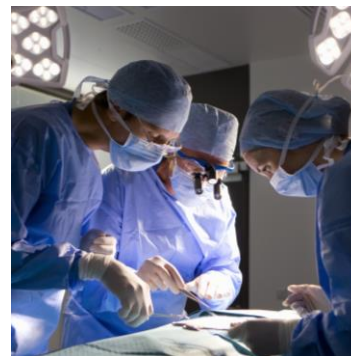
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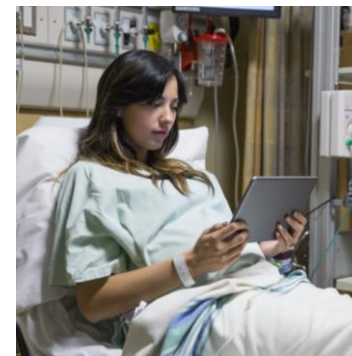
Key trends in the healthcare market

With the 60+
population expected
to double by 2050,
the patient population
will also surge

More than 50%
of healthcare
executives say
patient satisfaction
is a "top 5" concern

Safety is paramount
when lives are at stake;
33% of EHR
disruptions are caused
by a power outage

As many as 87%
of healthcare
organizations will
have adopted IoT
technology by 2019

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IoT – A system of systems

Connected, smart products

Connected systems

A system of systems

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IoT architecture for intelligent Healthcare facilities

Innovation at Every Level in hospitals

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Building world-class digital hospitals

The right information to the right person, anytime, anywhere

Patient outcomes

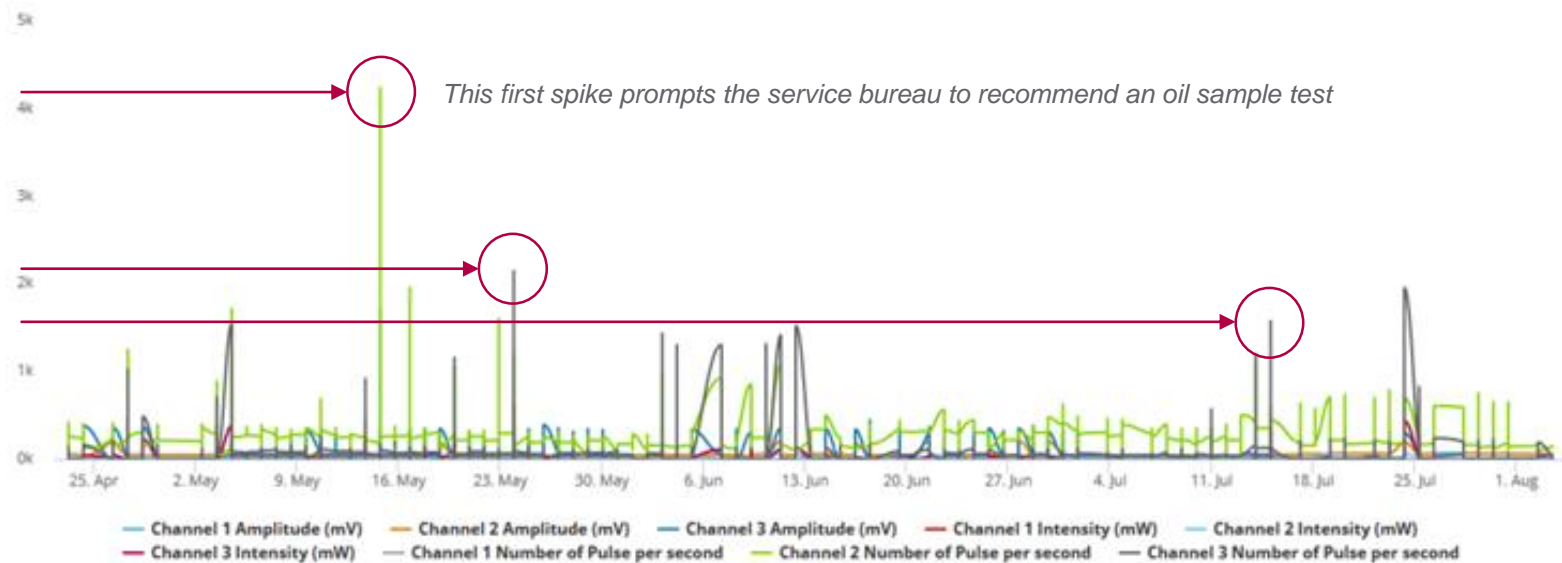Patient experience

Operational efficiency

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University of Rochester Medical Center

July 2014

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The service team investigates

Primary data center for hospital

This first spike prompts the service bureau to recommend an oil sample test

Legend: Channel 1 Amplitude (mV) — Channel 2 Amplitude (mV) — Channel 3 Amplitude (mV) — Channel 1 Intensity (mW) — Channel 2 Intensity (mW) — Channel 3 Intensity (mW) — Channel 1 Number of Pulse per second — Channel 2 Number of Pulse per second — Channel 3 Number of Pulse per second

Tests show an explosion is imminent
Primary data center

Explosion imminent!

3.1 Test Results

Date	Hydrogen	Oxygen	Nitrogen	Methane	Carbon Monoxide	Carbon Dioxide	Ethane	Ethylene	Acetylene	TDCG	Total Gas
11 Jul 2016	91	5,743	74,759	233	106	940	52	416	18	916	82,358 ⊗
07 Jul 2015	3	7,608	61,368	3	74	662	ND	5	ND	85	69,723 ✓
23 Jul 2014	15	14,238	76,004	3	41	677	ND	3	ND	62	90,981 ✓
17 Jul 2012	2	10,535	74,958	3	46	900	ND	ND	ND	51	86,444 ⚠
24 Aug 2011	3,599	12,257	62,015	198	125	1,104	33	1	ND	3,956	79,332 ⚠

July 11, 2016, the test shows that the gas levels are at a dangerous level.

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Operating theater safety

Power management
Monitor and control electrical system, ensure power quality and identify potential issues to maximize uptime and minimize equipment failure or damage.

Emergency power testing
Automatically tests Emergency Power Supply System (EPSS) or backup generators. Provides documentation for simplified regulatory compliance.

OT touch screen
Provides customized data and control of OT environment, including temperature, medical gas, power fault, lighting control, and air pressurization

Insulation monitoring
Tests insulation of power systems, monitors environment, warns of faults and notifies maintenance.

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ADT system integration with patient room control

Room temperature is raised to Mr. Chan's preference and lighting is turned on

Mr. Chan is transferred to the operating room and his room returns to unoccupied settings

Mr. Chan is admitted to the hospital

The facilities crew sees that room 201 is currently unoccupied and they perform a quick maintenance task while Mr. Chan is in surgery

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Individual care for patients

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Code gray – Aggression
A patient has attacked a nurse and she pulls her staff distress badge

Access control
I lock the door and increase the access level so only high-level authorized people can use the proximity reader.

Staff alert
I discretely notify security of the incident.

Paging and messaging system
I notify security staff in the vicinity of the issue.

Video wall
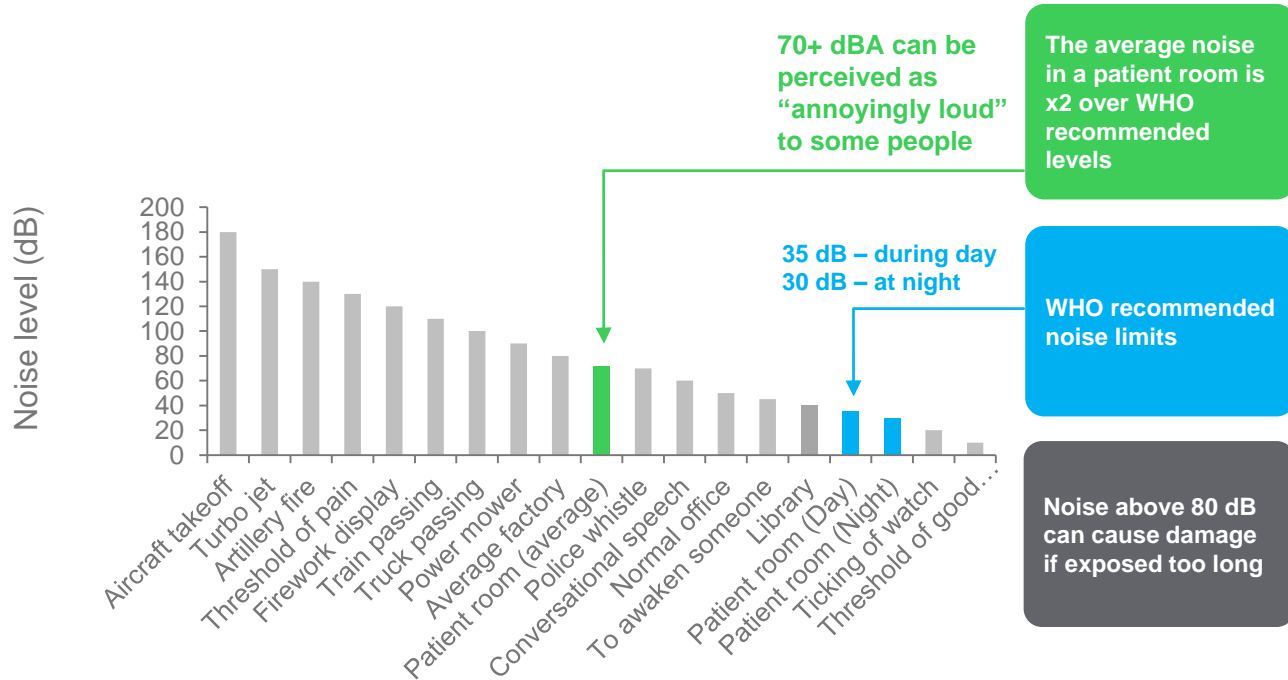I display video surveillance images for security staff to take action.

Video surveillance
I activate the local camera to focus on the door and take a snapshot.
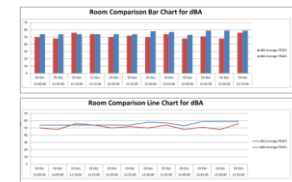
Real-time location system
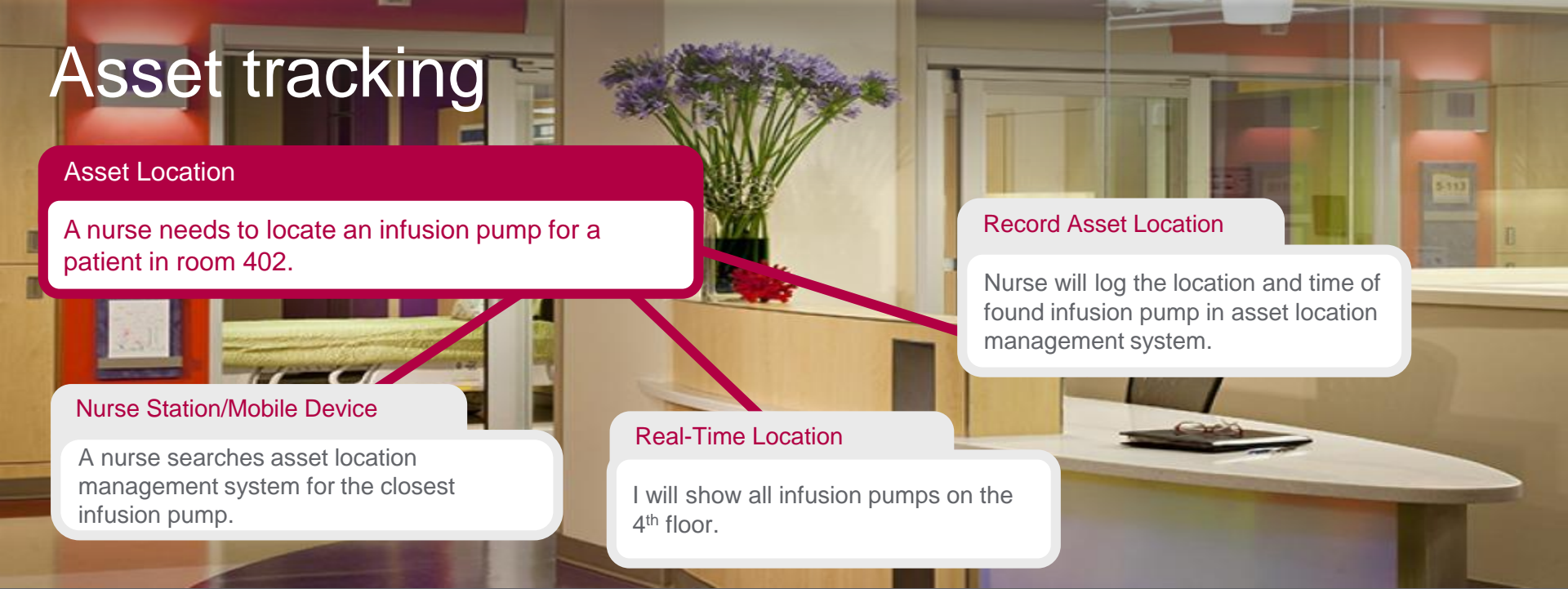I locate the staff member in distress.

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Noise level monitoring

70+ dBA can be perceived as "annoyingly loud" to some people

The average noise in a patient room is x2 over WHO recommended levels

35 dB – during day
30 dB – at night

WHO recommended noise limits

Noise above 80 dB can cause damage if exposed too long

Noise level (dB)

200
180
160
140
120
100
80
60
40
20
0

Aircraft takeoff
Turbo jet
Artillery fire
Threshold of pain
Firework display
Train passing
Truck passing
Power mower
Average factory
Patient room (average)
Police whistle
Conversational speech
Normal office
To awaken someone
Library
Patient room (Day)
Patient room (Night)
Ticking of watch
Threshold of good…

Dashboards and reports

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Asset tracking

Asset Location

A nurse needs to locate an infusion pump for a patient in room 402.

Record Asset Location

Nurse will log the location and time of found infusion pump in asset location management system.

Nurse Station/Mobile Device

A nurse searches asset location management system for the closest infusion pump.

Real-Time Location

I will show all infusion pumps on the 4th floor.

Nurses spend 5-30% of their time on a typical shift looking for medical assets.

Hospitals purchase more assets than necessary because they aren't shared efficiently.
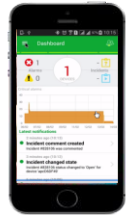
Expected savings: $500K/year

IoT to protect the hospital IT infrastructure

Manage and protect

Ensure data center uptime

IT Expert Mobile Insights
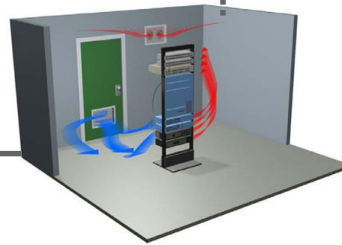
Data Center Infrastructure Analytics

IT Advisor

Easily manage data closets

Intelligent cabling management

Protect critical imaging equipment

Intelligent Power Monitoring

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IoT Hospital Facilities Case Studies

Energy Management

Asset Management

Workplace Efficiency

Apps & Analytics to drive Services

Research Laboratory

Academic MC

Northwell

Intelligent Power Management

Intelligent Building Management

Edge Control

Moorfields

CHI

Connected Products

Children's

Breakers – Smart Panels – Meters – Relays – UPS – Sensors & Actuators
RTLS tags – Third-party devices

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Research Laboratory

Massachusetts, USA

Nationally recognized US research and teaching hospital

Customer challenge

450,000 sq. ft. research laboratory needed:
- Monitoring of central and zone ventilation system
- Building performance insight
- Building data consolidation via 1 front end

The solution
- Building Analytics

Customer benefits
• Building Analytics identified several major problems resulting in $286K in annual savings

The results: Life Is On with ...
HVAC znalytics that provide significant operational savings and prevents costly equipment failure.

Based on Building Analytics findings, the following work has been performed:

- 84 VAV boxes were re-commissioned.
- 52 VAV box reheat valves were replaced.
- 12 VAV box actuators were replaced.
- An air handler chilled water valve was rebuilt.
- Multiple controls adjustments were made.

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Moorfields Eye Hospital

London, England

World-class center of excellence for ophthalmic research and education

Customer challenge
- Multiple legacy systems
- Aging infrastructure
- Worldwide reputation to uphold

The solution
- StruxureWare for Healthcare software suite
- Operating theater panel solution
- Real-time Location System solution

Customer benefits
- Innovative technology brings aging facilities into the modern era
- Easy-to-use products and systems that simplify and optimize day-to-day facilities operation
- Visibility of patient and clinician workflows to optimize future facility design

The results: Life Is On with ...
Solutions that provide innovation at every level of the hospital's facility infrastructure.

Moorfields Eye Hospital NHS
NHS Foundation Trust

"We adopted new technologies to integrate legacy systems across the facility and provide one interface to the facility management team, allowing them to monitor and control the infrastructure throughout the hospital. The openness of StruxureWare for Healthcare allowed us to integrate other technologies like tap flushing to ensure that our systems are not only operating as planned but also in cohesion with other systems across the facility."

- Chris Harding, Director of Estates and Facilities, Moorfields Eye Hospital

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Children's Hospital
Australia

A leader in innovative patient care and digital infrastructure design

Customer challenge
- Construction of new $1.2B pediatric trauma center to replace existing aging facility

The solution
• Complete digital hospital infrastructure design including SmartStruxure, PowerStruxure, security management, noise monitoring, patient room control apps, smart connect devices, and IT/OT integration with enterprise service bus

Customer benefits
• Welcome patients with "at home" environment for improved quality of care and satisfaction.
• Simplify daily activities and improve operational efficiency by delivering 50+ systems through one seamless interface.
• Provide staff with the real-time information they need to quickly and effectively.

The results: Life Is On with ...
Solutions that provide innovation at every level of the hospital's facility infrastructure.

"This hospital will be the center piece of the area's child health care system, providing the specialty medical treatment required for the most serious medical cases. The design and service models were chosen to deliver best practice care for children and a welcoming environment for families and staff."

 - Children's Hospital

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- **Patient outcomes**
- **Patient experience**
- **Operational efficiency**

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Questions & Answers

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