

# ***IIoT Data – The Good, The Bad and The Ugly***

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# ***What is IIoT Data?***

The **industrial internet of things (IIoT)** refers to interconnected sensors, instruments, and other devices networked together with computers' industrial applications, including manufacturing and energy management. This connectivity allows for data collection, exchange, and analysis, potentially facilitating improvements in productivity and efficiency as well as other economic benefits.<sup>[1][2]</sup> The IIoT is an evolution of a **distributed control system** (DCS) that allows for a higher degree of automation by using **cloud computing** to refine and optimize the process controls.

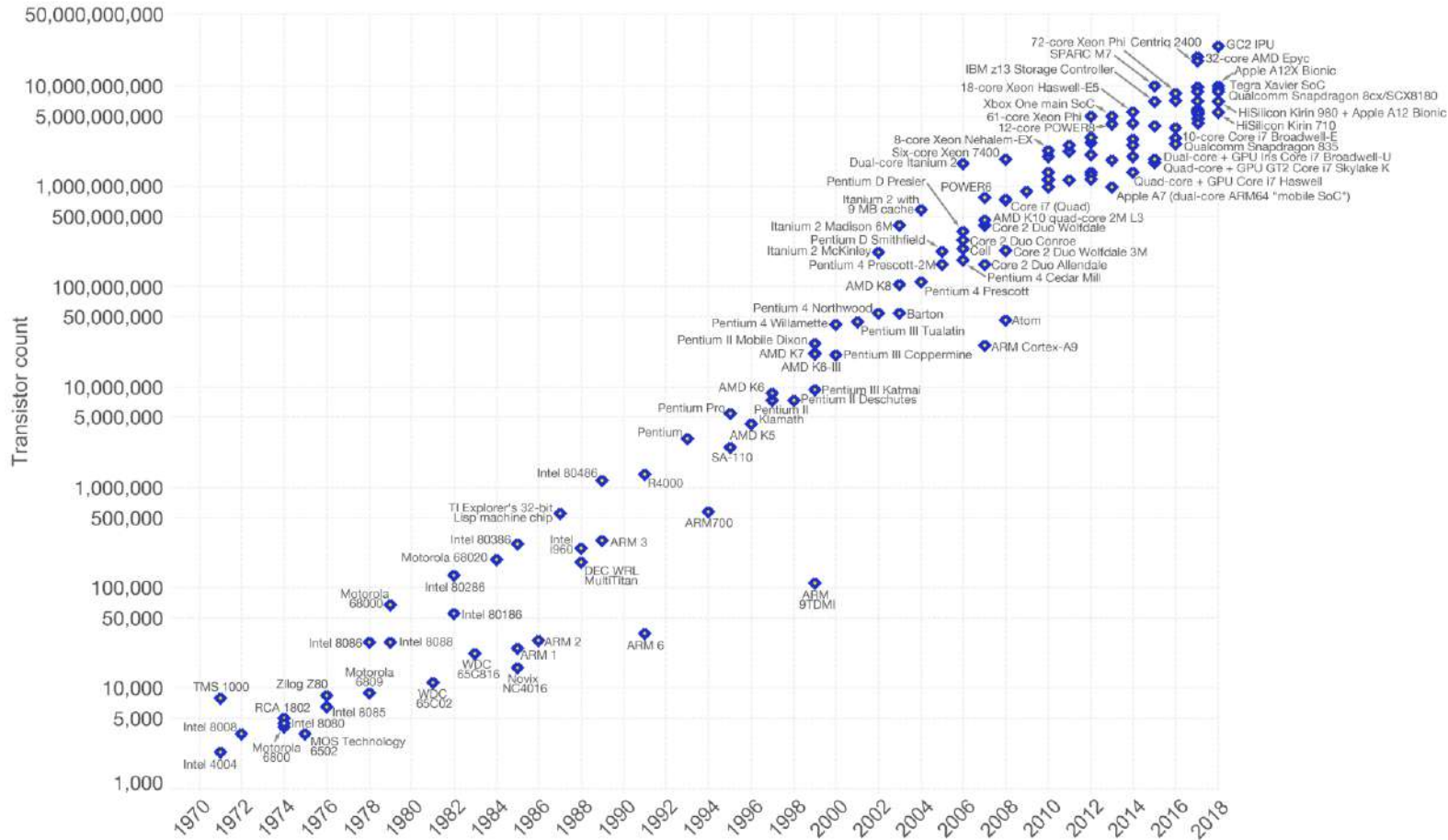
In common usage and statistics, **data** (US: /'dætə/; UK: /'deɪtə/) is a collection of discrete or continuous values that convey information, describing the quantity, quality, fact, statistics, other basic units of meaning, or simply sequences of symbols that may be further interpreted formally.



# Moore's Law

## Moore's Law – The number of transistors on integrated circuit chips (1971-2018)

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important as other aspects of technological progress – such as processing speed or the price of electronic products – are linked to Moore's law.



CPU



Storage



Networking



Power



Size



Cost

Data source: Wikipedia ([https://en.wikipedia.org/wiki/Transistor\\_count](https://en.wikipedia.org/wiki/Transistor_count))  
The data visualization is available at [OurWorldinData.org](https://ourworldindata.org). There you find more visualizations and research on this topic.

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# Areas of IIoT Devices

Smart City

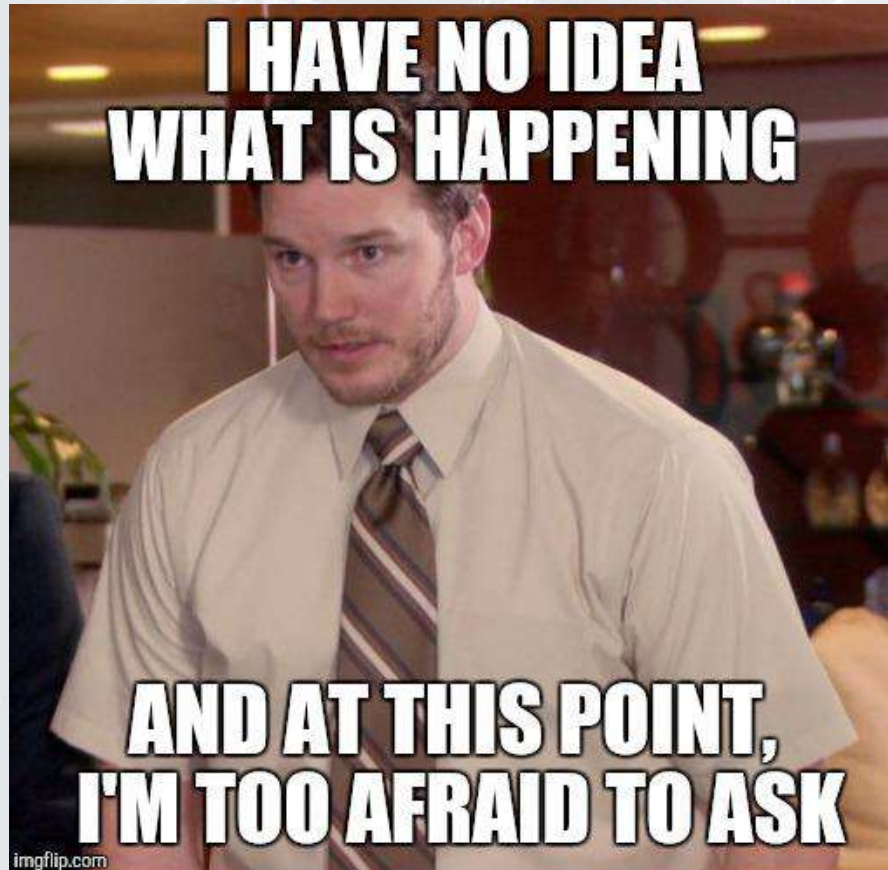


Smart Utility





# ***What is happening?***



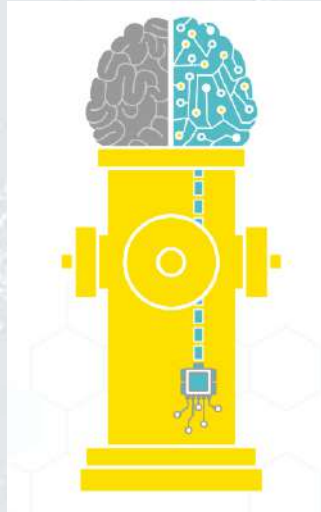

- Change how we operate
- Leverage new technologies
- Develop modern skills
- Create value
- Support ratepayers

# IloT Data - Internal





# Examples of IIoT Devices

**iHydrant™**

iHydrant™ combines a feature-rich monitoring platform with always-on sensors in the lower valve plate to send wireless system pressure and temperature feedback in real time. Available on new purchases or as a simple retrofit kit, iHydrant™ is your best option for year-round system analysis, problem prevention and rapid response mitigation that can recover significant savings for your utility — without compromising your ability to fight fires.

[iHydrant Product Brochure](#)



# IloT Data – Telemetry



Wi-Fi generations V·T·E

Generation	IEEE standard	Adopted	Maximum link rate (Mbit/s)	Radio frequency (GHz)
Wi-Fi 7	802.11be	(2024)	1376 to 46120	2.4/5/6
Wi-Fi 6E	802.11ax	2020	574 to 9608 <sup>[41]</sup>	6 <sup>[b]</sup>
Wi-Fi 6		2019		2.4/5
Wi-Fi 5	802.11ac	2014	433 to 6933	5 <sup>[c]</sup>
Wi-Fi 4	802.11n	2008	72 to 600	2.4/5
(Wi-Fi 3)*	802.11g	2003	6 to 54	2.4
(Wi-Fi 2)*	802.11a	1999		5
(Wi-Fi 1)*	802.11b	1999	1 to 11	2.4
(Wi-Fi 0)*	802.11	1997	1 to 2	2.4

\*Wi-Fi 0, 1, 2, and 3 are by retroactive inference <sup>[42][43][44]</sup>

3GPP LPWAN standards [ edit ]

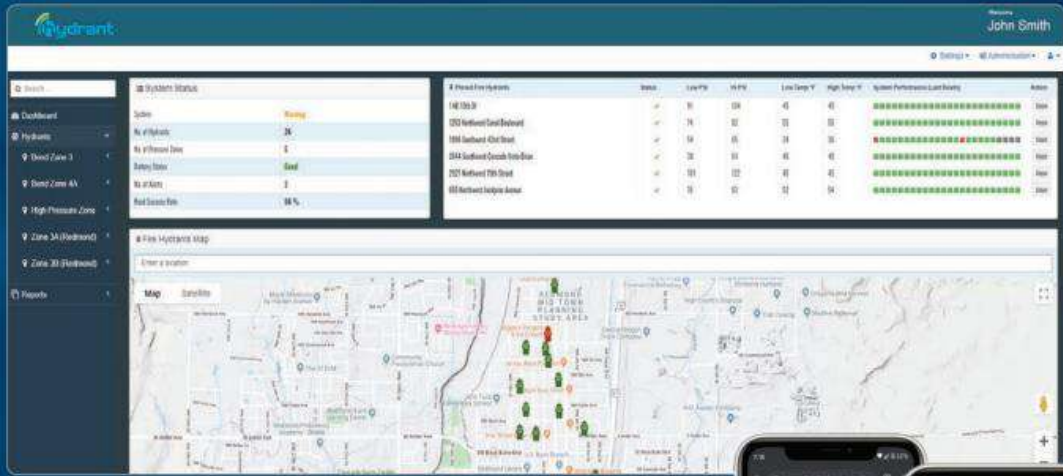
V·T·E <span>[12][13]</span>	LTE Cat 1	LTE Cat 1 bis	LTE-M				NB-IoT		EC-GSM-IoT
			LC-LTE/MTCe	eMTC			LTE Cat NB1	LTE Cat NB2	
				LTE Cat 0	LTE Cat M1	LTE Cat M2			
<b>3GPP Release</b>	Release 8	Release 13	Release 12	Release 13	Release 14	Release 14	Release 13	Release 14	Release 13
<b>Downlink Peak Rate</b>	10 Mbit/s	10 Mbit/s	1 Mbit/s	1 Mbit/s	~4 Mbit/s	~4 Mbit/s	26 kbit/s	127 kbit/s	474 kbit/s (EDGE) 2 Mbit/s (EGPRS2B)
<b>Uplink Peak Rate</b>	5 Mbit/s	5 Mbit/s	1 Mbit/s	1 Mbit/s	~7 Mbit/s	~7 Mbit/s	66 kbit/s (multi-tone) 16.9 kbit/s (single-tone)	159 kbit/s	474 kbit/s (EDGE) 2 Mbit/s (EGPRS2B)
<b>Latency</b>	50–100 ms		not deployed	10–15 ms			1.6–10 s		700 ms – 2 s
<b>Number of Antennas</b>	2	1	1	1	1	1	1	1	1–2
<b>Duplex Mode</b>	Full Duplex		Full or Half Duplex	Full or Half Duplex	Full or Half Duplex	Full or Half Duplex	Half Duplex	Half Duplex	Half Duplex
<b>Device Receive Bandwidth</b>	1.4–20 MHz		1.4–20 MHz	1.4 MHz	5 MHz	5 MHz	180 kHz	180 kHz	200 kHz
<b>Receiver Chains</b>	2 (MIMO)		1 (SISO)	1 (SISO)	1 (SISO)	1 (SISO)	1 (SISO)	1 (SISO)	1–2
<b>Device Transmit Power</b>	23 dBm	23 dBm	23 dBm	20 / 23 dBm	20 / 23 dBm	20 / 23 dBm	20 / 23 dBm	14 / 20 / 23 dBm	23 / 33 dBm



# IIoT Data - Portals

## Your iHydrant Dashboard

Your dashboard is the portal to your entire iHydrant network. From here, you can see your data in real time for all devices, specific hydrant zones or one hydrant at a time.



### iHydrant Dashboard Features:

- Hosted remotely for anytime access with no downtime risk.
- Accessible anywhere via desktop or mobile browser.
- Create custom logins for multiple users.
- Visual data collection for pressure and temperature, scalable down to the second.
- Export your data for additional manipulation or on-site storage.
- Set alerts for pre-defined events or to your own custom parameters.
- Battery life and reception monitoring and reporting let you know when to check a unit or replace a battery.



AMG LIVE is an online web based data analytics tool. Data collected is securely stored on redundant servers behind a full Unified Threat Management (UTM) firewall, and the entire system is backed up daily using a managed backup system. Our clients can log in at any time to view data collected for their project. Data can be laid out nicely in line or scatter plot graphs. Tabular forms are also available, including analytical data tables.

### Intuitive Graphing Engine

The graphing engine is extremely intuitive whereby the user can select to view their data in many different intervals, which instantly adjusts the resolution and the number of data points being viewed. The user can zoom in or hover over any point on the graph to see detailed information. Line and Scatter Plot graphs are available when viewing the data set.

# IloT Data – Vendors / Producers



SMARTCOVER®  
WE'VE GOT IT COVERED™



ihydrant™



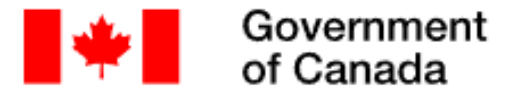
ieso  
Connecting Today.  
Powering Tomorrow.



BEWHERE



metasphere  
make data count



Government  
of Canada



Trimble®



AMG  
ENVIRONMENTAL  
ADVANCED MONITORING GROUP

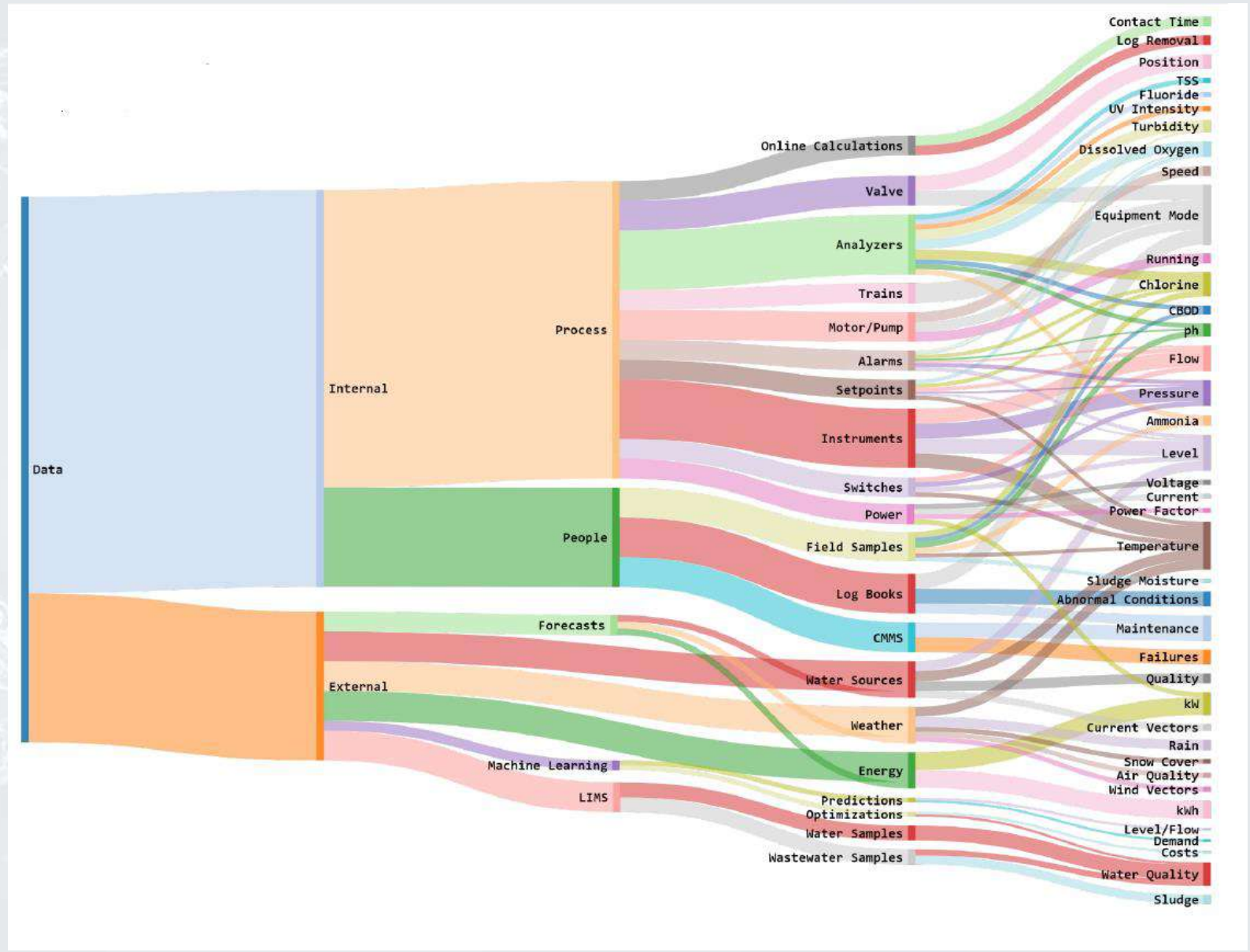


# ***The Good***



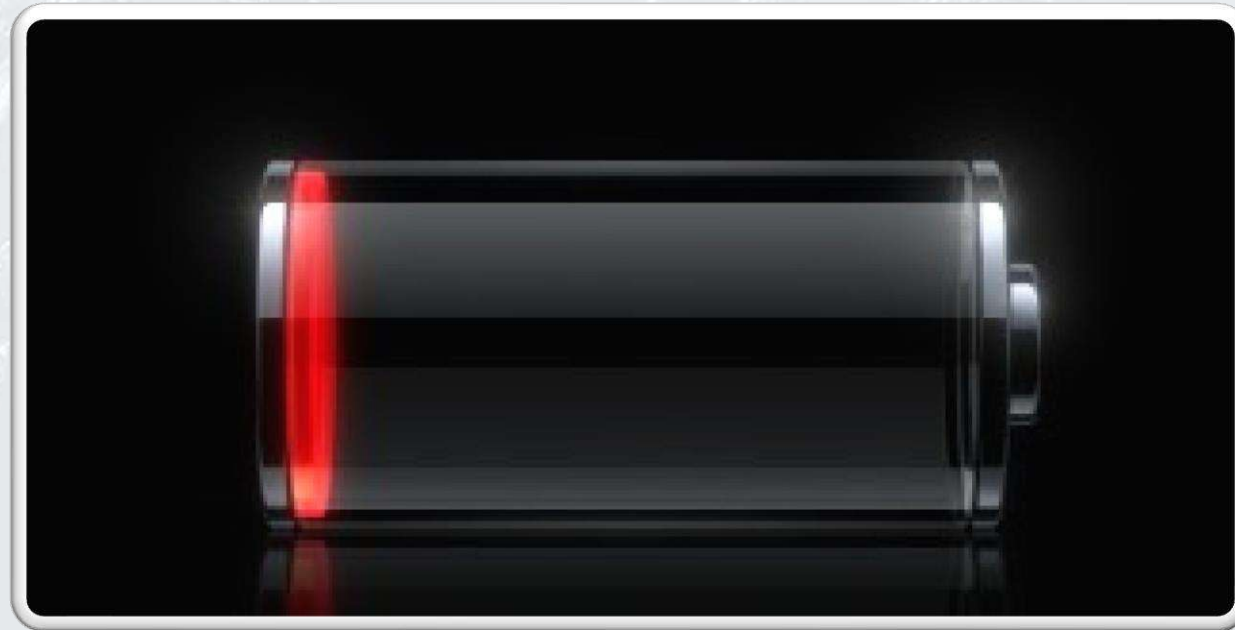
# The Bad

# Disparate Data





# ***The Bad***



# The Ugly





# The Ugly

## Ministry of the Environment, Conservation and Parks

Leading to healthier communities and economic prosperity through protecting Ontario's air, land and water.



# Make the Right Choice



Question	Decision/Choice
What to measure?	Be strategic in locations
Size?	Start small - Pilot
Data sampling frequency?	1 min? 5 min?
Upload frequency	1 hr, 6hr
Telemetry?	Many choices
Battery?	Many choices
Rent/Own?	Depends on skill set
Security?	Authenticate, Ciphers
Costs?	Data, Portal, User, Devices
Own your data?	API
Integrate?	SCADA, Unified Data Space
How to increase value?	AI/ML



# Increase Value



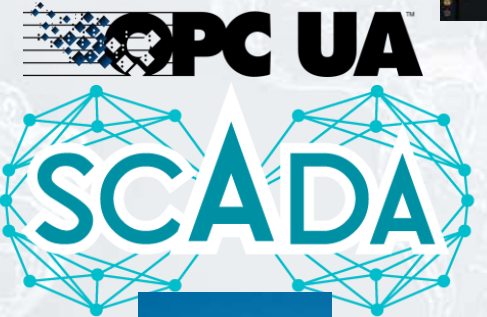
Date	Ozone ( $\mu\text{g}/\text{m}^3$ )	Temperature ( $^{\circ}\text{C}$ )	Relative humidity (%)	n deaths
1 Jan 2002	4.59	-0.2	75.7	199
2 Jan 2002	4.88	0.1	77.5	231
3 Jan 2002	4.71	0.9	81.3	210
4 Jan 2002	4.14	0.5	85.4	203
5 Jan 2002	2.01	4.3	93.5	224
6 Jan 2002	2.4	7.1	96.4	198
7 Jan 2002	4.08	5.2	93.5	180
8 Jan 2002	3.13	3.5	81.5	188
9 Jan 2002	2.05	3.2	88.3	168
10 Jan 2002	5.19	5.3	85.4	194
11 Jan 2002	3.59	3.0	92.6	223
12 Jan 2002	12.87	4.8	94.2	201



# Increase Value



**Total Integration!**  
**Unified Data Space**







# Questions?

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