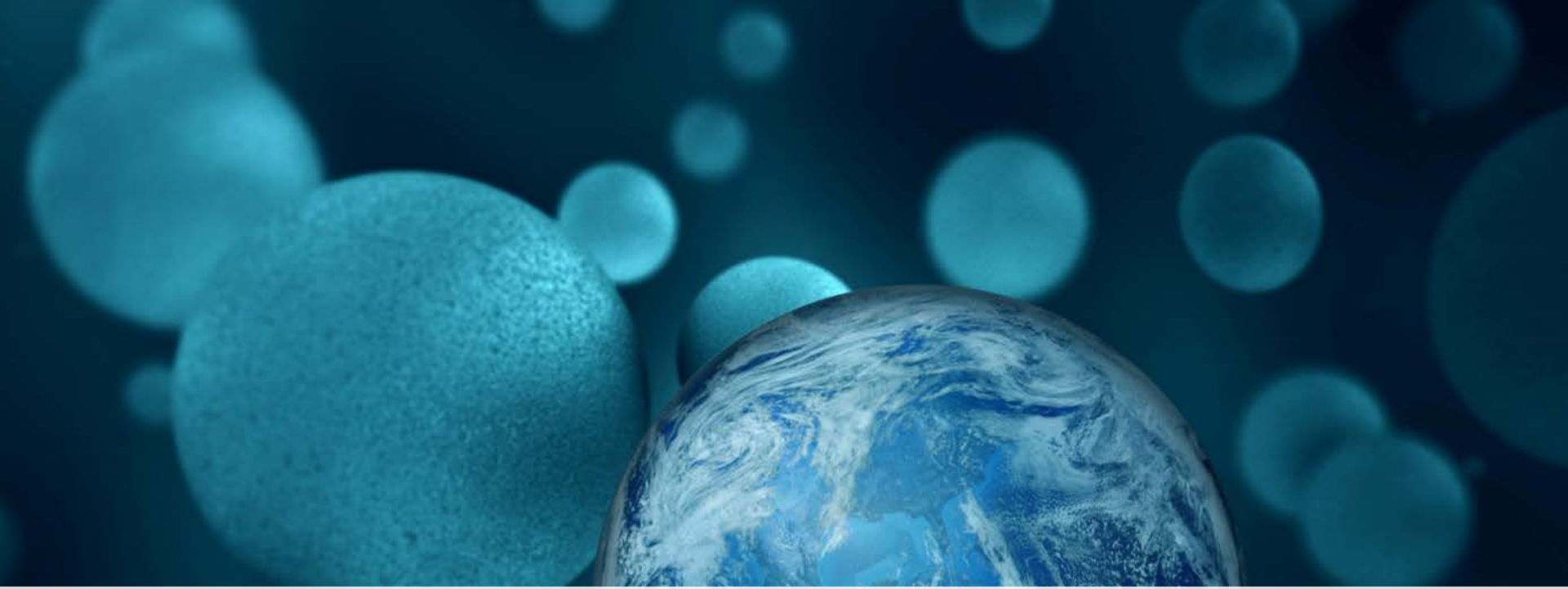

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Monitoring Solutions in a Mobile World

INPO/NSA Innovation Expo

Rich Palatine

5/22/18

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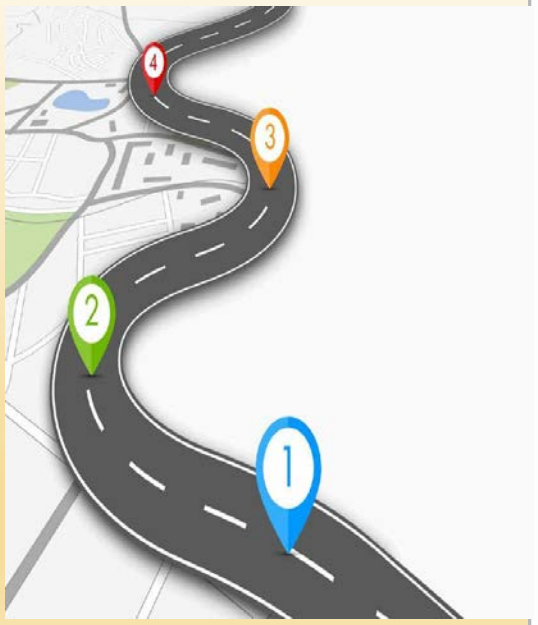
Presentation Roadmap

Monitoring Solutions in a Mobile World

- Monitoring Solutions in US Nuclear Industry: Past/Present/Future
- **Thermo Fisher's Approach in RP/ALARA and EP**
  - ❑ Portable Sensors
  - ❑ Communication Hardware Review
  - ❑ Monitoring *Systems* ---Choices

Reviewing Industry Examples and Customer Uses



- ❑ Questions?????

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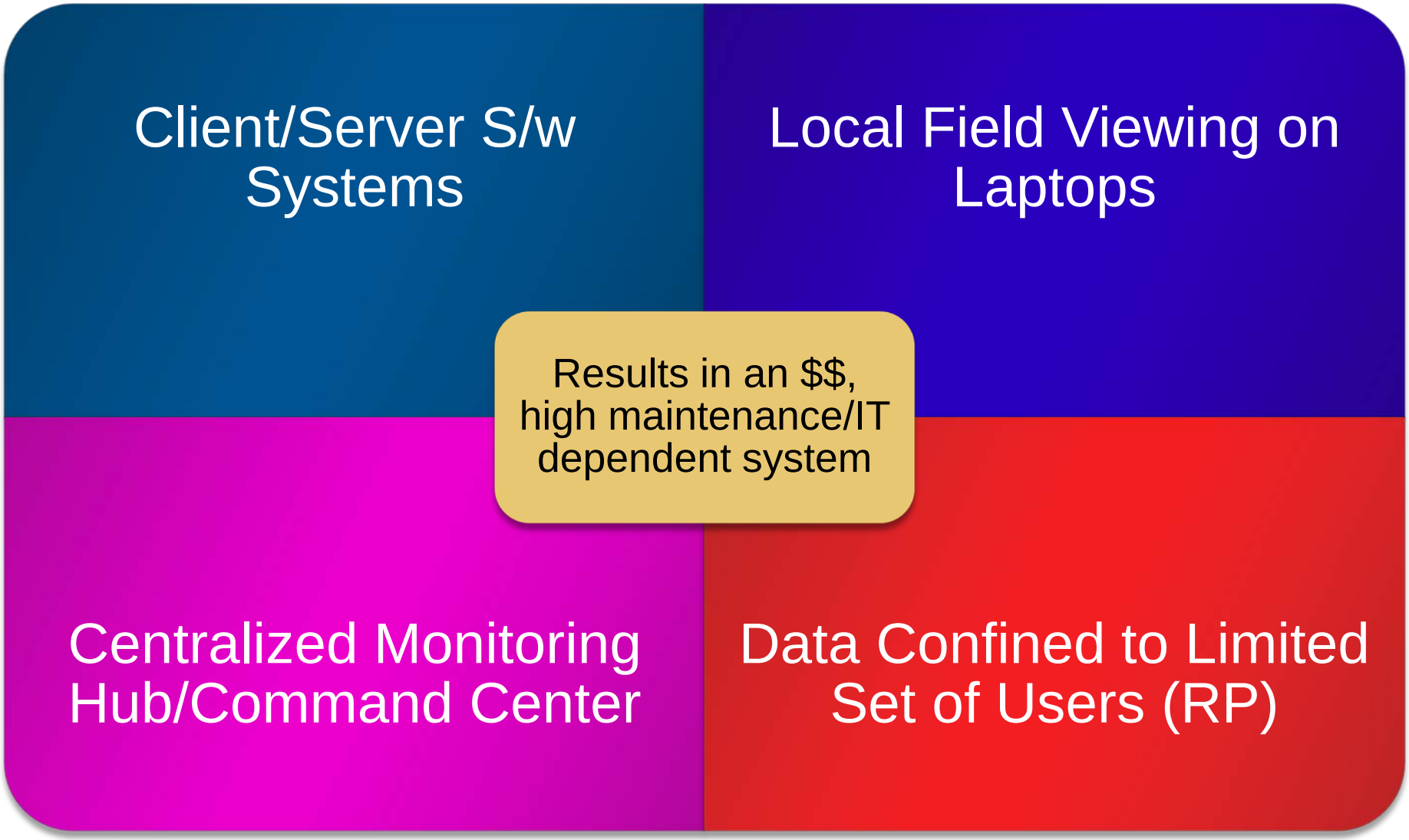
RP Monitoring Solutions In the Past



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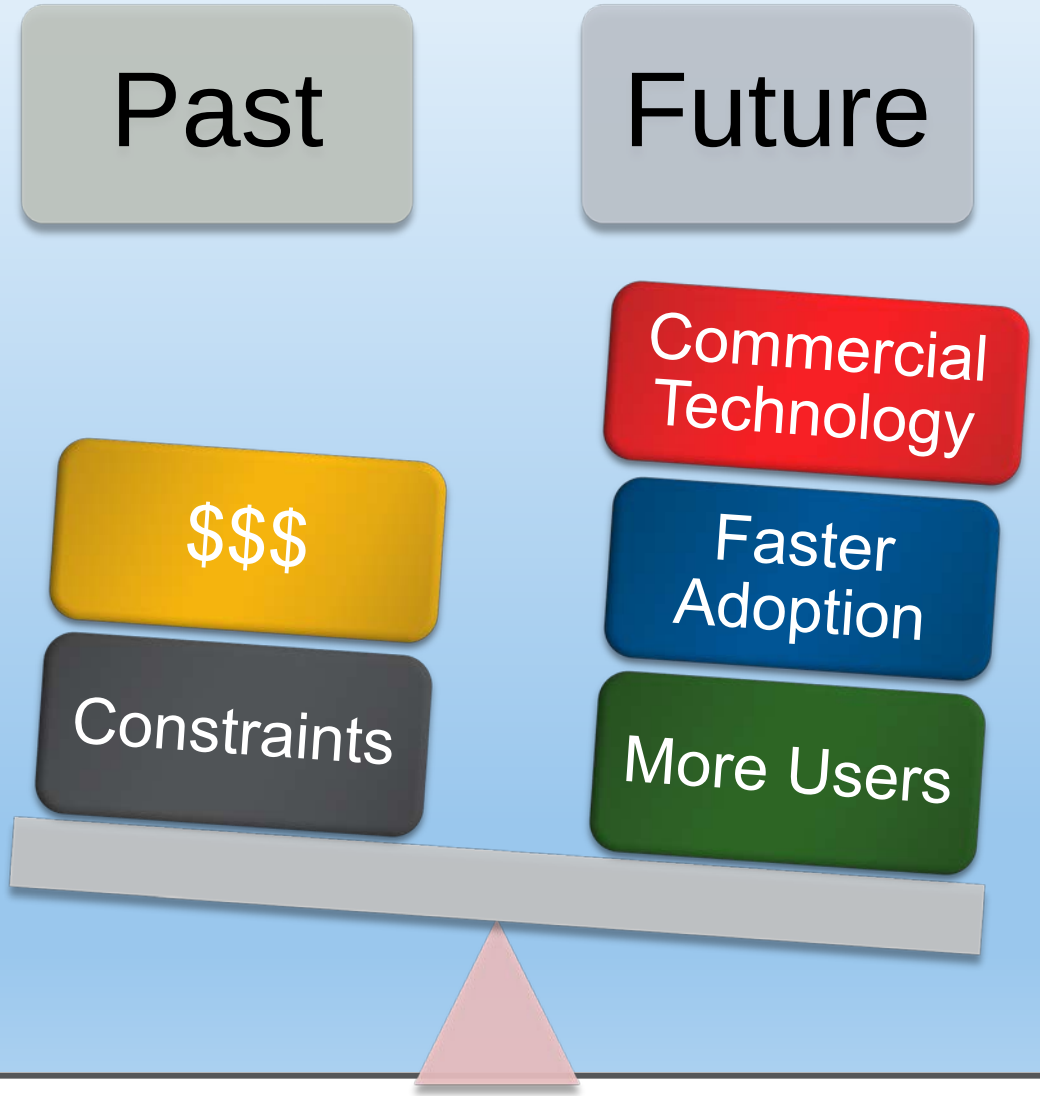
Present/Future of Monitoring Solutions at NPP's

Leverage Same Technology as use in our 'Everyday Lives'



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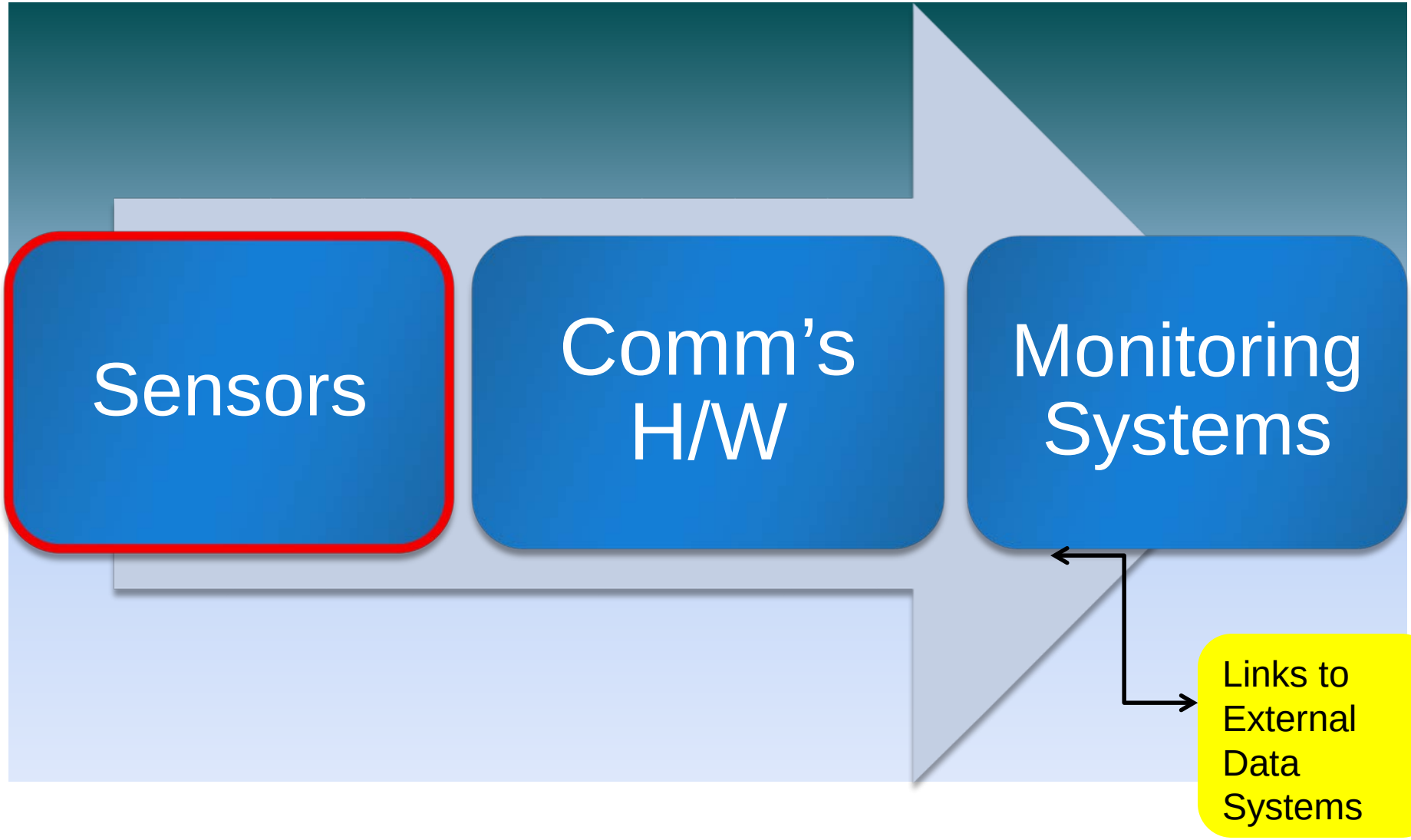
Monitoring Solution Platform --Starts w/ Game Changing Sensors



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Rad Eye B20 Portable Frisker

‘Game Changing’ Characteristics

- Beta/Gamma readings; one instrument; Dual Function: Dose Rate and Contam
- Light Weight, Transport on belt
- Bluetooth Comm’s, Leverage the App or Plant Wifi
- Vehicle Surveys on Pole

Benefits

- Save Major Capital $$$, one instrument takes place of two!
- Eliminate Large Service Budgets as Reliability and Ease of Calibration Save $$$
- Multiple Departmental uses: EP, RP, Rad Waste

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TVA Sequoyah *Major* user of B20 for 5+ years

Feedback:

- ✓ Great Acceptance with Rad. Tech's –cite portability, one-handed use
- ✓ Instrument Support; minimal, no significant repairs to speak of
- ✓ Reduce # of instruments in inventory
- ✓ Assign to each technician; personal responsibility

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TVA Sequoyah B20 ER Decisive Points

"We chose the B20 because of the size, technology, and its use of the H10 filter.

One of the reasons our managers chose this meter is the 2 in 1 function ---- It is a dose rate meter and a frisker."

---Daniel Portwood ---Sequoyah RP Instrumentation Department

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Game Changing Neutron Monitoring: Rad Eye (NL)

- PORTABILITY AND SAFETY DRIVERS Much Lighter than traditional Rem Ball N meters; Eliminate Safety Hazard of climbing, etc!
- Add Rad Eye G and get N and Gamma readings w/ 1 Hand!
- Easy to Calibrate; H3 Detector
- Easy to use Neutron Moderator; Boron Moderator Disc and Cover Plate to minimize effect of lower energy scattered neutrons
- ~98% accuracy from straight on position; ~90% accuracy from sides
- Same size and weight as traditional RadEyes

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Duke Power Neutron Instrumentation Test Cart at CR3 ISFSI

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Duke Power Neutron Instrumentation Test Cart in front of ISFSI

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Neutron Instrumentation Cart w/ CR 3 ISFSI in Background

- i

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Duke Power Rad Eye NL Study Conclusion

Device	Neutron DR - µrem/h
Nested Neutron Spectrometer (NNS)	35
REM500	39 (2-hr integration)
DMC2000GN	31 (6.5-hr integration)
Thermo Rad Eye (CF 0.35) (mRem/hr/cps)	40
TLD average	35 (6.5-hr integration)

Reproducible, Fast Response, Simple, Mobile, & Response Mimics Moderated Cf (Stable)

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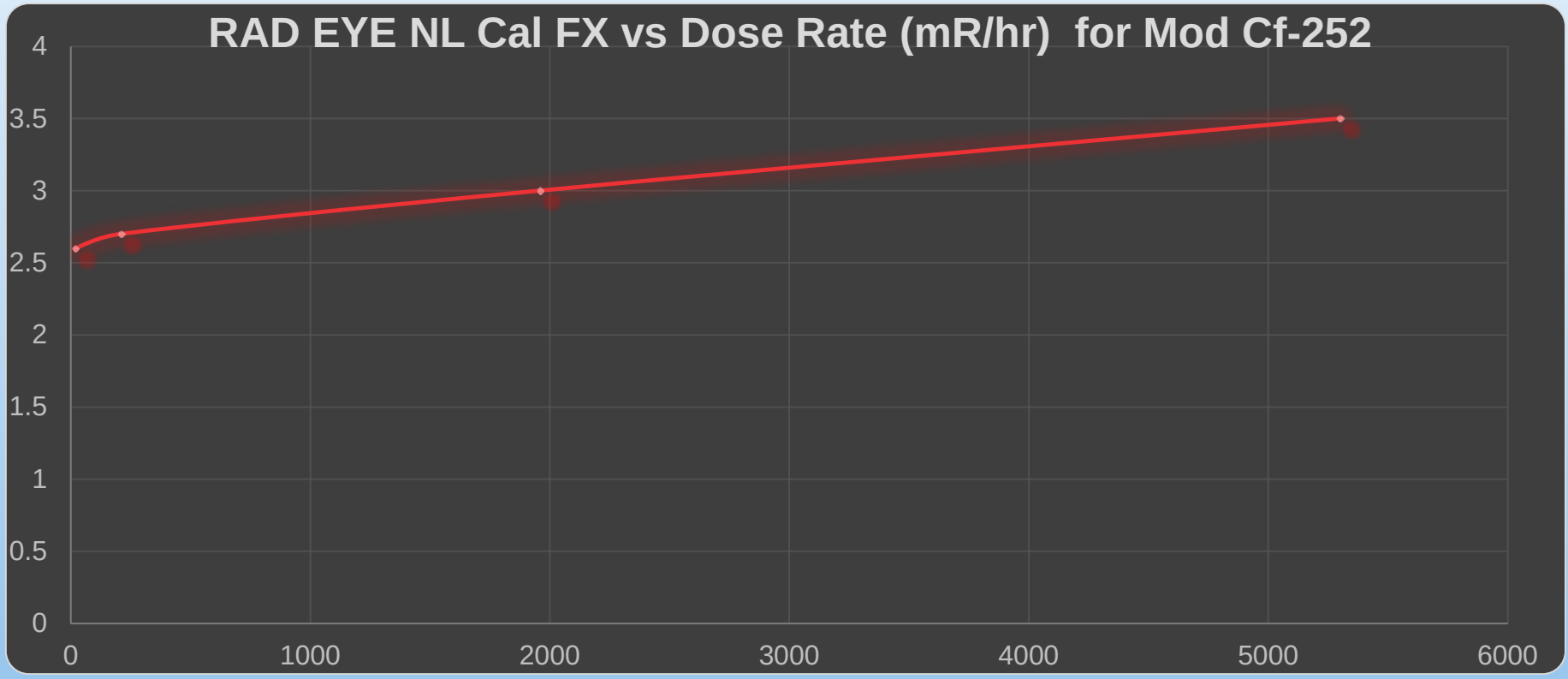
Rad Eye NL Cal FX vs Dose Rate for Mod Cf Source



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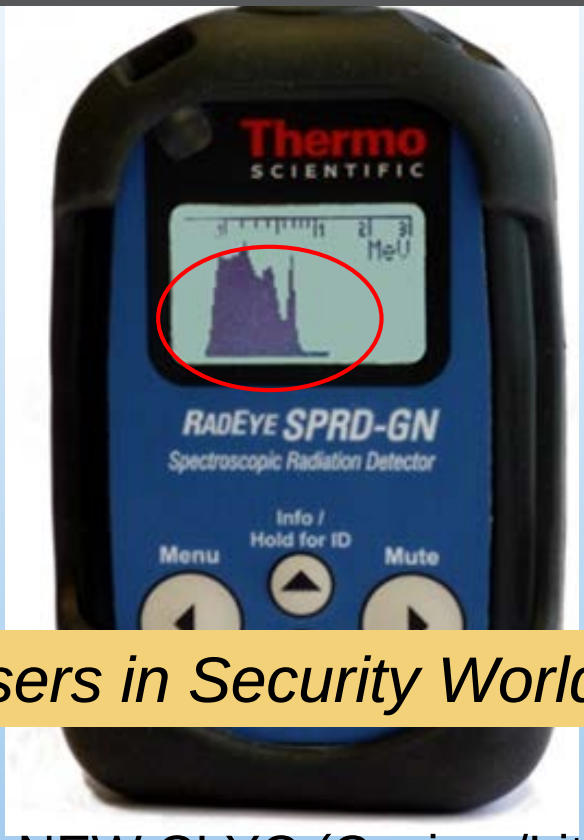
NEW STATE of ART TECHNOLOGY; Rad Eye Isotopic (GN)



Many Users in Security World …….Looking for NPP's to Demo

- Uses NEW CLYC (Cesium/Lithium/Yitrium, Chloride) Detector for Gamma + Neutron
- Full Isotope Identification capability
- Count rate, Dose Rate or Isotopic Mode

Mobile, Portable Solution for WHY is the Contam Monitor Alarming????

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EP (….and RP OPS) Portable Gamma ID ……. Rad Halo:

- 2 Models: Remote (RDP) and Fixed Boundary
- Portable (Mobile) or Permanent Mounting (Perimeter/ fence line Monitoring)
- Wide Range Gamma Dose Rate Detection:
- -5 uR/hr to 1000 R/hr
- Rapid Gamma Isotopic Analysis; Large Library: Verify Mix/Assumptions
- Weatherized and Waterproof; Rugged
- Long Battery Life: ~60 hours of charge
- GPS Location
- ‘Comm’s Friendly’: GSM, 2.4 GHz, Wifi, LAN
- Multiple S/w interfaces to match need/use

Simple, robust and flexible environmental monitoring tool

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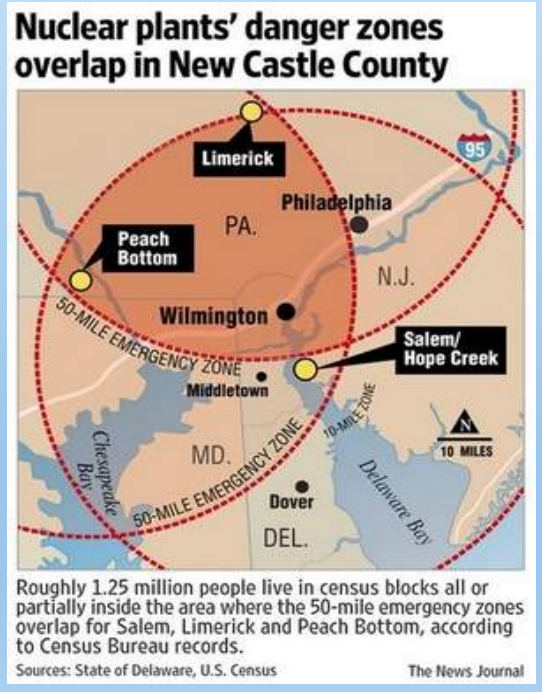
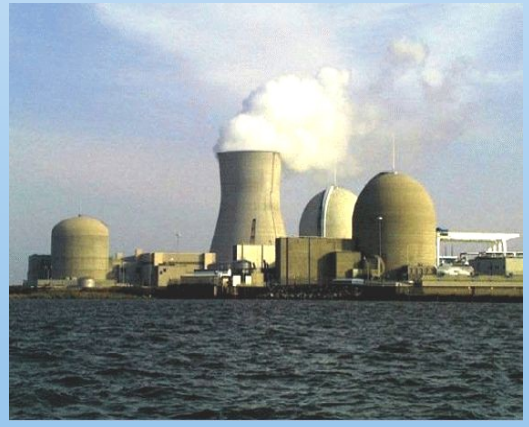
Rad Halo NPP Industry Users

- ✓ 2 State Agencies using Multiple Deployed Rad Halos
- ✓ AZ (Palo Verde) and Delaware (Salem HC)
- ✓ Using w/ Remote DNA Monitoring S/w for NPP EP
- ✓ Provides MOBILE SMART Device compatibility AND Command & Control Monitoring





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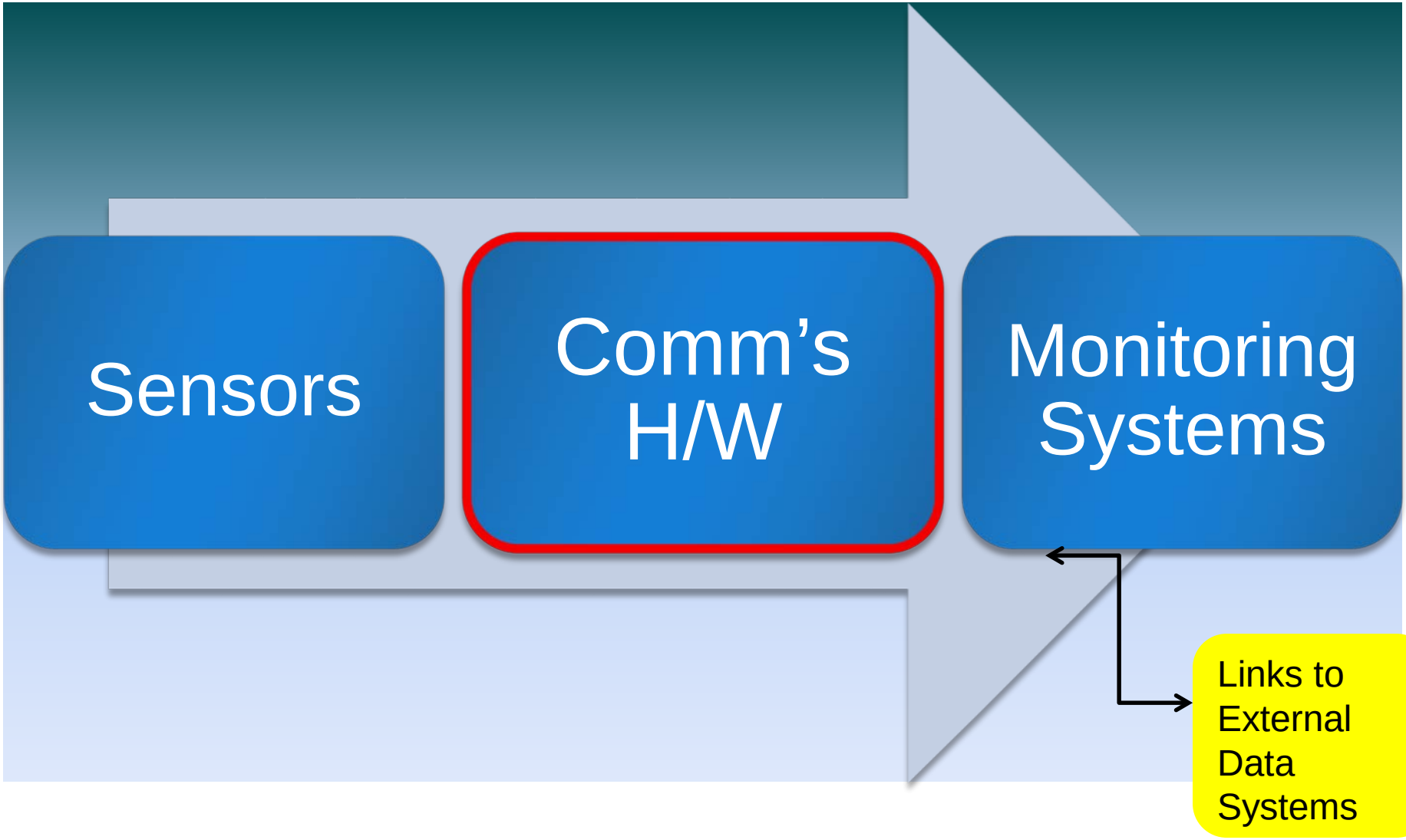
Monitoring Solution Platform –Getting Data from A to B!



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Use Commercially Available *Comm's* Technologies to Xfer Data

- "*The statistic depicts the mobile phone user penetration in the United States from 2012 to 2018. In 2016, the mobile phone user penetration rate in the United States was at **80.9 percent**. The number of mobile phone users in the United States stood at more than **260 million** in 2016" ---- Google 2018*

- "***85%** of companies have made **WiFI** networks a key focus area over the last 12 months. …….Wi-Fi hotspots will be key for the development of data applications and services"*
- *----World WiFi 2018*

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NPP Sequoyah Rad Eye APP: Bluetooth Update to Phone

- Rad Eye Fitted with Bluetooth Update to Windows Phone/Tablet
- Utilize Bluetooth Back + Phone/tablet
- IOS and Android App now available
- Reachback/Telemetry back to Software via GSM Cell Phone
- Compatibility with I Watch

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TVA Sequoyah Applications of Rad Eye + BT/Phone/Watch

Feedback/Value Propositions

"The functionality of the application on the phone is great";

- ✓ Like the readout and the event log
- ✓ Store data/look back at when taking the survey (historical)
- ✓ The watch is an added bonus now!!!
- ✓ Watch Alerts you when there is an alarm/event on the meter;
- ✓ Subtle improvements still, but Thermo's got it close to what we need! ----*Daniel Portwood*

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Link 2 Display Controller (SMART VDU)

- ✓Live-time data displayed on any sized display (HDMI)
- ✓Data ‘Boxes’ or Map
- ✓Interface with Thermo Wireless (VP SAT, CNET) and Mirion (WRM) wireless platforms
- ✓Direct/wired options
- ✓Integrated Wi-Fi, and Bluetooth Connectivity
- ✓110 V AC Power
- ✓Color-coded Alarms

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US Navy Deploys Smart VDU (Norfolk, Pugent Sound NSY's)

Feedback/Value Propositions

- ✓ Able to set up FAST/LOCAL (non-IT needed) ALARA Data Displays
- ✓ Workers and Management View Data Easily
- ✓ Large Screens at Low Dose Staging Areas (64" monitors)
- ✓ Inexpensive (<$1500/unit)
- ✓ Monitor EPD's + WAM Area Monitors
- ✓ Maps and Data Displayed
- ✓ **REQUIRES NO IT!**

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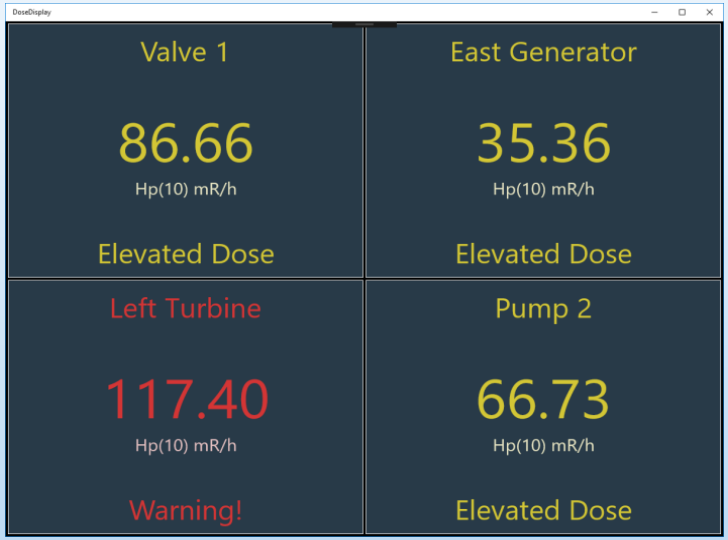
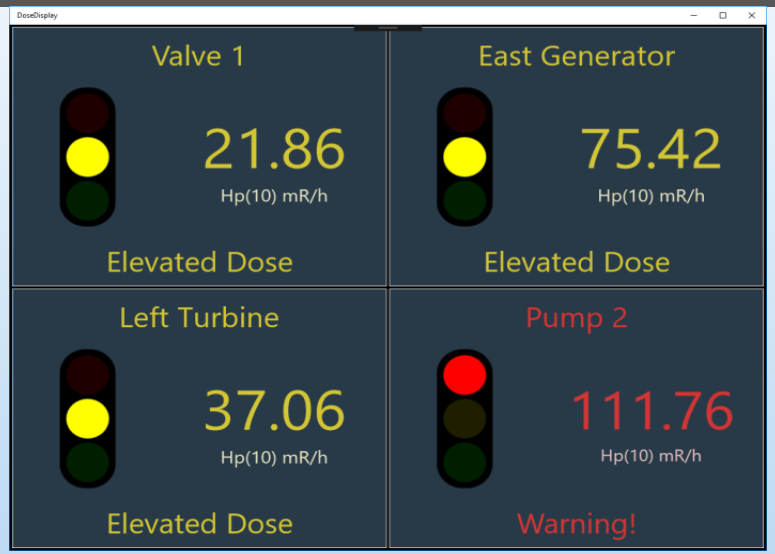
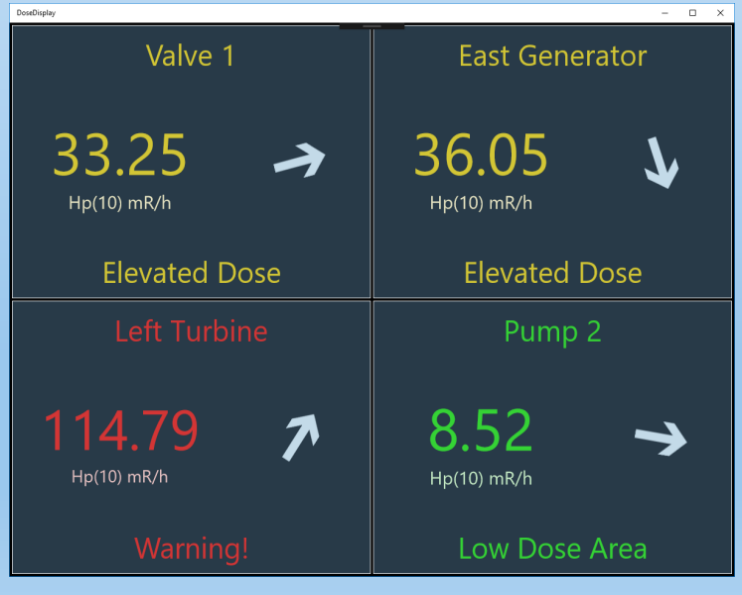
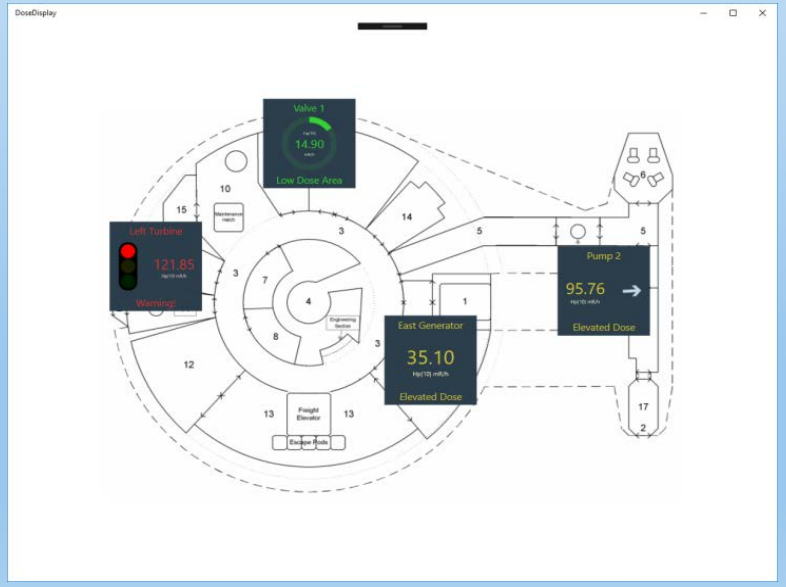
Link 2 Display Controller (Smart VDU) –Display Options









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Monitoring Solution Platform: The Power (VALUE) is in UI!

Use Systems that use Mobile Access (phones, tablets)
DRAMATICLY DRIVE VALUE!!

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TVA Sequoyah's View/Vision of Mobile User Interface

- Use Phone App to provide data read out and Alarm/Event log
- Capable of Storing Data on phone
- I Watch is an 'Upside" bonus

The future of User Interfaces/Monitoring Platforms

…"The next phase would be storage of the data to a cloud or our survey data system (VSDS)".

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Remote DNA Software

- Web-based; or Site hosted; Secure Data Management
  - Easily Monitor Specific Data (sensors) both Live Time and Historically
  - Monitor Remote Sites across large geographic areas (country/world) from remote location
- Able to Customize Screens
- Configurable ALARMS
- SMS, E-mail updates via any mobile device
- Remotely view from any Mobile Device
- Integrates to Dose Assessment S/w

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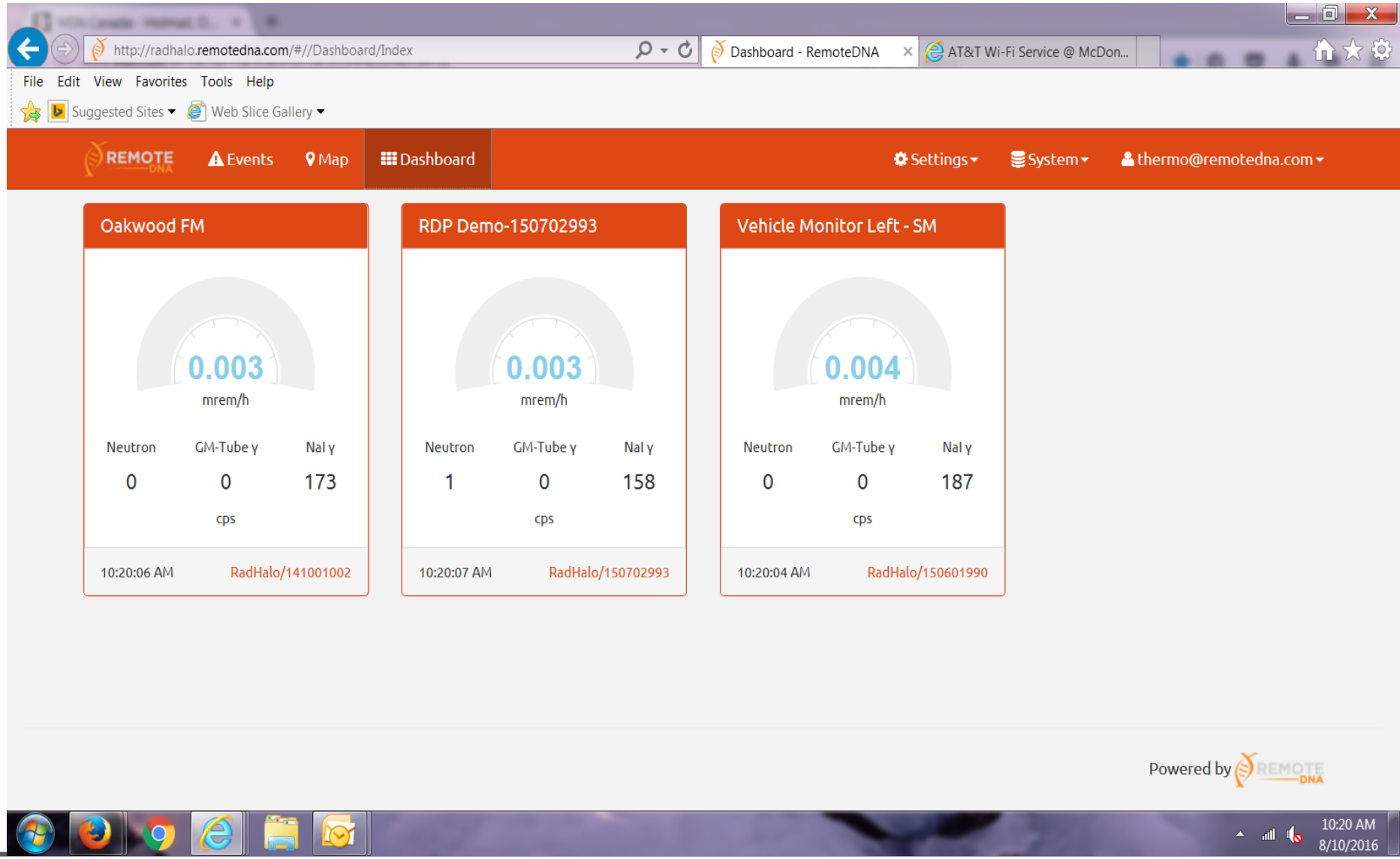
Screen Shot of Remote DNA: Dashboard



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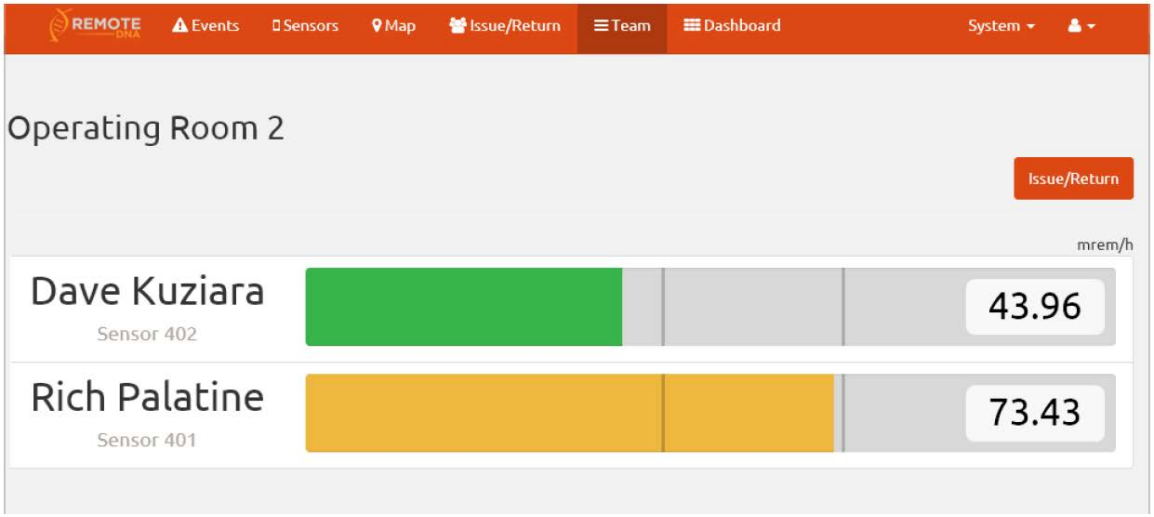
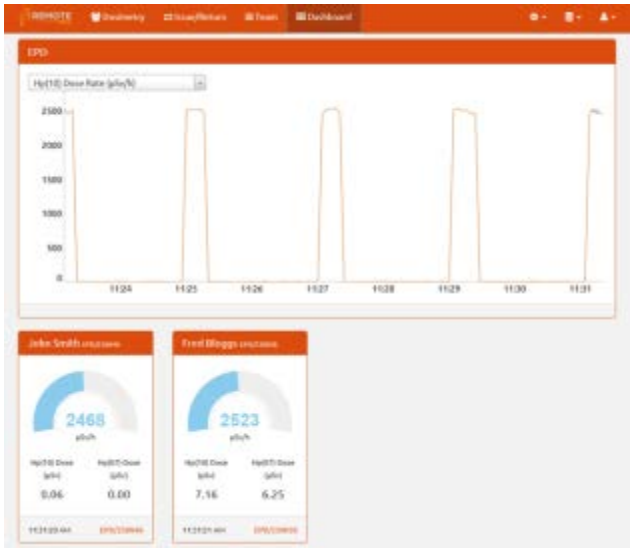
Viewing Options

- Simple bar charts
- Gauges
- Real-time graphs
- Audible alerts





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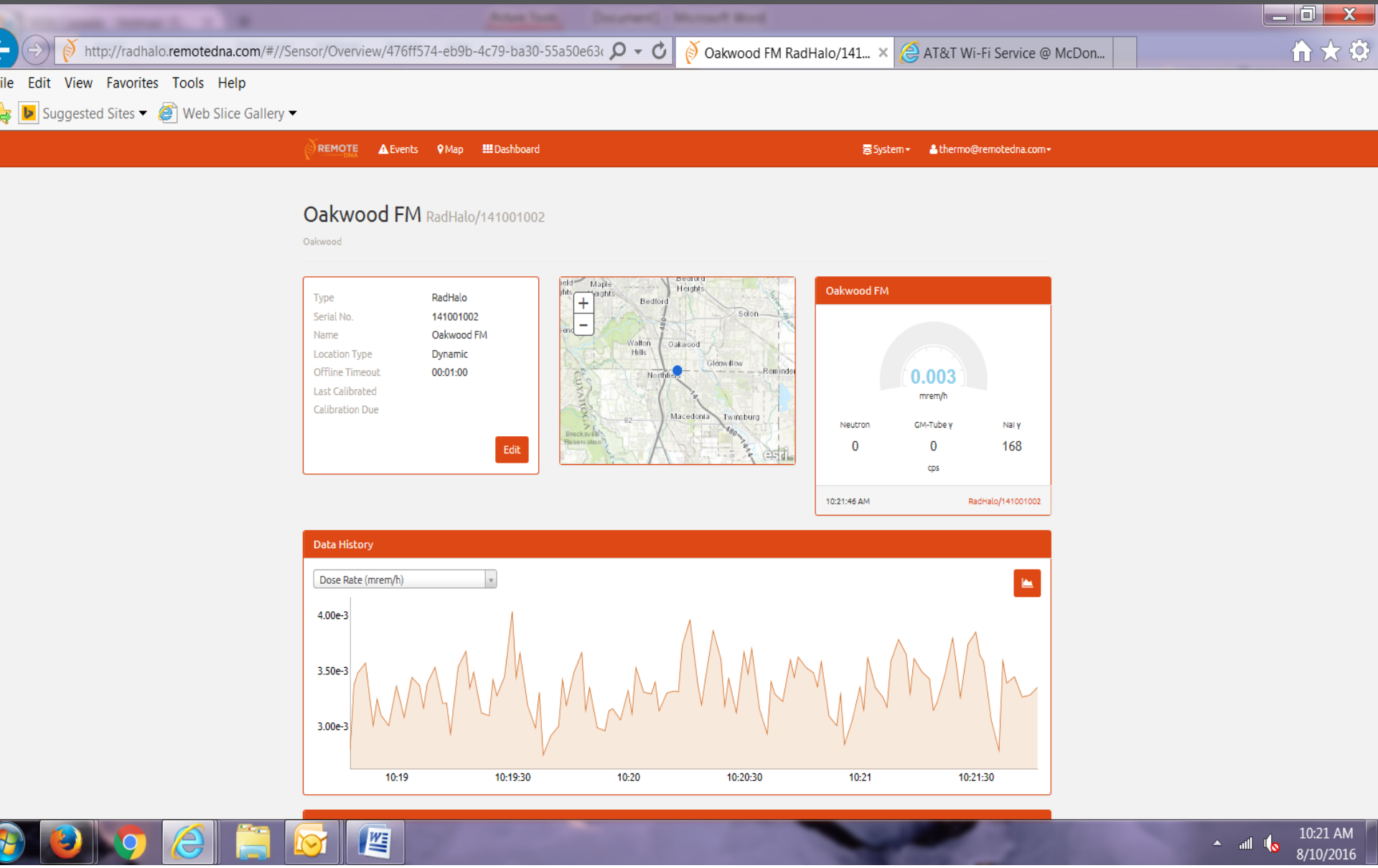
Screen Shot of Remote DNA: Device Details



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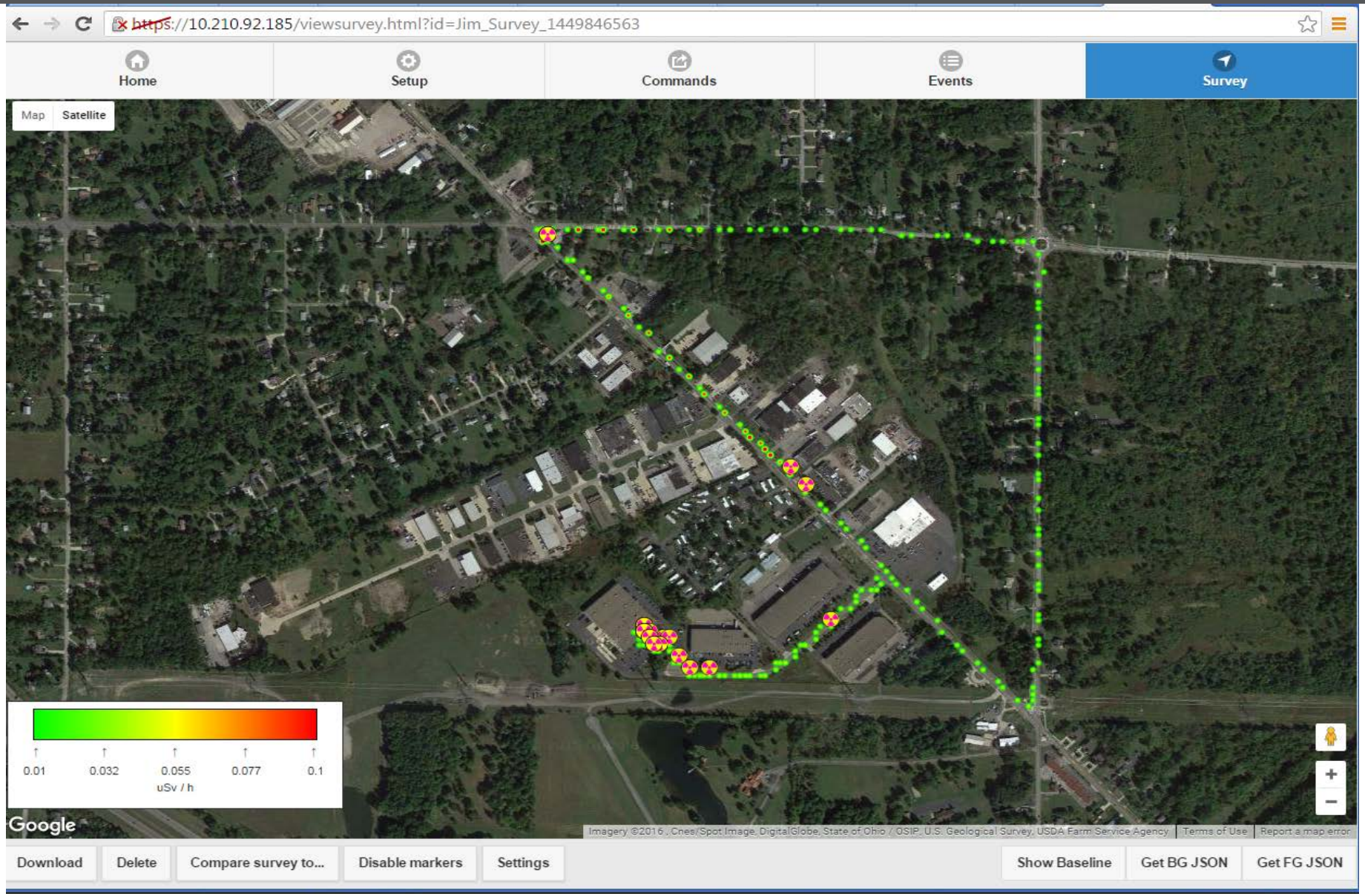
Rad Halo Dose Rate Gradient + GPS coordinates on Map



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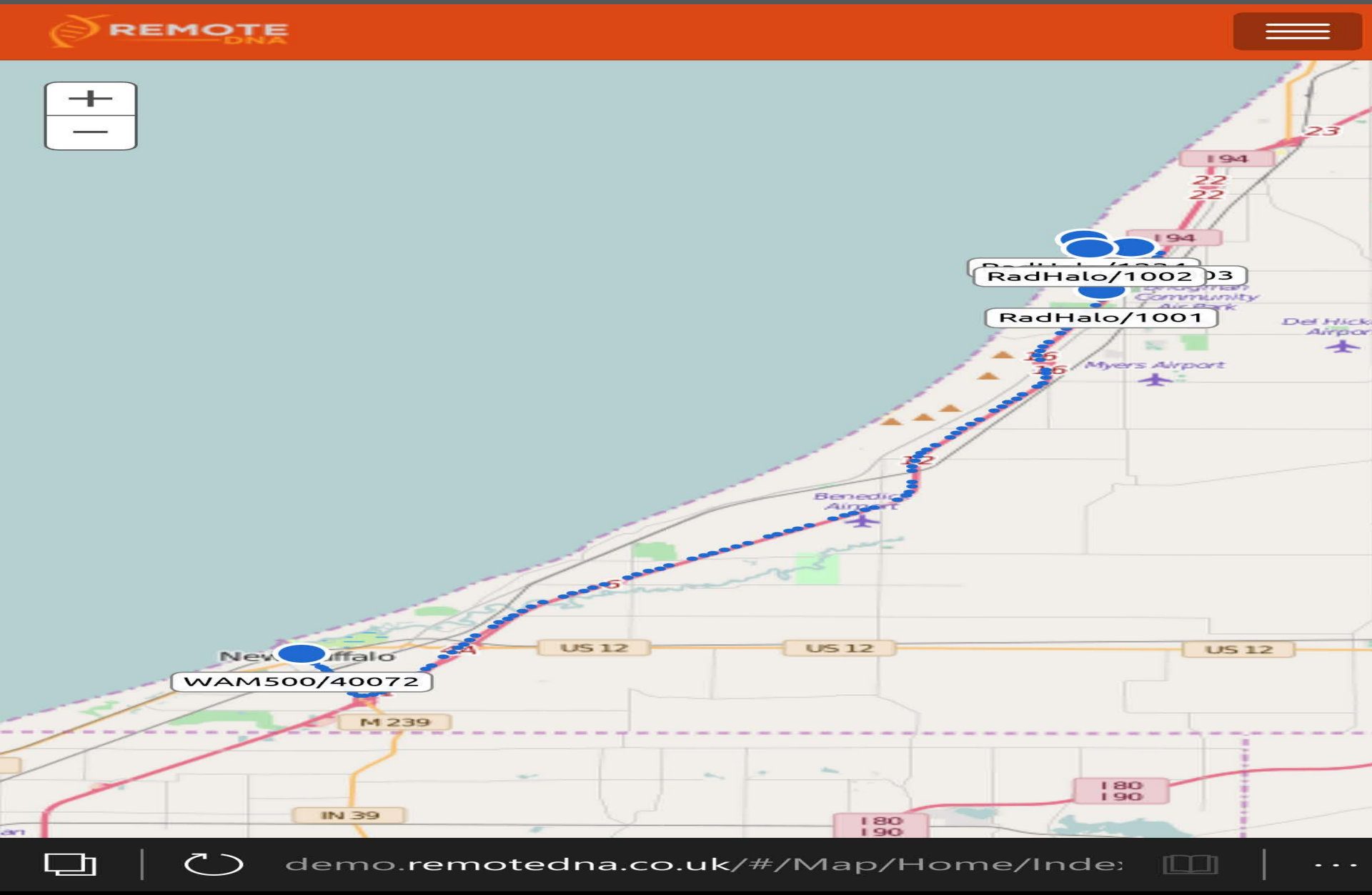
DC Cook Mobile Tracking of Rad Halo and WAM in vehicle



Cloud-based Systems allow sharing of data w/ other plant data

- Survey Mapping Systems (VSDS, etc.)
- Live-Time Plant Parameters: PIE system (equivalent) interfacing to real-time monitoring
- Emergency Planning; Plume tracking (MIDAS) taking inputs from RM System

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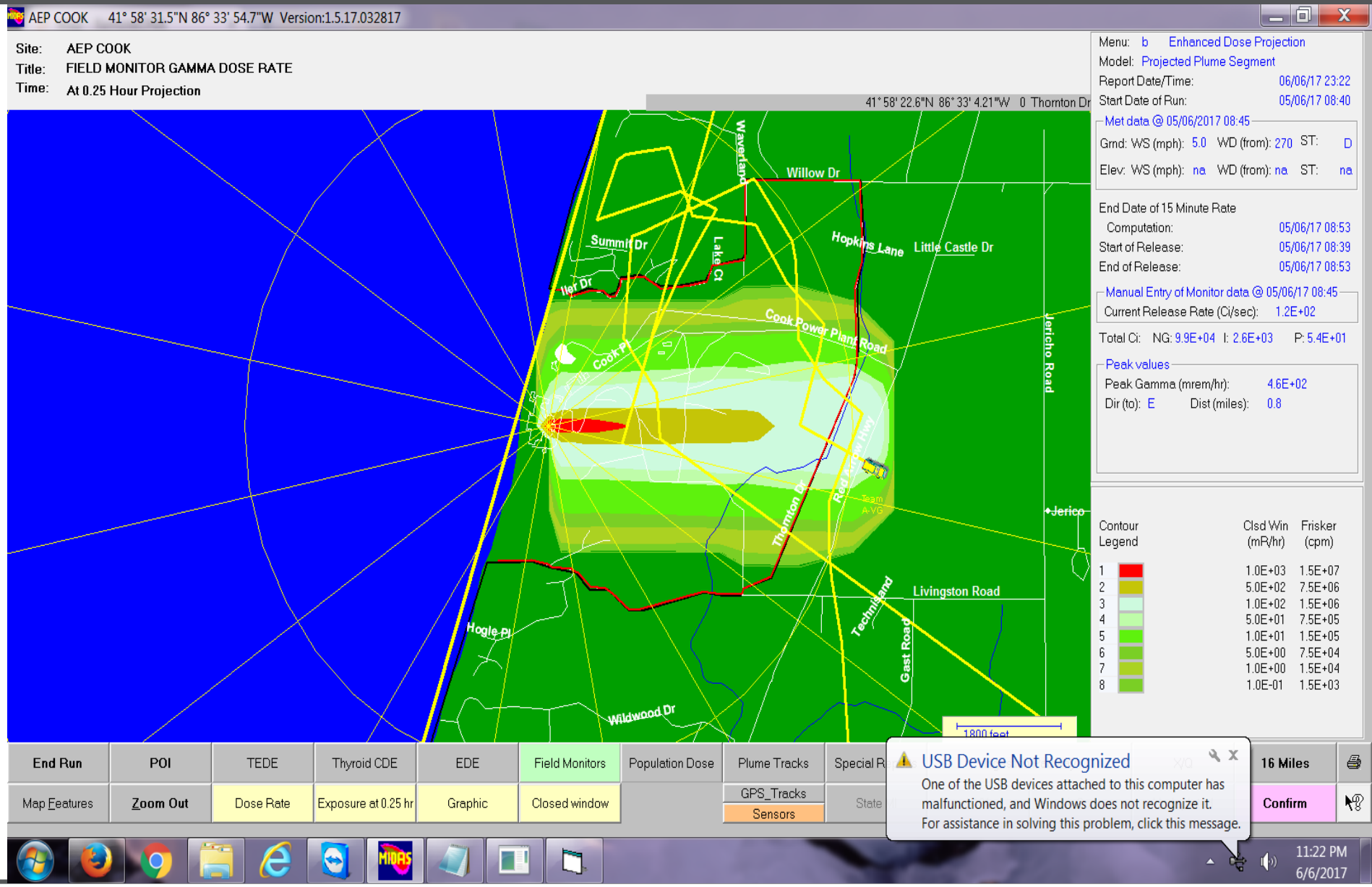
Plume Tracking/Dose Assessment Interfaces to *Remote DNA*



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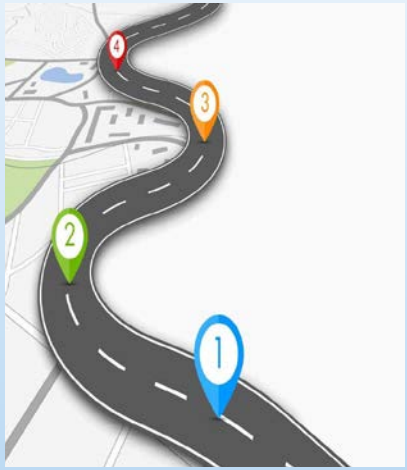
Monitoring Solutions in Mobile World -----Summary



SW/UI: The more accessible, the faster adopted, ↑↑ $$ Savings

Comm's: Leverage 'common' technology

Sensors: Rad Eyes + Others

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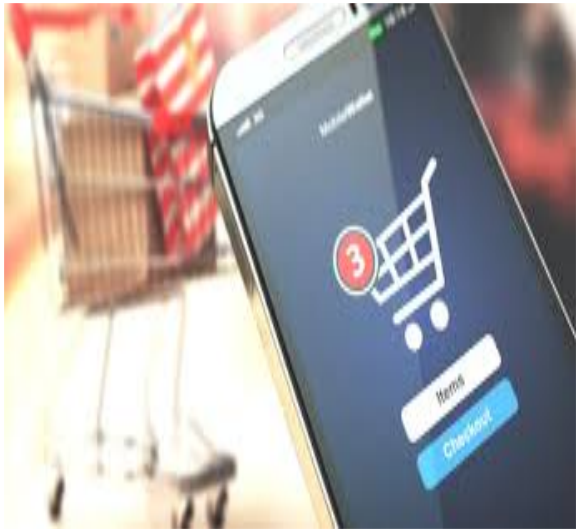
Final Quiz: What is being illustrated???



Bluetooth®

ANSWER…..'Commercial/Everyday Technology used in Industry'

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Questions ???

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