Environment, Health and Safety

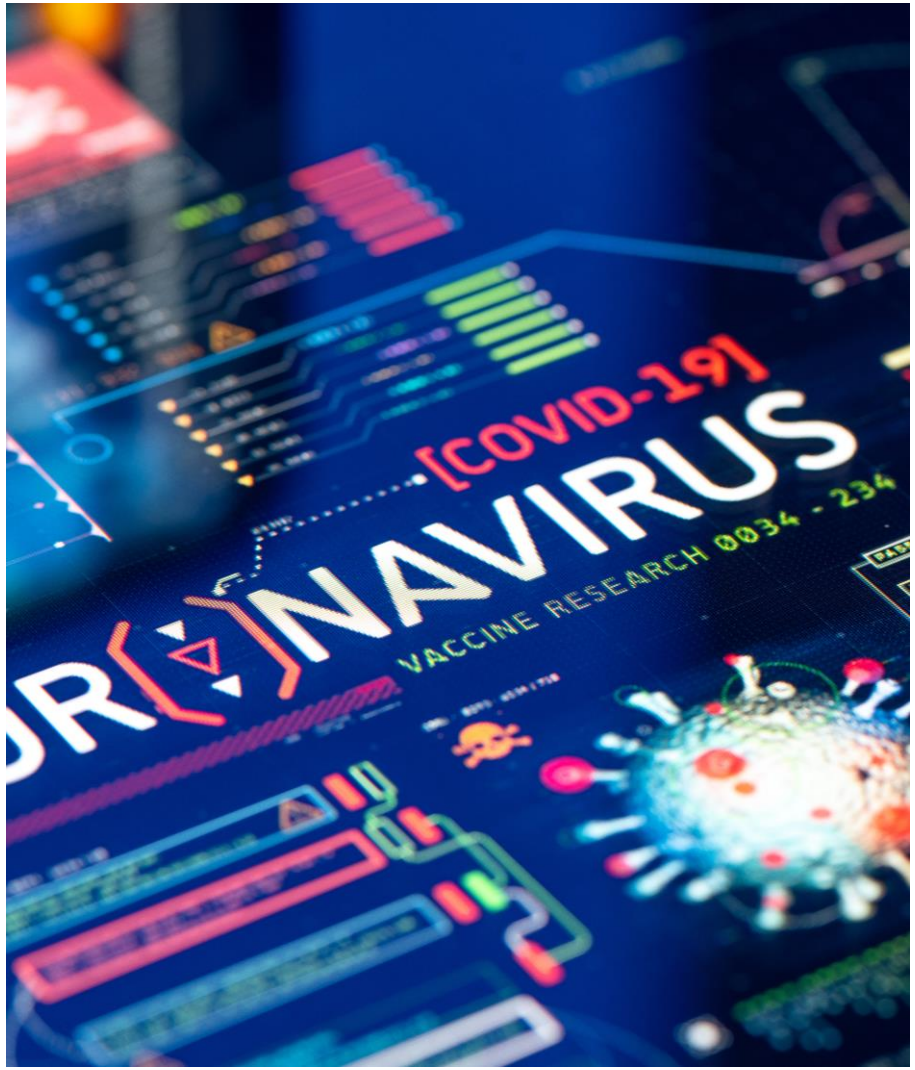
THE NEW IH FOR THE NEXT NORMAL

AIHA October Webinar

Guest speaker

Ron McMahan
Director, Business & Solution Development
SGS Galson
ronald.mcmahan@sgs.com

Ron has been at the forefront of applying burgeoning technology to monitoring solutions for over 30 years. He works with staff and clients developing innovative ways to improve data collection for the safety of workers.



The New IH for the Next Normal – Pandemic Driven Technology, Opens Possibilities

Integration of IoT, Cloud Computing and Pandemic Contact Tracing brings a possible evolution for how we do occupational exposure studies.

Learning objectives:

- Progress Industrial Hygienist working knowledge of the power of IoT and Cloud Computing.
- Get IHs thinking about how we can make 24/7 health monitoring an affordable, quality, reality

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The future of “real time” sensor, field generated analytical data and lab generated analytical data will:

- Move toward the field with IoT devices

- IoT is the Internet of Things – it encompasses a term for multiple devices connecting to the internet such as:
  - Computers
  - Tablets
  - Smart Phones
  - Sensors
  - And more……

The future of “real time” sensor, field generated analytical data and lab generated analytical data will:

- Be Cloud Based

- Cloud is a term used to describe a global network of servers, each with a unique function. The cloud is not a physical entity, but instead is a vast network of remote servers around the globe which are hooked together and meant to operate as a single ecosystem.

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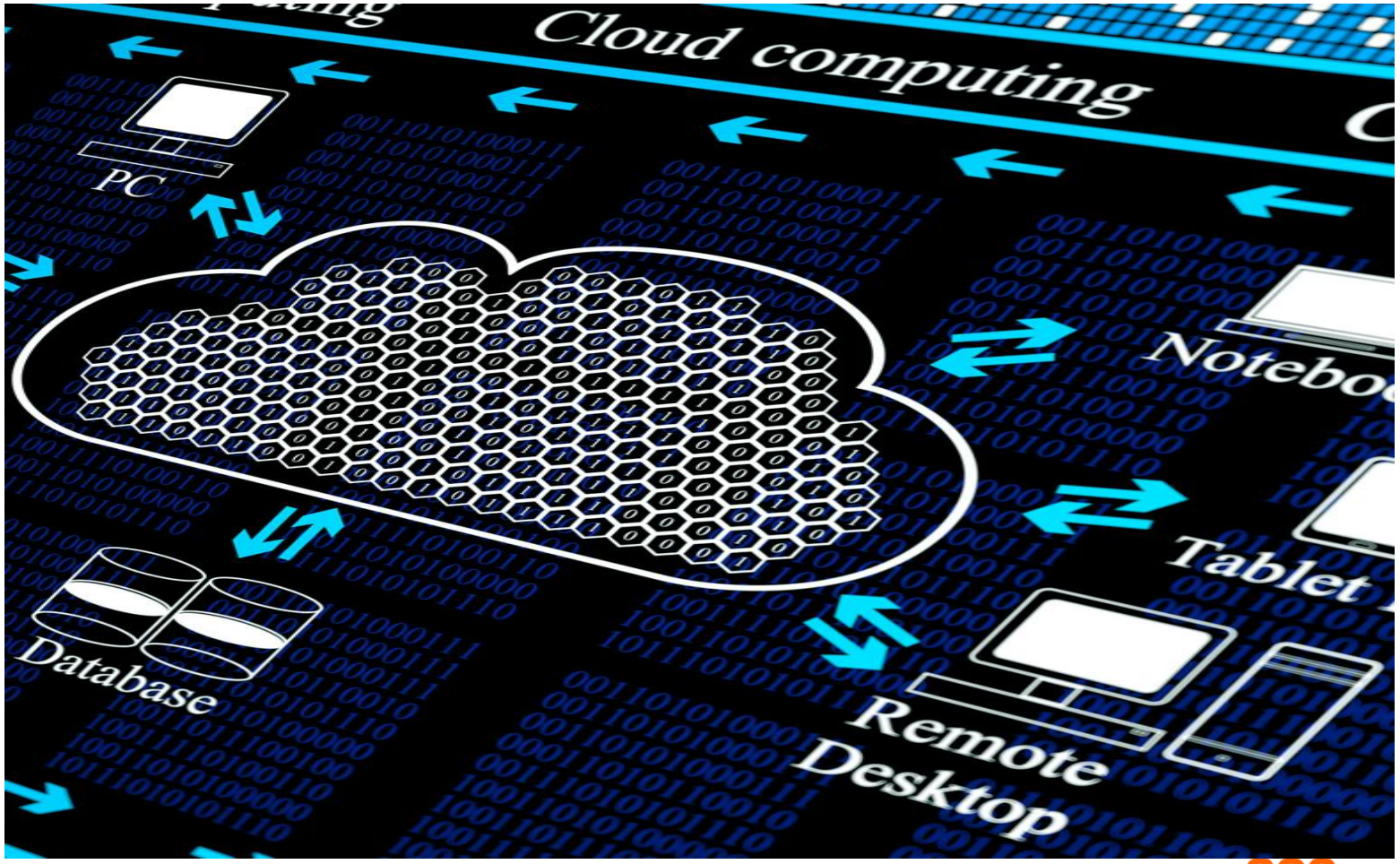
The future of “real time” sensor, field generated analytical data and lab generated analytical data will:

- Be enhanced by cloud computing

- Cloud Computing - the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.



The future of “real time” sensor, field generated analytical data and lab generated analytical data will:

- Be more powerful and efficient through interconnectivity of data

- The ability to access data from multiple data points globally, public and private can enable Algorithms and Dashboards for an increase in pertinent data for decision making, including AI.

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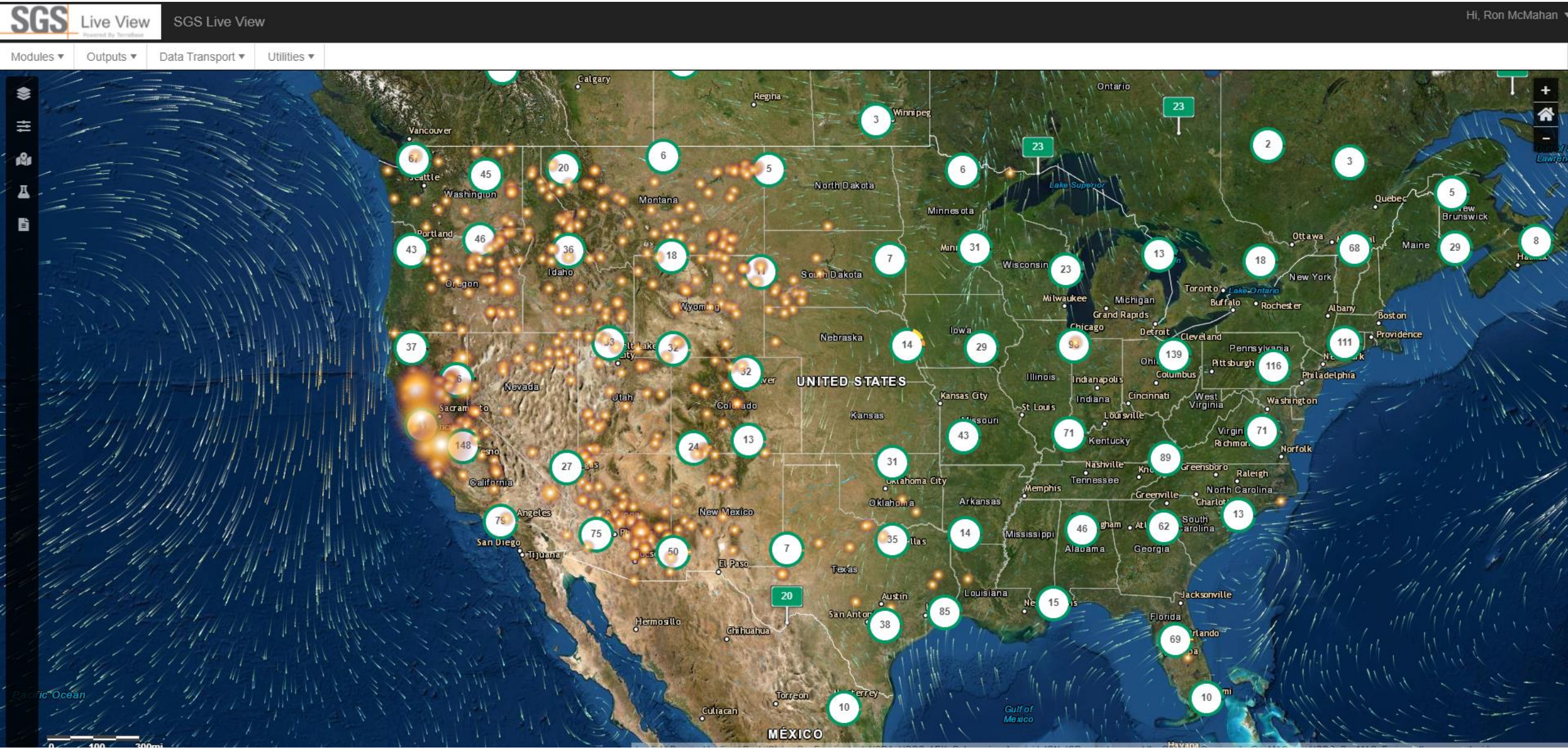

Example of Data Interconnectivity – Public Cloud Wind, Public Air Quality Index, Public Wild Fires and Private Air Data

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The Cost of EHS data for decision making through IoT and Cloud capability will drop dramatically through:

- Development of field based sensors and instruments that provide “screening” and “validated” measurements

- SGS SmartSense

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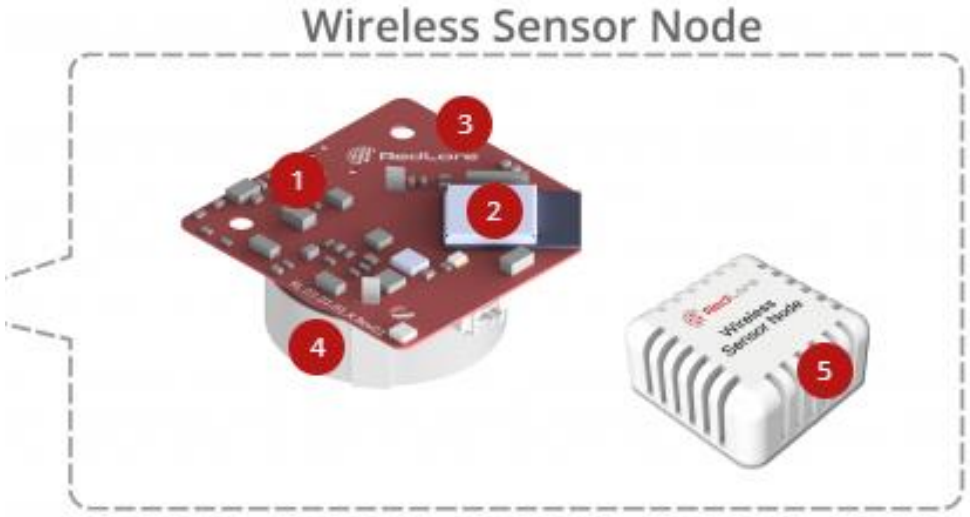
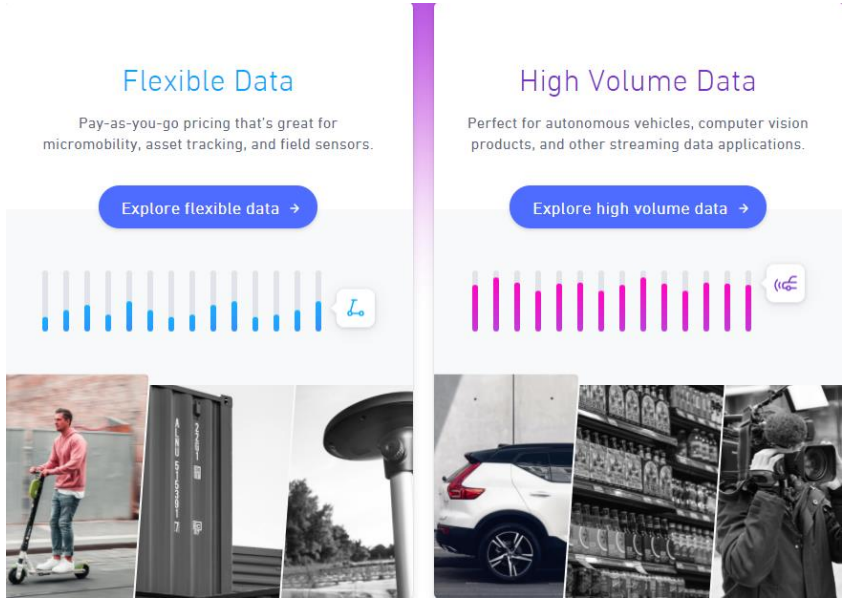


The Cost of EHS data for decision making through IoT and Cloud capability will drop dramatically through:

- Low Cost Web enabled devices and inexpensive cloud connectivity



- Device with 6 sensors: $135/unit
- Data Example: $3/month for cellular data

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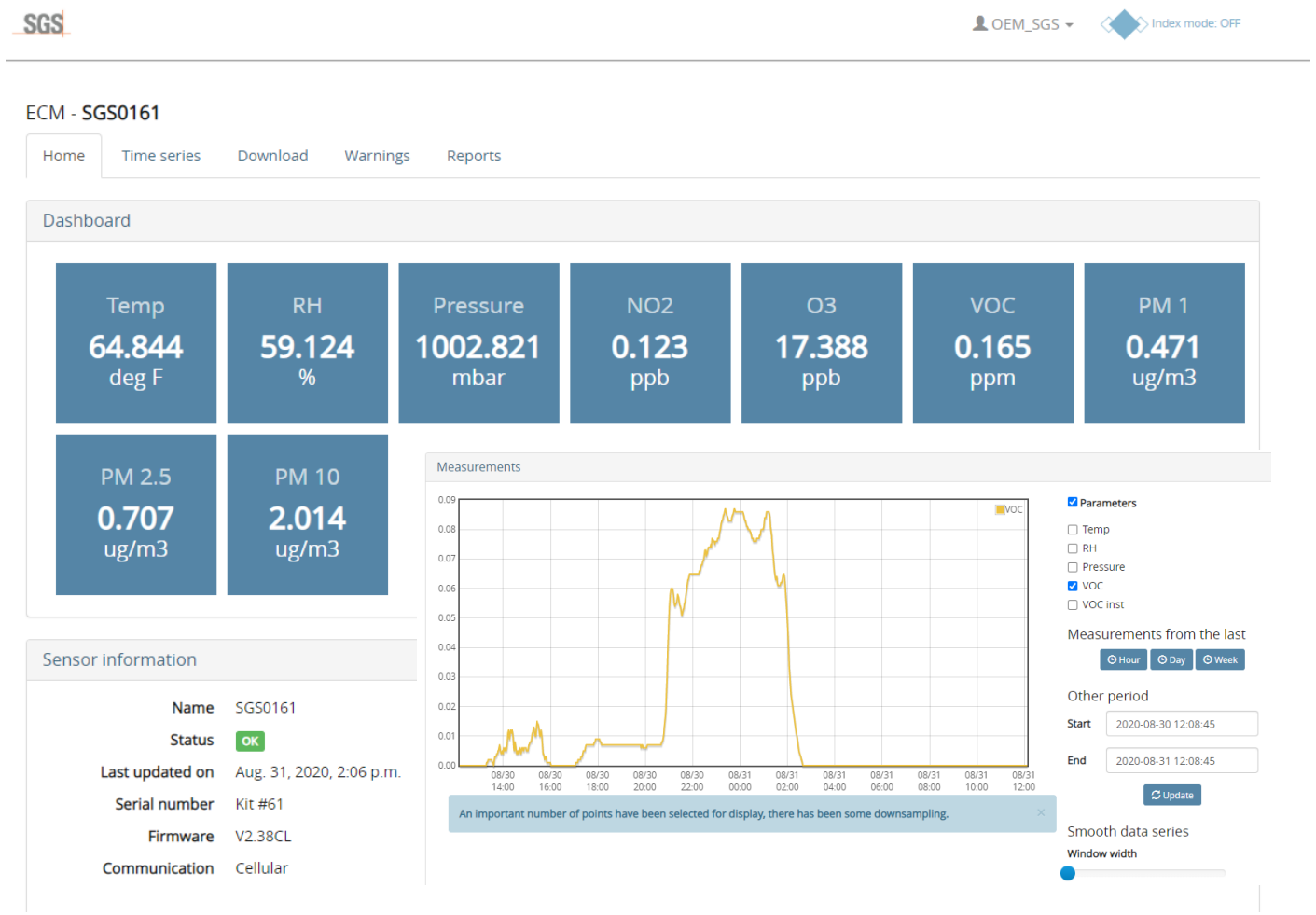
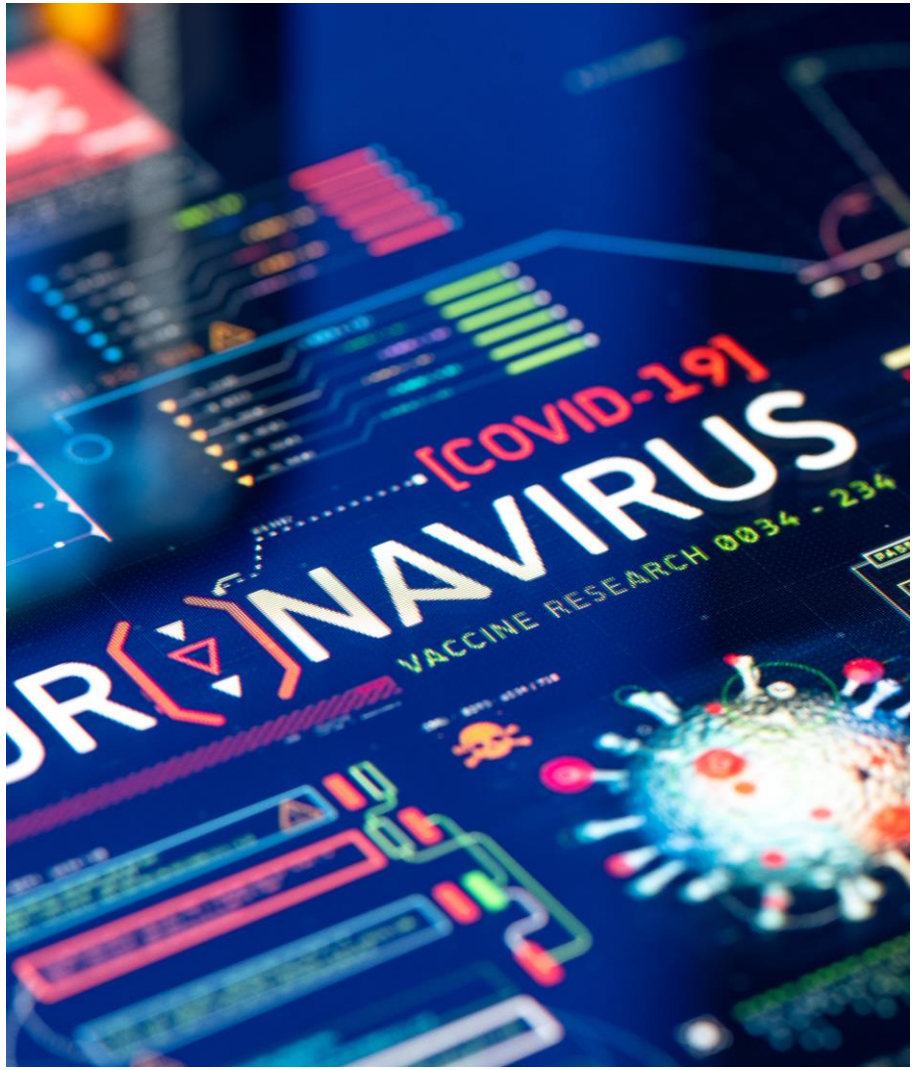
The Cost of EHS data for decision making through IoT and Cloud capability will drop dramatically through:

- Advanced Cloud based inter-data computing and simple cloud based tools





The New IH for the Next Normal – Pandemic Driven Technology, Opens Possibilities

Contact Tracing

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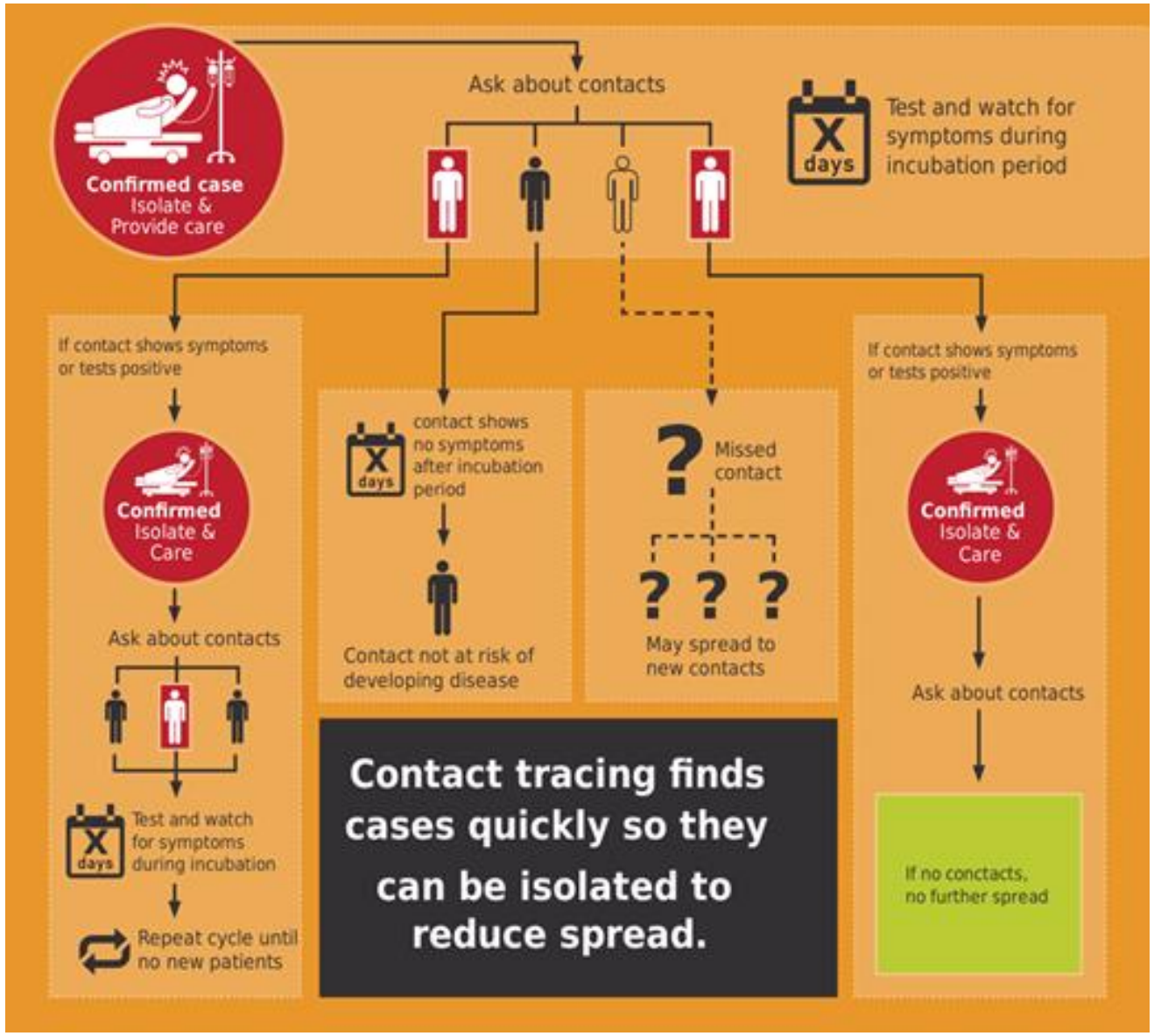
Contact Tracing



Critical Components

Anchor nodes

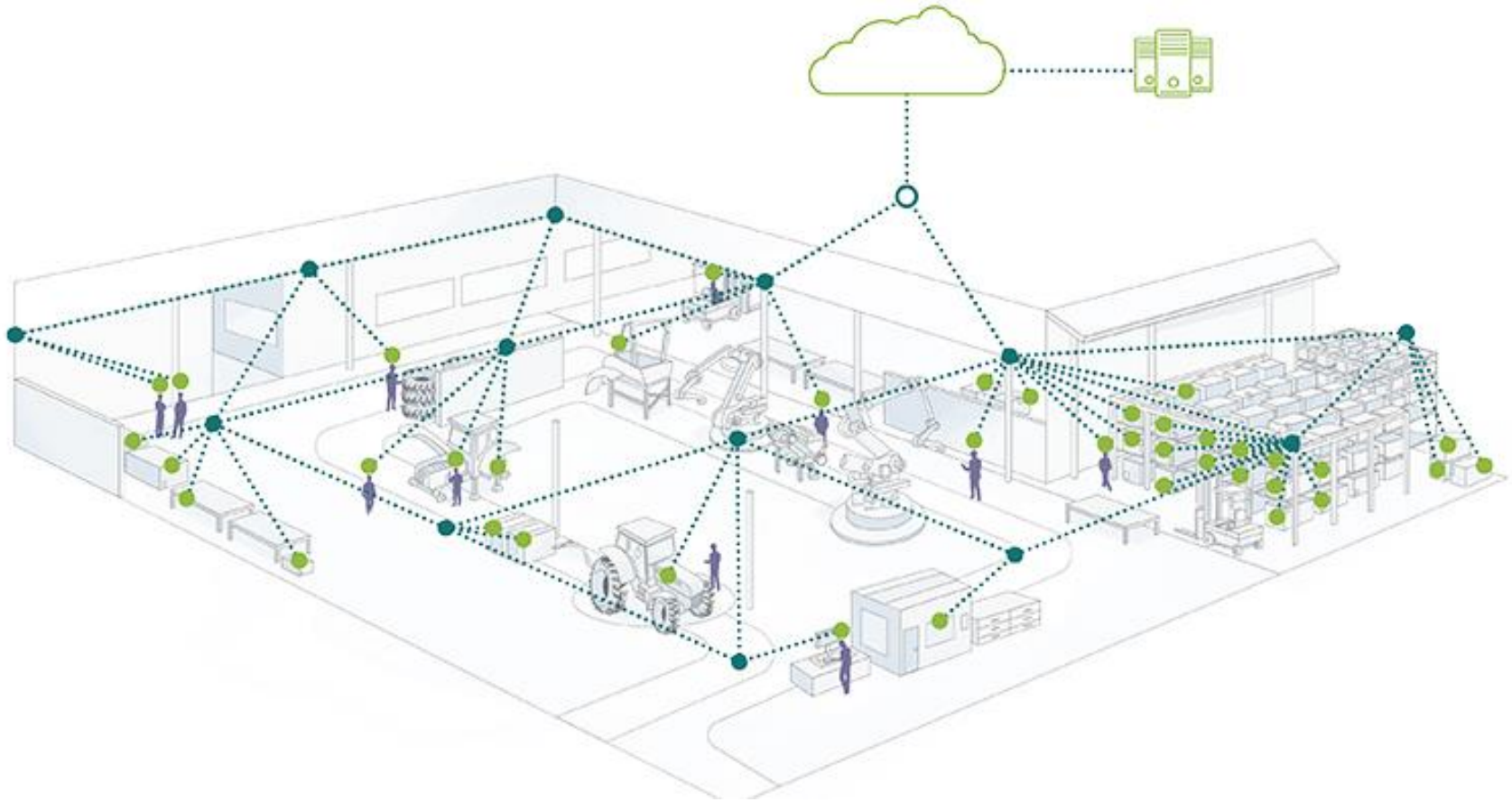
- Serve as the reference locations for positioning engine
- To be installed across the facility roughly on a square matrix. The exact location is not important, just roughly.
- With a matrix of 50ft x 50ft, the positioning accuracy is approx. 1-5ft. A denser matrix provides higher accuracy .
- Anchor nodes are battery powered or externally powered.

Personnel/Asset tags or Sensor Nodes

- To be attached to personnel/asset.
- Battery powered, autonomy typically 1-3 years

Gateway

- Connects wireless network to the cloud Positioning Engine
- Large installations will have rough 1 gateway for 200 to



Components

Anchor

- Forms backbone mesh network for Asset Tags and Sensor Nodes
- No network wiring required, no WIFI required
- High power transmission allows for 50m between Anchors indoors*
- Power supply: POE (battery power only or mains
- Supports most off-the-shelf Bluetooth Beacons
- Supports most Wirepas-capable sensor nodes

Sensor Node

- Joins the mesh network, can route messages for other sensor nodes
- Smart Sense full sensor offering
  - Noise
  - PM 1, 2.5, 10
  - CO
  - CO2
  - VOCs
  - Many More

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Components

Personnel/Asset tracking tag

- For personnel/asset localization and tracking
- Connects to anchor via Bluetooth Beacon
- 3 second update rate(configurable)
- Replaceable battery, 1-3 year battery life

Gateway

- Connects device to cloud server
- Ethernet, WIFI, BACNET, 4G/LTE
- Supports up to 250 anchors + sensor nodes (typically)

* Wireless range depends on infrastructure and environmental conditions

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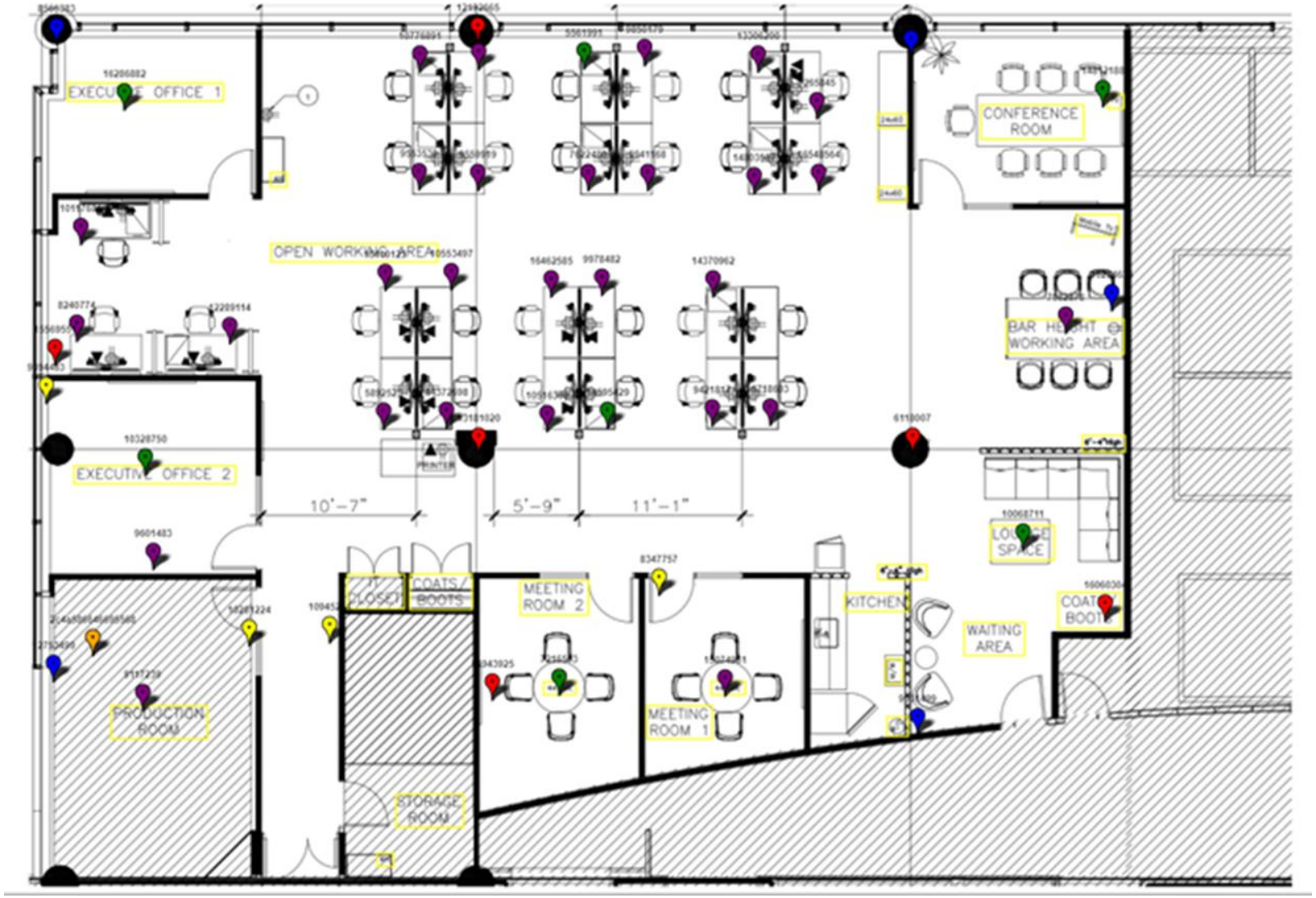
EXAMPLE OFFICE



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ARCHITECTURE

- Anchor
- Personnel/Asset tags
- Sensor Nodes
- Gateway
- Mesh Network

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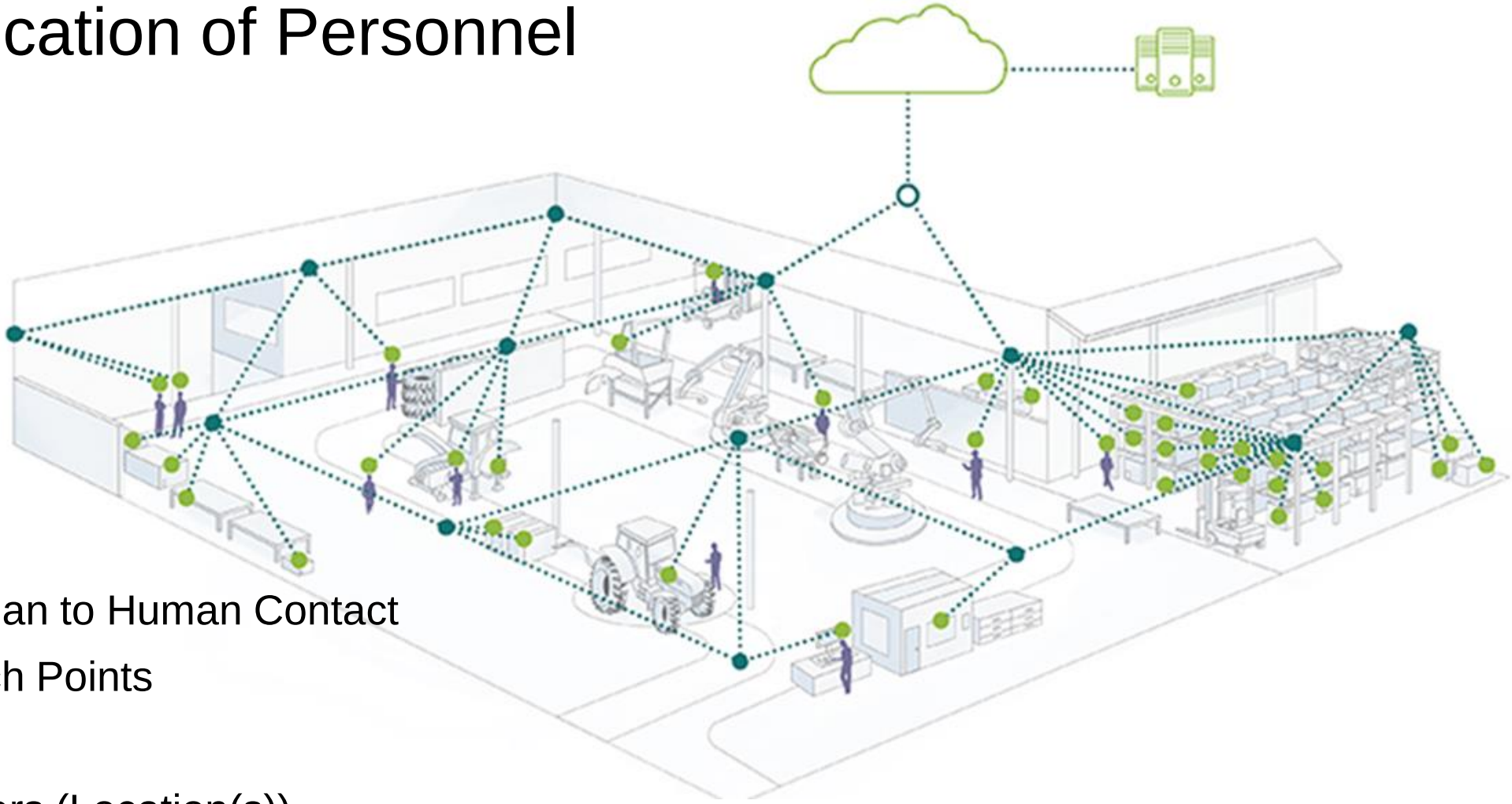
Results in Location of Personnel



- Contact Tracing
  - Location of Human to Human Contact
  - Location of Touch Points
- Social Distancing
  - Proximity to others (Location(s))
- Personal Exposure
  - Location to Exposure Risk

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ADVANTAGES

- No WIFI or Ethernet connection to any base stations required
  - Anchors self-form a wireless mesh network. Only power supply (Battery or mains) required
  - Only 1 gateway with internet connection required per 250 anchors + sensor nodes (typically)
- Future proof: Easy to add new applications
  - Backbone network of anchors support adding new sensor nodes
  - Compatible with (most) Wirepas-enabled sensors
- Easy installation
  - No wiring required
  - Mesh network is self-forming and self-healing, no network configuration required
  - Anchor locations can be freely chosen, no need for a precise grid
  - Local NFC communication between Sensor Node and smartphone app for field configuration
- Open and interoperable architecture
  - Anchors compatible with (most) Bluetooth Beacons and Sensor Nodes
  - Location and sensor data can be sent to most database, analytics platforms and visualization dashboards
- Highly Scalable
  - Existing installations show long-term stability with up to 3000 nodes in single building
- Same network for environmental and worker exposure sensors

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FOR THE NEXT NORMAL

Changing how we perform personal exposure assessments

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Personal Exposure Monitoring

- Today we place sampling equipment on personnel
- We monitor their work day
- We send samples to a lab or download data
- We generate a report
- We provide data to the database
- It happens once a year or if alterations to the process have changed

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The New IH using proximity to source

Worker name or job	Number of workers	L_{eq} dBA	Shift duration (hours)	L_{ex} dBA	Comments	Okay with regulations? (Y/N)	Recommendations
Bottling							
Feeder	1	83.5	10	84.5	• All measurements were for 4 hours and representative of entire day • L_{eq} converted to L_{ex} (according to *Basic Noise Calculations**) • Steady noise for long periods • No significant impact noise	Y	• Make hearing protection available
Filler	1	85.5	10	86.5		N	• Implement noise controls, such as engineering or administrative controls • Consider job rotation to reduce average L_{ex} to less than 85 dBA L_{ex} • If duration changes, redo dosimetry
Capper	1	81	10	82		Y	• Make hearing protection available
Labeller	2	80	10	81		Y	• No action required
Packer	5	78.5	10	79.5		Y	• No action required
Tablet pressing							
Acme press #1	1	89	7	88.5	• L_{eq} 4 hours, representative of entire shift • L_{eq} converted to L_{ex} (according to *Basic Noise Calculations**)	N	• Hearing conservation and noise control program

- Transform manual application of meters near or on individuals on a routine basis, manual recording and documenting with automated data based on proximity

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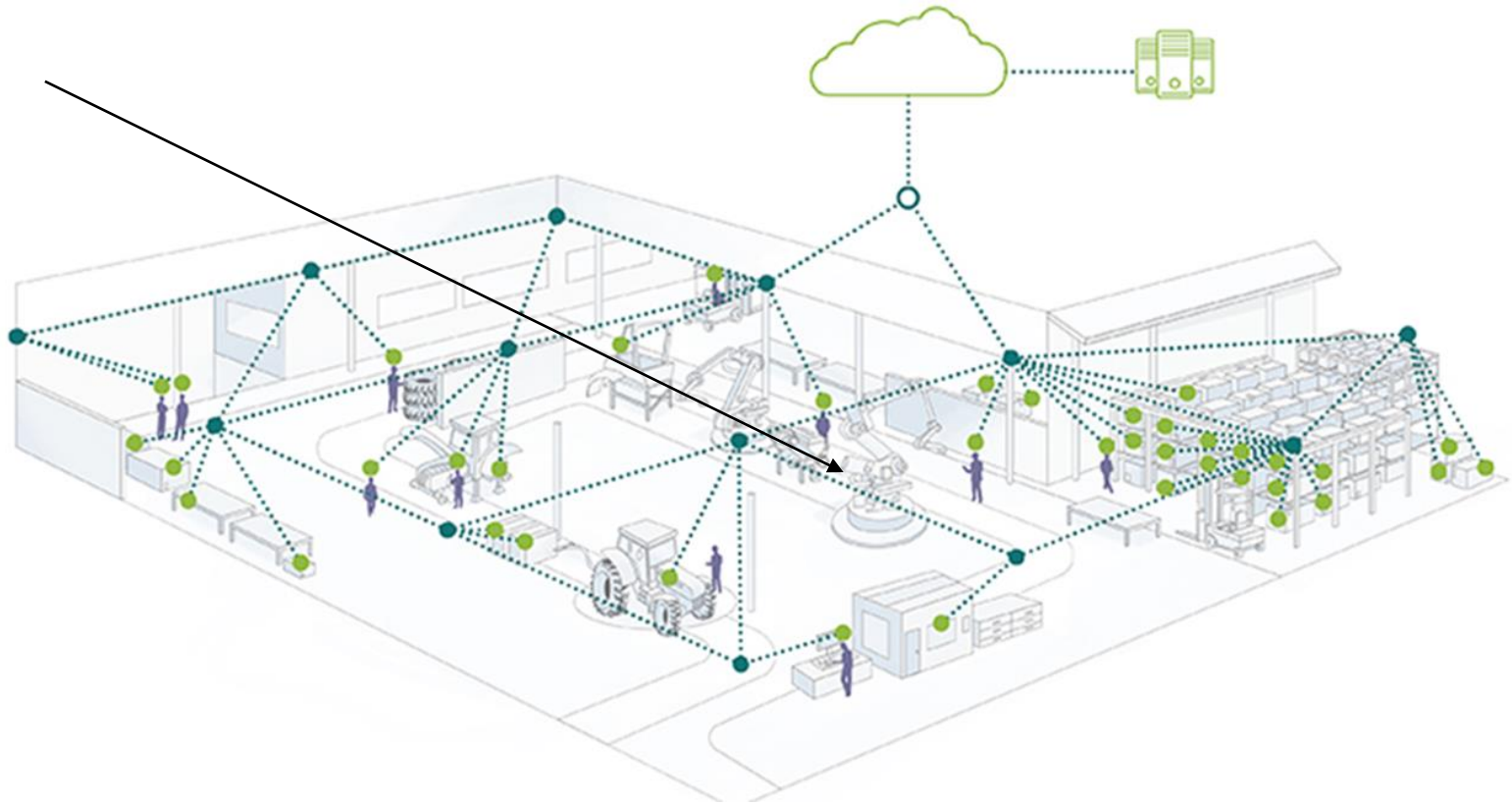
The New IH using proximity to source

Noise Source

Proximity and exposure data calculated automatically



The New IH using proximity to source

Noise Source

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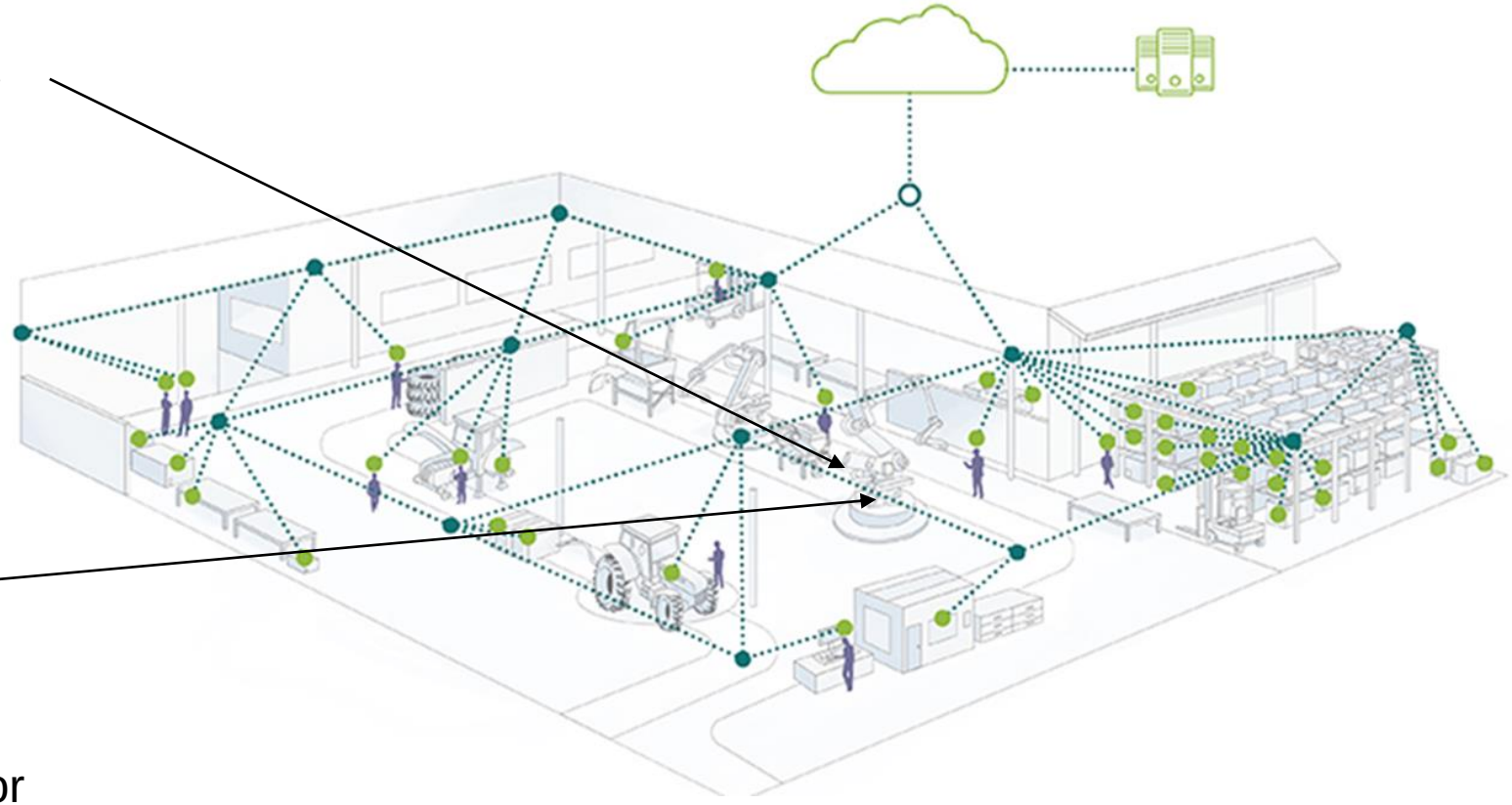

Continuous Noise Monitor

Connected to Cloud Computing System

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Personal Exposure for the new normal becomes inverted

- Utilization of location tags - we are able to detect the locale of individuals to the source
- By placing a reference device in the area of source we can obtain personal dosimetry through personal proximity to source

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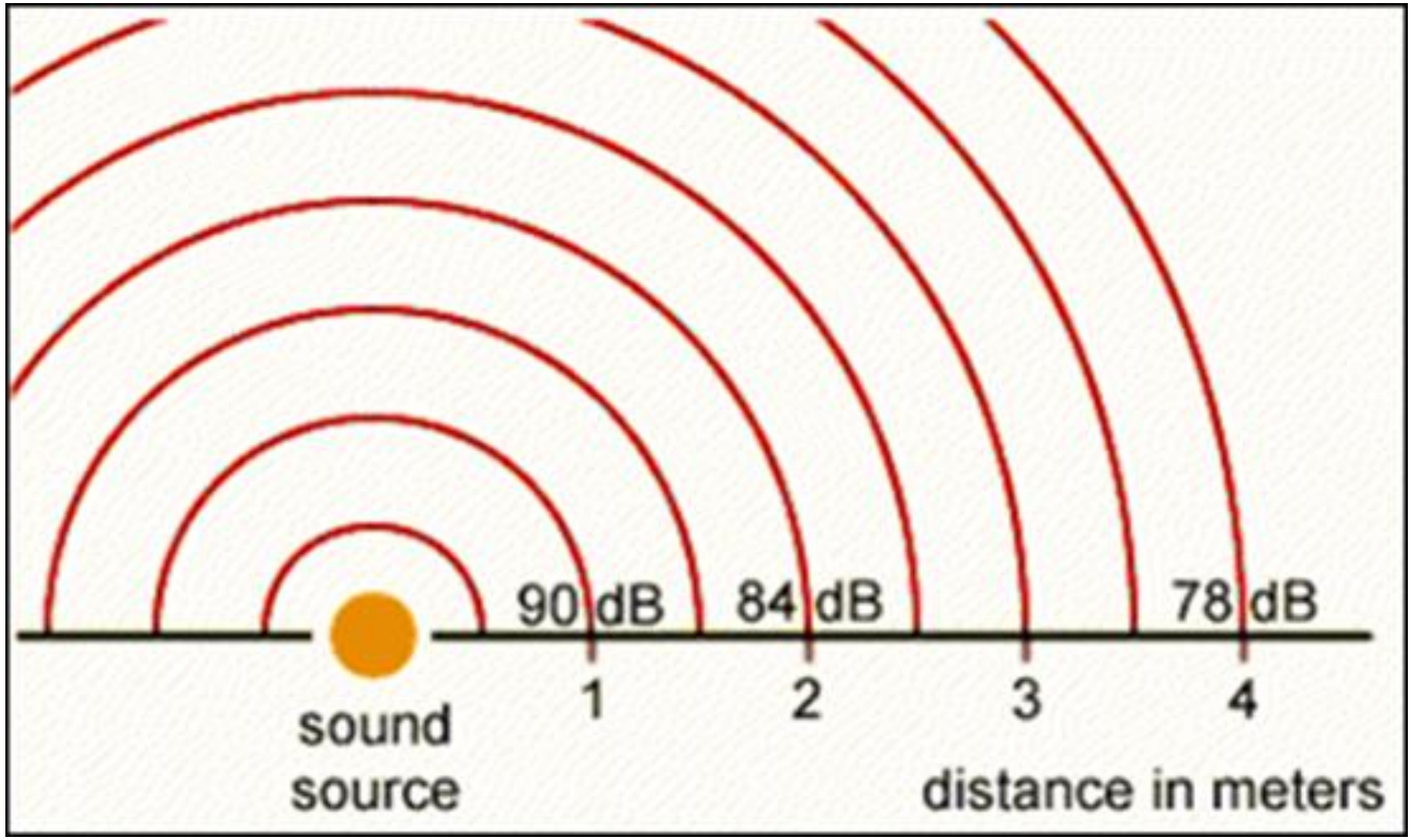

The New IH using proximity to source

Proximity with Cloud Computing and the power of AI/Algorithms applied to Exposure Data and Interpretation of that Data

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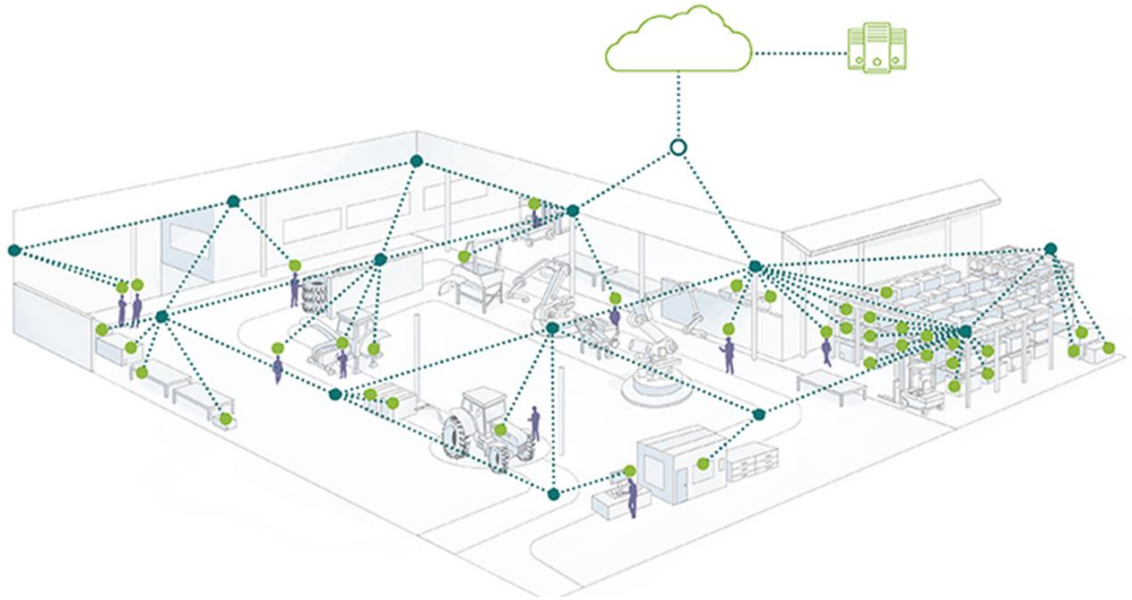
Personal Exposure for the new normal

- 100% of workers are covered for exposure data every day
- Instant notification of Exposure Exceedances
- No sampling, no labs/downloading, not data to transpose
- 100% Protection 24/7



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Questions?