REAL-TIME IH SYSTEMS: PRESENT AND FUTURE

LET'S SET THE STAGE FOR THE DISCUSSION

- Computing
  - Who saw Personal Computers evolving to today in 1980.
    - We can do on our smart phones what we did on the first PCs faster and easier
    - When is the last time you hand wrote a report.
  - What was a key to this - Microprocessors
- Communications
  - Who saw phones evolving to today in 1990.
    - We can call almost anywhere in the world on a battery operated device with no cords or strings
    - When was the last time you used a land line phone
  - What was a key to this – Cellular Technology
- Internet
  - Who saw Internet and its impact evolving to today in 1993
    - We have information at our fingertips on smart phones
    - When is the last time you stamped a letter and mailed it or used a Fax machine?
    - When is the last time you went to a library to do research?
    - When is the last time you used a printed map?
  - What was a key to this – WWW Software, Computers and now Speed – Fiber Optics

Key Seminar Objectives

- Real-Time and IH Sampling
  - Defining Real-Time
  - Advantages
  - Key Elements in IH
- What is available today and what drove the changes – a trip back in time
    - Comparing 1980 to today
      - Understanding the technology drivers (internal and external)
- The Next Generation Platform
  - Understanding how all the pieces fit
  - How you and IH fit

Key Learning Objectives

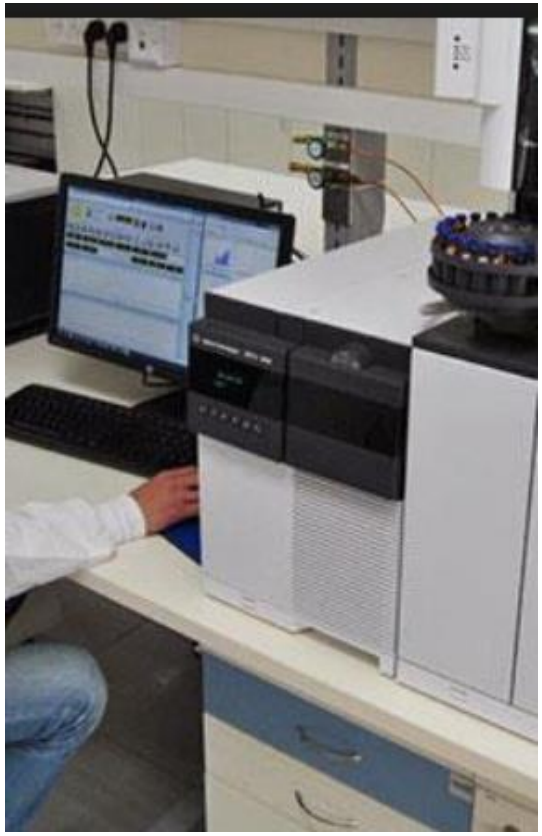
- Real-Time and IH Sampling
  - Defining Real-Time
    - Advantages
    - Key Elements in IH
- Understand what is available today and what to expect in the near future by
  - Looking back in time and examine how IH Real Time technology has advanced to today
    - The Regulatory Drivers
    - The Technology Drivers
- Gain insight to the Future of Real Time Technology and its impact on our daily activity
  - Projecting forward based on what we learned from looking back
    - The Regulatory Drivers
    - The Technology Drivers

REAL TIME and IH Sampling

- Real-Time is getting data results as they occur
  - Ex: Looking at your phone and checking the time

VS

REAL TIME and IH Sampling



- Sampling and waiting for results from a lab
  - Ex: Pulling air through a collection media, submit samples to a lab and receive the result at some specified TAT
  - A delay in data

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Advantages - The desire for real-time data

- If we took a survey, most of us would rather have instant access to valid data as needed vs waiting on results
  - Advantages
    - Simpler process with fewer potential errors
    - Trouble Shooting Tool
      - Instant evaluation of factors
    - Immediate corrective action
      - Immediate measure of corrective action working

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Key Elements for use of Real-Time Systems

- Regulatory Compliance
  - Devices should be accepted as “compliant”
    - Meet detection limits
    - Accuracy
    - Specificity
  - Screening applications may not require true “compliance”
- Performance
  - Devices have to meet “user” requirements
    - User Interfaces
      - Display
      - Data storage
      - Ease of use
- Cost Effective
  - Dependent on application

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Key Elements for Use of Real-Time Systems

- World Standards
  - Devices - Conform
    - Acceptance as a Standard against the Acceptable Goal
    - Becoming Global
  - Screening
    - Methods that assist in diagnosing or locating source(s) causing non-compliance

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Cost Effective

Model 405 nm NO_2/NO/NO_x Monitor™

Direct Measurement of NO_2 by Absorbance

FEM-Approved for NO_2 Compliance Monitoring

The Model 405 nm NO_x Monitor ("nm" for "nanometer" and for "NO_x Monitor") is designed for the direct measurement of atmospheric nitrogen dioxide (NO_2), nitric oxide (NO) and total reactive oxides of nitrogen (NO_x = NO + NO_2) in the concentration range 0-10,000 ppb (0-10 ppm) for NO_2 and 0-2,000 ppb (0-2 ppm) for NO with high precision and accuracy. In this instrument NO_2 is measured directly by absorbance at 405 nm. NO is measured by selective conversion with ~100% efficiency using the highly selective reaction of NO with ozone (O_3). Total NO_x is obtained by addition of NO and NO_2.

Rental: $1500/Week
Accurate - PPB
Real Time

Nitrogen Dioxide Gas Detectors (NO_2 Detectors)

Nitrogen dioxide (NO2) is an extremely toxic byproduct of the burning of hydrocarbons. Major sources of NO2 are internal combustion engines (diesel engines), and thermal power stations. Other sources of nitrogen dioxide include petroleum and metal refining, electricity generation from coal-fired power stations, other manufacturing industries, and wastewater treatment plants. Regardless of industry or application, Industrial Scientific offers a wide range of nitrogen dioxide gas detection instruments including the Tango™ TX1 and GasBadge® Pro single-gas detectors, the Ventis™ Pro Series, Ventis™ MX4, MX6 iBrid™ multi-gas detectors, as well as the Radius™ BZ1 Area Monitor.

Rental: $200/Week
Accurate – PPM, w interferences
Real Time

NITROGEN DIOXIDE / CAS# 10102-44-0

NOTE: All prices include media and free pump loan, unless otherwise noted.

Nitrogen dioxide	Nitrogen dioxide
FEE PER SAMPLE: $50.00	FEE PER SAMPLE: $50.00
Additional Analyte Fee:	Additional Analyte Fee:
METHOD: mod. NIOSH 6014, Colorimetric	METHOD: mod. OSHA ID-182, IC
ANALYTICAL TECHNIQUE: Color.	ANALYTICAL TECHNIQUE: IC
COLLECTION MEDIUM: Treated Molecular Sieve	COLLECTION MEDIUM: Treated Molecular Sieve
ORDER NUMBER: 226-40-02	ORDER NUMBER: 226-40-02
VOL / TIME / AREA / MASS: 1.5-6 L	VOL / TIME / AREA / MASS: 3.0 L
SAMPLING RATE: 0.025-0.2 LPM	SAMPLING RATE: 0.20 LPM
LOQ: 1.0 ug	LOQ: 2 ug

Rental: $50/Sample
Accurate - PPB
Lab Results

Key Seminar Objectives

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1980 vs Now for Total Particulate Area Sampling

- 1980 - Need pre-weighed filter from a lab that had a traceable balance, a lab where RH and temp are controlled and a means of generating a report and sending it to us. So let's go through the steps
    1. Filter arrives from lab – careful do not contaminate.
    2. Make sure our pump is charged in order to do the sampling for our duration (batteries were light years behind technology at this point vs. where they are today, rechargeable)
    3. Get out your calibrator – a rotameter or even worse blah blah blah
    4. Now run the sample as is designed.
    5. Complete your sampling event –
    6. Fill out your chain of custody on a piece of paper that has headers and rows
    7. Drop off or ship the chain, samples, blanks etc to the lab
    8. Lab needs for 48 hour equilibration of filters
    9. Lab uses balance and QA process to generate the data – total particles per volume.
    10. Important to note there is no size fraction done at this time although we could have added a device to do that but it adds a severe level of complexity
    11. Lab gets the data done and QA checked and is ready to send you your report – BY FAX(maybe FedEx) if in a hurry or by mail if not.
    12. You now have a report with data you can transcribe into your report with your typewriter.

- Now - This time Real-Time.
    1. Make sure instrument is calibrated
    2. Make sure unit is charged
    3. Turn power button on
    4. Take readings near instantly
    5. Download data for document with multiple points of data

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1980 vs Now - Confined Space

- 1980 - Ok there are some Oxygen meters and a squeeze bulb explosivity meter – two devices – O2 meter and a Sniffer which you squeeze the bulb. No real way to measure CO and H2S. Odor was the last piece.
    1. Make sure instruments are calibrated
    2. Make sure unit is charged
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    4. Take readings prior to entry
    5. Have an attendant keep an eye on occupants

- Now – Automated Web Based Automation Chargin and Calibration station. Datalog auto
    1. Turn power button on
    2. Automatic pump turns on and you can drop sampling hose into environment. Take readings instantly including H2S and CO.
    3. Take Readings prior to entry and allow to run the entire time of entry.
    4. Now there are remote monitoring that allows for remote attendants.

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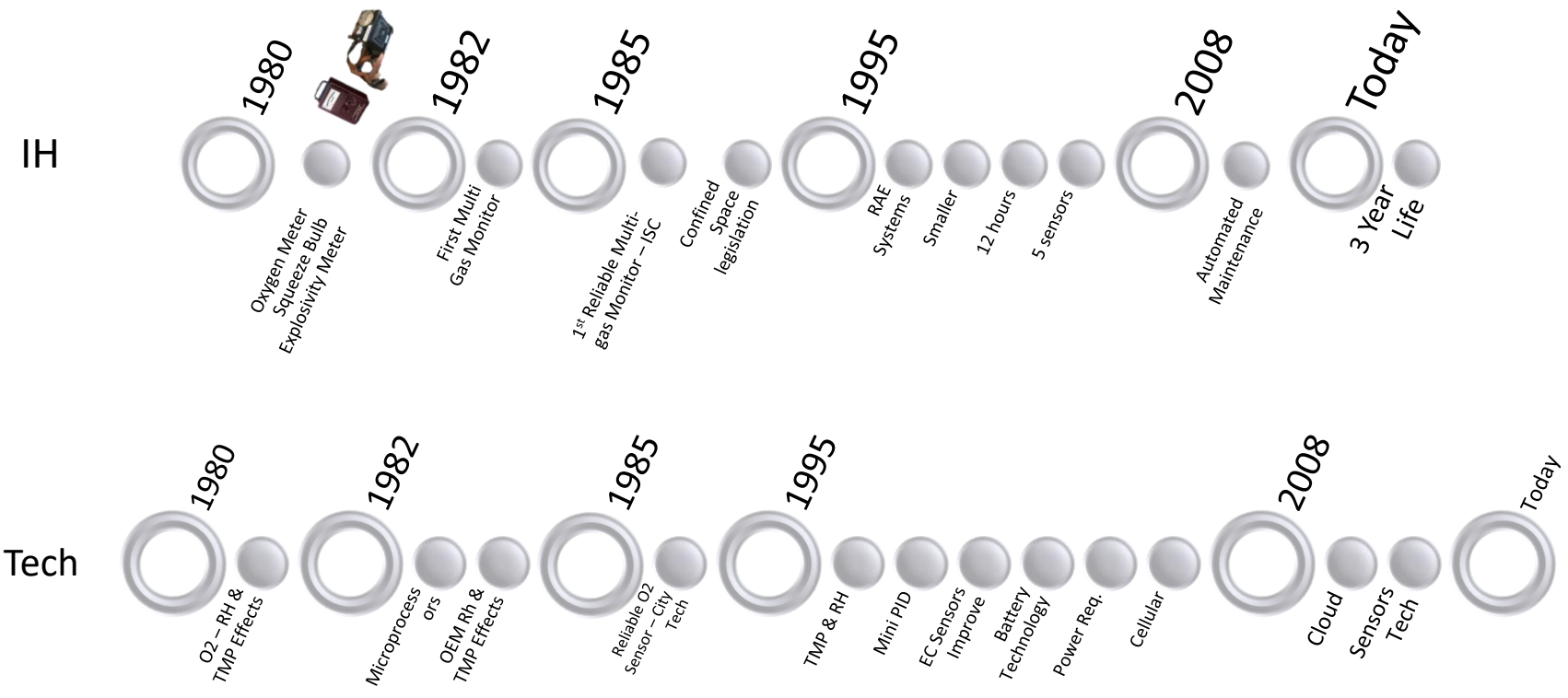
Particles and Confined Space



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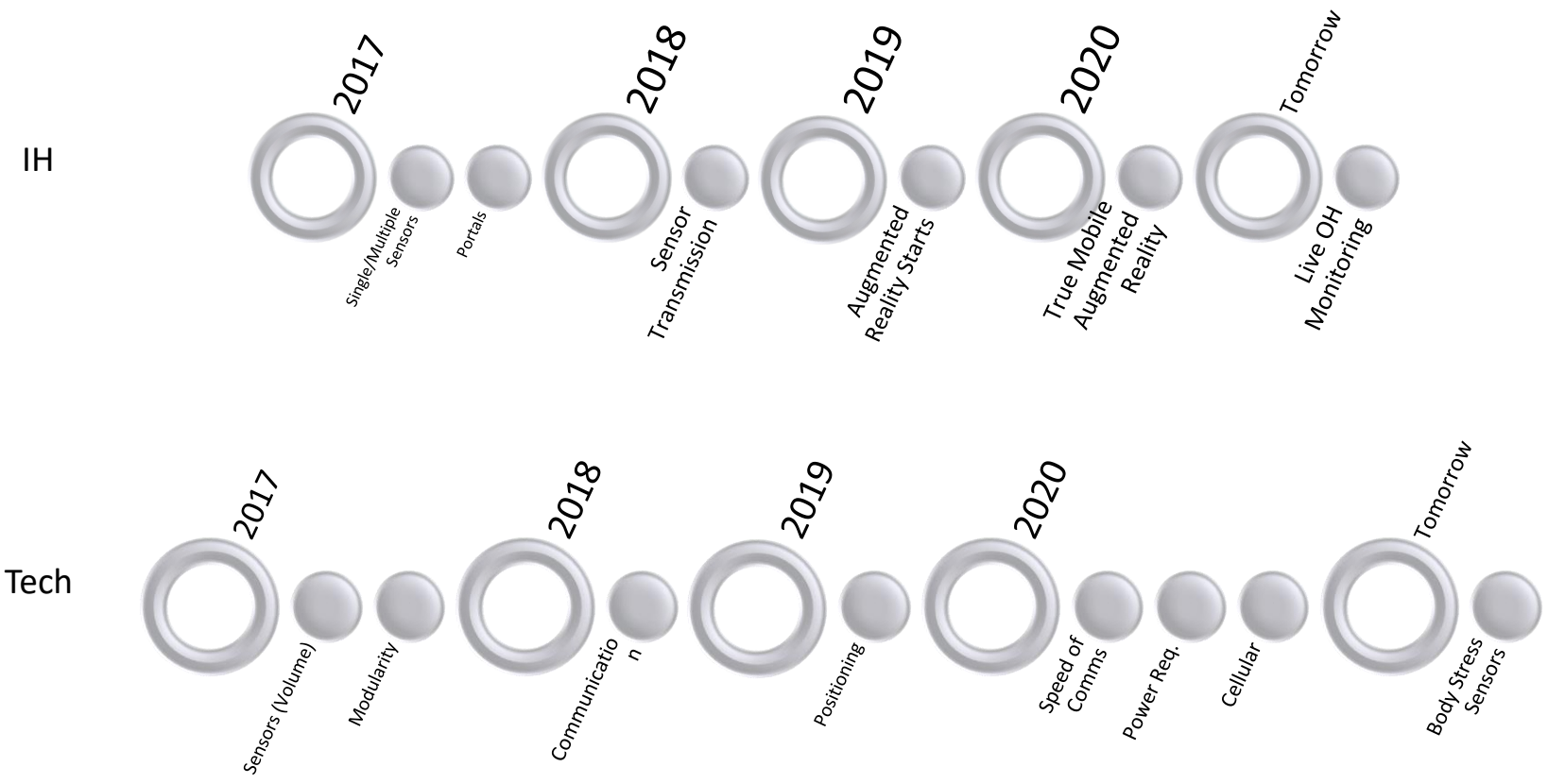
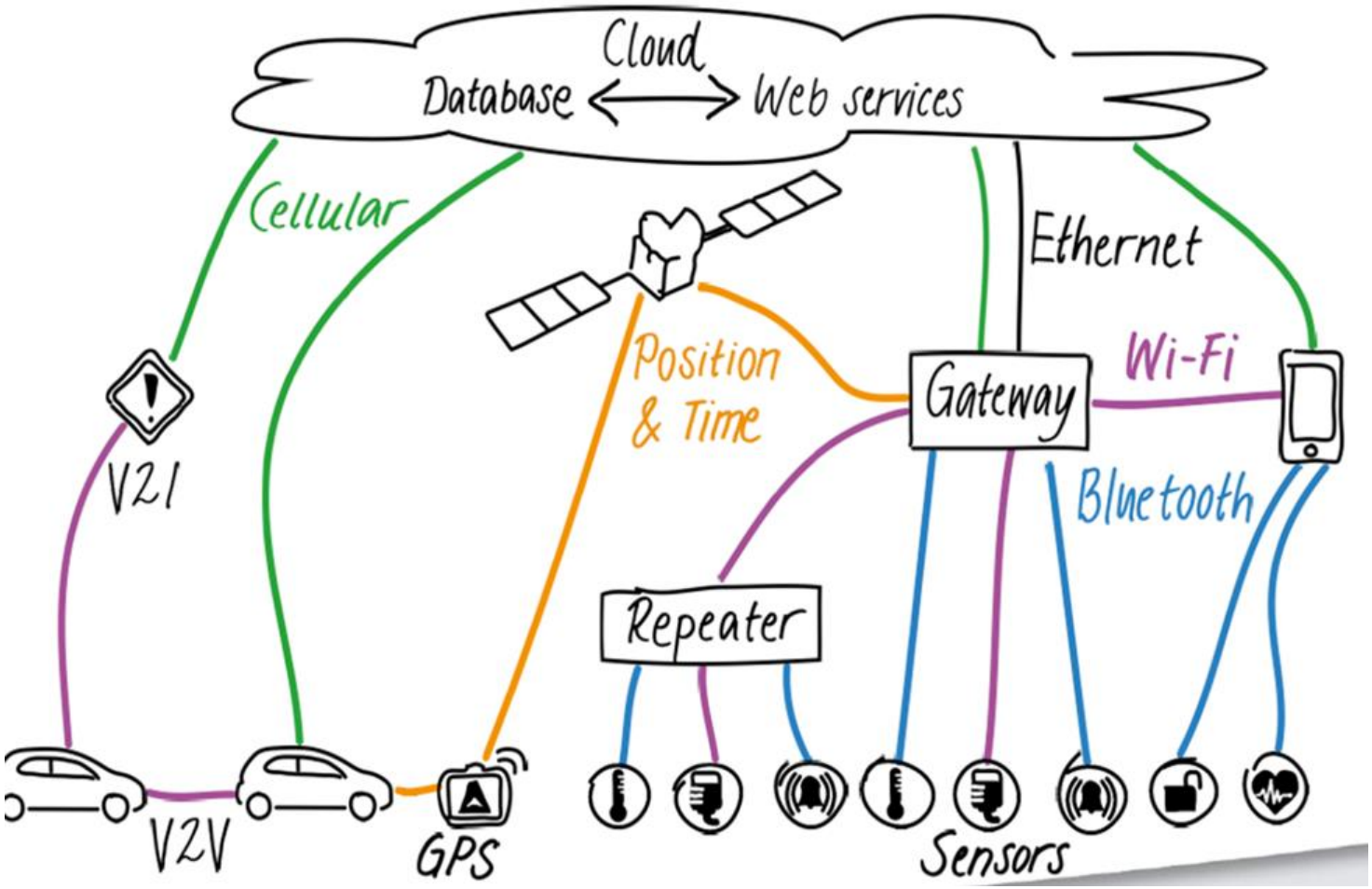
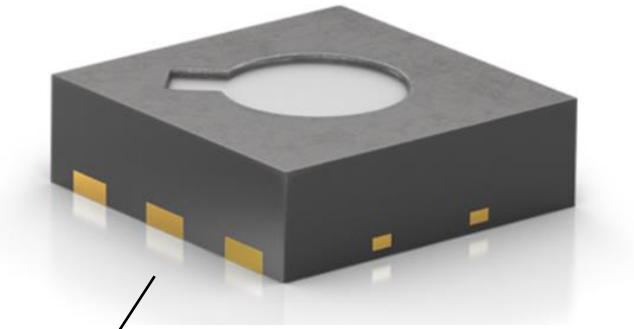
Projecting Forward

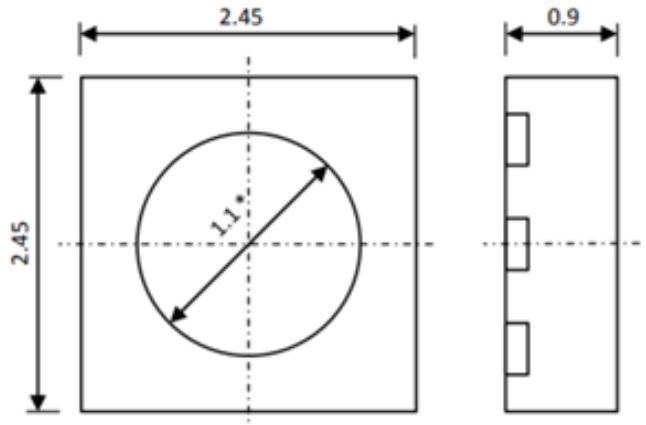


Cloud Connect



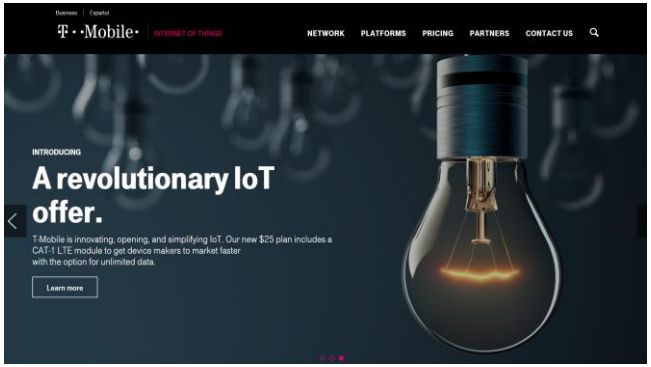
Sensors





Modularity

Communication Ignites the Fire



Optimized, single-mode LTE category 1 connectivity solution certified for use on the Verizon Wireless network

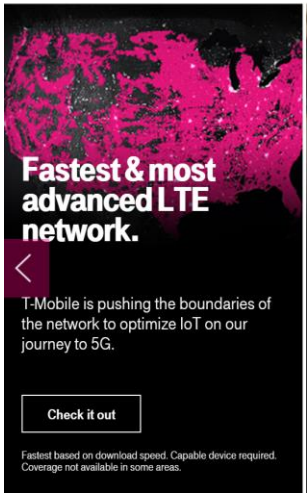
The VZ120Q EZLinkLTE module is the first, all-in-one, single-mode LTE category 1 (CAT 1) module certified compliant with Verizon Wireless Open Network specifications, operating on LTE bands 4 and 13. VZ120Q is based on Sequans CAT 1 Calliope LTE Platform, a member of Sequans' StreamliteLTE™ family of LTE chipset products for the Internet of Things. It can be easily paired with a GNSS solution for asset and IoT tracking. VZ120Q comprises Sequans' Calliope LTE Platform and all other elements necessary for a complete LTE modem system. These include an LTE-optimized transceiver, a complete dual-band RF front-end for bands 4 and 13, key interfaces, all in a single compact package. VZ120Q also includes Sequans' carrier-proven LTE protocol stack, an IMS client, and a comprehensive software package for over-the-air device management and packet routing. VZ120Q supports VoLTE and is compatible with Linux, Android, Windows and a wide range of embedded and real-time OSes.

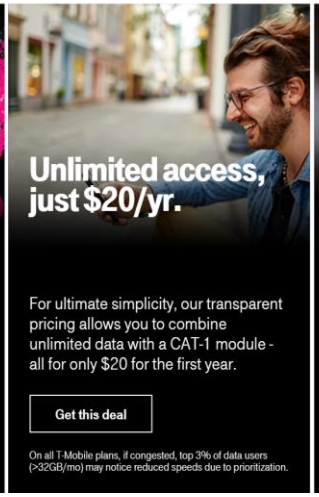
Applications

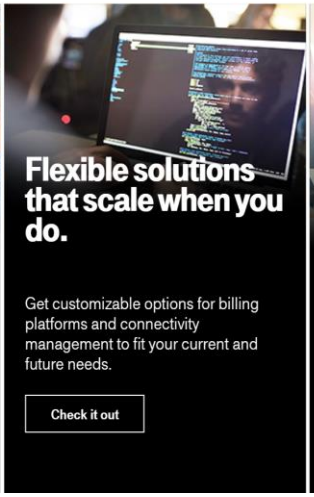
CERTIFIED VERIZON WIRELESS

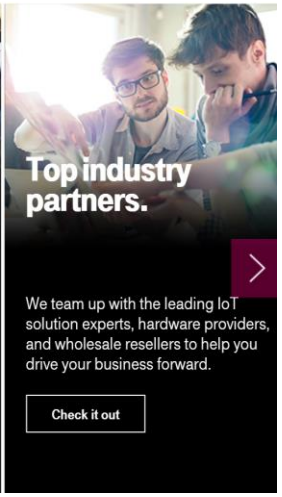
BUY AN EVALUATION KIT TODAY!

Changing the IoT game on the best network for data.





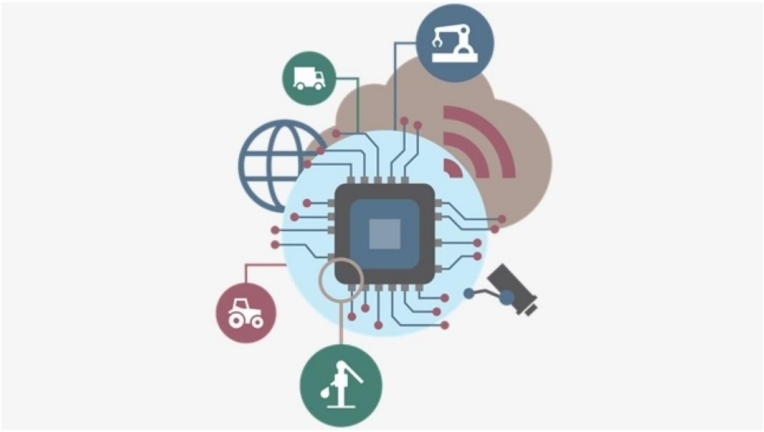




Communication

Verizon launching nationwide LTE Cat M1 network for IoT

by *Monica Alleven* | Mar 30, 2017 11:55am



Cat M1 is a new class of LTE chipset designed for sensors. Image: Verizon

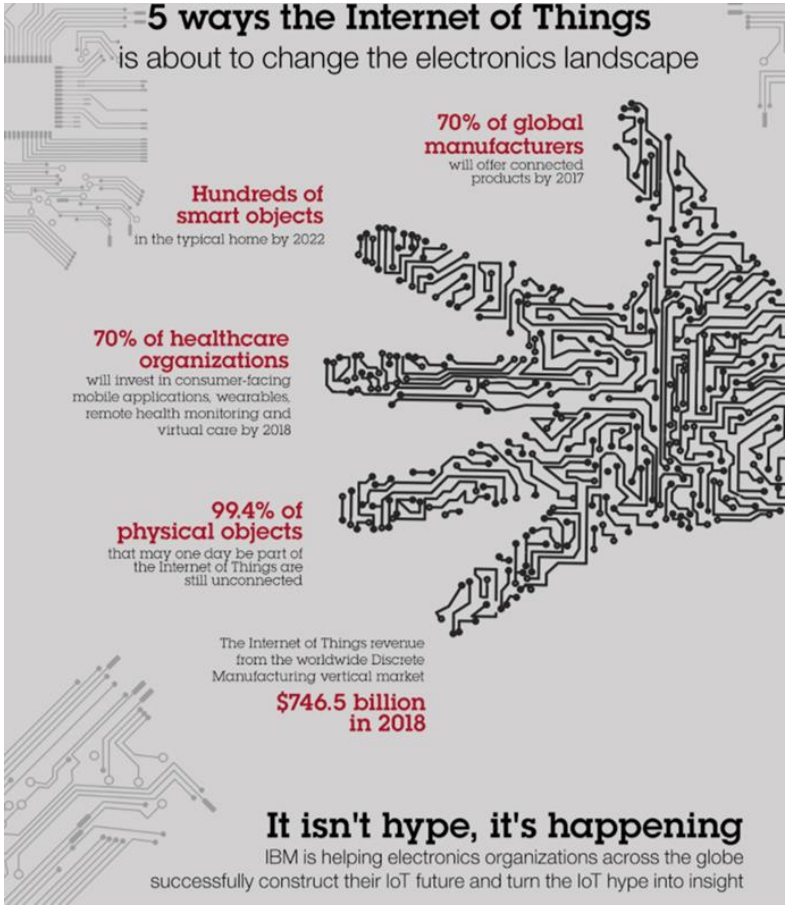
It's no longer about when LTE Category M1 will be widely available. Verizon announced that it will launch the first nationwide commercial 4G LTE Cat M1 network tomorrow.

It's a game changer, according to the company, representing a new class of LTE chipset designed for sensors running on data plans as low as $2 per month per device, with customized options available for bulk activations and volume purchases.

Now

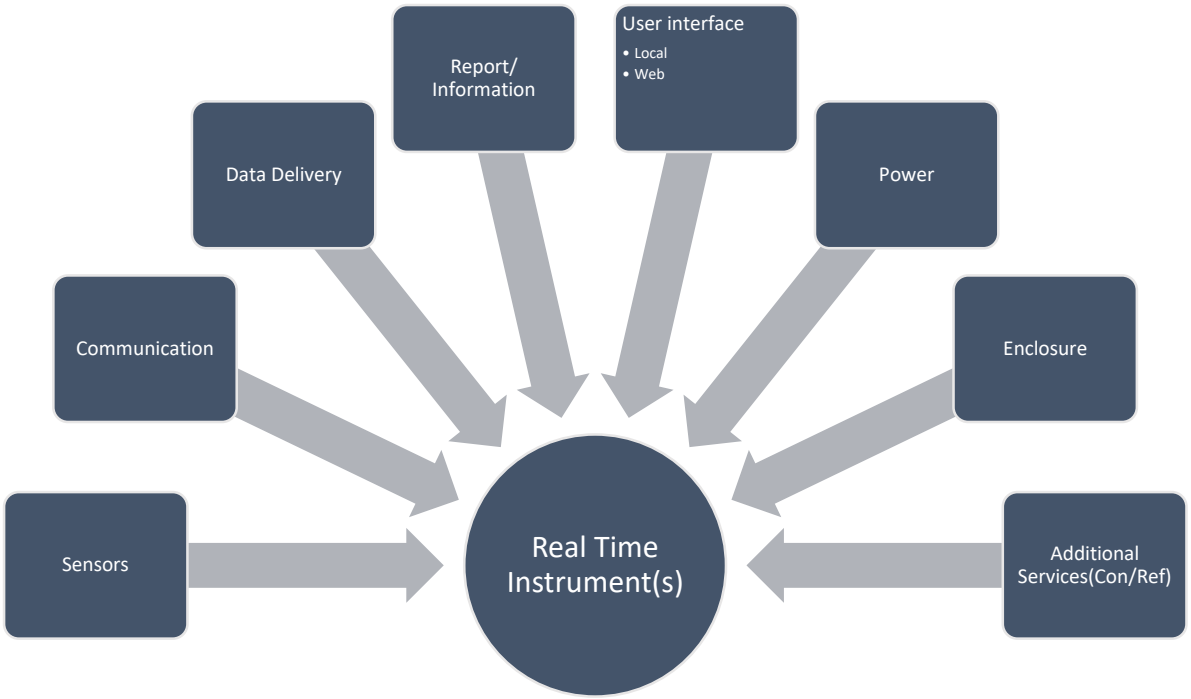
3-5 years
5G

The Volume


5 ways the Internet of Things
is about to change the electronics landscape
70% of global manufacturers
will offer connected products by 2017
Hundreds of smart objects
in the typical home by 2022
70% of healthcare organizations
will invest in consumer-facing mobile applications, wearables, remote health monitoring and virtual care by 2018
99.4% of physical objects
that may one day be part of the Internet of Things are still unconnected
The Internet of Things revenue from the worldwide Discrete Manufacturing vertical market
$746.5 billion in 2018
It isn't hype, it's happening
IBM is helping electronics organizations across the globe successfully construct their IoT future and turn the IoT hype into insight

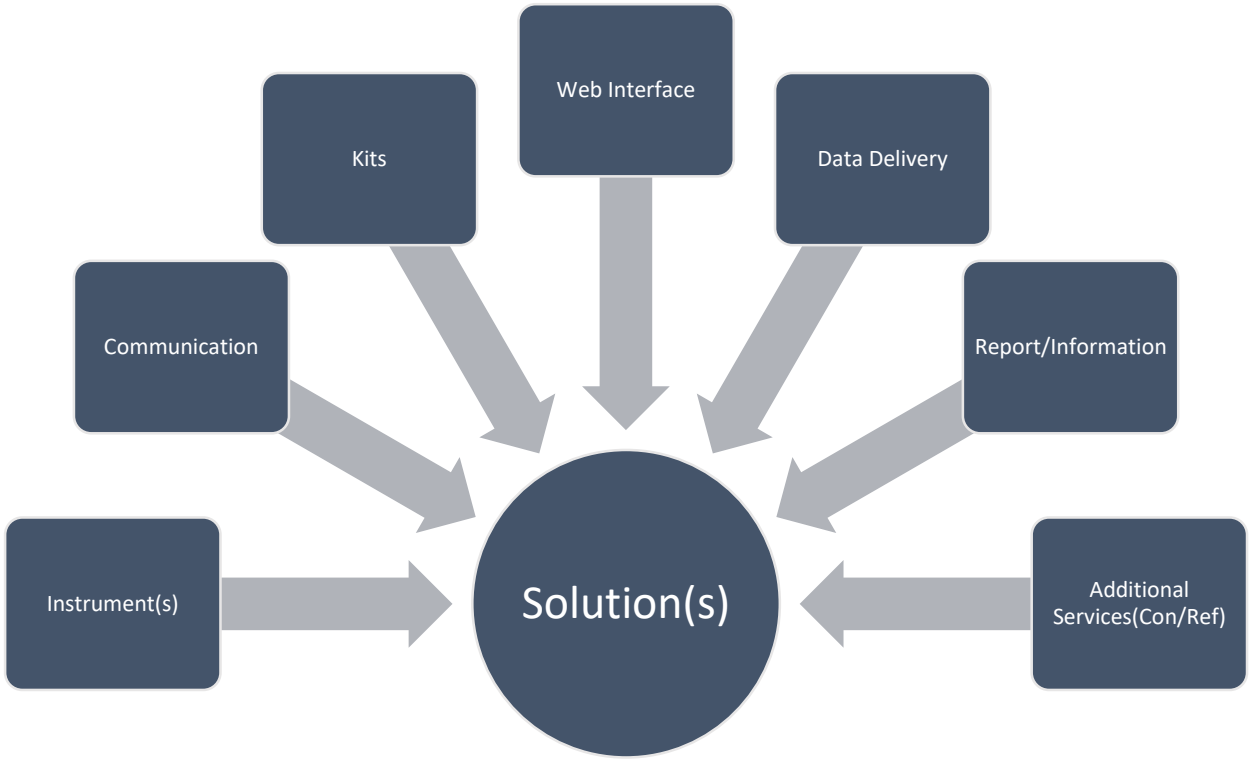
Real-Time Solution Design Elements:

Product development process - each one of these needs to be studied

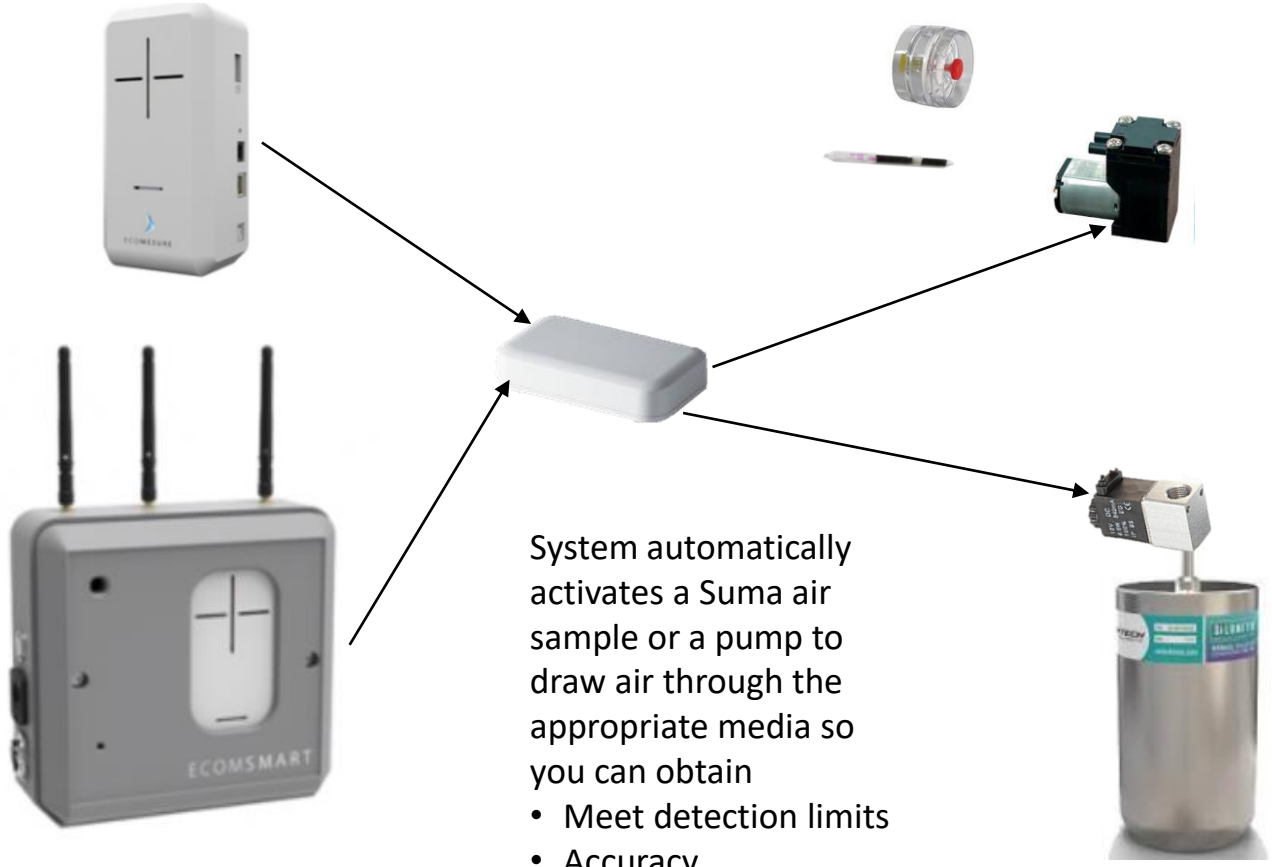


Product/Service Design Elements:

Business model process - each one of these needs to be detailed



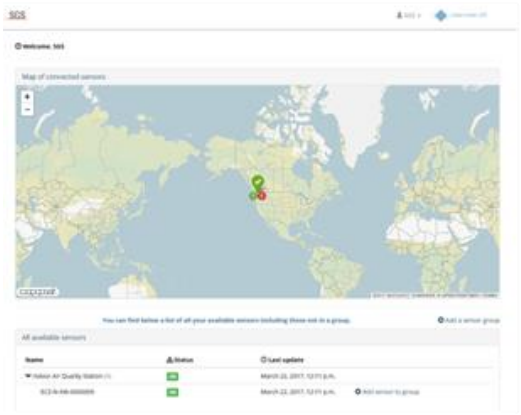
Perhaps Best Solution is a Combination of Real-Time and Sampling Kits

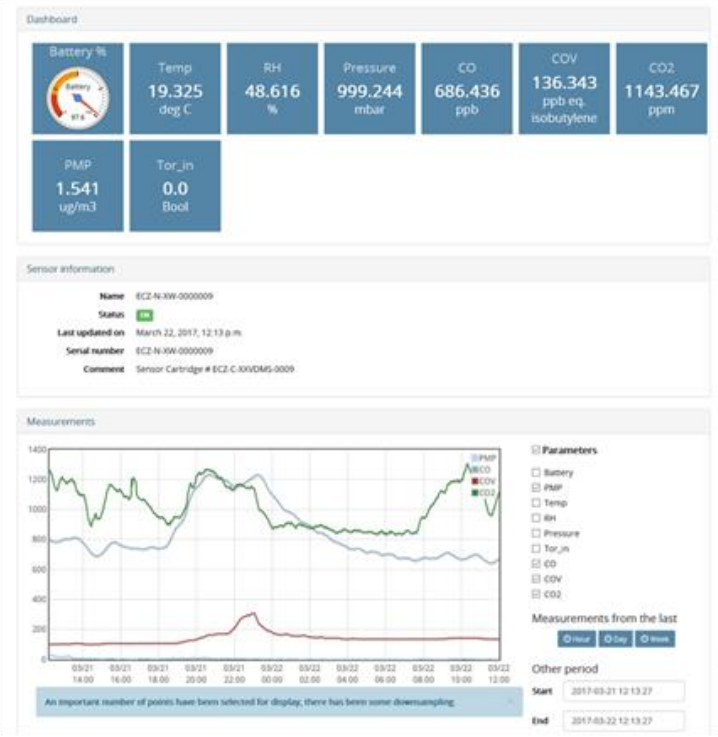


System automatically activates a Suma air sample or a pump to draw air through the appropriate media so you can obtain

- Meet detection limits
- Accuracy
- Specificity

User Interfaces





More Information

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